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Pathways from Agriculture to Nutrition

Implications of the Occupation Structure in Rural India

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Pathways from Agriculture to Nutrition: Implications of the Occupation Structure in Rural India

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Abstract

This paper examines whether the emerging occupational structure in rural India is conducive for improving nutrition outcomes. Using data from India's National Sample Survey Organisation's survey of employment and unemployment conducted in 2009-10, this paper establishes that there is greater dietary diversity, which is an intermediate outcome in the pathway to improved nutrition, among cultivators than agricultural laborers. However, over time, there has been a reduction in the number of cultivators and an increase in a number of agricultural laborers. Since poverty is also concentrated among rural labour household, such shifts in occupational structure could prove to be detrimental to addressing the problem of malnutrition.

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1. Introduction

The theme of the report on The State of Food Insecurity in the World 2012 is that: *‘economic growth is necessary but not sufficient to accelerate the reduction of hunger and malnutrition’*. The Report makes an unequivocal point that “Agricultural growth involving smallholders, especially women, will be most effective in reducing extreme poverty and hunger when it increases returns to labour and generates employment for the poor (FAO, WFP and IFAD 2012 p.28)”. From a macro perspective, the report categorically states that “In order for economic growth to enhance the nutrition of the neediest, the poor must participate in the growth process and its benefits: (i) growth needs to involve and reach the poor; (ii) the poor need to use the additional income for improving the quantity and quality of their diets and for improved health services; and (iii) governments need to use additional public resources for public goods and services to benefit the poor and hungry (p.2).” However, in the Indian context, the moot question is whether agricultural growth and overall economic growth benefits small land holders and increases returns to labourers. While India is slated to become a two trillion dollar economy and made significant progress in reducing hunger, the growth process itself has not necessarily proved to be inclusive. Motiram and Naraparaju (2013) find no evidence for pro-poor growth for the lower classes in rural areas, viz. laborers, marginal farmers and small farmers. In their analysis, growth is defined to be pro-poor if the consumption expenditure of the group under consideration is higher than that of the growth in consumption expenditure of the median household.

By pro-poor we mean that One question posed as a puzzle in the literature on undernutrition in India is why the country’s growth process and in particular agricultural growth has not translated into lower levels of malnutrition (Headey, Chiu and Kadiyala 2011). Not only does the occupation structure have implications for poverty reduction it also provides a useful starting point to address this puzzle. Among the pathways from agriculture to nutrition, two pathways that are identified are the following: agriculture as a source of food and agriculture as a source of income. The strength of these two pathways is not obvious given the recent changes in the occupation structure. Firstly, the proportion of cultivators in India’s workforce declined by 7.1 percentage points over the period 2001-11. Secondly, the proportion of agricultural laborers in the workforce increased by 3.5 percent in this period (Office of the Registrar General of India 2013).

Based on current evidence from National Sample Survey Organisation's (NSSO) survey of consumption expenditure poverty is concentrated among rural labour households (Government of India 2008). In 2009-10, 29 percent of rural households can be classified as rural labour households based on their major source of income. The reduction in the proportion of cultivator households coupled with the fact that a large proportion of rural households do not benefit from the growth process has implications for consumption patterns and hence the pace of improvement in nutrition indicators.

Not only is India witness to jobless growth, there is little evidence of workers transitioning from low productive jobs to jobs with higher productivity (Kotwal et al. 2011). In the current ecosystem, small and marginal farmers, and agricultural labourers are neither likely to be engines of growth nor are they likely to directly benefit from overall economic growth given the low share of agriculture in the overall gross domestic product (GDP) and the low rate of growth of agriculture. Consequently, the consumption basket of the households, not benefitting from the overall growth process, is likely to be cereal-centric and not necessarily nutritious. It is indeed true that poorer households get their calories from rice and wheat and not necessarily from nutritious food groups like dairy products, pulses, fruits, vegetables, egg fish and meat etc. In light of the above discussion, the focus of this paper is on dietary diversity which is an intermediate outcome in the pathway to improved nutritional intake.

The analysis presented in this paper is based on two different datasets. The first data set is based on information available as part of Census of India 2001 and 2011. This helps shed light on what the changing occupation structure could imply for reductions in undernutrition. The second data set is the National Sample Survey Organisation's nationally representative survey of employment and unemployment conducted in 2009-10 which has detailed information on the consumption basket of each household. Using this data set we focus on whether there are differences in dietary diversity across rural households classified by their major source of income and form of participation in agriculture.

The rest of the paper is structured as follows. In Section 2 we examine how in the absence of productive jobs certain weak links might emerge in the pathways from agriculture to nutrition. In Section 3 we undertake a multivariate analysis in order to identify differences in dietary diversity of households in rural India. Section 4 concludes

with a discussion of potential entry points for addressing some of the weaknesses in the agriculture-nutrition pathway.

2. Weak Links in the Agriculture-Nutrition Pathway

Gillespie et al. (2012) have identified the following seven pathways from agriculture to nutrition.

1. Agriculture as a source of food, the most direct pathway by which household agricultural production translates into consumption (via crops cultivated by the household)
2. Agriculture as a source of income, either through wages earned by agricultural workers or through the marketed sales of food produced
3. The link between agricultural policy and food prices, involving a range of supply-and-demand factors that affect the prices of various marketed food and nonfood crops, which, in turn, affect the incomes of net sellers and the ability to ensure household food security (including diet quality) of net buyers
4. Income derived from agriculture and how it is actually spent, especially the degree to which nonfood expenditures are allocated to nutrition-relevant activities (for example, expenditures for health, education, and social welfare)
5. Women's socioeconomic status and their ability to influence household decision-making and intra-household allocations of food, health, and care
6. Women's ability to manage the care, feeding, and health of young children
7. Women's own nutritional status, when their work-related energy expenditure exceeds their intakes, their dietary diversity is compromised, or their agricultural practices are hazardous to their health (which, in turn, may affect their nutritional status)

In the context of this paper, we primarily focus on the first four pathways. First, a reduction in a number of cultivator households implies that the proportion of households for whom agriculture is the source of food has declined and this brings to forth the weakness of the first pathway which focusses on agriculture as a source of food. Further, there is evidence to support the conjecture that the growth process has not been inclusive for marginal farmers and small farmers (Motiram and Naraparaju 2013). The second pathway relates to sources of income. One reason why agriculture has not been a viable source of income for either small and marginal farmers or agricultural labourers is because "... land distribution is more unequal, and yield growth has not sparked as much

reduction in poverty and undernourishment” (FAO, WFP and IFAD 2012 p.30). A survey conducted by the National Sample Survey Organisation in 2003 revealed that while 27 percent of the farmers did not like farming because it was not profitable if the opportunity arose 40 percent of farmers were open to taking up another career option (Government of India 2005). At the same time, employment opportunities in the rural non-farm sector have not been generated. Reviewing India’s economic growth, Kotwal et al. (2011) point out that, “An important component of growth — moving labor from low to high productivity activities — has been conspicuous by its absence in India. Also, as the labor to land ratio grows, it becomes that much more difficult to increase agricultural wages and reduce poverty (p.1195)”. Third, on the issue of the role of policy, increases in the minimum support price of rice and wheat has helped shield income of farmers (net sellers of food) and improvements in the public distribution system¹ has helped in protecting the agricultural labourers (net buyers of food) from food price inflation. Fourth, in terms of spending patterns, there are large differences across rural households in terms of share of food and non-food expenditure and the extent to which non-food expenditures are allocated to health, education etc.

The above discussion raises valid concerns over the emerging weak links that might appear in the first four pathways from agriculture to nutrition. While it is unrealistic to expect farming to be an effective strategy for exiting poverty, the reality is that small and marginal farmers and rural labourers will continue to be part of Indian agricultural in the next decade. In the discussion that follows, in addition to describing the occupation pattern across the states of India we also provide evidence on the extent of association between occupation patterns and incidence of poverty and nutrition indicators.

2.1 Evidence from Census of India

In 2011, the size of India’s workforce stood at 481.7 million of whom 118.7 million were cultivators, 144.3 million were agricultural labourers, 18.3 million were household industries workers and the remaining 200.4 million were other workers. A person is classified as cultivator if he or she is “*engaged in the cultivation of land owned or held from Government or held from private persons or institutions for payment in money, kind*

¹ The National Food Security Act 2013 seeks to ‘provide for food and nutritional security in human life cycle approach, by ensuring access to adequate quantity of quality food at affordable prices to people to live a life with dignity and for matters connected therewith or incidental thereto’. The Act is expected to tackle the problem of hunger and also protect poorer households from food price inflation.

*or share*². An agricultural labourer is a “*person who works on another person's land for wages in money or kind or share is regarded as an agricultural labourer. She or he has no risk in the cultivation but merely works on another person's land for wages. An agricultural labourer has no right of lease or contract on land on which she/he works*”.

The workforce participation rate has barely changed from 41.7 percent to 41.8 percent in the intercensal period 2001-11 (Table 1). However, the proportion of main workers declined from 73.9 percent to 70.5 percent and there was a corresponding increase in the proportion of marginal workers in the workforce. Main workers are individuals who worked for 6 months or more while marginal workers are individuals who worked less than 6 months. There is a marked decline in the proportion of main male workers to the total male workers. Even among the marginal workers, 19.3 percent of them worked for less than three months a year. Since the total income of the marginal workers could be lower than that of main workers, the increase in the proportion of marginal workers brings forth the possibility of the weakness of the income pathway from agriculture to nutrition.

Over the intercensal period 2001-2011, the share of cultivators in the total workforce declined from 31.7 percent to 24.6 percent while the share of agricultural labourers increased from 26.5 to 30 percent. Focusing only on rural India, the proportion of cultivators declined from 42 to 35.2 percent and the proportion of agricultural labourers increased from 27.5 percent to 34.4 percent (Table 2). Across the states of India, there are sizable variations in the proportion of cultivators and agricultural labourers in the workforce. As is well known, the twin problems of poverty and undernutrition are concentrated in eastern and central India and the proportion of agricultural labourers in these states is as follows: Bihar 56.9 percent, Chhattisgarh 48.6 percent, Jharkhand 40.3 percent, Madhya Pradesh 40.7 percent, Odisha 43.8 percent, Uttar Pradesh 36.4 percent, and West Bengal 40.9 percent. It should also be noted that in these states female literacy is lower. In addition, the age of marriage of women too is low and early marriage has implications for reproductive and child health outcomes.

²Cultivation includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or persons or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation of land, is not treated as cultivator. Similarly, a person working on another person's land for wages in cash or kind or a combination of both (agricultural labourer) is not treated as cultivator. Cultivation involves ploughing, sowing, harvesting and production of cereals and millet crops such as wheat, paddy, jowar, bajra, ragi, etc., and other crops such as sugarcane, tobacco, ground-nuts, tapioca, etc., and pulses, raw jute and kindred fibre crop, cotton, cinchona and other medicinal plants, fruit growing, vegetable growing or keeping orchards or groves, etc. Cultivation does not include the following plantation crops - tea, coffee, rubber, coconut and betel-nuts (areca).

The natural follow-up question that arises is whether there is any association between the proportion of agricultural labourers in a state, the head count ratio of poverty and indicators of nutrition. The most recent data on nutrition indicators at the state level comes from the National Family Health Survey 2004-05 while poverty estimates are available for 2004-05 and 2009-10.

The correlation between the proportion of agricultural labourers in a state in 2001 (2011) and the head count ratio of poverty in 2004-05 (2009-10) is 0.70 (0.64). One advantage of the NSSO data is that it classifies a household into one of the following types: Self-employed in Non-agriculture, Agricultural Labour, Other Labour, Self-Employed in Agriculture, and Others. The household type is determined on the basis of the source accounting for at least 50 percent of a household's income. In 2009-10, in rural India, 15 percent of households are classified as Self-employed in Non-agriculture, 26 percent Agricultural Labour, 15 percent Other Labour, 32 percent Self-Employed in Agriculture, and 12 percent Others. India's Eleventh Five Year Plan document summarizes the situation as follows: "The composition of the poor has been changing and rural poverty is getting concentrated in agricultural labour and artisanal households. Agricultural labour households accounted for 41% of rural poor in 1993-94 as well as in 2004-05. The share of self-employed in agriculture among the rural poor had fallen from 32% to 21.6%. The occupational composition of rural poor varied across the States. In general, in developed states poverty was highly concentrated among agricultural labour households and in contrast, among the backward states poverty extended to other occupational groups including self-employed in agriculture." (p.80, Government of India 2008).

The correlation between the proportion of agricultural labourers in a state in 2001 and the proportion of women aged 15-49 years classified as thin is 0.7 while the correlation between the proportion of agricultural labourers in a state in 2001 and the proportion of women aged 15-49 years classified as obese is -0.22.

Finally, the correlation between the proportion of agricultural labourers in a state in 2001 and the proportion of children with a weight for age below 2 standard deviations is 0.61. These correlations are further substantiated by findings from analysis of data from India's National Nutrition Monitoring Bureau survey. The proportion of men and women who are chronically energy deficient is highest among landless agricultural labourers (Table 3). The studies have established that the proportion of underweight children is

highest among households whose occupation is classified as landless agricultural labourers or other labourers. Stunting and wasting are also higher in these rural households as compared to those whose occupation is service, business or others (Table 4). What these statistics establish is a pattern where poverty is higher and women and child health outcomes are worse in states with a higher proportion of agricultural labourers.

2.2 Evidence from NSSO Data

While data from Census of India provides an aggregate snapshot, a more granular picture is available from NSSO's survey of employment and unemployment in 2009-10. Due to differences in the way the occupation structure is classified, the statistics from NSSO data and Census of India data are not strictly comparable. For every individual who is part of the workforce, based on National Classification of Occupation (NCO) 2004 his or her occupation can be classified into one of the following divisions: Division 1: Legislators, senior officials and managers, Division 2: Professionals, Division 3: Technicians and associate professionals, Division 4: Clerks, Division 5: Service workers and shop & market sales workers, Division 6: Skilled agricultural and fishery workers, Division 7: Craft and related trades workers, Division 8: Plant and machine operators and assemblers, Division 9: Elementary occupations and Division X: Workers not classified by occupations. The distribution of workers across the various Divisions is given in Table 5. As is evident from the table, Division 6³ and Division 9 account for the bulk of the workers. Within Division 6⁴ workers can be classified into two groups, viz. market-oriented skilled agricultural and fishery workers and subsistence agricultural and fishery workers. Market-oriented skilled agricultural and fishery workers are those *“carry out the necessary operations to grow and harvest field or tree and shrub crops, gather wild fruits and plants, breed, tend or hunt animals, produce a variety of animal husbandry products, cultivate, conserve and exploit forests, breed or catch fish and cultivate or gather other forms of aquatic life, for sale or delivery on a regular basis to*

³ Those classified as market-oriented skilled agricultural and fishery workers can be further classified into one of the following groups: market gardeners and crop growers (NCO 3 digit code 611), market-oriented animal producers and related workers (NCO 3 digit code 612), market oriented crop and animal producers (NCO 3 digit code 613), forestry and related workers (NCO 3 digit code 614), fishery workers, hunters and trappers (NCO 3 digit code 615). At the other end of the spectrum, subsistence agricultural and fishery workers (NCO 3 digit code 620) are those who “grow and harvest field or tree and shrub crops, grow vegetables and fruit, gather wild fruits and plants, tend or hunt animals, catch fish and gather other forms of aquatic life in order to provide food, shelter and a minimum of cash income for themselves and their households”.

⁴ These workers “grow and harvest field or tree and shrub crops, gather wild fruits and plants, breed, tend or hunt animals, produce a variety of animal husbandry products, cultivate, conserve and exploit forests, breed or catch fish and cultivate or gather other forms of aquatic life in order to provide food, shelter and income for themselves and their households”.

wholesale buyers, marketing organisations or at markets". Subsistence agricultural and fishery workers are those who "grow and harvest field or tree and shrub crops, grow vegetables and fruit, gather wild fruits and plants, tend or hunt animals, catch fish and gather other forms of aquatic life in order to provide food, shelter and a minimum of cash income for themselves and their households". This information can be used in order to understand their extent of participation in agriculture. The breakup of Division 6 male workers is as follows: 35.5 percent are market-oriented skilled agricultural and fishery workers and 2.5 percent are subsistence agricultural and fishery workers. The corresponding breakup for Division 6 female workers is 38 percent and 3.4 percent respectively. Notice that a greater proportion of women rather than men are working as market-oriented skilled agricultural and fishery workers⁵.

While 45.6 percent of workers engaged as market-oriented skilled agricultural and fishery workers are without any education or not completed primary education, the corresponding proportion for individuals engaged as subsistence agricultural and fishery workers is 54.8 percent. The proportion of individuals without education among those engaged in elementary occupation is highest at 47.3 percent (Table 6). These averages clearly bring out the low level of human capital among workers in Division 6 and 9.

When we examine the sub-national picture, there are interesting patterns that emerge. We find that while Uttar Pradesh accounts for 72 percent, Gujarat (the next highest) accounts for 9 percent of individuals working as subsistence agricultural and fishery workers. Within Uttar Pradesh, these workers are concentrated in Eastern Uttar Pradesh while in Gujarat they are concentrated in South Eastern Gujarat. In contrast, individuals engaged as market gardeners and crop growers are distributed evenly across the National Sample Survey Regions of India. In line with expectation, we find a concentration of workers engaged as market-oriented animal producers and related workers in Northern Plains of Gujarat. This National Sample Survey Region which includes the districts of Anand and Mahesana accounts for 10.15 percent of such workers. Finally, the elephant in the room in any discussion of occupation structure in rural India is the 104 million individuals engaged in elementary occupations in rural India. Elementary occupations consist of simple and routine tasks which mainly require the use of handheld tools and often some physical effort. Most occupations in this division require skill at the first skill level. Over 59 percent of these individuals reside in Andhra Pradesh, Bihar, Madhya

⁵ Dev and Kadiyala (2011) have argued that "realigning agriculture policy to empower women in agriculture is essential for accelerating reduction in under nutrition in India".

Pradesh, Maharashtra, Uttar Pradesh, and West Bengal. As is well established among these states Bihar, Uttar Pradesh and West Bengal are part of the eastern poverty corridor.

Barring the state of Maharashtra, due to the absence of nutrition indicators at the sub-state level we are unable to examine how they vary depending on occupation structure. In the case of Maharashtra when we examine the correlation between the proportion of agricultural labourers in the districts and the proportion of moderately underweight and severely underweight children we get a statistically significant correlation of 0.32.

3. Determinants of Dietary Diversity

In the Indian context, there is a large literature that focuses on understanding differences in consumption expenditure across households in rural and urban India. However, the literature that focuses on understanding the determinants of dietary diversity is fairly limited. An ideal data set would have information on the form and extent of participation in agriculture, detailed information on dietary diversity and consumption expenditure. However, such a nationally representative data set does not exist in India. While the surveys conducted by India's NSSO do not have anthropometric data they have enough information based on which we can construct measures of dietary diversity of the household. While such a measure does have its own limitations there is still merit in going down this road since it is an important intermediate outcome in the pathway to consumption of a nutritious food basket.

3.1 Data

We use a nationally representative survey on employment and unemployment conducted by National Sample Survey Organization (NSSO) in 2009-10. The survey covered a sample of 59,129 rural households collecting information on a total of 281,327 rural individuals. In addition to household characteristics, detailed information on demographic and socio-economic characteristics of the members was also collected. Information is collected on the expenditure incurred in the last 30 days preceding the survey on following items: cereals & cereal products⁶, pulses & pulse products, milk, milk products, edible oil and vanaspati, vegetables, fruits & nuts, egg, fish & meat, sugar, salt & spices, other food items, pan, tobacco & intoxicants, fuel & light,

⁶ There are three sources of consumption for rice and wheat, viz. from home produce, from public distribution system and purchases from the market.

entertainment, personal care and effects, toilet articles, sundry articles, consumer services excluding conveyance, conveyance, rent/ house rent, consumer taxes and cesses, and medical expenses (non-institutional).

Information is collected on the expenditure incurred in the last 365 days preceding the survey on following items with infrequent expenditure: medical (institutional), tuition fees & other fees, school books & other educational articles, clothing and bedding, footwear, durable goods, furniture and fixtures, crockery & utensils, cooking and household appliances, goods for recreation, jewelry& ornaments, personal transport equipment, therapeutic appliances, other personal goods, and repair and maintenance. Since expenditure on infrequently consumed items like durables etc are collected with a 365 day recall period, this information is converted to 30-day expenditure by multiplying the same by the factor (30/365). The monthly per capita expenditure of a household is the ratio of total monthly consumption expenditure and size of the household.

3.2 Empirical Model and Results

Our approach to measuring dietary diversity is in line with the extant literature (Ruel 2002). For example, Karamba et al. (2011) and Nguyen and Winters (2011) construct an index of food diversity by aggregating the share of expenditure on different food sub groups for each household⁷. Two standard measures used are the following: Shannon Index which is represented as $-\sum_{i=1}^n w_i \ln(w_i)$ and the Simpson Index $\sum_{i=1}^n w_i^2$ where w_i is the share of expenditure on each food sub group and $i = 1, 2, \dots, n$ are the n food sub groups. In the literature, there is also the tradition of standardizing the index as follows $\ln\left(\frac{I_i}{\max I_i - I_i}\right)$, where I_i is the value of index for household, i .

Our unit of observation for analysis is the household and the dependent variable Y_i is the Shannon Index⁸. X_i is a vector of household variables.

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

We include the following explanatory variables: social group (scheduled tribe, scheduled caste, other backward class and others), religion (Hindu, Muslim, Christian, others), household type (self-employed in non-agriculture, rural labour, self-employed in agriculture, others), household size, dummies for size of land possessed by the household. The rationale for the variables that we included as explanatory variables can

⁷ Unlike the survey of consumption expenditure conducted by NSSO, the survey of employment and unemployment does not have information on physical quantity consumed or count of various food items consumed.

⁸ The results do not change if we use the Simpson index.

be explained by the three stylized facts that emerge from the literature on poverty. First, poverty is concentrated among scheduled tribe and scheduled caste households. Second, on the average Muslim households are poorer. So there are differences in the incidence of poverty across social groups and religious groups. Third, as mentioned earlier bulk of the rural poor are from rural labour households. In addition, we include the proportion of household workers engaged in Division 1 (Unspecified), Division 2 (skill 4), Division 3 (skill 3), Divisions 4,5,7 and 8 (skill 2), Division 61 (skill 2), Division 62 (skill 2), Division 9 (skill 1) and Division X (Identification of skill level not possible). In the parenthesis, we have mentioned the skill levels corresponding to each of the Divisions with skill level 4 being the highest. In order to control for seasonality, we include dummies to reflect the sub round in which the household was surveyed. Recognizing the differences in occupation structure across India we include National Sample Survey Region dummies.

In the discussion that follows we begin by focusing on the variables of interest: household type and proportion of household workers engaged in various occupational divisions. We find that compared to rural labour households, those classified as self-employed in non-agriculture, self-employed in agriculture, or others have higher dietary diversity. This result should be seen in conjunction with two facts mentioned earlier. First, poverty is concentrated among rural labour households. Second, the proportion of men and women who are chronically energy deficient, the proportion of underweight children, stunting and wasting are higher among is rural labour households.

The results related to the share of workers in the household working in various occupational divisions are to be interpreted considering the following base category - the proportion of workers in the household with highest skill level (Division 2). We find that higher the proportion of market- oriented skilled agricultural and fishery workers (Division 61) lower is the dietary diversity. We also find that higher the proportion of subsistence agricultural and fishery workers (Division 62) lower is the dietary diversity. We also find that households with a higher proportion of workers in Division 62 have lower diversity compared to households with a higher proportion of workers in Division 61. What this result implies is that the nature and extent of participation in agriculture as a cultivator matters for dietary diversity. In the context of pathways from agriculture to nutrition, workers in Division 61 are not only producers of food but also sourcing their

income from cultivation while those in Division 62 are subsistence farmers who rely on agriculture as the source of food.

Similarly, we find that households with a higher proportion of workers engaged in elementary occupation (Division 9) have lower dietary diversity. This is not surprising since these workers have the lowest skill levels which translate into lower wages. It should be noted that Division 9 includes agricultural, fishery and related labourers. If ‘improvements in nutrition need to happen through jobs’ then skilling those workers in Division 9 and thereby contributing to higher wages becomes important.

The coefficient on the land dummies is positive. Interestingly, the coefficients increase and then decrease suggesting that dietary diversity declines in households with very large land holdings. Instead of land dummies, when we include the size of land possessed and the square of the size of land possessed as explanatory variables we find that the coefficient on the former is positive and on the latter is negative. This is consistent with the findings on the coefficient on land dummies.

The result pertaining to social group mirrors the findings in the literature on poverty. Compared to scheduled tribe households, scheduled caste, other backward class and other households have higher diversity.

4. Conclusion

There are discipline-specific differences in the literature on how to address the problem of undernutrition. One strand that has gained currency is the one on agriculture-nutrition pathways and the focus of this paper is on understanding the emerging strength or weakness of some of the pathways. This paper examines the conduciveness of emerging occupational structure in rural India to improving nutrition outcomes. At the outset, we pointed out that India’s growth in the last two decades has not translated into a rapid reduction in the proportion of malnourished children. One reason for this is that India has a larger proportion of workers engaged in agriculture than other countries at a similar stage of development or level of gross domestic product. This is evident from the twin facts: in 2012-13, the share of agriculture in GDP stood at 13.7 percent while 54.6 percent of the total workers were engaged in the agriculture sector in 2011.

Using data from India’s National Sample Survey Organisation survey of employment and unemployment conducted in 2009-10, this paper establishes that there is large heterogeneity in rural livelihoods since the form and extent of participation in agriculture

vary greatly across households. We find that there is greater dietary diversity, which is an intermediate outcome in the pathway to improved nutrition, among cultivators than agricultural laborers. Since, over time there has been a reduction in the number of cultivators and an increase in a number of agricultural laborers who are on the average poorer, such shifts in occupational structure could prove to be detrimental to addressing the problem of malnutrition. The basic premise of this paper is that while food security at the macro level is of paramount importance, from a micro (household) perspective there cannot be an excessive reliance on agriculture as a source of food and income to facilitate improvements in dietary diversity and nutritional intake of rural households.

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	<i>Workforce Participation Rate</i>		<i>Proportion of Main Workers to Total Workers</i>		<i>Proportion of Marginal Workers to Total Workers</i>	
	2001	2011	2001	2011	2001	2011
Male	52.1	53.0	85.0	78.5	15.0	21.5
Female	30.8	30.0	54.1	55.6	45.9	44.4
Total	41.7	41.8	73.9	70.5	26.1	29.5

Source: Authors' Calculations

	<i>Percentage of Cultivators to Total Workers</i>		<i>Percentage of Agricultural Labourers to Total Workers</i>		<i>Percentage of Household Industry and Other Workers to Total Workers</i>	
	2001	2011	2001	2011	2001	2011
Male	42.0	35.2	27.5	34.4	10.5	30.4
Female	37.1	28.8	43.0	48.5	19.9	22.7
Total	40.2	33.0	33.0	39.3	26.8	27.7

Source: Authors' Calculations

Occupation of Household Head	Chronic Energy Deficiency	Men		Chronic Energy Deficiency	Women	
		Normal	Overweight		Normal	Overweight
Landless Agricultural Labourer	43.3	43.7	13	40.2	43	16.8
Other Labourer	37.1	48.1	14.8	40.6	43.3	16.2
Owner Cultivator	35.7	45	19.3	38.9	43.3	17.8
Landlord	23.3	38.8	38	17.6	41.2	41.2
Tenant Cultivator	36.2	51	12.8	27.7	58	14.3
Artisans	27.2	45.7	27.1	30.8	43.5	25.7
Service	19.1	43.2	37.7	24.9	41.9	33.2
Business	16.8	43.3	39.8	22.1	38.7	39.2
Others	33	41.2	25.9	29.7	40.7	29.7

Note: Chronic Energy Deficiency(<18.5), Normal(18.5 – 23), Overweight (≥ 23)
Source: National Institute of Nutrition (2012)

Table 4: Distribution(%) of <5 year Children according to Nutritional Status

Occupation of Household Head	Wt. For Age		Ht. For Age		Wt. For Ht.	
	Underweight	Normal	Stunting	Normal	Wasting	Normal
Landless Agricultural Labourer	44.5	55.5	42.9	57.1	24.4	75.6
Other Labourer	46.8	53.2	47.4	52.6	24.1	75.9
Agriculture	42.6	57.4	45.1	54.9	22.5	77.5
Artisans	42.0	58.0	41.8	58.2	19.5	80.5
Service	33.4	66.6	35.5	64.5	18.0	82.0
Business	29.0	71.0	34.3	65.7	17.4	82.6
Others	27.7	72.3	31.6	68.4	15.4	84.6

Source: National Institute of Nutrition (2012)

Table 5 : Distribution of Rural Workers by Division of Work

	Male	Female	Total
Division 1	3.41	1.94	3.02
Division 2	1.86	1.13	1.67
Division 3	1.6	1.95	1.69
Division 4	0.9	0.29	0.74
Division 5	5.47	2.47	4.68
Division 6	37.9	41.39	38.82
Division 7	9.73	6.45	8.86
Division 8	3.3	0.6	2.59
Division 9	35.27	43.56	37.45
Division X	0.22	0.06	0.18
Not Reported	0.35	0.16	0.3
Total	100	100	100

Division 1: Legislators, senior officials and managers, Division 2: Professionals, Division 3: Technicians and associate professionals, Division 4: Clerks, Division 5: Service workers and shop & market sales workers, Division 6: Skilled agricultural and fishery workers, Division 7: Craft and related trades workers, Division 8: Plant and machine operators and assemblers, Division 9: Elementary occupations and Division X: Workers not classified by occupations.

Source: Calculations from NSSO Employment and Unemployment Survey Unit Level Data for the year 2009-10

Table 6: Educational Attainment of Agricultural and Fishery Workers and those in Elementary Occupations

	Market-oriented skilled agricultural and fishery workers	Subsistence agricultural and fishery workers	Elementary occupations	All Division s
Uneducated	35.0	48.4	47.3	36.1
Below Primary	10.6	6.4	13.7	11.4
Primary	15.8	11.1	15.8	15.7
Middle	17.8	15.6	14.4	17.2
Secondary	11.9	8.2	6.2	10.4
Higher Secondary / Diploma	6.3	5.3	2.1	5.7
Graduate and Above	2.6	5.0	0.5	3.5
Total	100	100	100	100

Source: Calculations from NSSO Employment and Unemployment Survey Unit Level Data for the year 2009-10

Table 7: Determinants of Dietary Diversity in Rural India

	Coefficient	Robust Standard Error
Household Type: Rural Labour		
Self-employed in non-agriculture	0.0411***	0.00827
Self-employed in agriculture	0.0552***	0.0118
Others	0.128***	0.0106
Proportion of Workers in the Households in: Division 2 (Skill Level 4)		
Division 1 (Unspecified)	0.00858	0.0187
Division 3 (Skill Level 3)	0.0246	0.0208
Divisions 4,5,7,8 (Skill Level 2)	-0.0606***	0.0162
Division 61 (Skill Level 2)	-0.139***	0.0189
Division 62 (Skill Level 2)	-0.224***	0.0308
Division 9 (Skill Level 1)	-0.149***	0.0173
Division X (Skill Level Not Classifiable)	-0.112**	0.0507
Land Possessed: Less than 0.01 hectares		
0.01-0.04	0.0176*	0.0100
0.04-0.4	0.0208**	0.00977
0.4-1	0.0227**	0.00996
1-2	0.0773***	0.0116
2-4	0.0696***	0.0134
More than 4	0.0380**	0.0157
Social Group: Scheduled Tribe		
Scheduled Caste	0.126***	0.0143
Other Backward Class	0.124***	0.0138
Others	0.111***	0.0147
Religion: Hindu		
Muslim	0.0519***	0.0128
Christian	-0.0191	0.0207
Others	-0.0386*	0.0229
Household Size	-0.0179***	0.00126

We also included sub round dummies and NSS region dummies.
Number of Observations: 55,728
R-squared: 0.308
*** p<0.01, ** p<0.05, * p<0.1