**Original Research Article**

# WHAT ARE WE ASSESSING WHILE MEASURING FOOD SECURITY: LESSONS FROM PURVANCHAL

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**ABSTRACT:** In advanced countries, increasing concern has developed in the past several decades about Food & Nutrition through health exposure to reduce risks of illness to occupants. These have grown out of previous and contemporary concern for the health consequences of only food. In developing countries, this trend in research and development (in the form of food renewal programme and diet programme) is relatively recent. And, problems of nutrition in towns and small cities are little understood. It is now increasingly realized that among the numerous problems food problem is the basic problem of humans today in India especially in poor regions like Bihar, Uttar Pradesh Orissa and Rajasthan. To find out and to measure the actual scenario of a backward region of Eastern Uttar Pradesh known as Purvanchal region Food Accessibility Index calculation has been done. Basically, the accessibility is depended upon the purchasing power of the population which is directly or indirectly somewhere related upon several factors.   The concept involves evaluation of the current situation and policy requirements pertaining to sustainable development [Singh and Hiramath 2010]. Food Accessibility index and security indicators draw attention to the factors that distinguishes the food secure districts from the food insecure districts.

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## 1. INTRODUCTION

Food and Agricultural Organization [FAO] analysis in 1983 focused on food access, leading to a definition based on the balance between the demand and supply side of the food security equation, it stated that *"Ensuring that all people at all times have both physical and economic access to the basic food that they need"*. In 1996 countries at the World Food Summit agreed on an achievable target to halve the number of hungry people in the world by 2015. This was complemented by Sen's theory of famine [1981] which highlighted the effect of personal entitlements on food access, i.e. production, labor, trade and transfer based resources. The Brundtland Commission defined sustainable development as the "ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987). The report of the commission emphasized that human needs are basic and essential for economic growth but it is equally important to share the resources with the people to sustain them in an equitable manner (Robert et al. 2013).The term food security is extensively discussed in the recent past, but actually it is the food insecurity and its causes which is the evident problem concerning economic development in developing countries. In developing countries poverty is not determined by growth alone. In fact it depends on the structure of the society, the manner in which food production, distribution and proper planning for growth are organized. It is the accessibility which determined the structure of the society; by looking a well-off society we can guess the food behavior of these people. The eastern part of Uttar Pradesh having diverse and complex agro ecological situation marked by frequent floods and droughts is known as Purvanchal. Though the region is richest in natural gift of water supply and fertile soil, still these people are lacking behind in terms of health and economy, to find out the actual scenario and causes of these failure in the region some calculations has been done. The region Purvanchal extends between $28°44''$ N to $24°26''$ N latitude and $80°03''$ E to $83°00''$ E longitude covering an area of about 85,845 sq. km Purvanchal consists of 27 districts of Uttar Pradesh.
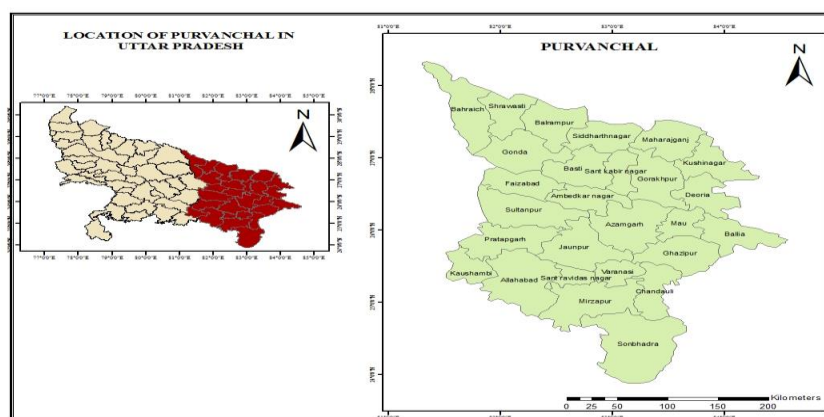


**Figure: 1 Location of Study Area**

**Food Accessibility:**

In 1970s, the focus of "food security" was only concerned with national and global food supplies, after a decade this focus shifted to questions of access to food at household and individual levels. The mere availability of food in the country is not sufficient to ensure access to food for all. Economic access of a household to adequate food depends on its purchasing power including the implicit value of its own production if any. According to the World Resources Institute, global per capita food production has been increasing substantially for the past several decades. In 2006, [MSNBC] reported that globally, the number of people who are overweight has surpassed the numbers who are undernourished – the world had more than one billion people who were overweight, and an estimated 800 million who were undernourished. In India, the second-most populous country in the world, 30 million people have been added to the ranks of the hungry since the mid-1990s and 46% of children are underweight (M.S.Swaminathan Report 1993).This is the scenario of hungry and undernourished as well as overweight. No doubt the availability of food is the most key factor of food security, but it is not enough. It should also be affordable and people should be able to access it. Access is tied up with people's capacity to buy, their earnings, livelihoods and other socio-economic factors (Abhijit, S.2010). To analyze and find out the facts it is calculated through several indicators. Basically, accessibility is depended upon the purchasing power of the population which is directly or indirectly somewhere related upon several factors. The indicators that have been taken into consideration so as to discuss the food accessibility are per capita income, population below poverty line, scheduled caste population, female literacy, work participation rate, proportion of agricultural workers, and public distribution system.

**Data Base and Methodology (Materials and Methods):** For the calculation of Food Availability Index (FAI) Max-Min (range estimation method) approach has been adopted. An index for each variable has been constructed. This is calculated by applying the following general Range Equalization Method (REM) adopted by the UNDP (HDR, 2005).

The formula is as under;

Variable Index = (Xi –Min X) / (Max X-Min X)

Where Xi = value of the variable

Min X= Minimum value of X in the scaling

Max X = Maximum value of X in the scaling

**Analysis of Accessibility Index:**

**1. Per Capita Income:**

Income is the principal factor as it plays a major role in accessibility of food of a family. The poor lack ownership of or access to assets such as land, water, forest, dwelling units, credit, literacy, longevity, voice and capital-both physical and social. It is evident from the **(Table: 1)** that the average per capita income of Purvanchal in 1991 was Rs. 3370.7. About 66.66 per cent districts had reported per capita income below the average of Purvanchal. It ranges between Rs. 3459 to Rs. 5838. Only nine districts come above this average income.

**2. Population below Poverty Line:**

It is used in determining the accessibility of a region. In-fact this shows the actual scenario of a country. At the global level, the South Asian region is home to more chronically food insecure people than any other region in the world. The average population below poverty line in Purvanchal in 1991 was 9.24 per cent. The proportion improved marginally to 8.2 per cent in 2001. In 1991, there were 10 districts having more BPL families than average 9.24.

**3.Proportion of Schedule Caste Population:**

The SC households are generally food insecure, largely because of their economic and social backwardness, due to historical deprivation and exclusion from mainstream population. These sections of the population are deprived of food access and livelihood access due to their disadvantaged position as a Scheduled Caste. The average percentage of SC population in Purvanchal in 1991 was 21.30 per cent. Out of 27 districts there are about 13 districts (48.14 per cent) which had more than average SC population of the study area.

**4.Female Literacy:**

It is a well-known fact that there are gender-based inequalities in food consumption within a household. Consequently, household consumption data cannot tell the real story of the household's food distribution and related facilities. Purpose is that a higher literacy rate of a woman is more likely to enable women to enhance their roles in family decision-making and increase their share of household consumption. It is evident from the (Table: 1) that there exists very low level of female literacy. The average female literacy of Purvanchal in 1991 is only 19.08 per cent. The spatial distribution is such that 50 per cent districts have literacy level more than the regional average and the remaining below the average.

**5.Proportion of Working Age Population:**

The ratio between the productive sections of the population to the economically dependent part is a valid demographic indicator at the household level. A ratio higher than a unity represents a positive scenario with more productive

| Districts | Per Capita Income | | Below Poverty Line (%) | | SC Population (%) | | Female Literacy(%) | | Work ParticipationRate (%) | | Agricultural Workers (%) | | Number of PDS | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1991 | 2001 | 1991 | 2001 | 1991 | 2001 | 1991 | 2001 | 1991 | 2001 | 1991 | 2001 | 1991 | 2001 |
| Bahraich | 3677 | 5493 | 17.04 | 13.05 | 15.12 | 14.39 | 10.73 | 22.78 | 32.51 | 26.58 | 3.56 | 21.71 | 429 | 734 |
| Shrawasti | 3122 | 5123 | 6.83 | 7.60 | 19.13 | 18.39 | 7.3 | 18.58 | 33.96 | 28.81 | 3.25 | 25.21 | 239 | 454 |
| Balrampur | 3002 | 5462 | 3.45 | 4.06 | 14.3 | 13.48 | 11.2 | 21.79 | 35.81 | 29.82 | 3.18 | 25.22 | 271 | 530 |
| Gonda | 2899 | 5395 | 5.22 | 5.87 | 16.35 | 15.67 | 12.58 | 27.17 | 31.32 | 25.21 | 3.62 | 20.65 | 423 | 766 |
| Siddharthnagar | 3017 | 6054 | 5.65 | 5.11 | 16.73 | 16.53 | 11.84 | 27.08 | 32.6 | 24.19 | 3.36 | 20.33 | 231 | 897 |
| Basti | 3200 | 6170 | 11.06 | 10.35 | 20.9 | 20.87 | 17.82 | 36.92 | 29.68 | 23.19 | 3.93 | 17.95 | 704 | 989 |
| Santkabirnagar | 2899 | 5989 | 8.78 | 7.21 | 21.13 | 21.19 | 16.8 | 34.92 | 28.25 | 20.77 | 4.03 | 15.95 | 376 | 999 |
| Maharajganj | 3012 | 6778 | 6.72 | 5.41 | 19.41 | 19.51 | 10.28 | 27.93 | 34.07 | 22.05 | 3.3 | 17.33 | 519 | 723 |
| Gorakhpur | 3459 | 6940 | 4.89 | 4.05 | 22.04 | 22.05 | 24.49 | 42.88 | 27.07 | 18.38 | 5.2 | 9.95 | 998 | 1044 |
| Deoria | 4420 | 5629 | 4.37 | 3.70 | 15.02 | 18.19 | 18.75 | 42.51 | 25.62 | 17.16 | 4.95 | 11.14 | 545 | 998 |
| Kushinagar | 2459 | 6237 | 9.43 | 7.60 | 16.07 | 18.12 | 13.9 | 29.64 | 29.39 | 19.87 | 3.36 | 15.33 | 330 | 1022 |
| Ballia | 3210 | 6199 | 5.75 | 4.91 | 14.69 | 16.46 | 26.13 | 43.16 | 26.7 | 18.27 | 4.73 | 11.68 | 663 | 1021 |
| Mau | 4104 | 7866 | 7.61 | 6.17 | 22.06 | 22.74 | 27.86 | 48.66 | 27.8 | 21.41 | 5.26 | 11.1 | 672 | 972 |
| Azamgarh | 3841 | 6235 | 3.22 | 3.59 | 25.81 | 25.73 | 22.67 | 43.4 | 26.09 | 19.55 | 4.88 | 13.06 | 912 | 1041 |
| Faizabad | 3258 | 6753 | 5.79 | 4.45 | 22.23 | 22.59 | 22.97 | 42.26 | 31.69 | 25.27 | 3.95 | 17.66 | 596 | 758 |
| Ambedkarnagar | 3544 | 5791 | 20.94 | 18.84 | 23.7 | 24.44 | 23.3 | 43.5 | 28.6 | 21.82 | 4.37 | 15.14 | 602 | 978 |
| Sultanpur | 2891 | 6933 | 10.74 | 9.26 | 22.27 | 22.25 | 20.84 | 40.86 | 29.43 | 21.12 | 4.04 | 14.88 | 492 | 708 |
| Pratapgarh | 2505 | 5404 | 49.95 | 41.89 | 21.49 | 22.01 | 20.48 | 41.54 | 29.08 | 21.19 | 4.16 | 15.27 | 662 | 946 |
| Jaunpur | 2599 | 5947 | 3.43 | 4.10 | 21.78 | 21.93 | 22.39 | 44.07 | 25.47 | 20.17 | 5.14 | 13.43 | 686 | 1002 |
| Allahabad | 4622 | 9452 | 4.68 | 4.09 | 21.59 | 21.58 | 23.45 | 46.38 | 30.48 | 22.42 | 5.15 | 11.26 | 702 | 1054 |
| Kaushambi | 3206 | 6517 | 10.14 | 11.17 | 35.4 | 36.1 | 12 | 29.79 | 35.58 | 25.16 | 3.23 | 18.73 | 321 | 439 |
| Mirzapur | 2899 | 7766 | 10.88 | 8.75 | 25.95 | 26.76 | 22.32 | 39.26 | 32.17 | 23.58 | 4.69 | 13.26 | 402 | 801 |
| Ghazipur | 3299 | 6313 | 5.60 | 5.11 | 20.57 | 21.38 | 24.38 | 44.03 | 27.02 | 21.31 | 4.68 | 14.36 | 628 | 776 |
| Varanasi | 2345 | 7826 | 2.43 | 2.00 | 13.83 | 13.88 | 28.87 | 53.05 | 28.51 | 24.56 | 9.46 | 6.33 | 481 | 730 |
| Chandauli | 3254 | 8328 | 9.43 | 7.60 | 24.08 | 24.29 | 26.4 | 44.13 | 30.87 | 20.69 | 4.26 | 11.9 | 399 | 608 |
| Sant Ravidas Nagar | 4428 | 10581 | 4.37 | 3.78 | 21.16 | 21.63 | 16.8 | 38.44 | 27.14 | 20.06 | 7.14 | 6.75 | 428 | 543 |
| Sonbhadra | 5838 | 17722 | 11.16 | 11.16 | 42.5 | 41.92 | 18.65 | 33.7 | 38.23 | 24.61 | 3.4 | 16.18 | 298 | 505 |
| Average | 3370 | 7070 | 9.24 | 8.20 | 21.31 | 21.6 | 9.1 | 37.3 | 30.2 | 22.5 | 4.45 | 15.25 | 518 | 816 |

Table: 1. Indicators of Food Availability in Purvachal , Source: Data Calculated by Author obtained from Economic and Statistics Department, Lucknow

## 6.Proportion of Agricultural Workers:

The agricultural laborers are characterized by extremely poor physical and human capital as well as having the highest poverty levels. Thus, the proportion of agricultural laborers is negatively related to food security, i.e. more the agricultural workers in a society, the worse is its food security situation. It is a known fact that the economy of Purvanchal is directed by agriculture. Agricultural laborers accounted for about 4.45 per cent (1991) and 15.25 (2001) per cent of the total workforce of Purvanchal.

## 7.Public Distribution System:

The public distribution system plays an important role in a country, especially in a third world country whose economy is largely dependent on agriculture. In the given exercise, instead of number of PDS per lakh population actual number of PDS in each district is considered because we believe that the number of PDS indicates its density and the distance between two PDS. Larger number of PDS means the consumers must travel lesser distance. Highest number of PDS are found in Deoria (998) followed by Faizabad (912) and lowest in Siddharthnagar (213) followed by Sharawasti (239) in 1991. The number of PDS increased significantly in 2001. For, there are six districts having PDS more than 1000 and eight districts had more than 800 such shops in 2001.

| Districts | 1991 | | 2001 | | Change 1991-2001 | |
|---|---|---|---|---|---|---|
| | Index | Rank | Index | Rank | Per Cent | Rank |
| Bahraich | 0.25 | 20 | 0.36 | 14 | 41.67 | 6 |
| Shrawasti | 0.17 | 25 | 0.32 | 24 | 90.16 | 1 |
| Balrampur | 0.18 | 24 | 0.33 | 21 | 82.75 | 3 |
| Gonda | 0.19 | 23 | 0.34 | 18 | 78.38 | 5 |
| Siddharthnagar | 0.17 | 26 | 0.36 | 13 | 119.70 | 13 |
| Basti | 0.32 | 15 | 0.44 | 5 | 37.86 | 10 |
| Santkabirnagar | 0.22 | 22 | 0.38 | 12 | 73.21 | 10 |
| Maharajganj | 0.24 | 21 | 0.30 | 25 | 26.61 | -4 |
| Gorakhpur | 0.41 | 5 | 0.35 | 17 | -14.74 | -12 |
| Deoria | 0.27 | 19 | 0.30 | 26 | 10.25 | -7 |
| Kushinagar | 0.15 | 27 | 0.34 | 20 | 128.48 | 7 |

| Ballia | 0.30 | 16 | 0.33 | 22 | 7.88 | -6 |
|---|---|---|---|---|---|---|
| Mau | 0.42 | 3 | 0.43 | 6 | 1.14 | -3 |
| Azamgarh | 0.40 | 6 | 0.40 | 9 | 0.73 | -3 |
| Faizabad | 0.35 | 11 | 0.42 | 7 | 21.32 | 4 |
| Ambedkarnagar | 0.39 | 7 | 0.47 | 3 | 20.34 | 4 |
| Sultanpur | 0.29 | 17 | 0.35 | 16 | 21.67 | 1 |
| Pratapgarh | 0.42 | 4 | 0.51 | 2 | 23.23 | 2 |
| Jaunpur | 0.28 | 18 | 0.38 | 11 | 35.81 | 7 |
| Allahabad | 0.43 | 2 | 0.45 | 4 | 4.10 | -2 |
| Kaushambi | 0.33 | 13 | 0.39 | 10 | 19.72 | 3 |
| Mirzapur | 0.35 | 10 | 0.42 | 8 | 19.01 | 2 |
| Ghazipur | 0.32 | 14 | 0.36 | 15 | 10.90 | -1 |
| Varanasi | 0.37 | 8 | 0.33 | 23 | -10.84 | -15 |
| Chandauli | 0.35 | 9 | 0.34 | 19 | -4.07 | -10 |
| Sant Ravidas Nagar | 0.34 | 12 | 0.25 | 27 | -25.12 | -15 |
| Sonbhadra | 0.55 | 1 | 0.56 | 1 | 1.39 | 0 |

**Table: 2, Accessibility Index Change Detection 1991-2001, Source: Calculated by Author**

**Result of Accessibility Index and Change Detection Analysis in 1991 and 2001**

The study area has emerged as high to very high secure in terms of accessibility as more than 50 per cent districts fall in this category. Sonbhadra ranked first followed by Allahabad and Mau. It is found that all the districts categorized as high to very high secure are lying in the southern and central part of Purvanchal. The remaining districts are categorized as moderate to low secure ranging between 0.15 and 0.31. Except Sant Ravidas Nagar and Varanasi, all such districts are bordering with Nepal (Table 2 Figure 2). The situation deteriorated in 2001 as only 37 per cent districts are categorized as high to very high secure. The index value ranges between 0.38 and 0.55. Sonbhadra with an index of 0.56 retained its rank whereas Allahabad dropped from second rank to fourth rank. Ambedkarnagar district registered a remarkable growth and moved from seventh rank to third place. The spatial distribution of such districts is similar to 1991. The bordering districts are still having poor rank but their number declined. It is observed that the districts with moderate to low security are sporadic and don't follow any specific pattern
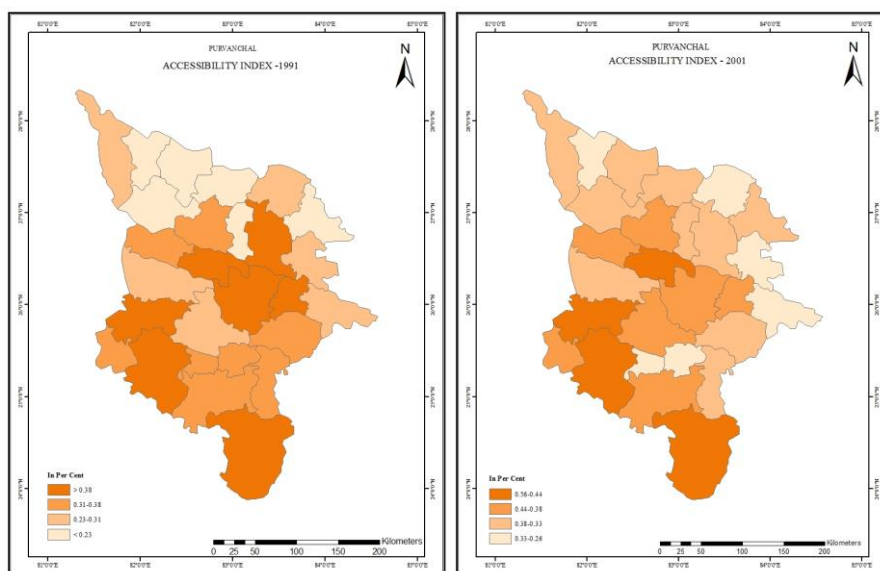
**Figure: 2 Accessibility Index 1991 and 2001**

There are many districts which show growth in accessibility. This growth rate falls between 0.73 per cent to 128.48 per cent, the highest growth rate of 128.48 per cent is recorded in Kushinagar district followed by Siddharthnagar 119.70 per cent, Shrawasti 90.16 per cent, Balrampur 82.75 per cent, Gonda 78.38 and Sant Kabir Nagar of 73.21 per cent.   It may be noted that all such districts are part of Tarai region. Only four districts namely Sant Ravidas Nagar -25.12 per cent, followed by Gorakhpur -14.74 per cent, Varanasi -10.84 per cent and Chandauli -4.07 per cent recorded negative growths in accessibility but there is remarkable change in the ranking of districts. For, there are eleven districts which recorded negative growth in their rank. Gorakhpur, Sant Kabir Nagar and Basti are three districts which need special mention. Gorakhpur recorded a negative growth of -14. 74 per cent and declined from 5th rank to 17th rank. Basti recorded a growth of 37.86 per cent and improved its rank by 10. Similarly, Sant Kabir Nagar recorded a growth of 73.21 per cent and the rank improved by 10. Based on these analysis it is clear that Purvanchal is a region which need a basic improvement in all aspects of economic as well as agricultural development, because the economy is somehow depend on the agriculture, and being an agricultural region it will affect the economy of the country.

**CONFLICT OF INTEREST**

The authors have no conflict of interest.

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