Hidden Hunger: A Longitudinal Study of Nutritional Insecurity among Non-Poor Tribal and Non-Tribal Households in West Bengal, India

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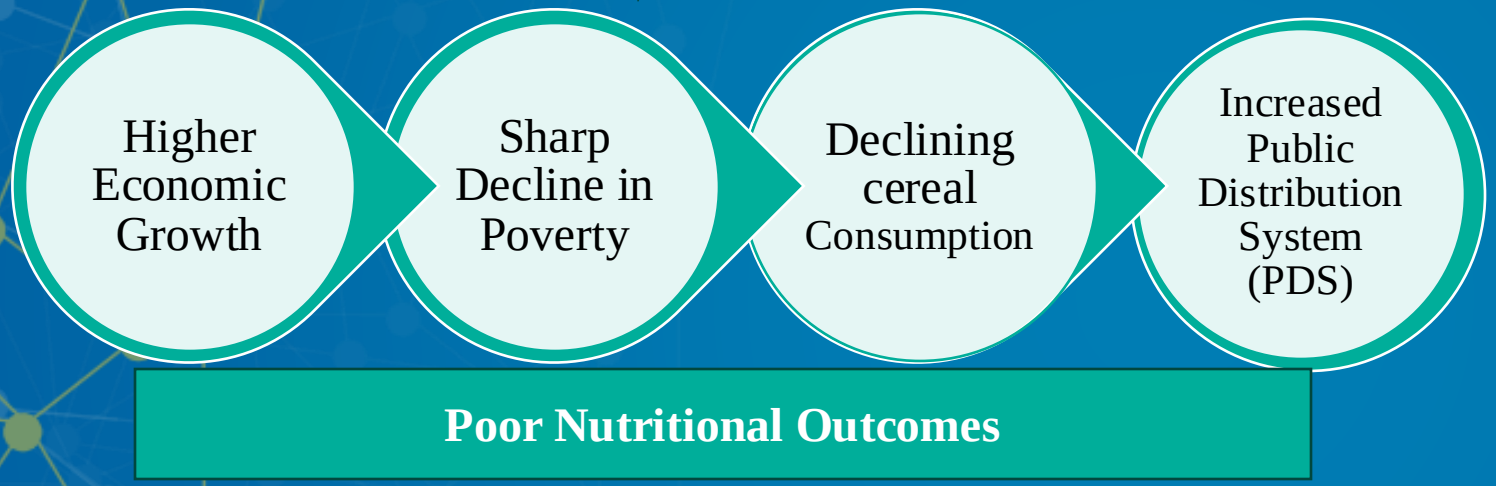
Puzzle



Hunger:

An inadequate amount of food intake

Food Insecurity: Hunger is a fundamental reason

Undernourishment: Caloric intake is below the minimum dietary energy requirement

Hidden hunger

Hidden hunger refers to eating food with insufficient nutrition

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)
- **Hunger** is a condition of the uneasy or painful sensation caused by a lack of food (American Institute of Nutrition, 1990)
- **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 insecurity **is necessary, but not sufficient** for nutrition security (FAO, 2012).
- **Undernourishment** is a term that the FAO(2012) uses to describe the state "when caloric intake is below the minimum dietary energy requirement"

Literature Cited

Identification	Records Identification through database searching: PubMed (n=60), Scopus(n=120), EMBASE (n=20)
Screening	Records after duplicates removed (n=48) Records Excluded in the abstract reporting results or no reviews(n=107)
Eligibility	Full text articles assessed (n=50) Full text articles excluded (n=5)
Included	Studies Includes (n=45)

➢ Poverty, Hunger & Food Security

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); Tendon and Lands (2011); Renuka and Sandy (2014); Akhil, K. (2017); Bhuyan et al. (2020)

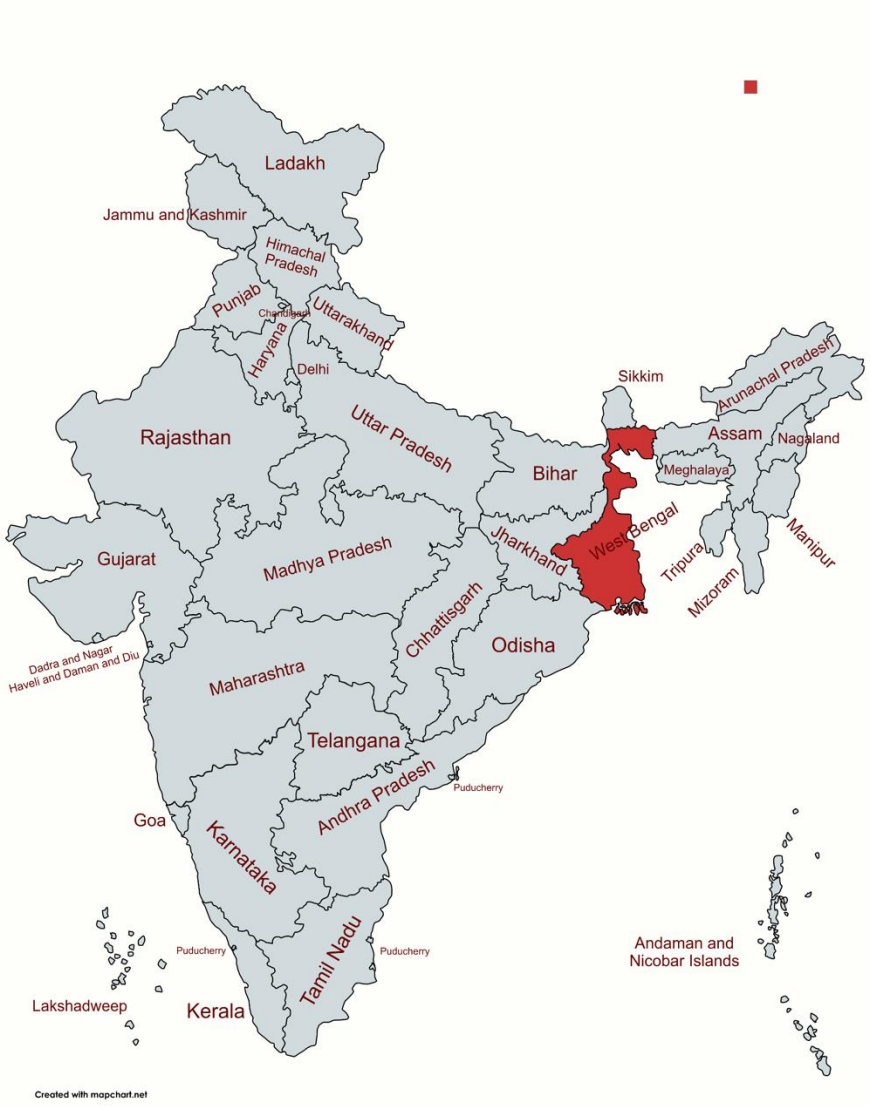
➢ Food and Nutrition Insecurity

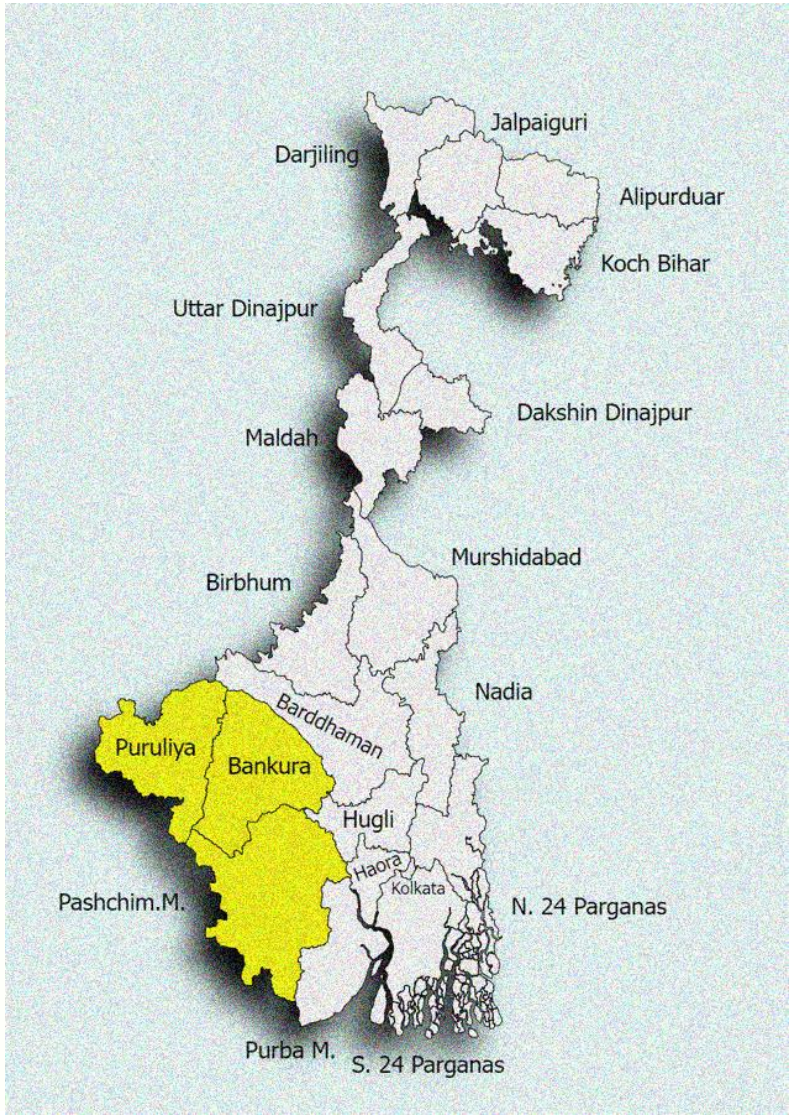
Kimberly and Devi (1995); Vyas (2000); Dreze (2004); Rao (2005); Alderman (2005); Schmidhuber and Tupelo (2007); Mittal (2007); Pond and Kumar (2009); Swaminathan (2011); Arimond & Ruel (2004); Basu & Basole (2012); Brahmanand et al. (2013); Mishra (2013); Hendriks (2016)

➢ Poverty, Nutrition and Hidden Hunger

Kannan et al. (2000); Swaminathan (2003); Basu (2011); Sinha (2013) and Dreze & Khera (2013); Karhad (2014); Deaton and Drèze (2009); 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)

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

Objectives

Depth of the Problem

This study investigates the paradox of nutritional insecurity among non-poor households in tribal and non-tribal communities of West Bengal.

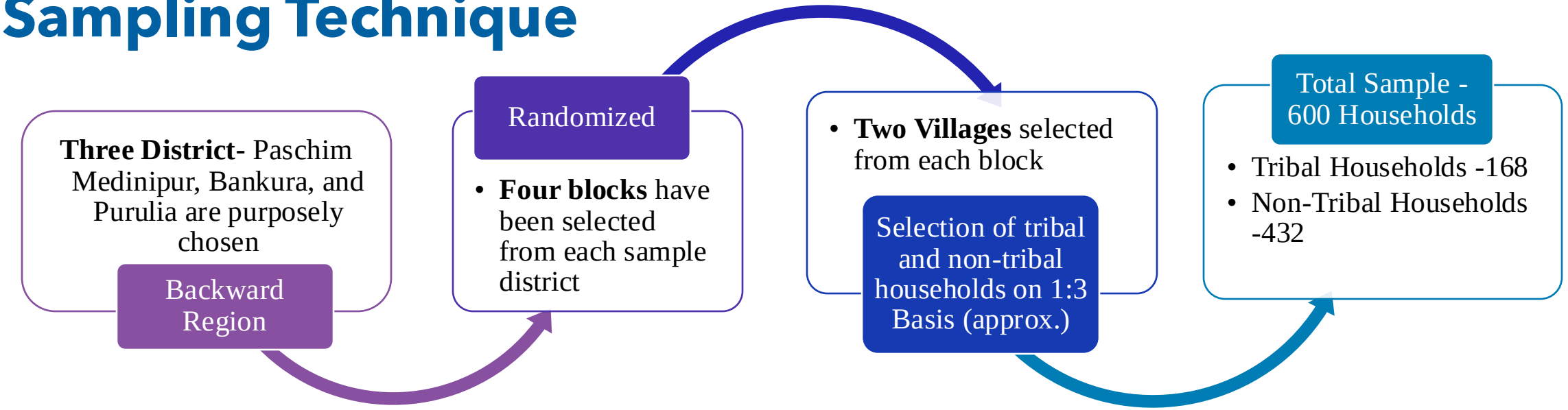
Exploration of Benefits

Assess the role of Public Distribution System (PDS) for the reduction of nutrition insecurity of the poor and non-poor households

Socio Economic Impact Analysis

Evaluate how socio-economic factors influence on hidden hunger, highlighting the persistent nutritional challenges despite poverty reduction in these regions.

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

Methods

Collect 600 sample households data and Standardize it

Estimates the status of Socio-Economic Condition, Poverty and Nutrition Insecurity

Analyse the dynamics of poverty and nutritional insecurity over time by a Multinomial Logit Model

Poverty Analysis

Upgradation of Poverty Line for West Bengal in 2023-24

Consider their Monthly Per Capita Consumption Expenditure in Rs.

Status of poverty is measured by FGT Method (1984) as

$$p_{\propto} = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z-e_i}{z}\right)^{\propto} \quad ;$$

$$\propto = 0, 1, and\ 2$$

Nutrition Insecurity Analysis

Estimation of Average Nutrition Intake considering "Nutritive Values of Indian Foods" (Das & Basar, 2020)

Consider average recommended calorie norms by ICMR as cut off i.e. 2155 kcal/person/day for rural areas and 2090 kcal/person/day for urban regions.

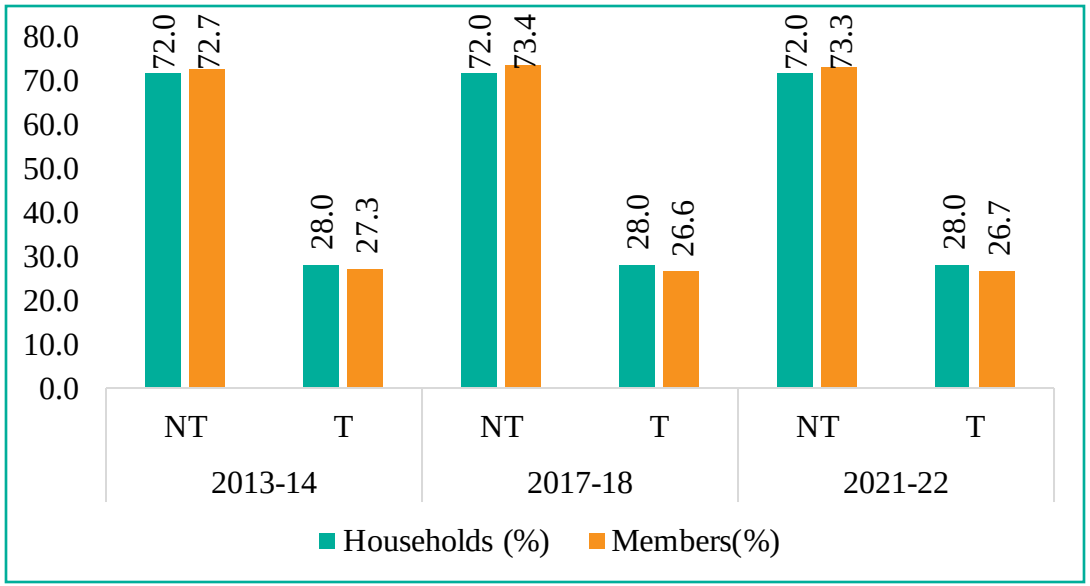
Status of nutrition Insecurity is measured by FGT Method (1984) as

$$NI_{\propto} = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{\overline{C}-C_i}{\overline{C}}\right)^{\propto} \quad ;$$

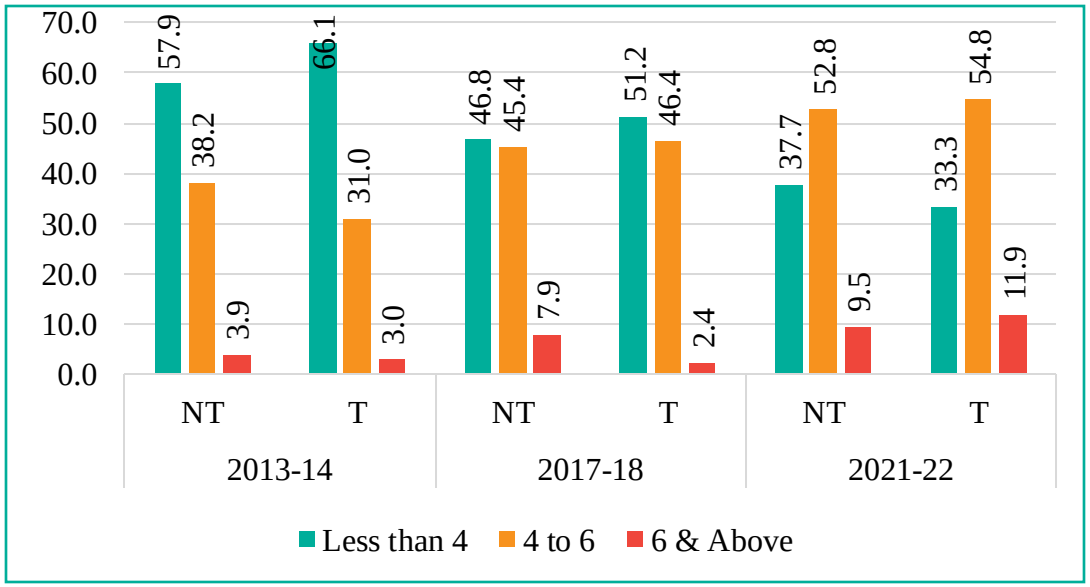
$$\propto = 0, 1, and\ 2$$

Socio Economic profile of the Sample Households (Primary Data)

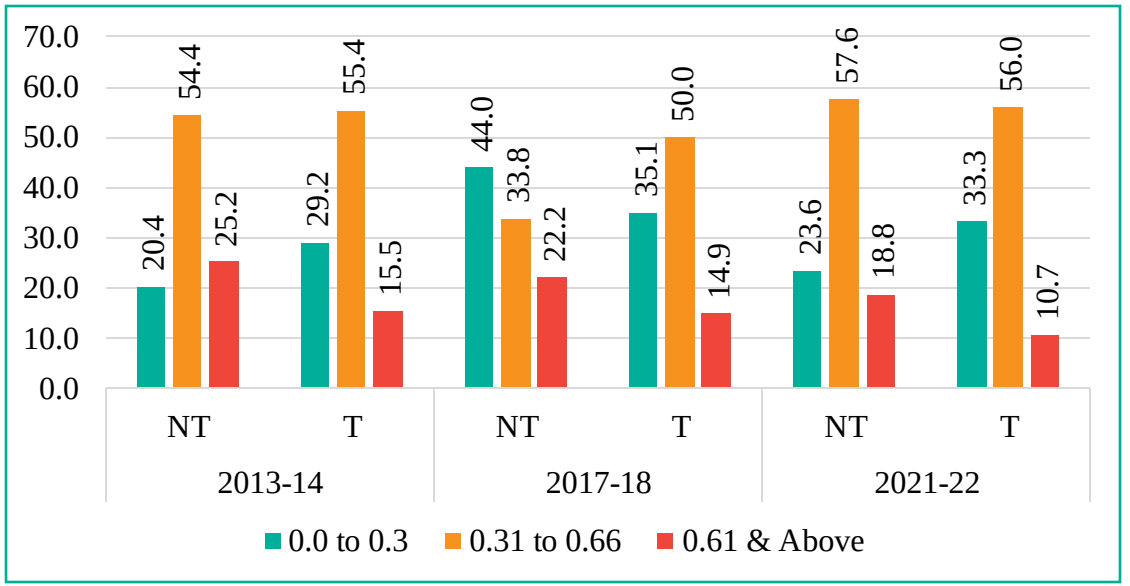
a. Social Group



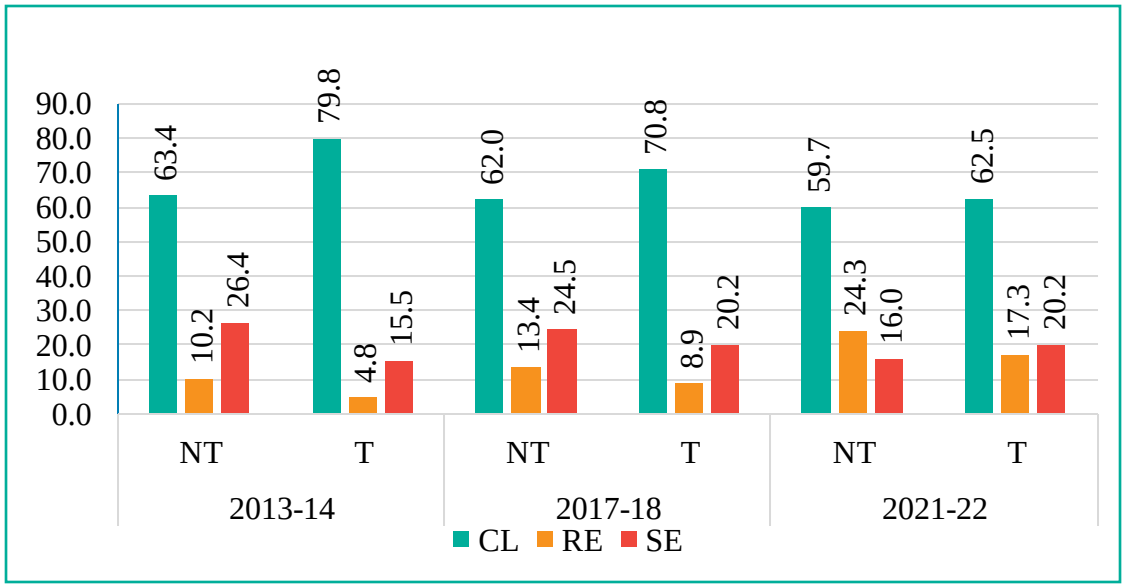
b. Average Education



c. Dependency Ratio

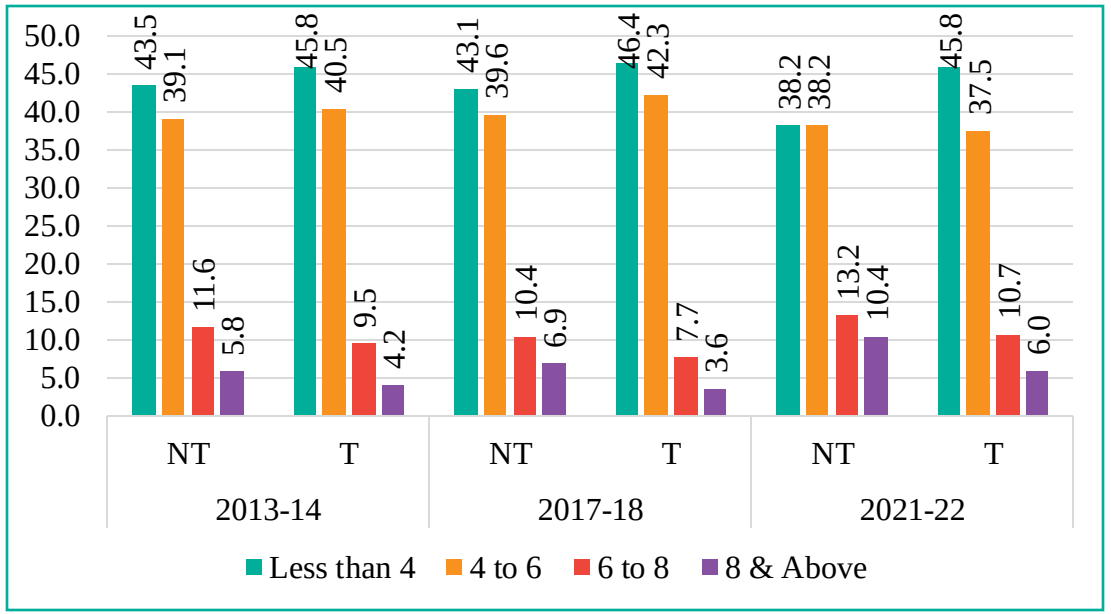


d. Employment Type

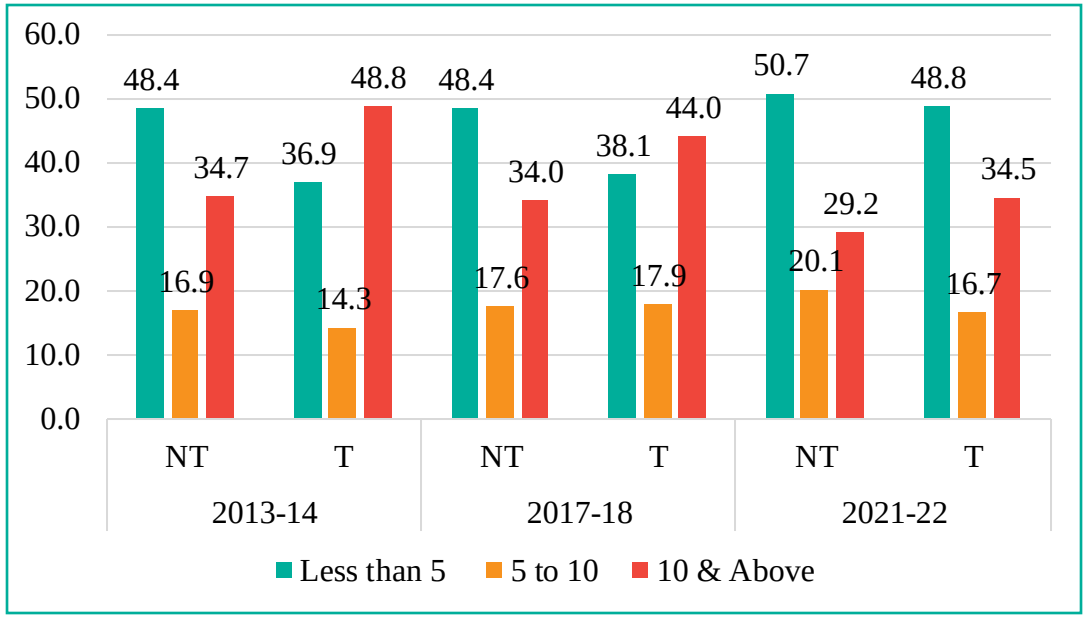


Socio Economic profile of the Sample Households (Primary Data)

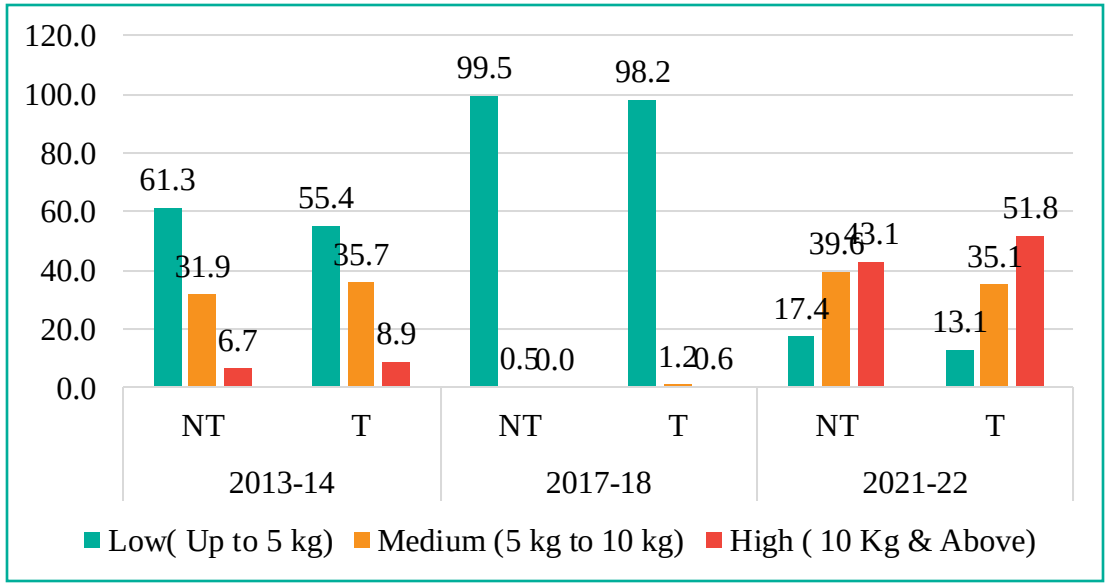
e. Households Size



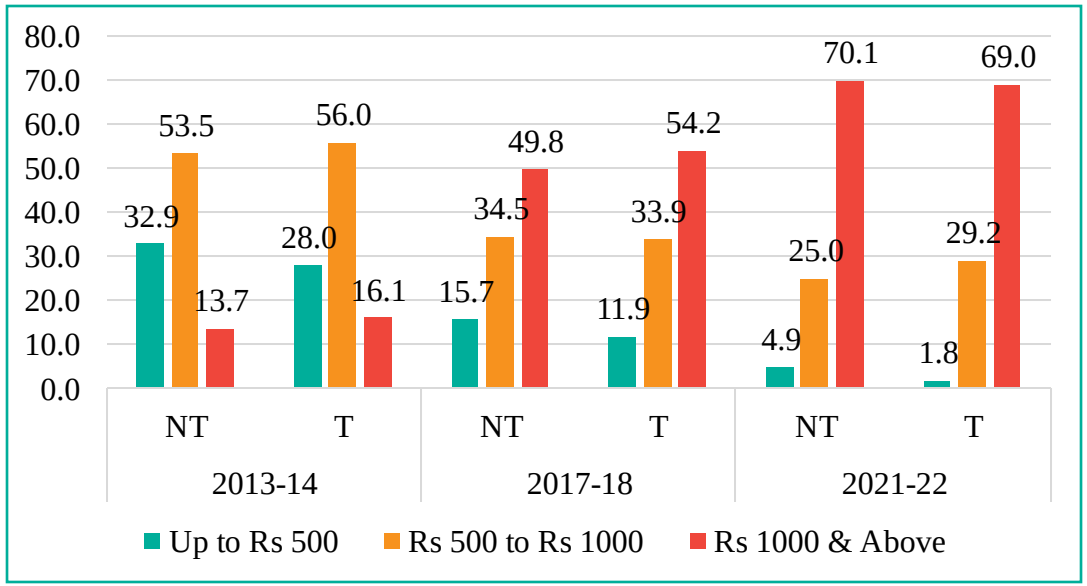
f. Per cultivable Land



f. Per capita PDS Benefit



f. PCMFCE

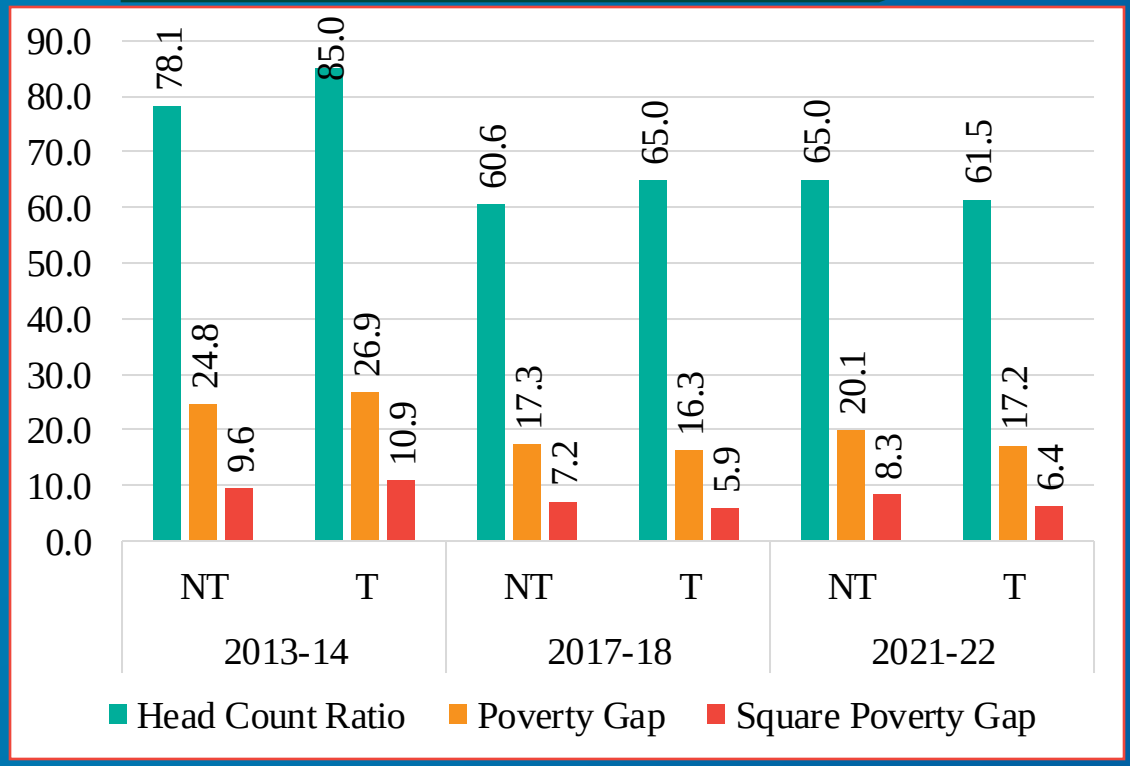


Status of Poverty of the Sample Households

Monthly Per Capita Consumption Expenditure in Rs. (In Current prices)

	Non Tribal HHs			Tribal HHs			All		
	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22
Up to Rs. 500	14.6	2.8	1.4	20.2	3.6	0.0	16.2	3.0	1.0
Rs. 500 to Rs. 1000	72.5	35.6	20.8	68.5	36.9	20.2	71.3	36.0	20.7
Rs 1000 to Rs. 1416.1	10.2	31.9	33.3	9.5	32.7	31.5	10.0	32.2	32.8
Rs. 1416.1 to Rs. 1521.2	1.2	4.6	6.9	0.0	5.4	3.0	0.8	4.8	5.8
Rs. 1521.2 to 1863.3	1.4	12.5	19.0	0.6	11.9	15.5	1.2	12.3	18.0
Above Rs. 1863.3	0.2	12.5	18.5	1.2	9.5	29.8	0.5	11.7	21.7
Grand Total	100	100	100	100	100	100	100	100	100

HCR, PG and SPG of Poverty

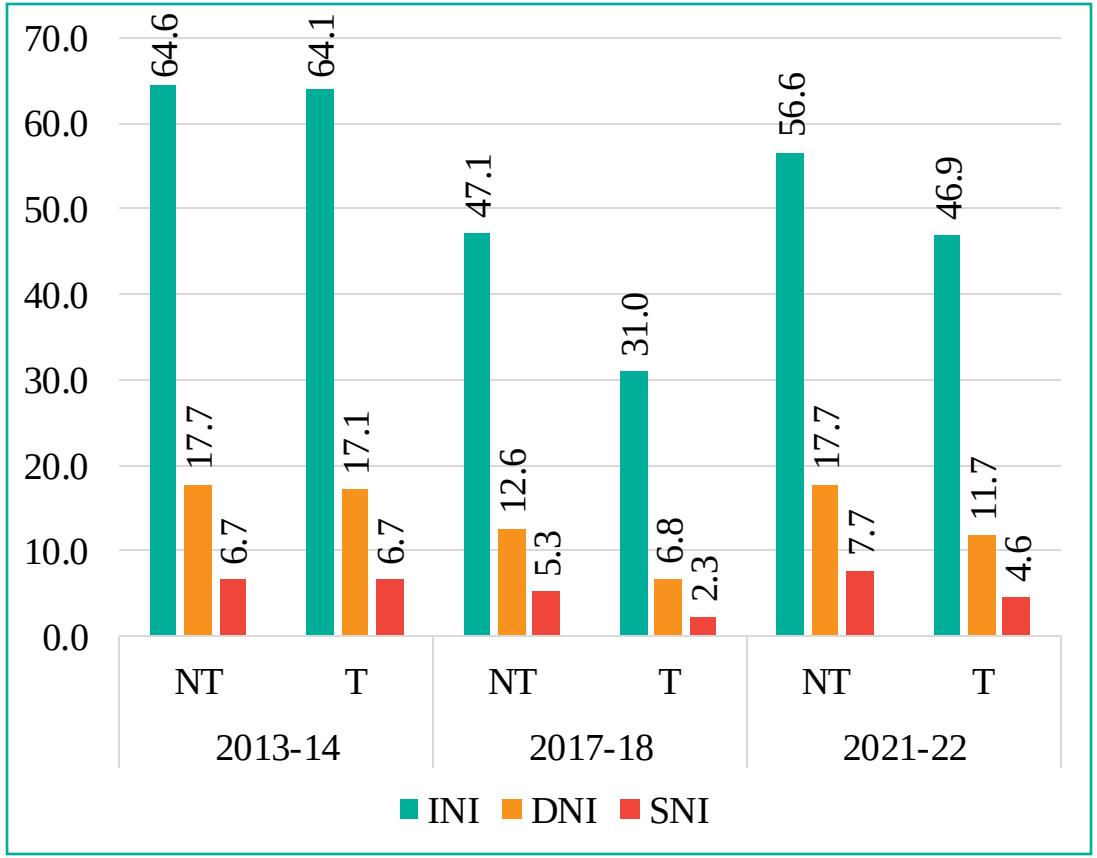


Status of Nutrition Insecurity of the Sample Households

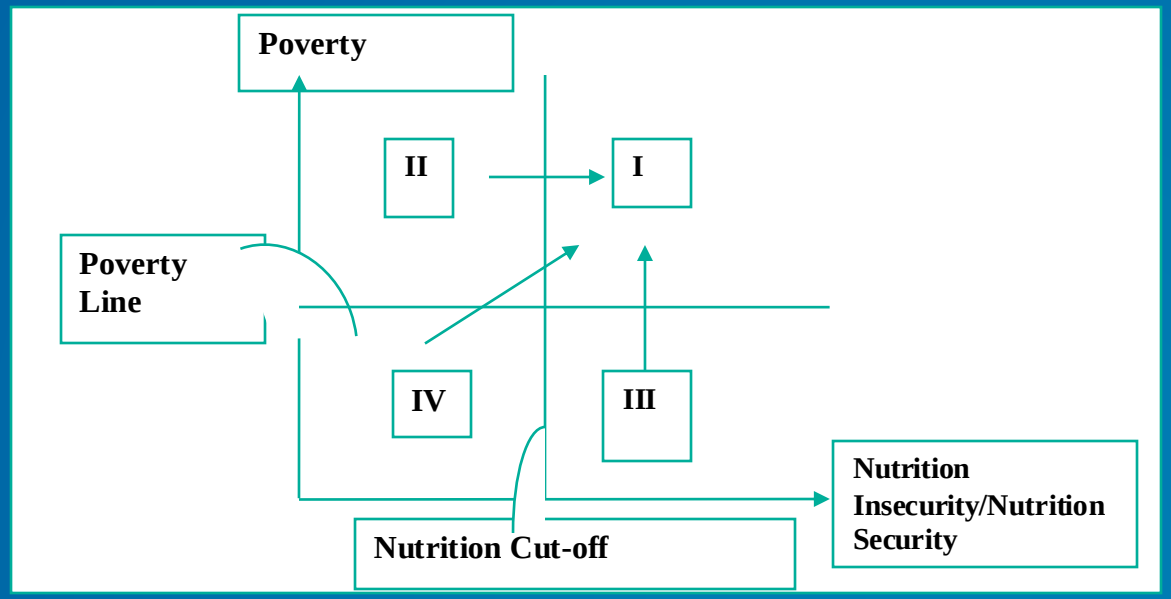
Level of calorie consumption (K. Cal/per day) of the Tribe and Non-Tribe Households

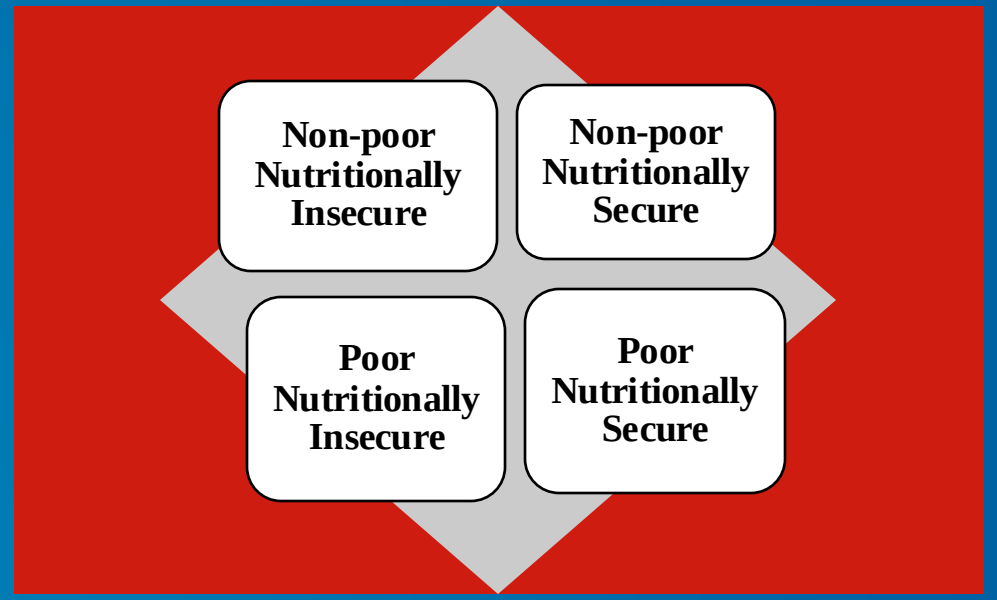
	Non-Tribe HHS			Tribe HHs			All HHS		
	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22	2013-14	2017-18	2021-22
Below 1000	3.0	3.0	5.5	4.8	1.2	5.0	3.5	2.5	5.3
1000-1999.9	50.5	30.2	33.7	45.2	20.9	22.4	49.0	27.7	30.7
2000 -2088.9	4.2	4.8	3.9	7.1	2.5	3.7	5.0	4.2	3.8
2089-2099.9	0.7	0.7	0.7	0.6	0.6	0.0	0.7	0.7	0.5
2100-2154.9	1.6	2.1	1.6	1.8	1.8	5.6	1.7	2.0	2.7
2155-2399.9	11.3	10.8	10.9	13.7	12.9	9.3	12.0	11.3	10.5
2400-2999.9	19.7	15.8	21.4	15.5	14.7	21.1	18.5	15.5	21.3
3000 & above	9.0	32.7	22.3	11.3	45.4	32.9	9.7	36.2	25.2

INI, DNI and SNI of the Sample Households

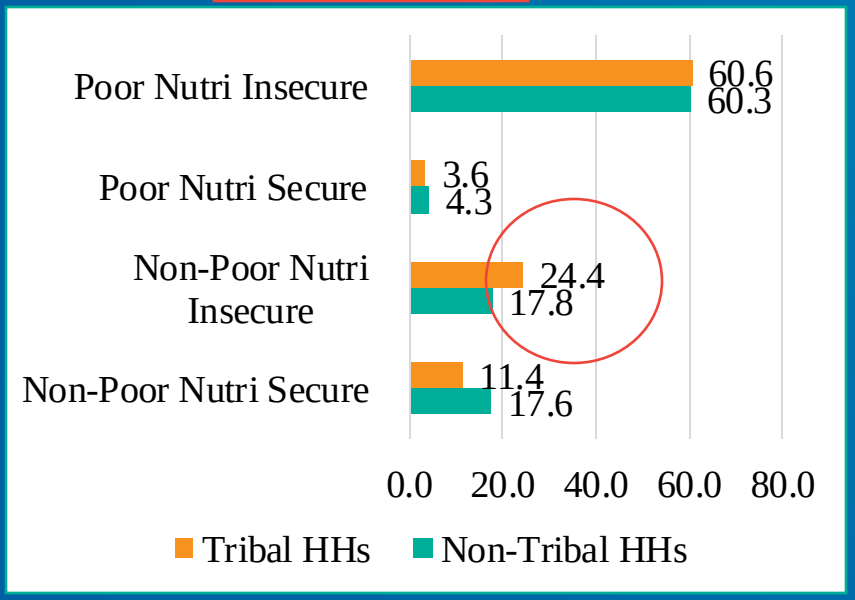


Poverty vs Nutrition Insecurity

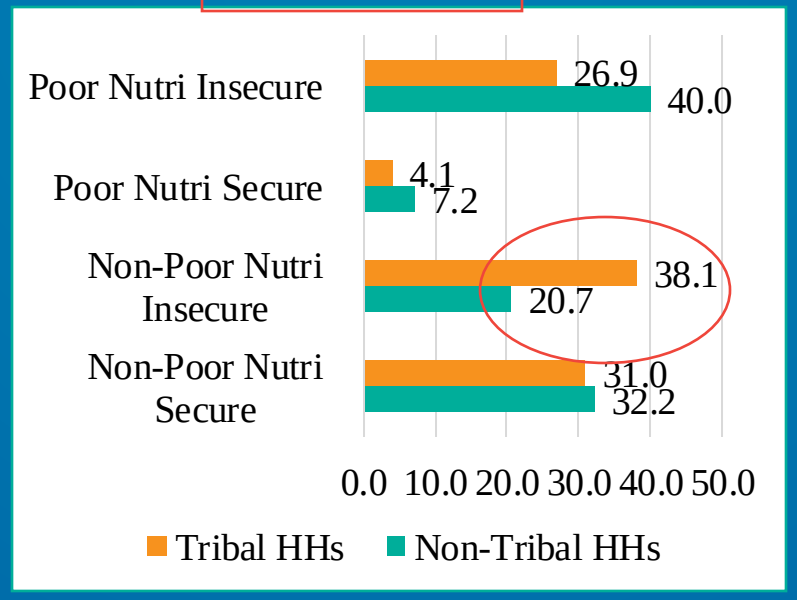




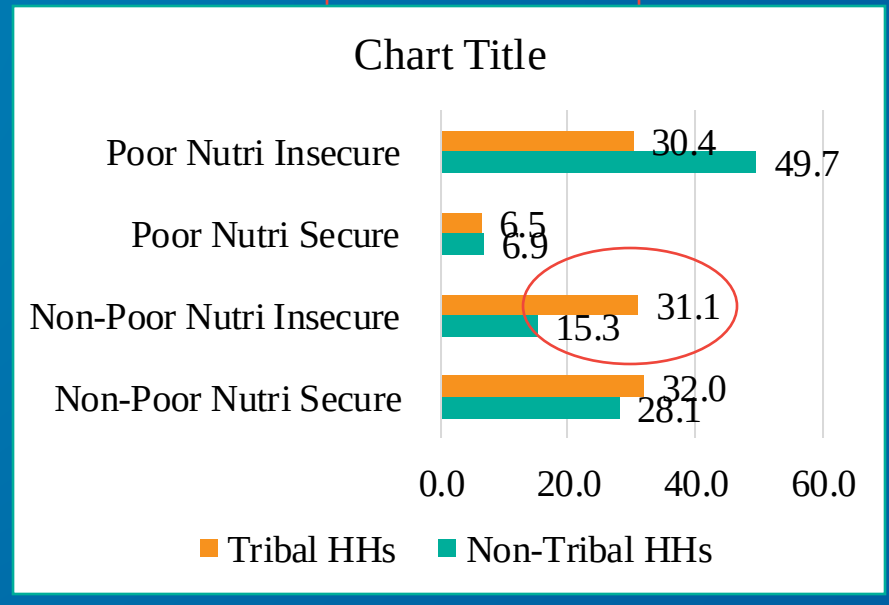
(a) 2013-14



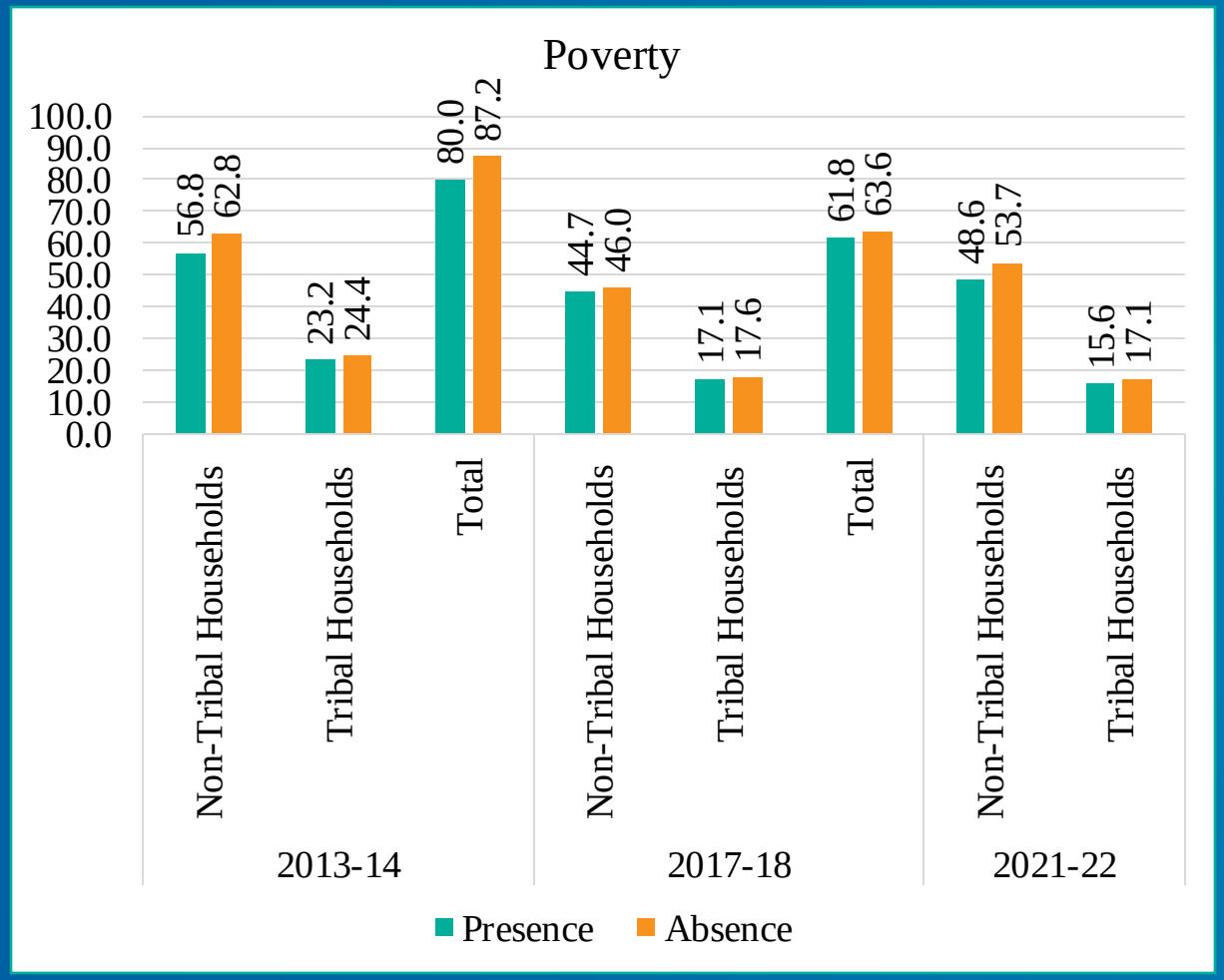
(b) 2017-18

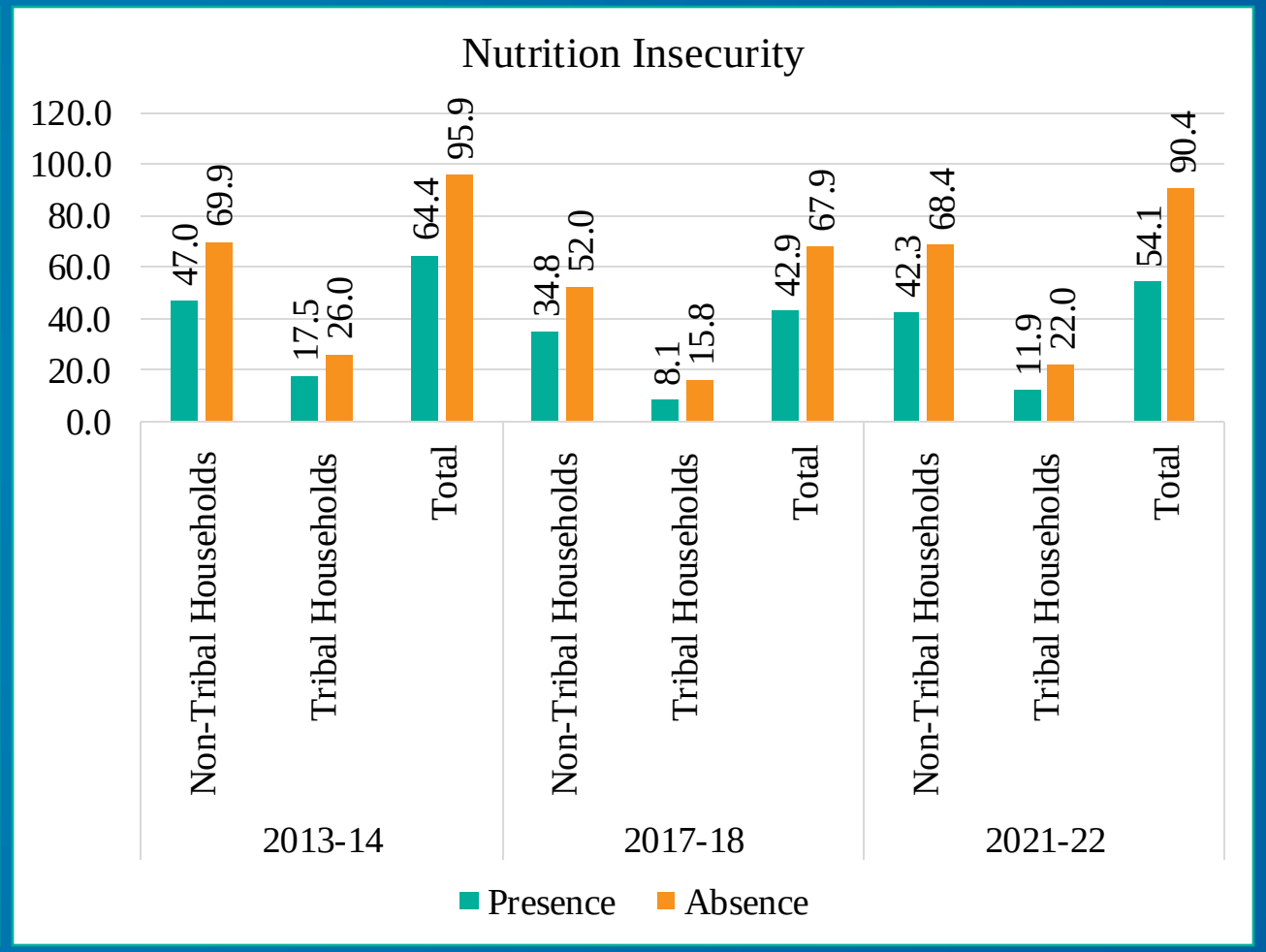


(c) 2021-22



Role of PDS Benefit in Poverty & Nutrition Insecurity





Econometric analysis of the Status of Poverty and Nutrition at the Household's Level

- ✓ multinomial logit (MNL) model on pooled data of the sample households of two years (2013-14, 2017-18 and 2021-22). For household *'i'* with time 't' it the MNL is stated as follows: $\boldsymbol{Y_{it} = X'_{it}\,\beta + \varepsilon_{it}}$
- ✓ The MNL model with j number of categories (j = 0, 1, 2, and 3) specifies that $\boldsymbol{p_{ij} = \frac{\exp(X'_{it}\beta_j)}{\sum_{j=1}^{m}\exp(X'_{it}\beta_j)}}$
- ✓ Where X_{it} is case-specific regressors that include an intercept and household characteristics along with PDS benefits. Clearly, this model confirms that $0 < p_{ij} < 1$ and $\sum_{j=1}^{m} p_{ij} = 1$.

Notation	Specification	Mean	SD
	Dependent Variables		
Y	Status of nutrition in relation to the status of poverty of the households. It takes 0 for 'non-poor_nutri secure', 1 for 'non-poor_nutri insecure', 2 for 'poor _nutri secure' and 3 for 'poor_nutri insecure'.		
	Independent Variables		
Cultural Factors			
AVED	Average years of education of the households	5.1	3.8
Social Factors			
ST	Whether the household belongs to STs (yes=1, no=0)	0.5	0.2
SC	Whether the household belongs to SCs (yes=1, no=0)	0.2	0.4
OBC	Whether the household belongs to OBCs (yes=1, no=0)	0.08	0.3
Demographic Factors			
Remoteness	Location of the Households more than 15 km form Town (yes=1, No =0)	0.60	0.48
HHSZ	Household's size (i.e., number of family members)	4.4	2.2
FHS	Whether the head the family is female (yes=1, no=0)	0.1	0.3
AGEH	Age of the head of the household	46.9	13.7
SAGEH	Squared age of head of the households	2385.7	1370.8
Economic Factors			
RE	Whether household has at least one regular employee (yes=1, no=0)	0.5	0.5
MPFCE	Monthly per capita food consumption expenditure (in Rs.)	648	515.5
PLAND	Per capita cultivable land of the household (in decimal)	0.5	2
PDS_Low	Is monthly per capita PDS benefit within 5 to 10 kg (yes=1, no=0)	0.12	0.32
PDS_Med	Is monthly per capita PDS benefit within 10 to 15kg (yes=1, no=0)	0.03	0.17
PDS_High	Is monthly per capita PDS benefit above15 kg (yes=1, no=0)	0.01	0.08
Other Variables			
TD	D1Time Dummy takes '1' for 2017-18, Otherwise '0' D2-Time Dummy takes '1' for 2021-22, Otherwise '0'	0.3	0.5

Results of Multinomial Logit Regression Model

Number of observations = 1800; LR chi2(48) = 590.01; Prob > chi2 = 0.0000; Log likelihood = -1912.177 ; Pseudo R2 = 0.1332; Base Outcome = 0 (Non-poor_nutri secure)

	1= Non-poor_nutri insecure			2= Poor_nutri secure			3= Poor_nutri insecure		
	Coefficient	Z stat	P>z	Coefficient	Z stat	P>z	Coefficient	Z stat	P>z
Sector	-0.502	-8.43	0.000	-2.552	-19.89	0.000	2.744	24.92	0.000
AVED	-0.075	-9.03	0.000	-0.217	-9.10	0.000	-0.202	-10.78	0.000
ST	0.176	2.15	0.050	0.480	2.32	0.020	0.082	1.85	0.064
SC	0.160	2.72	0.007	0.061	1.73	0.070	0.186	-1.93	0.053
OBC	0.347	3.81	0.000	0.012	0.06	0.948	0.234	-1.45	0.148
HHSZ	0.131	9.63	0.000	0.173	5.91	0.000	0.312	13.91	0.000
FHHS	0.060	0.74	0.460	0.270	1.65	0.099	-0.093	-0.70	0.483
HAGE	-0.071	-6.71	0.000	-0.029	-1.60	0.090	-0.051	-2.71	0.007
SHAGE	0.001	6.21	0.000	0.000	0.88	0.377	0.000	2.27	0.023
MPCFC	-0.006	-34.44	0.000	-0.023	-29.42	0.000	-0.039	-48.42	0.000
PDS_Low	-0.994	-7.00	0.000	-0.062	-0.36	0.722	-1.358	-7.17	0.000
PDS_Medium	-1.712	-3.36	0.001	-0.661	-1.71	0.087	-2.186	-3.39	0.001
PDS_High	-14.79	-0.02	0.984	0.568	0.38	0.701	-1.103	-1.72	0.071
RE	0.175	3.03	0.002	-0.247	-1.67	0.094	-0.381	-3.19	0.001
PCLAND	-0.202	-4.08	0.000	-0.215	-1.71	0.090	-0.517	-4.40	0.000
D1	-0.274	-3.66	0.000	5.901	25.71	0.000	-6.928	-34.17	0.000
D2	-0.826	-4.52	0.000	-0.627	-2.27	0.000	-1.294	-7.78	0.000
Constant	4.557	16.39	0.000	8.522	13.12	0.000	15.42	28.84	0.000

Summary Findings

- From 2013-14 to 2021-22, poverty in non-tribal and tribal households decreased by 13.5% and 20.9%, respectively, while nutrition insecurity reduced by 8.4% and 14.6%.
- Despite increased MPCE, a significant proportion of non-poor households remained nutritionally insecure, a clear sign of hidden hunger.
- This issue was particularly severe among tribal households, with 31.1% of non-poor tribal households still nutritionally insecure compared with 15.3% of non-poor non-tribal households in 2021-22.
- The multinomial logit model indicated that factors like education, pattern of food expenditure, PDS benefits, and non-farm income positively impacted the nutritional status of the tribe and non tribe households, but the persistence of hidden hunger suggests deeper systemic issues.
- This study reveals the persistence of hidden hunger among non-poor tribal as well as non-tribal households despite poverty reduction.

Conclusions

- ***Persistent Nutritional Insecurity Despite Poverty Reduction:*** Hidden hunger persists despite poverty reduction, particularly among tribal communities, highlighting that income improvements alone do not ensure nutritional security.
- ***Impact of Socio-Economic Factors:*** Education, food expenditure patterns, PDS benefits, and non-farm income positively influence nutritional status, though they are insufficient to eliminate hidden hunger.
- ***Systemic and Cultural Barriers:*** Deeper systemic issues, cultural food preferences, limited food diversity, and lack of nutrition awareness reduce the effectiveness of food security interventions.
- ***Regional Variability:*** Higher nutritional insecurity in tribal households in drought-prone areas like Jangal Mahal underscores the impact of geographic and regional characteristics.

Policy Suggestions

- ***Enhance Nutritional Education:*** Promote nutrition literacy alongside education policies to encourage better food choices and improve nutritional security.
- ***PDS Optimization:*** Diversify PDS offerings with nutrient-rich foods, prioritizing tribal and rural regions.
- ***Promote Local Nutritious Foods:*** Use community campaigns to encourage local, nutrient-dense food consumption, integrating indigenous knowledge.
- ***Integrated Nutrition Programs:*** Strengthen coordination between PDS, ICDS, and health services, with a focus on vulnerable groups.
- **Regional Focus in Policy Design:** Tailor policies to address unique regional challenges, ensuring local needs are met.
- ***Engage NGOs and Community Leaders:*** Leverage NGOs and local leaders to spread awareness, promote healthy eating, and increase participation in government programs.
- ***Research-Driven Policy Adjustments:*** Regular monitoring of nutritional outcomes should guide adaptive interventions to address emerging hidden hunger trends.

Thanks