



The Potential of Food-Based Safety Net Programs for Achieving Sustainable Food and Nutrition Security: Insights from India

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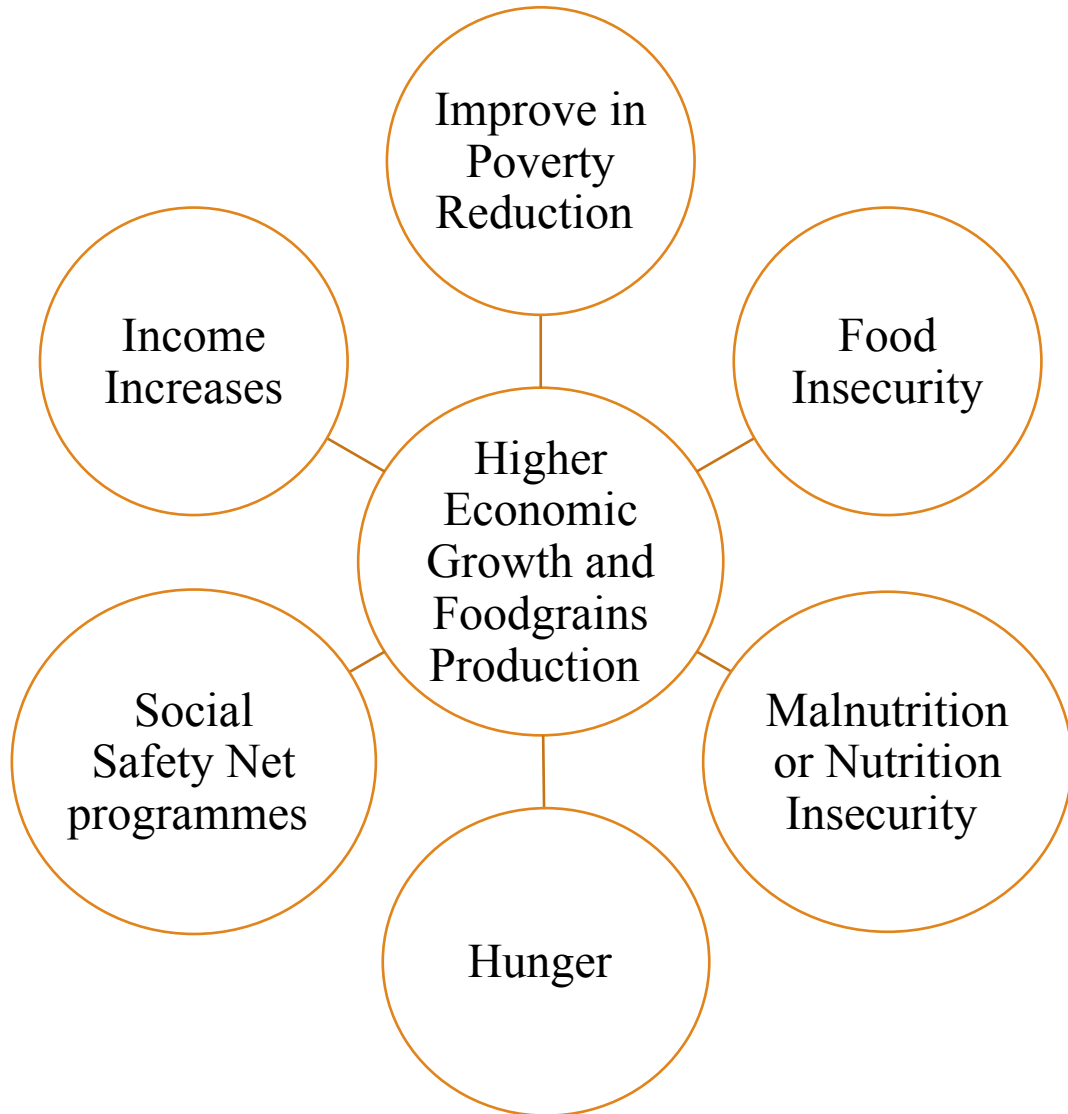
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Introduction

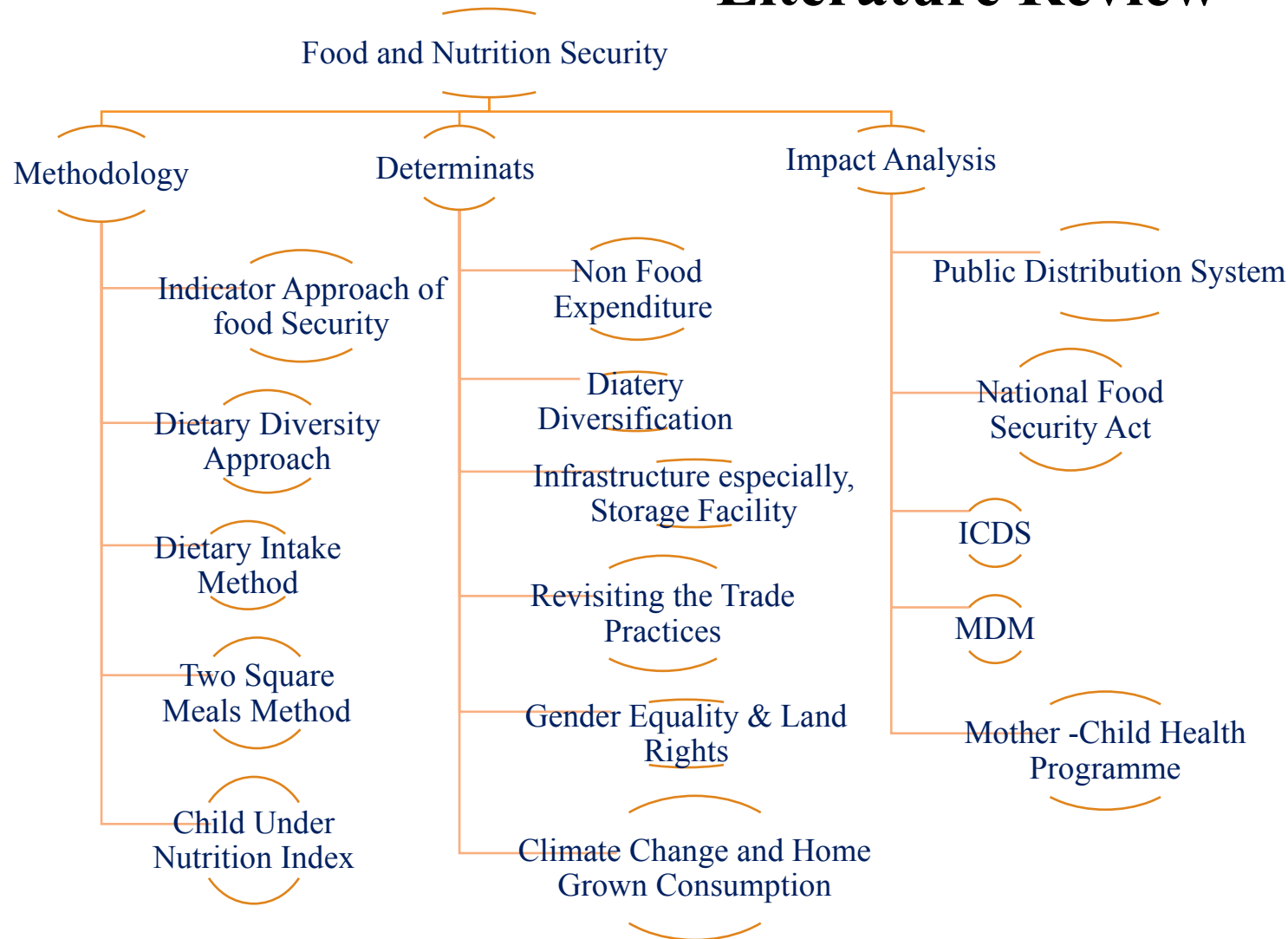


- ✓ West Bengal is one of the 17 major states in India.
- ✓ It's the **4th most populous** state with a **14% growth rate** (Census, 2011).
- ✓ The state boasts fertile soil and abundant water, making it a **leading producer of food grains in India**.
- ✓ However, West Bengal **lags in various macroeconomic indicators** and ranks **8th in terms of HDI**.
- ✓ 3.5% of its population doesn't have a guaranteed meal daily, and **16.5% struggle to have two meals** consistently throughout the year (Roy, 2009).
- ✓ 29.3% of the population consists of STs & SCs (Census, 2011) with **20% living in poverty**.
- ✓ Alarmingly, **32.2% of children are underweight**, and the **under-five mortality rate stands at 25.4** per thousand live births (NFHS-5).

Concepts of Food Security and Nutrition Security

- **Food Security** as” a situation at the individual, household, regional , national and global level, when all people , at all times, have **physical and economic access to safe and sufficient food** to meet their dietary needs and food preferences for an active , healthy and productive life.” (FAO, 1996)
- **Nutritional Security** exists when all people at all times have physical, social and economic access to food, which is **consumed in sufficient quantity and quality to meet their dietary needs** and is supported by an environment of adequate sanitation, health services and care for an active life (FAO, 1996).
- Food Security framework emphasizes an economic approach in which food as a commodity is a central focus. So it is purely a *quantitative judgment*.
- Nutrition Security or malnutrition framework adopts a **biological approach** in which the nutritional status of the human being is the major concern and **it is a qualitative judgment**. Nutrition is the **function of food intake and health status**.

Literature Review



References

- Rid Out, Seed and Ostry (2006); Akhil and Prasad (2015); Chen et al. (2019); Mitra et al. (2019); Shing & Nayak (2020); Das & Basar (2020); Jatav et al (2022)
- Sen (2005); Swain (2008); Deaton and Drèze (2009); Tendon and Lands (2011); Renuka and Sandy (2014); Akhil, K. (2017); Bhuyan et al. (2020)
- Kimberly and Devi (1995); Vyas (2000); Dreze (2004); Rao (2005); Alderman (2005); Schmidhuber and Tupelo (2007); Mittal (2007); Pond and Kumar (2009); Swaminathan (2011); Arimond & Ruel (2004); Basu & Basole (2012); Brahmanand et al. (2013); Mishra (2013); Hendriks (2016)
- Kannan et al. (2000); Swaminathan (2003); Basu (2011); Sinha (2013) and Dreze & Khera (2013); Karhad (2014);
- Radhyakrishna (2005); Ghosh (2006) and Dasgupta et al. (2012); Mark et al. (2012); Drèze and Khera (2013); Himanshu (2013) and Sen & Himanshu (2013); Aguayo and Badgaiyan (2014); Jose and Hari (2015); Jha and Acharya (2016); Song and Imai (2019)

Objectives

1.Exploration of Benefits:

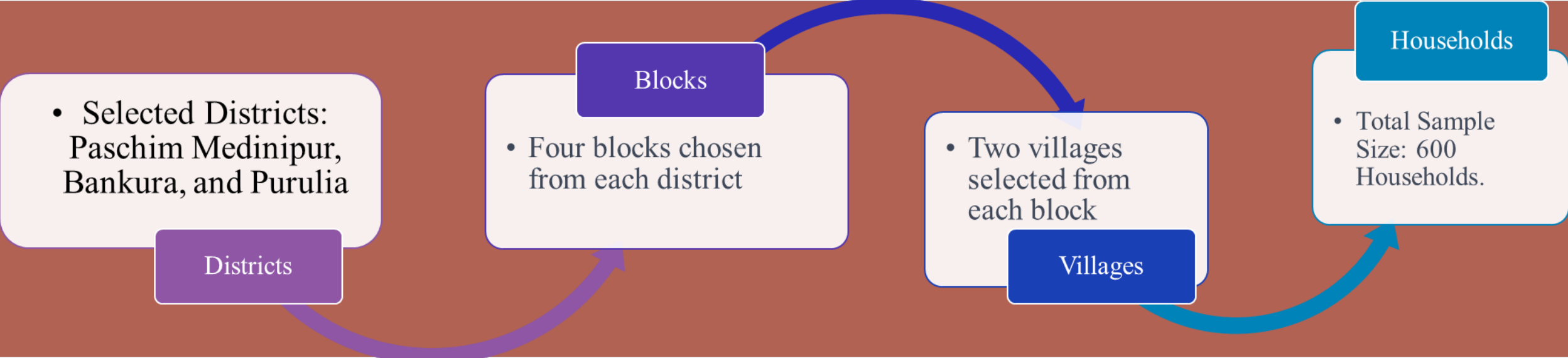
Investigate the impact of government food safety net programmes (FSNPs) on household food and nutrition insecurity in three underdeveloped districts of West Bengal using micro panel data.

2.Sustainability Assessment:

Assess the long-term sustainability of reductions in food and nutrition insecurity achieved through FSNPs.

3.Socio-economic Impact Analysis:

Evaluate how socio-economic factors influence household food and nutrition insecurity in the specified districts of West Bengal.



Data Collection & Analysis

- **Sampling Technique:** Employed a multistage stratified random sampling method for primary data collection.
- **Baseline Survey (2012-13):** Data from 600 households was collected as our foundational reference.
- **Follow-up Surveys:** Revisited the same 600 households for primary data collection in 2017-18 and 2021-22.
- **Data Preparation:** Compiled a micro panel dataset of these 600 households for analysis.

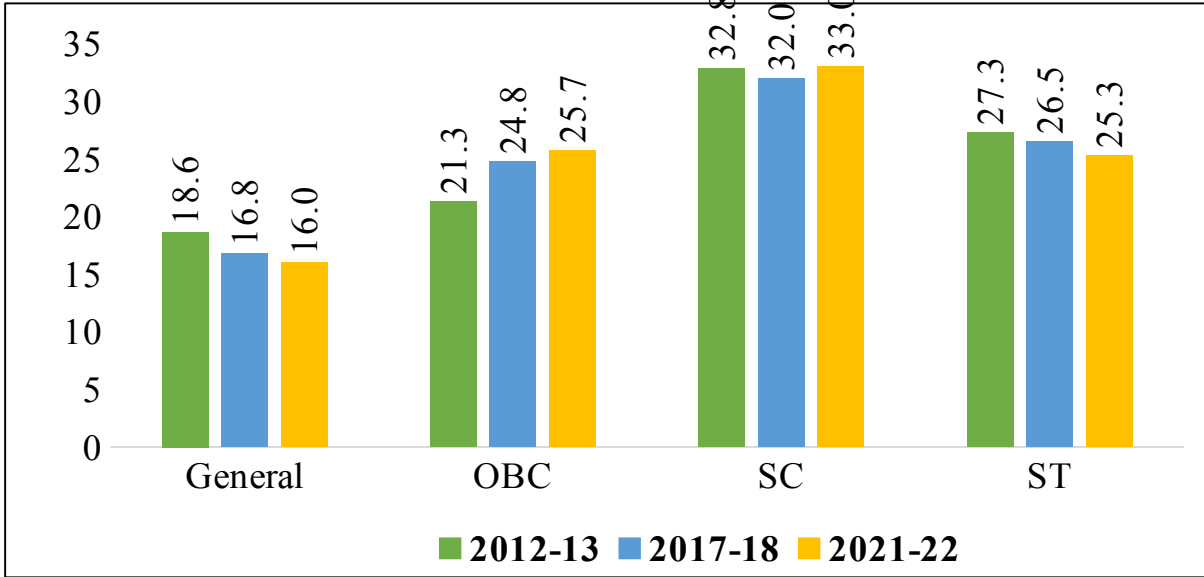
Areas of Inquiry

- *General information of households*
- *Occupation and earnings of the households*
- *Social Protection Schemes of Government*
- *Expenditure of the Households*
- *Multidimensional Poverty Indicators*

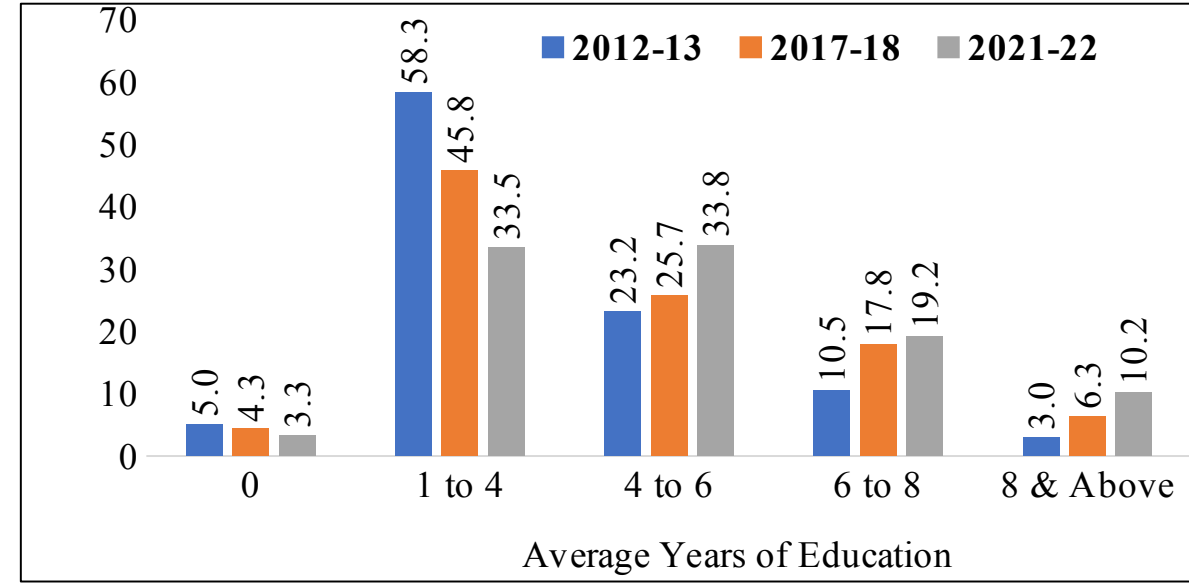
This survey was conducted with financial support from UGC & ICSSR in the Department of Economics, Vidyasagar University. Supervised by Dr. Pinaki Das. I contributed as a Research Assistant

Socio Economic profile of the Sample Households (Primary Data)

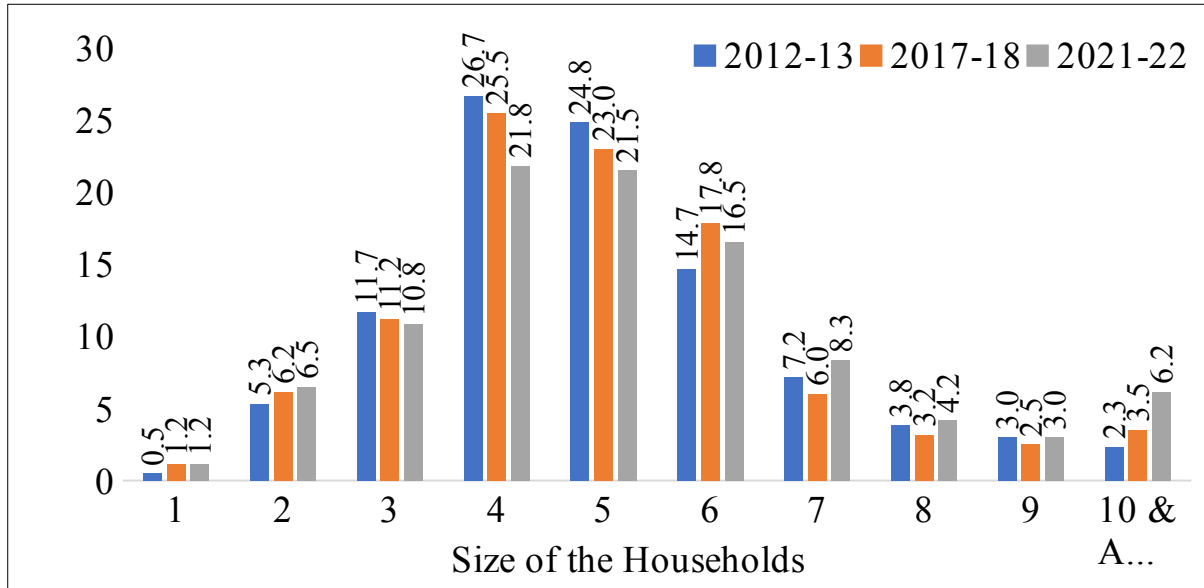
1. Social Group



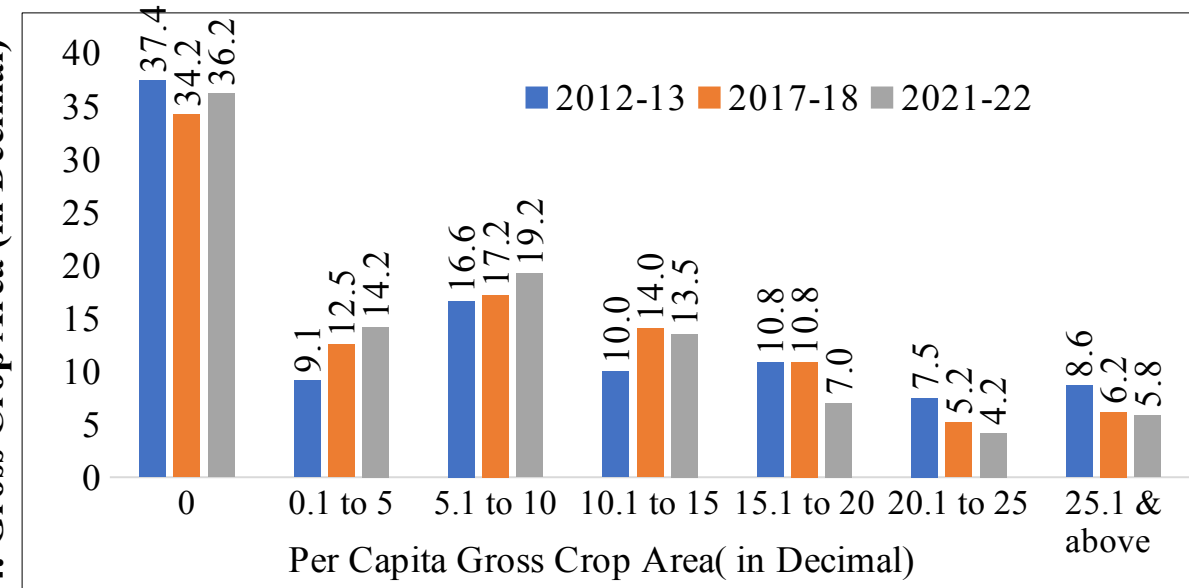
2. Level of Education



3. Households Size

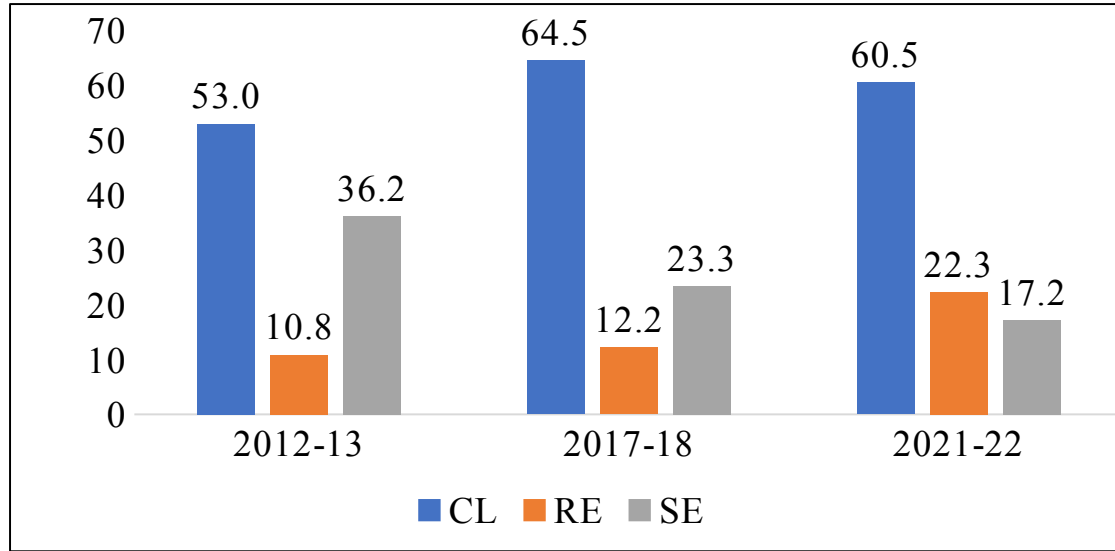


4. Gross Crop Area (in Decimal)

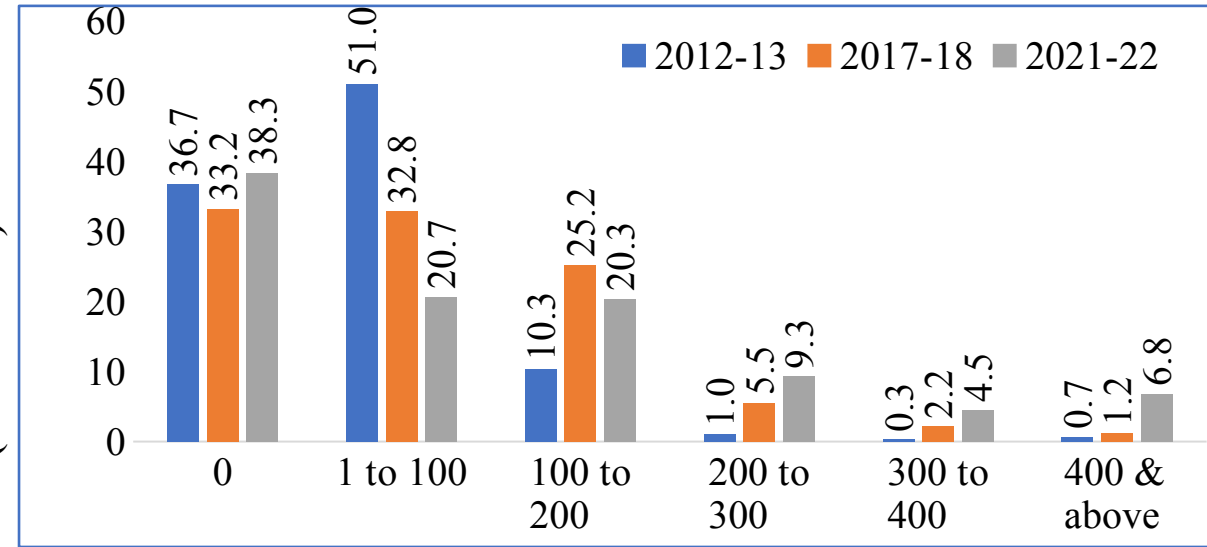


Socio Economic profile of the Sample Households (Primary Data)

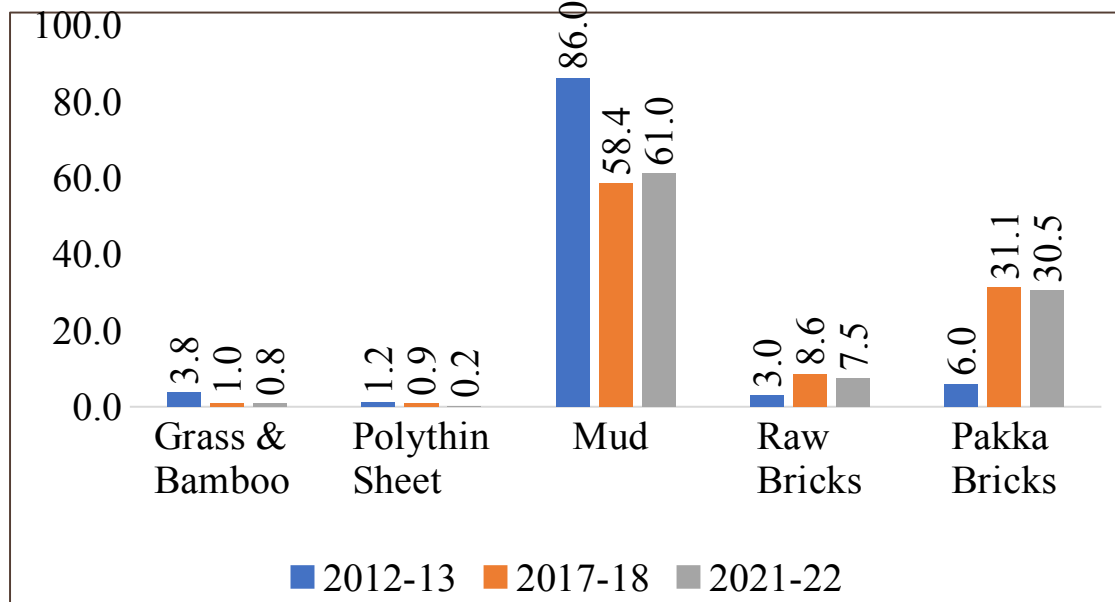
5. Type of Employment



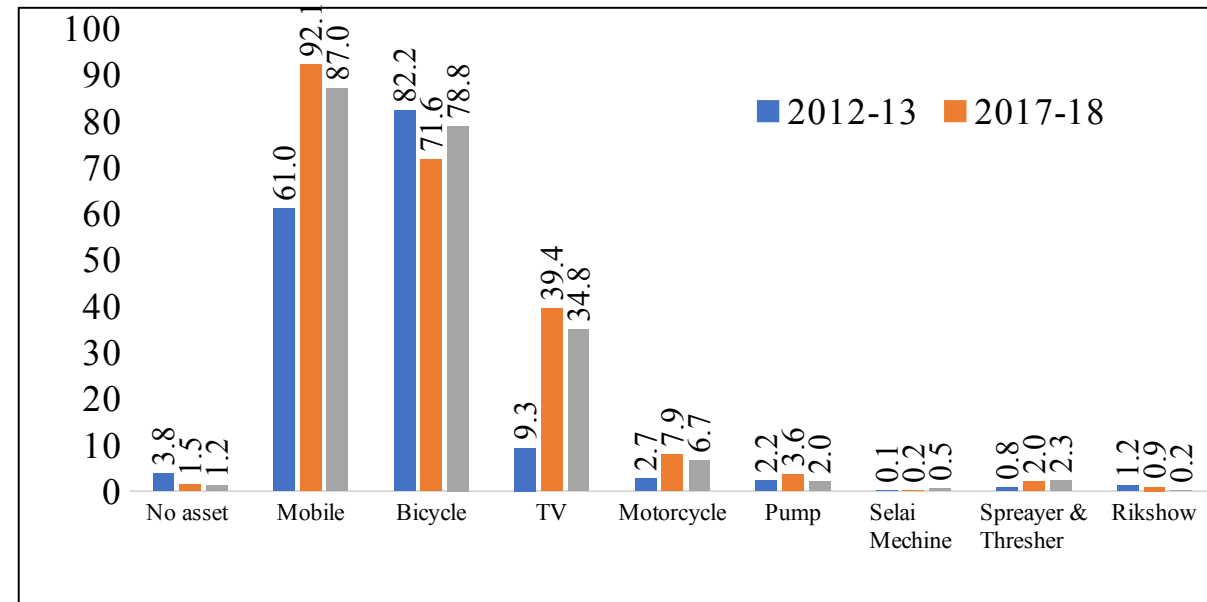
6. Productivity of land (Rs/Decimal)



7. House Wall



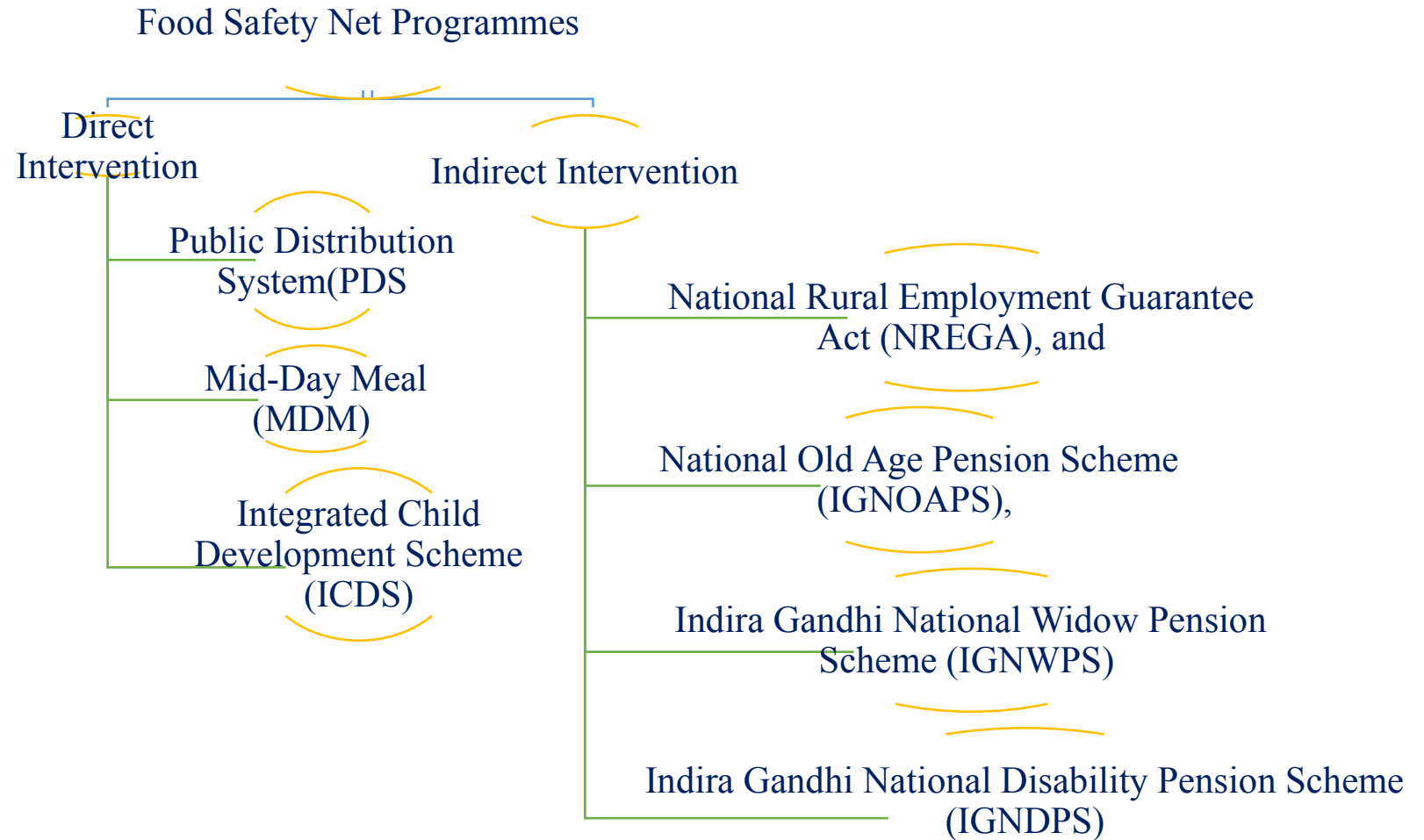
8. Assets Owned by sample household



Food Base Safety Net Programmes (FSNPs)

References

Jha et al., 2013; Rogers and Coates, 2002; Gregory et al., 2020; Das & Basar, 2020; Sen and Himanshu (2013); Jha and Acharya (2016); Drèze and Khera (2013); Srivastava and Chand (2017); and Narayana (2017)



Scope, Extent and Level of FSNDs Benefits of Sample Households

FSND Schemes	2012-13			2017-18			2021-22		
	Scope (%)	Coverage (%)	Extent (in Rs.)	Scope (%)	Coverage (%)	Extent (in Rs.)	Scope (%)	Coverage (%)	Extent (in Rs.)
A. Direct Intervention Programmes									
1. PDS	82.7	94	3125.9	90.5	95.9	2907.2	96.7	97.8	4368.9
2. ICDS	18.7	92	2915.5	22.3	94	2389	31.8	78.5	4865.3
3. MDM	43.7	99.6	1632.6	43.2	98.8	1675.6	44.2	98.5	2110.3
B. Indirect Intervention Programmes									
4. NREGA	76	98.5	3132.3	69	64.5	6310.8	85.8	72.2	4152.2
5. IGNOAPS	23.8	35.7	3658.8	10.7	67.2	1646.5	29.8	88.8	2017.6
6. IGNWPS	11.8	40.8	3434.5	9	53.7	4144.8	4.5	92.6	1992
7.IGNDPS	2	25	1700	6.8	51.2	1619	0.8	60	2362.2

- ✓ In 2012-13, 82.7% of the surveyed households possessed BPL ration cards, with 94% reaping benefits.
- ✓ The average monthly benefit was Rs. 3861.5 per household in 2012-13.
- ✓ This amount rose to Rs. 4784.4 in 2017-18 but dropped to Rs. 2177.2 by 2021-22.

Measurement of Food Insecurity

- ✓ We aimed to estimate a measure of food insecurity, similar to the poverty status, by defining a 'Food Insecurity Line (FIL)'. Using Das & Basar's (2018 and 2019) methodology, the FIL for each state (i) and region (j) is calculated as:

$$✓ \text{FIL}_{ij} = \text{PL}_{ij} * X_{ij}, [i= 1, 2...28 \text{ and } j=1, 2];$$

Where PL_{ij} is the poverty line of i-th state in j-th region, and X_{ij} is the share of food of i-th state in j-th region.

- ✓ For West Bengal, the FIL for the years 2012-13, 2017-18, & 2021-22 was updated using:

$$✓ \text{FIL}_{t+1,j} = \text{PL}_{tj} * \left(\frac{I_{t+1,j}}{I_{t,j}} \right) * X_j ;$$

where $I_{t+1,j}$ & $I_{t,j}$ is the current year and base year rural consumer price index in the j-th region.

- ✓ Resulting in FIL values of Rs. 524.5 (2012-13), Rs. 695.1 (2017-18), and Rs.855.4 (2021-22).
- ✓ The FGT Method evaluates the incidence, depth, and severity of food insecurity.

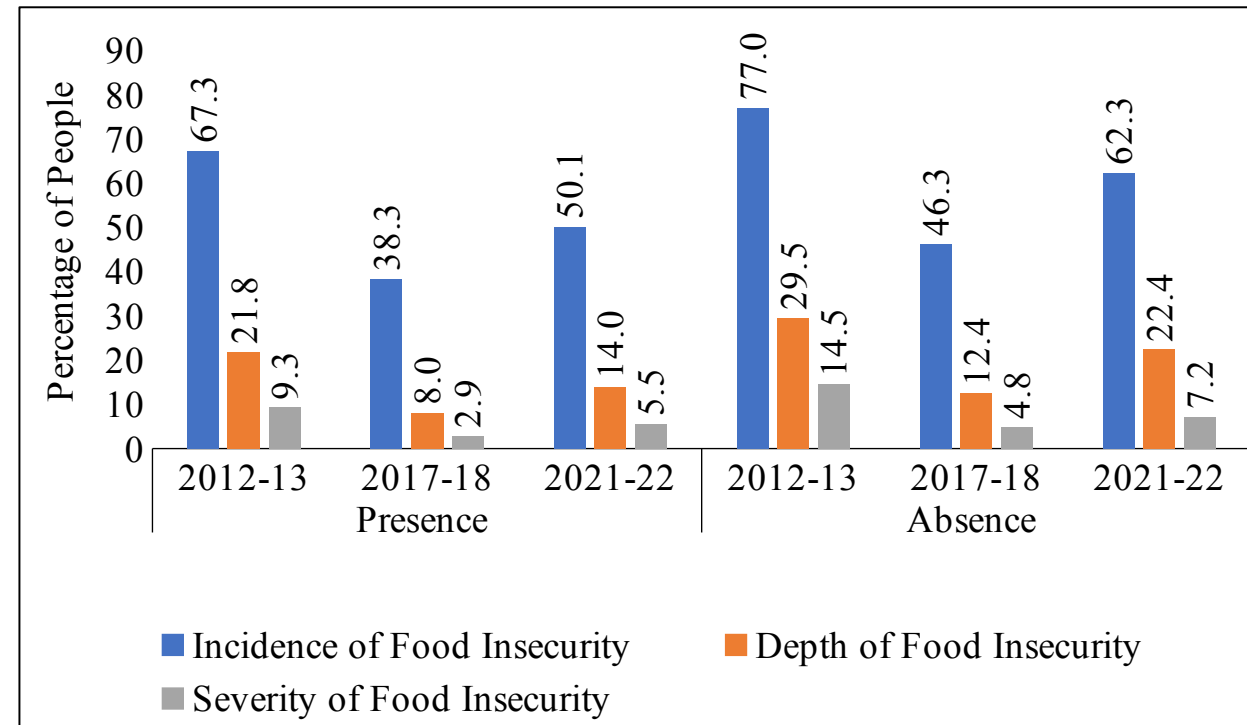
In 2011-12, the percentage of the Poverty Line allocated for food consumption expenditure in rural West Bengal was 60.4%,. (GOI, 2014)

Food Safety Net Programmes and the Status of Food Insecurity

Distribution of Households by their MPCFE in the absence and presence of FSNPs (in Rs.)

Monthly Per capita Food Consumption Expenditure (MPCEF)	2012-13		2017-18		2021-22	
	Absence	Presence	Absence	Presence	Absence	Presence
Less than 600	76.5	5.3	55.6	2	81.5	2.5
600.01 to 868.5	14.3	16.8	28.7	6.3	13	9.1
868.6 to 1000	2.3	14.6	7.5	8.5	1	9.6
1000 to 1152	1.8	18	3.8	12.7	2	11.5
1152.1 to 1416.1	2.5	24.3	2	21.5	0.8	17.3
Above 1416.1	2.6	21	2.4	49	1.7	50
Total	100	100	100	100	100	100

Incidence (IFI), Depth (DFI) and Severity (SFI) of Food Insecurity of the Sample Households



✓ With FSNP benefits, the incidence of food insecurity dropped by 9.7% in 2012-13, 6% in 2017-18, and 12.2% in 2021-22. Additionally, the depth and severity of food insecurity lessened due to these benefits.

Measurement of Nutrition Insecurity

Estimation of Average Nutrition Intake

Caloric intake was determined by converting the recorded quantities of consumed food items into calorie values for each household, as detailed by Das & Basar (2020). Here's the breakdown:

$$C = \begin{bmatrix} C_1 \\ C_2 \\ \cdot \\ \cdot \\ C_n \end{bmatrix} = \begin{bmatrix} X_{11} & X_{12} & \cdot & \cdot & X_{1j} \\ X_{21} & X_{22} & \cdot & \cdot & X_{2j} \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ X_{n1} & X_{n2} & \cdot & \cdot & X_{nj} \end{bmatrix} \begin{bmatrix} E_1 \\ E_2 \\ \cdot \\ \cdot \\ E_j \end{bmatrix}$$

Where $i=1,2,\dots,n$ (no of households) and $j=1,2,\dots,m$ (no of food items) and Per capita calorie consumption of the i -th households is given as $PC_i = \frac{C_i}{F_i}$

- FGT Method [$NI_\alpha = \frac{1}{N} \sum_{i=1}^q \left(\frac{\bar{C}-C_i}{\bar{C}} \right)^\alpha$; $\alpha = 0, 1, \text{ and } 2$] is used to estimate the incidence (INI), depth (DNI) and severity of nutrition insecurity (SNI).

Average Calorie Norm

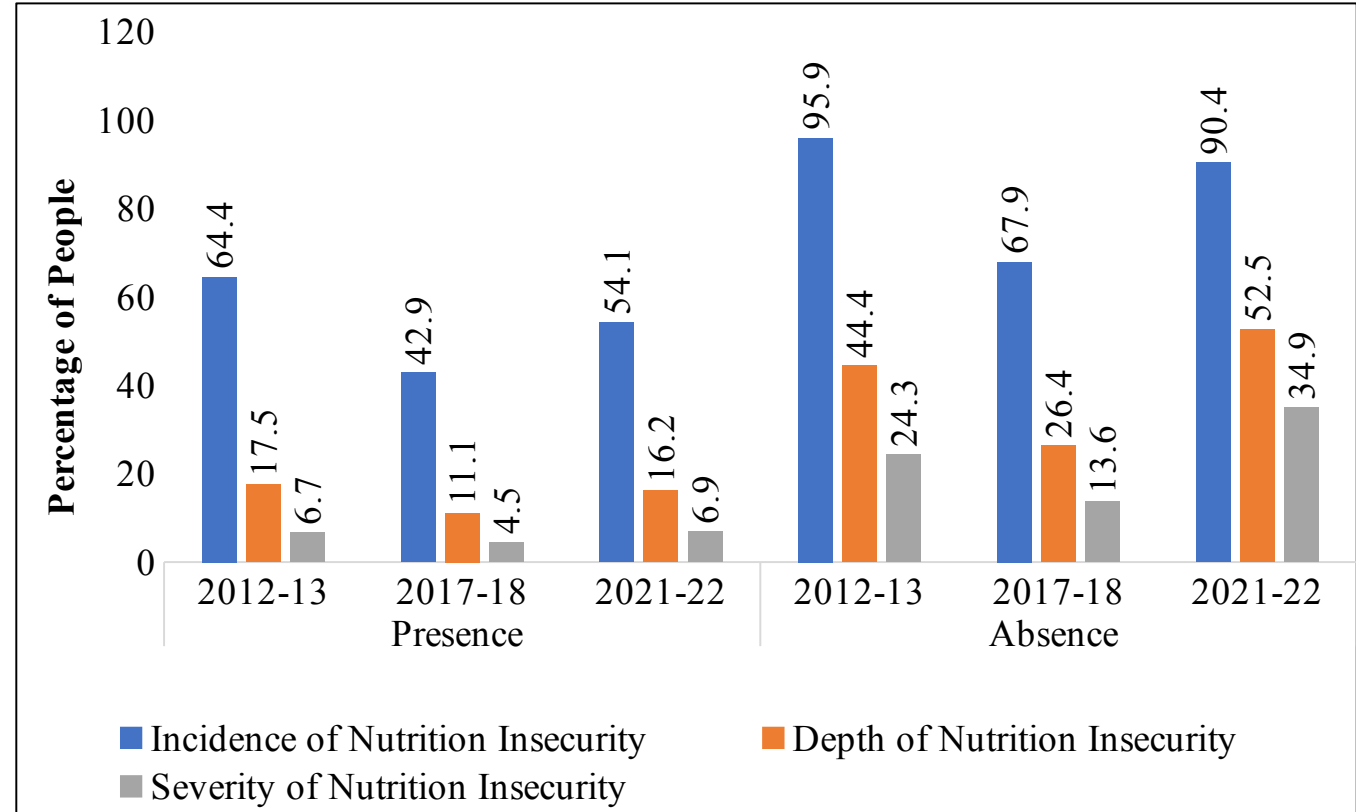
The newly recommended calorie norms by ICMR are set at 2155 kcal/person/day for rural areas and 2090 kcal/person/day for urban regions (ICMR, 2010).

Food Safety Net Programmes and the Status of Nutrition Insecurity

Level of calorie consumption (K. Cal/per day) in the absence and presence of PDS Benefit

Level of calorie	With PDS Benefit			Without PDS Benefit		
	2012-13	2017-18	2021-22	2012-13	2017-18	2021-22
Below 1000	3.5	2.5	5.3	37.0	14.5	50.6
1000-1999.9	49.0	27.7	30.7	55.5	43.8	32.9
2000 -2088.9	5.0	4.2	3.8	1.3	2.8	1.5
2089-2099.9	0.7	0.7	0.5	0.0	0.2	0.5
2100-2154.9	1.7	2.0	2.7	1.0	3.0	0.8
2155-2399.9	12.0	11.3	10.5	1.7	5.8	5.0
2400-2999.9	18.5	15.5	21.3	2.2	9.3	3.7
3000 & above	9.7	28.2	36.2	1.3	20.5	5.0
Total	100	100	100	100	100	100

INI, DNI and SNI of the Sample Households



✓ In 2012-13, 28.2% of households had a daily calorie consumption exceeding 2400 K. Cal, rising to 51.7% in 2017-18, then dropping to 46.5% in 2021-22.

✓ With FSNP support, 31.4% became nutritionally secure in 2012-13, 25% in 2017-18, and 36.3% in 2021-22.

Food Safety Net Programmes and the Sustainability of Food Insecurity and Nutrition Insecurity

Change of the IFI during 2012-13, 2017-18 and 2021-22

		2017-18			2021-22			
2012-13		<i>Food Secure HHs</i>	<i>Food Insecure HHs</i>	<i>Total HHs</i>	2017-18	<i>Food Secure HHs</i>	<i>Food Insecure HHs</i>	<i>Total HHs</i>
		<i>Food Secure HHs</i>	31.3	11		42.3		50.2
	<i>Food Insecure HHs</i>	36.5	21.2	57.7		13.9	18.3	32.2
	<i>Total HHs</i>	67.8	32.2	100		64.1	35.9	100

Change of the INI during 2012-13, 2017-18 and 2021-22

		2017-18			2021-22			
2012-13		<i>Nutritionally secure HHs</i>	<i>Nutritionally Insecure HHs</i>	<i>Total HHs</i>	2017-18	<i>Nutritionally Secure HHs</i>	<i>Nutritionally Insecure HHs</i>	<i>Total HHs</i>
		<i>Nutritionally Secure HHs</i>	27.7	12.5		40.2		43.8
	<i>Nutritionally Insecure HHs</i>	35.3	24.5	59.8		13.2	23.8	37.0
	<i>Total HHs</i>	63.0	37.0	100		57.0	43.0	100

Regression Results Heckman Selection Model of Food Insecurity -Two Step

Dependent Variable	Independent Variable	Coefficients	Z stat	P>z	
Depth of Food Insecurity (DFI)	FSNP-Average monthly income from food safety net programmes (in Rs.)	-0.0167	-2.62	0.009	Number of observations = 1800 Censored observation = 1108 Uncensored observation = 692 Wald chi2(11) = 37.16 Prob > chi2 = 0.0002 mills lambda = 0.13514 (0.165) rho = 0.5641 sigma = 0.1850
	YED-Average education level of the households	-0.0072	-2.16	0.031	
	SCST-Whether the household belongs to ST community (yes=1, no=0)	-0.0189	-1.01	0.313	
	OBC-Whether the households belong to OBC Community (yes=1, no=0)	-0.0418	-1.86	0.062	
	HSIZE- Size of the households	0.0470	4.48	0.000	
	Labour-Average monthly income from labour entitlement (in Rs.)	-0.0247	-1.36	0.174	
	Non-Farm- Average monthly income from non-farm-based activity (in Rs.)	-0.0290	-0.90	0.369	
	PCCLD-Per Capita Cultivable Land of Households (in decimal)	-0.0012	-1.36	0.174	
	CL-Whether the households are casually employed (yes =1, no=0)	-0.0092	-0.57	0.567	
	D1Time Dummy takes '1' for 2017-18, Otherwise '0'	-0.1766	-4.97	0.000	
	D2-Time Dummy takes '1' for 2021-22, Otherwise '0'	-0.0886	-4.18	0.000	
Constant	0.0667	0.90	0.370		
Whether the household is food secure or not (D_IFI)	FSNP-Average monthly income from food safety net programmes (in Rs.)	-0.0129	-4.83	0.000	
	YED-Average education level of the households	-0.0157	-1.93	0.030	
	SCST-Whether the household belongs to ST community (yes=1, no=0)	0.0257	0.27	0.789	
	OBC-Whether the households belong to OBC Community (yes=1, no=0)	-0.2038	-1.82	0.069	
	HSIZE- Size of the households	0.3735	16.28	0.000	
	Labour-Average monthly income from labour entitlement (in Rs.)	-0.0003	-6.20	0.000	
	Farm-Average monthly income from farm-based activity (in Rs.)	-0.0394	-0.11	0.913	
	Non-Farm-Average monthly income from non-farm-based activity (in Rs.)	-0.0004	-3.46	0.001	
	PCCLD-Per Capita Cultivable Land of Households (in decimal)	-0.0104	-2.44	0.015	
	CL-Whether the households are casually employed (yes =1, no=0)	-0.1286	-1.64	0.101	
	D1Time Dummy takes '1' for 2017-18, Otherwise '0'	-0.9319	-9.83	0.000	
	D2-Time Dummy takes '1' for 2021-22, Otherwise '0'	-0.3225	-3.02	0.003	
	Constant	-1.0208	-5.94	0.000	

Results of Heckman Selection Model of Nutrition Insecurity -Two Step

Dependent Variable	Independent Variable	Coefficients	Z stat	P>z	
Nutrition Insecurity Gap (NIG)	FSNP-Average monthly income from food safety net programmes (in Rs.)	-0.0151	-1.48	0.140	Number of observations = 1800 Censored observation = 934 Uncensored observation = 866 Wald chi2(11) = 27.72 Prob > chi2 = 0.0036 mills lambda = 0.3765542 (0.126) rho = 0.98647 sigma = 0.3766
	YED-Average education level of the households	-0.0020	-2.38	0.007	
	SCST-Whether the household belongs to ST community (yes=1, no=0)	-0.1201	-2.66	0.008	
	OBC-Whether the households belong to OBC Community (yes=1, no=0)	-0.1172	-3.17	0.002	
	H SIZE- Size of the households	0.0643	3.03	0.002	
	Labour-Average monthly income from labour entitlement (in Rs.)	-0.0460	-1.75	0.079	
	Non-Farm- Average monthly income from non-farm-based activity (in Rs.)	-0.0014	-0.04	0.969	
	PCCLD-Per Capita Cultivable Land of Households (in decimal)	-0.0017	-1.71	0.087	
	CL-Whether the households are casually employed (yes =1, no=0)	-0.0071	-0.29	0.775	
	D1Time Dummy takes '1' for 2017-18, Otherwise '0'	-0.3360	-3.35	0.001	
	D2-Time Dummy takes '1' for 2021-22, Otherwise '0'	0.1116	2.07	0.038	
	Constant	-0.3398	-1.45	0.146	
Whether the households are nutritionally insecure or not (D_INI)	FSNP-Average monthly income from food safety net programmes (in Rs.)	-0.0508	-1.82	0.068	
	YED-Average education level of the households	-0.0172	-2.30	0.009	
	SCST-Whether the household belongs to ST community (yes=1, no=0)	-0.3499	-4.02	0.000	
	OBC-Whether the households belong to OBC Community (yes=1, no=0)	-0.1624	-1.61	0.107	
	H SIZE- Size of the households	0.2258	12.02	0.000	
	Labour-Average monthly income from labour entitlement (in Rs.)	-0.0002	-4.52	0.000	
	Farm-Average monthly income from farm-based activity (in Rs.)	-0.0002	-0.69	0.488	
	Non-Farm-Average monthly income from non-farm-based activity (in Rs.)	-0.0130	-1.51	0.132	
	PCCLD-Per Capita Cultivable Land of Households (in decimal)	-0.0702	-0.21	0.832	
	CL-Whether the households are casually employed (yes =1, no=0)	-0.0379	-0.54	0.588	
	D1Time Dummy takes '1' for 2017-18, Otherwise '0'	-0.9506	-11.15	0.000	
	D2-Time Dummy takes '1' for 2021-22, Otherwise '0'	0.3890	4.08	0.000	
	Constant	-0.9968	-6.59	0.000	

- ❑ India's significant economic growth hasn't consistently improved nutritional outcomes, aligning with Engel's Law.
- ❑ Many households that were food and nutrition secure in 2012-13 faced insecurity by 2017-18 and worsened by 2021-22.
- ❑ Short-term food and nutrition security for vulnerable households relies heavily on FSNP benefits, raising sustainability concerns.
- ❑ Larger household sizes increase food insecurity, while factors like labor income and FSNP benefits offer mitigation.
- ❑ Labor income effectively reduces both incidence and depth of nutritional insecurity. However, FSNP benefits primarily address just the incidence.
- ❑ In essence, while India progresses economically, ensuring long-term nutritional well-being remains a challenge.

Policy Suggestions

- Promote awareness campaigns on selecting the right food basket and cultivating healthy eating habits through both governmental and NGO initiatives.
- Encourage identification of local food consumption patterns and nutritional mapping. This will facilitate promotion of local food groups without sacrificing nutritional value.
- Public policies should focus on enhancing the educational levels of citizens to improve their nutritional choices.
- The continuation of PDS benefits is vital to reach SDGs concerning nutrition security.
- Along with SPPs, emphasize the importance of child feeding practices, nutrition counselling, and coordination among different programs to combat hunger and nutrition insecurity.
- Policies and programs need a regional focus to address specific local needs effectively.
- Proper execution of the Swachh Bharat Mission can significantly reduce stunting, wasting, and undernourishment, benefiting those who are nutritionally insecure.