

Chapter 3

Methodology

In this chapter, we present the methodological issues related to the study. The first section deals with the conceptual framework related to the food security and non-farm sector. The second section describes about the study area. Third section elaborates the sampling and data collection procedures of the study. In the fourth section we have analyzed the analytical techniques related to the study. The first subsection deals with the analytical techniques of food security based on secondary data, followed by the analytical techniques related to the primary data. The third subsection elaborates the analytical techniques of non-farm sector based on secondary data, followed by the analytical techniques related to the primary data. The fifth subsection furnishes the analytical techniques of non-farm sector based on secondary data, followed by the analytical techniques related to the primary data.

3.1 Conceptual Framework

3.1.1 Food security

Food security has a more than 50 years history and a sequence of definitions and paradigms. For the first time in the historic Hot Spring Conference of Food and Agriculture in 1943, the concept of a “secure, adequate, and suitable supply of food for everyone” was accepted internationally. However, in the World Food Conference in 1974 due to food crises and major famines in the world, the term Food Security was introduced for the first time and was later developed and diversified by different researchers. The initial focus, reflecting the global concerns of 1974, was on the volume and stability of food supplies. Food security was defined in the 1974 World Food Summit as the availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices. As the occurrence of hunger, famine, and malnutrition are increasing from time to time in developing countries, the conceptual framework of food security has also progressively developed and expanded. The idea of food security attained wider attention since the 1980s after the debate on ‘access’ to food and the focus of the unit shifted from global and national levels to household and individual levels. This paradigm came with new concept and definition of food

security and it led to two additional major shifts in thinking; from a first food approach to a livelihood perspective and from objective indicators to subjective perceptions.

Thus, in 1983, FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security for ensuring that all people at all times have both physical and economic access to the basic food that they need. In 1986, the highly influential World Bank report “Poverty and Hunger” focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict. This concept of food security is further elaborated in terms of access of all people at all times to enough food for an active, healthy life.

By the mid-1990s food security was recognized as a significant concern, spanning a spectrum from the individual to the global level. However, access now involved sufficient food, indicating continuing concern with protein-energy malnutrition. But the definition was broadened to incorporate food safety and also nutritional balance, reflecting concerns about food composition and minor nutrient requirements for an active and healthy life. Food preferences, socially or culturally determined, now became a consideration. The potentially high degree of context specificity implies that the concept had both lost its simplicity and was not itself a goal, but an intermediating set of actions that contribute to an active and healthy life.

The 1994 UNDP Human Development Report promoted the construct of human security. Including a number of component aspects, of which food security was only one. This concept is closely related to the human rights perspective on development that has, in turn, influenced discussions about food security. The 1996 World Food Summit adopted a still more-complex definition:

“Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet

their dietary needs and food preferences for an active and healthy life. (FAO., 1996, p. 1)”.

This definition focuses on three distinct but interrelated elements, all three of which are essential to achieving food security: *Food availability*: having sufficient quantities of food from household production, other domestic output, commercial imports or food assistance, *Food access*: having adequate resource to obtain appropriate foods for a nutritious diet, which depends on available income, distribution of income in the household and food prices, *Food utilization*: proper biological use of food, requiring a diet with sufficient energy and essential nutrients, potable water and adequate sanitation, as well as knowledge of food storage, processing, basic nutrition and child care and illness management.

“Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO.,2001, p.7)”

This new emphasis on consumption, the demand side and the issues of access by vulnerable people to food, is most closely identified with the seminal study by Amartya Sen (1981). Eschewing the use of the concept of food security, he focuses on the entitlements of individuals and households. The concept of food security also has spatial and temporal dimensions. The spatial dimension refers to the degree of aggregation at which food security is being considered. It is possible to analyse food security at the global, continental, national, sub-national, village, household, or individual level. The temporal dimension refers to the time frame over which food security is being considered. In much of the food security literature, temporal dimension is almost universally classified into two states-chronic or transitory: Chronic food insecurity is a long-term or persistent inability to meet minimum food consumption requirements; while transitory food insecurity is a short-term or temporary food deficiency. Transitory is often used to imply acute, with the corollary assumption that chronic equates to mild or moderate food insecurity. Thus, five phases of food security policy and practice can be identified: Global food security

(1974-80); food entitlement and structural adjustment (1981-85); the golden age (1986-90); a focus on poverty (1991-95) and finally, since the mid-1990s, a phase that acknowledges the human right to food.

In short, food security can be described as a phenomenon relating to individuals. It is the nutritional status of the individual household member that is the ultimate focus, and the risk of that adequate status not being achieved or becoming undermined. The latter risk describes the vulnerability of individuals in this context. It is clear that, vulnerability may occur both as a chronic and transitory phenomenon. Useful working definitions are described below.

Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life, as emphasized by Food and Agriculture Organization. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.

3.1.2 Rural Non-farm Sector

There are no commonly accepted definitions of the rural farm sector. According to Davis (2003), the rural non-farm economy (RNFE) may be defined as comprising of all those non-agricultural activities which generate income to rural households (including income in kind and remittances), either through waged work or in self-employment. However, There is considerable disagreement on what, constitute “non-agricultural” activities and whether allied agricultural activities should be included within the purview of the rural non farm sector. This debate can be highlighted by focusing on the Classification of rural workers given by the population census in 1991. Census of India (1991) classified rural workers into nine categories viz.

- I. Cultivators
- II. Agricultural Labourers.

- III. Livestock, forestry, fishing, plantation, orchards and allied activities.
- IV. Mining and quarrying
- V. Manufacturing, processing, servicing and repairs.
- VI. Construction
- VII. Trade and commerce
- VIII. Transport, storage and communication
- IX. Other Services

The chief element of dispute is whether the third category should be treated as farm or non-farm. Lanjouw and Lanjouw (1995) defined the rural non-farm sector as incorporating all economic activities in rural areas, except agriculture, livestock, fishing and hunting. Therefore, according to this definition, all activities from IV to IX would constitute non-farm activities. Likewise, many Indian authors have excluded dairying and animal husbandry, fishing and aquaculture, poultry rearing, beekeeping etc. from the purview of the rural non-farm sector. Saith (1992) on the other hand has argued that the rural farm sector needs to be defined in a broader framework and auxiliary activities beyond crop production should be included. According to him, the importance of the rural non-farm sector arises from the limitations placed by the land-man ratio and hence, allied activities- which enable rural household to overcome the agricultural constraint should be considered as constituting nonfarm employment.

In outlining the conceptual framework of the Rural Non Farm Sector, the heterogeneity of nonfarm activities also needs to be highlighted. This aspect has received varied treatment in the hands of different authors. Mukhopadhyay and Lim (1985) classify the rural non-farm sector into two sub-sectors viz.

1. Enterprises run on a stable basis with an eye on surplus generation and growth, using hired labour (perhaps over and above family labour) and 'a certain degree of technical sophistication.

2. Often, but not always seasonal activities, run with help of unpaid household labour utilizing primitive technology to serve local markets, and responding to the supply side of the labour market rather than to market demand for output.

Likewise, Samal (1997) divides the rural nonfarm sector into formal and; informal subsectors each of which are further subdivided into traditional and modern.

There also exists substantial difference of opinion regarding the definition of rural areas. The debate primarily hinges on three aspects: whether rural towns are rural or urban, at what size does a rural settlement become urban, and the treatment of rural persons commuting to urban area: for employment (Gordon et al. 2001). The Population Census of India (2001) categorized all statutory places with a municipality, corporation, cantonment board or notified town area committee etc. or any place having a minimum population of 5000, with at least 75% of the male workers engaged in non agricultural pursuits and a population density of at least 400 per sq. km as urban. Other areas are treated as rural. However, given the extensive linkages between rural towns and the areas around them, some authors have suggested that rural towns with population up to 50,000 should be included in the definition of rural non farm sector. In addition to the spatial dispute regarding the coverage of rural areas, there exists further confusion on the issue of workers who commute to nearby urban centers for employment. According to Bruce & Lloyd (1997), persons who are based in rural areas but commute daily to nearby urban centers should indeed be treated at rural workers and hence they believed that recognition of livelihood diversity requires an extended concept of the rural household beyond the resident social unit to include spatially dispersed contributors to household welfare”.

In the light of the above discussion, we adopt the definition given by The Study Group on rural non farm sector in Assam (Bhimjiani, 1994) with slight modification as follows:

“The rural non farm sector comprises all non-agricultural activities: mining and quarrying household and non-household manufacturing, processing, repairs, construction, trade, transport and other services in villages and rural and rural towns of up to 50,000 population undertaken by enterprises varying in size from household ‘own-account enterprises.’ all the way to factories”.

For the purpose of the present study the above definition is accepted with minor adaptation pertaining to population size. Thus, all villages and rural towns with population up to 5000 are categorized as rural areas in order to ensure conformity with the definition of rural areas and classification of the rural workforce as given in India's Population Census.

We now present below the conceptual framework on the relationship between food security and non-farm sector with the help of arrow diagram in Figure 3.1

3.2 The Geographical Area

The study area for the present study is the state of Assam, the land of red river and blue hills, is situated between longitude 89.50⁰E and 96.1⁰E and latitude 24.8⁰N and 27.58⁰N. The state is surrounded by Bhutan and Arunachal Pradesh on the north; Nagaland, Manipur and Arunachal Pradesh on the east; Meghalaya, Mizoram and Tripura on the south; and Bangladesh, Meghalaya and west Bengal on the west.

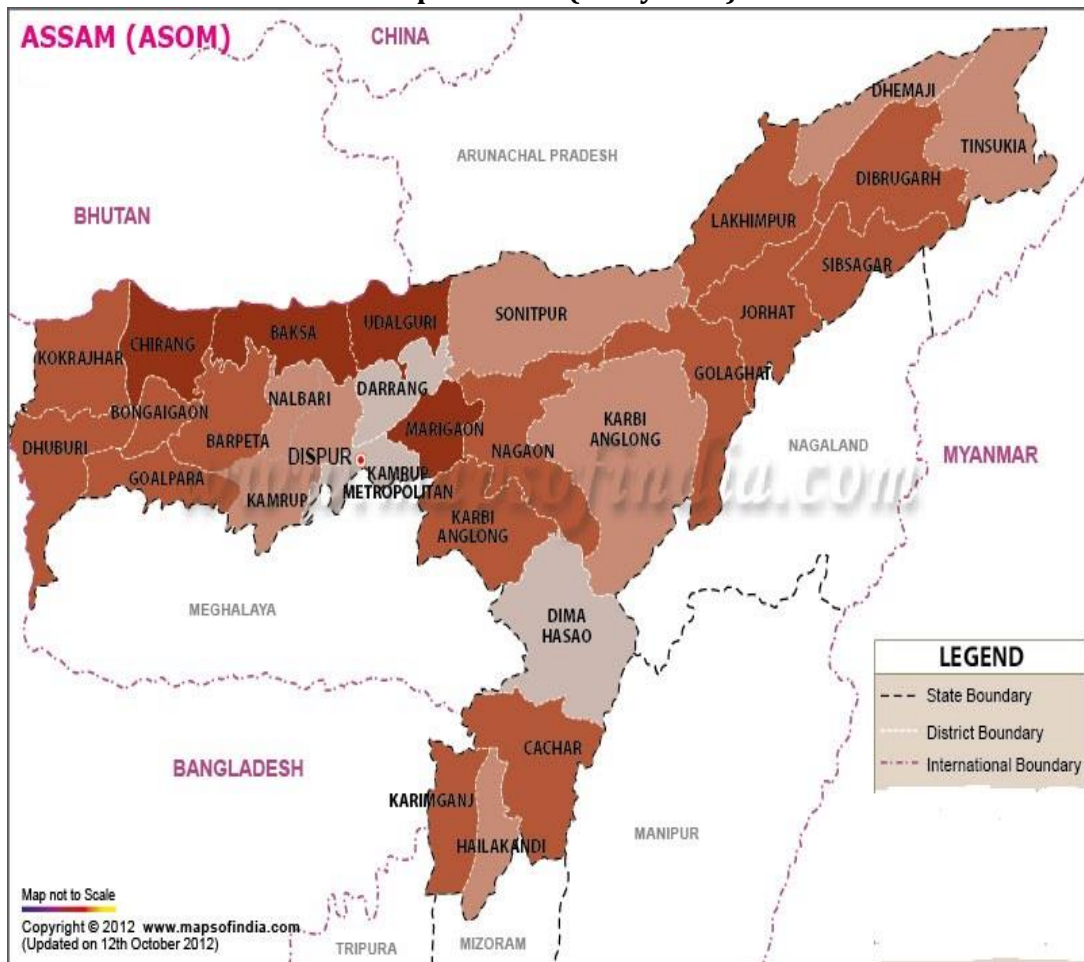
Having geographical area of 78,438 square kilometers. i.e, with a 2.4 percent of the country's total geographical area, Assam provides shelter to 2.57 percent population of the Country. Most of the state's population lives in the lush and verdant valleys of its two major river systems such as the Brahmaputra valley and the Barak valley. The less densely populated two hill districts - Karbi-Anglong and Dima Hasao, separated the two valleys.

Map 3.1
Map of India (Study Area)



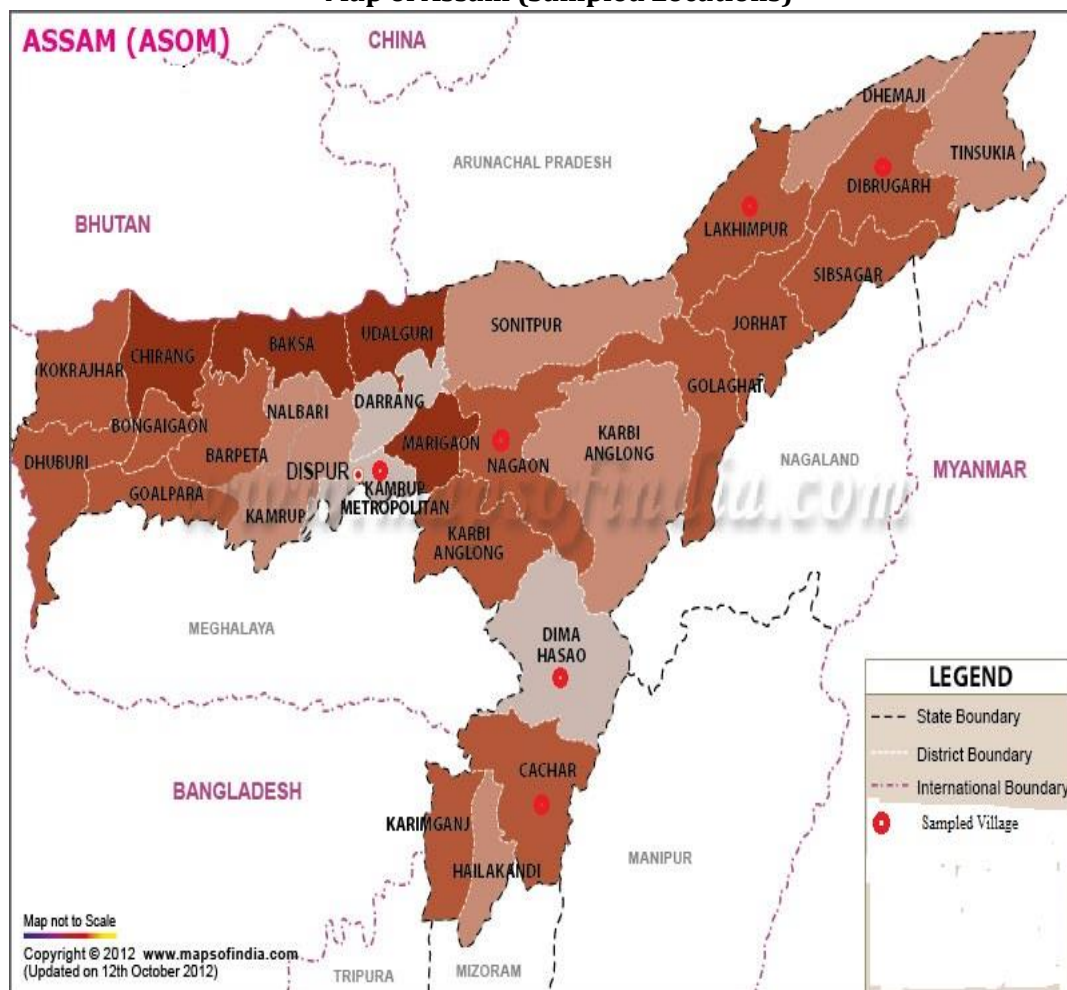
Source: Retrieved from www.Mapsofindia.com on 17.04.2013

Map 3.2
Map of Assam (Study Area)



Source: Retrieved from www.Mapsofindia.com on 17.04.2013

Map 3.3
Map of Assam (Sampled Locations)



Source: Retrieved from www.Mapsofindia.com on 17.04.2013

3.3 Sampling and Data Collection

The present study is based on both secondary data and primary data. Primary data is used to complement the inadequate secondary information about food security status and non farm employment opportunities.

3.3.1 Secondary Data Collection: Secondary data is used to assess the level of food security, the structure of non-farm employment opportunities and also to evaluate the possible effects of non-farm sector on food security at macro level.

(a)Data Sources: For collecting the secondary data, different publications of Directorate of Economics and Statistics, Government of Assam; District Rural

Development Agency, Government of Assam; National sample survey Organization, Ministry of Statistics and Programme implementation, Government of India; Central statistical Organization, Ministry of Statistics and Programme implementation, Government of India; and various volumes of population census is utilized.

(b)Data Collection Techniques: Digital platforms have been utilized to acquire data from sources like NSSO; CSO; and Population Census. Further, the process also includes seven personal visits to the offices of Directorate of Economics and Statistics; DRDA, Government of Assam.

3.3.2 Primary data collection: Primary data is collected through field survey by the researcher himself during the period July 2014 to March 2015. Primary data is used to assess the food security status of rural households of Assam and also to ascertain the structure of non-farm employment opportunities available in Assam. Besides this, the data collected is also used to evaluate the possible effects of non-farm sector on food security at the household level.

(a)Data Sources: The main source of primary data is the randomly selected households. Some peripheral information on generating profile of people's perceptions, villagers' perceptions of livelihood issues-the assets, vulnerability, peoples' perceptions for improvement in access to livelihoods and employment opportunities available is sought from the focus groups.

(b)Data Collection Techniques: Primary data is collected from field survey conducted through sample survey method. Primary unit of sample is the rural households of Assam. Multistage random sampling technique is used for sample selection. Considering the diverse physiography of the state of Assam it can be broadly classified into three distinct geographical regions: Brahmaputra Valley in the north, Barak Valley in the south and the Hill Region. So, Assam is divided into these three regions and each region is further sub-classified into agro-climatic zones yielding six different zones. This initiates us to the first stage of sample selection i.e. selection of districts.

(i) Selection of Districts

All the districts in each of the agro-climatic zones have been ranked separately on their relative share in the selected variables. We have chosen those indicators which directly or appropriately measures the well-being of an average individual in a geographical area under consideration. A brief description of these variables is outlined below:

1. Infant Survival Rate: This is motivated by the fact that infant survival rate is widely accepted in the literature as a good indicator of the health and well-being of children and the overall health of a community. It reflects the status of maternal health, the accessibility and quality of primary health care, and the availability of supportive services in the community.

2. Percentage of literate population: Education is one of the most consistent predictors of favorable development outcomes. Literacy can be instrumental in people's achievement of a range of capabilities such as maintaining good health and improving living conditions. Society benefits overall from having a literate population. So literacy acts as a major factor in economic and social development.

3. Percentage of population having permanent houses: A good living house is very essential for a decent standard of living. So, a developed district is assumed to have greater percentage of population having good permanent houses.

4. Infrastructural facility: Social infrastructure plays an important role in people's everyday lives. Infrastructural development is important for ensuring good quality of life which guarantees both social and economic wellbeing. So, districts need provision of such infrastructure to ensure a decent quality of life to its habitants. A district with more of such facilities will definitely provide its habitants a more diversified developed status of living. However it is decisive not to include the variables rendering information on primary health centre, schools as it is already being captured by existing variables of health and education indicators. Thus the other most important variable is that of access to modern financial and communication facilities which is

being captured by the variable namely the 'Percentage of villages having access to postal or banking services and telephone facilities.'

5. Household amenities: Household amenities are a good indicator of household's quality of life. A household's amenities also signify its economic context and the development status of local infrastructure. A clean water supply is the single most important determinant of public health. We have taken 'Percentage of Household's having Safe Drinking Water sources within premises' as the indicator for "household amenities".

The values for these five variables are aggregated to create an overall index for development. The values of each indicator is normalized between 0 and 1 using UNDP's Max-Min Approach, and rescaled such that 1 indicates a highest degree of development. Normalization is necessary to ensure no subcomponent has a disproportionate weight in the overall index. Simple arithmetic mean of the normalized values is taken to arrive at the composite district development index.

The selection process ends with the selection of a district from each of the agro-climatic zones- one having highest value. This procedure yields a total of six districts. Next, we proceed for selection of one most developed block from each of the selected districts.

(ii) Selection of Blocks

All the blocks in each of the selected districts have been ranked separately on their relative share in the selected variables. We have chosen those indicators which directly or appropriately measures the well-being of an average individual in a geographical area under consideration. A brief description of these variables is outlined below:

1. Percentage of population having access to safe drinking water facilities: Clean water supply is one of the single most determinants of public health. We have taken 'Percentage of having Safe Drinking Water sources within premises' as the sub-indicator for this.

2. Percentage of literate population: Education is one of the most consistent predictors of favorable development outcomes. Literacy can be instrumental in people's achievement of a range of capabilities such as maintaining good health and improving living conditions. Society benefits overall from having a literate population. So literacy acts as a major factor in economic and social development.

3. Percentage of population living above poverty line: The problem of poverty is considered as the biggest challenge to development. High poverty levels are synonymous with poor quality of life, deprivation, malnutrition, illiteracy and low human resource development.

4. Percentage of main workers to total workers: Percentage of workers in a block is deemed crucial for its development. Moreover, the percentage of main workers to total workers is more crucial as it reflect the actual level of efficient workers available in a block. A greater percentage of main workers to total workers will definitely influence the standard of living attained by the people in a specified block.

The values for these four variables are aggregated to create an overall development index at block level in selected districts. The values of each indicator is normalized between 0 and 1 using, UNDP's Max-Min Approach, and rescaled such that 1 indicates a highest degree of development. Normalization is necessary to ensure no sub-component has a disproportionate weight in the overall index. Simple arithmetic mean of the normalized values is taken to arrive at the composite block development index.

The selection process ends with the selection of a block from each of the selected districts- one having highest value. This procedure yields a total of six blocks. Next, we proceed for selection of one most developed village from each of the selected blocks.

(ii) Selection of Villages

From all the villages within a block we make a list of villages which are having total population above 500 to make the sample more or less homogeneous. Next, all the listed villages in each of the selected blocks have been ranked separately on their relative

share in the selected variables. We have chosen those indicators which directly or appropriately measures the development pattern of a geographical area under consideration. A brief description of these variables is outlined below:

1. Percentage of literate population: Education is one of the most consistent predictors of favorable development outcomes. Literacy can be instrumental in people's achievement of a range of capabilities such as maintaining good health and improving living conditions. Society benefits overall from having a literate population. So literacy acts as a major factor in economic and social development.

2. Proportion of main workers in total workers: Work is the most important determinant of living standards around the world. For the vast majority of people, their work is the main source of income and a key driver of poverty reduction. 'Work' is defined as participation in any economically productive activity. Such participation was physical or mental in nature. According to this definition, the entire population has been classified into three main categories, i.e., Main workers, Marginal workers and Non- workers. Main workers are those who had worked for the major part of the year (for 183 days or more during the year) preceding the date of enumeration while marginal workers were those who worked any time at all in the year preceding the enumeration but did not work for a major part of the year and Non-workers were those who had not worked any time at all in the year preceding the date of enumeration.

So, from the definitions it is clear that more the number of main workers more will be sustained level of income through- out the year. Furthermore, as earnings increase, individual choices expand.

3. Proportion of non-Scheduled Tribes and Scheduled Castes Population: The ST and SC households are known to be generally disadvantageous groups, largely on account of their economic and social deprivation -the former on account of geographical marginalization and the latter due to historical deprivation and exclusion from mainstream - all resulting in political marginalization. The proportion of ST and SC population has been taken as an indicator of this marginalization. Hence we have taken 'Proportion of non-Scheduled Tribes and

Scheduled Castes Population' as one of the indicators with the assumption is that the greater the ST and SC population in a district the less it will be associated with development.

The selection process ends with the selection of a village from each of the selected blocks- one having highest value in composite index. This procedure yields a total of six villages. Next, we proceed for selection of households, the final unit of selection, from each of the selected villages.

(iv) Selection of Households

In this stage, detailed list of households residing in the selected village have been prepared. From the list we have chosen ten (10) percent of the total households using simple random sampling technique with the help of random number tables. Then the selected households are surveyed through household economic survey method.

(c) Survey Tools

Primary Data is also collected from the randomly selected households with the help of structured schedule through personal interview method (refer to Appendix I from pages 313-326). Household questionnaire covered information on household particulars such as age, education level, occupation (principal and subsidiary), employment status, food consumption status, etc. Particulars on land and other productive assets have been also collected that has profound impact on the livelihoods pattern of rural population. Employment pattern and income from agriculture and animal husbandry, livestock, has also been gathered. Apart from this, information has also been collected on the different segments of non-farm employment with emphasis on rural enterprises has also been made in order to understand the nature and types of enterprises along with employment patterns.

Moreover, the information on household accessibility to safe drinking water, health status, and household facilities in relation to food preservation, preparation, and pattern of food sharing in the household is collected.

Focus group discussions technique was also used to generate a profile of people's perceptions. Focus group discussions are carried out in all selected villages. The discussions were designed to elicit responses pertaining to the villagers perceptions about the socio-economic characteristics of sampled area, sources of livelihood, employment opportunities available etc.

3.4 Analytical Techniques

An analysis often rests with various techniques. These techniques range from descriptive formats to various statistical techniques. Descriptive formats to graphical tools are followed in analyzing the food security status across agro-climatic zones.

3.4.1 Food Security Status (Analysis of Secondary Data):

(a) Descriptive Tools

Most of the results concerning food security dimensions are presented in the form of bi-variate tables. Bivariate tables illustrate the relationship between two variables by displaying the distribution of one variable across the categories of a second variable.

(b) Graphical Tools

To unveil various dimensions of food security we have used various graphical representations, the visual display of data using various plots and charts. We have used bar diagrams and multiple bar diagrams for this purpose. A bar chart is a chart that presents grouped data with rectangular bars the length of which is proportional to the values that they represent. The bars chart is two dimensional diagrams with one axis of the chart showing the specific categories being compared and the other axis represents a discrete value. While a bar diagram which displays two or more sets of data at once for easy comparison is termed as multiple bar diagram.

3.4.2 Food Security Status (Analysis of Primary Data):

(a) Descriptive Tools

We have extensively used tabular presentations to present food security status. Tabular presentation of the data involves the arrangement of data in a systematic way in rows and columns. Besides facilitating easy analysis and comparison, data presented this way highlights characteristics of data and help in easy understanding. Tabular presentations are used to demonstrate the household level food availability, accessibility, utilization, stability and finally food security status. So, it helps to illustrate the food security status of Assam in a lucid manner.

To analyze the relationship among food security and some non-economic variables, we have extensively used cross-tabulation techniques. Cross-tabulation is one of the most commonly used techniques to explore the relationship between two variables that have organized in a table.

(b) Statistical Tools

Cross tabulation exercise illustrated in terms of contingency table in matrix format is also undertaken to analyze the relationship among food security and some economic variables, followed by the use of contingency coefficients. A contingency table is a type of table in matrix format that displays the frequency distribution of the variables while, contingency coefficient can be used to estimate the extent of relationship between two variables.

(c) Graphical Tools

To unveil various dimensions of household food security we have used various graphical representations such as bar diagrams and multiple bar diagrams.

3.4.3 Non farm Sector (Analysis of Secondary Data):

(a) Descriptive Tools

Most of the results concerning food security dimensions are presented in the form of bi-variate tables. Bivariate tables illustrate the relationship between two variables by displaying the distribution of one variable across the categories of a second variable. For analyzing and communicating the behavior of food security standards we have computed the compound annual growth rate. The compound annual growth rate is the mean annual growth rate over a period of time longer than one year. To calculate compound annual growth rate, we divide the value of the variable at the end of the period in question by its value at the beginning of that period, raise the result to the power of one divided by the period length, and subtract one from the subsequent result.

(b) Graphical Tools

To unveil various dimensions of food security we have used various graphical representations, the visual display of data using various plots and charts. We have used bar diagrams and multiple bar diagrams for this purpose. A bar chart is a chart that presents grouped data with rectangular bars the length of which is proportional to the values that they represent. The bars chart is two dimensional diagrams with one axis of the chart showing the specific categories being compared and the other axis represents a discrete value. While a bar diagram which displays two or more sets of data at once for easy comparison is termed as multiple bar diagram.

3.4.4 Non farm Sector (Analysis of Primary Data):

(a) Descriptive Tools

We have extensively used tabular presentations to present food security data. Tabular presentation of the data involves the arrangement of data in a systematic way in rows and columns. Besides facilitating easy analysis and comparison, data presented this way highlights characteristics of data and help in easy understanding. Tabular presentations are used to demonstrate the household level food security status which

has used calculated as a proportion or share per thousand i.e. a number expressed as a share of 1000. It helps to illustrate the food security status of Assam in a lucid manner. To analyze the relationship among food security and some non-economic variables, we have extensively used cross-tabulation techniques. Cross-tabulation is one of the most commonly used techniques to explore the relationship between two variables that have organized in a table.

(b)Statistical Tools

Cross tabulation exercise illustrated in terms of contingency table in matrix format is also undertaken to analyze the relationship between non farm sector and some economic variables, followed by the use of contingency coefficients.

In illustrating various dynamics of non farm sector the tool of average, percentage and proportion is used. An average is a figure that represents the whole group and can represent a simple and systematic description of the principal features of the data. Average is the simple average of all items in a series and is calculated by adding the values of all items in a series and dividing the total by the number of items. A percentage is defined as a proportion or share in relation to a whole. It is a fraction or ratio with hundred understood as denominator. In some cases proportion is calculated with thousand as denominator.

(c)Graphical Tools

To unveil various dimensions of food security we have used various graphical representations, the visual display of data using various plots and charts. We have used bar diagrams and multiple bar diagrams for this purpose.

3.4.5Food Security and Non farm Sector (Analysis of Secondary data):

(a)Statistical Tools:

In analyzing the relationship between food security status and non-farm employment in Assam a bivariate correlation coefficient is obtained. For this purpose we have taken variables like percentage of food secure households in a district to define

household food security status of rural households and the percentage of rural non farm workers in a district as proxy variable for non farm sector.

3.4.6 Food Security and Non farm Sector (Analysis of Primary data):

(a) Descriptive Tools:

We have extensively used tabular presentations to present food security and non farm sector data. Tabular presentations are used to demonstrate the relationship between household level food security status and different non-farm sector indicators. To analyze the relationship among food security and some non-economic variables, we have extensively used cross-tabulation techniques.

(b) Statistical Tools:

Cross tabulation exercise illustrated in terms of contingency table in matrix format is also undertaken to analyze the relationship among food security, non farm sector and some economic variables, followed by the use of contingency coefficients.

(c) Econometric Tools:

To identify the impacts of non-farm sector on the status of food security at the household level in the state we fit following logistic model taking food security status of rural households as the dependent variable. The model is as follows:

$$Y_i = \frac{1}{1 + e^{-[\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + U_i]}}$$

Where, Y_i is the dependent variable; $X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9$ and X_{10} are the independent variables; β_0 is the constant term; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9$ and β_{10} are the regression coefficients and U_i is Stochastic Error term.

In particular,

$Y_i =$ Food security Status of the household (1, if the household is food secure;

0 otherwise).

X_1 = Significance of Non-farm Sector in the household (1, if the primary occupation of the household is non-farm related activities and 0 otherwise)

X_2 = Landholding Size (in acres)

X_3 = Livestock (in Tropical Livestock Units)

X_4 = Value of Household productive asset endowments (in Rupees)

X_5 = Accessibility to credit (1 for yes, 0 otherwise)

X_6 = Level of education attained by the head of the household (in completed years)

X_7 = Gender of the head of the household (1 for male, 0 otherwise)

X_8 = Impact of Government programmes (1 for significant impact, 0 otherwise)

X_9 = Social group of the household (1 if it belongs to General category, 0 otherwise)

X_{10} = Religion of the household (1 for Hindu, 0 otherwise)