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REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

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SCOPE FOR FURTHER RESEARCH

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CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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WEBSITES

- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

FOOD SECURITY IN WEST BENGAL, INDIA: IN TERMS OF BALANCE DIET

UTTAM HALDAR
ASST. PROFESSOR
BARRACKPORE RASTRAGURU SURENDRANATH COLLEGE
BARRACKPORE

ABSTRACT

The green revolution resulted in the attainment of self-sufficiency in food-grains at the national level is one of the India's major achievements in the post-independence period. Surplus stock of food grains and food grains export/import are two major indicators to claim attainment of self-sufficiency. As a result India was overcoming transitory food insecurity though chronic food insecurity at micro level exists in various parts of India despite mounting buffer stock. Existence of Chronic food insecurity is reflected in Global Hunger Index and National family and health survey 3. In this background the study is revisiting the thought that our country has overcome transitory food insecurity or not? To do this the estimated requirement of food-grains has compared with the net domestic production of Cereal in West Bengal. Food grain requirement has estimated with the help of dietary recommendation of Balance diet of ICMR and distribution of population by age and sex. The study shows that there was an excess requirement of food grains over the domestic production in the post liberalization period 1991, 2001, 2006 and 2011. Food gap as a percentage of total requirements in respective years was 37.99%, 43.70%, 33.34%, 46.20% in the above period. Hence in the sense of balance diet west Bengal (highest rice producing state in India) did not achieve self-sufficiency in cereal production. Study projected that cereal requirement in west Bengal will be 15577.2, 16223.7, 16853.68 thousand tone in the years 2016, 2021, 2026 respectively.

JEL CODES
I12, Q18, Q11, I39,

KEYWORDS
Balance Diet, Cereal Requirement, Cereal Supply, Food Gap, Food Security.

INTRODUCTION

At the time of independence, the main problem that India had faced was to supply food grains to feed all Indians. Food crisis became more severe during initial years of third five year plan. Government of India signs a contact with United States government, with the law PL-480 to import wheat. Government then supplied food grains through Food Corporation Of India (FCI). To solve the food crisis it became necessary to attain food security at macro level. Government of India gave importance to attain self sufficiency in food grain and to increase purchasing power of all section of people through distribution of land and non land asset, employment generation etc. To attain self sufficiency in food grain governments of India introduced new and improve method of cultivation which contains HYV seeds, chemical fertilizer, pesticides, insecticides and deep-tube-well irrigation. India became more or less self-sufficient in cereals mainly in rice and wheat but deficit in pulses and oilseeds. The green revolution resulted in the attainment of self-sufficiency in food-grains at the national level is one of the India's major achievements in the post-independence period. It enhanced capacity to cope with inter year fluctuation in production (Giri 2006, Dev et.al 2010, Golait et.al 2006, Nasurudden et.al 2006). Table 1 shows surplus stock of food grains and food grains export/import are two major indicators to claim attainment of self-sufficiency.

Production and stock of food-grains has increased in India. It has enhanced capacity to cope with inter year fluctuation in production. As a result there has been a paradigmatic shifting in the concept of food security, from food availability and stability to household food security, and from assessment of input measures like comparing per capita consumption of food, per capita food energy intake with required norms to output indicators such as anthropometric measures and clinical signs of malnutrition like weight of newborn babies, weight under five years, weight and height because nutrition depends not only on the nutrient intake but also non-nutrient food attributes, privately and publicly provided inputs and health status. (Radhakrishna 2002)

Existence of chronic food insecurity at micro level in many parts of India has illustrated in various studies. The Global Hunger Index(GHI) 2009 ranks India at the bottom with 65th position (out of 84 countries) with a GHI of 23.90 and which the index characterizes as "alarming" food insecurity situation. About 50% of Indians children below three years of age are malnourished. India has largest number of malnourished children in the world. One third of India's adult population has a body mass index of less than 18.5. (IFPRI. 2009)

National family and health survey-3 (NFHS-3) reported that average percentage of undernourished children under five years for 26 sub-Saharan African countries was 25% about half of the Indian average of 46%. Weight and height of Indians have not shown significant improvement. 21.5% babies in India born with low weight, a problem begins at womb. Child malnutrition is higher in rural compare to urban implying a lower food intake. Majority of socially marginalized people lives in rural areas. Highest percentage of underweight and stunted children among social group was recorded for STs followed by SCs and among religious group was recorded for Muslim.

In this background the study will revisiting the thought that our country has overcome transitory food insecurity which is associated with the risk related to either access or availability of food. That means sufficient amount of food is available in contrast to the requirement at macrolevel.

LITERATURE SURVEY

The Literature Survey of the study has concentrated on the demand side matching with the objective i.e.to compare the estimated food requirement with the net domestic supply. In the literature of food security many demand systems is found with varying scales and assumption. Scholars in the past have projected India's food grain demand for 2020 (Bhalla et al. 2001, Kumar, 1998; Rosegrant et al., 1995 and 2002; Radhakrishna and Reddy 2004). These studies, in varying degrees have accounted the emerging trends of increasing animal product consumption and the resulting feed demand. However, most of the studies concentrated only on the grain demand. Demand elasticities are an important parameter in predicting food demand. The magnitude of these elasticities depends largely on the methodology used in computing the price and expenditure elasticity. Dyson and Hantche (2000) based on the spatial and temporal trends between 1987 and 1988 and between 1993 and 1994, have projected the grain and non-grain crop demand at the state level up to 2020. A two-stage budgeting framework is used in Mittal (2006) to model the consumption behavior of households. The model assumes that there is a non-linear relationship between income and expenditure. Quadratic equation is used as a specific case to nonlinear function. Since the model is quadratic in per capita expenditure it is named as the quad-AIDS (QUAIDS) model. The demand projections are made using the demand elasticities as derived from the QUAIDS model. Demand projection of cereal in India is 159.9 mt, 182.2 mt, 196 mt for the year 2011, 2021, 2026 respectively. Rosegrant et.al (1995), based on IMPACT model, used demand elasticity and technical coefficients synthesized from other sources, primarily from past studies, and have projected demand for total cereals in India at 237.3 million tons for the year 2020. Kumar (1998) computed the expenditure and price elasticities for food and non-food commodities using various econometric (Transcendental Logarithmic Demand System (TLDS), Normalized Quadratic Demand System (NQDS) and Linear Expenditure Demand System (LEDS) and non-econometric (Food Characteristic Demand System (FCDS) techniques. The total demand for cereals is projected to be 223.7 mt in 2010 and 265.7 mt in India for 2020 in Kumar's study. Praduman Kumara (2010) used translog cost function model and the system of factor demand equations has been derived. Using factor demand parameters, the output supply elasticities has been derived. Bhalla and Hazell (2001) computed demand for total cereals in 2020 as 374.7 million tonnes. This study used new estimates on livestock growth. These estimates are based on the IMPACT model and based on the assumptions of GDP

growth of 7.5-7.7 per cent. In Chand (2009) Per capita demand projections for year 2011-12 and 2020-21 were prepared separately for rural and urban population and for rice, wheat and coarse cereals based on the changes observed in consumption between 1993-94 and 2004-05, and by using income elasticity of demand for various foodgrains, growth rate in per capita income and rate of change in demand due to shift in preferences and taste. The basis of demand analysis in the paper of Seale et.al (2003) is the maximization of utility subject to budget constraint. Thamarajakshi (2001) estimated the total demand for cereals 2020 to be 274 million tones under different assumptions of population and growth in urbanization. To study the urban Ethopian, Worako (2009) employed Working-Leser expenditure share model to estimate income elasticity of demand and determinants of urban household consumption for Addis Ababa city and six major towns. The study also extended its analysis by running simulations for rise in per capita income.

Existing literature focused their analysis based on changing food consumption pattern using price, income and expenditure elasticities; budget constraint; GDP growth; aggregate national population, population growth and livestock growth.

RESEARCH GAP

Average does not measure requirement of specific group of the people. Most of the demand model for Food grains does not capture the Impact of intra-household food distribution (men, women, boys, girls,). It is well known that women and girls in poor household receive poorer quality food and less food in a normal household. Hence estimation of food grain requirement incorporating balance diet, population by age and sex is much urgent.

OBJECTIVE OF THE STUDY

Attempt of the study is to find out whether the West Bengal, an eastern state of India is self-sufficient in food grains at macro level or not? In other words, objective of the study is to verify that West Bengal has been producing enough food-grains to meet the requirement of dietary recommendation of balance diet of ICMR for all the people distribution by age and sex in West Bengal.

DATA AND METHODOLOGY

METHODOLOGY

Total requirement of cereal in the period t in West Bengal is estimated as under:

$C_t^c = \sum_{i=1} p_{to} c_{jo}^i + \sum_{i=1} p_{tm} c_{jm}^i + \sum_{i=1} p_{tf} c_{jf}^i$

Where, $C_t^c =$ requirement of cereal in the year t, t =$\sum i$, i=1,2,,,,,365; j=age group; o= children; m=male; f=female; c_{jo}^i= per capita per day requirement of cereal of j age group of children; c_{jm}^i= per capita per day requirement of cereal of j age group of male; c_{jf}^i = per capita requirement of cereal of j age group of female; pt = No of population in the year t.

$\sum_{i=1} p_{to} c_{jo}^i$ = Total requirement of cereal of jth age group of children in year t

$\sum_{i=1} p_{tm} c_{jm}^i$ = Total requirement of cereal of jth age group of male in the year t

$\sum_{i=1} p_{tf} c_{jf}^i$ = Total requirement of cereal of jth age group of female in the year t

Net domestic production of cereal in a given year in West Bengal (Y_t)is estimated as

Net domestic production of (Rice + Wheat + Coarse Cereal)

Net domestic production of cereal $Y_t^C = Y_t^R + Y_t^F + (1- 0.125)Y_t^{CC}$

Production of rice in period t (Y_t^R) = (1-0.125)*(0.65) Y_t^P ; Y_t^P= production of Paddy in period t

Flour production (Y_t^F)= (1- 0.125) Y_t^W ;

production of Wheat in period t= Y_t^W

Production of Coarse Cereal in period t= Y_t^{CC}

Food gap is defined as the excess requirement of cereal over net domestic production (thousand tonne) in a particular year in West Bengal.

SOURCES OF DATA

The study has used secondary data from following sources i) recommended balance diet of Indian Council of Medical Research (ICMR) for Indian people in different age, sex from Parks Text Book of preventive and social medicine, seventh edition 2002 pp 456. ii) Number of population by age and sex in different years (actual population of 1991, 2001 and projected population of 2006, 2011, 2016, 2021, and 2026) from the Census of India. iii) Data on production of food grains is extract as available in Economic Survey, Government of India; Economic review, Government of West Bengal; Statistical Abstract of West Bengal; Hand Book of the Economy, RBI. iv) Consumption pattern as available in various rounds of 27th (1972-73), 28th (1973-74), 32th (1977-78), 38th (1983), 43rd (1987-88), 50th (1993-94), 55th (1999-2000), 61st (2004-05), 66th (2009-10) in NSSO reports.

SOME OBSERVATIONS

POVERTY DECLINING

Using minimum dietary energy requirement norm Planning Commission has defined poverty line as monthly per capita income of Rs 350.17 in village and Rs 409.22 in urban areas. In 1996-97 west Bengal government define poverty line as Rs 274.35. Using index number of Indian Labor journal Feb 2006 poverty line in west Bengal was Rs 387.64. According to the above measurement poverty has reduced from 56.44% in 1973-74 to 27.09% in 1999-2000 in India and 73.16% to 31.85% in west Bengal in the same period.

Tendulkar Committee for the first time, have developed a methodology using implicit price indices (Fisher Price Index) derived from quantity and value data collected from 66th Round NSS (2009-10) data on Household Consumer Expenditure Surveys (based on mixed reference period (MRP)) for computing state wise poverty lines for the year 2004-05 and updating for 2009-10. Population as on March 1, 2010 has been used for estimating the number of persons below the poverty line.

As per Tendulkar Committee recommendations, anyone earning Rs. 672.8 monthly that is earning Rs. 22.42 per day in the rural area and Rs. 859.6 monthly or Rs. 28.35 per day in the urban area is lie above the poverty line at the national level. Where as in west Bengal the poverty line estimated as monthly income of Rs 643.2 in rural and Rs 830.6 in urban areas (though World Bank criterion of poverty line is $1.25 per day). According to this estimate 29.8 per cent of the Indian population alone was below poverty line (BPL) in 2009-10 which was 37.2 per cent in 2004-05, where as in West Bengal, BPL population declined from 34.2% in 2004-05 to 26.7% in 2009-2010.

In all-India level Head Count Ratio (HCR) has declined by 7.3 percentage points from 37.2% in 2004-05 to 29.8% in 2009-10, with rural poverty declining by 8.0 percentage points from 41.8% to 33.8% and urban poverty declining by 4.8 percentage points from 25.7% to 20.9%.

(Source: http://planningcommission.nic.in/news/press_pov1903.pdf retrieved dated 23.10.13)

DECREASE IN CALORIE INTAKE

Data on calorie intake as revealed by various round of National Sample Survey Organization (NSSO) shows that average per capita calorie intake has been declining in India both in Rural and Urban areas over four decades. Table 2 has shown that, in the period 1972-73 to 2009-2010 per day per capita calorie intake was decreases from 2266 Kcal to 2020 Kcal per day i.e. 246 Kcal in absolute and 11 percentage in rural India where as in urban India it has decreased from 2107 Kcal to 1946 Kcal in absolute and 10% in percentage term. In Rural India calorie intake has been decreased gradually in all the NSS round. Over the period 1993-94 to 1999-2000 decreasing calorie was lowest in absolute term as well as in percentage term, where as in that period urban India shows an exceptionally increase in calorie intake. In the period 1900-2000 to 2004-05 decreasing calorie intake was highest both in rural and urban. In last 37 year period average calorie intake in Rural India did not touch recommended calorie norms, where as in urban India, only in 27th round and in 55th round touch the calorie requirement at recommended level.

The share of food in consumption expenditure has decreased from 72.9% to 53.6% in rural areas and 64.5% to 40.7% over the 37 year period (1972-73 to 2009-10). The share of cereal in total expenditure shows a decline trend, both in urban and rural areas. The share of pulses also follows the same trend. Percentage share of egg, fish meat in total expenditure has raised from 2.5% to 3.3% in rural and 2.5% to 3.6% in urban in the period of 1972-73 to 1983-88.

Table 3 has shown that, in absolute term monthly per capita consumption of cereal has been declining gradually over the period of 1972-73 to 2009-10. The fall in cereal consumption is sounder in rural areas than urban. But the rate of decline had decrease significantly between the periods 1993-94 and 1999-2000 NSSO rounds compare to previous rounds. The cereal consumption per person per day before and after 1993-94 NSSO rounds has declined by 1.19 percents and 0.74 percents annually in the rural areas, and 0.91 percents and 0.24 percents in the urban areas.

Declining poverty, increasing of buffer stock and increasing export of food grain have shown India's progress on food security. The bright picture of food security shall be blunt when we noticed that average calorie intake has been declining. Side by side the decrease in percentage share of cereal (major and cheapest source of energy) on Monthly Per Capita Expenditure (MPCE) and monthly per capita consumption of cereal in absolute term (Kg) both in rural and urban population raise the question of food security in India.

FOOD SECURITY

According to the Food and Agriculture Organization (FAO) food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security has three components, viz., availability, access, and absorption. These three are interconnected. It has many dimensions that extend beyond the production, availability, and demand for food. At the household level, food security refers to the ability of a household to secure adequate food to meet the dietary needs of all the members of the household. Food security is conceptualized here as foodgrains (cereal) available for human consumption at the macro level from net domestic production of Cereal**.**

ESTIMATION OF CEREAL REQUIREMENT

Despite the shift in dietary pattern from cereal to non cereal and animal product, food-grains are considered to be of paramount importance for household food and nutrition security. This is because of four reasons. **One**, cereal and pulses are staple foods and there is no perfect substitution between staple foods and other foods. **Two,** due to inadequate level of intake of almost all foods, increased consumption of other foods, in most cases, fill dietary deficiency. **Three,** food-grains are the major and the cheapest source of energy and protein as compared to other foods and are thus vital for food and nutrition security of low income masses. **Four,** increased production and consumption of livestock products resulting from rising per capita income require high growth in use of grain as feed for livestock. Because of these reasons, food-grains continue to be the main pillars of food security in the country and any slack in their production translates into persistent price shock and adverse impact on common people.

The eleventh plan observes that cereals are a major source of energy intake for the Indian population. Percentage breakup of calorie consumption over nine food group over the period 1993-94 to 2009-10 shows that cereal is the major source of calorie intake of Indian people. 64.16% of calories come from cereal in rural India and 55.01% of calorie comes from cereal in urban India in 2009-10. Average per capita cereal consumption has decline in both rural and urban areas. Consumption of non-cereal has not been able to make up for this decline. That means decrease in cereal consumption is the major reason of decline in calorie intake over time. With increasing price coarse cereal, cereal become still cheapest source of calorie but both rich and poor reduced consumption of coarse cereal with a difference that poorer section substitute coarse cereal by superior cereal resulted in increase in total cereal consumption by poorest decile group (Suryanarayana 2011).

The present study is doing a preliminary exercise to estimate direct requirement of cereal at state level to meet the recommended balance diet of the population of West Bengal (highest rice producing state) in post liberalization period. Requirement of cereal for industrial use, livestock feeding and industrial use like production of bio-diesel are excluded. As providing sufficient food-grains to all people is primary importance, an attempt is made to know how much food grains mainly cereal is required for direct human consumption in West Bengal. As the estimation is based on balance diet, the estimated cereal requirement for direct consumption is differ from the demand of cereal as market demand needed purchasing power and other uses.

The study has taken recommended balance diet of Indian Council of Medical Research (ICMR) for Indian people in different age, sex from Parks Text Book of preventive and social medicine, seventh edition 2002 pp 456. The recommended dietary allowance is given in table-4. Here is some adjustment in the age-sex distribution in table-4 to match with the age sex distribution in population data. Cereal consumption of adults with moderate, heavy and sedentary work has taken as an average of all these three categories.

Table-5 gives the actual population of the year 1991, 2001, and projected population of the year 2006, 2011, 2016, 2021, 2026 distribution by age and sex. Population statistics is collected from the census report of government of India. As distribution of population by age and sex are unavailable the study has taken projected population of 2011. All the age group above 19 has clubbed in to one i.e adult.

Incorporating these statistics, shown in table-4 and table-5, the study has calculated how much cereal is required for all person of West Bengal to meets its balance diet and live healthy. Using the methodology given in Methodology Section of the study has estimated the total cereal requirement. The estimated requirement of cereal both at aggregate and disaggregates level in West Bengal in the respective years of post liberalization period has shown in table 6.

The chart1 and chart 2 displays the comparative cereal consumption across sex in different years. In both the age group the cereal requirement of female is less than compare to male. Chart 3 and chart 4 represents the requirement of cereal of male and female respectively across age group 10-14 and 15-19 in different years. In both age group upper age groups require more cereal than lower with an exception in 1991 in male and 1991, 2001 in female.

ESTIMATION OF PRODUCTION OF FOODGRAINS

In the supply side the production statistics of cereal (Rice, wheat, coarse cereal) has taken from the Economic review 2004-05, 2009-10, Government of West Bengal. Using the methodology given in Methodology Section of the study has estimated the net availability of Rice, Wheat, Coarse Cereal and total Cereal. The production figures of Rice Wheat, Coarse Cereal and total Cereal of West Bengal in different years are represents in Table-7. 12.5% of paddy produced has been deducted for seed preservation and wastage due to transportation, pest, rodent and others. From the available paddy, on an average we obtained 65% rice. Second column of table 7 has shown the net availability of paddy (Yt^{P}) from production. Similarly available wheat and coarse cereal is the 87.5% of total wheat and coarse cereal produced. 3rd column has presented the production of net availability of wheat in West Bengal. There is negligible wastage during processing of wheat to flours. The estimated flour (Yt^{F}) produced from available paddy has shown in column 5. Seventh column has presented the production of net availability of Coarse Cereal (Yt^{CC}) in West Bengal. Last column has presented the total cereal available from domestic production from rice, wheat and coarse cereal in West Bengal in corresponding year.

FOOD GAP

Food gap is defined as the excess requirement of cereal over net domestic production of Cereal (thousand tonne) in a particular year in West Bengal.

Table-8 has represented the excess requirement of cereal over domestic production in West Bengal for the year 1991, 2001, 2006, and 2011. Column 2 has represented total cereal requirement from table 6. Column 3 has represented net cereal production from table 6. The difference between the column 2 and column 3 determines the Food Gap which has presented in column 4. It has shown that in the post liberalization period total cereal requirement is higher compare to corresponding net cereal production. That means there was deficiency of cereal compare to requirement. The deficit was 3989.23, 5514.9, 4582.6, 6750.3 thousand tone in the year 1991, 2001, 2006, 2011 respectively. The figure in the last column i.e. column-5 indicate food gap as a percentage of total requirement of cereal in the study period.

This implies that, West Bengal's agricultural production has not ready to produce sufficient cereal to all people for their balance diet. As a result, a large section of people remains hungry day after day. Simply those who have capability in collecting cereal are getting their required cereal.

CONCLUSION

In a simple exercise West Bengal's cereal requirement is far from the domestic production in the post liberalization period. In the sense of balance diet West Bengal did not achieve self-sufficiency in cereal production though it is highest rice producing state in India. Excess requirement of food grain (Cereal) over domestic production i.e Food Gap was 3989.23, 5514.9, 4582.6, 6750.3 thousand tone in the year 1991, 2001, 2006, 2011 respectively. Food gap as a percentage

of total requirements of the respective year was 37.99%, 43.70%, 33.34%, 46.20% in the above period. If we noticed food gap of the census years i.e 1991, 2001and 2011, it shows an increasing trend. In any age group the cereal requirement of female is less than compare to male. With increase in population the cereal requirement gradually increase. Study has projected that cereal requirement in West Bengal will be 15577.2, 16223.7, 16853.68 thousand tone in the years 2016, 2021, 2026 respectively.

POLICY PRESCRIPTION

To combat food security required multi dimensional program consisting environment friendly new technological progress in cultivation, reduction of wastage of food grains, efficiently disbursement of fresh cereal to the needy.

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ANNEXURE

TABLE 1: INDIA'S FOODGRAINS STOCK AND NET IMPORT (Million Tonne)

	1951	1961	1971	1981	1991	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Procurement	3.8	0.5	8.9	13.0	19.6	35.6	42.6	40.3	34.5	41.1	41.5	37.0	35.8	54.2	60.5	56.1
PDS Supply	8.0	4.0	7.8	13.0	20.8	13.0	13.2	18.2	23.2	28.3	31.0	31.8	32.8	34.7	47.3	43.7
Buffer Stock	-4.2	-3.5	1.1	00	-1.2	22.6	29.4	22.1	11.3	12.8	10.5	5.2	3.0	19.5	19.2	12.4
Net import	4.8	3.5	2.0	0.5	-0.6	-1.4	-4.5	-8.5	-7.1	-7.7	-7.2	-3.8	-7.0	-14.4	-7.2	-4.7

Source: Das et.al 2005, http://indiabudget.nic.in

TABLE-2: PER-CAPITA INTAKE OF CALORIES IN INDIA, 1972-73 TO 2009-2010

	Kcal/day		Change over previous year			
			Rural		urban	
	Rural	urban	absolute	%ge	absolute	%ge
1972-73(27th round)	2266	2107				
1983(38th round)	2221	2089	-45	-1.099	-18	-0.85
1993-94(50th round)	2153	2071	-68	-3.061	-18	-0.86
1999-00(55th round)	2149	2156	-4	-0.100	+85	+4.10
2004-05(61th round)	2047	2020	-102	-4.740	-136	-6.30
2009-10(66th round)	2020	1946	-27	-1.320	-74	-3.66
Percentage change between 1972-73 and 2009-10	-10.9	-9.5				

Source: NSS 66th round, computed from p70

TABLE: 3 MONTHLY PER CAPITA CONSUMPTION OF CEREAL (Kg) IN DIFFERENT NSS ROUND

	27th	32th	38th	43rd	50th	55th	56th	57th	58th	59th	60th	61st	66th
rural	15.26	15.68	14.8	14.40	13.40	12.70	12.40	12.20	12.10	12.30	12.40	12.12	11.35
urban	11.24	11.62	11.30	11.20	10.60	10.40	10.00	9.80	9.80	9.90	10.00	9.94	9.39

Source: Source: computed from various round of NSSO

TABLE 4: PER CAPITA REQUIREMENT OF CEREAL PER DAY BY AGE, SEX

Age	0-4	5-9	10-14		15-19		Above 19 (adult)	
Sex	M+F	M+F	male	female	male	female	male	female
Cereal Requirement (Gm)	175	270	420	300	500	400	550	475

Source: Parks Text Book of preventive and social medicine, seventh edition 2002 pp 456.

TABLE 5: POPULATIONS (THOUSANDS) OF WEST BENGAL BY AGE, SEX

Age	0-4	5-9	10-14		15-19		Above 19(adult)		total
Sex	M+F	M+F	male	female	male	female	male	Female	
Population 1991	8170	8850	4261	3908	3196	2931	19176	17586	68078
Population 2001	8573	9047	4695	4368	4162	3817	23642	21872	80176
Projected Population2006	7366	8473	4601	4389	4659	4328	26635	24764	85216
Projected Population2011	6890	7286	4264	4160	4568	4351	29966	28015	89499
Projected Population2016	6945	6819	3703	3542	4233	4124	33036	31148	933550
Projected Population2021	7032	6879	3469	3313	3675	3509	35586	33919	97383
Projected Population2026	6715	6968	3501	3342	3443	3282	37362	35921	100534

Source: Computed from Census Report

TABLE 6: REQUIREMENT OF CEREAL ('000 tonne) **IN WEST BENGAL, 1TONNE=10 QUINTAL**

Age	0-4	5-9	10-14		15-19		Above 19		Total cereal requirement
Sex / year	M+F	M+F	male	female	male	female	male	female	
1991	521.8	872.2	653.2	542.0	583.3	427.9	3849.6	3049.0	10499.0
2001	547.6	891.6	719.7	605.8	759.6	557.3	4746.1	3792.1	12619.8
2006	470.5	835.0	750.0	608.8	850.3	631.9	5347.0	4293.5	13742.3
2011	440.1	718.03	653.67	455.52	833.66	635.24	6015.67	4857.1	14608.9
2016	443.6	672.01	567.7	487.1	772.52	602.1	6631.97	5400.28	15577.2
2021	449.1	672.92	531.80	362.77	665.21	512.31	7143.89	5880.70	16223.70
2026	428.9	686.7	536.7	365.95	628.34	479.17	7500.42	6227.80	16853.68

Source: computed by author

TABLE: 7 PRODUCTION OF RICE, WHEAT, COARSE CEREAL IN WEST BENGAL ('000tonne)

year	Paddy production Y_t^P	Wheat production Y_t^W	Rice produced from paddy in col-2 Y_t^R	Flour produced from wheat in col-3 Y_t^F	rice +flour Col4+col5 $Y_t^R + Y_t^F$	Coarse cereal Y_t^{CC}	Total cereal Produced in W.B Col6+col7 Y_t^C
1	2	3	4	5	6	7	8
1990-91	10435.5	530.2	5935.75	463.92	6399.67	110.10	6509.77
2000-01	12428.0	1058.6	7068.42	926.28	6994.70	109.4	7104.1
2005-06	14510.8	773.5	8253.01	676.81	8929.82	229.92	9159.74
2006-07	14745.9	799.9	8386.73	699.91	9086.64	274.7	9361.34
2007-08	14719.5	917.3	8371.71	802.63	9174.34	265.8	9440.14
2008-09	15037.3	764.5	8552.46	668.93	9221.39	375.3	9596.69
2009-10	14606.8	901.0	8307.61	788.37	9095.98	354.7	9450.68
2010-11	12332.7	842.0	7014.22	736.75	7750.97	407.9	8158.87
2011-12	14853.0	884.0	8206.28	773.5	8979.78	364.9	9334.68

Source: computed from statistical abstract-2003-04, 2009-10 WB government, RBI hand Book of Economy 2011-12, pp74

TABLE 8: TOTAL REQUIREMENT OF CEREAL, NET PRODUCTION OF CEREAL AND FOOD GAP (thousand tonne)

year	Total cereal requirement in W.B	Total cereal Produced in W.B	food gap = requirement – domestic production	food gap as a percentage of requirement
1	2	3	4	5
1991	10499.0	6509.77	+3989.23	37.99
2001	12619.8	7104.1	+5514.9	43.70
2006	13742.3	9159.74	+4582.6	33.34
2011	14608.9	8158.87	+6750.03	46.20

Source: Calculated by author from table 6 & 7

CHART 1: REQUIREMENT OF CEREAL OF AGE GROUP 10-14 IN DIFFERENT YEARS BY SEX DIVISION

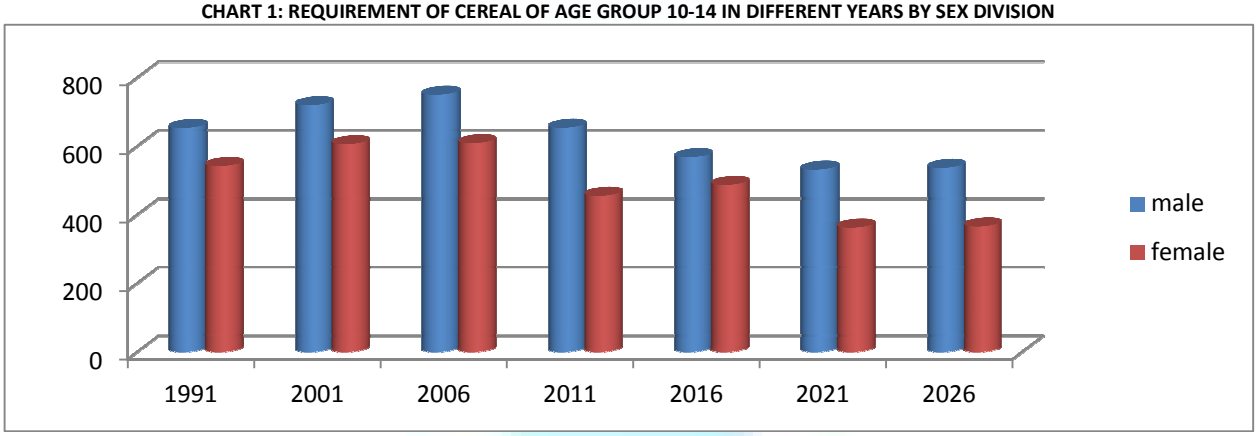


CHART 2: REQUIREMENT OF CEREAL OF AGE GROUP 15-19 IN DIFFERENT YEARS BY SEX DIVISION

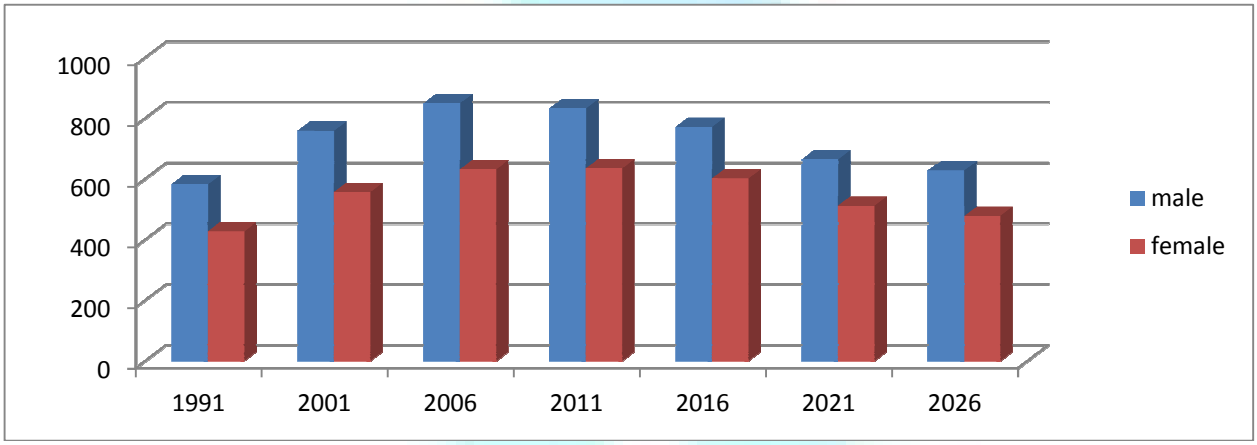


CHART 3: REQUIREMENT OF CEREAL OF FEMALE ACROSS AGE GROUP 10-14 AND 15-19 IN DIFFERENT YEARS

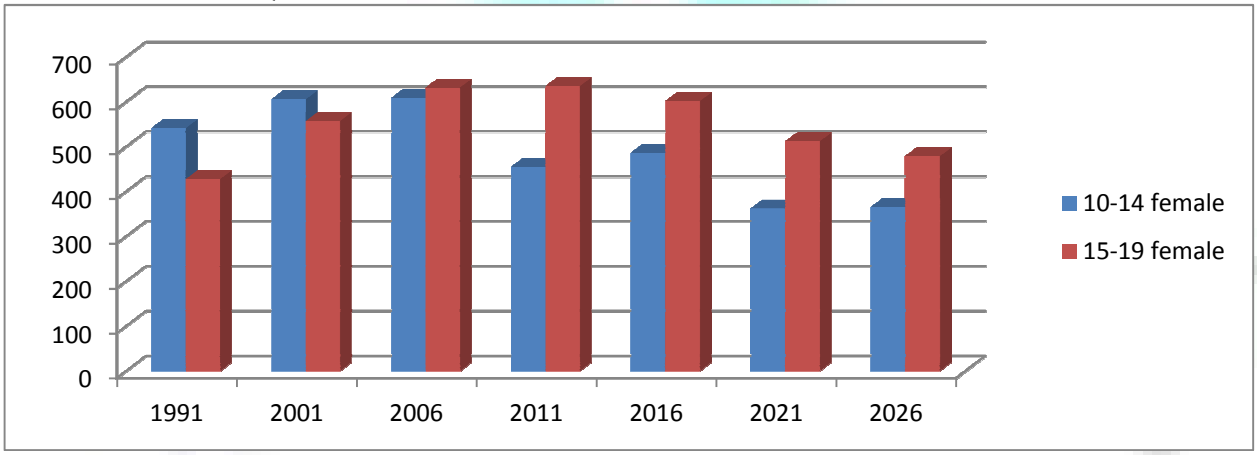
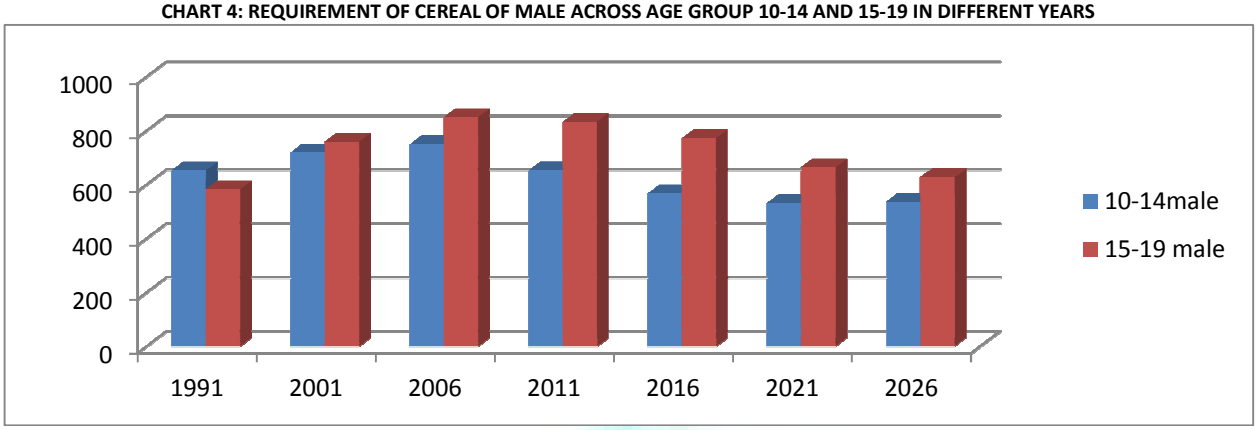


CHART 4: REQUIREMENT OF CEREAL OF MALE ACROSS AGE GROUP 10-14 AND 15-19 IN DIFFERENT YEARS



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