CHAPTER I

INTRODUCTION

1.1: INTRODUCTION AND CONCEPTS:

Poverty is man's powerful and massive affliction. It is the progenitor of much pain from hunger and disease onto civil war and conflict itself. Nearly half of the world populations continue to live largely under condition of subsistence agriculture and acute poverty. A poverty curtain has descended right across the face of the world, dividing it materially and philosophically into two different worlds – one embarrassingly rich and the other desperately poor. This invisible barrier exists within nations as well as between them, and it often provides unity of thought and purpose to the third world countries which otherwise have their economic, political and cultural differences. “The struggle to lift this curtain is certainly the most formidable challenge of our time”. Over the ages, a culture of poverty has got transmitted from generation to generation in India. Poverty here is not a pathological deviation from the normal and normative but the state of affairs and the set of conditions under which the overwhelming majority of the people are compelled to live. “Backwardness here has often been characterized by a syndrome of collective poverty”. In India planning was adopted in the early 1950's but the necessity and urge for planning was openly expressed during the later half of the previous century. Leading nationalist wrote extensively on pauperization, famine and abject poverty among the masses. Thus “poverty has been our continuing preoccupation since the colonial period”. Thus, it is natural to expect from our planners under the leadership of Nehru to give top priority to poverty alleviation programme from the beginning of planning.

The definition of poverty is related to people's living standard. Poverty is human condition characterized by the sustained or chronic deprivation of the resources, capabilities, choices, security and power necessary for the enjoyment of an adequate standard of living; others include civil, cultural, economic, political and social rights (World Health Organization 2004). According to Sen (1992), ‘Poverty [is] the failure of basic capabilities to reach certain minimally acceptable

levels. The functioning's relevant to this can vary from such elementary physical ones as being well-nourished, being adequately clothed and sheltered, avoiding preventable morbidity, etc., to more complex social achievements such as taking part in the life of the community, being able to appear in public without shame, and so on'. Poverty exists when individuals or groups are not able to satisfy their basic needs adequately. This view maintains that poverty has three aspects of want of material goods or materialistic possession: (i) those necessary to avoid suffering and needed to fulfill the requirements of hunger and shelter, that is, those needed to survive, (ii) such as are essential to meet human needs of health, that is, to get nutrition and to avoid disease, and (iii) those needed to maintain a minimum subsistence level. In simple term, this refers to minimum amount of food intake, adequate housing, clothing, education and health care. A similar definition put forwarded by Dubey and Sarma (2000) states that the concept of poverty is related to deprivation perceived by a civic society with respect to the basic minimum needs.

Recent quantitative assessment of poverty distinguishes between absolute and relative poverty. Poverty can be defined objectively and applied consistently only in terms of the concept of relative deprivation; Individuals families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the societies to which they belong. Their resources are so seriously below those commanded by the average individual or family that they are, in effect, excluded from ordinary living patterns, customs or activities. Thus, at the core of relative poverty is inequality. The relative poverty takes into account relative deprivation rather than the absolute deprivation. In this sense, relative poverty essentially compares the deprivation of the people at the lower end of distribution to those of the higher end. Therefore, in relative sense, a person might be above the socially perceived minimum level of economic welfare but she/he will be considered poor in relative sense. The direct measure of inequality look at the cumulative distribution of income or consumption and estimate the extent to which it deviates from a norm of perfect equality. “The most preferred index is Gini Index”. The absolute poverty is based on socially perceived

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deprivation, where one or more members of the population in a predefined universe fail to fulfill their minimum basic needs. The common approach in measuring absolute poverty is to specify a bundle of goods and services deemed necessary to meet basic consumption needs. "The most widely used estimates use food requirements to define basic consumption needs"¹⁰. "Poverty breeds malnutrition and, in turn, malnutrition increases poverty, a vicious circle" states Horwitz (1997)¹¹. Thus, poverty also means malnutrition, hunger and food poverty. Hunger is "a craving or need for food" and malnutrition is "faulty or imperfect nutrition"¹². Hunger Task Force (2003)¹³, defines hunger as a condition in which people lack the basic food intake to provide them with the energy and nutrients for fully productive lives. Dasgupta (1993)¹⁴ states that hunger is measured in terms of availability, access or intake of calories relative to caloric requirements that vary principally by age, sex and activity levels. Friel (2004)¹⁵ defines food poverty as the inability to access a nutritionally adequate diet and related impacts on health culture and social participation. Thus, the interlink age between poverty and nutrition cannot be ignored. Nutritional intake and status is both the effect and a cause of income earning opportunities of the individuals and households. As an out come, the nutritional status of individuals is influenced, among other things, by the amount and type of food that is consumed. A given level of income may be distributed differently by household between food and non-food items, which, in turn, will affect the nutritional outcome of a given levels of income¹⁶. In India, the expert group on poverty appointed by the Planning Commission in 1993 had recommended that the definition of poverty be extended to include deprivation in basic needs such as education, health and shelter as also other basic amenities such as drinking water. However, not much progress has been made in widening the definition of poverty in India¹⁷.

Now the pertinent question that arises here is, then, what is the actual nutritional requirement or income for the people to be non-poor? Poverty is determined by the standard that exists within the society. Poverty is perceived in terms of poverty line, which is determined by the prevailing standard of what is needed for health, efficiency, nurturing of children, social participation and the maintenance of self-respect. Thus, defining poverty line becomes the first step in estimating poverty. The current concept for world poverty is the number of people who live in households whose daily consumption per head is less than the purchasing power parity (PPP) equivalent of $1 a day in constant 1985 PPP dollars. The Census Bureau uses a set of money income thresholds that vary by family size and composition to establish the official measure of poverty in the U.S. The poverty threshold was $9,214 in 2001 for a single person, increasing to $18,022 for a family of one adult and three related children under 18 years. The food poverty line is derived from estimating the cost of food baskets in obtaining calorie requirements of individual household. Per capita household calorie requirement is defined by aggregating required calories per day of each household member with respect to their age and sex. This household calorie requirement is converted into money. Calorie cost along with non-food expenditure are aggregated and divided by the population to give the poverty line. In India the definition of poverty line was attempted first in 1962 by a working group of eminent economist and social thinker after taking into account the recommendation of the Medical Research (ICMR, 1958). They recommended that the national minimum for each household of 5 persons should not be less than Rs. 100 per month in terms of 1960-61 prices or Rs. 20 per capita. This national minimum excludes expenditure on health and education, both of which are expected to be provided by the state according to the constitution and in the light of its other commitments. A poverty line dividing the poor from non-poor is used, by putting a price on the minimum required consumption level of foods. The major components of food are carbohydrates, proteins, fats, vitamins and minerals. These foods give the nutritional requirement of the people measured in terms of calorie. However, academic studies in the early 1970's generated a rich and extensive literature on poverty based on, or related to, the poverty line. The result was greater data availability, increasing methodological sophistication, and
emerging concerns and insights. Thus while deriving poverty lines, it was recognized that human existence is more than just food, and provision for other goods and services also needed to be made. Since there are no a priori norms for these, it was felt that the actual expenditure of the households should form the basis for estimating the necessary expenditure on these goods and services. The task force (1979) estimated the total expenditure on both food and non-food items of the group. This expenditure levels for rural areas and urban areas became the poverty line. Since then, the methodology formulated by the task force has been used in estimating the incidence of poverty in the planning commission. The task force appointed by the government of India defined poverty line in terms of calorie intake per day by an individual. The derived official poverty line came out to be 2435 calories, which is rounded as 2400 calories per person per day for rural areas, and as 2095 calories rounded as 2100 for urban areas. Working out in terms of monetary value, the official poverty line came out to be Rs. 49.09 per month for rural and Rs. 56.64 per capita per month for urban areas at 1973-74 prices respectively.

Thus in India many scholars, NGO's and Governmental Organization have estimated poverty line in their own ways. One of the earliest and very comprehensive studies was made by Dandekar and Rath (1971). According to this study group, the average calorie norm is 2250 calories per capita per day for both the rural and urban areas. They suggested that whereas the planning commission accepts Rs. 20 per capita per month (Rs. 240 per annum) as the minimum desirable standard, it would not be fair to use this figure for both rural and urban areas. On the basis of the NSSO data on consumer expenditure, they revealed that, in rural area, the households with monthly per capita of Rs.14.20 at 1960-61 prices consumed on an average food with calorie equivalent to 2250 per capita per day together with such non-food items as they chose. The corresponding figures in the urban area were Rs. 22.50 per capita per month at 1960-61 prices. On average a per capita monthly expenditure of Rs. 20 (at 1960-61 prices) was deemed to be the national minimum. In the late sixties, Ojha (1970) defined poverty in terms of basic minimum needs, which in turn, were expressed in terms of physical survival. According to him, the minimum calories requirement was 2250 per day per person. In terms of food grains (Pulses and Cereals) minimum calories required were 1500 and 1800 for urban and rural areas respectively. Minimum calorie intake was then expressed in terms of physical quantities of food grains. He

25 Ibid 4
estimated 518 grams per day per person for rural areas and 432 grams per day per capita urban areas. He defined poverty line at Rs. 15-18 (at 1960-61 prices) per capita per month for rural population and Rs. 8-11 per capita per month for urban population. Bardhan (1973), defined poverty line to be Rs. 15 per person per month at 1960-61 prices for the rural people. He noted that 53% of the rural population were below the poverty line. Minhas (1978) does not split the minimum requirements to draw the poverty line between rural and urban areas. He defines poverty line in terms of minimum amount of per capita consumption expenditure. He refers to a distinguished study group constituted in July 1962 comprising D. R. Gadgil, B. N. Ganguli, P. S. Lokanathan, M. R. Masani, Asoka Mehta, Shriman Narayan, Pitambar Pant, V. K. R. V. Rao, and Anna Saheb Sahasrabuddha which recommended a standard of private consumption of Rs. 240 (at 1960-61 prices) per capita per year bare minimum. For rural areas, Minhas suggested that, the poverty line may be drawn at Rs. 200 per capita per year. The World Bank in its study on India’s poverty used alternative method of estimating poverty proportions applying a deflator series developed by NSS and the Indian Statistical Institute to calculate updated poverty lines in current prices. The study showed that the poverty line is Rs. 55.2 for rural and Rs. 112.2 for urban for 1977-78 and Rs. 89 for rural and Rs. 68.6 for urban for 1983. Like wise the estimate of Datt and Ravallion (1989) gave the poverty line at Rs. 89 and developed the concept of poverty gap. The planning Commission constituted an expert group in September 1989 to consider methodological and computational aspects of estimation of proportion and number of poor in India. The poverty line recommended by the task force on projection of minimum needs and effective consumption demand, namely a monthly per capita total expenditure of Rs. 49.09 per month for rural areas and Rs. 56.64 per month for urban areas rounded respectively to Rs. 49 and Rs. 57 at all India level at 1973-74 prices. This was anchored in the recommended per capita daily intake of 2400 calories in the rural areas with reference to the consumption pattern as obtained in 1973-74. Similarly, Dubey and Gangopadhyay (1998) taking the calorie intake as 2435 per capita per day for rural and 2095 per capita per day for urban areas and the poverty line of Rs. 49.09 for rural and Rs. 56.64 for urban areas as estimated by the Expert group (1993), they re-estimated the poverty line. The re-estimated rural poverty line on the basis of a uniform calorie is 2250 per capita. The rural poverty line turned out to be the Per Capita Total Expenditure (PCTE) level of Rs. 15 per month at 1960-

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31 Ibid 4
Poverty, as the phenomenon accompanying to all economic systems, existed in all times. That 1.3 billion People, i.e. one in every five person on earth, survive on less than $1 a day and 2.8 billion people in the world live on less than $2 a day, this indicates that nearly half of the people in the world live in poverty. The case for public action to eradicate malnutrition and poverty is a strong one, and one that can be forcefully made using either ethical or economic arguments. But public action to reduce malnutrition and poverty is a moral imperative. However, food and nutrition are human rights enshrined in various conventions and most recently the 1989 convention on the rights of the child. Thus, the government has a duty to ensure that these dimensions of human well being are realized. Following the convention, many Governments and nation have followed eradication of malnutrition and poverty as their main development objectives. The declaration of the 1st Millennium Development Goal of the World Bank has underlined the importance of eradication of poverty. The millennium Development Goals call for reducing the proportion of people living on less than $1 a day to half the 1990 level by 2015 – from 27.9 percent of all people in low and middle income economies to 14.0 percent. The Goal also calls for halving the proportion of people who suffer from hunger between 1990 and 2015. Thus, eradication of poverty is taking the center stage in all nations' development agenda.

It is only in the twentieth century that poverty and the poor have come to be a matter of concern and obligation in India. After a long neglect of the poor during the British rule, the measure adopted after independence signify the recognition of poverty and the social responsibility for alleviating and reducing it. Thus, in India, poverty was with us during the colonial period and is still prevalent even after 50 years of independence. One of the objectives of the planning is to

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33 Ibid 4.
reduce inequalities of income and wealth and to set up a socialist society based on equality and justice and absence of exploitation\textsuperscript{36}. But despite all the pious sentiment for the weaker sections the number of the poor continued to swell in the country. The Garibi Hatao (remove Poverty) slogan raised during the parliamentary elections of 1971 brought a sharp focus on the problems of poverty. Thus, in the fifth plan, direct attack on the problem of unemployment and under-employment were launched to end poverty\textsuperscript{37}. There is no doubt that as a result of intensification of the poverty eradication programmes, such as, IRDP, JRY, etc., by the successive government, the poverty level has started to move in the down ward direction. However, the successive round of NSSO shows a chronic prevalence of poverty in the country with some signs of slowing down. At the national level, the 56th round of the National Sample Survey Organisation’s (NSSO) household survey indicates that poverty level is 24.4% in 2000-2001. This poverty numbers are derived from sample surveys carried out by the NSSO on consumer expenditure.

The state of Nagaland, the 16\textsuperscript{th} state of Indian Union is no exception to other state when it comes to poverty. Nagaland, even after more than four (4) decades of statehood, has 32.67 percentages of people living below poverty line during 1999-00. More over, the phenomenon of poverty is dominant in the rural areas with 40.04% of people living below the poverty line as compared to 7.47% of the poor in urban areas. However, it is to be noted here that the poverty ratio of Assam is being used to measure the extent of poverty of Nagaland\textsuperscript{38} that is not appropriate. Thus, estimating the extent and depth of poverty in Nagaland based on its own norms becomes vital. In Nagaland, no individual or government agencies have brought out the nutritional norms and poverty line for the state except the one provided by NSSO. It is for these reasons; the study of Assessment on Nutrition and Poverty in Nagaland becomes important.

1.3: AREA AND PERIOD OF STUDY:

Nagaland has an area of 16,597 Sq.Km with a population of 19,88,636, out of which 82.26% live in the rural areas. It has eleven (11) districts at present, viz, Dimapur, Kiphire, Kohima, Longleng, Mokokchung, Mon, Peren, Phek, Tuensang, Wokha and Zunheboto. The state is mostly inhabited by tribal population having similar socio-economic conditions. Now considering all the common features of development, habits, and social life of the rural people in the state, a study of Wokha district has been taken as a representative study for the rest of the rural areas of Nagaland. Wokha district has an area of 1,628 Sq.Km inhabited by Lotha tribe with a

\textsuperscript{37} GOI (1972), “Towards an Approach to the Fifth Plan”, Planning Commission, New Delhi, p 7.
population of 1,61,098 that constitutes 8.1% of the state's population. Out of the total population, 76.61% consist of rural population and the urban population consists of 23.48%. The literacy rate is 73.92%.\(^{29}\) The district is divided into three (3) geographical ranges, viz, Lower range, Middle range and Upper range showing a total of 128 villages. Taking into account the common socio-economic features of the district, four (4) villages were selected under the present study. As a representative of their respective ranges, one village from the lower, two villages from the middle and one village from the upper range were selected. Two villages were selected from the middle ranges because this range is having the maximum number (60) of the villages while upper range has 30 villages and the lower range 38 villages. The study estimated the average calorie requirement through nutritional intake and the per capita monthly expenditure (PCTE) of the people in the villages during the period 2005-06.

1.4: OBJECTIVES:

The study has been conducted with the following objectives:

1. To study the level of socio-economic development in the study area.
2. To assess the average calorie norms per day and derive the poverty line for the sample population and compare it with national calorie norms/poverty line and state calorie norms/poverty line given by NSSO 2004-05.
3. To estimate the average calorie requirement and the inter-variation in the calorie intake for the cross section of the population (different income, age and gender, village-wise, range-wise, sex-wise and occupation-wise head of the household).
4. To assess the relationship between the calorie intake and the family size, income and PCTE.
5. To measure the extent of poverty and inequalities in calorie intake and PCTE and the relationship between the proportion of poor and the inequalities.
6. To assess the impact of government's poverty alleviation programmes undertaken in the village on the sample population.
7. To suggest policy options for poverty alleviation for the study areas.

1.5: HYPOTHESIS OF THE STUDY:

In order to achieve the objective stated above, the study tested the following hypothesis:

a. Low-income groups are vulnerable to poor diet and nutrition and thus, low per capita income/PCTE is positively correlated with higher incidence of poverty.

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Household consumption expenditure:
The expenditure incurred by a household on domestic consumption during the reference period is the household's consumption expenditure. Household consumption expenditure is the total of the monetary values of consumption of various groups of items, namely food.

It is pertinent to mention here that the consumer expenditure of a household on food items relates to the actual consumption by the members of the household and also by the guests during ceremonies or otherwise. To avoid double counting, transfer payments like charity, loan advance, etc. made by the household are not considered as consumption for items, since transfer receipts of these items have been taken into account.

Value of consumption: Consumption out of purchase is evaluated at the purchase price. Consumption out of home produce is evaluated at ex farm or ex factory rate. Value of consumption out of gifts, loans, free collections, and goods received in exchange of

1.6: SCOPE OF THE STUDY:
This study throws lights on the methods of measuring poverty and brings out the required average calorie intake by different age, sex, village-wise, range-wise, sex-wise head of the household and occupation-wise head of the household for the rural areas of the state. The study provides a sample calorie norms and poverty line for the state which will be useful for the state government and NGOs. Moreover, the detail analysis on the extent, magnitudes, characteristics of poverty and the poverty line derived from the study will provide a reliable base that will assist the policy planners while formulating effective poverty-focused policies for the state of Nagaland.

1.7: METHODOLOGY:
1.7.1: The concepts and definitions used while collecting and analyzing data are given below:
(i) Household: A group of person's normally living together and taking food from a common kitchen constitutes a household. The word "normally" means that temporary visitors are excluded but temporary stay-away are included.
(ii) Household size: The size of a household is the total number of persons in the household.
(iii) Household consumption expenditure: The expenditure incurred by a household on domestic consumption during the reference period is the household's consumption expenditure. Household consumption expenditure is the total of the monetary values of consumption of various groups of items, namely food.

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(iii) Value of consumption: Consumption out of purchase is evaluated at the purchase price. Consumption out of home produce is evaluated at ex farm or ex factory rate. Value of consumption out of gifts, loans, free collections, and goods received in exchange of
Reference periods: The reference periods used for collection of consumption data on items are for the last 30 days and 365 days. The data of households expenditure on foods, pan, tobacco & intoxicants, fuel and light, miscellaneous goods and services, including non-institutional medical care, rents and, taxes, cereals, egg, fish & meat, fruits (fresh & dry), conveyance etc. are collected over the last 30 days prior to the survey. The household expenditures data on clothing, footwear, education, medical care and durable goods which are not frequent, are collected over the last 365 days prior to the survey, thereafter, the total expenditure is divided by 12 months so as to arrive at monthly average expenditure.

1.7.2: Sources of Data:

(i) Primary and Secondary data:

The study is based on both primary and secondary data. The secondary data have been collected from the published as well as unpublished sources such as, government official records, statistical hand books, census reports, journals, newspapers, etc. While the primary data were collected through sample survey using direct personal interviews and questionnaire methods.

1.7.3: Sample design:

The primary data were collected using stratified random sampling method during 2005-06. The villages were stratified according to well defined geographical ranges in the first stage. From the three ranges of Wokha districts, four villages were selected as sample villages representing their respective ranges. Accordingly upper range is represented by Longsa, middle range by Yunchuchu and Sunglup villages and the lower range by Bhandari village.

Secondly, a total of 99 households were selected as sample household that fairly represent the universe of the study. The village-wise households samples are as follows, 68 households from Longsa that constituted 10% of the total household in the village, 9 households from Yunchuchu village that constituted 10.59% of the total households in the village, 12 households from Sunglup that constituted 10.17% of the total households in the village and 10 households from Bhandari that constituted 10.42% of the total households in the village. Thus, the sample survey covered goods and services is imputed at the rate of average local retail prices prevailing during the reference period.

(iv) Monthly per capita consumer expenditure (MPCE): For a household, this is the total consumer expenditure over all items divided by its size and expressed on a per month (30 days) basis. A person’s MPCE is understood as that of the household to which he or she belongs.
10% of the households from each sample villages. This includes 393 individuals that encompass 5.39% of the total sample village population. The village-wise sample populations covered by the survey are as follows, Longsa with 259 persons accounting for 4.93% of the total village population, Yunchuchu, Sunglup and Bhandari villages with 42, 38, and 54 persons respectively accounting for 4.97%, 4.32% and 17.36% of their respective village population.

Further, the data on consumption of food were collected at the individual level from the sample population. Then, the collected data were converted into calories using the nutritional chart of the NSSO report 513 (61/1.0/6). Moreover, the data of expenditure on food and non-food items and their monthly income were collected at household level from the sample household.

Lastly, the information on the household’s access to government poverty alleviation programmes was also collected.

1.7.4: Data Analysis:

The collected data were analysed at the households and individual levels using the following statistical tools, such as,

(i) Mean: It is obtained by dividing the sum of values of observations by the number of observations. It is easy to compute and understand. The formula is given below

\[ x = \frac{\sum x}{N} \]

\( x \) is the Arithmetic means, \( \sum x \) is the sum of the variables and \( N \) is the number of observation.

(ii) Standard Deviation: Standard deviation is also known as root mean square deviation for reason that it is the square root of the mean of the squared deviation from the arithmetic mean. The greater the standard deviation, the greater will be the magnitude of the deviations of the values from their mean. A smaller standard deviation means a high degree of uniformity of the observation as well as homogeneity of a series; a large standard deviation means just the opposite. It is represented by sigma and is given below,

\[ \sigma = \sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2 \cdot \text{i}} \]

Where \( i \) is the class interval.

(iii) Coefficient of Variation: The relative measure of dispersion is known as coefficient of variation. The series for which the coefficient of variation is greater is said to be more variable or less consistent. On the other hand, the series for which coefficient of variation is less is said to be less variable or more consistent. It is given as,
(iv) Variance: The variance of a set of numbers is the square of the standard deviation. It is given as,
\[ \text{Variance} = \sigma^2 \]

(vi) Correlation: If the change in one variable affects a change in the other variable, the variables are said to be correlated. If the variables deviate in the same direction, correlation is said to be positive. But if they constantly deviate in the opposite directions, correlation is negative. It is useful in determining the dependency of one variable with the other. The formula is as follows;
\[ R = \frac{N \sum dx dy - \sum dx \sum dy}{\sqrt{N \sum dx^2 - (\sum dx)^2} \sqrt{N \sum dy^2 - (\sum dy)^2}} \]

(vii) Probable Error: The probable error of the coefficient of correlation helps in interpreting its value. With the help of probable error it is possible to determine the reliability of the value of the coefficient in so far as it depends on the conditions of random sampling. The probable error of the coefficient of correlation is obtained as follows;
\[ \text{P.E.}_r = 0.6745 \frac{1 - r^2}{\sqrt{N}} \]
Where \( r \) is the coefficient of correlation and \( N \) is the number of pairs of observation.

a) If \( r \) is less than the probable error, there is no evidence of correlation, i.e., the value of \( r \) is not significant.

b) If \( r \) is more than six times the probable error, the coefficient of correlation is practically certain, i.e., the value of \( r \) is significant.

(viii) Regression: Regression analysis is a mathematical measure of the average relationship between two or more variables in terms of the original units of data. In regression there are two variables. The variable whose value influenced or is to be predicted is called the dependent variable and the variable which influences the values or is used for prediction is called the independent variable. Regression equation of \( y \) on \( x \) is as
\[ y = a + bx \]
Where \( a \) is the intercept, \( y \) is the dependent variable, \( x \) is the independent variable, and \( b \) is the regression coefficient.
\[ b_{yx} = \frac{N \sum xy - (\sum y)(\sum x)}{N \sum x^2 - (\sum x)^2} \]
(ix) Standard Error Estimates: The measure which indicates how precise the prediction of y is, based on x or conversely or how inaccurate the prediction might be is called the standard error of estimates. The standard error of regression of y values from ŷ is given as

\[ S_{xy} = \sqrt{\frac{\sum y^2 - a\sum y - b\sum xy}{N}} \]

The smaller the value of standard error estimates, the closer will be the dots to the regression line and the better the estimates based on the equation of this line. If the standard error of the estimates is zero, then there is no variation about the line and the correlation will be perfect.

(x) Measures of Poverty and Inequality: In order to measure poverty and the extent of relative inequality in the area under study, the following measures have been applied.

(a) Head Count Ratio (H): This measure gives the proportion of the total population deemed to be poor (i.e., those below poverty line). Let Z be the poverty line and Y be the income/calorie intake of the person with income/calorie intake arranged in ascending order so that \( Y_1 \leq Y_{i+1} \) for all i, let ‘n’ denote the total number of people in the community and ‘q’ the number of people below poverty line.

The Head Count Ratio (H) is then.

\[ H = \frac{q}{n} \]

But Sen observed in 1976 that head count Ratio (H) is very crude index. This index is highly insensitive to the extent of the aggregate short fall of the income from the poverty line as well as to the distribution of income amongst the poor.

(b) Poverty Gap Index (PG): This is an indicator which measures the depth of poverty. It depends on the distance of the poor below the poverty line (Z) the Poverty Gap. Where Z = Poverty line, \( Y_i = \) income/calorie intake of the poorest poor.

\[ PG = \sum_{i=1}^{q} \frac{Z - Y_i}{Z} \]

PG could also be defined as the mean proportionate poverty gap across the whole population (zero gaps for non-poor). PG also has an interpretation as an indicator of the potential for eliminating poverty by targeting transfer to poor. The minimum cost of eliminating poverty using targeted transfers simply the sum of all the poverty in a population. One drawback of the poverty gap measure is that it ignores the number actually in poverty.\(^{40}\)

(c) *Lorenz Curve:* Income/calorie intake inequalities in different groups have been examined with the help of Lorenz Curve. The Lorenz Curve shows the percentage of income/calorie intake received by X percent of population, X varying from 0 to 100. The advantage of Lorenz Curve comparison is that we can say something about the comparative levels of social welfare without specifying anything very particular about the exact welfare function. The degree to which a line Lorenz Curve deviates from the line of equal distribution is a measure of inequality of distributions of incomes/calorie intake. The further the Curve moves away from this line the greater is the inequality. The degree of this inequality at any stage is indicated by the distance from the equal distribution line. But sometimes distribution does not have this property. Thus in the study on the distribution of income/calorie intake, references is frequently made to the Gini-Co-Efficient measure.

(d) *Gini-Coefficient* ($G_p$): Gini-Coefficient is used to attach some absolute measures to the degree of inequality or gives some idea whether the inequality is large or small. Gini-Coefficient is not purely statistical and it embodies implicit judgment about the weight to be attached to inequality at different points on the income scale. This co-efficient may be interpreted in two ways. First, it may be seen geometrically in terms of Lorenz Curve.

\[ G = \frac{\sum (F_i Q_{i+1} - F_{i+1} Q_i)}{n-1} \]

The co-efficient may be seen to range from zero when income/calorie intake is equal (The Lorenz Curve follows the Diagonal) to one and at the other extreme (The Lorenz Curve have a shape). Secondly, it may be computed mathematically using Rao’s definition\(^{41}\) as follows. Area between Lorenz Curve and Diagonal ($G$) is given by;

\[ G = \frac{\text{Area between Lorenz Curve and Diagonal}}{\text{Total Area under Diagonal}} \]

(e) *Sen Index* ($P$): The measure of poverty proposed by Sen incorporates the number of poor, the income/calorie short fall of the calorie norms/poverty line and the transfer of income/calorie from the poor to the very poor. The Index is given as,

\[ P = \frac{q}{n} \cdot 1 \cdot z \left[ z - v + \frac{q+1}{q} v G_p \right] \]

where:
- $n =$ Total population.
- $q =$ Total number of poor.
- $z =$ Calorie norms/income requirement.

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\( v = \text{Mean calorie intake/income of the poor people.} \)

\( y_i = \text{Calorie intake/income of a poor person.} \)

Where \( z \) is the poverty line and \( v \) is the mean income of the poor. The index \( P \) lies in between 0 to 1. It assumes the value 0 when everyone’s income/calorie intake is above the calorie norms/poverty line \( z \) and the value 1 when everyone has zero income/calorie intake implying everyone is below the calorie norms/poverty line. One serious limitation of Sen Index is it is not decomposable. The poverty index suggested by Foster, Greer and Thorbecke takes care of this problem.

\((f) \text{ Foster, Greer and Thorbecke Measure (} P^F)\): This measure is decomposable and takes care of the limitation of Sen Index. This is an indicator which is used to measure how income/calorie intake is distributed below the calorie intake/poverty line and takes into account the intensity and severity of poverty. It is given by:

\[
(P^F) = 1 \sum_{i=1}^{n} \left( \frac{Z - Y_i}{Z} \right)^2
\]

This could be defined as the mean squared proportionate poverty gaps (Ravallion, M. 1992).

1.8: CHAPTERISATION:
The analysis of the study area is organized and presented in the following chapters’ as follows;

Chapter I: Introduction.

Chapter II: Review of Literatures.

Chapter III: Socio-Economic Profile of the Study Area.

Chapter IV: Assessment of Nutritional Intake and the PCTE.

Chapter V: Measurement of Poverty and Inequalities.

Chapter VI: Findings and Conclusion.