Chapter 5

Impact of Social Protection Programmes and Common Property Resources for the Food Security of Tribes in the Backward Regions of West Bengal

Households or individuals who are already poor and vulnerable to hunger due to the deficiency of resources to meet their nominal needs on a daily basis (they has been facing chronic food insecurity). They are highly venerated to even small shocks that will force them closer to deprivation, starvation, even premature mortality. So, social assistance is therefore gaining attraction as a means to mitigate vulnerability and to tackle food insecurity. At present, in most parts of India, tribes consist of one of the economically weakest sections of the society. So far there has not been any systematic study for the impact of Social Protection Programs (SPP) and Common Property Resources (CPR) on tribal consumption. This chapter examines the effectiveness of other Social Programs and common property resources on food security in the three Tribal dominated districts of Puruliya, Bankura and Paschim Midnapur of West Bengal as a whole.

The plan of this chapter is as follows. Social Protection Instruments for Combating Food Insecurity has been analysed in Section 5.1. Section 5.2 deals with Common Property Resources for combating food insecurity. Section 5.3 discusses about the Social Protection Programmes (SPPs), Common Property Resources (CPRs) and Food Security of the tribes. Section 5.4 deals with the impact of Common Property Resources and Social Protection Programs over Tribal livelihood. Section 5.5 discussed about the Path analysis. Section 5.6 examines the Econometric analysis of Independent Variables over MPCE at the tribal household level. Section 5.7 deals with

Econometric analysis of the impact of Social Protection Programs and Common Property Resources over Food Security and finally Section 5.8 makes the summing up of the chapter.

5.1 Social Protection Instruments for Combating Food Insecurity:

Food insecurity arises when the addition of these factors are insufficient to satisfy the basic consumption requirements of a household and/or individuals. Food security can be stimulated with proper subsidies, while harvest disaster can be amends with primary insurance. Insufficient retrieve to food can be scripted directly by reallocating of food (school feeding, supplementary feeding), or by cash. This section estimates the workings of social protection programs that can combat the food insecurity which has been listed below.

Table 5.1.1: Social Protection Instruments on Food Security Objectives

Entitlement	**Social Protection Instruments**	**Food Security Objectives**
Consumption	Cereal Subsidies	Keep cereals affordable for the poor
	Food Subsidies	Keep food affordable for the poor
	Fuel Subsidies	Ensure basic livelihood
Transfers	School feeding	Combat with malnutrition
	Supplementary feeding (Pregnant	Enhance food consumption

	and lactating mother)	
	Unconditional cash transfers	Promote access to education
		Ensure healthcare
Labour	Public works programmes	Conditional cash transfers
		Ensurelivelihood
		Create useful infrastructure

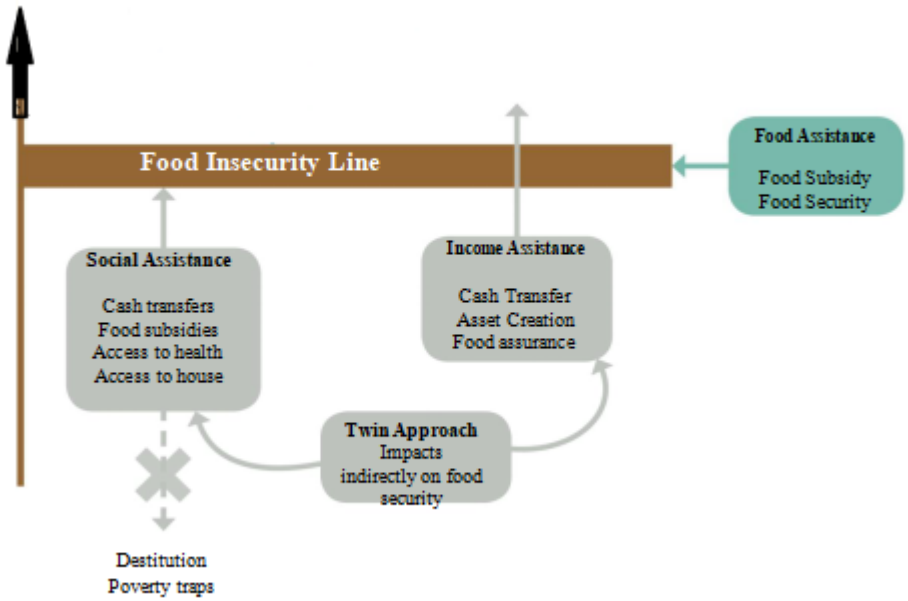
The commonest form of food subsidy is a direct and untargeted subsidy that lowers the price of a staple food for all the backward consumers of an economy. Governments adopting this policy are motivated by its several advantages. First, it raises the consumption of food, especially by low-income consumers. Second; it is politically more adequate than many other social protections programmes. India's Public Distribution System (PDS) has been in operation for over five decades. Though the name has varied from time to time, its vital features remain the same: the parastatal Food Corporation of India (FCI) procures foodgrains from farmers at guaranteed Minimum Support Prices,and households below the poverty line such as tribes are given ration cards to access subsidized foodgrains through a network of 'fair price' shops.The subsidies has been giver in cereals such as rice and wheat, other food items such as sugar and other products such as kerosene that confirm the livelihood of tribals , who are living below the poverty line .

School feeding (children below 14 years, Pregnant and Lactating mother) can take several forms: an in-school prepared meal such as porridge served as breakfast at the

start of the school day, a breakfast snack such as a micro-nutrient stimulate biscuit,or a take-home ration of grains, pulses and cooking-oil. School feeding programmes have dual objectives: decreasing hunger and increasing food security, particularly for children and mothers; and improving human capital accumulation through giving incentives for children to attend school and by providing food which helps children to concentrate and learn. Incentive parents by decreasing opportunity costs of schooling is essential for poor households, where children often provide labour from a young age – school feeding can assist to decrease the incidence of child labour. A critical feature of direct cash transfer, therefore, is the attempt to balance two policy objectives: to increase the consumption levels of poor families, and to raise the human capital of widows, disables and old persons of a household. The direct impact of cash transfers on household food security depends on the size and frequency ofthe transfers, as well as their purchasing power. Though cash is less effective where markets are weak and food prices are high or unpredictable.

In India, food-for-work began during the pre-independence period, expanded to cover the whole country during the 1950s, and more recently evolved into the innovative Mahatma Gandhi National Rural Employment Guarantee Scheme. The popularity of public works programmes with policy-makers can be described by several distinctive features. First, because of the work requirement and low wages offered – often in food rather than cash – public works are self-targeting and avoid ‘dependency on handouts’. Second, well-designed public works projects can generate useful physical infrastructure while simultaneously transferring food or cash to poor people. Third, agriculture-related public works activities, such as hillside terracing or soil and water conservation, can increase farm yields, generating sustainable benefits for household food security.

Figure 5.1.1: Workings of Social Protection for Food Security



Viewed in this way, social protection covers a wide array of instruments that enhances income generating abilities and opportunities for the poor and vulnerable households. These have been explained in the figure above. Social assistance and Income assistance program have an impact on food security, through which households or individuals can combat their security on food. Whereas, the food assistance programs have a direct impact on the food security scenario for the tribal groups. These programs has help those households to become food secure and on the other hand they can break their poverty trap also.

5.2 Common Property Resources for Combating Food Insecurity:

There is no attainment formula of the aspect that in recent years wise management of common property resources (CPRs) has been assumed a major significance from the point of view of providing basic needs of livelihood to a number of rural vulnerable

people. In India forest resources have been represented the second largest land use after agriculture with coverage of 641.13 sq km (22% of total land). Apart from providing lots of benefits to the economy generally, forests provide a part of the subsistence and cash livelihoods to about 275 million rural people in our country. In regions where variations in local institutions do not exist, degree of separation in people's participation in summation with differential in socio and economic factors find out the common property results. The difficulties of getting added importance when studied in respect of a CPR region habited to mainly by backward community especially tribes who are usually expected to be highly dependent on nature for their survival. Tribes depend on forest related economic activity like NTFP collection, Babui grass cultivation, Jun grass cultivation, Sal and Kendu leaves collection, fire wood, and stone and root collection and also for food such as vegetables, roots and animals.

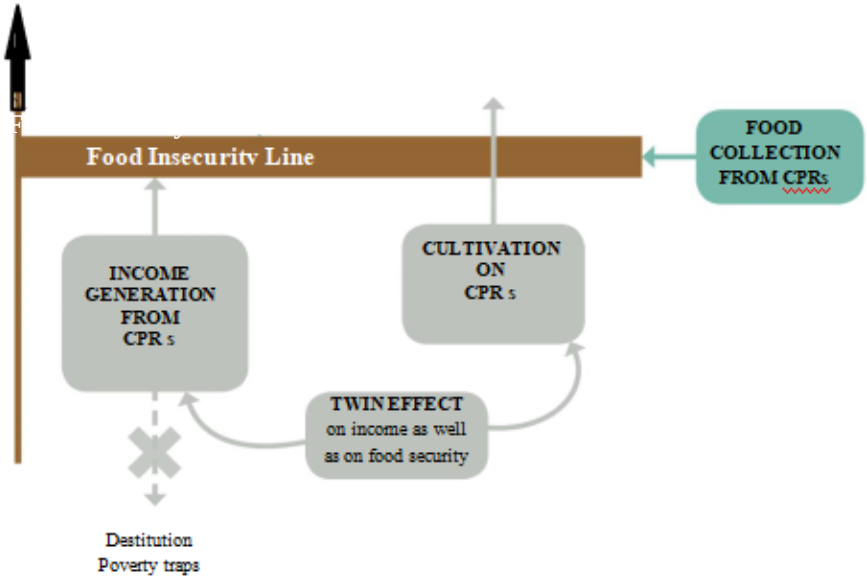
Table 5.2.1: Common Property Resources on Food security Objectives

Entitlement	**Common Property Instruments**	**Food Security Objectives**
Consumption	Food Substitutes	Enhance food consumption
		Reduce hunger
	Fuel Substitutes	Ensure basic livelihood
Income	Collection of Sal & Kendu leaves	Generate income
	Collection of Stones	Enhance Income

	Collection of roots	Ensure food security
Cultivation	Cultivation of Babui grass	Generate income
	Cultivation of Jun grass	Ensure livelihood

As we are known CPR means Common Property Resources which is very important for tribal because they collected many types of forest food and non-food items for years and years. Not only that, they can earn a lot of part of their income through such first product such as Sal leaf, Kandu leaf, White Stone, roots of wild tress, Babui grass and Jun grass. Both in the case of food and non-food consumption the impact of Common Resources practically visible for sustainability of tribal Common Property Resources always provide both food and non-food as well as generate income for them. Again Common Property resources help tribes to enhance their livelihood by fodder from the forest, for making houses, for walls as well as for basic amenities.

Figure 5.2.1: Workings of Common Property resources for Food Security:



Viewed in this way, common property resources covers a wide array of instruments which increases income generating abilities and opportunities for the poor and vulnerable groups.These has been explained in the figure above. Incomes generating scope and cultivation on CPRs have an impact on food security, through which households or individuals can combat their insecurity on food. Whereas direct food collection from the CPRs have direct effect on food security structure of the vulnerable groups. So CPRs has helped those households to become food assured and on the other hand they can break their poverty trap also.

5.3 Social Protection Programmes (SPPs), Common Property Resources (CPRs) and Food Security:

India has been acquired a three-pronged scheme for addressing household food insecurity. Firstly cash/income in the hands of the hardcore poor so that they can command for food in the market. Secondly decrease the price of food through subsidized distribution of food to targeted food insecure households. These programmes have been operating on both the supply-side and the demand-side. While

the supply-side Public Distribution System has remained since Independence and the demand-side programmes constitute a slow adjustment of the strategy to the newly appearing growth-inspired vulnerabilities. And the final parts of programmes aim at protecting households against shocks, both ex ante and ex post.

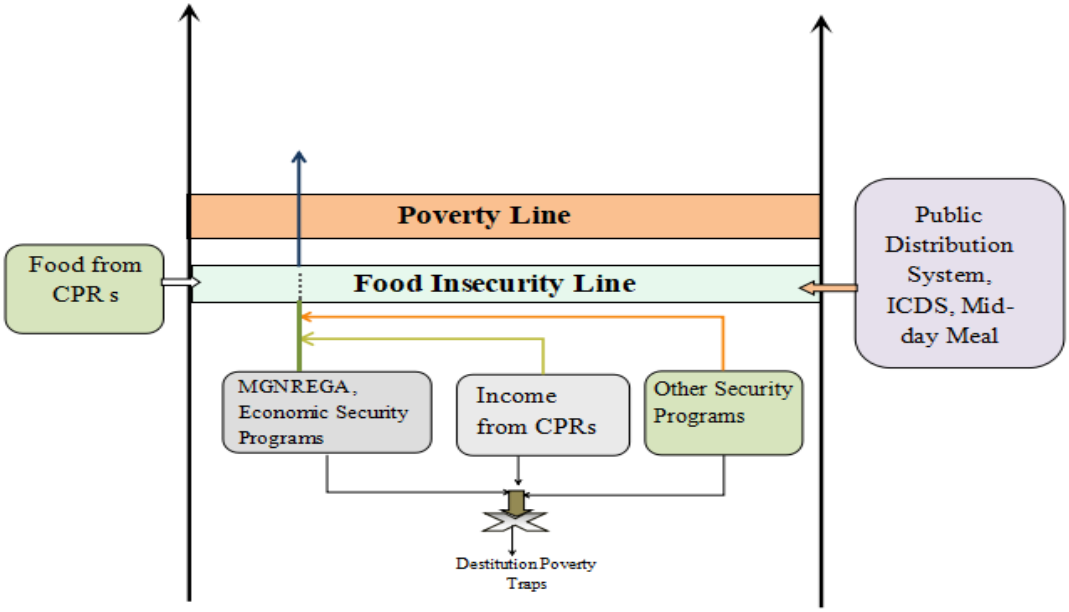
The first set of programmes that place cash in the hands of vulnerable groups include: Indira Gandhi Old Age Pension Scheme, Disabled Pension Scheme, Widows Pension Scheme, free insurance cover for the poor against disorder and accidents, heavily subsidized social insurance for workers in the unorganized sectors, and housing grants targeted to destitute households. All these programmes are mostly preservative in character, inasmuch as they offer ex ante protection against income shocks (old age, disability, loss of breadwinner, widowhood, and many more), and enable livelihoods to command food in the market. The second sets of programmes have been in existence for several decades: the food subsidy programme known as the Public Distribution System (PDS) and the Mid-day Meal schemes for school going children. PDS provides subsidized wheat and rice, kerosene and sugar: the subsidy differs depending on whether a household is Below the Poverty Line or Above the Poverty Line, or destitute– known as an Annapurna household. The school feeding programme provides hot meals to children in grades 1 to 8 in government and government-aided schools. Free meals as well as medicines have also been provided to lactating mothers and pregnant women. The third set of programmes such as public works, has also been implemented in India for many decades, and also switched to a rights based approach when the National Rural Employment Guarantee Act was passed in 2005. Every rural household in need of work is entitled to apply for a job card and register at the local village council office, and should then be provided with a job within two weeks. Employment on low-skilled or unskilled public works projects

is guaranteed up to a ceiling of 100 days per household per year. The unique feature of being accessible on demand makes this programme an effective intervention against chronic food insecurity, seasonal hunger and shocks such as job loss or harvest failure – it offers social assistance as well as a kind of surrogate social insurance. Since paid work is guaranteed and available at all times, shocks such as a flood or drought need not lead to a sudden loss of entitlement to food.

Now, Common Property should also be utilized for creating foods and fodders and to create cash livelihood of forest dwellers. The region is rich in multiple species of diverse NTFPs which have tremendous potential for commercial tapping if properly reared, harvested, processed and marketed. Although the responsibility collection of sal and kendu leaves from the tribal people make then economically stable.The importance of CPR on livelihood is that they can become some food security from forest which makes them highly dependent on nature for their survival.

The working dynamics of various Social Protection Programmes and Common Property Resources on food security has been estimated with the help of the below diagram.

Figure 5.3.1: Working Dynamics of SPPs and CPR s



Generally, we measure food insecurity through the food percentage share of Monthly Percapita Consumption Expenditure for tribal livelihood. In India Public Distribution System is one of the major policies of Food Security Scheme. Though there are also some schemes provides by government whose have an impact on Food Security for example Mid Day Meal and Integrated Child Development Service for children of 5-14 years and peregrinated lactating mother respective through which food security also enrich. These schemes have direct effect on the food security of the tribes. Again in case of tribal's they very much depend on food from Common Property resources that have an effect on their food security.

Now the income security schemes such as MGNREGA and others have a positive effect on their food as well as their poverty reduction. Since tribes are coincide towards the main stream population that means their income may be spent more on non-food rather food. But the programmes such as Education Schemes, Housing Schemes, Employment Schemes, Health Schemes and Social Security Schemes have also indirectly reflect an effect on food security so that the individuals

programs and sub- programs have an effect directly or indirectly on Food Security as well as in poverty reduction.

There are two way causalities between the social protection and vulnerability. The social protection decreases vulnerability and the vulnerability in most of the cases decreases the access of some kind of social protection. To avail a certain type of social protection one has to spend an amount of money whatever it is minimal, so all types of social protection programs are to be introducing simultaneously to support different type of programme for the betterment of vulnerable people. Social security programmes like nutritional programmes and health programmes create a working capability to a indigent which helps him to drive to the economic security. On the other hand the programmes of economic security like employment guarantee schemes will give him a minimum amount of earnings to avail the other kind of social securities.

5.4 Impact of Common Property Resources and Social Protection Programs over Tribal livelihood:

Even this is so important for them that deforestation in recent years will eventually make them in a too poor situation to stand back. So after all we can make a statistical analysis and an empirical relationship that comes from Common Property Resources (CPRs). Though the shrinkage and degradation of Common Property Resources, their impact to the rural economy continues to be significant, particularly in drought and

dry prone areas. In a paper Jodha has examined that the per household per year income calculated from Common Property Resources ranging between 530 rupees and 830 rupees in different Indian zones, which has been higher than the income generated by a number of anti-poverty programmes in different zones (Jodha 1986). The market value of the CPRs has been estimated by multiplying the market price of the goods that has been accessed from the forest annually. Similarly the forest product from which income has been estimated from marketed values. The family labour which has been use for extracting the CPRs has been included in the imputation of costs.

Table 5.4.1: Monthly Income in Percentage (in Rs.) from CPRs to Total Income

All CPRs Income	
Puruliya	22.96
Bankura	35.41
Paschim Midnapur	11.69

Sources: Field survey & authors own calculation

In the table 5.4.1 depicts that the monthly income from Common Property Resources has been describe across the sample households of Puruliya, Bankura and Paschim Midnapur districts. Though performance of Paschim Midnapur districts has been poor than the two other districts.

Table 5.4.2: Percentage of CPRs Obtained across Income Class

Class	Puruliya	Bankura	Paschim Midnapur
0-2250	19.34	37.77	29.9

2251-4500	16.92	20.74	19.12
4501-6750	14.24	16.2	13.45
6751-9000	9.89	17.26	8.9
9001-11250	9.07	11.8	9.26
11251-13500	11	7.4	0
13501-15750	8.09	9	0
15751-18000	11	0	0

Sources: Field survey & authors own calculation

The table 5.4.2 depicts that the lower income class have greater dependency on Common Property Resources. Particularly the lower income class of Bankura districts has 38 percent of Common Property Resources income; the next income classes have 21 percent Common Property Resources income. This scenario has been found in all the districts, as the income class increased the Common Property Resources income class has decreased. So this data revel the economic theory that as income increased dependency on Common Property Resources has been decreased. Since the fuel wood has been wholly generate from the CPRs, which has been depicted in the table 5.4.3.

Table 5.4.3: Percentage of Monthly Percapita Consumption (Food & Non Food) comes from CPRs

	Puruliya	Bankura	{Paschim Midnapur
Food	25.69	28.32	57.68
Non Food	69.86	75.43	92.07

Sources: Field survey & authors own calculation

The table 5.4.3 discussed about the percentage of Monthly Percapita Food Consumption (MPFC) and Monthly Percapita Non Food Consumption (MPNFC) that has been generated from the Common Property Resources. The table also depicts the percentage of CPRs in food consumption out of total food consumption and in case of non food consumption also. Paschim Midnapur district has more dependency on food that comes from Common Property Resources than Bankura and Puruliya.

For non-food consumption nearly all villages have near about 70 percent of non-food comes from Common Property Resources. Though the villages of Paschim Midnapur have mostly significant impact of Common Property Resources than two others districts. So finally we can say that in case of tribal livelihood the impact of Common Property Resources is too high. There are so many social protection programs in our rural economy. But among them some are very closely related to food security and done are not but little.

In India Public Distribution System (PDS) has been functioning for over theyears.The provision of getting per head rice for specially identified BPL in Jangalmahal (JM) area is 2 KG/week and for Wheat is 750 gm/week. Generally under Annapurna Yojana (ANY) the scale of distribution for BPL is 1Kg/head/week for rice and 1125 gm/head/week of Wheat. In case of AAY, the scale for distribution of rice is 1250 gm /head/week and 750 gm /head/week for wheat. Again schemes like ICDS and Midday meal have food secure impacts for pregnant and latching mother as well as for children up to 14 years.So Public Distribution System (PDS), Integrated Child Development Services (ICDS) and Mid Day Meal (MDM), are those Social Protection programs that will affect food-security.

Table 5.4.4: Percentage share of Food Security Programmes in MPCE of Food

	Public Distribution System (PDS)	Mid Day Meal (MDM)	Integrated Child Development Services (ICDS)
Puruliya	13.94	12.46	4.93
Bankura	13.46	11.74	4.11
Paschim Midnapur	14.69	10.07	4.23

Sources: Field survey & authors own calculation

The table 5.4.4 illustrates the percentage share of PDS, MDM and ICDS over total food consumption. The contribution of Public Distribution System in Monthly Percapita Consumption Expenditure (MPCE) is more than 13 percent for all the studied sample districts. Whereas Mid Day Meal generates a 10 to 12 percent food consumption in the sample district over total food consumption. Again ICDS generates more than 4 percent of food consumption in all the districts.

So, the above data reveals that in Food security PDS, MDM and ICDS provides an impact on the sample households of the study area.

5.5 Path Analysis:

Hypothesis: Let a social factor V is a function of n social variables$u_1, u_2, u_3, , , , , , u_n$. Now according to the inter-social dependency they form an interaction path. Quiet naturally, there are some loops present in that graph. Without loss of generality, let us assume that these variables $u_{i_1}, u_{i_2}, , , , , u_{i_r}$form a loop, where each of these variable belongs to $\{u_1, u_2, u_3, , , , , , u_n\}$.

Proof: The chain formed by the loop looks like

$u_{i_1} \to u_{i_2} \to \quad \to \quad \to u_{i_r} \to u_{i_1}$, but it is very clear that all of $u_{i_2},,,,,u_{i_r}$ can also be made starting point of the loop as like $u_{i_2} \to \ u_{i_3} \quad \to \quad \to u_{i_r} \to u_{i_1} \to u_{i_2}$. Similarly u_{12} can create loops with u_{21} and this can be happens with other u_{ij} also.

So all of $u_{i_1,}u_{i_2},,,,,u_{i_r}$ are equivalently strong in the perspective of loop-making.

But if we examine other loops, let one of those is $u_{j_1} \to \ u_{j_2} \ \to \ \to \ \to \ \to \ \to u_{j_m}$. All of these m social variables make themselves of same quality (in the perspective of loop-making nature) like above said r variables. Proceeding in the same way, we can check all possible loops available in our model consisting of those $n$variables$u_1, u_2, u_3,,,,,,u_n$.

Now from the first loop, for convenience let us assume that only one of those $r$variables namely $u_{i_{r_1}}$ is also present in the second loop as $u_{j_{m_1}}$and none of remaining $u_{j_1},u_{j_2},,,,u_{j_{m_1-1}},u_{j_{m_1+1}},,,,,u_{i_r}$ is equal to one of $u_{i_1,}u_{i_2},,,u_{i_{r_1-1}},u_{i_{r_1+1}},,,u_{i_r}$. So the variable which is present as $u_{i_{r_1}}$ in first loop & as $u_{j_{m_1}}$ in second loop, is the most prominent social factor which has dependency on a vast area of society through the effectiveness over those remaining $(r-1)+(m-1)=(r+m-2)$ variables in those two loops simultaneously.

Again, if we select a variable u_k , where $k \in \begin{cases} \{i_1, i_2,,,,i_{r_1-1}, i_{r_1+1},,,,i_r\} for\ \ 1stloop \\ \{j_1, j_2,,,,j_{m_1-1}, j_{m_1+1},,,,j_m\} for\ \ 2ndloop \end{cases}$

Among the remaining $(r+m-2)$ variables as an independent variable, then that would be very redundant because any of those $(r+m-2)$ variables can represent the effectiveness of at most either $(r-1) or\ \ (m-1)$ variable.

So to maximize the effectiveness of all social factors by selecting minimum number of variable, we have to choose the variables like $u_{i_{r_1}}$ or $u_{j_{m_1}}$.(**PROVED**)

Working procedure: If we take common of all loop-making variables and write down them as

$$\alpha_1, \alpha_1, \alpha_1, , , , , , \alpha_1(p_1 times), \alpha_2, \alpha_2\ , \alpha_2\ , , , , , , \alpha_2(p_2 times), , , , , , , , , , , , , , , , \alpha_s, \alpha_s, \alpha_s, , , , \alpha_s$$

($p_s times$), if α_1 is present in p_1 number of loops, α_2 is present in $p_2$number of loops etc. Then we will select the variable with maximum frequency, and after selecting one we will take the next one with maximum frequency and will proceed according to our desired degree of accuracy.

That means, our selected variables will be arranged in the order $\{\alpha_t\}$, where {t} is a decreasing sequence consisting of $\{p_1, p_2, , , p_s\}$

Now we will consider the co-relation coefficient of each of the n variables with$V$.Because that part makes a great sense in dealing with all social factor, since we always want to know what variable has greater co-relation coefficient with V.

Now let us locate the co-ordinates $(l, r^{/})$ in the 2D plane, where l = no. of loops made by the selected variables &$r^{/}$ = 10 times the co-relation coefficient of them with V.Now draw the circles of radius$\sqrt{l^2 + r^{/2}}$, and the greater circles will give us the ultimate selected variables. {Where, the number of selected circles must depend on the desired degree of accuracy}.

Since our main study is based on consumption expenditure of tribes, so let us check the correlation Coefficient between Monthly Percapita Consumption Expenditure (C_E) with other independent variables of study area.

Table 5.5.1: Correlation Coefficient between MPCE and the other Independent Variable

	TOTAL						
		Correlations					
	MPCE	PCI	LAND	EDU	SPP	CPR	OCCU
MPCE	1						
PCI	.911**	1					
LAND	.098*	.103*	1				
EDU	.159**	.155**	.131**	1			
SPP	.112**	.141**	-0.07	-.134**	1		
CPR	-0.008	-0.018	-0.014	-0.046	-0.019	1	
OCCU	0.07	.105*	-.226**	0.016	-.131**	0.014	1
*. signify correlation is significant at the 0.01 level ** Signify correlation is significant at the 0.5 level							

Sources: Field survey & authors own calculation

N.B: PCI = Per Capita Income, LAND = Mean Land holdings, EDU = Mean Education Level, SPP = Mean Social Protection Program benefit, CPR = Mean Common Property Resource benefit, OCCU= Mean Occupation.

Analysis reveals that Monthly Percapita Consumption expenditure has significant impact with Percapita Income, Land Cultivated, Mean Education and Social Protection Program.So, from the table 5.6.1 MPCE have positively Correlation with Income, land holding and Education in the study area across tribes and negatively correlated with Common Property resources and Household sizes in all the districts across tribes.

As we know Monthly Percapita Consumption Expenditure(C_E) depends mainly upon the Income distribution of the households.

$C_E = f(I)$ ……(i)

Now in case of tribal groups Percapita Income (I) is a function of land holding (Lh), Common Property Resources (C_{pr}), Education (E_d), Occupation (O_p) and Social Protection Programs (S_{pp}).

$I=f_1(L_h, O_p, C_{pr}, E_d, S_{pp})$……..(ii)

$O_p=f_2(E_d, C_{pr})$……..(iii)

$E_d=f_4(I)$……(iv)

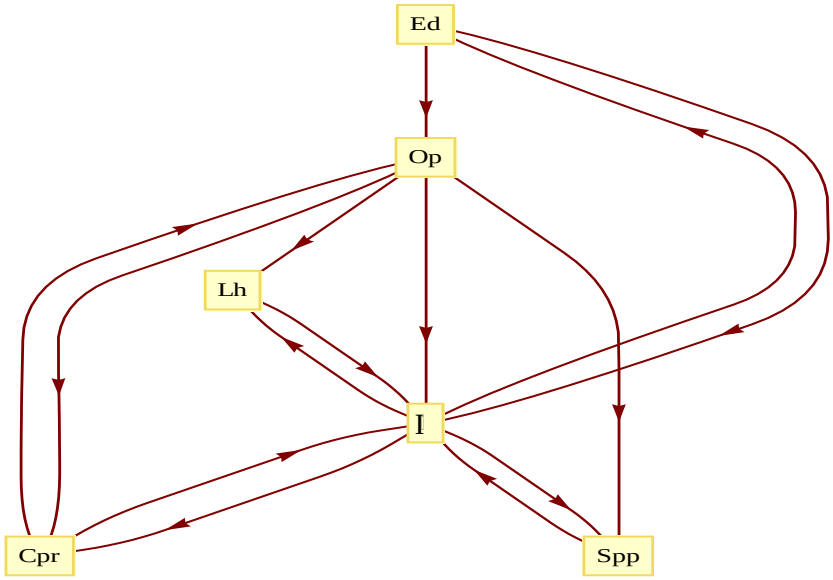
$Lh=f_2(I,O_p)$……(v)

$C_{pr}=f_3(I, O_p)$……(vi)

$S_{pp} = f_6(I,O_p)$……..(vii)

This relationship can be better understood with the help of the following diagram.

Figure 5.5.1: Relationship between the variables



In this model, the numbers of loops made by the variables are given below:

I→9, O_p→6, Ed→5, Lh→3, Cpr→2, and S_{PP}→2.

Number of loops in this model represents the ground-level inter-relationship or economic domination upon other variables and larger co-relation co-efficient with C_E makes a variable more distinguishable.

So if we consider a two-dimensional co-ordinate system with vertical axis as 10 times co-relation co-efficient ($r^{/}$) with C_E and in the horizontal axis the number of loops (l) , then the corresponding co-ordinates will be respectively.

So, the number of loops and correlation with MPCE of the dependent variables

A_1=I=> 9, 0.910725 == (9, 9.10725)

A_2=Op =>6, -0.07031== (6, 0.7031)

A_3=Ed =>5, 0.145108== (5, 1.45108)

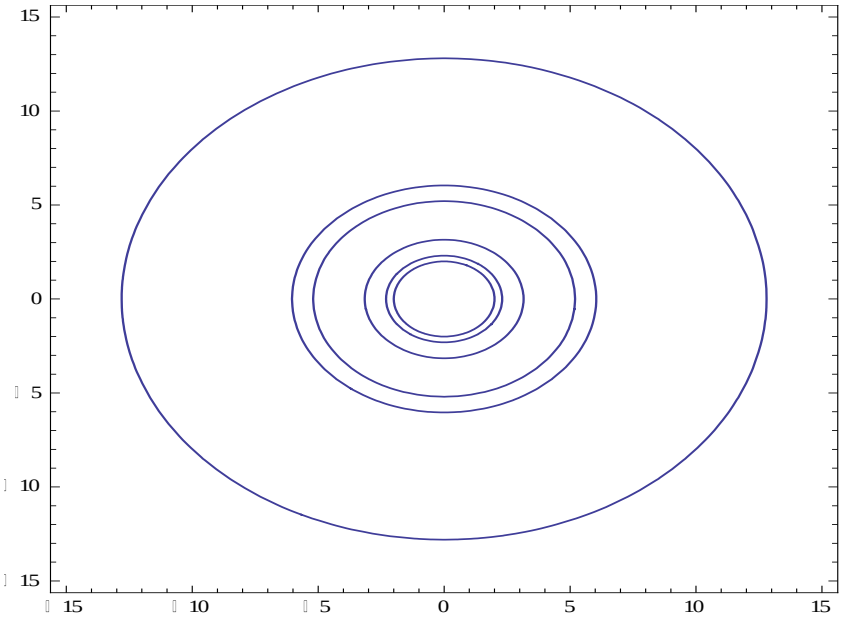
A_4=Lh => 3, 0.097563== (3, 0.97563)

A_5=Cpr => 2, -0.00845== (2, 0.0845)

A_6=Spp=> 2, 0.114881== (2, 1.14881)

Now for the selection of variables we measure $\sqrt{(l^2 + r^{/2})}$ to distinguish the greater circles, where the distance of each A_i from origin are respectively $I = 12.80398386$, $Op = 6.041055339$, $Ed = 5.206307056$, $Lh = 3.154655908$, $Cpr = 2.001784267$,$Spp = 2.306461449$.

Figure 5.5.2: Selection of Variables



Obviously the 1st, 2nd, 3rd, 4th, 5th and 6th circles made themselves distinguished. So in this case, if we select four variables, the selected variables will be I, Op, Ed and Lh.

Therefore, we can say in this case, $C_E = f(I, Op, Ed, Lh)$

Now we can generate the general equation in explicit form as

$C_E = b_{1.2345} + b_{12.345}I + b_{13.245}Op + b_{14.235}Ed + b_{15.234}Lh$

Where $b_{12.345}$, $b_{13.245}$, $b_{14.235}$, $b_{15.234}$ are given by $P^{-1}Q$,

Where,

$$P = \begin{bmatrix} n & \sum I & \sum Op & \sum Ed & \sum Lh \\ \sum I & \sum I^2 & \sum(I,Op) & \sum(I,Ed) & \sum(I,Lh) \\ \sum Op & \sum(I,Op) & \sum I^2 & \sum(Op,Ed) & \sum(Op,Lh) \\ \sum Ed & \sum(I,Ed) & \sum(Op,Ed) & \sum I^2 & \sum(Ed,Lh) \\ \sum Lh & \sum(I,Lh) & \sum(Op,Lh) & \sum(Ed,Lh) & \sum Lh^2 \end{bmatrix} \quad Q = \begin{bmatrix} \sum Ce \\ \sum(Ce,I) \\ \sum(Ce,Op) \\ \sum(Ce,Ed) \\ \sum(Ce,Lh) \end{bmatrix},$$

So, Path analysis has been uniquely estimated the variables using the intra relationship between the variables and interrelationship between the dependent variable and them.

5.6 Econometric Analysis of Independent Variables over MPCE at the Household Level:

As the above section deals with the selection of variables which have an impact on the Monthly Percapita Consumption through Path Analysis and let analyse the same impact on MPCE through multiple linear regression analysis.The present section analyses the determinants of Monthly Percapita Consumption Expenditure at the household level in the Jangalmahal Region. Tribalhouseholds are widely dependent on nature, they also earn from forests that it by means of Common Property resources(CPR).Their consumption also depend on Social Protection Program (SPP) income, Occupation, Household sizes, Education and Percapita income.Now, we investigate the impact of other independent variables over MPCE of the sample household's by using multiple linear regression analysis. The variables identified to capture these processes and their specifications and their descriptive statistics are presented in the table 5.6.1.

Table 5.6.1: Notation, Mean, and SD of the Variables used in Linear Regression Model to Estimate the Dependency of Independent Variables over MPCE of Sample Households

	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable				
MPCE	1170	526.8	291.1	4304.3
Independent Variable				
Percapita Income (I)	1233.3	620.4	303.6	5147.9
Land holding (Lh)	64.0	80.0	0.0	844.8
Educational Level(E_d)	5.0	2.7	0.0	21.0
SPP Income (S_{pp})	140.7	132.1	0.0	1000.0
CPR Income (C_{pr})	231.3	233.6	0	1750
Occupation(O_p)	0.4	0.5	0.0	1.0

Source: Field survey & authors own calculation

The results indicate that the Monthly Percapita Consumption Expenditure of the tribes is significantly influenced by the Percapital income, Occupation, Education, Land holding and Social Protection Program. Though, other variables do not have significant impact over the Monthly Percapita Consumption of the tribes as a whole.

Table 5.6.2 Linear Estimation of Dependency of MPCE and other Independent Variables of the Sample Households

	Coefficients	t Statistics	P-Value	Regression Statistics	
Intercept	137.9488	3.549042	0.000		
Percapita Income (I)	0.75823	47.82208	0.000	Multiple R	0.91181
Land holding (Lh)	0.031391	0.245996	0.081	R Square	0.83140
Educational Level(E_d)	2.989892	0.898007	0.063	Adjusted R	0.82941

				Square
SPP Income (S_{pp})	0.09084	1.30292	0.071	
CPR Income (C_{pr})	0.08254	0.84	0.435	Observations 600
Occupation(O_p)	28.36063	1.500161	0.035	

Source: Field survey & authors own calculation

So, it is clear that in this way we can put any empirical data in the Path analysis model, and linear regression mode; with the proper introduction of variables initially and consequently the functional relationship between the variables can be well established. Path analysis have selected the four major variables which impacts on the MPCE of the tribes, where as multiple regression model has estimated the same four variables which have an major impact over MPCE (Percapita Income, Occupation, Education and Land Holding).

5.7 Econometric Analysis of the Impact of Social Protection Programs (SPP) and Common Property Resources (CPR) over Food Security:

In this section, we investigate the impact of social protection programmes and Common Property Resources over consumption of the household's by using multiple linear regression analysis. The variables identified to capture these processes and their descriptive statistics are presented in the table 5.7.1.

Table 5.7.1: Notation, Mean, and SD of the Variables Used in Linear Regression Model to Estimate the Effect of SPPs and CPRs over the Tribes:

	Mean	Standard	Minimum	Maximum

		Deviation		
Dependent Variable				
MPCE	1170	526.8	291.1	4304.3
Independent Variable				
CPR Income	231.3	233.6	0	1750
CPR Consumption	21.4	16.3	3.6	72.0
PDS	181	136	0	1867
MDM	11.4	14.7	0	76
ICDS	4.4	8.6	0	45
MGNREGA	446.6	365.3	0	2916
Social Assistance	156.7	343.8	0	2000
RPHC	204.3	137.2	0	1800
JSY	31.8	173.7	0	2000
Educational Security	1278	1994.2	0	16600

Source: Field survey & authors own calculation

As the analysis is based on the food security scenario, so the dependent variable is the Monthly Percapita Consumption Expenditure of the tribes. Whereas the independent variables are Common Property Resources (CPR) income, Common Property Resources (CPR) consumption, Public Distribution System (PDS) benefit, benefits from Mid day Meal (MDM), benefits of Integrated Child Development Scheme (ICDS), income from Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), income from Social Assistance programs, Rural Primary Health Care (RPHC) benefit, Janani Suraksha Yojana (JSY) benefit and finally Educational Security.

Now let us analyze the data by linear regression model.

Table 5.7.2 Linear Estimation of SPPs and CPRs over sample Households

	Coefficients	t Statistics	P-Value	Regression Statistics
Intercept	1527.99	31.29	0.000	
CPR Income	0.08	0.84	0.435	
CPR Consumption	-11.75	-2.54	0.006	Multiple R 0.89411
PDS	0.47	2.77	0.000	R Square 0.75532
MDM	-4.65	-2.92	0.000	Adjusted R Square 0.74098
ICDS	-8.07	-3.08	0.000	Observations 600
MGNREGA	0.03	0.39	0.694	
Social Assistance	0.06	0.94	0.345	
RPHC	-0.39	-2.21	0.026	
JSY	0.02	0.19	0.842	
Educational Security	0.03	2.32	0.023	

Source: Field survey & authors own calculation

. The analysis indicate that the Monthly Percapita Consumption Expenditure has been significantly influenced by the Consumption from CPRs, Social Welfare programs like Public Distribution Systems, ICDS, Mid day Meal, Health Schemes and Education Schemes. Though, schemes like MGNREGA, Janani Suraksha Yojana (JSY) do not have significant impact over the consumption of tribes. As consumption has been directly related to the Social Protection Programmes such as Public

Distribution System where they get subsidized food, again from ICDS and Mid-day Meal they get the complementary meal. As a result MDM and ICDS have inverse impact on the Monthly Percapita Consumption of Households. Again due to Rural Primary Health Care they get the basic health expenses at free of cost that's why RPHC has a significant negative impact on MPCE. Due to Educational Security Programmes, the households get lump sum money in terms of book grant, tuition fees etc, they these money has been majorly used in their consumption purpose, that's why educational securities have a positively significant impact on their consumption. Tribes are mainly dependent on Social Security Programmes such as MGNREGA, Common Property Resources income but these programmes don't have significant impact on their consumption because the benefit from income generating schemes are too small for tribes. The tribes are not similar approach alike non-tribes to those schemes. That's why these schemes don't produce any impact over their consumption.

Now, we investigate the impact of Social Protection Programmes and Common Property Resources over Food security as well as in the Poverty of the household's by using Probit regression analysis.

The Probit model is a statistical probability model with two categories in the dependent variable. Probit analysis has been based on the cumulative normal probability distribution. The binary dependent variable, 'y', takes on the values of zero and one. The probit analysis also provides the statistically significant finding of which demographics increase or decrease the probability of consumption. The status of food and nutritional insecurity is analyzed with the help of Probit model.

The variables identified to capture these processes and their descriptive statistics are presented in the table 5.7.3.

Table 5.7.3: Notation, Mean, and SD of the Variables Used in Probit Regression Model to Estimate the Effect of SPPs and CPRs over the Tribes:

	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable				
Poverty(Poor=1, Other=0)	0.2	0.4	0.0	1.0
Food Security(Food Insecure=1, Others=0)	0.1	0.3	0.0	1.0
Independent Variable				
CPR Income	231.3	233.6	0.0	1750.0
CPR Consumption	21.4	16.3	3.6	72.0
PDS(Rs.)	181.0	136.0	0.0	1867.0
MDM-Meal(No)	11.4	14.7	0.0	76.0
ICDS-Meal (No)	4.4	8.6	0.0	45.0
MGNREGA	446.6	365.3	0.0	2916.0

Source: Field survey & authors own calculation

Now let us analyze the data by Probit regression model.

In our binary Probit model poverty and food security are the dependent variable, in poverty poor was taken as 1 while others or non poor as 0. In case of food security, food insecure households were taken as 1, while others as 0.

Table 5.7.4: Probit Estimation of SPPs and CPRs over Sample Households on Poverty

	Coefficien	Std. Error	z	P>z	Number of obs = 600

	t				LR chi2(5) = 55.85 Prob > chi2 = 0.0000 Log likelihood = -266.69 Pseudo R2 = 0.095
Constant	-1.35	0.15	-9.20	0.000	
CPR Income	-0.00091	0.0003	-2.86	0.004	
CPR Consumption	-0.002	0.00004	-2.16	0.042	
PDS	-0.003	0.0009	-3.72	0.000	
MDM	-0.01	0.0042	-2.28	0.023	
ICDS	-0.03	0.0008	-3.50	0.035	
MGNREGA	-0.0001	0.0002	-1.56	0.006	

Source: Field survey & authors own calculation

From the table 5.7.4, estimation states that the benefits of the PDS, Number of Mid day Meal, Number of ICDS meal, and income from CPR, consumption from CPR and income from MGNREGA have a significant impact over the Poverty of the tribes. Incomes from CPR and MGNREGA have negatively statistically significant. That means as their income generates their level of Poverty will decrease. Again Schemes like PDS, Mid day Meal and ICDS have negatively statistically significant. That implies these schemes will reduce poverty of the households because these schemes provides benefits in minimal price and/or cashless which will increase their consumption level.

Table 5.7.5: Probit Estimation of SPPs and CPRs over Sample Households on Food Insecurity

	Coefficient	Std. Error	z	P>z	
Constant	-1.48	0.17	-8.90	0.000	Number of obs= 600
CPR Income	-0.002	0.0004	-3.67	0.000	LR chi2(5) = 41.51
CPR Consumption	-0.0024	0.0003	-3.05	0.000	Prob > chi2= 0.0000
PDS	-0.003	0.001	-2.96	0.003	Log likelihood = -185.05411
MDM	-0.01	0.005	-2.04	0.041	Pseudo R2= 0.1008
ICDS	-0.02	0.006	-2.32	0.055	
MGNREGA	-0.00006	0.0002	-0.26	0.798	

Source: Field survey & authors own calculation

From the table 5.7.5, estimation states that impact of PDS, Meals of MDM, Meals of ICDS, CPR income and CPR consumption have significant impact over food security of the tribes. Consumption from common property resources and schemes like PDS, Mid day Meal and ICDS have negatively statistically significant. That implies these schemes will reduce food insecurity of the households because these schemes provides basic food benefits in minimal price and/or cashless which have a direct impact on food security of the tribal households. Income from CPR has negatively statistically significant. That means as their income generates their level of Food Insecurity will also decrease. Though MGNREGA do not have significant impact over food security of the tribes that because they spend the MGNREGA income on the non food consumption mainly.

5.8 Summing Up:

Studying the impact of Social Protection Programs and Common Property Resources of the tribes anywhere in India in general and our study area in particular it is clear that though slowly yet gradually tribes are adopting the benefits of various Social Protection Programs. The percentage of income generate from Common Property Resources over total income in Puruliya is 22.96 percent, in Bankura is 35.41 percent and in Midnapur is 11.69 percent. Again in case of Percentage share of Food Security Programmes in MPCE of Food, analysis reveals that Public Distribution System generates near about 13-14 percent in all the districts, Mid Day Meal generates 12.46 in Puruliya, 11.74 percent in Bankura and 10.07 percent in Paschim Midnapur , finally ICDS generates 4 percent in all the districts.The empirical results relating to the effect of Social Security Programs and Common Property Resources over food security on tribes has been estimated by Probit regression model. The results indicate that in Poverty and food insecurity is significantly influenced by the Social Security programs like Public Distribution Systems, Mid day meal, ICDS, and CPR consumption as well as income. Path analysis model has been estimated the variables using the intra relationship between the variables and interrelationship between the dependent variable and them. The regression result also gives the same result as the path analysis. The empirical results relating to the effect of Social Security Programs and Common Property Resources over food security on tribes has been estimated by Probit regression model. The results indicate that food insecurity is significantly influenced by the Social Security programs like Public Distribution Systems, Mid day Meal, ICDS and consumption as well as income from Common Property Resources.

Case Study:

Manida chitrakar, a Bhumij tribes of Majramura village of Puruliya district. Manida is a 62 years old man living in this village from his childhood. He has been living in a one room house made by government under Gitanjali Awash Prokolpo with others mine members. He is one of the traditional Chitrakar of West Bengal who generally told mythological stories in public places with hand drawing placards. In modern era of economy these traditional cultures of Bengal have been in the path of extinct.

Minada have no cultivable land and living in government allocated land with other chitrakar families. His son Drijalal acts as a labour under MGNREGA schemes, and his wife Baruni get ST pension of 1000 per month. Nayanmani and Sangeeta the grand daughters of Manida are the beneficially of Midday Meal, book grant, shoes grant and dress grant whereas other two granddaughters Purnima and Puja are getting ICDS benefits.

Total monthly income of the Manida family is Rs 4250 (approx), out of which Manida earn nearly Rs 1100 per month, his earn get Rs 1000 under Social assistance schemes, and his son earn rests though MGNREGA, the employment Security Scheme of the government. Again in case of consumption fuel have been supplied

from forest resources, electricity have been provided without cost, meals have been substituted though Midday Meal and Integrated Child Development Schemes, three Jangal Mahal Ration cards provide the subsidized rice and wheat. Dresses for children and basic educational amenities' have been provided by the government, basic health disorders have been recovered through rural primary health centre.

The Manida family is one of the Chitrakar families of Bengal who are just surviving and living far below the Below Poverty Line with Rs. 395.33 Per Capita Consumption Expenditure of a month, inspite of that they are maintaining their traditional livelihood. This family is surviving by getting the government social security benefits and common property benefits. For surviving this Chitrakar family, benefits of social protection and common resources should be maximized so that they can continue to maintain their tradition.