

Rural Poverty in Odisha- A Statistical Analysis

MOHANTY, Bigyanananda^a

^a Joint Director, Directorate of Economics and Statistics, Odisha, INDIA

ABSTRACT

This paper discusses the measures of poverty such as incidence, depth and severity and Gini Coefficient of inequality for rural Odisha by different regions and different social groups using data from 61st round (2004-05), 66th round (2009-10) and 68th round (2011-12) of National Sample Survey (NSS) household consumer expenditure survey. The study has been undertaken by existing the incidence of poverty, depth and severity of poverty by using simple head count method as well as fitting a log linear regression estimation on Monthly Per Capita Expenditure (MPCE). It is observed that the incidence, depth and severity were more in the Southern region than the Northern and the Coastal region during 2004-05 and 2011-12 as per the estimates. The study also shows wide disparities in poverty among different regions as well as social groups of rural Odisha. In case of social groups, the Scheduled Tribes (ST) communities are the most vulnerable group in poverty incidence, depth and severity than Scheduled Castes (SC), Other Backward Classes (OBC) and other social groups. Besides, log linear regression model has been fitted to the observed consumer expenditure taking logarithm of MPCE as dependent variable and a host of auxiliary variables supposed to be associated MPCE. A combined estimate of incidence of poverty across social groups has been obtained by combining both direct and predicted percentage of persons below poverty line.

KEYWORDS

Poverty, FGT, National Sample Survey, Incidence, Depth, Severity and Kappa.

1. Introduction

The poverty is commonly visualized as a state of not having enough resources to meet the basic needs such as food, clothing and housing of a person (World Bank 2000). It is a highly heterogeneous phenomenon in most of the countries of the world. Measurement of poverty has been at the centre stage of the planning process in every developing country. While measuring the poverty the main focus is on whether households or individuals have enough

CONTACT Author^a, Email: bigyanmohanty65@yahoo.com

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resources to meet their needs. Thus, the poverty is measured by comparing individual's income or consumption with some defined threshold below which he is considered to be poor. The poverty is largely considered in monetary terms. According to Amartya Sen (1987) the well-being of person comes from a capability to function in a society. He viewed that the poverty arises when people lack key capabilities and so have inadequate incomes, or education, or poor health, or insecurity, or low self confidence, or a sense of powerless, or the absence of rights such as freedom of speech. This makes the poverty a multidimensional phenomenon and less amenable to simple mathematical solutions. The purpose of poverty measurement in this paper is to find out who is poor, how many people are poor and where poor are located based on economic criteria.

However, this is a powerful tool to focus the attention of the government and policy makers on living condition of poor. It also helps the government to target the section of society which is poor and to evaluate the programmes and policies implemented to eradicate the poverty. Besides, it also helps international agencies to target the poor region of world with their policy intervention.

Foster et al. (1984) and Ravallion (1996) used three indices of poverty measurements such as head count index, the poverty gap index and the square poverty gap index. Towards this end, Coudouel et al.(2002) pointed out that consumption expenditure is a better outcome indicator than their income as it is more closely related to wellbeing of a person, more reliable and wellbeing reflex actual standard of living of household. The poverty line is defined as the cut off standard of expenditure on food or per capita income below which an individual or household is poor.

2. Poverty Trend in Odisha and some major States of India

Odisha is one of the poorest States in India which shows high incidence of poverty. The percentage of poverty in Odisha and some selected major States of India for the period from 2004-05 to 2011-12 according to various reports of the Planning Commission, Government of India has been presented in **Table 1**. It shows that there is a declined trend on percentage of poverty in Odisha as well as all States of India. The reduction of poverty was noticed in the State from 2004-05 (46.6%) to 2011-12 (32.6%) corresponding to 37.2% to 21.9% at all India level respectively. The rural picture of Odisha's poverty was almost identical which

slipped down to 35.7% during 2011-12 from 46.8% during 2004-05. The rural India's poverty count was 41.8% (2004-05) and 25.7% (2011-12). But Odisha's position is still at the 4th position from the bottom and just above Bihar, Jharkhand and Chhattisgarh.

Table 1: Poverty in Odisha Vrs Other Major States of India.

Sl.No.	Name of the State	2004-05	2009-10	2011-12
1	Andhra Pradesh	30.0	21.3	9.3
2	Bihar	54.6	53.7	34.1
3	Chhattisgarh	51.0	50.3	40.2
4	Gujarat	32.5	23.2	17.0
5	Jharkhand	47.2	39.3	37.5
6	Karnataka	33.9	23.8	21.2
7	Kerala	19.8	12.0	8.1
8	Madhya Pradesh	49.2	37.3	32.0
9	Maharashtra	38.9	24.8	17.3
10	Odisha	57.6	37.3	32.9
11	Punjab	21.0	15.8	8.2
12	Rajasthan	34.5	24.8	14.8
13	Tamil Nadu	30.7	17.4	11.7
14	Uttar Pradesh	41.0	37.8	29.5
15	Uttarakhand	33.0	16.6	11.4
16	West Bengal	34.9	27.1	20.4
India		37.7	29.9	22.0

Source: Working Paper No.2013-02, "Poverty by Social, Religious, and Economic Groups in India and its largest States, 1993-94 to 2011-12, by Arvind Panagariya and Vishal More, Columbia University.

3. Objectives

The objectives of the study are:

- i. To study the extent of poverty in rural areas among different social groups of Odisha by using different poverty measures.
- ii. To study the poverty inequality of different regions and sectors of Odisha.
- iii. To compare the poverty indices from observed data and estimated data (fitting a log linear regression model) and to find composite estimate of incidence of poverty.

4. Data used

In this study different poverty measures have been computed using monthly per capita expenditure (MPCE) data of 61st round (2004-05), 66th round (2009-10) and 68th round (2011-12) of National Sample Survey (NSS). A stratified two stage sampling design was adopted for household expenditure survey conducted by the National Sample Survey

Office (NSSO). Each district of the State has been treated as a stratum. For each stratum, a sample village of first stage unit (FSU) was selected by circular systematic sampling. FSUs were sub divided into hamlet groups for rural sector. All the household listed were stratified in second stage stratum (SSS). The sample households were selected from each selected FSU by using simple Random Sampling without Replacement (SRSWOR) method. The total number of sample households for rural sector of 61st, 66th and 68th round NSS were 3477, 2975 and 2973 respectively.

5. Methodology

There are several measures to construct the poverty index. It is a statistical function that translates the comparison of the indicator of household wellbeing and the chosen poverty line into one aggregate number of the population as a whole or population sub group.

However, the most commonly used measure for estimation of poverty is FGT (Foster, Greer and Thorbecke, 1984) class of poverty measure, which satisfy the broad array of axioms. This is generalized version of poverty indices. The general formula of the FGT measure is as follows:

$$FGT_{\alpha} = \frac{1}{N} \sum \left[\frac{Z - Y_i}{Z} \right]^{\alpha} * I(Y_i < Z) \quad (1)$$

Where $N = \text{Total population.}$

$Z = \text{Poverty Line.}$

$Y_i = \text{Monthly Per Capita Consumption Expenditure of } i^{\text{th}} \text{ individual below the poverty line.}$

$\alpha = \text{Reflects poverty aversion.}$

$I(Y_i < Z) = \text{An indicator functions equal to 1, when the expenditure / income below poverty line and 0, Otherwise.}$

α is a real number and interpretable values of α are $\alpha = 0, 1$ and 2 .

For $\alpha = 0$, $HC = \frac{1}{N} \sum_{i=1}^N I(Y_i < Z)$, shows the extent of poverty or Head Count Ratio.

For $\alpha = 1$, $PG = \frac{1}{N} \sum_{i=1}^N \left(\frac{Z - Y_i}{Z} \right) * I(Y_i < Z)$, shows the intensity of poverty or Total Poverty Gap.

For $\alpha=2$, $SPG = \frac{1}{N} \sum_{i=1}^N \left(\frac{Z-Y_i}{Z} \right)^2 * I(Y_i < Z)$, shows the inequality among the poor or Squared Poverty Gap.

The head count ratio (Incidence of poverty) is a measure representing the share of the population that cannot afford to buy a basic basket of food. The poverty gap ratio shows the average poverty gap by adding up the extent to which the household on average fall below the poverty line. The squared poverty gap ratio takes into account not only the distance separating the poor from poverty line, but also the inequality among the poor. The squared poverty gap index takes inequality among the poor into account.

5.1 Regression Analysis for poverty measure:

As the sample sizes fixed for different rounds of the National Sample Survey (NSS) are very small as compared to the total households of the State, it may be worthwhile to compute indirect estimates of the poverty for Odisha through a suitable regression model using the explanatory variables correlated with the Monthly Per Capita Expenditure (MPCE) (dependent variable). In this study logarithm of MPCE is taken as the dependent variable and the ten explanatory variables (independent variables) used in are: household size, social group, total land possessed by the household, age, sex, marital status and general education of the head of the household, sources of energy for cooking and lighting, salary earner of the household, percentage of MPCE on food items (Table 2). Thus, the log linear multiple regression models are stated as

$$\text{Log } Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \varepsilon_i, \quad i=1,2,3,\dots,N \quad (2)$$

where Y_i ($i=1,2,3,\dots,N$) is the MPCE of the i^{th} individual household.

$X_{1i}, X_{2i}, X_{3i}, \dots, X_{ki}$ are the explanatory variables of the i^{th} household.

$\beta_0, \beta_1, \beta_2, \dots, \beta_k$ are the unknown constants called parameters.

ε_i is a random error assumed to be independently and normally distributed with mean 0 and constant variance σ_e^2 .

Log regression analysis links the MPCE of 'N' individuals to 'k' explanatory variables corresponding to household to which they belong.

Table 2: List of Explanatory Variables

Variable	Explanatory Variables	Variable type	Short form of Explanatory Variable
X_1	Household size	Discrete	hsize
X_2	Social group	Categories	sgrp
X_3	Total land possessed	Continuous	tot_pos
X_4	Sources of energy for lighting	Categories	light
X_5	Salary earner	Dichotomous	salary
X_6	Sex of the head of the household	Dichotomous	sex
X_7	Age of the head of the household	Continuous	age
X_8	Marital status of the household	Categories	m_stat
X_9	General education of the household	Categories	gen_edu
X_{10}	Percentage of MPCE under food items	Continuous	food_per

Besides, the theoretical test of regression model, another measure of agreement between the observed classification as poor and non poor with expected ones is computed with the help of Cohen's (1960) Kappa Coefficient.

5.2 Kappa Coefficient (Cohen's Kappa)

When two binary variables are attempted by two raters to measure the same thing, the Kappa Coefficient can be used as a measure of agreement between the two raters (Cohen, 1960 & 1968). Kappa measures the percentage of data values in the main diagonal of the table and then adjusts these values for the amount of agreement that could be expected due to chance alone.

		<i>Observed</i>		<i>Total</i>
		<i>0</i>	<i>1</i>	
<i>Estimated</i>	<i>0</i>	<i>a</i>	<i>b</i>	<i>a+b</i>
	<i>1</i>	<i>c</i>	<i>d</i>	<i>c+d</i>
	<i>Total</i>	<i>a+c</i>	<i>b+d</i>	<i>N</i>

		<i>Observed</i>		<i>Total</i>
		<i>0</i>	<i>1</i>	
<i>Estimated</i>	<i>0</i>	<i>p₀₀</i>	<i>p₀₁</i>	<i>p_{0.}</i>
	<i>1</i>	<i>p₁₀</i>	<i>p₁₁</i>	<i>P_{1.}</i>
	<i>Total</i>	<i>p_{.0}</i>	<i>p_{.1}</i>	<i>N</i>

$$\text{Kappa Coefficient} = K = \frac{p_0 - p_e}{1 - p_e}, \quad (3)$$

where $p_o = p_{00} + p_{11}$ and $p_e = p_{.0} p_{0.} + p_{.1} p_{1.}$ $p_{00} = \frac{a}{N}$, $p_{11} = \frac{d}{N}$, $p_{.0} = \frac{a+c}{N}$, $p_{0.} = \frac{a+b}{N}$, $p_{.1} = \frac{b+d}{N}$, and $p_{1.} = \frac{c+d}{N}$

In Kappa Coefficient the numerator represents the discrepancy between the observed probability of success and the probability of success under the assumption of an extremely bad case. The maximum value for Kappa occurs when the observed level of agreement is 1, which makes the numerator as large as the denominator. Kappa is always less than or equal to 1. A value of 1 implies perfect agreement and values less than 1 imply less than perfect agreement. In rare situations, Kappa can be negative. When it happens, it is interpreted that there is no effective agreement between the two cases. By the thumb rule for the interpretation of Kappa, is given by Sim and Wright (2005), which is as follows.

- Poor agreement = Less than 0.20
- Fair agreement = 0.20 to 0.40
- Moderate agreement = 0.40 to 0.60
- Good agreement = 0.60 to 0.80
- Very good agreement = 0.80 to 1.00

Cohen (1960) also gave the following approximate expression for the Standard Error of k as.

$$SE(k) = \sqrt{\frac{p_o(1-p_o)}{(1-p_e)^2}} / \sqrt{N} \tag{4}$$

5.3 Composite Estimate of Proportion of Population below Poverty Line.

$$C = \frac{V_e H_o + V_o H_e}{V_e + V_o} \tag{5}$$

- where C = Combined estimate of poverty
- H_o = Observed poverty incidence.
- H_e = Estimated (expected) poverty incidence.
- V_o = Variance of observed poverty incidence.
- = $\frac{H_o(1-H_o)}{N}$
- V_e = Variance of expected poverty incidence.
- = $\frac{H_e(1-H_e)}{N}$

5.4 Gini Coefficient of Inequality:

Inequality can be defined as the dispersion of the distribution of income /expenditure or some other welfare indicators (Litchfield, 1999). The Gini Coefficient is the most commonly used measure of inequality of distribution.

5.5 Fitting of Log Linear Regression Model (NSS,2011 Consumer Expenditure Data):

The analysis of the poverty of the sampled households is carried out using the log linear regression model with log-mpce as the dependent variable and explanatory variables given in Table 2. After fitting the log linear regression model by the method least squares and eliminating the non-significant variables by step wise regression techniques (using SPSS software package), the effect of the following explanatory variables (Table 4) are found to be significant. The R and R Square and β Coefficients are given in Table 3 and Table 4. It is surprising that total land possessed by the household is not found to be statistically significant and casts doubt on the representativeness of the sample.

Table 3: Model Summary

R	R Square	Adjusted R Square	Standard Error of the Estimate
0.712	0.507	0.506	0.33452

Table 4: Coefficients

Variables	Unstandardized Coefficients		Standardized Coefficients	t	P-value
	β	Std. Error	Beta		
Constant	7.567	0.073	-	103.124	<0.01
hsize	-0.061	0.003	-0.250	-17.613	<0.01
sgrp	0.024	0.002	0.141	10.168	<0.01
light	0.057	0.004	0.212	14.962	<0.01
salary	-0.174	0.018	-0.137	-9.816	<0.01
sex	0.085	0.026	0.053	3.245	<0.01
age	0.005	0.001	0.134	9.176	<0.01
m_stat	-0.108	0.021	-0.083	-5.038	<0.01
gen_edu	0.034	0.002	0.233	14.907	<0.01
food_per	-0.014	0.001	-0.296	-21.295	<0.01

Dependent Variable: log-mpce, Source: Computed from primary data of NSSO

The estimated regression equation is given as follows:

$$\log(Y_i) = 7.567 + (-0.061)X_{1i} (\text{hsize}) + 0.024X_{2i} (\text{sgrp}) + 0.057X_{4i} (\text{light}) + (-0.174) X_{5i} (\text{salary}) + 0.085X_{6i} (\text{sex}) + 0.005X_{7i} (\text{age}) + (-0.108) X_{8i} (\text{m_stat}) + 0.034X_{9i} (\text{gen-edu}) + (-0.014) X_{10i} \text{food_per} \quad (6)$$

with $R^2 = 0.507$, which is found to be significant at 5% level.

6. Results and Discussion:

The incidence, depth and severity of poverty in rural Odisha has been calculated by using 61st (2004-05), 66th (2009-10) and 68th (2011-12) round NSS central sample consumer expenditure data across the different regions of Odisha as well as different social groups like ST, SC, OBC and others and presented in Table 5. The regions having the highest head count, poverty gap and squared poverty gap indicated affliction of actual poverty and regions having the lowest ratio is treated as relatively lower victims of poverty.

It is observed that the highest head count ratio, poverty gap and squared poverty gap in the southern region of the state accommodating the backward KBK region. Although the situation prevailed during 2004-05 has improved during 2011-12, the region still continues to be the worst affected by the poverty. The coastal region of the state continued with the lowest head count ratio, poverty gap and squared poverty gap during 2004-05, 2009-10 and 2011-12. It implies that the incidence, depth and severity of poverty in the coastal region are less than the Northern and the Southern regions of Odisha.

It is also observed that the distribution of the poverty among the ST communities was severe with the head count, the poverty gap and the squared poverty gap during the periods from 2004-05 to 2011-12 followed by SC, OBC and others. The OBCs were in better place in comparison to STs and SCs in rural Odisha.

Table 5: Incidence (HC), Depth (PG) and Severity (SPG) of Poverty by Region and Social Group in Rural Odisha.

Category	2004-05			2009-10			2011-12		
	HC	PG	SPG	HC	PG	SPG	HC	PG	SPG
Coastal	0.45	0.095	0.030	0.25	0.041	0.010	0.22	0.034	0.008
Southern	0.81	0.030	0.137	0.52	0.133	0.048	0.48	0.100	0.031
Northern	0.72	0.209	0.077	0.42	0.103	0.034	0.40	0.083	0.025
Social Group									
ST	0.84	0.305	0.130	0.66	0.196	0.076	0.64	0.144	0.046
SC	0.68	0.190	0.072	0.47	0.092	0.026	0.41	0.082	0.023
OBC	0.53	0.125	0.042	0.26	0.046	0.012	0.24	0.038	0.009
Others	0.37	0.074	0.022	0.25	0.046	0.014	0.14	0.020	0.004
Total	0.61	0.174	0.066	0.39	0.090	0.030	0.36	0.070	0.021

Source: Computed from primary data of NSSO

The poverty inequality by means of Gini Coefficient of rural Odisha during the periods from 2004-05 to 2011-12 across the different regions and social groups has been displayed in Table 6. A downward movement of the Gini Coefficient during these periods in rural Odisha is a healthy expectation to bridge the inequality status. The Coastal region has less Gini Coefficient than the Northern and Southern regions of the State. The Gini Coefficient of inequality for the poverty for ST communities is lower than that of SC, OBC and others. It is seen that there are wide disparities in poverty among different regions as well as social groups of rural Odisha during the period from 2004-05 to 2011-12.

Table 6: Trends of Poverty Inequality in Rural Odisha (Gini Coefficient)

Category	2004-05	2009-10	2011-12
Region			
Coastal	0.224	0.225	0.206
Southern	0.256	0.253	0.243
Northern	0.265	0.250	0.245
Social Group			
ST	0.216	0.216	0.194
SC	0.224	0.210	0.199
OBC	0.238	0.224	0.216
Others	0.247	0.244	0.223
Total	0.260	0.247	0.234

Source: Computed from primary data of NSSO

The incidence, depth and severity of the poverty in rural Odisha has been estimated after fitting a multiple linear regression model of log MPCE as the dependent variable on explanatory variables like household size, social groups, total land possessed, sources of energy for lighting, sex, age, marital status, general education of the head of the household, salary earner and the percentage of MPCE on food items using the 68th round of NSS household consumer expenditure data for the rural Odisha. The detail analysis of the predicted head count ratio, poverty gap index and squared poverty gap index by different regions and social groups of rural Odisha are shown in Table 7. The proportion of head count ratio, poverty gap and squared poverty gap in the Southern region are seen to be the highest having 0.37, 0.061 and 0.015 respectively. Among social group, the ST communities have head count ratio of 0.49, poverty gap of 0.099 and squared poverty gap of 0.028.

Table 7: Observed and Predicted Incidence, Poverty Gap (Depth), and Squared Poverty Gap (Severity of Poverty) according to Regions and Social Groups in Rural Odisha based on Consumer Expenditure data of NSS, 2011-12.

Category	Observed			Predicted		
Region	HC	PG	SPG	HC	PG	SPG
Coastal	0.22	0.034	0.008	0.13	0.017	0.004
Southern	0.48	0.100	0.030	0.37	0.061	0.015
Northern	0.40	0.083	0.025	0.33	0.058	0.015
Social Group						
ST	0.64	0.144	0.046	0.49	0.099	0.028
SC	0.41	0.082	0.023	0.30	0.045	0.009
OBC	0.24	0.038	0.009	0.20	0.024	0.005
Others	0.14	0.020	0.004	0.06	0.004	0.0004
Total	0.36	0.070	0.020	0.27	0.043	0.011

Source: Computed from primary data of NSSO

6.1 Computation of Kappa Coefficient:

The agreement between observed and expected classifications are measured by calculating kappa coefficient as follows.

Table 8: Classification of Observed and Estimated Poor and Non-poor according to Poverty Line

		Observed		
		Less than Rs.695 (1)	Greater than Rs.695 (0)	Total
Estimated	Less than Rs.695 (1)	336 (a)	197 (b)	533 (a+b)
	Greater than Rs.695 (0)	423 (c)	2017 (d)	2440 (c+d)
	Total	759 (a+c)	2214 (b+d)	2973 N

Source: Computed from primary data of NSSO

$$Kappa\ Coefficient = k = \frac{p_0 - p_e}{1 - p_e}$$

$$We\ compute\ p_0 = p_{00} + p_{11} = \frac{a}{N} + \frac{d}{N} = \frac{336}{2973} + \frac{2017}{2973} = \frac{2353}{2973} = 0.791$$

$$and\ p_e = p_{.0}p_{0.} + p_{.1}p_{1.} = \frac{a+c}{N} * \frac{a+b}{N} + \frac{b+d}{N} * \frac{c+d}{N}$$

$$= \frac{759}{2973} * \frac{533}{2973} + \frac{2214}{2973} * \frac{2440}{2973} = 0.656$$

$$So,\ k = \frac{p_0 - p_e}{1 - p_e} = \frac{0.791 - 0.656}{1 - 0.656} = 0.392$$

$$Standard\ Error\ (k) = \frac{\sqrt{\frac{p_0(1-p_0)}{(1-p_e)^2}}}{\sqrt{N}} = 0.0217$$

The value of k=0.392 shows that there is fair amount of agreement between the poor and non-poor classes of the observed data and the poor and non-poor classes of the estimated

class. Thus, the combined estimate of incidence poverty by region and social group in rural Odisha has been calculated by combining direct and predicted head count ratio giving weights as the inverse of the variance of each estimate. The region wise and social group wise combined estimate of poverty is presented in Table 9.

Table 9: Observed, Predicted and Combined estimate of incidence of poverty by Region and Social Group in Rural Odisha for 2011-12.

Category	N	Observed		Predicted		Combined Head Count
		Head Count	Variance	Head Count	Variance	
Region						
Coastal	1054	0.22	0.00016	0.13	0.00011	0.17
Southern	1024	0.48	0.00024	0.37	0.00023	0.42
Northern	895	0.4	0.00027	0.33	0.00025	0.36
Social Group						
ST	671	0.64	0.00034	0.49	0.00037	0.57
SC	565	0.41	0.00043	0.3	0.00037	0.35
OBC	1151	0.24	0.00016	0.2	0.00014	0.22
Others	586	0.14	0.00021	0.06	0.00010	0.09
Total	2073	0.36	0.00011	0.27	0.00010	0.31

Source: Computed from primary data of NSSO

7. Conclusion:

Despite of poverty amelioration programmes initiated by the Government, the rural poverty still exists, but in a declining trend. Analysis of poverty estimation on different methods has been discussed at length to determine the incidence, depth and severity of poverty. The key indicators like Head Count Ratio, Poverty Gap and Squared Poverty Gap have been computed using NSSO data for 61st, 66th and 68th round region wise and social group wise to study the impact of poverty. It is revealed that the highest incidence of poverty was in Southern region followed by Northern and Coastal region. Among the social group, the ST communities indicated the highest incidence followed by the SC, OBC and Others. Further, the depth and severity of poverty is more in the Southern region compared to, the Northern region and the Coastal region. The inequality among the regions as well as social groups has been measured through Gini Coefficient. The study shows wide disparities in poverty among different regions as well as social groups of rural Odisha. The measurement has also been computed through fitting a log linear regression model taking log MPCE as the dependent variable. The fair amount of agreement exists between the observed and estimated poor and non-poor classes with Kappa Coefficient ($K=0.392$). The combined estimate of incidence of poverty has been computed by combining

direct and predicted head count ratio giving weights as the inverse of the variance of each estimate for rural Odisha.

Strategic plans targeting the poor and neglected party of the society should be chalked out for successful implementation of poverty alleviation programmes. This should be area specific and dimension focussed keeping in view the incidence depth and severity in respective area / region as well as social groups.

Reference

- [1] Cohen, J.(1960): “*A Coefficient of agreement for nominal scales*”, *Educ Psychol Meas*, 20; 37-46.
- [2] Cohen, J.(1968): “*Weighted Kappa: nominal scale agreement with provision for scaled disagreement or partial credit*,” *Psychol Bull*, 70, 213 -220.
- [3] Coudouel, A., Hentschel, J. and Wodon, Q.(2002): “*Poverty Measurement and Analysis*”, Washington D.C., The World Bank.
- [4] Fleiss, J.L., Cohen, J., and Evertt, B.S.(1969): “Large sample standard errors of Kappa and weighted Kappa,” *Psychological Bulletin*, 72(5), 323 – 327.
- [5] Foster, J., Greer, J. and Thorbecke, E.(1984): “*A class of Decomposable Poverty Measure*,” *Econometrica*, 52,761 – 765.”
- [6] Gini, Carrado(1921): “*Measurement of Inequality of Income*”, *Economic Journal* 31: 124 – 126
- [7] Litchfield, J., A.(1999): “*Inequality: Methods and Tools*”, The World Bank, Washington D.C.,
- [8] Ravallion, M. (1996) : “*Issues in Measuring and Modelling Poverty*”, *Economic Journal*, Vol:106, 1328 -1343.
- [9] Sen, Amartya (1987): “*The standard of living Cambridge*”. Cambridge University Press.

- [10] Sim, J. and Wright, C.C. (2005). “*The Kappa Statistic in reliability studies: Use, interpretation, and sample size requirement,*” Physical Therapy, Volume 85, Issue 3, 257 -268.
- [11] World Bank (2000): “*The Geography of Poverty: Estimation and Analysis of Small Area Welfare Indicators*”, Washington DC (mimeo).