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Food Security and Policy Perspective in India

R.K. Singh, Anshu Vishwakarma and P.K. Singh*

Achievement of national food security has been a major goal of development policy in India for half a century, since the country became Independent. This was to be achieved by attaining self-sufficiency in the availability of food; raising the purchasing power of the poor through the endowment of land and non-land assets and by generating employment opportunities. In the process of ensuring availability of food, an important step is the food distribution through public intervention for stabilising consumption. In India, the achievements have been substantial in terms of reaching near self-sufficiency in food and overcoming transient food insecurity through public procurement and distribution of foodgrains. However, despite a significant decline in poverty from 51.3 per cent in 1977-78 to 36 per cent in 1993-94 and 26.1 per cent in 1999-2000, the problem of food insecurity still persists, as a large proportion of the population is still below poverty line. There has been an increase in the consumption of superior cereals like rice and wheat with a reduction in the consumption of coarse cereals. The value of monthly per capita consumption expenditure on food items has declined from 63.8 per cent to 54 per cent in rural areas and from 56 per cent to 42 per cent in urban areas in the last one and half decade. The expenditure on non-food items on the other hand has gone up. Since, in India, agriculture continues to be a tradable sector, many of the structural reform policies are now showing their effect on agricultural exports, imports, investments in new technology and on rural infrastructure, patterns of agricultural growth, income and employment in agriculture, agricultural prices and on food security. As regards food access through structural adjustments, it may be considered that structural adjustment may contribute to food security in a number of ways. One is the long run food security, may be enhanced through economic growth. Increasing food product incentives increases food security. But in the short run, structural adjustment lead to higher food prices, which tend to increase more rapidly than the incomes of the poor segments of the population, hence food security is reduced. There is need to explore the possibility of increasing food supplies and food security be increased by economic growth.

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Food and Nutrition Security of Poor Households in North Bihar : A Village Level Analysis

Veena Kumari and R.K.P. Singh[†]

Despite the tremendous progress in foodgrain production the problem of malnutrition still persists in the country. The present study investigates the food and nutrition security in various socio-economic groups of poor households of North Bihar. For the purpose of study, a sample size of 100 households were selected randomly from two selected villages, Hajpurwa (Samastipur) and Baikunthwa (West Champaran) and the data pertained to the year 2003. The analysis showed that cereals and roots and tubers constituted the major source of food and nutrients in the diet. Cereals supplied 80.11 per cent of energy, 76.51 per cent of proteins and 30.6 per cent of fats whereas roots and tubers supplied 8.98 per cent of energy, 6.93 per cent of protein and 1.43 per cent of fats in the diet. The level of food consumption and nutrient intake varied across the socio-economic groups. The deficiencies in the nutrient intake particularly protein and fats were comparatively high among the landless households and households with illiterate head of the households. However the energy intake was relatively low in households headed by literate members. There exists gender differential with respect to chronic energy deficiency among adult members and children of poor households. A much higher proportion of females were chronically energy deficient than their male counterparts. The children of poor households were also found to be prone to malnutrition where female children were more prone to malnutrition. The major policy measures required for improving food and nutrition security and nutritional status in terms of reduced chronic energy deficiency include improvement in the level of education, generate awareness about the importance of good health and not to make discrimination between the male and the female child, ensure employment to increase purchasing power, setting up of dairy enterprises, etc. Targeting socio-economically backward poor households warrants special attention for improving their nutritional status.

The Global Food Security Scenario: State Policies, Achievements and Road Ahead

R.L. Shiyani and F.A. Shaheen*

World agriculture has been highly successful in increasing average food availability per person by about 20 per cent while the population has more than doubled in less than 50 years to over 6 billion people. Global food supplies are ample to meet everyone's essential needs, yet over 800 million people are chronically

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undernourished. At the other end of the spectrum, over-consumption of food, reflected in a rapidly rising incidence of obesity, is now regarded as a major cause of ill health. The paper revisits the hunger eradication and state of food security scenario and reviews the state policies and constraints in achieving the target of reducing hunger by 2015 as set by Millennium Development Goals (MDG). Much of the increased food output has been from the small farmers in developing countries, especially in Asia. Even, however, in those countries which have been most successful in raising smallholder output, such as India and China, many millions of people, both rural and urban, continue to be chronically undernourished. The failure to make significant progress towards hunger eradication since 1996, when governments attending the World Food Summit (WFS) committed themselves to halve the number of undernourished persons by 2015, suggests that either the wrong measures are being used or that the size of interventions is simply too small. The fact that some countries have been successful in reducing hunger implies that the Summit goal remains attainable. However, this will require changes in tactics and in the sequencing and scale of actions by countries which continue to be faced with widespread food insecurity. The success in achieving the WFS goal requires the adoption by committed countries of an inclusive approach to hunger reduction, which addresses all the main underlying causes of the different manifestations of food insecurity and malnutrition. If fast progress is to be made in hunger reduction, this will normally require simultaneous large-scale action along two main tracks. The first track involves creating opportunities for food insecure people to make sustainable improvements in their livelihoods wherever this is possible. The second track must ensure immediate access to adequate food for those who cannot in the short term acquire the means either to produce or to purchase the food needed for a full and healthy life. Safety nets are required not just in emergency situations. The analysis of these issues suggests that the absence of these aspects of governance can be a major obstacle to hunger reduction but that achieving progress depends on many other factors. Furthermore, a conducive macro policy environment should seek to accomplish the goal of food security by limiting the population to carrying capacity, producing food at affordable prices to consumers while giving incentives to food producers, and ensuring income and support to those who lack resources to access food.

Dietary Intake Pattern and Nutritional Status of Rural Households: Socio-Economic Evidences from Chhattisgarh

R. Bhakar[†], K.N.S. Banafar[‡] and N.P. Singh[†]

An attempt is made to examine the influence of socio-economic factors on dietary intake pattern as well as nutritional status in order to target groups for prioritising and focusing efforts for improvement of nutritional status of the rural population. The study was conducted in Dharsiwa block of Raipur district in Chhattisgarh state. The study pertained to the year 2002-03. The study revealed that the food basket was dominated by cereals with a negligible portion of protein and energy being supplied by food of animal origin. Cereals provided more than 75 per cent of proteins, carbohydrates, calories, phosphorus, thiamine and niacin, though they all were deficient from the recommended dietary allowance. The per capita consumption of fruits in the state was found to be much lower than the all India for both the farm and non-farm households. Diet diversification increased with increase in the farm size, monthly per capita expenditure and literacy level. The policies aimed at improving the nutritional status of rural population include intensifying rural development programmes and promoting agro-based industries to increase the purchasing power of rural population. Development of dairy enterprises needs to be given priority for raising the income levels, diversify food basket and raising the nutritional status of the rural population.

Poverty and Food Insecurity – A Study of Forest-Based Tribal Economy in South India

P.C. Ravi,* B.M. Ramachandra Reddy*, B.M. Shashidhara* and M.R. Girish**

The paper attempts to understand the socio-economic characteristics and status of poverty and food security among the tribal households with special reference to *Jenukuruba* tribes of Heggada Devanakote (H.D. Kote) in South India. The study is based on primary data collected from 180 *Jenukuruba* tribal households, living in and around the protected forests covered by the 'Rajiv Gandhi National Park' in Karnataka, South India. The study revealed that these tribals live in abject poverty, virtually devoid of any productive resources and exposure to education. The tribal households, on an average, earned cash income of Rs. 7,873 per annum, which was far below the poverty line. They lived on hand to mouth existence. The average

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income spent on food by the tribal households was Rs. 3,537 per family per annum. In terms of calorie intake, food consumption, in general, was limited to a meager 1,072 k. calories per capita per day, which was far below the minimum consumption needs. In order to make up the calorie deficit the tribals depend heavily on edible forest products to sustain themselves. The Sen's index estimated has value of 0.47, which in other words, reveals the poverty gap implying that income of the tribals should be increased by 47 per cent to entirely alleviate the tribals from poverty line. Thus the government programmes for tribal resettlement should be enhanced taking a cue from their existing deficiencies, for greater success of the programmes.

Food Security – The Indian Scenario

Pradeep D. Hadke and Surendra R. Jichkar[†]

The paper has defined the concept of food security from various studies and examines the various approaches advocated in improving food security in developing countries. A direct relationship exists between food consumption levels and poverty. Families with the financial resources to escape extreme poverty rarely suffer from chronic hunger; while poor families not only suffer from chronic hunger, but are also the segment of the population most at risk during food shortages and famines. There are many economic approaches advocated to improve food security in developing countries, viz., westernised view (profit maximisation), food justice (food for all) and food sovereignty. To sum up food security seems to have improved in India, both at the national and the household levels. India can legitimately take pride in the fact that in spite of a history of famines and 16 to 18 million people being added to its already huge population, it has developed the capacity to ensure that no household is again required to face famines, widespread hunger and starvation. The food, at least of cereals, availability is thus, quite comfortable, even though poor households may have achieved this security at a certain social cost, like many children going to work rather than to schools. A nutritionally balanced diet is still a far cry for millions of poor families, their present income levels are too low to register their demands on the agricultural sector and to induce that sector, which still has tremendous untapped potential. Some policy measures/options are suggested to improve the total food and nutrition security.

Food Security in North-Eastern Hilly Region of India: Retrospect and Prospect

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The study aims to review the existing status, scope and prospects of food security in the North-Eastern Hilly Region (NEHR) states at the macro level, and its status

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and position at the household level. Over the decade, the trends of foodgrains production and productivity for the NEHR indicated an increase of 20 per cent and 16 per cent respectively. It can be termed as moderate if not high, and more or less satisfactory for the region. At the regional level, it helps to reduce the poverty ratio by nearly 6 points, from 32 per cent to 26 per cent. But this did not reflect at the individual household level. The household level study suggested that more than 74 per cent of the people in the NEHR region do not possess the necessary food or access to necessary calories. The results of the study indicated that on an average the monthly per capita consumption demand for cereals is about 14 kg whereas its availability is only 12 kg. Similarly for non-cereal items, per month per person requirements of fish and meat is about 6 kg whereas at the household level they can afford only 3.5 kg. The average monthly per capita consumption expenditure is about Rs. 465 which works out to Rs.16 per person, can spend for their food whereas a person requires at least Rs. 19 per day to meet the 2400 calorie norm. In the public distribution (PDS) front, the allocation and lifting of foodgrains from central pool is not commensurate with the prevailing moderately high level of poverty in the states of the region. The explanation for such poor performance might be the narrow gap between market prices and retail prices or lack of the need for more focused effort to eradicate poverty from the region. What is likely, however, is that foodgrains are not simply available in Fair Price Shops (FPS), either because these do not reach on time or because these are siphoned off. It is also likely that either a large number of FPS do not really exist except on paper or the same are not operational, since most FPS operators find them economically unviable. From the above facts and findings it is clear that in the NEHR, failure to access food or calories is not due to failure of production but due to distribution failure. In the region where poverty and food security continue to be preponderant among large masses of population, the notion of sustainable agriculture ought to be viewed in the context of the need for enhancement of productivity, production and profitability of agriculture and above all, for the improvement in the economic conditions of the farmers. The different pull and push factors of agricultural economic development must be identified properly and accordingly a differentiated strategy should be suggested in which the farmers' needs and aspirations should be given priority. The field level socio-economic studies or investigation suggests that in NEHR, the human, material resources and technology are not the main constraints in establishing agriculture on the sustainable development path. The challenge is to identify the specific agricultural and rural needs, and to focus investment in areas where the greatest impact on food security and poverty will be achieved. This could be made possible through developing an understanding of the local factors and linkages found in the wide range of rural locations subject to differing socio-economic and ecological conditions. Greater focus should be made on the communitarian, household, and individual decisions in order to make the region food secure.

An Economic Analysis of Vegetable Consumption in Cuddalore District of Tamil Nadu

V. Banumathy and K.R. Sundaravaradarajan[†]

A research study was conducted in Cuddalore district of Tamil Nadu to study the consumption pattern of vegetables in rural and urban areas by income groups and to identify the factors influencing the demand for vegetables. The results of the study showed that there were differences in the consumption level of vegetables in the rural and urban areas. The average monthly household expenditure per household indicated that the urban families incurred double the amount of expenditure on vegetables than their rural counterparts. The expenditure elasticity was also higher in urban households for all vegetables. This would denote the difference in the consumption level of vegetables. Vegetable consumption varies across income groups and rural and urban areas. The results indicated that the income elasticities are positive and they are lower than the price elasticities. Therefore, lower prices through enhanced vegetable supplies brought about by the adoption of cost reducing or production enhancing technologies played a stronger role in increasing vegetable consumption than induced consumption via enhanced income. Also vegetable consumption in the study area is far below the recommended level. Efforts to enhance vegetable supplies coupled with the creation of awareness on the role of vegetables in supplying micronutrients that are vital to good health need to be pursued vigorously. More research is needed to develop new varieties that add value for the poor and malnourished population.

Trends in Consumption of Food Commodities: A Global Perspective

D. Bardhan, S.K. Tewari, Y.P.S. Dabas and Avadhesh Kumar*

The present study was carried out with the broad objective of assessing the trends in food consumption patterns of different food commodities in the world over the last three decades with special emphasis on identifying the changing importance of specific food commodities as sources of major dietary nutrients and to ascertain status of India vis-à-vis other countries of the world, in the context of nutritional security. The data were taken from FAOSTAT Database (2006). Time series data pertaining to the last three decades, viz., 1970-2003 were used for this analysis. Compound growth rates were estimated using the exponential regression model to examine the changes in consumption pattern of different food commodities. Herfindahl index of diversity was used to test the concentration of food commodities

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towards specific regions/countries of the world. Convergence in consumption (i.e., tendency of the diets in different countries to become similar over time) was tested by fitting a linear regression model, wherein growth rates in consumption of different commodities in each of twelve regions/countries considered in the study were regressed upon the initial level of consumption at the start of the period of analysis. A statistically significant negative coefficient on the initial consumption would imply existence of convergence of diets across countries. The results revealed noticeable dietary differences between the developed and developing countries. High value livestock food products constituted the major source of nutrients in the developed world accounting for 57 per cent and 26 per cent of total proteins and calories consumed per person in 2003, whereas in the developing countries, low value commodities like cereals contributed most to total nutrients consumed: cereals accounted for 47 per cent and 52 per cent of proteins and calories consumed per person in 2003. The consumption of most of the food commodities is by and large widely diversified across the world, with the exception of pig meat, vegetables, eggs and rice, the consumption of which is relatively more concentrated towards a particular region/country, mainly China. However consumption of livestock food products was largely skewed in favour of the developed countries as these countries with a share of 21 per cent of the world's population accounted for 43 per cent, 33 per cent and 31 per cent of world's consumption of meat, milk and eggs, respectively, higher than any other food commodities. However, in the last three decades a distinct transformation in consumption patterns has become evident. For meat, milk and eggs, whose initial consumption level in the developed countries in 1970 was high, the existence of consumption convergence was found, because of significantly faster consumption growth rates in the developing countries than in the developed world. Thus, it could be inferred that the relative importance of livestock food products is increasing in the diets of the people across the developing countries. The driving forces behind these changes in dietary preferences, such as income and population growth and urbanisation are robust and unlikely to subside in the near future. Rapid transformation in food consumption taking place in the developing world including India, with livestock food products becoming increasingly important in the diets of the people, not only are expected to ensure nutritional security, but also provide income growth opportunities for many rural poor.

India's Concerns for Food and Nutritional Security

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India has definitely made rapid strides in foodgrain production, which has made the country self-sufficient in food requirements. However, the increasing population

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and the opening of agriculture to import competition due to WTO regime necessitate new policy initiatives. This is especially so because the growth rate of agricultural production has decelerated in the 1990s. The paper examines the status of food and nutritional security in India. It is noted that though India has definitely made a lot of progress in agriculture, we cannot possibly say that India has attained food security because there are almost 350 million people who do not fall in the category of being adequately fed or nourished. The net per capita income has been almost stagnant and therefore rural poverty has not been contained. There is a vicious circle of population increase, rural poverty and agriculture unsustainability. The Government can break this vicious circle by formulating and executing appropriate policies thereby increasing food and nutritional security. The future food security programme should have a broad objective of increased agricultural production and enhanced access to food through a participatory approach by the local people.

Food Security: Present Scenario and Future Strategies in Himachal Pradesh

M. S. Pathania and G. D. Vashist*

The present study was undertaken with a view to analyse the availability and requirement of foodgrains and to suggest ways and means for improving the food security in the state of Himachal Pradesh. The study is based on secondary data collected from the state Government publications and different published sources. The findings of the study have clearly brought out that population in Himachal Pradesh increased by 76 per cent over the years. The reduction in poverty has resulted in spurt in the demand for foodgrains as well as quality food. The large and medium holdings dwindled while the small and marginal holdings increased over the years resulting in higher human labour pressure on agriculture. This trend calls for not only reduction of the increased population dependent on agriculture to lift it from subsistence to sustainable level but also to withdraw population from agriculture by opening up alternative employment opportunities. The education status of both males and females has increased over the period under study. The literacy rate in case of females was noticed to be lesser than the males. Both birth and death rates have reduced over time in the state. The per capita income at current prices showed an increase from Rs. 816 in 1971-72 to Rs. 22,576 in 2002-03. There has been a slight change in the area and productivity of foodgrain crops over the years. For instance, the productivity of maize, wheat and paddy crops has increased while pulses registered a declining trend. The total area under irrigated crops accounted for only 18 per cent. Again, the consumption of fertilisers was very low as compared to the recommended doses. Imbalanced use of three primary nutrients (NPK) not only adversely affects the growth of agricultural production, but also damages the physical

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and chemical structure of the soil. There exists more than 50 per cent gap between the actual and potential productivity of the crops except maize where it was 28 per cent. Therefore, transfer of technology for improved crop productivity needs to be taken up on a priority basis. The rate of growth of availability for foodgrains was 74 per cent as against 80 per cent of their requirement during the same period. The study suggests the need to promote women education, equality and empower them through education so that the nutritional level of the family could be increased. It was observed that farmers could produce more food if they were enabled to do so through adoption of appropriate technologies. The state is also faced with the challenge to reduce the poverty and accelerate sustainable development to ensure food security at local, individual and household level. Food security policy must, therefore, be evolved in totality as a basic element of a social security policy together with nutritional security.

Consumption Pattern and Food Security in Arid Regions of Haryana and Rajasthan

R.K. Khatkar[†], V.K. Singh[†] and Dhanpat Suthar[‡]

A study was conducted to examine the status of consumption pattern in relation to food security in arid regions of Haryana and Rajasthan. Based on the data collected from a sample of 200 respondents drawn from two selected districts from each state, it was observed that consumption of cereals in both the categories of irrigated and unirrigated farms is less than the recommended level, viz., 520 gms/per capita/day but it is more than the national availability of 428 gms/per capita/day. The actual consumption of cereals in the study area is 430 and 450 gms/per capita/day in irrigated farms of Hanumangarh and Jaisalmer districts respectively, while it is 468 gms/per capita/day and 577 gms/per capita/day in unirrigated farms. The consumption of cereals in unirrigated farms is more than the irrigated farms, which is an indicator of prosperity because income and consumption of cereals have negative relationship. In the case of pulses per capita consumption in all the farms viz., irrigated and unirrigated is less than the recommended quantity. The recommended quantity of consumption of pulses is 50 gm/capita/day while in this study it ranged from 12 gms/capita/day in Jaisalmer (unirrigated) to 0.26 gms in Hanumangarh (unirrigated). It does not show any relationship with irrigation. The consumption of coarse cereals and pulses was found to be higher on unirrigated farms owing to more production of these commodities on such farms and that of fine cereals, vegetables and fruits were found higher on irrigated farms due to higher income on the latter category of farms. The pulses consumption was lower than the ICMR recommended level, while the consumption of sugar and gur was found on a higher side. Energy and

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iron intake was found to be lower in Bhiwani district while the calcium and phosphorus intake was found on a higher side. The protein intake was also found higher in Sirsa district and it was found almost at recommended level in Bhiwani district. Thus, the lower consumption of coarse cereals and pulses also indicates nutritive imbalance in the diet in the study areas as coarse cereals and pulses are grown mainly in the arid regions. Keeping lower productivity of major crops in the study areas, there is a need to improve the productivity through suitable technology development and gearing up the extension activities for meeting the food security. The income level also needs to be improved through providing off-farm employment opportunities to such a large vulnerable section of the population residing in the challenged areas.

A Comparative Analysis of Food Consumption and Monthly Per Capita Expenditure of Orissa vis-à-vis All-India Level

H.N. Atibudhi*

The study seeks (i) to examine the changes in dietary pattern and food consumption in rural and urban areas of the state of Orissa and (ii) to compare the Engel's ratio and monthly per capita expenditure of Orissa with all India level. The study utilises the household level data of National Sample Survey for the purpose. The analysis indicated that per capita expenditure on non-food items are significantly increasing compared to expenditure on food items in rural and urban areas of the state over the years. The expenditure on non-food items was more than the food items in urban areas and the situation was just the reverse in rural areas. There has been a decline in the percentage expenditure on cereals and rapid increase in the consumption of edible oils, milk, meat, eggs and fish. The structural shift in the dietary pattern towards livestock, fisheries etc. is already underway and is likely to intensify further. The structural shift necessitates greater emphasis on diversification towards pulses, oilseeds, milk and vegetables to meet the growing demand for these commodities. The monthly per capita consumer expenditure indicates that there is a wide gap in per capita expenditure of the state between Orissa and all India level, in rural as well as urban areas. The higher Engel's ratio further confirms the low standard of living of the State in comparison with the national averages in all the regions. This necessitates for special planning with special packages to increase the per capita income. The net state domestic product of the State has to be increased through high doses of investment on farm and non-farm sectors along with the social sectors with increase in employment opportunities in both rural and urban areas of Orissa.

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Trends in Food Consumption and Nutrition: Food Security Concerns

Archana Sinha[†]

With an estimated population of more than 1.2 billion, India is the most populous country in the region of South-east Asia. In the recent past, the country has made considerable progress on social and economic fronts, as indicated by improvements in indicators such as life expectancy, infant mortality rate and maternal mortality rate, under-five mortality and literacy rate. However, improvement in nutritional status of the poorer section of the society has lagged behind. The population of India doubled between 1960 and 1992, but the impressive foodgrain production nearly kept pace with population growth, and therefore, the per capita availability did not decline. While it is estimated that per capita cereal availability within India is adequate, national level surveys still show that 40 per cent of the population in India consume less than 80 per cent of the energy required. Low purchasing power, limited access to food, and individual household food insecurity are the major constraints. The development policies of the government have turned the country from a position of net importer of foodgrains to the state of marginally surplus one. Food security and malnutrition continued to be the main problems among the consumers of low expenditure quartile group more so in the state with backward or slowly growing agriculture, like in Bihar, Orissa, Andhra Pradesh and Tamil Nadu. The task of providing minimum level of nutrition to the people is primarily that of adequate production and access to it, which in turn depends upon an appropriate distribution of incomes and productive resources. The study provides several suggestions to improve the food security situation of the rural poor.

Trends in Food Consumption and Nutritional Status of Households in Haryana

U.K. Pandey, K.S. Suhag and Sanjay Kumar*

In the present study an attempt has been made to examine the spatio-temporal and inter-sectoral changes in food consumption pattern and per capita daily intake of energy and nutrients from different items in Haryana. For this study Haryana state has been divided into north-eastern and south-western regions. The North-eastern region comprised the districts of Ambala, Panchkula, Yamunanagar, Karnal, Panipat, Kaithal, Kurukshetra, Sonapat and Rohtak while the south-western region includes Hisar, Fatehabad, Sirsa, Jind, Bhiwani, Mohindergarh, Rewari, Jhajjar, Gurgaon and Faridabad districts.

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The study is based on the data collected from 32nd (1977-78) and 55th Rounds (1999-2000) of National Sample Survey (NSS) on consumption expenditure, etc., in Haryana. Two-stage stratified random sampling method was used for selection of the ultimate units of the sample as adopted by the NSSO. The first stage units are the census villages in rural areas and census enumeration blocks in the urban areas. Household forms the second stage unit in both rural and urban sectors. All the districts of Haryana state are stratified as rural and urban populations as per the size of the population. The food consumption pattern of the households has been studied by assessing the items consumed and characteristics of food items dominating the daily diet, reasons for dominance of specific food items, dependence of food diet on plant or animal food and dependence of diet on local production or otherwise. The quantity of food items consumed by the people has been converted into nutrient values by multiplying these quantities consumed by their respective nutritional coefficients. Tabular analysis has been done to derive the inferences. The study clearly reveals that although the per capita consumption of cereals declined spatio-temporal-inter-sectorally in Haryana, yet it is still a major source of calorie intake. Furthermore, the households have also diversified their food consumption pattern thereby implying that the source of calorie intake has changed due to their choice across the stratum of consumer households. Besides, the farmers of Haryana state also supply rice and wheat towards the national food basket and consumer households of the state are by and large economically better-off as compared to other states of the country. However, it cannot be asserted that there are no lapses in the public distribution system of the state. On the whole, a decline in cereal/food consumption and calorie intake need not necessarily mean a decline in the food security.

Assessment of Food Security at Household Level in Different Zones of Hindukush Himalayas with Particular Reference to Himachal Pradesh in India

S.P. Saraswat[†], Pratap Singh[‡], Amresh Sharma* and S.K. Garg[‡]

Food security essentially means that all people at all times have access to safe and nutritious food to maintain a healthy and active life. This definition implies three dimensions to food security, namely, availability, access and stability at various levels of aggregation, i.e., global, national, household and individual level. India is today a food self-sufficient country. For the study purpose, Himachal Pradesh is divided into three zones, i.e., low, mid and high. A sample of 60 households was

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taken, i.e., 20 from each zone. The information about the consumption pattern was collected by cost accounting method for the agricultural year 2004-05. In this study efforts have been made to work out the calorie intake per person in different age groups on different size of holdings in different zones of Himachal Pradesh. In case of per capita availability of cereals, Himachal Pradesh occupies a better position which is not the case for pulses. In the case of net availability of cereals at farm level maize is surplus at all sizes of farms in all zones, while wheat and rice in most of the cases are in deficit. The study reveals that large farmers had more calorie intake than that of small farmers in all zones. In low hill zone, the calorie intake of male population on small farms is 2346 calories. While in mid hill zone male population of large farms take 2781 calories and the male population of small farms take 2750 calories. Likewise in high hill zone the male population of large farms takes 3408 calories as compared to small farms, i.e., 3220 calories. As far as female population is concerned, the calorie intake by large farms in low hill zone was worked out to be 1996 calories as compared to 1871 calories in small farms. In mid-hill zone female population of large farms take 2429 calories as compared to 2202 calories by small farms. The female population of large farms in high hill zone takes 3112 calories and small farms 2867 calories. It was also observed that cereals are the main ingredients of total energy intake. The proportion of cereals intake decreases as farm size increases and the intake of calories increases as elevation increases. In Himachal Pradesh, the quantity of calorie intake is much closer to the recommended quantity. Thus it can be inferred that the food security scenario is much better in the case of Himachal Pradesh.

Consumption Pattern of Milk and Milk Products in Rural Punjab

G.S. Randhawa and S.S. Chahal*

The present study was undertaken to examine the consumption pattern of milk and milk products and to investigate the factors affecting their consumption in rural Punjab. In order to achieve the stipulated objectives a multistage random sampling technique was used. At the first stage the number of milch animals per hectare per district was computed and all the districts were categorised into two groups, one above the state average and one below the state average number of milch animals per hectare. Consequently, Amritsar district representing the developed region and Kapurthala district representing the less developed region were selected randomly. Twenty households were selected from each village and thus a total sample size was 240 comprising 120 households from each region. The requisite data was collected through personal interview method. The information on family profile, education, income, pattern of expenditure, factors affecting demand for milk, etc., was collected

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for the year 2004-05. Both tabular as well as functional analyses were carried out to analyse the data. The results revealed that the relative share of expenditure in developed region was higher than the total expenditure in less developed region. It was observed that the relative share of expenditure on milk and milk products to total expenditure was 10.71 per cent of the total expenditure. Also, the relative share of expenditure on other food items was higher than the expenditure on total milk and milk products. The expenditure elasticities were 0.89 and 0.67 for liquid milk and 'milk and milk products' respectively. Per capita total expenditure on milk and milk products had a positive relation with per capita expenditure for all income categories in less developed region. Also, per capita total expenditure elasticities were significant statistically for all the income categories. Per capita total expenditure on milk and milk products had positive and statistically significant relation with per capita expenditure for all income categories in the less developed region. The positive sign of education coefficient indicates that with increase in education level, the per capita total expenditure on milk and milk products increased. The positive sign of food habit coefficient indicates that the vegetarian households consumed more milk and milk products as compared to non-vegetarian households in the less developed region.

Consumption Pattern and Nutritional Adequacy Levels of Rural Households under Different Farming Systems

**P.G. Chengappa, B.M. Karumbaiah, Vijayalakshmi Dega,
N. Nagaraj and A.V. Manjunatha[†]**

The purpose of the paper is to analyse the economics of different farming systems and its impact on income and nutrition with an emphasis on finding out the gap in nutritional adequacy. For this study, a total of 100 farmers were selected at random from the Bangalore rural district representing eastern dry zone of Karnataka. The results indicate that irrespective of the size of holding, farmers adopted diversified farming systems involving high value commodities, which in turn helped them to realise higher net returns. Access to groundwater irrigation and institutional source of credit facilitated the farming systems to diversify with high value commodities. Foodgrains constituted nearly 40 per cent of the total expenditure incurred on food, which decreased as the farming system diversified to high value commodities. The per capita consumption of milk was much below the recommended level even though milk production was an important component of the diversified farming system. The farmers preferred to sell milk to realise cash income so as to meet their routine expenditure. The farmers following diversified farming systems have shown higher diversity in their consumption pattern and *vice versa*. The status of nutrient intake

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assessed through a dietary survey following 7 days recall method indicated that the nutrient deficiency was higher with households following the farming system involving only crops. The adequacy level of nutrient intake increased in the farming systems that were more diversified with high value commodities. Except for calcium, the deficiency for all other nutrients was clearly visible for children, women and men. Highest nutritional deficiency was witnessed among the landless labour households.

Food Consumption and Calorie Intake in Udaipur District of Rajasthan

P.S. Rao and D.C. Pant*

An attempt has been made to study the consumption pattern and expenditure, calorie intake and variation to recommended balanced diet in various income groups in Udaipur city of Rajasthan. Households were divided into three income classes, i.e., lower (monthly income less than Rs. 5000), middle (monthly income Rs. 5000-Rs.15000) and higher class (monthly income Rs. 15000 and above). From each income class 15 respondents were randomly selected to make a total of 45 respondents. The data were collected for the year 2004-05. The average monthly income of higher, middle and lower income class groups was found to be Rs. 20,740, Rs. 10,600 and Rs. 3,850, respectively. The income used to purchase food was 15.74 per cent by higher income class, 23.73 per cent by middle income class and 28.13 per cent by lower income class. The major share of food expenditure of higher and middle income class was on milk while in the lower class it was on cereals. In absolute terms the expenditure on cereals of lower income class was nearly half the expenditure of middle class and one-third of the higher income class. However, lower class compensate the quantity of cereals by purchasing poor quality as well as purchasing wheat and rice at lower price with below poverty line (BPL) card. Meat and eggs were afforded by middle and higher income class only. The consumption of food items was the highest in winter and lowest in summer season. The average per day calorie intake worked out to 2346, 2316 and 1906 calories by an individual of higher, middle and lower income class, respectively. Among the food items the highest calorie intake was found from cereal consumption in all the three income classes. On the whole, in all income groups, the intake of various food items was less than the quantity recommended for balanced diet of 18-20 years age-group, except in case of milk where the quantity consumed was more than that recommended.

Structural Changes in Consumption and Nutrition of Livestock Products in India: Implication for Food Security

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Livestock is an important sub-sector of Indian agricultural economy and plays a multifaceted role in providing livelihood support to the rural population. Livestock contributes nearly 25 per cent to the gross value of agricultural output and it has been increasing consistently. In fact, growth in the livestock sector has always remained higher than the growth in crop sector. The consumption pattern in India has undergone significant changes towards high value commodities like fruits and vegetables, milk, meat and eggs due to increase in per capita income, urbanisation, changes in lifestyles, preferences, relative prices and increased awareness about food nutrients among consumers. During 1983 to 1999, consumption of cereals declined from 192 to 152 kg per year in rural areas and 147 to 125 kg in urban areas. But on the other hand, consumption of fruits increased by 553 per cent, vegetables by 167 per cent, milk and milk products by 105 per cent, and of meat, eggs and fish by 85 per cent in rural areas over the same period. These changes in diets were even more dramatic in urban areas. As a result, the domestic demand for high-value agricultural products has grown while demand for food grains remained stagnant. The livestock products have great potential to contribute significantly in providing nutritional security in terms of calorie, protein and fats. The contribution of livestock products in food nutrition is lower in India as compared to the other parts of the world. This paper analyses the structural changes in consumption of livestock products and its contribution in providing nutritional security in terms of supply of rich calorie, protein and fats to rural and urban population of the country.

Economic Analysis of Food Security Among Rural Households in Resource Degraded Areas of Southern Tamil Nadu

M. Thilagavathi and M. Chandrasekaran*

The objectives of the study are to analyse the influence of agriculture in ensuring food security in rural households and to examine the household consumption behaviour and the coping strategies for ensuring better household food security at the micro level in resource degraded areas. Paramakudi and Vilathikulam taluks of Ramanathapuram and Tuticorin districts of Southern Tamil Nadu have been purposively selected for the study and the data were collected from 160 affected and 80 non-affected sample households from the selected two districts during the year 2003-04. Simultaneous equation model was used to assess the determinants of household income, consumption and activity diversification. The results revealed that, the sample farmers allocate, on an average 65 to 70 per cent of their cropped area to cereal and pulse crops from which they get the maximum proportion of intake of calories and protein. As far as income is concerned, 24.60 per cent and 36.82 per

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cent of the total income was earned through crop production in affected and non-affected households. But in sample farm families, more than 57 per cent of the total family income was generated through non-farm activities. Non-farm sources provided more employment opportunities to the sample households which is in the affected category whereas in the non-sample farms this was only 36.86 per cent while on-farm employment constituted 54.10 per cent in non-affected farm families. Per capita monthly total expenditure on food for the adult units in farm categories revealed that the amount allocation was high in non-affected farm category when compared to the affected farm category but the difference was meager. Per capita monthly total consumption expenditure for the adult units in farm categories indicated that the amount allocation was higher in affected farm category when compared to non-affected farm category. The significant and relatively larger influence of activity diversification, household income and family consumption units on family consumption expenditure implied that the consumption expenditure was largely influenced by the magnitude of income and income generating activities rather than the demand side variables such as number of dependents or family consumption units. The number of earners, differences in the wage rate between different activities in trade and service sector, acted as pull factors of the family members to diversify their activities in the sample households.

An Economic Analysis of Production, Consumption and Marketed Surplus of Milk in Karimnagar District of Andhra Pradesh – A Case Study

M. Srikanth Reddy and N. Vasudev*

An attempt has been made to quantify the level of consumption, production and marketed surplus of milk in Karimnagar district of Andhra Pradesh. Better feeding followed by congenial weather conditions during the winter has positive effect on milk production. It was also interesting to note that in relative terms marketed surplus was more in summer (ranging from 58.5 per cent to 60 per cent) as compared to that in rainy season (50 per cent to 56 per cent). On an average marketed surplus during the year ranged between 55 per cent in the case of small farmers to 57.2 per cent in the case of medium farmers. But in all the categories of farmers the consumption of milk was above recommended level, i.e., 250 gm/day/person. With the disposal of marketed surplus of milk through different agencies it was evident that the co-operatives and milk vendors emerge as major procurement agencies (more than 70 per cent) in all categories of farmers. Majority of the small and medium farmers preferred milk vendors while large farmers preferred milk co-operatives to

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sell their surplus milk. The large family size, education level of family head influenced the consumption pattern of milk. These factors lead to consume more, resulting in shrinkage of marketed surplus.

A Novel Approach to Food Security

G.V. Krishna Rao and K.R. Chowdary[†]

A novel approach is evolved and practiced by Deccan Development Society in Andhra Pradesh (DDS) for ensuring food security to the people. This approach has to be people-centered and people designed based on time tested people's science. The food security is sought to be provided to the local people through improvements in dryland agriculture and putting fallow lands to efficient utilisation. Jowar, millets and pulses are part of the new approach. The DDS initiated the alternative public distribution system (PDS) through community grain bank. The basic objective of this jowar-based PDS programme was to ensure local production, local storage and local distribution. This programme was operationalised for 1,600 landless labourers and marginal farmers in 32 villages. Financial assistance was advanced to them to reclaim their 1000 ha fallow lands through timely cultivation, application of farm yard manure and carrying out the other timely farming practices. The agreement was that the money advanced will be returned in the form of grains which are stored in their own village and sold at a cheap price to the poorest families in the villages. The success of the alternative PDS can be gauged by the fact that it expanded to 100 villages covering 5000 acres of fallows. These lands produced nearly two million kgs of extra foodgrains in these villages and generated 2,50,000 person-days of employment every season. The millet ration cards covered nearly 8,800 households and fed 50,000 poor households at a very cheap price. The novel approach, when operationalised has provided excellent alternative PDS model for food security. This needs replication to make the people to enjoy not only food security but also food sovereignty.

Food Security Concerns in Rainfed Rice Agriculture

K.N. Selvaraj and C. Ramasamy*

The paper addresses the causes of food insecurity in the rainfed areas using secondary data and farm level data collected from 230 farm households spread over various water limiting rice production environments. Decrease in rice production due to drought was 16.44 lakh tonnes in Tamil Nadu, while it was 1.61, 2.28 and 0.77

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lakh tonnes, respectively in Ramnad, Thiruvallur and Coimbatore districts. Loss in production due to drought was estimated to the tune of 30 per cent of the state total rice production and in value terms it amount to Rs. 852.11 crores, which accounts for 5.54 per cent of the gross state domestic product. Loss in employment was 17 per cent. To meet the loss in employment Rs. 300 crores is needed as additional investment to generate the employment. The negative correlation between prices and yields reduces crop revenue fluctuations and provides a natural edge to the farmers but such a relationship was not observed in most of the rice production environments. Variability in income in rainfed areas was explained more by variability in yield than the price both during normal and drought periods. The results of recursive model indicate that although rural poverty is found to be inversely associated with agricultural income per capita of rural population, the strength of the relationship between poverty and agricultural growth are found to have declined in the drought period. Rice is the major source of income accounting for 60 per cent of the total income in these fragile environments even during the drought period and per capita income is lower than the state average (Rs. 19,141 at current prices). Per capita consumption of rice/cereals and pulses in these water limiting rice production environments is lower than the state average (Rice: 110, cereals: 130 and pulses: 12.4 kg per year). These estimates show that the farmers in these fragile areas are prone to various risks and they have to adopt several income and consumption smoothening strategies to overcome the risk of crop failures. Therefore, agriculture still needs to play a key role in supplying adequate food at affordable prices to ensure food security in the rainfed environments. In this context, development and commercialisation of drought-tolerant rice varieties and productive investments are some of the key areas that need attention.

Inter-State Assessment of Food Security in Relation to Development Indicators and Incidence of Poverty

K.A. Varghese, Azad Mordia and Madan Lal Gurjar[†]

An attempt has been made to assess the inter-state disparities of indicators directly related to food security in relation to the overall composite indices of rural development in these states. Keeping in view the aspects of physical availability and economic access of food security, those states with relatively higher per capita foodgrain production, less inter year variability in production, higher growth in food grain production, low growth in population and having lower share of below poverty line (BPL) population could be considered as less vulnerable to food security. The

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compound growth rates of foodgrains during the new economic regime (1991-2004) in different states revealed that the growth rate of foodgrain production has been higher than population growth in states like Bihar, Haryana, Meghalaya, Nagaland, Rajasthan and West Bengal. However, the inter-state variation in per capita foodgrain production ranging from 0.02 tonnes in Kerala to 0.98 tonnes in Punjab reveals the existing regional disparities in the local access to food security. In 18 out of 28 states, the per capita production is less than the national average of 0.20 tonnes/person in a normal year. While the inter-state variability within a year in the per capita production remained very high during the recent past, the inter-year variability within the states in per capita production has been high for states like Gujarat, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Sikkim and Tamil Nadu. The high inter-year consistency as evidenced by the low coefficient of variation in per capita production of foodgrains in states like Assam, Goa, Haryana, Himachal Pradesh, Meghalaya, Punjab, Tripura, Uttar Pradesh and West Bengal revealed that the production of foodgrains in these states has been growing keeping pace with the population growth. The share of BPL population is more than the national average in states like Arunachal Pradesh, Assam, Bihar, Madhya Pradesh, Meghalaya, Nagaland, Orissa, Sikkim, Tripura, Uttar Pradesh, West Bengal and Manipur. The states such as Punjab, Goa, Tamil Nadu, Andhra Pradesh, Kerala, Karnataka, Maharashtra and Haryana stood as the top eight states in terms of overall development. The states at the bottom of development level included Jharkhand, Bihar, Uttar Pradesh, Rajasthan, Nagaland, Jammu and Kashmir, Meghalaya and Orissa. In terms of food security indices the top states are Punjab, Haryana, West Bengal, Himachal Pradesh, Andhra Pradesh, Goa, Uttar Pradesh, Tripura and bottom states are Sikkim, Orissa, Maharashtra, Bihar, Jharkhand, Tamil Nadu, Kerala, Madhya Pradesh and Jammu and Kashmir. The rank correlation between overall development indices and food security indices turned out to be non-significant for Indian states.

Analysis of Food Consumption in Orissa and Implications for Nutrition Policy

Parshuram Samal*

Orissa is the poorest state of India and calorie deficiencies are most widespread among the people with lower incomes. The study analyses the changes in consumption pattern of the consumers of Orissa taking into consideration six quinquennial round data between 1972-73 to 1999-2000. Data were analysed by rural and urban areas and also by income groups. To investigate into the response of the poor to food price changes, the demand elasticities for various income groups

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were computed and analysed. In rural areas, the proportion spent on food decreased from 75 to 66 per cent and in urban areas from 65 to 56 per cent during 1972-73 to 1999-2000. The expenditure share on rice was reduced by 16 per cent in rural and 8 per cent in urban areas. The food groups with marginal increase in expenditure share were pulses, milk, vegetables, meat-fish-eggs and “other” food groups in both areas. Rice is the dominant cereal among all the energy producing foods, which accounted for more than 85 and 80 per cent in rural and urban areas respectively. But, the consumption of rice has decreased significantly over the years in the two non-poor groups in rural areas and highest income group in urban areas. However, the very poor group has increased their rice consumption in both rural and urban areas, thus improving their calorie intake. It was observed from the demand elasticity matrix of rice that in most of the cases, the own and cross price elasticities declined as income increased, which indicates that low income households were more responsive to food price changes than high income households. The curvature in the Slutsky substitution elasticity matrix for rice was found to be statistically significant, which implies that poor substitute more flexibly than the rich. Disaggregation by commodity and income class is essential because the poor respond very differently to changes in prices of commodities than the rich. The policy implication of this finding is that as rice is the staple food of the poor people in Orissa and a number of varieties (coarse, fine and superfine) within the commodity are available, the coarse variety of rice being consumed widely by the poor people and being the cheapest among all the rice varieties, should be subsidised to increase their calorie intake. This will also help in subsidy planning for rice in the state of Orissa.

Food Security in India

S.S. Wadkar, S.R. Bagade, P.D. Veerkar and D.B. Malve[†]

Food security essentially means that all people at all times have access to safe and nutritious food to maintain health and to lead active life. The need for food security arises due to the fluctuations in food production and non-availability of sufficient food from domestic sources, also one-fifth of the world's population is still under-nourished and hungry. Also pressure on land is increasing day by day due to growing population and about 40 per cent of the people live below the poverty line. India's food grain production has increased nearly four-fold from 50.8 million tonnes to 199.4 million tonnes between 1950-51 to 1996-97 of which the percentage of cereals increased from 83.5 per cent to 92.9 per cent and the share of pulses has declined from 16.5 per cent to just 7.1 per cent during the above period. This is an unhealthy trend. India has achieved food security in terms of reaching near self sufficiency in food and accumulating an imposing buffer stocks but still there are a

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number of weaknesses, such as low gross domestic product growth rate, higher population growth, poverty, under nutrition, low productivity, etc. We must therefore aim towards improvement in productivity to ensure sustainable household food and nutrition security so that we have a safe and bright future for our younger generation.

Food Security in India: Status and Strategy Analysis

K.K. Shrivastava, Padma Saxena and Vishesh Sahai*

With the 2 per cent world's geographical area, India has the responsibility to feed 18 per cent of world population. Since Independence, our country is constantly increasing foodgrain production and now it is 204.6 million tonnes in 2004-05, four times more than the 50.8 million tonnes in 1950-51. With the success of green, white and blue revolution, we are now in the position of self-reliance in foodgrain production but possessing a comfortable buffer stock. After Independence, all indicators of food security/availability increased due to extension of irrigation facilities, high-yielding variety seeds, use of fertilisers and chemicals and mechanisation of agriculture. The main objectives of the paper are to examine the per capita availability of various food crops in India, to examine the consumption pattern in India after Independence, to know the status of food security in India and the causes for low availability of food in our country. The study is based on secondary data. The production of foodgrain increased over the increase in population increasing the per capita availability of food. The consumption and availability of food increased since Independence. About pulses, a negative trend emerged. The production of pulses decreased by 3.6 per cent and the per capita per day availability of pulses decreased by 36.64 per cent during this period. The production of edible oil increased by 214.3 per cent. Similarly, the per capita per year availability of edible oil and vanaspati increased by 139 per cent and 101.43 per cent respectively. The production and availability of milk and sugar also increased. Thus the availability and consumption of cereals, edible oils, vanaspati, sugar, milk, tea and coffee increased but in the case of pulses is disappointing because of negative results. The production of foodgrains needs to be increased and balanced distribution of food products is also needed. There are various measures to improve agricultural productivity upto second green revolution. Rural infrastructure development, job creation and income security are the important tools for combating food insecurity and malnutrition in India.

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Food Consumption and Nutritional Status in Rural Areas of Maharashtra

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The Green Revolution helped India to overcome chronic food scarcity and made the country self-sufficient in food production. The incidence of hunger is more in the dry regions. Using farm level data from three regions of Maharashtra this paper attempts to examine the pattern of consumption of nutrients by cultivators and sources of supply of different nutrients. The study is based on the primary data collected from 90 cultivators from the selected centers of the comprehensive scheme spread over three regions in Maharashtra. The data pertained to the agricultural year 2005-06. These data were analysed according to the size groups of farmers and regions. The analysis showed that there was dependence on plant products in diets. The diets in Maharashtra were mainly based on cereals. There were deficiencies in food consumption and nutrient intake when compared with the recommended dietary requirement. It is important to emphasise that although a certain proportion of population was consuming less than the dietary requirements the greatest relative gaps were observed in the case of meat, egg and fish. Similarly, the major nutrition problem was calorie deficiency. Cereals constituted the major source of nutrients. They supplied 70 per cent of the energy, 57 per cent of proteins and 20 per cent of fats. The intake of foodstuffs varied among the size groups of farms and regions. Diet diversification increased with increase in the land holding and income. The main policy measures for improving the nutritional status of cultivators include improved agricultural technologies and dairy enterprise and plans and programmes for increasing purchasing power of poor farmers. Dairy enterprises should be given more priority in diversifying agriculture and diets, raising both income and nutritional status of the cultivators.

An Emerging Scenario of Long Term Changes in Dietary Pattern and Food Requirement in Uttar Pradesh

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In this paper an attempt has been made to analyse the National Sample Survey (NSS) data in respect of Uttar Pradesh and to quantify the nutritional problem in the state. The calorie and protein content of food items consumed per consumer unit constituted the main source of information for this paper. It gives the per capita food consumption levels for 1983 and 1999, disaggregated by rural and urban areas: these data exhibit a more diversified food basket with significantly higher levels of per capita consumption of edible oils, milk, fruits and meat, fish and eggs, increasing urbanisation and widening rural-urban disparity has reduced the consumption per head for cereals and pulses. The consumption of cereals per head declined while consumption for fruits and vegetables, milk and eggs increased significantly. This shift has taken place among both the rural and urban consumers. The trend in rising consumption of high value commodities has generated higher growth in demand for edible oils, horticultural and livestock products. Future increase in the production of food has to be essentially achieved through increase in productivity, as possibilities of area expansion are minimal. A structural shift in dietary pattern towards livestock, fisheries, and horticultural products is already underway and is being predicted to intensify further. A decline in per capita consumption of cereals and rapid increase in consumption of edible oils, fruits, vegetables, milk, meat, eggs and fish is observed. Food demand challenges ahead are formidable considering the non-availability of favourable environment and shrinking resource base. The state enjoys a surplus status in rice, wheat, sugarcane, fruits, fish and eggs. It is marginally surplus in milk production, but falls short in supply of vegetables, pulses, oilseeds and meat. Greater emphasis is needed on diversification towards pulses, oilseeds, milk and vegetables to meet the growing demand for these commodities. Emphasis has to be laid on diversification, dissemination of productivity increasing technology, and adequate development of general and marketing infrastructure which will help in balancing the food production and demand.

Food Insecurity and Farm Households – A Study in Union Territory of Pondicherry

P. Vinodhini and A. Pouchepparadjou[†]

The study was carried out at a micro-level in Union Territory of Pondicherry to estimate the food security situation of farm and non-farm households and their food consumption pattern. The study covered different aspects of food security such as food consumption, food crisis in farm and non-farm households. The sample for the

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present study included 65 farm households from both low and high income groups and 65 non-farm households from low and high income groups in Ozhukarai commune of Pondicherry region. The household consumption pattern of the sample households showed that the average monthly expenditure on food and non-food items, of high income group was higher than low income group in both farm and non-farm households. The developed cumulative food security index indicated that the non-farm households were more food secure than the farm households. Of the total sample households, 29.23 per cent of the farm households had adequate production to meet their consumption and nearly 27.69 per cent of non-farm households had adequate income to meet their consumption. Nearly 70 per cent of the sample households reported inadequacy in food. The reasons cited for food insufficiency according to farm households, were less price for products and low production while the rural non-farm households stated high price of products, less income for adequate purchase and low wages as the reasons. Non-farm households were thus more food secure than the farm households. Further the high-income groups were in a better food security situation than the low-income group in both farm and rural non-farm households.

Consumption Expenditure Pattern of Lac Growers: A Study in Jharkhand

Govind Pal, M.L. Bhagat and A. Bhattacharya*

The paper examines the consumption expenditure of lac growers in Ranchi district of Jharkhand. The study is based on the analysis of survey data conducted for 200 lac growers in the year 2003-04 and 2004-05. Primary data have been collected from the respondents with the help of pre-tested schedule/questionnaire and the data were analysed using tabular analysis. The economy of the sample lac growers was primarily based on agriculture and forest produce. Income from lac cultivation was found to constitute 19.8 and 28.3 per cent of the total income and farm income respectively. Income from foodgrains was found to constitute 27.5 and 39.3 per cent of total and farm income respectively. The opportunities for non-farm employment were very few in the villages. The ratio of expenditure on food and non-food items was 57.6 : 42.4. The share of average expenditure on foodgrains was dominated by rice. Among the non-food items the proportion of total expenditure on clothing was found to be the highest followed by other non-food items and medicine. The findings of the study indicated that the standards of living of the surveyed households were very low. There is need to diversify agriculture and other related activities in the study area which will facilitate production of a variety of home produce and generate sufficient income to the lac growers.

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Food Security and Economic Reforms: Justice in Public Distribution is Key to Success

Mukesh Kumar Singh and Anita Tyagi[†]

Although self-sufficiency in foodgrains and other agricultural products remained one of the basic goals of Indian planning, our country is still in the stage of infancy as far as food security is concerned. Even though self-sufficiency of food production has been achieved, the population still lack access to normal diet. The impact of green revolution in the form of changed policy of seed-water fertiliser in the past and the process of globalisation and economic reforms adopted since 1991 has increased the foodgrains production significantly. In the last fifty years it has increased more than four times. In place of import of foodgrains, at present, export is possible. The government stock is piling up. But in case of pulses and other nutritious products, the growth is very discouraging. The production of pulses increased only less than double in the last fifty years. A negative trend is observed in the area expansion in pulses. As far as the per capita net availability of foodgrains is concerned it has increased marginally in the case of cereals but remained half for pulses, which is a serious drawback for the food security. The production trends of foodgrains reflect the substantial increase but without increasing the net availability, the target of food security cannot be achieved. The process of globalisation has certainly positively affected the foodgrains production in the country but without an equitable distribution of income and perpetuating the benefits upto the masses it cannot sustain in the long run. There is no way out but to sustain the agriculture growth achieved in the past coupled with a proper and sound distributive system. The progressive overhauling of Public Distribution System (PDS) is urgently required. Above all, the access to food articles of mass population can be made possible only by the increased purchasing power bringing the population above poverty line. The finding of the regression analysis for the three variables, viz., foodgrains availability, government procurement and PDS distribution in the past one decade of economic reforms reveal that the availability of foodgrains has not significantly affected the government procurement but the government procurement significantly affects the PDS distribution. Above all, the total procured foodgrains are not largely used for PDS distribution but a sizeable chunk is leaked out. The provision for ensuring effective food security at

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reasonable costs to the government requires integration of production, procurement and distribution policies.

Dietary Pattern and Nutritional Status of Rural Households in North-Eastern States of India

Ashok Kumar*

Adequate nourishment in terms of quantity and quality is necessary for sustainable life. The present study examines the nutritional status of rural households in the North Eastern States for important nutrients like carbohydrate, calorie, protein, fat, calcium, iron, carotene, thiamin, riboflavin, niacin, Vitamin B6, Vitamin C, folic acid and magnesium and the socio-economic factors influencing the dietary pattern and nutritional status of rural households. For the purpose, the data of the 55th Round (1999-2000) of National Sample Survey Organisation was analysed. The study shows the states of Meghalaya, Sikkim, Assam and Mizoram in terms of calorie intake were below 2100 kilo calories. It was also found that no state was deficient in thiamin, niacin, Vitamin B6, Vitamin C, folic acid and magnesium. However, some of the states are deficient in protein, fats, calcium, iron, carotene and riboflavin (B2). The analysis of determinants of nutrition also confirms that in most of the states the significant factors affecting nutritional status adversely are cost per calorie (prices) and monthly per capita expenditure (purchasing capacity) on food.

Nutrition Management in Consumption Pattern of Farm and Non-Farm Households in Varanasi District of Uttar Pradesh: An Economic Analysis

L.D. Hatai, H.P. Singh, C. Sen and R.S. Dixit[†]

An attempt has been made with the specific objectives to examine the consumption pattern of food and nutrition status, to estimate per capita per day levels of income, expenditure and nutrition in different categories of households and to identify the factors affecting nutrition efficiency in selected farm and non-farm households in Varanasi district of Uttar Pradesh. A sample of 20 per cent of total households based on probability proportion to size (PPS) method was drawn from marginal (< 1 ha), small (1-2 ha), medium (2-4 ha) and large (> 4 ha) farms. In order to select the non-farm households, four distinct incomes groups of below Rs. 2500, Rs. 2500-5000, Rs. 5000-7500 and above Rs. 7500 were selected from the

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employees working under different institutions situated in the studied block and adjoining areas. A sample of 30 farm households and 35 non-farm households was drawn for the study pertaining to the year 2004-05. The selected respondents were interviewed and primary data were collected through survey method. The findings of the study revealed that as the farm size and income group increases, the percentage expenditure on cereals registered a declining trend. On marginal farms, the percentage expenditure on cereals was obtained to be 40.58 per cent which declined to 31.33 per cent in large farms. On the other hand, in non-farm households, the magnitude of decline was reported to be more rapid than the farm households. It is observed that per capita per day income level was estimated to be lower for the farm households as compared to the non-farm households. Both farm and non-farm families were better in protein intake as they were able to compete with the standard norms of protein requirement. It also clearly showed that the rate of efficiency in nutritional standard was found to be increasing as the farm size/income level of households increased. Almost 70 per cent of the farm household respondents supported that rise in per capita income would directly lead to an increase in the nutrition level. Both farm and non-farm households responded favourably, i.e., better environment, sanitation and public health measures would enhance the nutrition level. It is observed that the factors affecting nutrition efficiency indicated that family per capita income, percentage of expenditure on purchased food and the level of education in both farm and non-farm households had significant impact on enhancing nutrition standards. It is essential to adopt a holistic action plan to achieve sustainable food and nutrition security. At the level of each individual we should ensure physical, economic and environmental access to balanced diets, including safe drinking water, primary health and education so as to enable them to lead a healthy and productive life.

An Analysis of Production and Consumption Patterns of Diverse Food Groups - Food Security Concerns in Andhra Pradesh

K. Suhasini, R.V. Sujatha and Y. Eswara Prasad*

The study undertakes to analyse the growth rates in production of food crops before and after WTO Agreement, changes in consumption pattern, alongwith estimates of demand analysis of impact of food policy decisions on food security and suggest alternative strategies. The growth trend in production of major food items such as grains, pulses, oilseeds, fruits, vegetables, egg, milk and meat are analysed for pre-WTO and post-WTO periods, namely, Period I (1986-95), Period II (1996-2005) and over all period (from 1986-2005). Foodgrain production registered a

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growth rate of 0.65 per cent during period II and the overall growth is 1.44 per cent which seemed to be much lower than the growth rate of population (1.99 per cent) for Andhra Pradesh. This may compel the government to adopt the policy to importing foodgrains in a big way. A negative growth rate in oilseed necessitates the novel approach to improve oilseed production using biotechnology tools. Despite the positive growth seen in pulses production during post-WTO period it could not enhance the per capita availability of pulses more than 0.72 kg/month. Production and demand have been projected for two points of time and the gap of cereal production was observed to be 2628 MT and 3766 MT respectively for 2010 and 2025 excluding the demand for animal feed. If the ideal expenditure is worked out by considering the recommended diet of ICMR and prices prevailing to arrive at the average monthly income required to have balanced diet, it is found to be Rs. 598 for females and Rs.692 for males. A primary data survey conducted in Mahaboobnagar district has shown that for small and marginal farmers, about 85.56 per cent of the production goes to market and only 7.49 per cent of the production is used for family consumption showing three-fourth of food requirement as deficit to a household. Therefore, there is a need to restrict the role of private sector in procurement of foodgrains, develop infrastructure of godowns and warehouses, continue with public distribution system with variety of basic food items and make them available on time in order to provide access to balanced diet.

Trend of Consumption of Nutrition Diets and the Transformation of Food Supply in India

Sant Ram, T.R. Singh, B.K. Gupta and Rajesh Kumar[†]

In this paper we have examined the change in the nature of food demand in India in the last twenty years. The study has identified two distinct stages of diet transition associated with the period of economic growth. The impact of globalisation has implications for food supply systems. Liberalisation has meant that large food chains have a strong incentive to enter the very large Indian market but given their relative bargaining power this could have adverse effects on Indian suppliers. There has been a significant change in the food grain scenario from scarcity to surplus situation because of the acceleration in the production of foodgrains in the 1980s. More significant is foodgrain stocks held by the Government. The predictions are that the surplus situation will be sustained. Agriculture is going to be diversified and the export of rice, wheat and agro-products will increase. However, whilst agricultural diversification has marked the process of transition in food production in order to

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meet the changes in food demand this need not spell the demise of small farmers. Though the supply prospects of Indian agriculture appear to be bright, the most challenging problem at the moment is created by the leveling of cereals and calorie intake. There is evidence that the income of the poor which is a key factor in food entitlement has shown a moderate improvement and the relative prices of cereals which is another factor determinant of food supply. The major challenge facing domestic agriculture is the need to adopt its production systems in order to meet the requirements of the two stages of diet diversification. There is a considerable evidence that the proportion of the Indian population that fails to enjoy an adequate diet is sizeable; even if further changes in consumer preferences are assumed away, cereal consumption per head is likely to increase at 0.5 per cent per annum. In contrast to the slow growth of cereal demand, there will be considerable expansion of demand for non-cereal food which is less calorie intensive. The recent evidence shows that domestic price is generally lower than the international price for cereals and higher for other food items. If liberalisation has its way and the cereals price is allowed to increase and the other prices are allowed to fall in order to integrate the domestic market with the international market, the poor may be hurt in transition since cereals are by far the major and cheap source of calories. Raising the real income of poor to enable them to buy more food, though an important instrument of improving nutrition, would be a slow process. Hence, the need for better targeted public distribution system, supplementary feeding etc, remains even in the next fifteen years with the transition of the grain economy from a scarcity to surplus situation. The policy thrust must shift from irrigated crops in the green revolution belt to rainfed crops in the lagging regions where there is high concentration of poverty and food insecurity. This involves not only in emphasising different technologies but also spreading agricultural growth far more widely than in the past. Public investment should flow more into development of watersheds, conservation and productive use of common lands and wide range of infrastructures in the backward regions. The policy agenda needs to focus on incentives that promote agricultural diversification, but also at the same time enhance the competitiveness of cereal crop production.

Improving Food Consumption and Nutrition Through Efficient Food Security System

Brahm Prakash*, D.K. Sharma* and V.P. Tyagi**

India has made significant progress in food production, disease control and economic and social development since Independence. Per capita availability of total foodgrains in India which was 144.1 kg/year during 1951 increased to 169.1 kg/year

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during 2004. But it is still lower than that of 182.5 kg/year recommended by Indian Council of Medical Research. Apart from foodgrains, the per capita availability of fruits and vegetables, milk, egg, fish and meat has also increased considerably. In spite of these achievements, India still accounts for 40 per cent of the world's malnourished children and about 60 per cent of Indian women are anaemic. It may be due to low calorie intake in the country. Low calorie intake has been noticed even in large percentage of population in comparatively economically better states like Maharashtra, Kerala and Karnataka. Even protein calorie inadequacy and Vitamin A deficiency has been noticed in most of the states of the country. Even during 1999-2000, 27.1 per cent of rural and 23.6 per cent of urban Indians were below poverty line which indicate that their per capita consumption expenditure level could not meet the average per capita daily calorie requirement of 2400 calories in rural areas and 2100 calories in urban areas along with a minimum non-food expenditure. In rural and urban areas, cereals which accounted for 55.7 per cent and 38.2 per cent of the per capita expenditure as percentage of total monthly per capita expenditure (MPCE) of total food items during 1972-73 has declined to 51 per cent and 23.4 per cent during 2002. But in spite of declining per capita consumption of cereals and calorie intake, the life expectancy of the Indians which was 32.1 years during 1951 has increased to about 62 years now. The death rate per thousand population which was 22.8 during 1951-60 has been reduced to about 8 now and infant mortality rate per thousand which was 78 during 1991-92 has been reduced to about 50 now. It revealed that the declining per capita cereal consumption and calorie intake can be treated as a testimonial of improvement in the economic and health status and low cereal/food consumption and calorie intake does not mean a decline in food security. But the efforts should be made to increase the cereal consumption and calorie intake of the poorer section of the society to the level sufficient to meet the subsistence norms.

Food Security in Rural Orissa – Its Demand and Supply Aspects

R.K. Panda[†]

The study attempts to discuss the food security issue of rural Orissa taking into account its demand and supply aspects. Secondary data obtained from different publications of Government of India and Government of Orissa are used for the analysis. The production data of selected commodities are taken from the publications of Government of Orissa for the period from 1991-92 to 2003-04. The findings of the study thus reveal that food security in the state suffers from demand well as supply/production deficiencies. The individuals in rural Orissa suffer greatly as reflected in their low level of consumption expenditure and low intake of high value commodities. The annual production of different food products, particularly

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staple crops exhibit negative growth with high instability. The non-crop commodities also exhibit low annual growth rate. In view of the above findings, there is urgent need to reduce negative growth and instability in the production of staple commodities like rice and cereals as these are considered poor man's food. Pulses being considered as poor man's protein, steps should be taken to bring in more area for the cultivation of pulses, particularly in dry areas of the state to reduce its high negative growth and instability. The production of non-crop food items needs to be stepped up in the state as the production of these commodities is found less volatile. The policy strategy to develop different allied activities needs to be changed and separate policy programmes are to be taken up to accelerate growth of this sector. To increase the purchasing power among the rural people different non-farm activities under state initiative needs to be developed. Effective implementation of rural employment programmes will go a long way in enhancing the purchasing power among the rural people.

Status of Food and Nutritional Security in Himachal Pradesh – Empirical Assessment

K.D. Sharma, Harbans Lal and Manoj Gupta*

The study based on micro and macro level data pertaining to the hill state of Himachal Pradesh examine the status of food and nutritional security scenario in Himachal Pradesh and supports the argument that the diverse production base and variety of food products produced in the state offer better opportunities to achieve food and nutritional security. It has been estimated that at the state level, the aggregate energy values of all food products during 1999-2000 was to the tune of 28,907 billion kilocalories. Foodgrains (mainly cereals) accounted for about 62 per cent of the total energy, 64 per cent of the carbohydrates, 67 per cent of proteins and 36 per cent of fats. Livestock products (mainly milk) were found to be the major source of fats accounting for about 54 per cent of the total fats available from all sources. Thus, it was observed that in the absence of sufficient production of oilseeds, the dairy industry plays a crucial role in meeting the requirement of oils/fats in the state. Per capita availability of total food energy has been estimated at 2500 calories which is appreciably higher than the minimum requirement of 2250 calories. Similarly, the availability of carbohydrates and proteins is satisfactory. Keeping in view the dietary pattern as well as the recommendations made by ICMR, the state is found to be surplus in maize, vegetables and fruits but deficit in rice, pulses, oilseeds and milk. It was found that farmers could strengthen food security by producing more high value commercial crops and purchasing foodgrains from other surplus

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areas. By growing vegetable crops and fruits, farmers can strengthen food security remarkably rather than producing traditional cereal crops. It has been observed that farmers producing off-season vegetables and fruits are far more food secure than the farmers producing cereal crops. Therefore, emphasis should be laid on promoting high value commercial crops supported with efficient marketing and processing infrastructure. Surplus maize that has versatile nutritive values, multifarious industrial uses and major contributor towards food security can be used as feed and fodder to increase the supply of livestock products, which are in short supply in the state. There is also need to increase the yields of crops mainly wheat, rice, pulses and oilseeds, presently below the national average, to reduce the deficit.

Impact of Improved Technologies on Food Consumption: A Village Level Study of Chhattisgarh

A.K. Gauraha[†]

The nature of food security challenges in India is changing fast. The twin challenges facing us now are first, increasing the management efficiency and productivity of small farms (for ensuring an ecological sustainability to agricultural production) and secondly, improving the consumption capacity (towards the nutrition security) of the rural poor. Keeping in view the above aspects an attempt has been made to examine the impact of new technology on the income, employment and consumption pattern on small farms at two points of time, viz., 1986-87 and 2004-05. The study was conducted in Semartara village of Fingeshwar block of Raipur district of Chhattisgarh. The study concludes that the number of farmers has increased but the average family size and average operational holding has decreased due to subdivision of holding and households within the size of the group of farm. In rainy (*kharif*) season, there has been shift in area from local and improved varieties of paddy to high-yielding varieties (HYVs) paddy. This shows a shift from low income varieties to high income varieties. Thus, the new technology has tended to promote specialisation as against diversification among crop enterprises. There is a clear shift of food consumption expenditure to non-food expenditure and saving. The quantity of food items consumed has been found below the recommended level in almost all the food items except cereals in both the periods. It could be further concluded that the deficit consumption was more in case of vegetables and milk in both the periods. The findings suggest that the small farms have been sustaining food security through improving the efficiency and productivity of agriculture without damaging the ecological sustainability. More emphasis should be given to winter (*rabi*) and

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summer crops in terms of assured two to three irrigation through tubewell irrigation so that the farmers may use HYVs and more balanced inputs towards the higher benefit. In respect of infrastructure provision one of the most efficacious instruments for generating overall non-farm employment growth appears to be capital expenditure on minor irrigation projects, roads, development of market, public distribution system etc. This may go a long way in enhancing the well being of small farmers. When we move from the concept of food security to nutrition security the challenge becomes even greater. Nutritional security is essential for providing children with an opportunity for the full expression of their innate genetic potential for physical and mental development and for adults with an opportunity for a productive life. There is a need to train the rural women by Government, NGOs and private sector health workers on various aspects of balanced nutrition for adult and children so that the nutritional security could be achieved.

Minimising Food Losses: A Vital Complementary Measure to Improve Food Security

D.K. Grover and Parminder Singh*

To estimate correctly the food supplies available, the losses during and after harvest in terms of storage, transportation and marketing, etc. need to be studied scientifically. The present study has been initiated to estimate the wastage ratio of foodgrain during and after harvest in Punjab and to suggest policy measures for minimising such losses. The study is confined to two crops, i.e., wheat and mungbean based on the predominant area in the state. A total sample of 600 cultivators, viz., 300 wheat growers + 300 mungbean growers, spread over the four strata growing wheat and mungbean in Amritsar and Sangrur districts, respectively was selected for the survey. The reference year of the study is 2004-05. The total wheat wastage at harvest as well as various post-harvest stages taken together accounted for 2.46 per cent of net wheat production in the study area. It turned to be highest for small categories, i.e., 3.44 per cent followed by 2.53 per cent on medium category. Minimum losses occurred on large holdings, i.e., 2.05 per cent of the net wheat production. In case of mungbean, the total wastage (harvesting stages and post-harvest stages) has been estimated as 1.04 per cent. Total wastage as proportion of net mungbean production worked out to be 1.35 per cent, 1.09 per cent and 0.93 per cent on small, medium and large farm size respectively. The major reason for these negative relationships of harvesting loss with the size of holding was that the small farmers usually harvested wheat mainly manually with sickles and use ordinary thresher for threshing, whereas the relatively larger farmers harvested and threshed their crop with sophisticated machinery like combine harvester resulting in saving

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some grains. Based on the estimated wastage ratio at post-harvest prices, the Punjab incurred losses to the tune of Rs. 245 crores in wheat and Rs. 0.23 crores in mungbean during the study period. These huge losses need to be minimised by adopting improved foodgrain handling practices, thus making more grain available for human consumption to tackle the issue of food security partially.

Food Security Scenario in India Towards Eleventh Five Year Plan

Gajendra Singh* and T.S. Bhogal**

In a developing country like India, food security means making available minimum quantity of foodgrains to the entire population. Despite the fact that India has made a satisfactory achievement in food grains production, its population growth has nullified the benefits of production. Thus, examination of food-population relationship is very important. Therefore, the present study is devoted to estimate the supply of food grains and its requirement to visualise the food security scenario for the major states of the country, which accounts for about 97 per cent of total production as well as population, up to the period close to the eleventh five-year plan (2010-11). The projection of production of cereals and pulses was made for the years 2005-06 and 2010-11 using regression, exponential and moving averages and other econometric methods based on their suitability. The requirement for food grains was estimated, age group wise, using ICMR dietary recommendation. The study reveals that cereals and pulses will be in deficit during the year 2005-06 by 199 and 5528 thousand tonnes, respectively. However, in the year 2010-11, production of the cereals would be marginally in surplus by 2910 thousand tonnes while the pulses would be in deficit by 6,177 thousand tonnes. Comparing the results for different states for the year 2005-06, it was observed that the largest surplus of cereals will be contributed by Punjab followed by Haryana, Uttar Pradesh, Rajasthan, Madhya Pradesh and with a marginal surplus by the state of Himachal Pradesh. In the case of pulses, the largest surplus would be contributed by Madhya Pradesh followed by Rajasthan and Maharashtra. Only Madhya Pradesh and Rajasthan would be the states which can fulfill their requirements of cereals and pulses both but the largest contribution of food grains to the nation would be from Punjab followed by Haryana, Uttar Pradesh, Rajasthan and Madhya Pradesh. The major conclusions which can be drawn from the study are that Haryana, Punjab, Rajasthan, Madhya Pradesh and Uttar Pradesh will continue to be the backbone of food security of the country in the near future; both cereals and pulses would be deficit in Tenth five year plan while the self-sufficiency is expected to be observed in the case of cereals in the coming Eleventh five year plan, pulses will continue to be in deficit; lastly a constructive policy and

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planning framework is very essential to ensure the food supply that would be commensurate with the population growth in the country in the long run without discrimination on the basis of social and economic classes, gender and age groups.

Food and Nutritional Security in India: Revisited

V.R. Kiresur*, **G.S.V. Raghavan[†]**, **V. Sosle[†]** and **V.S. Kulkarni***

India's food security situation was precarious at the time of Independence. But due to hard work put forth by the researchers, farmers and the government, self-sufficiency could be achieved by the end of the 1970s. However, food security on regional and especially on household level could not be achieved due to poverty and problems in food distribution. Nearly 350 million people (about 33 per cent) are living in poverty and the absolute number of poor has been increasing during the last decade. The low priced food made available through PDS is also not affordable by the very poor. The effectiveness of the PDS system is low in rural areas, due to high wastage, leakage and transportation bottlenecks leading to poor availability. The burgeoning population of over a billion not only marginalises the economic achievement of our country but also does not allow the country to substantially enhance the food and nutritional security of the people. All these factors together have put the food and nutritional security of the country on a shaky ground. In order to improve the food and nutritional status of the country, we need to focus our attention on the following issues: (a) Rapid economic growth with steep rise in per capita income, backed by effective redistribution policies; (b) A second green revolution in crops other than rice and wheat and in areas other than the already benefited ones; (c) Maintaining and further increasing the tempo in growth of horticulture, animal husbandry and fisheries sectors; (d) Technical education and development of human resources; (e) Sharply focused, people-led and asset building programmes in rural areas; (f) Targeting of PDS to provide an effective safety net only for identified poor households; (g) Integration of nutrition programmes with health and education; (h) Finally, and most importantly, an effective population control programme.

Food Security: Some Implications on Indian Agriculture

Arjinder Kaur and Kiran Sethi[†]

The concept of 'food security' involves the linkage between population growth and food production and also the need to evolve measures to satisfy the ever growing food requirements of the nation. It is a basis for improving human welfare, achieving

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social justice, securing democracy and saving the pride of a nation. Foodgrains production was found to be increasing over decades, but wide variations in its decadal growth rates vis-à-vis of that of population hints at the prevalence of Malthusian pessimism. The hype to diversify away from foodgrains was put to rest by the study as it was found that gross cropped area increased at a rate of 0.69 per cent per annum and annual compound growth rate of area under foodgrains was 0.43 per cent per annum and of non-foodgrains it was 1.30 per cent per annum. The net availability of foodgrains per capita per day though declined in recent years, but was found to be substantially higher than the average recommended level for an adult person and also from actual consumption calculated from NSSO data. A comparison of grain stocks with the government and minimum buffer norms depicted a declining trend in stocks but still higher than the minimum norms. And the growth rates for exports of foodgrains in total agricultural exports were found to be higher both in quantitative and value terms than that of imports of foodgrains in the post-liberalised period. So, the present food scenario may create a feeling of complacency and lessen the fear of food shortage in the country, but unpredictable weather and consequent increase and decline in food output can always spell danger. Efforts should be continued on the population front also to solve the food problem that increased production is accompanied by population control. There is need for a more flexible and rational approach towards diversification of agriculture and food security is warranted for the Indian population under the process of new economic policy.

Towards a Nutrition Secure India: Intervention of the Government

Rajashree Padhi*

The study attempts to understand the various states' efforts in making India nutrition secure while introducing several nutrition related programmes. The slow progress of achievement of basic human development indicators like infant mortality rate, maternal mortality rate, birth weights, the larger number of undernourished and anemic women and children reflects the poor nutritional status of the population. Therefore, provision of adequate and nutritious food to the entire population has thus become the primary component of government's policy and an essential element of its plans and programmes. The experiences indicate that social variables continue to have a strong influence in the nutritional status of pre-school children. The efforts to improve child nutrition will not be successful without active participation of the community. Private industries could also be given incentives for participation and partnership in infrastructure development. A great potential for fortification of foods like milk, oil, sugar and salt exists with active participation of the private sector to combat the micronutrient deficiencies. It is thus necessary to find out the ways and

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means to implement existing laws with the proper participation of the community co-operation from the private sector and voluntary agencies.

Growth of Production and Productivity of Principal Crops and Constraints of Food Security in Madhya Pradesh

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The paper attempts to examine the growth of area, production and productivity of principal crops and constraints of food security in Madhya Pradesh. The secondary data were collected from Government of Madhya Pradesh *Compendium of Agricultural Statistics 2001*. The annual compound growth rates of area, production and productivity of principal crops in Madhya Pradesh were calculated for the period 1986-87 to 2000-01. The growth behaviour was analysed with the help of exponential function $Y = a.b^X$ using least square method. The trend analysis indicates that there was a major breakthrough in the annual compound growth rates of area and productivity of oilseeds at 2.35 per cent and 1.68 per cent respectively, resulting in higher growth of production at 4.03 per cent per annum. The trend rate of growth of different crops has also confirmed the fact that the area under foodgrain crops has declined continuously over the period of 15 years. However, the growth rate of productivity of different crops has dispelled the fear that continuous reduction of area under foodgrain crops would make an adverse impact on the production of foodgrains. The trend rate of growth of productivity of different foodgrain crops is much higher than the growth rate of area and in fact it was very impressive. In the case of cereals, the growth in area was not high but the increase in productivity was quite promising. Pulses showed non-significant results as there has been wide variability. This could be seen from the results that no substitution took place among foodgrains and oilseeds as a whole, as gross area sown also increased with a growth rate of 0.42 per cent per annum. The irrigated area increased at the rate of 1.74 per cent per annum, which might be the reason for increase in the yields. Cropwise compound growth rates show that potato and sugarcane have experienced respectively the highest and the second highest growth rates in both area and production. But variability in both aspects is higher in the case of potato than in the case of sugarcane. However, potato has experienced the highest increase in productivity. Among the foodgrains, wheat stands second next to barley in productivity increase. Lowest productivity increase among the foodgrains is found in the case of coarse cereals. The introduction of high-yielding varieties technology from the mid-sixties has been conspicuous only in small pockets of well endowed

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irrigated area. It can be concluded that cropping pattern is changing in favour of remunerative crops. Presently, this is not affecting food security adversely as there is enough scope to increase the cropped area. The state is yet to achieve a breakthrough in pulse production. Improving opportunities for increasing incomes of the poorest of the poor may be as important to their food security as providing them with new productivity enhancing technologies. Development of suitable farming systems for sustainable livelihood security of the resource poor households through maximising income and employment by increasing the productivity of resources is suggested. Besides some of the policy measures included; appropriate agricultural policy which create conducive economic incentives to ensure that modern inputs used efficiently and at acceptable environmental cost; strengthening infrastructure facilities especially better post-harvest technology; ensure that risks and uncertainties are managed efficiently especially in rainfed areas; institutionalisation of a support led security system, including a targeted public distribution system for vulnerable groups; fostering agri-business consortium between small farmers and corporate industry. The potential benefits of biotechnology are considerable. Biotechnology is enhancing the quality of food in addition to improving the quantity of food. It can improve the sustainability of production systems by requiring fewer inputs to control pests and better protect the quality of water and land mass around us. Thus the human and environmental benefits of agricultural biotechnology could be dramatic and widespread. In summary, biotechnology, applied to agriculture, will effectively help in achieving future food security for our country.