

System of Promoting
Appropriate National Dynamism for
Agriculture and Nutrition

SPANDAN

Filling Key Knowledge Gaps
in the Pathways
from Agriculture to Nutrition

An Initiative Supported by
Bill and Melinda Gates Foundation

Indira Gandhi Institute of Development Research, Mumbai

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The genesis of the SPANDAN initiative can be traced to my conversations with Prabhu Pingali when he was with the Bill and Melinda Gates Foundation. The foundation was looking for an Indian institution to follow up on the work done by International Food Policy Research Institute (IFPRI) under the project Tackling Agriculture Nutrition Disconnect in India (TANDI). I am grateful to Bill and Melinda Gates Foundation for giving Indira Gandhi Institute of Development Research (IGIDR) the opportunity to work on issues related to pathways from agriculture to nutrition. Thanks to Prabhu Pingali for initiating the award of this project to IGIDR when he was at the foundation.

I am grateful to National Institute of Nutrition, Institute for Human Development and IRIS Knowledge Foundation for partnering with us. I thank my colleagues at IGIDR and all the researchers from within and outside IGIDR. A very special thank you to all the individuals who helped us conduct the unique survey in Bihar and Odisha. Without them we would not have been able to successfully execute the survey.

The members of the steering committee took time off from their busy schedule to give us inputs. Their guidance helped us get clarity on many aspects related to the project. And last but not the least, we are grateful to Shelly Sundberg, from the Bill and Melinda Gates Foundation, for many an insightful conversation, and her steadfast support for SPANDAN.

S Mahendra Dev

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Director (Vice Chancellor), Indira Gandhi Institute of Development Research, Mumbai

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ABOUT SPANDAN

The objective of the initiative 'System of Promoting Appropriate National Dynamism for Agriculture and Nutrition' (SPANDAN) is to undertake research on understanding the linkages between agriculture, nutrition and health in India. SPANDAN is supported by a grant from Bill and Melinda Gates Foundation and is housed in Indira Gandhi Institute of Development Research, Mumbai.

Institute of Human Development, National Institute of Nutrition, IRIS Knowledge Foundation and a few independent researchers collaborated with faculty from Indira Gandhi Institute of Development Research on this initiative.

GOAL	<p>SPANDAN addresses the data limitations and suggests ways to overcome the data disconnect. The initiative strengthens and increases the evidence base for understanding the strength and dynamics of the multiple pathways from agriculture to nutrition. The research initiative led by IGIDR seeks to:</p> <ol style="list-style-type: none">1. Build the Evidence Base to Better Understand and Strengthen Agriculture-Nutrition Pathways in India2. Evaluate Impact of Specific Agricultural Interventions and Policies on Nutrition Outcomes3. Advocacy: Bring Evidence on Strengthening Agriculture-Nutrition Linkages to Existing and New Stakeholder Policy Platforms
DISTINCTIVE ELEMENT	<p>The distinctive element of SPANDAN is the close interaction between development economists, agricultural economists, applied econometricians, clinical nutritionists, and gender specialists building upon the knowledge of all partners in order to address common issues of interest. Each partner and collaborating researcher has independently worked on the issue of agriculture, consumption, gender, and nutrition and has built a body of knowledge. As a result of this collaboration, it is expected that the research output would lead to a better understanding of the underlying issues and policy makers would be able to better appreciate the interplay between agriculture, consumption and nutrition outcomes.</p>

TRENDS IN NUTRITIONAL STATUS OF CHILDREN: PROPORTION OF CHILDREN STUNTED, WASTED, UNDERWEIGHT

India's National Nutrition Policy (NNP) formulated in 1993, not only recognized that 'nutrition affects development as much as development affects nutrition' but also recognized the vicious cycle of poverty stemming from low intake of nutrients and under nutrition.

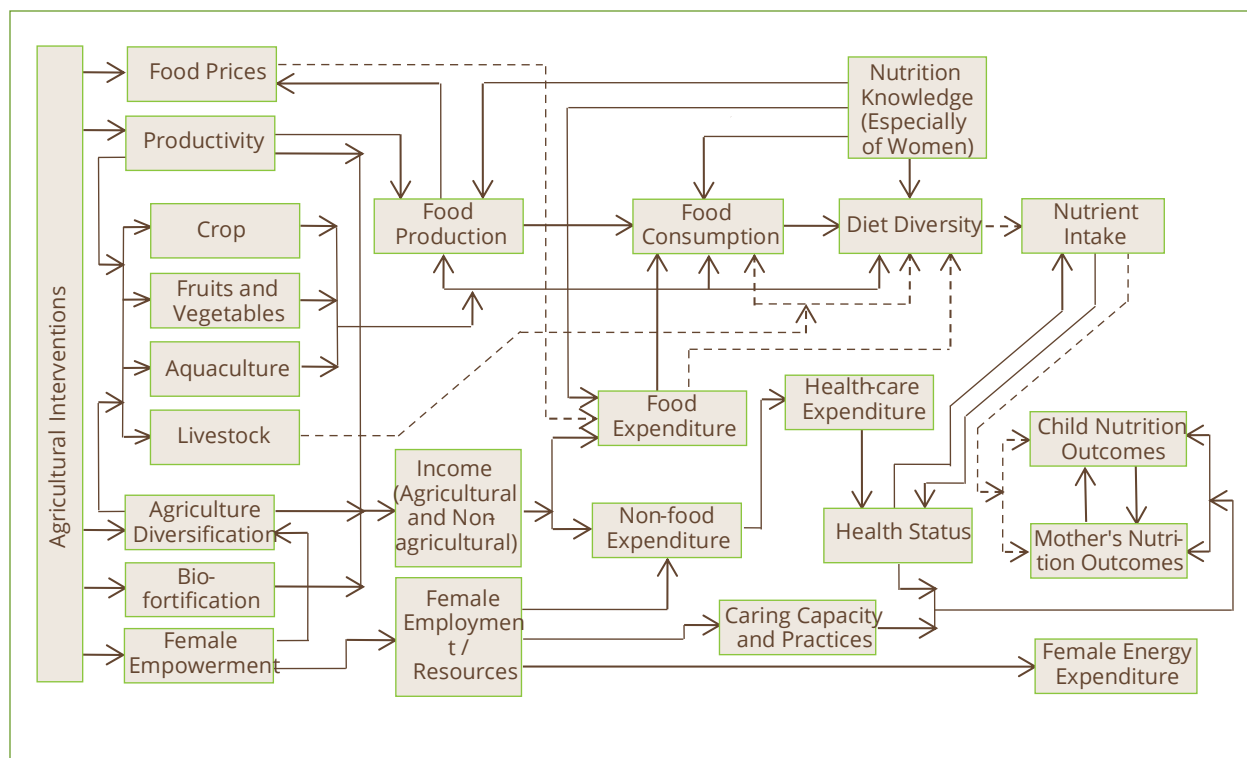
Poverty → Low Intake of Food Nutrients → Under Nutrition: Repeated Impact of Nutrition Related Diseases and Infections → Stunted Development of Children and Growth Faltering → Small Body Size of Adults → Impaired Productivity → Low Earning Capacity → Poverty

There are valid concerns that India has not seen an improvement in the nutritional status commensurate with the growth of the economy. There are also large disparities at the sub-national level with the nutritional status of children in Bihar and Odisha lagging behind the all India averages in one or more dimension.

TRENDS IN NUTRITIONAL STATUS OF CHILDREN: PROPORTION OF CHILDREN STUNTED, WASTED, UNDERWEIGHT		
	NFHS-3 (2005-06)	NFHS-4 (2015-16)
All India		
Stunted	48	38
Wasted	20	21
Underweight	43	36
Bihar		
Stunted	56	48
Wasted	27	21
Underweight	56	44
Odisha		
Stunted	45	34
Wasted	20	20
Underweight	56	44
Definitions: Stunted: Low Height for Age, Wasted: Low Weight for Height, Underweight: Low Weight for Age		

Source: National Family Health Survey (NFHS) Report and State Fact Sheets. Available: <https://dhsprogram.com/publications/publication-OF31-Other-Fact-Sheets.cfm>

PATHWAYS FROM AGRICULTURAL INTERVENTIONS TO NUTRITION



- For improving nutrient intake and nutritional outcomes there is need for
 - Production of targeted nutrition-rich crops
 - Homestead gardens
 - Diversification of the agricultural production system towards fruits and vegetables and aquaculture
 - For establishing linkage between agriculture and nutritional outcomes empowerment of women and nutrition knowledge are very important

Reference: Vijay Laxmi Pandey, S Mahendra Dev, Usha Jayachandran (2016) Impact of Agricultural Interventions on Nutritional Status in South Asia: A Review, Food Policy 62 (2016) 28–40

ESTIMATES OF FOOD SUFFICIENCY IN INDIA: ADDRESSING THE DATA GAPS

The National Sample Survey Organisation's (NSSO) survey of consumption expenditure is woefully inadequate for a meaningful estimate of number of food-insecure households in India. The survey conducted in 2011-12 had two questions.

- Do all members of your household 'get two square meals every day'? (Yes: every month of the year, Yes: Some months of the year; No month of the year)
- If the response was Yes: Some month of the year, the follow up question asked the respondent to identify which calendar months any member of the household did not 'get two square meals every day'?

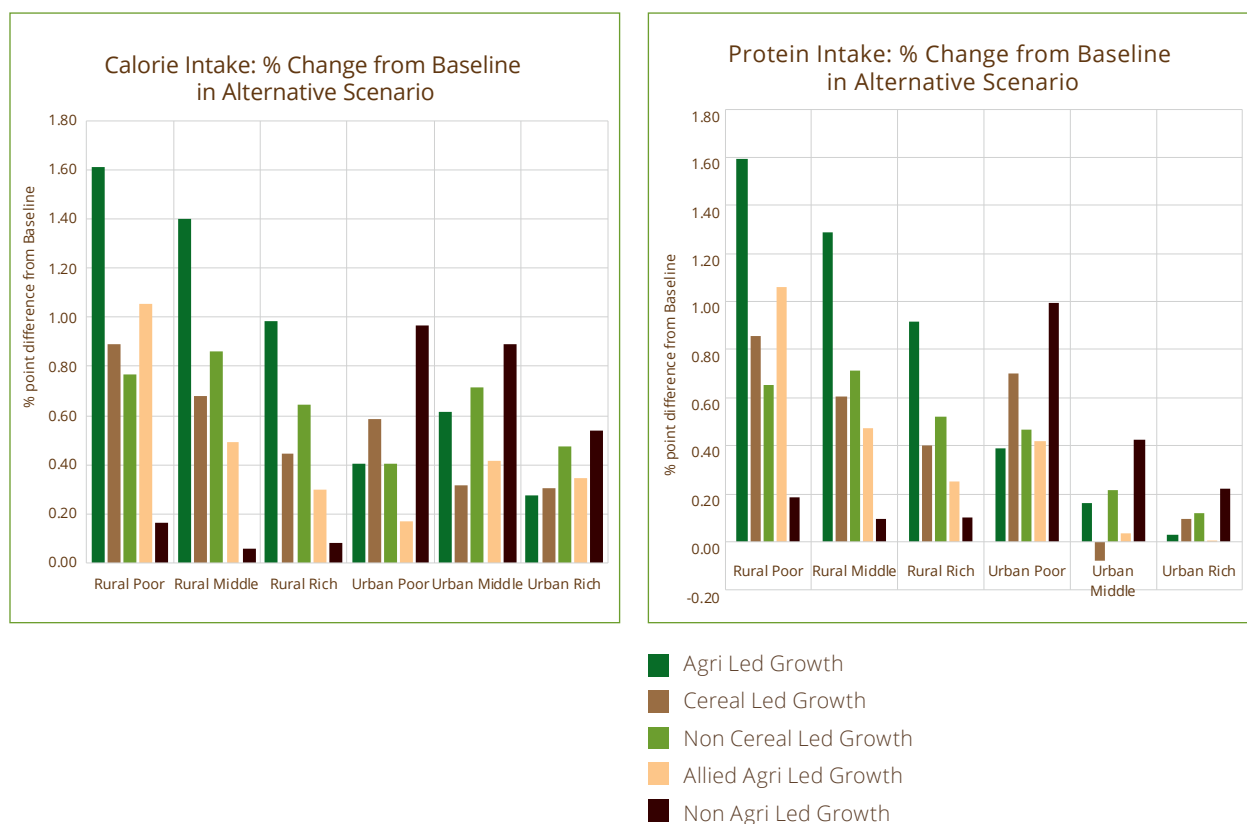
The report on Perceived Adequacy Consumption in Indian of Food Household published by NSSO states that, "The all-India percentage of households reporting getting two square meals every day throughout the year has gradually increased over the last 16 years from 94.5% to about 99% in rural India and from about 98% to 99.6% in urban India." Yet, the Government of India admits that there is a problem of hunger. In a report documenting India's progress towards achieving MDGs, the Government of India mentions that progress in reducing hunger is "slow or almost off-track" (Government of India 2013). This assertion is based on the estimates of households that do not consume adequate amounts of calories. There is also recognition on the need for moving away from a caloric centric view of food security to one that focuses on the four pillars of food security: availability, access, nutritional adequacy/utilization and stability. The Comprehensive Nutrition Survey in Maharashtra (CNSM) as an example of such a survey that does a decent job of capturing the different elements of food security. It is important for future surveys of NSSO to learn from the success of CNSM in collecting such information and incorporate the same in its future surveys.

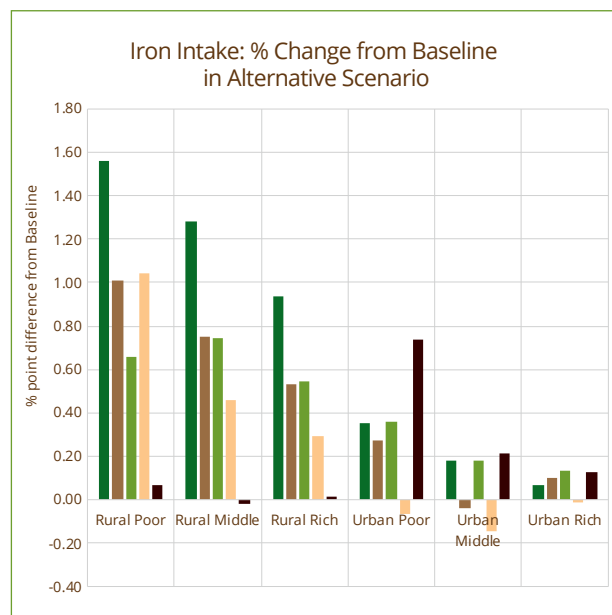
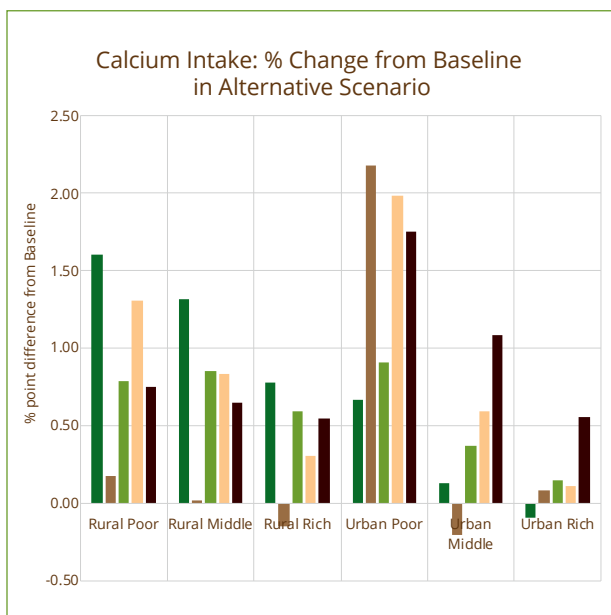
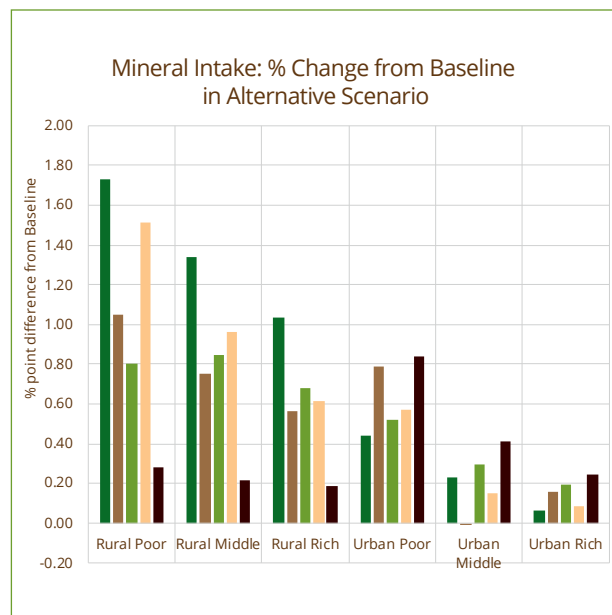
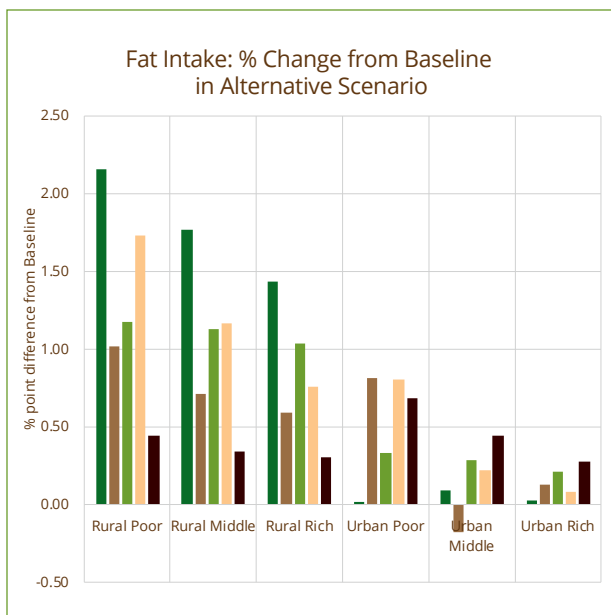
It is important for NSSO to learn from the success of Comprehensive Nutrition Survey in Maharashtra in collecting information on the four pillars of food security and incorporate the same in its future surveys of consumption expenditure.

Reference: S Chandrasekhar and Vijay Laxmi Pandey (2015) "Food Sufficiency in India: Addressing the Data Gaps" Economic and Political Weekly (2015) Vol - L No. 9, February 28, pp. 21-23

CONSUMPTION AND NUTRITIONAL IMPLICATIONS OF ALTERNATIVE GROWTH SCENARIO FOR INDIA

The impacts of alternative growth scenario on consumption of food products and nutrition are analysed within a general equilibrium framework. The results confirmed that nutrient intake will improve for rural poor if the allied agriculture sector is given more attention for expansion. However for urban poor, in view of their inability to satisfy their minimum grain intake, cereal led growth assumes significance. But the scope for this is very limited in reality unless a dramatic yield growth of cereals is expected in future with the technological advances. Hence it is a policy challenge to improve nutrient intake of urban poor to the desired level. The results also endorsed the existing findings that consumption of high value added products such as fruits, vegetables, and milk and milk products which are nutritionally rich in micronutrients are highly income elastic. The findings confirmed that the continuing present trend in the output growth of non-cereal and the allied agricultural sector can have far reaching implications in improving the nutritional status of the rural poor. However it is questionable if this would help urban poor to the expected level and hence specific targeted programs may be needed. The institutions implementing policies play a key role in linking growth with target nutrient level.





- Agri Led Growth
- Cereal Led Growth
- Non Cereal Led Growth
- Allied Agri Led Growth
- Non Agri Led Growth

G Mythili (2017) Consumption and Nutritional Implications of Alternative Growth Scenario for India, Chapter 5, India Development Report 2017, published by Oxford University Press

THE ROLE OF PUBLIC DISTRIBUTION SYSTEM IN IMPROVING HOUSEHOLD FOOD SECURITY AND CONSUMPTION BASKET

Using a Difference-in-Difference methodology over two repeated cross sectional household surveys, it is established that the shift from targeted to a universal food security program in the KBK region of Odisha has led to an improvement in the household nutritional intake and diet quality.

Analysis of multiple rounds of data from NSSO survey of consumption expenditure establishes that consumer food subsidies have an important role in improving nutritional intake and diet quality. In 8 districts of Odisha, popularly known as the Kalahandi-Balangir-Koraput (KBK) region which is notable for extreme poverty and starvation deaths, the government did away with the targeted food assistance program in 2008 and made the scheme universal. Using a Difference-in-Difference methodology over two repeated cross sectional household surveys, it is established that the shift from targeted to a universal food security program in the KBK region of Odisha has led to an improvement in the household nutritional intake and diet quality. Further examination suggests that proportion of households consuming below the recommended dietary allowance of calorie, fats and protein has declined significantly in this region post the intervention. This finding is important in light of the literature on revival in the functioning of public distribution system through which food subsidies are delivered.

There have been significant improvements in the public distribution system in rural India after 2004-05. Tamil Nadu and Himachal Pradesh continue to be the leading performers, but early movers such as Odisha saw improvements in the functioning of the PDS between 2004-05 and 2009-10. Among late movers such as Bihar and Jharkhand, improvement was evident between 2009-10 and 2011-12. The share of the PDS as a source of rice and wheat has increased over time, suggesting an improvement in its outreach. Furthermore, consumption from public distribution system or consumption from home produce reduces reliance on open market purchase. Thus access to the public distribution system reduces the probability of food price inflation affecting the consumption basket.

Reference: Andaleeb Rahman (2014) Revival of Rural Public Distribution System Expansion and Outreach, Economic and Political Weekly (2014) vol XLIX no 20, May 17, pp. 62-68.

Andaleeb Rahman (2016) Universal Food Security Program and Nutritional Intake: Evidence from the Hunger Prone KBK Districts in Odisha, Food Policy 63 (2016) 73-86

CHALLENGE OF DOUBLING INCOME OF FARMERS

Income is one of the important components in the pathway from agriculture to nutrition. There are valid concerns that income could be one of the weak links in this pathway.

The distribution of households by principal source of incomes of agricultural households as evident from NSSO's Situation Assessment of Agricultural Households 2013 is: Cultivation (63.5%), Livestock (3.7%), Other Agricultural Activity (1%), Non-Agricultural Enterprises (4.7%), Wage / Salaried Employment (22%), Pension (1.1%), Remittances (3.3%), and Others (0.7). However, the distribution of households by principal source of income only reveals a partial story. In reality, individuals from agricultural households undertake multiple activities in addition to cultivation. Among households whose principal source of income is cultivation (livestock), only 12% (13%) do not undertake any additional activity. It is evident that a very small proportion of agricultural households rely only on cultivation for their income.

Although not surprising a worrisome fact, is that the monthly income of farmer households with less than 1 hectare of land is barely sufficient to cover their reported monthly expenditure. These marginal farms lead, almost inevitably, to marginal existences. There is no evidence of doubling of income of farmer or agricultural households over the period 2003-13. In fact for those with less than one hectare of land their incomes grew only marginally in real terms. This seriously raises questions on whether the Government of India will succeed in meeting the ambitious target of doubling the income of farmers by 2022.

There is no evidence of doubling of income of farmer or agricultural households over the period 2003-13.

RATIO OF AVERAGE MONTHLY INCOME FROM DIFFERENT SOURCES IN 2013 TO THE AVERAGE MONTHLY INCOME FROM DIFFERENT SOURCES IN 2003					
SIZE CLASS OF LAND OWNED (HECTARES)	WAGES	CULTIVATION*	FARMING OF ANIMALS*	NON-FARM BUSINESS*	TOTAL
<0.01	1.01	0.34	3.4	0.63	1.13
0.01-0.40	1.07	1.09	2.78	0.67	1.1
0.41-1.00	1.26	1.4	2.61	1.08	1.38
1.01-2.00	1.23	1.5	3.31	1.61	1.52
2.01-4.00	1.26	1.54	5.39	1.23	1.59
4.01-10.00	1.81	1.76	7.88	1.33	1.85
>10.00	1.23	2.06	3.58	1.32	2.02
All Classes	1.22	1.32	3.21	1	1.34
* Net income Major states only					

INEQUALITY IN INDIA'S AGRICULTURAL SECTOR

Inequality of income has never been estimated with official data in India for any population or subset; all the existing estimates are of expenditure or consumption inequality. There is a large difference between the two measurement concepts—income vs. consumption inequality—where the Gini Coefficients of per capita income and consumption are 0.58 and 0.28 respectively in the agricultural sector in 2013. These measurements of inequality challenge the widely-held belief that India is a low-inequality country. Given the high level of inequality, there are valid concerns that growth might not be pro-poor, i.e. pro small and marginal land holder. Another important finding is that about half of the income inequality is explained by the household-level variance in income from cultivation, which in turn is primarily dependent on variance in landownership.

ESTIMATES OF INEQUALITY (GINI) IN PER CAPITA INCOME & MPCE IN 2013 AND 2003									
STATES	PER CAPITA INCOME		MPCE*		STATES	PER CAPITA INCOME		MPCE*	
	2013	2003	2013	2003		2013	2003	2013	2003
Punjab	0.53	0.63	0.29	0.25	Chhattisgarh	0.43	0.56	0.22	0.2
Haryana	0.51	0.6	0.25	0.23	Madhya Pradesh	0.49	0.82	0.25	0.22
Rajasthan	0.5	0.65	0.27	0.25	Gujarat	0.43	0.53	0.23	0.28
Uttar Pradesh	0.58	0.65	0.28	0.26	Maharashtra	0.57	0.61	0.21	0.23
Bihar	0.61	0.56	0.22	0.21	Andhra Pradesh	0.6	0.61	0.27	0.26
Assam	0.52	0.45	0.23	0.18	Karnataka	0.58	0.56	0.23	0.22
West Bengal	0.53	0.59	0.28	0.23	Kerala	0.59	0.52	0.31	0.35
Jharkhand	0.52	0.52	0.24	0.2	Tamil Nadu	0.59	0.67	0.28	0.28
Odisha	0.53	0.6	0.24	0.23	All-India	0.58	0.63	0.28	0.27

*MPCE: Monthly Per Capita Expenditure

Estimates are based on unit level data from Situation Assessment Surveys of Farmers/Agricultural Households undertaken by NSSO in 2003 and 2013

Reference: Sanjoy Chakravorty, S Chandrasekhar, Karthikeya Naraparaju (2017) *Income Generation and Inequality in India's Agricultural Sector: The Consequences of Land Fragmentation*

LAND USE AND CROPPING DECISIONS OF AGRICULTURAL HOUSEHOLDS IN INDIA

The NSSO's 2013 Survey of Land and Livestock Holdings helps improve our understanding of current cropping patterns in India since this is the only data set with rich information on plot level characteristics and details of crop cultivated on each plot of land possessed by the household during a crop calendar year. The data set allows us to answer the following question. What is the probability of a particular crop being chosen for cultivation in the period January – June 2013 (which overlaps with Rabi season when wheat is the main crop) after controlling for plot level characteristics including what was sown in the first period i.e. July – December 2012 (which roughly overlaps with Kharif season when paddy is the main crop)?

After controlling for unobserved household heterogeneity, we find that with 77.9 per cent probability, a farmer who cultivates cereals in Kharif season is likely to cultivate cereals in the Rabi season too if he or she is part of the rice wheat system. In case of other states, this probability is lower is 44.2 per cent.

One important initiative of Government of India is large investments in irrigation sector. Based on these baseline estimates it is also possible to establish that the probability of growing cereals increases when the plot gets irrigated. It is also true that the provision of irrigation will indeed ensure that plots are less likely to be kept fallow by the farmers. Another proposed initiative is liberalization of land lease laws. This would imply that small land holders will be able to lease in land. Increasing the size of operational land of small farmers has often been thought of as the first step towards improving their livelihoods. Liberalising land lease laws is unlikely to affect cropping patterns in states part of the rice wheat system. In contrast, the other states, the probability of growing pulses could increase.

With 77.9 per cent probability, a farmer who cultivates cereals in Kharif season is likely to cultivate cereals in the Rabi season too if he or she is part of the rice wheat system.

Reference: S Chandrasekhar, Vijay Laxmi Pandey and Soham Sahoo (2017) Crop Choice Patterns and Dynamics in Indian Agriculture

TRANSITION PROBABILITIES FOR CROP CHOICE: RICE WHEAT SYSTEM									
	CROP IN RABI SEASON								
CROP IN KHARIF SEASON	CEREALS	PULSES	OIL-SEEDS	VEGETABLES	FODDER	OTHER CROP	NONE	TOTAL LAND (HECTARES)	% LAND
Cereals	0.779*	0.045*	0.045*	0.048*	0.006*	0.024*	0.054*	14796545	70.22
Pulses	0.624*	0.075*	0.025	0.125*	0.008	0.034*	0.110*	1206184	5.72
Oilseeds	0.328*	0.156*	0.038	0.104*	0.210*	0.117*	0.047*	395417	1.88
Vegetables	0.300*	0.083*	0.093*	0.425*	0.055*	0.006	0.037*	285427	1.35
Fodder	0.303*	0.014	0.050*	0.176*	0.351*	0.084*	0.021*	519808	2.47
Other crop	0.414*	0.01	0.032*	0.097*	0.013*	0.386*	0.047*	2826245	13.41
None	0.434*	0.024*	0.022*	0.055*	0.006	0.023*	0.437*	1041889	4.94
Total land (hectares)	15518537	806870	773846	751126	410687	1713268	1095864		
% land	73.65	3.83	3.67	3.56	1.95	8.13	5.2		
Notes: Row probabilities add up to 1 * indicates significant at 10%, * at 5% and * at 1% levels of significance.									

TRANSITION PROBABILITIES FOR CROP CHOICE: OTHER STATES									
	CROP IN RABISEASON								
CROP IN KHARIF SEASON	CEREALS	PULSES	OIL-SEEDS	VEGETABLES	FODDER	OTHER CROP	NONE	TOTAL LAND (HECTARES)	% LAND
Cereals	0.442*	0.076*	0.037*	0.035*	0.012*	0.027*	0.371*	34255012	51.38
Pulses	0.238*	0.261*	0.028*	0.043*	0.007*	0.044*	0.380*	4342901	6.51
Oilseeds	0.270*	0.149*	0.161*	0.037*	0.011*	0.049*	0.323*	11833705	17.75
Vegetables	0.171*	0.063*	0.021*	0.409*	0.005*	0.054*	0.276*	1328044	1.99
Fodder	0.297*	0.052*	0.037*	0.017*	0.110*	0.029*	0.458*	657777	0.99
Other crop	0.229*	0.068*	0.028*	0.021*	0.018*	0.299*	0.338*	11052559	16.58
None	0.095*	0.019*	0.028*	0.057*	0.005*	0.030*	0.765*	3195053	4.79
Total land (hectares)	22928824	5970630	4112682	1997851	616340	6390974	24926809		
% land	34.25	8.92	6.14	2.98	0.92	9.55	37.24		
Notes: Row probabilities add up to 1 * indicates significant at 10%, * at 5% and * at 1% levels of significance.									

MIGRATION AND WOMEN IN FARM MANAGEMENT

In developing countries, including India, the discourse on feminisation of workforce has focussed on ‘feminisation of agricultural labour’ rather than on ‘feminisation of farm management’. For the first time in India, NSSO’s Survey on Land and Livestock Holdings 2013 conducted in rural India collected information on both short-term migration and association of household members with operational holdings was collected as part of the same survey. This data affords a rare glimpse of how the presence of a short-term migrant in the household affects whether other members are associated with the household’s operational holding as decision makers. Thus, for the first time in the context of a large developing country, viz. India, we can focus on feminisation of farm management and not the feminisation of farm labour. This provides a superior estimate of managerial feminisation over the current measures in the literature that use female-headed households as a proxy for managerial feminization.

In 2013, we estimate that 11.8 million women and 85 million men in the age group 15-65 years are main operators. These men and women can truly be considered as farm managers. We also estimate that 104 million women and 58.7 million men in the above age group are associated operators. It is a stylized fact that male migration contributes to the feminisation of agriculture in developing countries. Women, in comparison with men, are less likely to be either associated or be the main operator of the operational holding when there is no short-term migrant in the household. However, in case of women, the probability of their being involved with the operational holding either as a main or associated operator increases by 4.1 percentage points. This estimate is similar to that obtained in China where the probability of working on a farm is 6 per cent higher for women left behind in migrant households. Overall, the results suggest that short-term migration is indeed associated with a greater degree of feminisation of farm management. An immediate implication for policy is to ensure that the agricultural extension system becomes gender sensitive and can respond to the needs of women farmers. This is usually not the norm in many developing countries and certainly not of the Indian context as well.

In 2013, we estimate that 11.8 million women and 85 million men in the age group 15-65 years are main operators. These men and women can truly be considered as farm managers.

Reference: S Chandrasekhar, Soham Sahoo, Hema Swaminathan (2018) Seasonal Migration and Feminisation of Farm Management: Evidence from India.

EMPOWERMENT OF WOMEN IN AGRICULTURE AND ITS IMPLICATION FOR NUTRITION IN INDIA

The dynamic changes in the agricultural sector, in terms of new marketing institutions, changes in the preferences of commodities, climate change, and composition of the rural workforce due to the migration of male members increase the work burden and pose a serious challenge to the women in agriculture. Empirical evidence on gender aspects suggests that women's empowerment has the potential to increase productivity, achieve food security, reduce hunger and improve nutritional outcomes for both children and women. Women being the primary caregivers of children are central to the decision related to children's nutrition. Therefore, the low status of women contributes more to the poor nutritional outcomes of children. Recent studies suggest that women are the key stakeholders for the agriculture-nutritional interventions and their empowerment is consequential for the nutritional outcomes of children and women.

Women's empowerment, as measured by the Women's Empowerment in Agriculture Index using VDSA data, is low and dis-empowerment of women is more prominent in Bihar as compared to Jharkhand and Odisha.

In general, women's empowerment, as measured by the Women's Empowerment in Agriculture Index using VDSA data, is low and dis-empowerment of women is more prominent in Bihar as compared to Jharkhand and Odisha. The results show that dimensions in which women are dis-empowered mostly pertain to access to resources, access to assets, decision-making authority over the income, and poor participation in group activities. The household diet diversity is significantly and positively affected by gender parity gap, operational landholdings, and possession of number of milch animals. Reduction in income inadequacy for women significantly improves the household diet diversity. Since, women's representation in agriculture has been increasing, in terms of agricultural labourers and livestock breeders, from a public policy perspective, labour saving technologies, livestock development, training, and extension interventions should recognize the central role played by women.

Reference: S. Mahendra Dev, Vijay Laxmi Pandey, D Suganthi (2017) Empowerment of Women in Agriculture and Its Implication for Nutrition in India, Chapter in India Development Report 2017

FOOD SECURITY ATLAS OF ODISHA

CLASSIFICATION OF DISTRICTS IN ODISHA BASED ON FOOD SECURITY INDEX				
EXTREMELY INSECURE	SEVERELY INSECURE	MODERATELY INSECURE	MODERATELY SECURE	SECURE
Kandhamal	Gajapati	Nuapada	Subarnapur	Kendrapara
Malkangiri	Kendujhar	Kalahandi	Bargarh	Bhadrak
Debagarh	Rayagada	Mayurbhanj	Anugul	Baleshwar
	Nabarangapur	Balangir	Jajapur	Cuttack
	Koraput	Sambalpur	Khordha	Ganjam
	Sundargarh	Nayagarh		Jagatsinghapur
	Baudh	Dhenkanal		Puri
		Jharsuguda		

FOOD SECURITY ATLAS OF BIHAR

CLASSIFICATION OF DISTRICTS IN BIHAR BASED ON FOOD SECURITY INDEX				
EXTREMELY INSECURE	SEVERELY INSECURE	MODERATELY INSECURE	MODERATELY SECURE	SECURE
Purnia	Gaya	Sitamarhi	Kaimur (Bhabua)	Bhojpur
Jamui	Supaul	Saharsa	Bhagalpur	Siwan
Banka	Pashchim Champaran	Purba Champaran	Munger	Arwal
Araria	Kishanganj	Madhepura	Nalanda	Vaishali
Katihar	Darbhanga	Sheohar	Muzaffarpur	Rohtas
		Madhubani	Gopalganj	Patna
		Nawada	Buxar	Jehanabad
		Samastipur	Aurangabad	
			Saran	
			Khagaria	
			Sheikhpura	
			Begusarai	
			Lakhisarai	

Reference: Institute for Human Development (2018) Food Security Atlas of Bihar and Odisha,

INTEGRATED SURVEY ON AGRICULTURE AND NUTRITION IN BIHAR AND ODISHA (SPANDAN SURVEY): DETAILS

SURVEY	<p>Indira Gandhi Institute of Development Research, Mumbai collaborated with National Institute of Nutrition, Hyderabad on an integrated survey on agriculture, food consumption patterns, behavioral factors and nutrition outcomes in the year 2014-15. The findings from the survey conducted in Bihar and Odisha help us gain an in-depth understanding of how the nature and extent of participation in agriculture in conjunction with food, non-food consumption patterns and other behavioral factors influence the nutritional status of children less than five years of age. The findings are expected to inform policies, formulation of government programmes and future interventions aimed at improving the nutritional status of children.</p>
OBJECTIVE	<ul style="list-style-type: none"> • To understand the pathways from the nature and extent of participation in agriculture to consumption and nutrition outcomes • To assess the nutritional status and morbidity patterns among children less than five years of age • To assess the role of various factors affecting nutritional status of young children: dietary intakes, child care practices, health seeking behaviour, socio-demographic profile of the household, participation in government nutrition and agriculture programs etc • To collect information on the infrastructure facilities at the community level
SAMPLE	<ul style="list-style-type: none"> • A total of 2047 households from Bihar and 2053 households from Odisha are surveyed. • From each selected district two blocks are selected. Each selected block is visited twice, once during Rabi season and again during Kharif season. Only the households with children less than 5 years of age are included in the survey. All randomly selected households who give written informed consent for participation are included in the survey. There are four sets of questionnaires: Community Level, Household Socio-Demographic, Household (Agriculture), and Household (Nutrition).

SELECTION OF DISTRICTS FOR THE SURVEY	FOCUS GROUP DISCUSSION: SELECTION OF PARTICIPANTS
<p>Districts by Agro climatic Zones</p> <ul style="list-style-type: none"> ● Odisha: Mayurbhanj, Deogarh (Northern Plateau), Kendrapada, Puri (Coastal Zone), Angul, Balangir (Central Table Land), Koraput, Rayagada (Eastern Ghat), Kalahandi, Nuapada (Western Undulating) ● Bihar: Supaul, Purnia (North-east alluvial Plain), Sitamarhi, Darbhanga (North-West alluvial plain), Lakhisarai, Jamui (South Bihar alluvial plain (a)), Nawada, Rohtas (South Bihar alluvial plain (b)) 	<ul style="list-style-type: none"> ● A total of 6 villages from Sitamarhi, Purnea, and Lakhisarai ● A total of 8 villages from Mayurbhanj, Bolangir, Rayagada and Puri ● Number of FGDs with Male Participants 24 in Bihar and 32 in Odisha ● Number of FGDs for mothers having child <5 years 48 in Bihar and 64 in Odisha ● Key Informant Interviews: Women above 40 years of age from farm households, scheduled caste, scheduled tribe and landless households.

Survey was designed and coordinated by Sudha Narayanan and Vijay Laxmi Pandey from Indira Gandhi Institute of Development Research, Mumbai and Bharati Kulkarni, from National Institute of Nutrition, Hyderabad. Suganthi Dhanapal assisted with the data analysis. Focus group discussion was coordinated by Vijay Laxmi Pandey.

SPANDAN SURVEY: KEY STATISTICS

DISTRICT WISE PREVALENCE OF STUNTING, WASTING AND UNDERWEIGHT OF CHILDREN UNDER 5 YEARS							
BIHAR				ODISHA			
DISTRICTS	STUNTED	UNDER-WEIGHT	WASTED	DISTRICTS	STUNTED	UNDER-WEIGHT	WASTED
Supaul	30.0	28.5	13.3	Mayurbhanj	37.0	39.6	25.6
Purnia	42.4	35.1	11.6	Debagrah	28.0	32.7	22.6
Sitamarhi	41.6	40.5	20.0	Kendrapara	24.4	22.0	13.3
Darbhanga	35.9	36.9	19.7	Puri	20.0	16.8	11.5
Lakhisarai	37.3	26.6	10.5	Angul	18.0	21.7	13.7
Jamui	42.5	38.9	17.3	Bolangir	36.0	31.5	17.1
Nawadah	41.7	31.0	14.6	Koraput	41.0	39.4	19.8
Rohtas	34.5	34.0	17.4	Rayagada	37.0	39.1	18.6
				Kalahandi	40.7	41.9	22.2
				Nuapada	30.9	37.9	21.2

EVIDENCE FROM SPANDAN SURVEY

- **IMPORTANCE OF HOUSEHOLD FOOD SECURITY AND CHILDREN'S DIET**

We find that household food security is strongly associated with child diet diversity for both children in age group 6-23 months and 6-59 months. Children from extremely food insecure households are more likely to have a lower diet diversity score. Infant and young child feeding practices and ownership of agriculture land are positively and significantly associated with child diet diversity. But the crop diversity variables are not statistically significant. The results are unchanged even after controlling for wealth index and mother's characteristics.

The results for 6-23 months children show that infant and young child feeding practices, ownership of agriculture land and consumption from market purchases positively and significantly influences child diet diversity. Among the children between 6-59 months, access to irrigation, larger landholdings and consumption from home production and other sources are associated with improved diet diversity. The results hold even after controlling for mother's characteristics and wealth index. When all the indicators of household food security are controlled for, the influence of household food insecurity score still continue to influence child diet diversity along with infant and young child feeding practices, ownership of agriculture land and consumption from market purchases in the case of 6-23 months age group.

Overall, in the case of 6-59 months children, household food insecurity score continues to influence child diet diversity along with consumption from home production and other sources. Also, access to irrigation and marketed surplus of food crops are associated with child diet diversity.

The results for 6-23 months children show that infant and young child feeding practices, ownership of agriculture land and consumption from market purchases positively significantly influences child diet diversity.

- **CORRELATES OF UNDERWEIGHT**

We find that children from extremely food insecure households and those with lower diet diversity are more likely to be underweight. Consumption from own production, market and public distribution system (PDS) significantly influences child underweight among the children of 6-23 months. After controlling for mother's characteristics and wealth index, consumption from market and PDS continues to significantly influence child underweight. Among the children between 6-59 months, child diet diversity score and consumption from PDS are also significant determinants.

For children of age 6-23 months, household food security and child diet diversity do not seem to influence child underweight in the presence of other agriculture variables. Consumption from own production, markets and PDS continue to influence child underweight even after controlling for wealth and mother's characteristics. In the case of children between 6-59 months, household food security and child diet diversity persist to influence child underweight in the presence of other agriculture variables.

• CORRELATES OF STUNTING

Consumption from own production, markets and PDS continue to influence child underweight even after controlling for wealth and mother's characteristics.

We find that children from food insecure households are more likely to be stunted. Household food security and child diet diversity along with agriculture variables are not significantly associated with stunting for 6-23 months children. Nevertheless, for 6-59 months children, diversity of crops grown in kitchen garden is strongly associated with stunting. It continues to be significant in the presence of mother's characteristics and wealth index. Mother's characteristics such as mother's height and education levels and child's characteristics such as birth weight also affect stunting. The results show that household food security along with consumption from PDS significantly influences child stunting among the children of age group 6-59 months. After controlling for mother's characteristics and wealth index, the above results do not hold.

Even after controlling for wealth and mother's characteristics, consumption from own production continues to influence child stunting

Among the children between 6-23 months, none of the agriculture variables is associated with child stunting. For these children, household food security and child diet diversity do not seem to influence stunting in the presence of other agriculture variables. Consumption from own production, markets and PDS influences child stunting. Even after controlling for wealth and mother's characteristics, consumption from own production continues to influence child stunting. In the case of children between 6-59 months, crop diversity in the kitchen garden is significant and persists to influence child stunting in the presence of wealth index and mother's characteristics. .

• CORRELATES OF WASTING

Household food insecurity score, child diet diversity, participation in agriculture, consumption from own production, market and PDS do not significantly influence child wasting.

- **MATERNAL EMPLOYMENT AND NUTRITIONAL STATUS**

Child diet diversity is strongly associated with maternal employment for both children in age group 6-23 months and 6-59 months respectively. We find that children from households with mothers employed in agriculture are more likely to be underweight. Maternal characteristics such as maternal education and height influence children's nutritional status. For the age group 6-59 months, child wasting is strongly associated with maternal employment. We find that children from households with mothers employed in agriculture are more likely to be wasted; however, children from households with mothers employed in non-farm are less likely to be wasted.

Maternal characteristics such as maternal education and height influence children's nutritional status.

INSIGHTS FROM FOCUS GROUP DISCUSSION

PULSES: PRODUCTION BARRIERS & COPING STRATEGIES.	PERCEIVED EFFECTIVENESS OF AGRICULTURAL PROGRAMS
<ul style="list-style-type: none"> Scheduled castes, Scheduled tribes, and landless households are most vulnerable and resort to most severe consumption coping strategies, involving stop eating pulses. The large and marginal farmers generally substitute pulses with foods of higher or equal nutritive value whereas, landless class substitutes pulses with food of lower nutritive value. There is an urgent need to include pulses in the public distribution system and create new avenues for non-farm income. For encouraging the farmers to increase pulse production, availability of certified quality seeds, crop insurance, efficient and effective extension services, efficient markets and price support are needed <p><i>"We always get cheated by the seed sellers. At the time of selling the seeds, they claim the seeds to be high yielding. Later it turns out very poor. We do not get high-yielding variety seeds in the market."</i> (A Large Farmer, Lakhisarai, Bihar)</p> <p><i>"We realize that the pulses have become expensive only when we go to buy them in the shops... otherwise there is no much change in the price of pulses for producer".</i> (A Large Farmer, Sitamarhi, Bihar)</p> <p><i>"We are poor people and can't afford pulses if prices rise. Sometimes we eat kangul (a very cheap variety of pulse) if prices go up... we usually manage by eating rice with salt and chili."</i> (Landless, Scheduled Caste and Scheduled Tribe Households, Rayagada, Odisha)</p>	<ul style="list-style-type: none"> Input subsidy program is more uniformly covered. Lack of awareness about many on-going programs in the villages. Better coverage is required. Perception of favoritism and corruption. Procedure is tedious and cumbersome due to which small and marginal farmers are not able to participate in the program. Need to timely disseminate the information about the availability of inputs and other information. <p><i>"We do not get the information on time... Kri-si-salahkar is of no use... we stopped asking him about anything now, since his answer is always no".</i> (A Large Farmer, Purnia, Bihar)</p> <p><i>"Government programmes are good, but the corruption in the implementation is the main problem. Only some better-networked farmers are getting the benefits others are not".</i> (A Marginal Farmer, Purnia, Bihar)</p> <p><i>"We do not get the information, for example, information on the availability of fertilisers and weed-icides in the block. There is no other way to get informed other than by visiting the block office regularly. It is really cumbersome. These benefits should be distributed at panchayat level".</i> (A Large Farmer, Sitamarhi, Bihar)</p>

Reference: Vijay Laxmi Pandey, S. Mahendra Dev, Ranjeeta Mishra. Pulses in India: A qualitative study of production barriers and consumption coping strategies.

Reference: Vijay Laxmi Pandey and Ranjeet Mishra. Agricultural Programs Implementation and their Perceived Effectiveness: A Mixed Method Approach.

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