Food-Based Safety Net Programs (FSNPs) and Sustainability of Indigenous Populations: An Intertemporal Analysis from the Backward Regions of West Bengal

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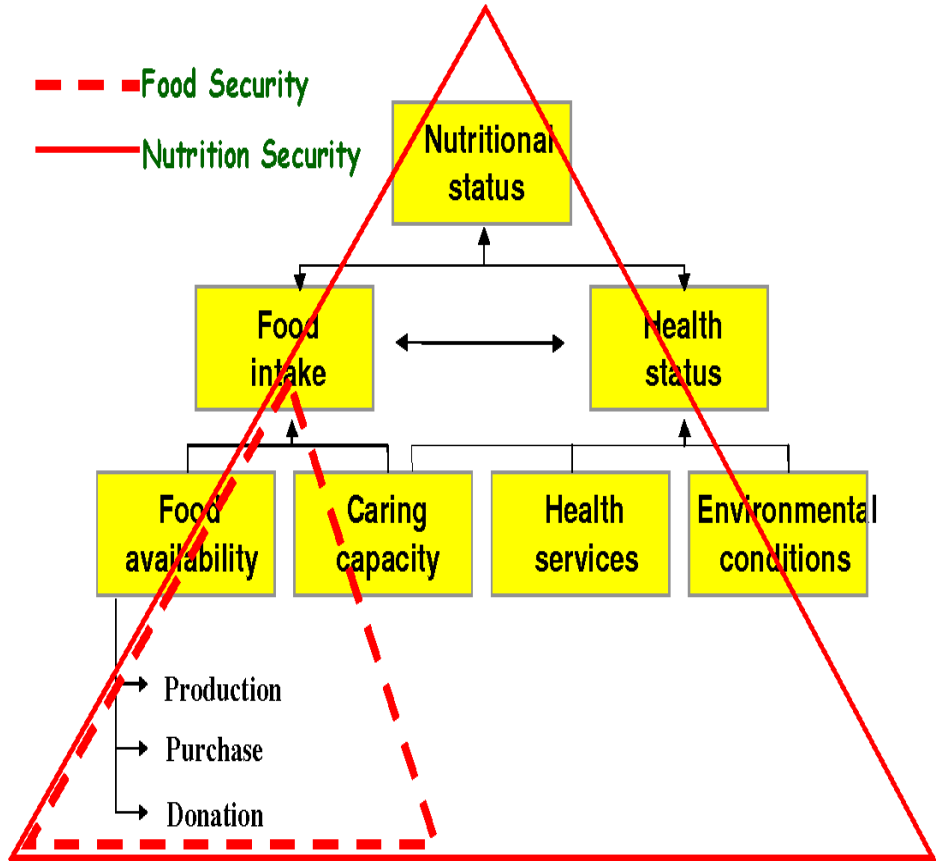
Introduction

- High Population Density
- Large Number of Poor People
- Around 93 per cent workforce are Informal
- Lack of any type of Social Protection
- Food and Nutrition problem are deeply rooted
- Challenged government to ensure food and Nutrition insecurity

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)



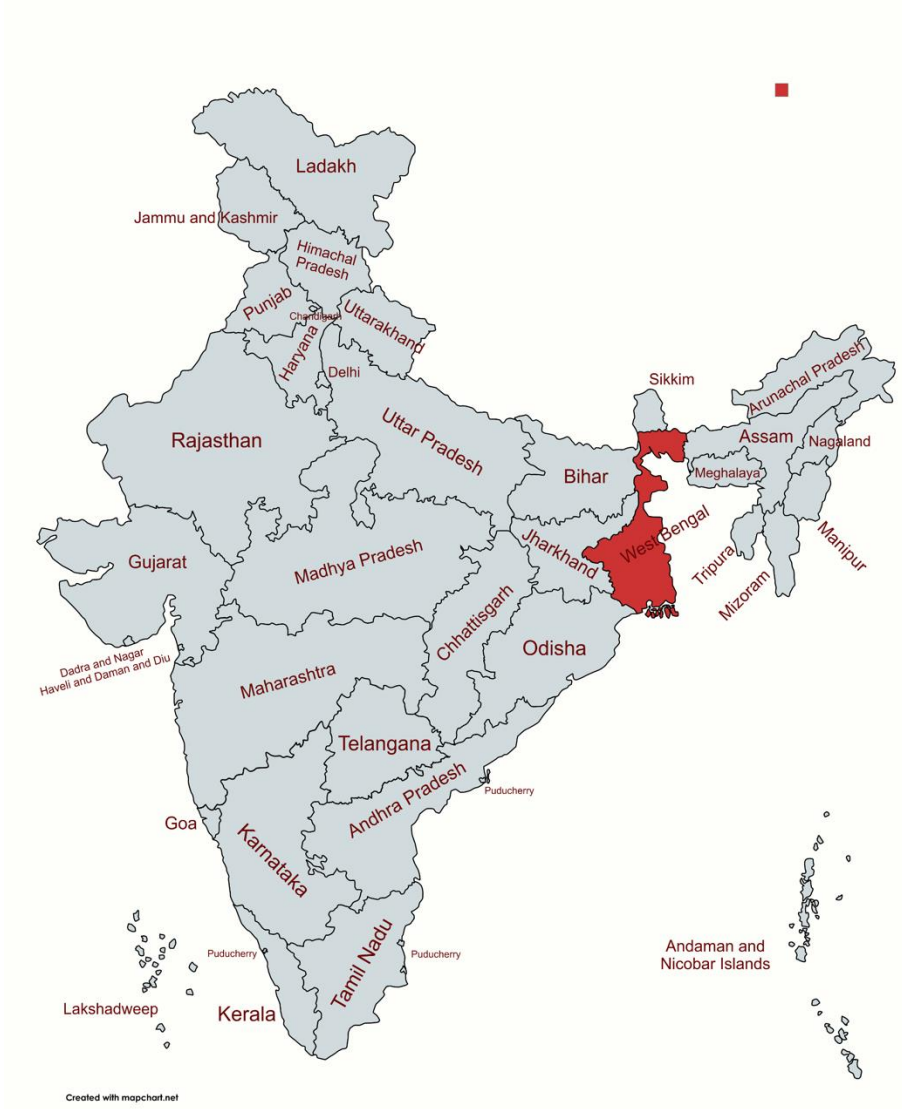
➢**Nutritional Security** exists when all people at all times have physical, social and economic access to food, which is **consumed in sufficient quantity and quality to meet their dietary needs** and is supported by an environment of adequate sanitation, health services and care for an active life (FAO, 1996).

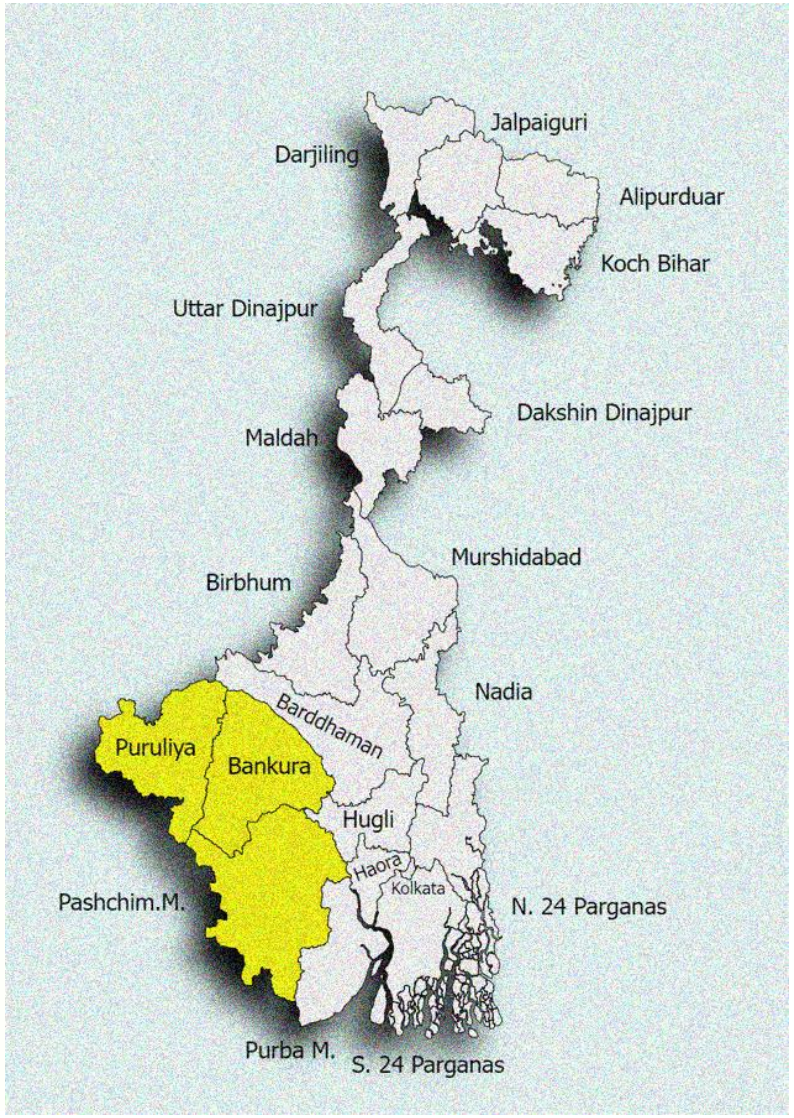
➢Food Security framework is purely a ***quantitative judgment***.

➢Nutrition Security or malnutrition framework **is a *qualititative judgment*** *considered* **food intake and health status**.

➢Therefore food security is a **necessary, but not sufficient** for nutrition security (FAO, 2012).

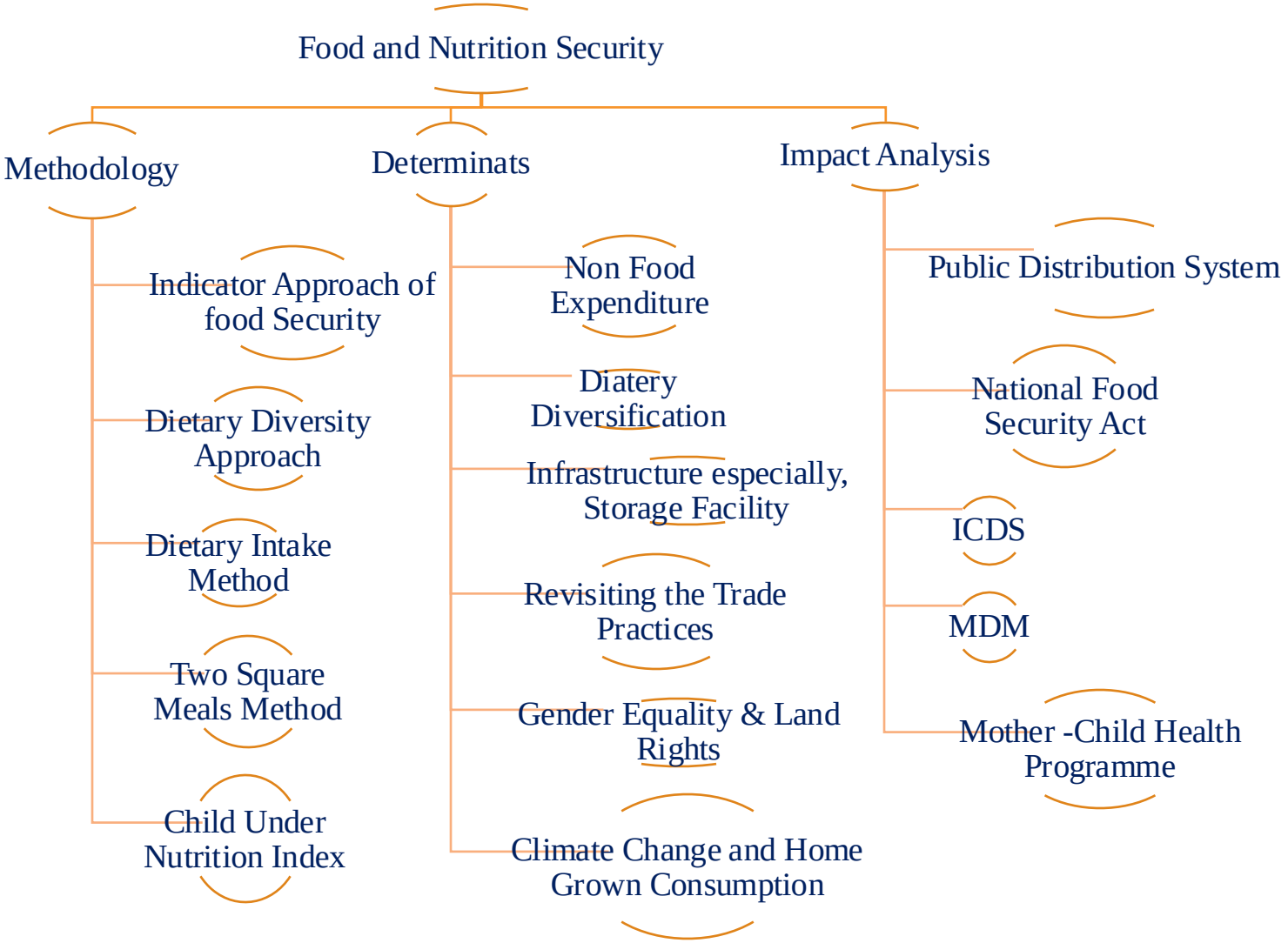
Study Region





- Three Districts of West Bengal namely '**Paschim Medinipur', 'Bankura', and 'Purulia'** from the **Jangal Mahal region** is purposively chosen in the present study.
- **Jungle Mahal** & **Backwardness** are the two sides of the same coin since time immemorial. These three district has a **higher concentration of Indigenous people.**
- The present **socio-economic condition is extremely fragile** due to the over-exploitation of natural and environmental resources on which they were mostly dependent.
- Most of the area of this region is a **drought-prone area** with poor fertility of the soil

Literature Cited



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:

To investigate the impact of government food safety net programmes (FSNPs) on tribal and non tribal household's food and nutrition insecurity in three underdeveloped districts of West Bengal using micro panel data.

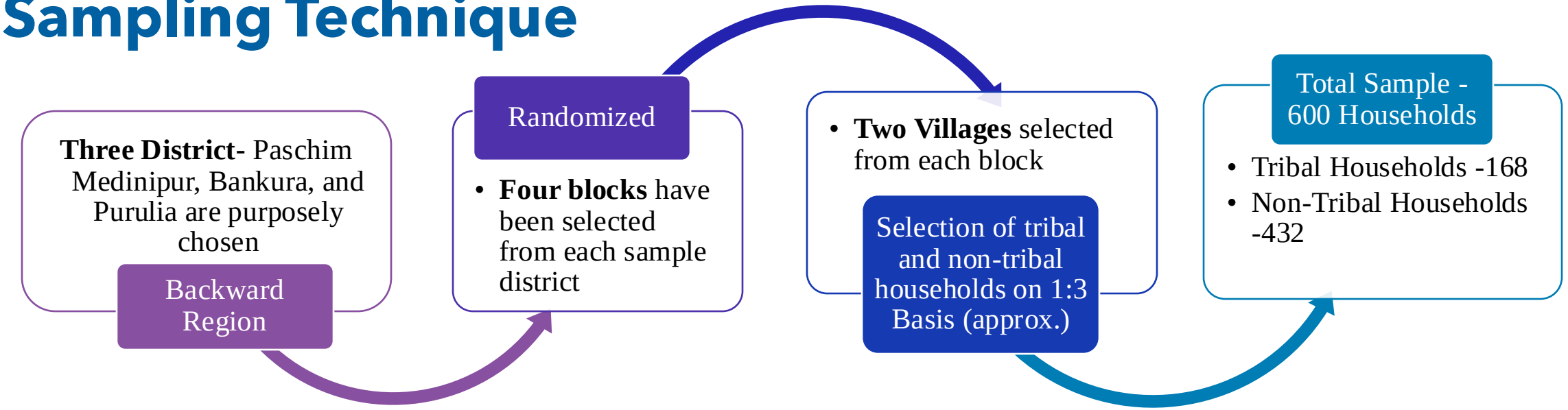
2.Sustainability Assessment:

Assess the issues of 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.

Sampling Technique



Data Collection & Analysis

•**Sampling Technique**: Employed a multistage stratified random sampling method for primary data collection.

•**Baseline Survey (2013-14)**: 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.

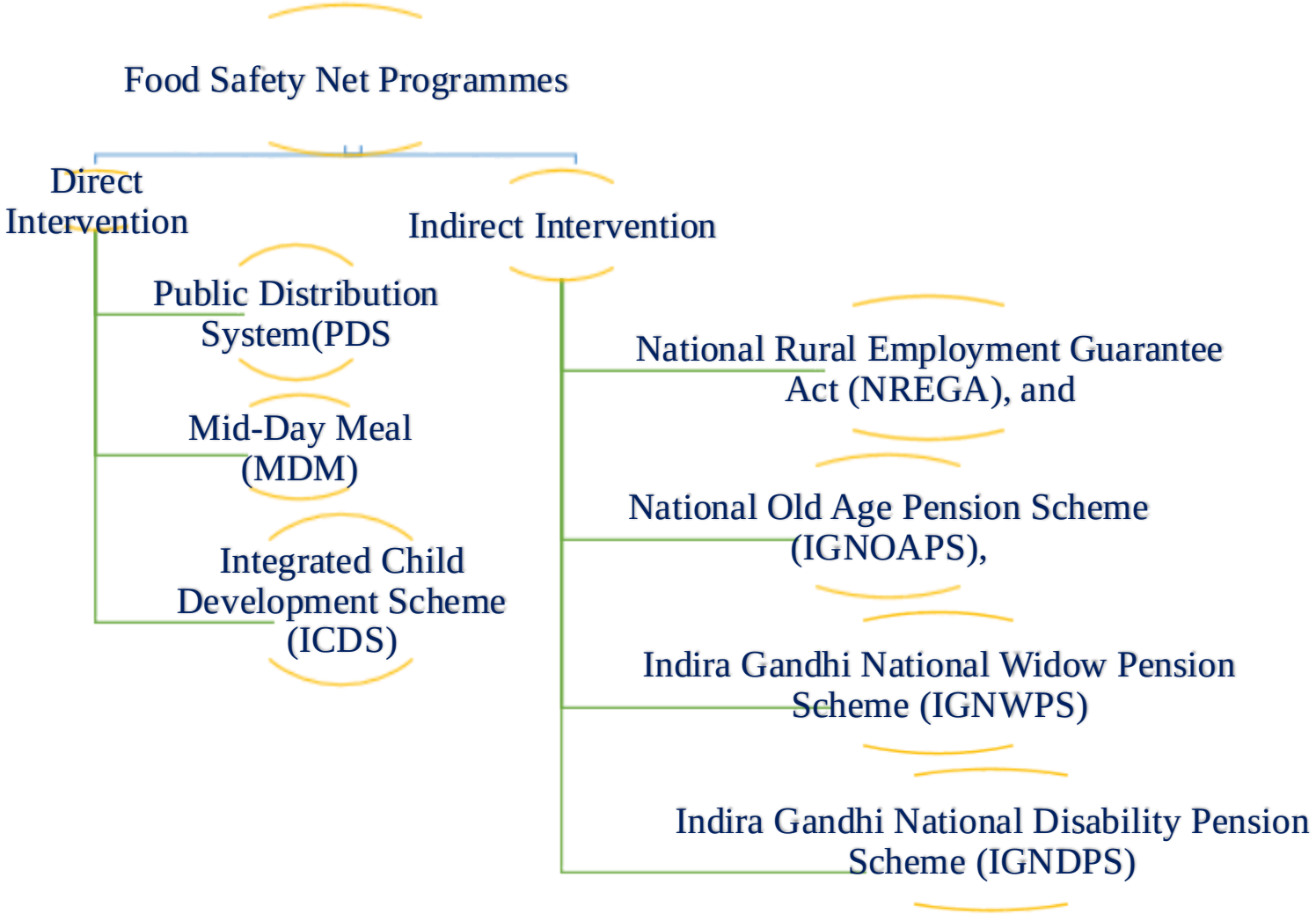
•**Data Preparation**: Compiled a micro panel dataset of these 600 households for analysis.

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 under my Supervision

Food Base Safety Net Programmes (FSNPs)

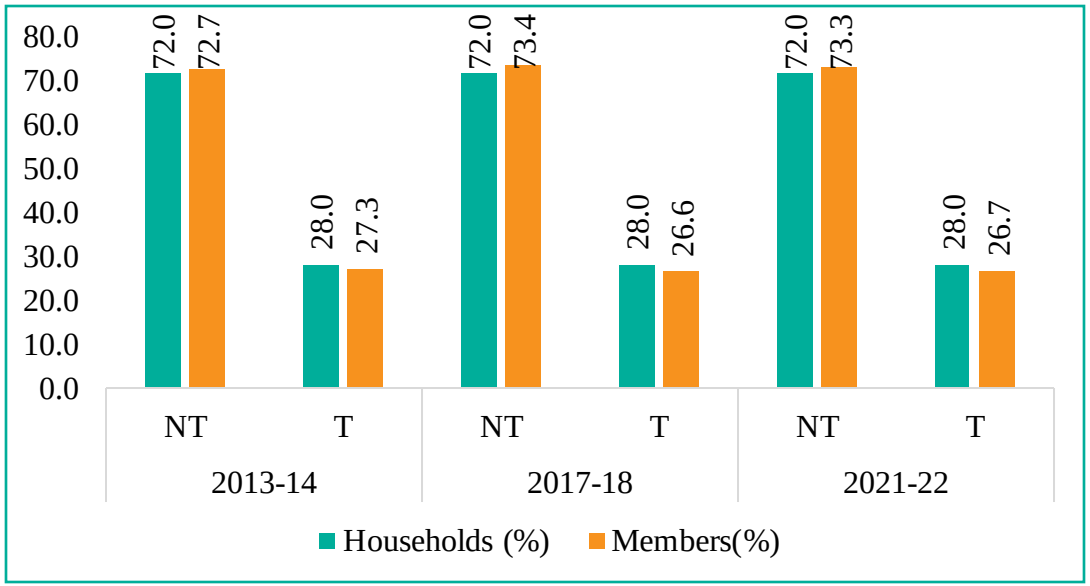


References

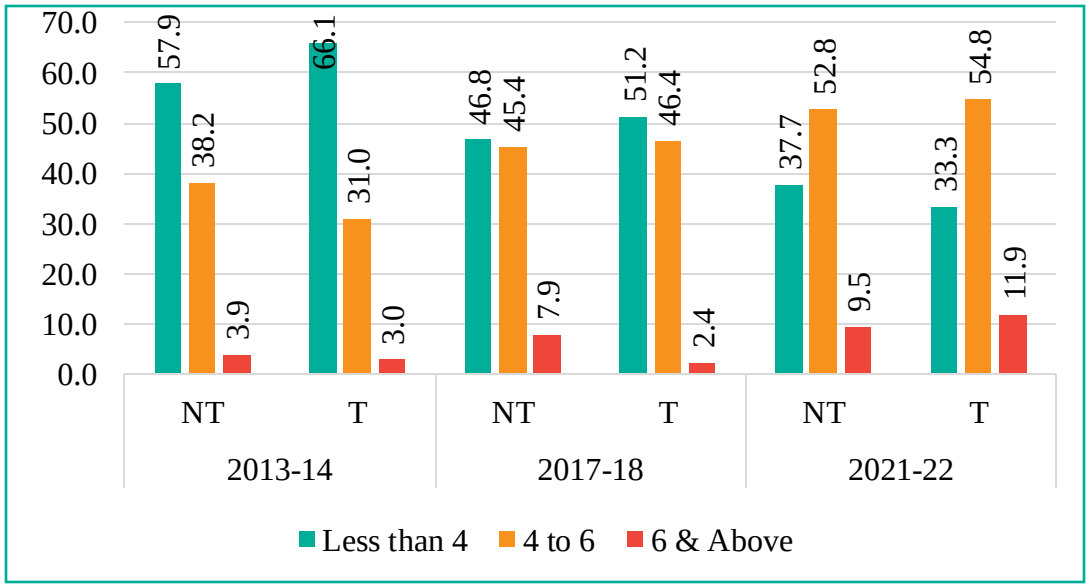
Jha et al., 2013; Rogers and Coates, 2002; Gregory et al., 2020; Das & Basar, 2020; Sen and Himanshu (2013); Jha and Acharya (2016); Drèze and Khera (2013); Srivastava and Chand (2017); and Narayana (2017)

Socio Economic profile of the Sample Households (Primary Data)

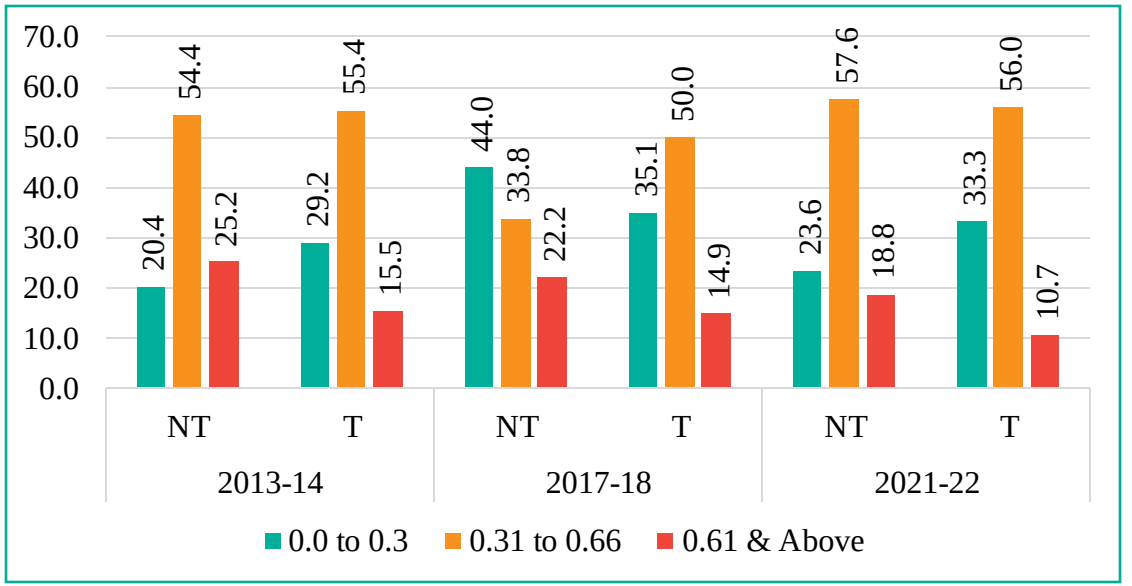
a. Social Group



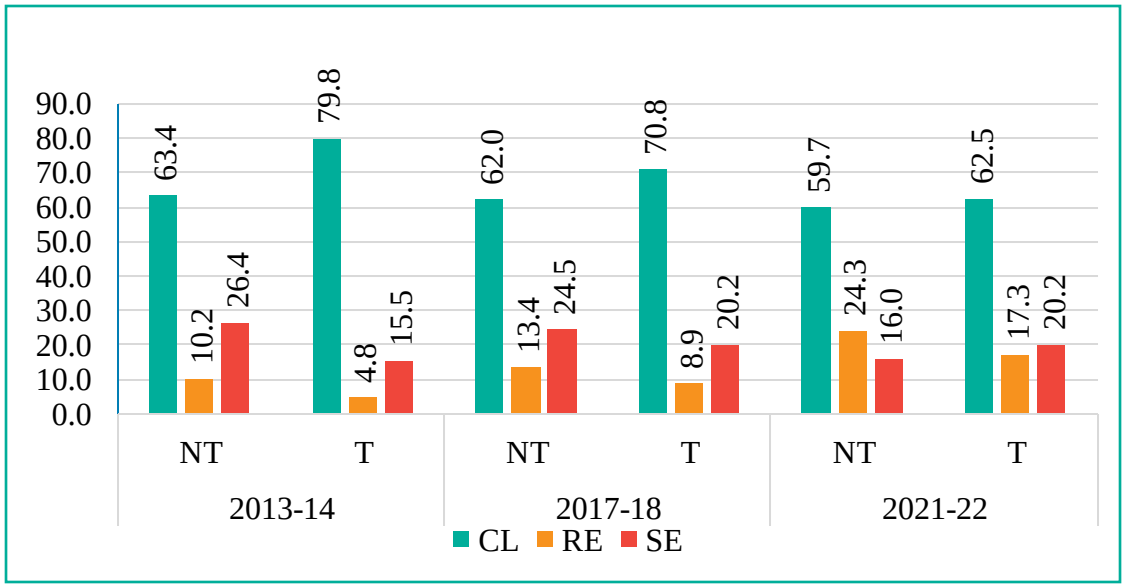
b. Average Education



c. Dependency Ratio

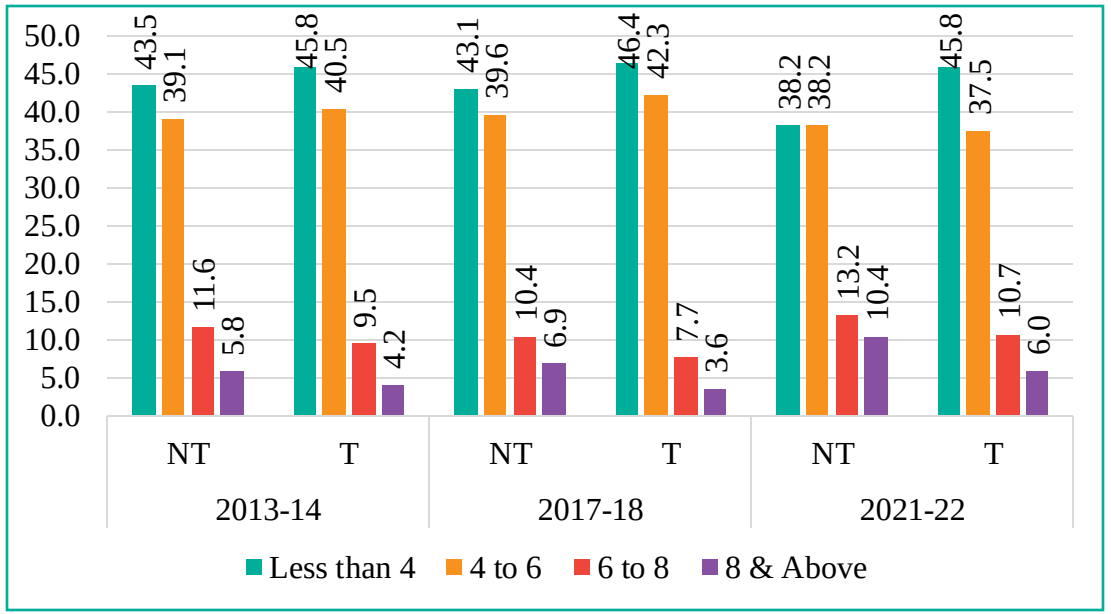


d. Employment Type

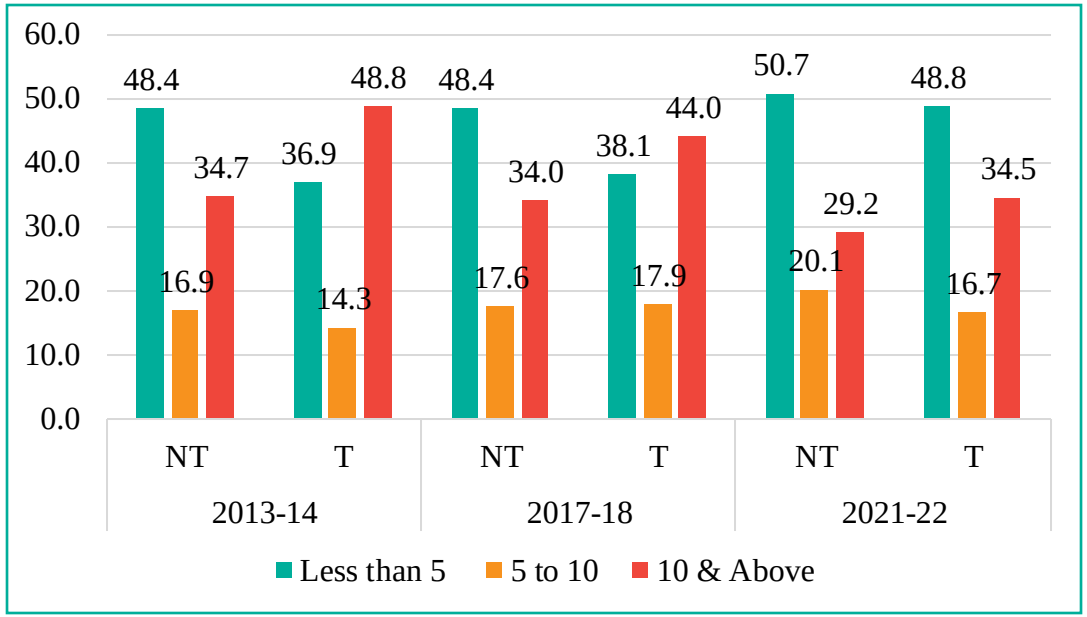


Socio Economic profile of the Sample Households (Primary Data)

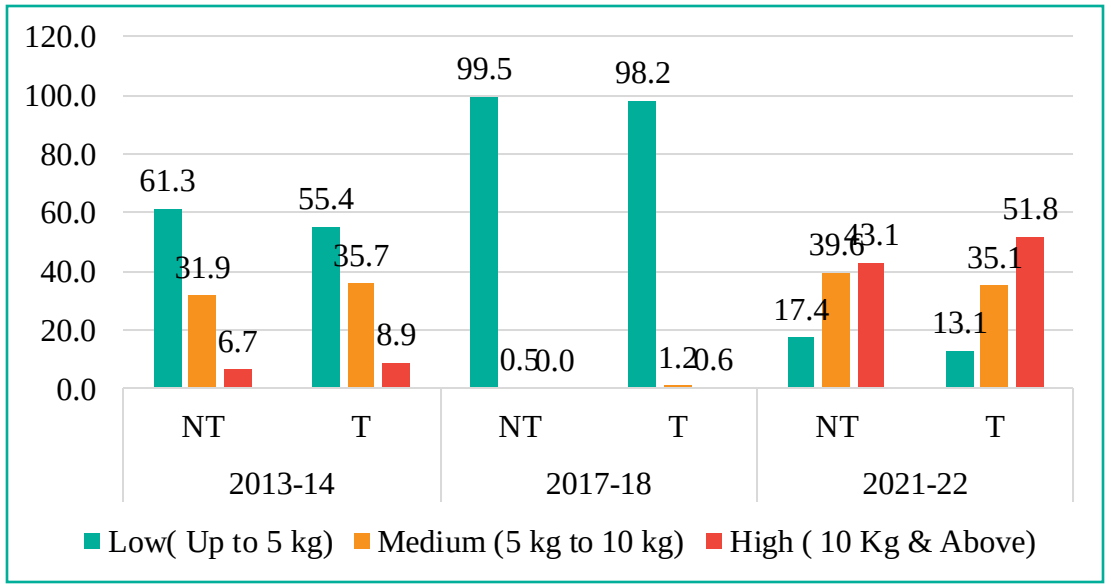
e. Households Size



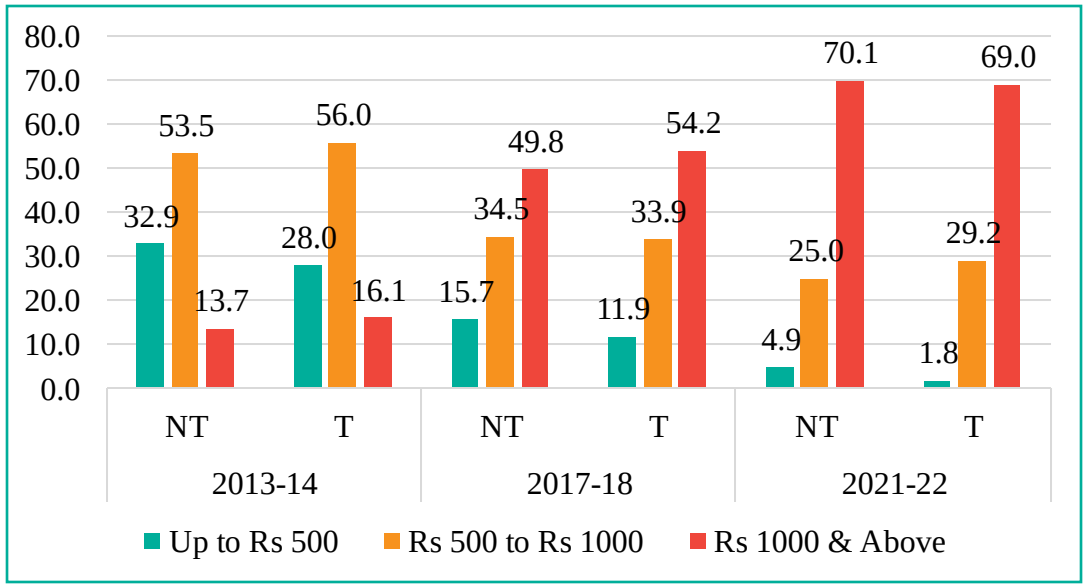
f. Per cultivable Land



f. Per capita PDS Benefit



f. PCMFCE



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:

$$\checkmark \; FIL_{ij} = PL_{ij} * X_{ij} \text{ , [i= 1, 2...28 and j=1, 2];}$$

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:

$$\checkmark \; FIL_{t+1,j} = PL_{tj} * \left(\frac{I_{t+1,j}}{I_{t,j}}\right) * X_j \;\text{;}$$

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

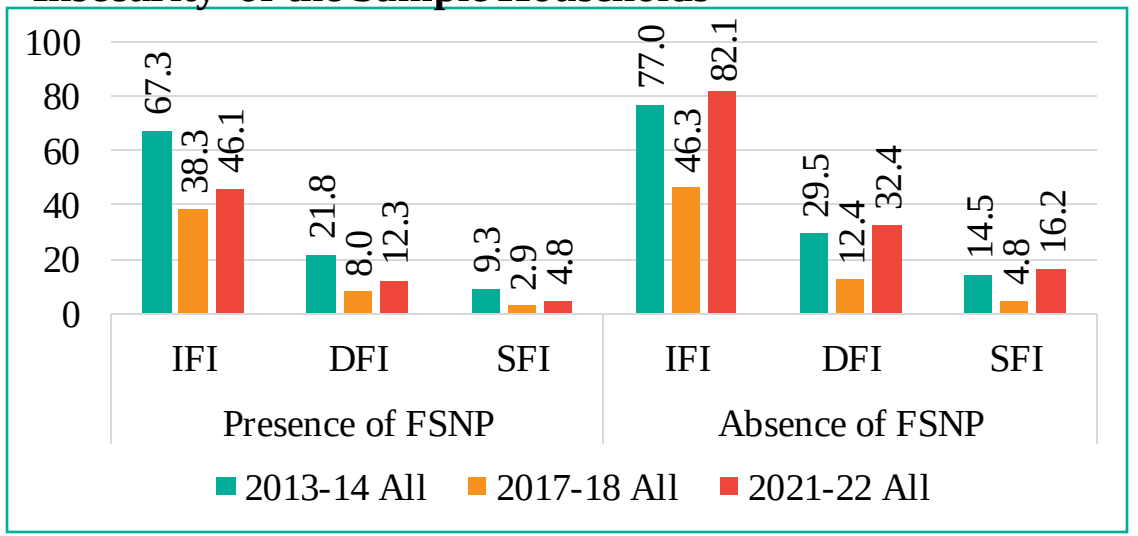
Households (%) by their MPCFE in the absence of FSNPs (in Rs.)

	Non-Tribal HHs			Tribal HHs		
	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22
Less than 600	66.4	16.4	18.4	66.7	12.5	10.7
600.01 to 868.5	21.5	36.3	24.2	20.2	34.5	29.2
868.6 to 1000	4.2	14.4	17.4	4.8	18.5	14.3
1000 to 1152	2.3	13.0	13.5	1.2	9.5	10.7
1152.1 to 1416.1	2.5	10.6	16.5	4.8	13.7	14.9
Above 1416.1	3.0	9.3	10.0	2.4	11.3	20.2

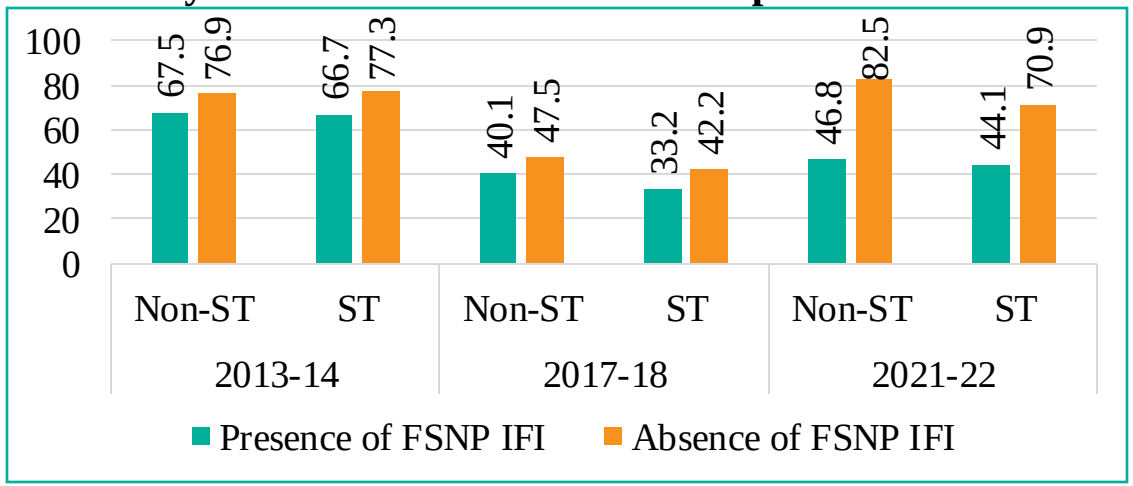
Households (%) by their MPCFE in the absence of FSNPs (in Rs.)

	Non-Tribal HHs			Tribal HHs		
	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22
Less than 600	75.9	30.7	45.6	78.0	25.2	44.7
600.01 to 868.5	14.6	34.1	29.8	13.7	43.6	29.8
868.6 to 1000	2.8	11.9	8.4	0.6	8.6	8.7
1000 to 1152	1.6	8.9	5.9	2.4	9.2	5.0
1152.1 to 1416.1	2.3	7.8	5.5	3.0	11.0	5.0
Above 1416.1	2.8	6.6	4.8	2.4	2.5	6.8

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



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



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:

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

Where i=1,2,……n (no of households) and j= 1,2,……...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 $[NI_{\propto} = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{\overline{C}-C_i}{\overline{C}}\right)^{\propto} \; ; \propto = 0, 1, and\ 2]$is used to estimate the incidence (INI), depth (DNI) and severity of nutrition insecurity (SNI).

- 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

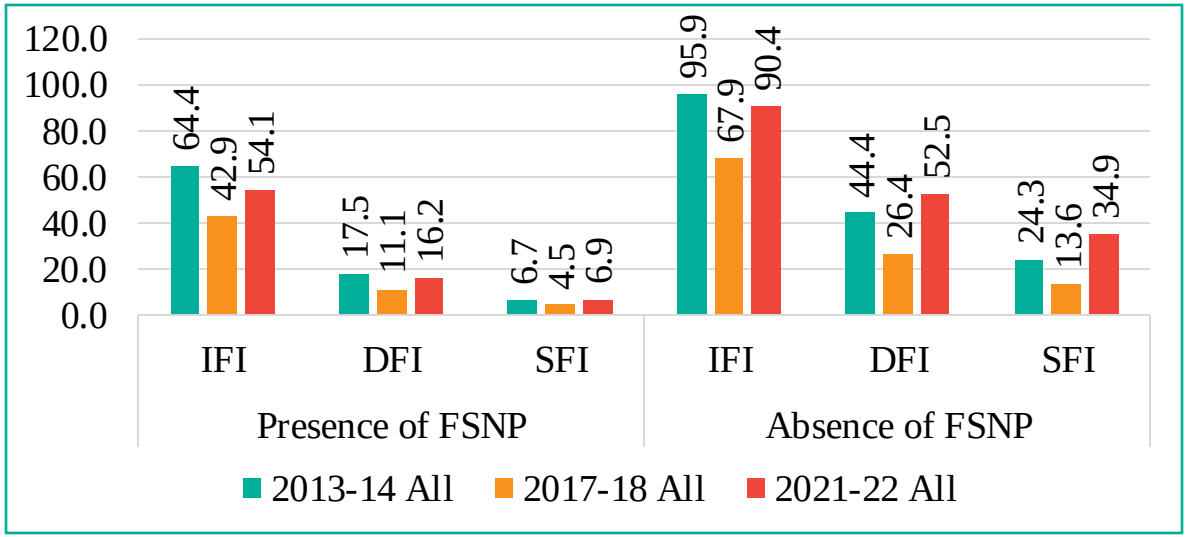
Households (%) by Level of calorie consumption (K. Cal/per day) in the presence of FSNPs

	NT			T		
	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22
Below 1000	3.0	3.0	5.5	4.8	1.2	5.0
1000-1999.9	50.5	30.2	33.7	45.2	20.9	22.4
2000 -2088.9	4.2	4.8	3.9	7.1	2.5	3.7
2089-2099.9	0.7	0.7	0.7	0.6	0.6	0.0
2100-2154.9	1.6	2.1	1.6	1.8	1.8	5.6
2155-2399.9	11.3	10.8	10.9	13.7	12.9	9.3
2400-2999.9	19.7	15.8	21.4	15.5	14.7	21.1
3000 & above	9.0	32.7	22.3	11.3	45.4	32.9

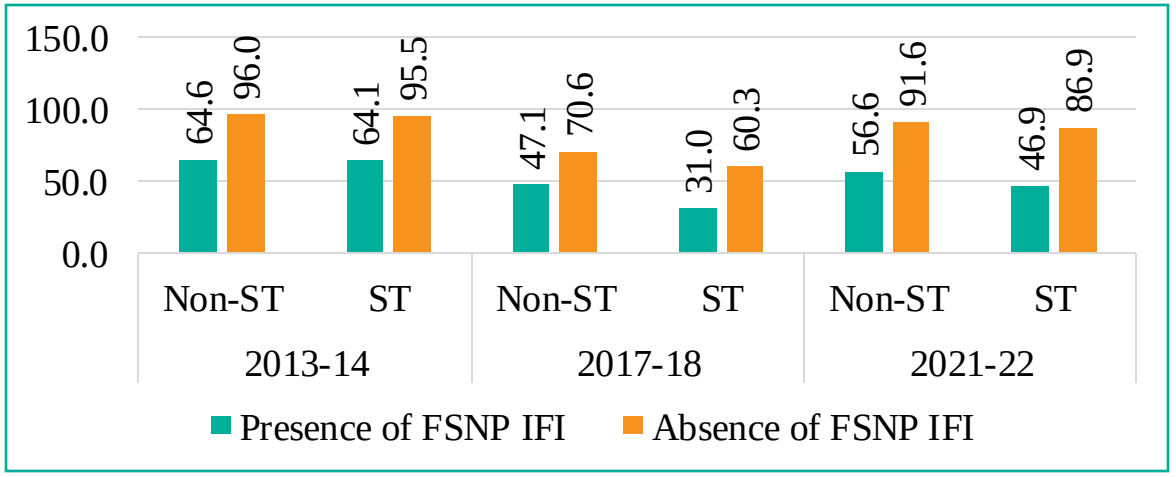
Households (%) by Level of calorie consumption (K. Cal/per day) in the presence of FSNPs

	NT			T		
	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22
Below 1000	36.6	14.6	52.2	38.1	14.1	46.0
1000-1999.9	55.8	46.9	32.3	54.8	35.6	34.2
2000 -2088.9	1.9	2.5	1.6	0.0	3.7	1.2
2089-2099.9	0.0	0.2	0.9	0.0	0.0	0.0
2100-2154.9	0.7	3.0	0.9	1.8	3.1	0.6
2155-2399.9	1.9	5.9	4.6	1.2	5.5	6.2
2400-2999.9	2.3	9.2	3.0	1.8	9.8	5.6
3000 & above	0.9	17.6	4.6	2.4	28.2	6.2

INI, DNI and SNI of the Sample Households



INI, DNI and SNI of tribal and non tribal Sample Households



FSNPs and the Sustainability of Food Insecurity and Nutrition Insecurity of the Tribal Households

Change of the IFI during 2012-13, 2017-18 and 2021-22 of 168 Tribal HHs

		2017-18			2021-22			
2012-13		*Food Secure HHs*	*Food Insecure HHs*	*Total HHs*	2017-18		*Food Secure HHs*	*Food Insecure HHs*	*Total HHs*
	Food Secure HHs	31.5	**10.1**	41.7		*Food Secure HHs*	46.4	**20.8**	67.3
	Food Insecure HHs	35.7	22.6	58.3		*Food Insecure HHs*	15.5	17.3	32.7
	Total HHs	67.3	32.7	100		*Total HHs*	61.9	38.1	100

Change of the INI during 2012-13, 2017-18 and 2021-22 of 168 Tribal HHs

2012-13	2017-18				2017-18	2021-22			
		Nutritionally secure HHs	*Nutritionally Insecure HHs*	*Total HHs*			*Nutritionally Secure HHs*	*Nutritionally Insecure HHs*	*Total HHs*
	Nutritionally Secure HHs	31.4	12.6	44		*Nutritionally Secure HHs*	44.6	19.0	63.7
	Nutritionally Insecure HHs	32.3	23.7	56		*Nutritionally Insecure HHs*	14.3	22.0	36.3
	Total HHs	63.7	36.6	100		*Total HHs*	58.9	41.1	100

Impact of FSNPs on Households Food Insecurity and Nutrition Insecurity by Propensity Score Matching Method

- ✓ Here we have categorized the treated households as if they getting more than 30 per cent of food budget from FSNPs.
- ✓ Basically FSNPs is a treatment factor. several demographic, social and economic factors are considered as explanatory variables

Variables	Description
Food Insecure HHs	If Yes =1, No=0
Nutrition Insecure Households	If Yes =1, No=0
Average Education	Average education level of the households in Years
ST HHs	Whether the household belongs to ST community (yes=1, no=0)
SC HHs	Whether the household belongs to SC community (yes=1, no=0)
OBC HHs	Whether the household belongs to OBC community (yes=1, no=0)
Household Size	Member of the Households
Labour Income	Average monthly income from labour entitlement (in Rs.)
Farm Income	Average monthly income from farm-based activity (in Rs.)
Non-farm Income	Average monthly income from non-farm-based activity (in Rs.)
Per capita cultivable land	Per Capita Cultivable Land of Households (in decimal)
Self Employed HHs	Whether the households are self employed (yes =1, no=0)
Regular Employed HHs	Whether the households are regularly employed (yes =1, no=0)
D1	Time Dummy takes ‘1’ for 2017-18, Otherwise ‘0’
D2	Time Dummy takes ‘1’ for 2021-22, Otherwise ‘0’

FSNPs and Households Nutrition Insecurity by PSM

	FSNPs=0					FSNPs=1				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Food Insecure HHs	1,076	0.6	0.5	0	1	724	0.6	0.5	0	1
Average Education	1,076	4.4	2.6	0	29	724	4.3	2.6	0	26.2
ST HHs	1,076	0.5	0.9	0	2	724	0.6	0.9	0	2
SC HHs	1,076	0.3	0.5	0	1	724	0.3	0.5	0	1
OBC HHs	1,076	0.2	0.4	0	1	724	0.2	0.4	0	1
Household Size	1,076	5.5	2.1	1	14	724	4.5	1.7	1	12
Labour Income	1,076	948.4	1046.9	0	13333.3	724	1066.2	2238.0	0	54000
Farm Income	1,076	82.8	133.2	0	1486.1	724	122.3	211.4	0	2829.2
Non-farm Income	1,076	199.7	434.0	0	6872.5	724	211.5	415.0	0	6250
Per capita cultivable land	1,076	8.7	11.8	0	98	724	11.0	14.2	0	118
Self Employed HHs	1,076	0.2	0.4	0	1	724	0.2	0.4	0	1
Regular Employed HHs	1,076	0.2	0.4	0	1	724	0.1	0.3	0	1

Block of pscore	FSNP(0/1)		
	0	1	Total
0	146	20	166
0.2	196	66	262
0.3	272	159	431
0.4	159	104	263
0.45	97	114	211
0.5	166	172	338
0.6	39	84	123
0.8	1	5	6
Total	1,076	724	1,800

Average treatment effect

	Treat. Group	Control Group	ATT	Std. Err.	t
Nearest Neighbor Matching method	724	1076	-0.026	0.010	-2.672
Radius Matching method	724	1076	-0.035	0.009	-3.954
Kernel Matching method	724	1076	-0.025	0.006	-3.905

FSNPs and Nutrition Insecure by PSM

	FSNPs=0					FSNPs=1				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Nutrition Insecure HHs	1,076	0.3	0.3	0	1	724	0.2	0.3	0	1
Average Education	1,076	4.4	2.6	0	29	724	4.3	2.6	0	26.2
ST HHs	1,076	0.5	0.9	0	2	724	0.6	0.9	0	2
SC HHs	1,076	0.3	0.5	0	1	724	0.3	0.5	0	1
OBC HHs	1,076	0.2	0.4	0	1	724	0.2	0.4	0	1
Household Size	1,076	5.5	2.1	1	14	724	4.5	1.7	1	12
Labour Income	1,076	948.4	1046.9	0	13333.3	724	1066.2	2238.0	0	54000
Farm Income	1,076	82.8	133.2	0	1486.1	724	122.3	211.4	0	2829.2
Non-farm Income	1,076	199.7	434.0	0	6872.5	724	211.5	415.0	0	6250
Cultivable land	1,076	8.7	11.8	0	98	724	11.0	14.2	0	118
Self Employed HHs	1,076	0.2	0.4	0	1	724	0.2	0.4	0	1
Regular Employed HHs	1,076	0.2	0.4	0	1	724	0.1	0.3	0	1

Block of pscore	FSNP(0/1)		
	0	1	Total
0	146	20	166
0.2	196	66	262
0.3	272	159	431
0.4	159	104	263
0.45	97	114	211
0.5	166	172	338
0.6	39	84	123
0.8	1	5	6
Total	1,076	724	1,800

Average treatment effect

	Treat. Group	Treat. Group	ATT	Std. Err.	t
Nearest Neighbor Matching method	724	1076	0.012	-0.006	-2.093
Radius Matching method	724	1076	0.017	-0.005	-3.536
Kernel Matching method	724	1076	0.014	-0.005	-2.643

Conclusion

- FSNPs significantly reduced food and nutritional insecurity among indigenous populations, with a 10.6% & 31.3% decline in 2012-13, 9% & 29.3% in 2017-18, and 26.8% & 40% in 2021-22, respectively.
- PSM results confirm FSNPs positive impact on reducing household food insecurity.
- However, sustainability issues persist due to the deficiency of own entitlements: households previously secure in 2012-13 faced insecurity in later years. We found that 12.6 % and 19.0% of nutritionally secure households in 2012-13 and 2017-18, respectively, becoming insecure.
- This study underscores the importance of FSNPs in reducing food and nutritional insecurity among indigenous populations but highlights the critical need to strengthen own entitlements.
- To ensure long-term sustainability, policies must balance immediate FSNP benefits with efforts to build household resilience and reduce dependency on external support.

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 FSNPs 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.

Thanks