2

REVIEW OF LITERATURE

This chapter reviewed literatures about the meanings and concepts of food security and livelihood. In addition, theories and approaches of both food security and sustainable livelihoods in the literature are assessed. Finally, it reviewed factors determining rural food security and livelihood at household level and different coping mechanisms suitable for small holder farmers are discussed within different countries experiences.

2.1 Conceptual Development of Food Security

The concerns on the concept of food security can be traced back to the 1943 Hot Springs Conference of Food and Agriculture, and ever since the concept has undergone different major redefinitions. The conference mainly evolved on the concept of *"a secure, adequate and a suitable food supply for everyone"*, and from that time the concept was subsequently taken up to the international level (FAO, 1996). After that, in the 1950s it was a stage for donor countries like Canada and USA to set up bilateral agencies whereby their surplus agricultural produces would be shipped to overseas for countries in need. In the 1960s there came a growing understanding that in fact food aid hampers receiving countries' progress to a self-sufficiency and consequently making them dependents. Afterwards, the concept of "Food for Development" was born in 1963 and in its institutional term, the World Food Programme (WFP). Conversely, the era of food abundance was coming to an end and in the years between 1972 to 1974 food crisis revealed a beginning in the fluctuation of food prices and supplies. To counter balance this catastrophe, insurance schemes were designed to assure food supply access and this led to an enhanced harmonization of donor

organizations/countries and improved monitoring and evaluation of the situation from the ground in donor receiving countries (Marion N., 2011).

Ever since, the concept of food security has been given a huge emphasis and its conceptual framework has passed through an immense evolution, dazzling changes in the awareness of global food situation over time and has been intrinsically linked with the interrelationship between population and food production problems. However, much attention was focused on the term 'food security' which was first highlighted as a technical concept at the 1974 World Food Conference in Rome, where this first explicit acknowledged that the issue of food concerns to the whole of mankind;

> *"Every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties. Accordingly, the eradication of hunger is a common objective of all the countries of the international community, especially of the developed countries and others in a position to help."* (UN, 1975)

Initially, food security was understood as the adequacy of food supply at national or global level, where it was assumed that a good sized food security balance sheet at a macro level will ensure household and individual level food security. Consequently, World Food Conference in 1974 defined food security as follows;

> *"Availability at all times of adequate world food supplies of basic foodstuff to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".* (UN, 1975)

For this reason, international and national food policies accentuated mainly on how to boost food production rather than focusing on policies that are capable of ensuring access of food at household and individual levels. Moreover, there was witnessed an increasing trend in food production per capita at the national and global level, yet on the other hand household level food insecurity that reached famine and hunger proportions paralleled the aggregate food availability at the national or global level. Despite the increase in the national and global food production, a significant portion of mainly the population in developing nations were suffering from malnutrition and hunger. This clearly depicted the fact that global food availability does not necessarily guarantee acquisition of food at household and individual levels. Here the definition merely focused on the food production variables and failed to notice the numerous forces that in many ways determined food access.

Until the 1980s, supply oriented conceptualization of food security was highly emphasized where the emphasis was mainly on the national food stock and production expansion. Similarly, unit of analysis was limited to the aggregate consumption and production. The approach was principally premeditated to encourage food deficit countries to stress their food policy to attain food self-sufficiency and ultimately lessen their dependency on the unstable international food market. On the contrary, African food crisis in the early 1980's and following debates over food access brought an essential shift in the understanding of food security and its respective unit of analysis. In addition to this, the 1980s' Green Revolution started delivering few of its promises and in fact the level of food production has shown an enormous increase, yet famine and problems related to famine didn't go away. Consequently, at this specific point it was realized that the principal cause was not only supply of food but also the purchasing power and other various special social issues (Marion N., 2011).

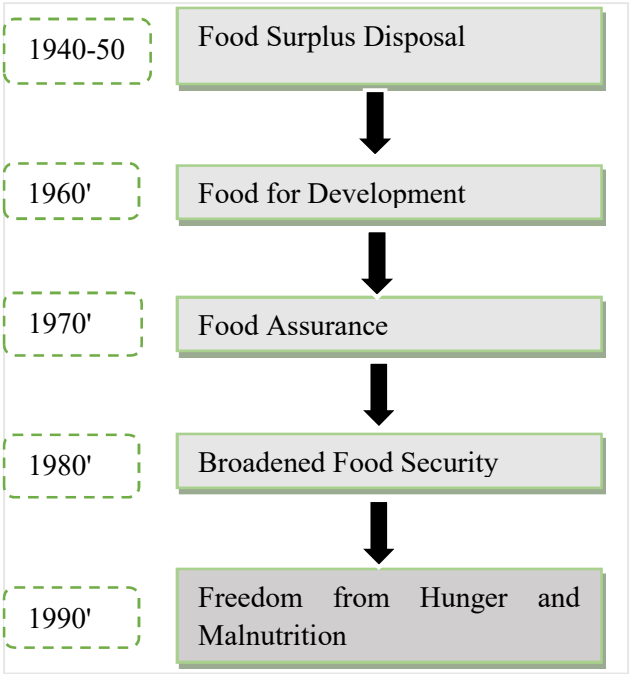
The debate paved a way to the shift mainly in the unit of analysis from the national and global level to household and individual levels. Consequently in 1983, FAO expanded conceptualization of food security to incorporate food security and food access by vulnerable people implying that there should be a balance between the demand and supply sides of food security equation. Thus, FAO in 1983 stated that the world food security ultimate objective should emphasize in *"ensuring that all people at all times have both physical and economic access to the basic food that they need"*. In addition, it was mentioned that food security should have three fundamental aims namely; "*ensuring production of adequate food supplies; maximizing stability in the flow of supplies; and securing access to available supplies on the part of those who need them."* Here the definition of food security took the economics as well as physical aspects in the availability of food and more emphasis was given on the ways for poverty alleviation and enhancing various special social groups in the development process (FAO, 1996).

The World Food Conference definition of food security was further broadened when Amartya Sen's book titled "Poverty and Famine" was published in 1981. In his book, he pointed that the starving are usually denied from food access rather than a suffering for the reason that food is unavailable and in doing so he introduced the idea of entitlement to food: *"Starvation is the characteristic of some people not having enough food to eat. It is not the characteristic of there being not enough food to eat."* (Sen A., 1981). Food access is a measure for the entitlement of food that people encompass which is the amount that they can either gain through production (net of feed and losses), purchase or received in any form such as through public distribution system or direct foreign aid.

Since then, food security concept became multifarious and more complex due to the modifications made in the level of analysis from global and national to individual and household

levels. Sen newly developed idea on food security posed that the mere presence of food in the economy or market may not enable a household or a person to consume it. According to him, people usually famished mainly due to lack of ability to access food rather than the availability, in a sense that income or purchasing power is the most limiting factor for food security. The history in the conceptualization of food security since the World Food Summit can be generalized as comprising of three overlapping and crucial paradigm shifts; the shift; from the national and global level to household and individual level, from food first point of view to livelihood perspective and lastly from objective to subjective indicators and perceptions (Maxwell A. J., 1996).

Figure 2.1 Food security conceptual evolution



Source: Marion N., 2011

Additionally, the 1996 World Food Summit affirmed that Heads of States to commit their respective countries in cutting number of undernourished by half in 2015. In 1996, FAO expanded food security concept to enable it as the chief working definition in the Summit of 1996.

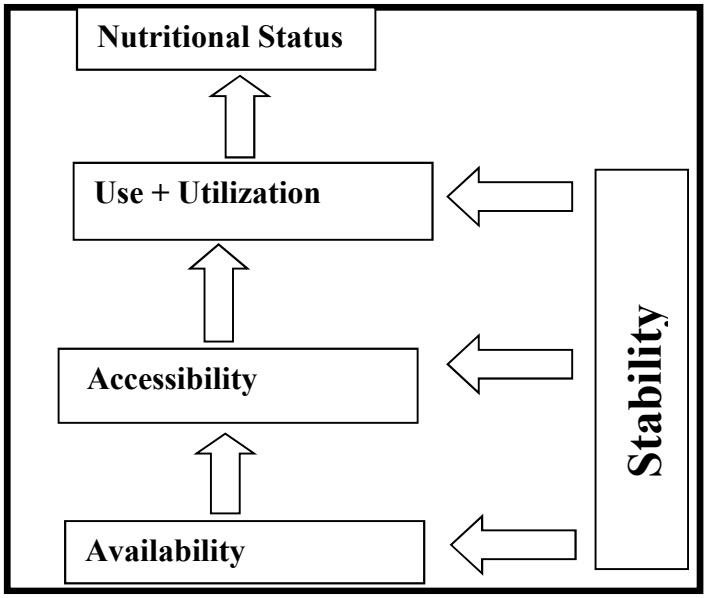
> *"Food security exists when all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life"* (FAO, 1996).

This definition integrates stability, access to food, availability of nutritionally adequate food and the biological utilization of food. Within the above definition of food security, there are three major components:

- **Availability** refers to the quantity, quality and seasonality of food supply within affected areas. It generally includes all local sources of food production including agricultural setting, livestock and fisheries as well as gathering. It also comprises all foods imported into the area by different traders. The existence of a well-functioning market system which is able to deliver food to the area on unswerving basis and in adequate quantity and quality is a major determinant of food availability.
- **Access:** The second term in the above definition refers to the capacity of a household to obtain sufficient food which can satisfy the nutritional needs of all its members. It measures the households' ability to acquire available food during a given period through different combination of home production and stocks, barter, purchases, borrowing, food aid or gifts.
- **Utilization** refers to households' use of the food to which they have an access on, like practices including storage of the food, preparation and processing as well as the distribution within the household themselves. Moreover, it also illustrates to an individual's personal ability to absorb and metabolize the nutrients, which can be affected by various factors like disease and malnutrition.

An additional component in food security definition and conceptualization is concerned with the type of food supplied and its actual quality and a requirement that should not only satisfy a protein energy needs but also provide a nutritional balance that is necessary for an active and healthy life. In addition to this, the recognition of traditional habits, socially acceptable food types and preferences were incorporated in the definition of food security. The 1996 World Food Summit included these aspects when it defined food security as; "*access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life*", where this generally accepted definition of food security incorporated and described the "*Four Pillars*" of food security, namely; Accessibility, Availability, Utilization and Stability.

Figure 2.2 Food Security Framework



Source: Marion N., 2011

Stability: As can be seen above, the framework incorporates physical determinants; Availability, Accessibility and Utilization and a temporal determinant, i.e. the fourth. Stability, which refers to a temporal dimension, connoting the time frame of food security as stated in the definition of food security as *"at all times"*. Stability as defined in USAID (2010), *"the*

ability to access and utilize appropriate levels of nutritious food over time". The framework denotes that food may be available but does not determine assess, whereas also, access may be viable but does not possibly guarantee utilization and all these three physical determinants can be interrupted by lack of stability which can be cause by conflict, climate change, disease, unemployment or other similar factors. Lack of stability can affect all of the other three physical determining components of the above food security framework (Maxwell D. and Wiebe K. 1998).

Here it should be noted that, equating national food security with the food self-sufficiency is such a quandary that needs to be clearly understood. Attaining food self-sufficiency at a macro level does not necessarily assure the achievement of food security at micro level. This further led the distinction between macro level food supply insecurity and the micro level food insecurity dimensions of the problem. Food supply insecurity is the aggregate national food insecurity which mainly arises when a given country is unable to supply aggregate food requirements in either through domestic production, shift back to reserves and stocks or imports. Whereas, food consumption insecurity refers to certain individuals or households not gaining the access to adequate food given to their normal incomes, availability and price of food items. The later one mainly exists within the supply security where certain individuals or households lack the access to adequate food although a given country may still possess adequate aggregate food supply to meet the needs. This clearly reveals that household food insecurity may still possibly exist regardless of the status in the aggregate regional or national food supply. In addition to this, food availability refers to the need for sufficient food production in such a way that can generate a better income for small scale producers while keeping sustainably the natural resource base and access to food in the market for consumers at affordable prices (Von Braun, J.; Bouis, H.; Kumar, S. and Pandya-

Lorch, R., 1992). Accordingly, Kifle L. and Yosef G. (1999) also asserted that food availability is the households' capability to produce the food needs of its household members.

Moreover, in the year 2000, in the formulation of Millennium Development Goals (MDG) halving the proportion of people who are suffering from hunger by 2015 was incorporated as MDG 3 goal. Yet, the number of hungry people in the world is still escalating and more than a billion people are still suffering from extreme poverty especially in developing nations. Hunger Watch Report clearly depicted the devastating picture of hunger as follows;

> *"Hunger is undignified. Hunger is injustice. It is humbling to be reminded that hunger has a human face, that every day millions of people are forced to make heartbreaking choices about who in their family eats and who does not. The right to food is a matter of social justice and human dignity" Hunger Watch Report 2007-2008*

Hunger for any human being is the last thing that can be faced where the craving and urgent need for food creates a weakened condition and uneasy sensation hampering every movement and consequently leading to a huge decline in economy of a country in general. For the betterment of food insecurity situations, different initiatives were taken especially in early warning and identification. The new paradigm of food security focuses that the victims of food insecurity aren't the passive agents where they adopt different behavioral responses to mitigate the risk and its negative implication especially in the future welfare of the household.

In wrapping up the conceptual development of food security, the concept has been changing and progressing to achieve the ultimate goals of food security in the last quarter of a century. The concept has been deemed at various levels; national, regional, state, household and

individual levels. Even though, the ultimate objective is chiefly at the household or individual levels, it is vital to apprehend that food security other than the household and the individual levels since food security has a strong impact on the performance at the household level. In the initial stages, food security referred to the arrangements of providing the minimum physical supply of food grains at national level at all times including those circumstances like harvest failures. Afterwards, it was recognized that physical supply availability at national level alone will not necessarily ensure the economic access to food for all the populace particularly the vulnerable and poor sections of population. Subsequently, it was highly emphasized that satisfactory level of production of supplies must be matched for poverty reduction and the increase in the effective demand to ensure physical and economic access for the poor and vulnerable groups of the population.

Now a days, food security has gone beyond the notion of physical food supply so as to incorporate access which is determined by food entitlements, vulnerability and sustainability (Sen A., 1981). In line with this, availability, access, utilization and stability have been identified as the main components of food security which can be applied to various forms and at all levels of human organization; from macro (national level) to micro (household or individual level).

Household Food Security

As discussed above food security was defined as the access by all people at all times to enough food for a healthy and active life (WB, 2005). In addition, the various conceptual models and definitions all approved that the defining characteristics of household food security as sufficient food and secure access at all times. The definitions revolve around four core issues; 'sufficiency' as defined in the calories required for a healthy and active life, 'access to food' is through the

production, purchase, gifts or exchange and others, 'Security' is the balance between the risk vulnerability and insurance, and finally 'Stability' is the time frame and can be regarded as chronic, transitory or cyclical (Maxwell D. and Wiebe K., 1998).

Sufficiency

The concept of 'enough' has been presented in various forms in different literatures, and the most agreeable approach lies as a minimum food consumption level having a target level and a food which can meet the nutritional requirement. In a more expressive form, it refers to a food which stands for a healthy, active and productive life, for productive effort and growth of youth. The concept of enough food is mainly to delineate the food quality and quantity should be in such a way as to fully meet the needs of everyone. Sahn (1989) as cited in SC-UK/Ethiopia, (2000) putted enough food as: "*enough food to supply the energy needed for all family members to live active, healthy and productive lives.*" Similarly, Maxwell S., and Frankenberger T., (1992) referred enough food as the "minimal food level consumption", "target level", "basic food need", which is "adequate in meeting nutritional needs", "enough for life, growth and health of young and productive efforts". "Enough food for a healthy and active life", where, "enough supply of food for the energy needed to the households' members healthy, active and productive lives".

From these, four aspects core issues are derived so as to better understand the concept of food security. The first issue is the unit of analysis, where it is incorporated as individual and not household, where the unit of analysis for the household is mostly referred as the satisfaction of food needs of combination of individuals. Secondly, the explanations chiefly refer to 'food', where the main concern is with calories and not the micronutrients, protein or generally the food quality and safety. The main reason behind when analysts maneuver on the principle that the other needs

are mostly satisfied when the calorie intakes are satisfied. Though, it is really difficult to conclude precisely the calorie intake needs of different groups in a given population, most analysts conclude that all the nutritional requirements should be treated as value judgments. Moreover, the other aspect which is crucial in assessing whether people have the access to enough food is to inquire about how far they have fallen below the threshold. Thus, the gap difference is a vital theme in food security and poverty analysis. Putting the above considerations collectively, it is apparent that the concept of food security within the spectrum of 'enough food' is challenging. Yet, it appears to have sagacity on; firstly, to concentrate on calories, secondly to identify needs not only for survival but also "for a healthy and active life", thirdly to find the facts of gravity not the shortfall and lastly to start with the individual need then to build up to the household (SC-UK/ Ethiopia, 2000).

Access and Entitlements

The second most crucial concept is "Access", which focuses on whether households and individuals are able to acquire sufficient food. A better understanding beneath the conceptual framework of food security should not merely focus on the availability of food, it should also include the demand (access) and utilization (Von Braun, J., Bouis H., Kumar, S. and Pandya-Lorch, R., 1992). The concept of access refers to the question whether households or individuals have the ability to acquire food, where access signifies the ability of households' or individuals' command over food. For a sufficient calorie intake, availability of food in some space and time frame may be a necessary condition but not a sufficient condition, in cases where it cannot guarantee an effective food demand. Thus, access to food has an important role in securing a better command over food which is determined by the production, transfer or exchange (Debebe H., 2000).

The 1992 African Regional Workshop concluded that households will be food secure when the conditions related to accessibility and availability are met, taking into account that availability of food incorporates adequacy in staples, animal protein, vegetables, vitamin supplements and energy concentrated food sources. These listed food items must be in line with the cultural preferences and safety. Accessibility refers that household's ability to produce food through transformation of endowments like labor, land, capital and other resources for food entitlements (Republic of Zambia, 1992 as cited in Sutherland A. J. et al. 1999). This clearly implies that household food security is just not simply a function of households' food production, but complex and interlinked of overall households' livelihood strategies (Maxwell S., and Frankenberger T., 1992).

Furthermore, it is often said that the focus on the issue of access is the phenomenon of the 1980's, mostly an outcome from a pioneering work of Sen A. in 1981 in the concept of food entitlements. Sen's framework for entitlement offers a systematic approach for assessing vulnerability. It states that individuals' entitlement is mainly rooted from their initial resource endowment bundle which is converted through production and trade and then into commodities or food, which will make them capable to exchange for food. If the entitlement set is not including an adequate amount of food with a commodity bundle, the person is surely hungry. In Sen's terminology, the individual suffers an entitlement collapse. In addition to this, in a market economy, entitlement relations of individuals are chiefly determined by what they produce, what they own, what they can trade, and what they have inherited.

By employing this entitlement framework, Sen demonstrated that decline in adequate food availability was neither the sufficient nor the necessary condition to create hunger. He illustrated that famine could happen in the absence of feasible changes in the production, where if the value

of work activities and production declined relative to cost of staple food items. Likewise, Sen himself and as others critics pointed, an approach which focuses on food entitlement failure, cannot be necessarily inconsistent with the one that focuses on food availability decline, since decline in food production may lead to both higher food prices and reduction in nominal income. Even so, availability of food decline cannot be a necessary condition for food entitlement reduction, yet remains to be a key concern in food security.

Moreover, Swift's illustration brings a wrap up that households' vulnerability to famine can thus clearly be understood with respect to inadequacy, not only immediate entitlements but also scarcity of households' assets. As reality suggests that the poorest tend to have the lowest concentration of assets, they will be the most vulnerable. Without a doubt, successive and severe crises deplete the depth and scale of available assets of the household and as a consequence the households' vulnerability function will be the result of both the extent of existing shields that have been exhausted and the immediate entitlement failure. The first one is a function of the intensity, frequency and duration of the former crisis exposure (Mwanki A., 2005).

Security

The third important concept is 'Security', which is a secured enough food accessibility. This concept mainly emanates from the vulnerability to entitlement failure emphasizing on risk, where in most cases it creates a sense of freedom from anxiety or fear in food accessibility. Since the term food security came in to use, notions of risk and avoidance of risk have been central themes to the various views and definitions of food security. Concomitantly, as the scope of food security widened from time to time, the scope of risk also has widened to focus on household and individual level analysis.

In the 1974 World Food Conference has identified the risks as "*acute food shortages in the midst of wide spread crop failure, natural or other disasters as well as the risk of fluctuations in prices and production*" (FAO, 1996). Following this, numerous analyses emphasized on risks to balance of payment and national food supply. On the other hand, others started to focus more closely on welfare vulnerability, households' food systems ability to resist crisis and short term entitlement variability to enhance food consumption level. Subsequently, in the mid of 1980's, inadequate food access risk analysis became a vital concern and food insecurity became more often expressed in terms of risk. Bringing risk to the discussion of entitlements, it is thus necessary to recognize food entitlement failure risk. The failure risk can originate from various sources which includes crop production variability, price and market variability, food supply, wages and employment risks and health related risks.

In general, household and individual risk profile is determined by the access to food channels through which the food is mediated and by assets which are accessible and available for them as buffers. With this in mind, the most food insecure and vulnerable households will be those facing the utmost probability of failure in entitlement with the smallest amount of asset holdings. In case of materialized risk, vulnerable household will be left with no choice other than to render the costs of entitlement failure in various ways like decreasing dietary intake either in the current time or for the future. Even in cases where asset holdings are huge, households or individuals might be reluctant in disposing productive assets to maintain the current food consumption as of the opportunity cost of the future food access. Nevertheless, there will still come a point where it will be no longer rational to keep future entitlement underutilization if the household won't survive the current period. This scrutiny has crucial implication for the models of food security. Therefore,

it is really important to differentiate between the failure risk of entitlements and costs incurred in case of failures, and this has number of merits in conceptualizing food security.

Firstly, it proposes a suitable framework within which acceptable food security indicators can be developed. For instance, asset holdings and probabilities of threshold may possibly be employed to categorize households. A series of assessments can also be employed in distinguishing between the severely, moderately and mildly insecure. Secondly, focusing on risks draws attention to the critical alternatives faced by planners for food security in poor resource countries. Public policy can then focus on mitigating the costs related to entitlement failure, termed as "entitlement protection" or focus on decreasing the possibility of entitlement failure, termed as "entitlement promotion" (Sen A., 1981). Thirdly, the notion of risk lays emphasis on time dimension of food security setbacks. Households may probably allocate their different resources in such a way that can maximize their food access adequacy, without sacrificing stability. In other words, households try to make sure of their current access without endangering future consumption of food. This brings the notion of choice into the scrutiny which allows dietary inadequacy to be looked through by both cost of entitlement failures and the opportunity costs of entitlement promotion investments.

Table 2.1 Food Insecurity risk sources and related influences

Risks	**Households at risk of food insecurity**
Crop production risks like Pests, improved seeds, drought and others	Smallholders and landless with limited income diversification and little access to improved technology such as fertilizers, irrigation, seeds and pests...
Agricultural trade risks like distribution of exports or imports	Smallholders who are highly specialized in an export crop, small scale pastoralists, poor households that are highly dependent on imported food and the urban poor
Food prices rises like large and sudden price rises	Poor and net food purchasing households

Employment risks	Wage earning households and informal sector employees mostly the poor in urban areas
Health related risks like infectious diseases which result in the decline of labor productivity	The entire households and communities in general who may not be able to afford curative and preventative care especially vulnerable members of households
Policy and political failure risks	Households in war zones and areas with civil unrest and households in areas with low potential especially areas which are not connected to growth areas and low infrastructure
Demographical risks like individual risks which affect large groups	Women and female headed households, especially with low or no access to education, children and aged people

Source: Von Broun J., et. al., (1992)

Time

The last issue in the conceptualization of household food security is "time", a secure access to enough food at all times. Following the guide of World Bank (1986), it became conventional to put a distinction between transitory and chronic food insecurity. Transitory food insecurity happens when a household or individual faces a temporary decline in entitlement security and when the duration in the failure risk of meeting food needs is short period of time. Transitory food insecurity focuses on the inter and intra annual variations in the food access of households (WB, 2005).

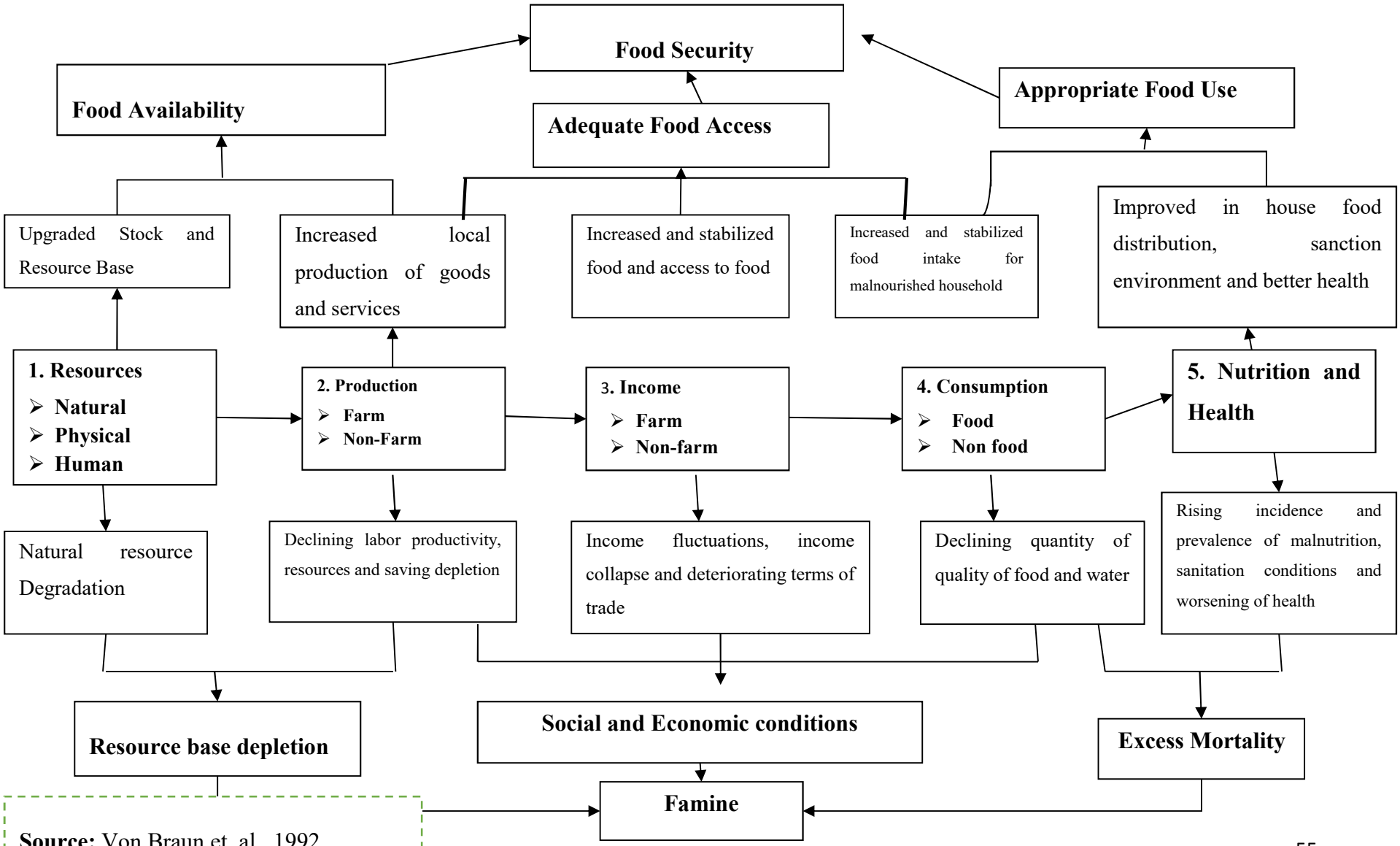
Transitory food insecurity is short-term and temporary and arises due to incidences like a sudden drop in the ability to produce or access to enough food to maintain a good nutritional status, short-term shocks and fluctuations in food availability and food access, including year-to-year distinctions in domestic food production, food prices and household incomes. This type of food insecurity is relatively unpredictable and can emerge suddenly (WB, 2005). This makes planning more difficult and requires different capacities and types of intervention, which includes early warning capacity and safety net program (FAO, 2010). Transitory food insecurity can further be

categorized into cyclical and temporary food insecurity when there will be a regular periodicity pattern of food access inadequacy.

In contrary, chronic food insecurity occurs when a household runs into a continually high risk of incapability to meet food needs of its household members. Chronic food insecurity is a long-term and persistent in type where people are unable to meet their minimum food requirements for over a long period of time. Chronic food insecurity is manifested by lack of various types of assets, extended periods of poverty, and inadequacy or inaccessibility of productive and/or financial resource. It also encompasses those long term development measures which are also used to deal with poverty, such as education or access to productive resources, such as credit access. They may also need more direct access to food to allow them to raise their productive capacity (FAO, 2010). In reality, transitory and chronic food insecurities are closely interlinked. Consecutive temporary food insecurity exposure which is often severe and stressful insecurity increases households vulnerability and may lead to a chronic food insecurity. This on the other hand causes households in assets liquidation to stabilize their food consumption.

Finally, it is clear that when any of the above discussed food security constituents are threatened, households are going to find some way out, which are known as coping strategies. The strategies entail behavioral changes regarding food variety choices, per dime number of meals (frequency of eating), looking for alternative income sources, borrowing and other options. In concomitant to this, when situation worsens households will start to sell their assets and belongings such as tools, livestock, personal and household goods. Thus, building and strengthening household asset is important component in the fight against food insecurity (Kifle L. and Yosef G., 1999).

Figure 2.3 Conceptual Framework of food security and famine



Source: Von Braun et. al., 1992

2.2 Description of Livelihood and its framework

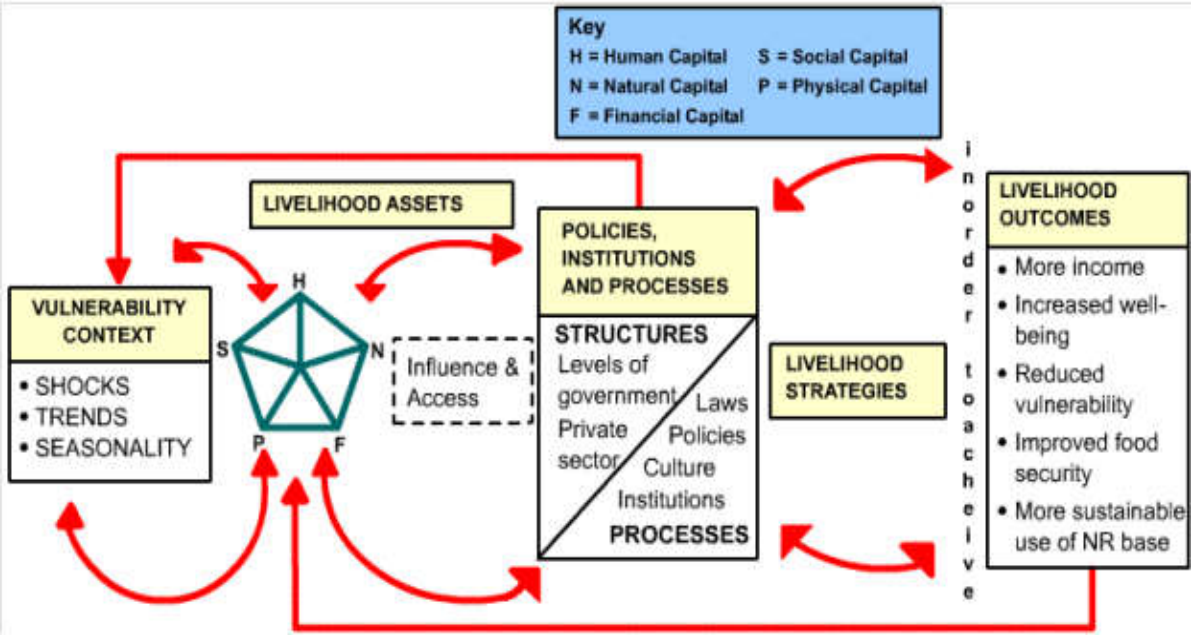
A livelihood encompasses the capabilities, which are comprised of assets including both material and social resources, and activities exercised by households for a means of living. *"Household's livelihood is secure when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and productive asset base."* (Chambers and Conway, 1992 as cited in ACF, 2011) Generally, Livelihood is a way or means of securing the basic necessities of life.

Sustainable Livelihood Framework

The Sustainable Livelihood Framework (SLF) is a tool for improving the understanding of livelihoods. It presents major role players affecting livelihood, their affiliation and how livelihoods work. Sustainable Livelihood Framework can be applied as a conceptual tool for improving the sympathetic of livelihoods and also as a tool to identify areas of intervention to further improve livelihoods (DFID, 1997).

The framework is people centered and aspires to assist stakeholders with different standpoints to engage in structured and logical subject matters to illustrate how different factors affect livelihood and their relative significance on the way how they interact with each other. The framework was developed within the span period of time of several moths by Sustainable Rural Livelihoods Advisory Committee under Department for International Development (DFID).

Figure 2.4 Sustainable Livelihood Framework



Source: DFID, 1997

- **Human Capital (H)** refers to capability of people to work in terms of their health status, educational advancement and skills. In case of using household as a measure or unit of analysis, human capital will refer to the quality and size of the household labor pool.
- **Natural Capital (N)** refers general to the natural resources found in the environment. These natural environment resources include water, land, soil, tress, animals etc. while taking into the consideration of processes which are biophysical and mandatory to sustain them.
- **Financial Capital (F)** refers to the inflows and stock of money to accomplish the livelihood objectives of people. These are access to credit, savings, incomes earned etc.
- **Physical Capital (P)** refers to basic equipment, services and infrastructures to sustain livelihoods.

- **Social Capital (S)** refers to the social capital resources that people depict in their quest for achieving livelihood objectives. These include kinship and family networks, membership of groups, degree of cooperation among themselves and etc.

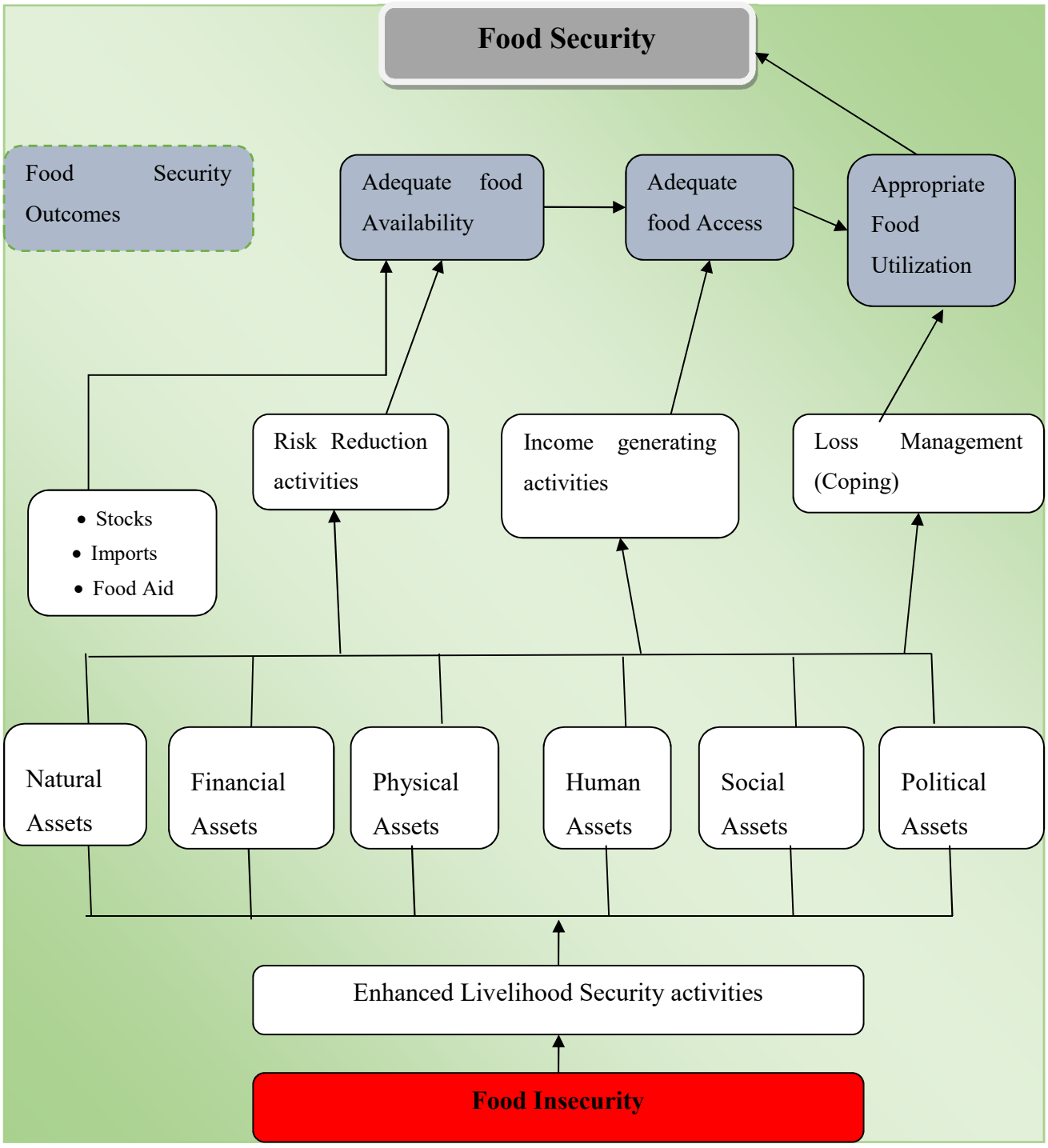
Through all the courses of practices to be exercised, there will result or impact on livelihood outcomes. There are five prospective outcomes that are identified in the Sustainable Livelihood Framework. These are increased well-being, increased income, reduced vulnerability, more sustainable use of natural resources and finally improved food security. The inter-relation between food security and livelihood is a very complex concern and it is manipulated through a wide range of factors that oscillate across time and context. According LIFT (2009),

> "*Food security cannot be viewed as a unique and objectively defined need at any point in time independent of the household's other priorities as informed by its risk perceptions and inter-temporal decision framework. Rather, vulnerable households allocate their assets over time so as to balance their current food needs with their ability to secure their ongoing livelihood viability and future food needs through a variety of livelihood strategies*"

This in turn reveals that a triumphant food security should not only deal with issues related food security but also should have a wider glance towards livelihoods and wellbeing's of households and their vulnerability. In concomitant to this, ACF (2011) asserted that whichever alterations to food security should be identified in a food security and livelihood assessment. With this in mind, other researchers have also identified food as one major part of a jigsaw within livelihood needs and the significance of integrating food concerns within the context of livelihoods approaches for a healthier enhancement and interventions.

The primary specific focus of Sustainable Livelihood Approach is to assist households in such a way that they can access and use assets efficiently to commence various livelihood activities and to assure their livelihood security. Furthermore, the spectrum of households' basic needs covers principally the issues of food, health, personal needs, education and etc. It is crucial to note that within the Livelihood Framework, food security is one of the fraction components. As Maxwell S., and Frankenberger T., (1992) noted, in the close relationship of food security and livelihood attainments, *"food security will be achieved when equitable growth ensures that the poor and vulnerable have sustainable livelihoods".* With this in mind, LIFT (2009) has developed a framework to integrate these issues.

Figure 2.5 Food security and livelihood resources conceptual framework



Source: LIFT, 2009

2.3 Food Security and livelihood indicators and assessment methods

Food security assessment is a difficult task as there is no a uniformly established and accepted indicator which can serve as a measuring tool. There are numerous interrelated factors affecting food security conditions which can vary from immediate factors affecting food supply at household level to basic factors which form an overall economic system of a country (IFAD, 1992 as cited in Mulugeta D., 2012). Barrett, C. B., Reardon, T., Webb, P., (2001), stated that "*Measurement drives diagnosis and response. As global attention returns to food security, new opportunities emerge to improve its measurement."* Hence, food security requires a multidimensional contemplation since it is affected by various interrelated environmental, socio-economic and political factors. Thus, due to the aforementioned predicaments in assessing, monitoring and analyzing, food security follows varied distinct measurement approaches (Debebe H., 2000).

Households' state of food security is mainly determined by factors which are mainly related to the food acquisition process, procurement strategies of households and the socio economic conditions of the society. Food availability of households is affected by various sources of food and the handling patterns which chiefly facilitate time dimension of households' food availability. Moreover, access to various resources and social support patterns have bigger impact on the food supplies procurement strategies. Resources such as land, labor, cash, markets and various public services determine the probability of enhancing food entitlement. These are the crucial determining factors for either food security promotion. Nevertheless, none of them by their own are able and sufficient to influence food supplies. The distinctiveness of utilization and management of these resources are very important to the success of households in attaining a suitable way in food supplies.

In concomitant to this, along with the conceptual development of food security, various food security indicators have been identified. There are approximately there are about 200 definitions of food security and about 450 indicators identified for food security (Abdulai A., Christopher B., Barrett Hoddinott J., 2005). In addition to this, Maxwell S., and Frankenberger T., (1992), in their volume regarding household food security identified 25 broadly defined food security indicators. Abdulai A., Christopher B., Barrett Hoddinott J., (2005), also identified 73 indicators in somehow disaggregated form than in those listed by Maxwell S., and Frankenberger T., (1992). With this profusion of indicators, the very crucial methodological dilemma for development practitioners and researchers is to decide which indicators are suitable and appropriate. However, the deployment of these indicators differs between the theme characteristics of procedures, investigations and the level of aggregation. Besides, in most cases, the depth and purpose of investigations is highly significant in the choice of indicators. In some instances like early warning systems, three sets of major indicators are often employed to spot out possible food security collapses. These often include; **food supply indicators** like area covered with plantation, rainfall, production yield forecasts and estimations, **social stress indicators**; such as accessibility of produce in markets and market prices, migration, wages and labor patterns and lastly, **individual stress indicators;** which include diseases, nutritional status and mortality (Debebe H., 2000).

Furthermore, Maxwell S., and Frankenberger T., (1992), made a clear distinction between the "process indicators" which explains food access and food supply, and the "outcome indicators" which describe food consumption. Many studies found that the process indicators are highly insufficient to characterize outcomes of food security. As Abdulai A., Christopher B., Barrett Hoddinott J., (2005) noted, there is a very little correlation between sets of process indicators and food security measures of outcomes. These findings echo the conclusions of numerous

development agencies where there is a very little correlation between household food security and area level production of food (IFPRI, 2012). Moreover, one significant dimension of household food security is the availability of food in the nearby area of households to obtain. Number of determinants and indicators play a crucial role in limiting food availability or supply. Borton and Shoham (1991) as cited in Maxwell S., and Frankenberger T., (1992), categorized these types of indicators as a risk of a specific event indicator. These are supply indicators which give information on the possibility of a disaster or shock event which on the other hand will affect household food security. These supply indicators include issues such as measure of agricultural production and inputs, market infrastructure and institutional development, access to natural resources, revelation to regional conflicts and their consequences. On the other hand, Debebe H., (2000), stated that such similar supply indicators in most cases are aggregated by nature and they hardly serve as household level food stress monitoring device. Their application and function also differs between range of places and households economic activities.

According to Maxwell S., and Frankenberger T., (1992), the vitality of indicators which measure food access become clear after it was realized that household famine and food security situations were occurring in spite of food availability. Effective demand of households and food entitlement are now a days seen as a significant to household food security. Socioeconomic indicators are sought which represent stress degree or level which is expressed by a household as economic and social conditions vary and how they respond to it.

Being acquainted that households are not passive to a stress, a major prospect of vulnerability to household food security is households' ability to cope up with the stress. As Borton and Shoham (1991) as cited in Maxwell S., and Frankenberger T., (1992), referred to these kinds of indicators as coping ability indicators which give information about the capacity of a given

population which is affected by disaster or shock with their respective effects. Furthermore, contrasting to supply indicators, access to food indicators are comparatively more effective in monitoring household level food security situation. Their use and relevance differs among seasons, regions and social strata which reflects different agencies in the course of managing diversified sources of food like changes to sideline activities, diversification and disposal and exchange of productive and non-productive assets.

Given the time and cost employed for input data collection of households, outcome indicators are mostly proxies for an adequate food consumption. Generally, as Maxwell S., and Frankenberger T., (1992) stated, there are two groups of household food security outcome indicators; direct and indirect indicators. The direct indicators of food consumption incorporate indicators that are very closest to an actual consumption of food rather than medical status or marketing channel information. In addition, the indirect indicators are in general used when either the direct indicators are too costly in terms of money and time or are unavailable. Debebe H., (2000), put forward that as opposed to indicators of food supply, outcome indicators can be easily disaggregated at lower level. The crucial challenge with outcome indicators is that majority of the indicators like anthropometric indicators results may not possibly indicate the exact food crisis level in view of the fact that nutritional intake is influenced by various factors like health care.

Table 2.2 Household food security indicators

1. Supply Indicators	
-Meteorological data	-Agro ecological models
-Information on natural resources	-Food balance sheet
-Agricultural production data	-Information on pest damage
-Marketing information	-Regional conflicts
2. Food Access Indicators	
-Land use practice	-Diversification of livestock
- Dietary change	-Change of food source
-Diversification of income sources	-Access to loan or credit
-Livestock sales	-Seasonal migration
-Sale of productive assets	-Distress migration
3. Outcome Indicators	
-Household budget and expenditure	-Nutritional status
-Food consumption frequency	-Household perception of food security
-Subsistence potential	-Storage elements

Source: Maxwell S., and Frankenberger T., 1992

Furthermore, IFPRI (2012) report for improving food security of mainly the poor indicated that given the multiple dimensions of food security; transitory, chronic, long term and short term can be indicators for measuring food security. Different and multidimensional indicators are important in capturing the various dimensions of food security at different levels (National, household or individual level), which incorporates;

- Food security at national level to some extent can be monitored in terms of supply and demand indicators; that is, in the availability of food versus needs quantities and the net import demands versus the import capacity. Import capacity is described as the foreign exchange earnings of net debt services and other essential foreign exchange expenditure.

- Food security at the household level can be best measured by a direct survey of households' dietary intake which is in comparison with the appropriate adequacy norms. Nevertheless, they emphasize on measuring the existing situation and not the downside risks which may possibly occur. The changes and level in demographic and socio economic variables such as employment, wage rates, migration and price ratios, if appropriately analyzed, they may serve as good proxies in indicating the change and status in household level food security. Moreover, indicators and their respective risks patterns should be continually interpreted and measured to monitor household food security level.

- Anthropometric information is helpful complement in that here measurements are taken from individual level. Nonetheless, such an information is an outcome of variations in the above listed indicators such as sanitation and health of the environment. However, this information shows food security after an impact. Anthropometric indicators provide a good estimation in the prevalence of malnutrition at the time when a survey was done. However, they don't give no indications if the finding is abnormal or how the malnutrition rate is likely future evolvement without which is impossible for a response plan (FAO, 2005). However, different studies taken in various countries are revealing that there appears to be either a very feeble correlation or totally no correlation between anthropometric indicators of malnutrition and calorie deprivation and most studies made under IFPRI in different parts of Ethiopia reached at the same conclusion. Yet there are different researches that are being undertaken by different governmental and non-governmental organizations without even taking into consideration of the limitations within this measure (IFPRI, 2012).

Measurement is very crucial for any development investigation and intervention to find out the food insecure and to characterize their nature of insecurity. Food and nutrition security measures the availability and stability of sufficient food which is adequately nutritious for a household (CSA, 2014). Food security concepts and different definitions have been suggested by different scholars mainly basing on the number of factors involved. These factors include examination result needs based on the effects or causes of food insecurity, scope of the analysis, qualitative or quantitative form of analysis, analysis level to be carried out; macro (national level), meso (regional level), micro (household or individual level). As Coll-Black, S., et al., (2011) asserted, there are almost about 200 different definitions and about 450 indicators of food security. For this reason, a significant number of food security indices have been assessed. Specifically speaking, food security explains the adequacy of enough food access at all times where by ensuring a healthy and active life, whereas food insecurity describes and measures basically hunger. The 'World Food Summit' in Rome in 1996, have witnessed governments of the world pledging to halve hunger levels of the world by 2015 and similarly MDG's Target 3 had an aim "halving the proportion of people who suffer from hunger" and two main indicators were set to measure the progress and success towards the above goals;

- The prevalence of underweight children, and
- The proportion of a population living below the minimum level of food energy consumption of FAO's calculations.

Hunger can be referred in terms of the causes, the effects or both. Moreover, two indices that can combine the causes and the effects have been set: the Global Hunger Index (GHI) which is further developed by IFPRI (International Food Policy Research Institute) for the macro level and the Action Aid Hunger Index issued in 2009 which works at the micro level (households and

individuals) (Marion N., 2011). In concomitant to these listed, there are also various types and classifications for measuring food security, yet there is no fixed rules as to which method to use as there are diversified characteristics and levels of considerations of food security. The decision to employ a particular method often depends on the objectives of the study, availability of data, resources and time considerations, degree of accuracy needed and the type of users. (Debebe H., 2000).

FAO Index

The FAO index of food energy deficiency was initially started in 1987 and following the second publication was published about a decade later and since then it has been published annually. The index measures mainly hunger as a proportion of the population with their respective individual energy consumption below the standard nutritional requirements. Regarding to national food security estimates, percentage of population of respective countries who are food energy deficient is the chief indicator which has been used to scrutinize countries progress in achieving goals like Millennium Development Goals which stipulated halving the proportion of people who suffer from hunger (Marion N., 2011). United Nations Food and Agriculture Organization (FAO) index is conventional and a low cost approach, yet imperfections ensuing from the food balance sheet estimates of the indicator result in imprecise results. This is because, the food balance sheet estimates are based on the total amounts of food availability at national level rather than a data from households (Smith, Lisa C., and Ali S., 2007).

Hunger is a multidimensional index for food insecurity where energy deficiency causes the reduction of body weight which then results in the inability to work properly. The three parameters which are employed in the measurement of hunger are;

A. The per capita availability of food;
B. The inequality in the energy intakes and
C. The country energy requirements by age and sex group

The FAO index calculation is a three stage process where in the first phase a country's Food Balance Sheet is taken for the approximate calculation of calorie intake of a person. In the second phase of the calculation, an estimate of calorie distribution within the population will be prepared by taking a log normal distribution of energy consumption into consideration and calculating coefficient of variation of energy expenditure. Finally, a cut-off point for calorie will be prepared to calculate the number of undernourished people (Neiken, 2003 as cited in FAO, 2010). The index's advantages and disadvantages have been a subject matter of discussion for various scholars and development practitioners by taking into account the cut-off points which are claimed that they are not sensitive on distribution. As a result, undernourishment level is highly underestimated since the highly affected group of the population is subjected for further food deficiency which is not shown in the index (Marion N., 2011).

Household Income and Expenditure Surveys (HIES)

National household income and expenditure surveys are chiefly used to assess the welfare and consumption levels of a population. Household income and expenditure based surveys and estimates are a less costly options, since the data collection mainly focuses on the food acquired rather than actual dishes prepared and consumed which makes it bay far less complicated for measuring food quantities (Smith, Lisa C., and Ali S., 2007). Despite the fact that, measurement is less precise than that of a food consumption survey, household income and expenditure surveys are still reasonably accurate, where by yielding approximately similar estimates of food energy

deficiency for a population group. As more and more countries began to collect suitable data for their national household income and expenditure surveys, it paved a way for a viable option to monitor national and global food security. Food data gathered through HIES regards the amount of acquired food rather than consumption of households and it has three sources to collect the data, namely;

A) Purchases of food,

B) Gifts of food or received food as a payment for labor, and

C) Home-produced food

Dietary energy quantity which is available to a household every day is calculated by changing food items into kilocalorie amounts, summing up the total and dividing that amount by the number of days. This figure is further divided by the total number of adult members of the household and after that the dietary energy adequacy can be calculated. The estimated energy intake amount should be reported as such and should not incorporate considerations or reference of dietary needs unless and otherwise these issues are specifically evaluated with the population concerned. One of the main benefits in estimating energy consumption from household income and expenditure survey is distribution and intakes of dietary energy of a household level will be revealed. These estimates will possibly be of a great value if focused especially on selected countries (Marion N., 2011).

Table 2.3 Food security indicators and household level measurement

Population level indicator	Household level measurement
Diet Quantity	
Daily food energy consumption per capita	Household daily food energy available per capita. The energy in the food acquired by a household over the survey reference period divided by the number of household members and the number of days in the period.
Percentage of households that are food energy deficient	Whether a household is food energy deficient. Whether a household acquires insufficient food over the reference period to meet the energy requirements of all its members for a basal metabolic function and light activity.
Diet Quality	
Diet diversity	Household diet diversity: the number of foods or nutritionally significant food groups acquired by a household over the reference period.
Percentage of food energy from staples	Percentage of food energy available from staples. the percentage of the energy acquired by a household over the reference period that is derived from staple foods like cereals, roots and tubers.
Quantities of foods consumed daily per capita `	Quantities of foods acquired daily per capita. Quantity of specific foods acquired by a household over the reference period divided by the number of household members and the number of days in the period.
Current Economic Vulnerability	
Percentage of expenditures on food	Percentage of expenditures on food: the percentage of total household expenditures on food over the reference period

Source: Smith, Lisa C., and Ali S., (2007)

From the above table, the first two indicators are for diet quantity which is the amount of food consumed by people. Consumed food energy at household level is calculated by the total

energy amount from the food consumed by a household over the study period reference for the data collection. Moreover, the second quantity of diet indicator is the percentage of households from a population group who could not consume an adequate dietary energy. This is measured by calculating whether a household is acquiring adequate food over the reference period to meet the dietary needs of all the members. The rest three indicators measure the diet quality which is also very crucial for achieving food security assessments. It is reasonably possible for a person to meet the energy requirements but to be thwarted from leading a healthy and active life because of deficiencies of supplementary nutrients like proteins, micronutrients, iron, Vitamin A, iodine and the like. A number of studies have revealed that an improved diet quality is highly correlated with an enhanced birth weight and nutritional status of children with a lessened mortality. Moreover, it is highly emphasized that insufficient diet quality rather than the insufficiency in energy consumption is more becoming major dietary dilemma facing the poor across the globe (Ruel M., 2002). Basing on these motivational grounds, it is crucial to incorporate nutritional quality indicators in food security analysis.

- **Household Caloric Acquisition:** This is the total number of calories or nutrients which are available for consumption by the household members within a predetermined period of time. A set of questions which inquire about the food prepared (meals) for a specified period of time which is usually 7 or 14 days, which is asked directly to the person in the household who is responsible for the preparation. Afterwards, the food consumed will be changed into the same measurement of kilocalories. Hitherto, calorie indicators are not normally without a doubt while measuring the individual level food security. Even in case of a household, caloric acquisition indicators are taken as a strong predictors of the

individual nutrition outcomes, and yet there might still be a concern at the inability of this indicator to measure individual level outcomes (IFPRI, 2012).

Dietary Diversity Indicators (DDI)

Dietary diversity indicators basically show how the various food groups that are typically consumed by a household (IFPRI, 2012). Similarly, as various empirical and theoretical evidences suggested, dietary diversity indicators are more effective as food and nutrition security indicators mainly for two fundamental justifications; first, the standard definitions of both nutrition and food security stress on the importance of both micro and macro nutrients (FAO, 1996). Foremost, dietary diversity must capture a consumption of both categorizations of nutrients, or in general, a more balanced diet (Ruel M., 2002). Second, demand economic theories as well as basic psychological theories such as Maslow's hierarchy of needs (Maslow A., 1943) suggest that individuals tend to shift to higher macro nutrient rich food such as meat, eggs, fish, and dairy products and to a lessened consumption of vegetables. Maslow's hierarchy of needs basically stipulates that most of the basic needs levels must be met before the individual will desire strongly for the higher levels of needs. He used the term ‘meta motivation’ to portray the motivation of people who mostly go ahead the scope of basic needs and struggle for a constant betterment. In similar words, as poor become richer, they gravitate away from a relatively tasteless staple foods to macro and micro nutrient rich foods which have far greater taste. For these reasons stated and due to the relative cost effectiveness of dietary diversity indicators, they have become a popular and widely accepted indicators of food security predominantly in nutrition and health surveys like demographic and health related surveys and also World Food Program (WFP's) Food Security Emergency Assessments.

In general, dietary diversity indicators basically incorporate issues which demand the respondents to recall about their consumption patterns of particular food items or groups of food items over a given period of time ranging from one day recall to a two weeks recall period time. The most familiar indicators under DDIs include; Food Variety Score (FVS), the Household Dietary Diversity Score (HDDS), Individual Dietary Diversity Score (IDDS) and Food Frequency Scores (FFS). The food variety score provides a number count of various food items consumed. The household and individual dietary diversity scores provide the number of different food groups often between 7 to 15 various food groups. The food frequency score is mainly based on the recalls which ask how often a specific group of food was consumed over a given period of time (IFPRI, 2012).

The major justifications on why the dietary diversity indicators are useful proxy indicators to measures food security and livelihoods has been forwarded by ACF (2011), as follows;

- A highly diversified diet is mainly associated with various enhanced outcomes in thematic areas like children anthropometric status, birth weight and increased concentrations of hemoglobin.
- A more diversified diet is extremely correlated with factors like protein and calorie adequacy, household income and percentage of protein from high quality protein sources like animals and their products. Even in cases of poor households, high expenditure on food resulting from additional extra income is highly correlated with the enhanced quantity and quality of diet. This is directly related with the theory of demand and Maslow's hierarchy of needs theory while taking into account that other factors which may affect the consumption and utility remaining constant.

- In case of dietary diversity indicators, units of assessment can be at the individual or household level, which makes it possible to assess food security and livelihood at the household and intra household level, and finally,
- Acquiring data for dietary diversity indicators is relatively undemanding and straightforward. Various studies and field experiences indicated that for field staffs' to get the information on dietary diversity is not complex or complicated, and on the side of respondents also, the questions are relatively easier to respond and are not burdensome for the respondents.

Similarly, FAO (2010) also asserted that dietary diversity indicators are useful proxies to indicate the nutritional adequacy of diets and they provide a timely and direct information on what households are eating and the changes they alter in their diet preferences in response to reduced food access like in times of shocks. Moreover, FAO stated that dietary diversity indicators are just as simple as counting food groups consumption over a determined period of time like for a day or may be two weeks. Dietary diversity indicators encompass highly advantageous premises as comparing to other food security indicators in that they can be quickly administered, they are simple to analyze and can be administered in low cost. As a concluding remark, FAO avowed that dietary diversity indicators are of a high-quality indicators in the improvements in household food access, diet quality and food consumption and also asserted that food security will be best measured by dietary intake measurements. Previous studies both from developing and developed countries has consistently revealed that diet diversity is a tremendous nutrient adequacy indicator where the adequacy basis on a diet which can meet the basic requirements for energy, protein and all the necessary nutrients (Ruel M., 2002).

Basing on the expenditure or quantity data collected from households or individuals, diet diversity is calculated simply as the number of nutritionally momentous food groups from the food acquired over the reference period of time of the survey. Diet diversity indicators which are basing on food groups forecast adequacy of nutrients better than those basing on individual foods (Ruel M., 2002). Some chief nutritionally important food groups are cereals, tubers, roots and plantains, legumes, pulses, seeds and nuts, fruits and vegetables, meat, seafood and fish, milk and similar dairy products, eggs, fats and oil and miscellaneous foods (See Annexure 1) (ACF, 2011). In line with this, the three main dietary diversity scores are discussed with their respective merits and demerits as follows.

Household Dietary Diversity Score

The household dietary diversity score is one of the most commonly used from dietary diversity score indicators and provides the number of various food groups consumed over a given period of time which measures by employing the twelve scale food groups. It was initially developed by Food and Nutrition Technical Assistance (FANTA) project by the United States Agency of International Development (USAID, 2010). Lately, FAO has redeveloped and modified a nine scale food groups which is more obliging for assessing women's nutrition and food security which differs from FANTA's household dietary diversity score by leaving out the non-staple and micronutrient poor food groups like sugars and fats and by regrouping fruits, vegetables and animal products accordingly with their vitamin A availability and iron contents (ACF, 2011). Household dietary diversity indicators are vital indicators which link food, food security and nutrition together, and they provide a timely and appropriate food security and nutrition information which is related to diet at a decentralized level particularly at household level within a time frame generally of a 24 hours of recall period for respondents (USAID, 2010).

Household dietary diversity is a highly significant indicator of diet quality, and for a better reflection of diet quality, the total number of different food groups eaten in the household is calculated, rather than the frequency number of different foods consumed. This is because, knowing households consume, like for instance, an average of five various food groups implies that the households' diet shows some diversity in both micro and macro nutrients. This indicator is a more meaningful and consequential indicator which paves a way for answering whether the households consumption of the five different foods is just like for instance is it all from cereals or not. On the other hand, as any participatory tool, HDDS has also some potential pitfalls like for instance, as the recall time is 24hrs it will be easy for respondents to recall and respond however, because of the timely limited information, the information may be skewed because of days like festivals, holidays or any special days. There are 12 food groups which are prepared and which can be modified accordingly to the staples and preferences of a specified group of people. (See Annexure 1)

Individual Dietary Diversity Score (IDDS)

Individual dietary diversity score is mostly employed as a proxy measure for the nutritional individual diet quality, and it is just a number of various food groups consumed over a given time of period. The household dietary diversity score is mostly used as a proxy measure taking household as a measurement unit (ACF, 2011). Whereas, individual dietary diversity score is mostly employed in situations where the focus is on an individual subject like children or women. In this case, the surveys collected assess food amount consumed by the individual members or a member set for a study over a determined period of time (Marion N., 2011). This dietary diversity indicator provides a specific information limited food groups which is often of an interest to policymakers who are aiming to enhance the food security condition of a particular group of

population. For example, having the right information about the amounts of consumed food groups that are nutrient rich may serve as a basis for policies which are aiming at reducing nutrient deficiencies (IFPRI, 2012).

While the questions designed to collect the HDDS and IDDS are similar, there are also some basic differences which are highly reflective for the different objectives. Unlike the HDDS, here in the IDDS there are only 8 food groups designed with the exclusion of some food groups which are included in HDDS (See Annexure 1) (ACF, 2011). As a socioeconomic change indicator, the inclusion of some food groups and items in a household reveals about their ability for access or purchase of food. In comparison, food groups which are not included in the list of IDDS specifically for children, it is because the food groups' importance as contributors to the nutritional diet quality of children (Marion N., 2011).

In order to capture the changes in the individual dietary diversity score over a given period of time, the collection should be in times of the greatest food shortages especially immediately before harvest time. Alike to HDDS, IDDS also have a similar recall period of the food consumption by the individual, i.e. 24 hours, which is really easy for the respondents, however, this kind of short term recalls may cause skewed results due to exceptions like days of festivals, holidays and other special days.

Food Consumption Score

Food consumption score is another indicator of household dietary diversity score which focuses on energy and macro nutrients. It generally indicates whether people are having a sufficient food intake for leading a nutritionally balanced life. In comparison, while individual dietary diversity score calculates the nutritional diet quality of an individual and the household dietary diversity

score measures the socioeconomic condition of a household, the food consumption score measures the food consumption adequacy through quality and frequency of consumption (ACF, 2011). In addition, the recall period differs where in case of food consumption score, the recall period is 7 days which is higher as compared to household and individual dietary diversity scores. Furthermore, comparing to the number of food groups, the food consumption score has a similar number of food groups like the individual dietary diversity score; 8 food groups.

Moreover, the WFP (2009) has revealed that food consumption score is a frequency weighted dietary diversity score which is computed basing on seven days of households' food consumption recall. Food consumption score calculation attaches a greater emphasis on foods which are deemed to have the most crucial nutritional purposes, where the highest weights are given to; meat, milk and fish - 4, pulses - 3, cereals - 2, fruits and vegetables - 1 and finally oil and sugar - 0.5 (See Annexure 2) (WFP, 2009). Whereas, the food consumption score omits condiments and other miscellaneous food items which are taken in a very small quantities and which are assumed to have very insignificant valuable impacts on the overall diet. These food items consist of items like coffee, tea, salt and a minute amounts of milk added to coffee or tea. As the weights are applied subsequent to the data collection, the final food consumption score may be altered to differ the emphasis on macro nutrients (ACF, 2011).

As part of the data collection, respondents (households) are enquired about the frequency of the 8 food groups which they have consumed in the past 7 days. It has been also noted that, the information which is collected need not to be collected on how many times each food has been consumed in a day. Afterwards the calculation follows a simple basic mathematical computation, where the consumed frequency of each food group is multiplied by the assigned weight (See

Annexure 2) which is based on the nutritional content (ACF, 2011). Accordingly, the basic formula is as follows;

Food Consumption Score (FCS) = (Staple frequency x Staple weight) + (Pulse frequency x Pulse weight) + (Veg frequency x Veg weight) + (Fruit frequency x Fruit weight) + (Animal frequency x Animal weight) + (Sugar frequency x Sugar weight) + (Dairy frequency x Dairy weight) + (Oil frequency x Oil weight)

The household food consumption score could go up to a maximum value of 126. As in the table shown below, depending up on whether the population falls into the typical threshold group (Column A), or with a population who consumes oil and sugar on daily basis (Column B), the threshold varies. Depending on the local context, some modification can be made with an appropriate documentation to ensure a suitable consideration during follow up surveys and interpretation.

Table 2.4 Food consumption score thresholds

A- Typical Threshold	B- Thresholds with oil and sugar consumed on a daily basis	Profiles
0-21	0-28	**Poor** food consumption
21.5-35	28.5-42	**Borderline** food consumption
>35	>42	**Acceptable** food consumption

Source: ACF, 2011

Months of Adequate Household Food Provisioning (MAHFP)

This particular index tries to depict the change in the ability of a household to address vulnerability in a way that food will be available for a minimum of 9 months in a year. Households below a poverty line generally fall under less than 9 Months of Adequate Household Food provisioning

(MAHFP) (ACF, 2011). This on the other hand refers that these households are only able to assure that their members of the household got an adequate food for less than 9 months in a year. In the remaining 3 months of the year, they ensure their existence by complying through other activities and coping mechanisms. Most common coping mechanisms employed by vulnerable households include looking for credit, decreasing consumption, supports from governmental and nongovernmental organizations, selling productive assets and etc. The figure of MAHFP in general varies mainly basing on households level of production, asset holdings and available cash earnings for purchasing food items. Moreover, this can further vary based on the risks and shocks households face within a given year plus households capacity to cope up with them. This particular index is well acknowledged as a measure for an annual food gap faced by households and their ability to cope with food insecurity. In general, knowing MAHFP of a household helps to capture the combined effects of strategies and interventions like production, storage and other related interventions which can enhance the household's purchasing power (ACF, 2011). Accordingly, MAHFP can be calculated as follows;

MAHFP = 12 months minus the total number of months out of the previous 12 months that the household was unable to meet their food needs. (12) - Sum (1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12)

2.4 Empirical evidences of food security trends

Food security condition globally has shown a betterment though yet there are about 925 million undernourished, out of which 900 million living in developing nations (FAO, 2010). Majority of the undernourished and hungry people live in Sub Saharan Africa (30%), Asia and the Pacific

(16%), Latin America (9%) and North Africa (8%). Conversely, about 870 million people were estimated to be undernourished in the years between 2010 to 2012 facing irregularities in getting access to food for leading an active and health life. Out of which 852 million (12.5% of the total global population) people were living in developing countries (FAO, 2015). In similar lines, in the year between 2011 and 2013, a total of 842 million people were believed to be undernourished and suffering from a chronic hunger. All the past figures revealed that the total number of the undernourished has fallen tremendously since the 1990's (FAO, 2015).

In Africa, there has been high efforts from leaders of nations and other supporting nongovernmental organization to minimize and achieve international hunger targets, yet the progress has been subjected to a very slow improvement. The continent has been affected by internal conflicts and natural disasters where one in four people are either undernourished or chronically food insecure. While Sub-Saharan Africa remains with the highest prevalence of undernourishment, there has been some enhancements in the past two decades. The undernourishment prevalence has declined from 32.7% to 24.8% (AFSH, 2014 as cited in Birara E., 2015). The five African states with highest number and incidences of undernourishment in descending order are; 32.1 million people in Ethiopia, 15.7 million in Tanzania, 12.1 in Nigeria, 11 million in Kenya and finally 10.7 million in Uganda. This shows that four out of the five countries mentioned are located in the horn of Africa; Ethiopia, Kenya, Tanzania and Uganda (Birara E., 2015).

The Ethiopian agricultural sector in terms of feeding the country's population has been and continued to be poor. In the country there are more than 10 million people who have been affected by recurrent drought. According to WFP (2009), about 4.6 million people are threatened by malnutrition and severe hunger and are in need of a direct food assistance, and this deteriorating

condition has been more aggravated by high price of food commodities. Various studies have also indicated that about 41% of the total population in the country lives below poverty line and 31.6 million people are undernourished (FAO, 2011).

Table 2.5 Ethiopia's progress in selected development indicators (2000-2011)

No.	Percentage of population	2000	2011
1	Living below the national poverty line	44	30
2	Living on less than USD1.25 PPP a day	56	31
3	Illitracy	70	50
4	Electricity power supply coverage	12	23
5	Piped water	17	34
6	Percentage of children under 5 years that are stunted	58	44
7	Percentage of rural women receiving an antenatal checkup	22	37
8	Life expectancy (years)	52	63
9	Total fertility rate	6	4

Source: CSA[3], 2013

The above table 2.5 indicated the tremendous positive changes in the country's decade effort to alleviate poverty and to enhance various development indicators, though, there is yet much to be done. The recent undernourishment figures reveal a similar positive trend (1990-1992 71%; 1995-1997 64%; 2000-2002 50%; and 2004-2006 44% of the population) (FAO., 2010). The prevalence of chronic food insecurity and malnutrition is higher in the rural parts of the country where 6 to 7 million people are chronically food insecure and about 13 million people seasonally food insecure (Bill and Melinda Gates Foundation, 2010).

However, the number of total population who are chronically food insecure in Ethiopia has been more aggravated by the current El-Niño weather condition in the year between 2015 -16. As

mentioned in the earlier chapter, Ethiopia has been highly affected by drought due to this weather trauma leaving behind about 15 million lives temporally and chronically food insecure (FAO, 2016). The devastating trauma have left huge impacts on agricultural productivity in numerous parts of the country has either created a failure or a decline in crop productivity.

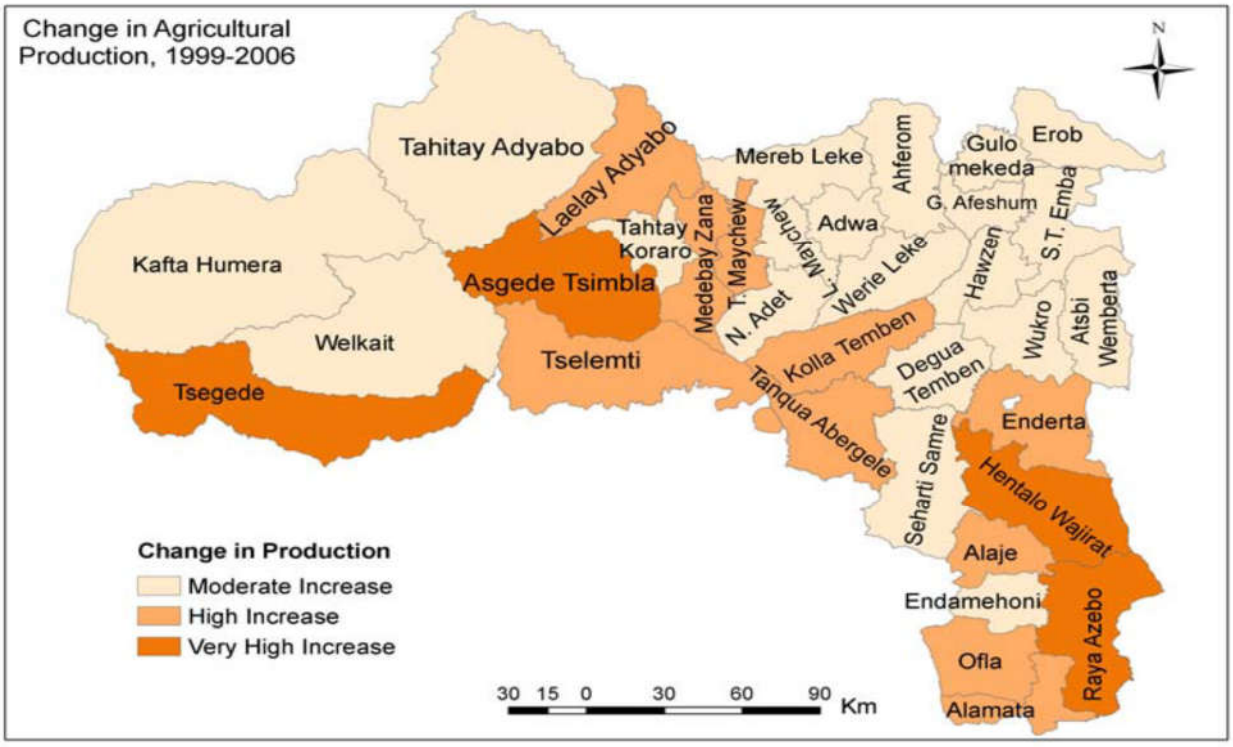
Various studies indicated that the role of households asset holdings such as land, livestock, oxen and supportive income from nonfarm activities have a supreme importance to achieve food security at household level. Hence, livelihood diversification schemes which can enhance the farming households to diversify their income generating strategies are highly important. Mequanent M. & Esubalew T. (2015) revealed that development interventions which are aimed in encouraging elder households experience sharing to the younger ones, income diversification of the households, enhancing access and supply of fertilizers, improving the productivity of land and better breeds of livestock, incentives to use water and soil conservation activities are found to have a positive impact on the food security status of households. Similarly, the study suggested that authorized governmental and nongovernmental bodies need to aim on strategies to diversify income of the households, improve the supply of fertilizers, and enhance the productivity of land and livestock as major steps to alleviate food insecurity challenges in southwestern Ethiopia.

A similar study made in Welayita district also revealed a wealth ranking of 22.5% better-offs, 35% of less poor and 42.5% as poor households from the total sample population. It also revealed that the income portfolio analysis majorly lies on agricultural sector through its contribution to 64.1% of the total income in the district and the rest to off/non-farm activities. Moreover, it was found that the district's food security status was very low accounting for 74.2% as food insecure households (Adugna E., 2008). A similar study conducted in Welayita district revealed that, rural households in the study area employ diversified livelihood strategies where

majority of the households (about 57.7% of the total sample households) combine agriculture with other allied non/off-farm activities. Moreover, it was also noted that 57% of the total sample households were found to be food insecure basing on the nationally recommended calorie requirement of 2200kcal. In addition, it was noted that the relationship between food security status and livelihood strategies of households shows that majority (62% of the total sample households) still solely rely on crop production as a major source of livelihood. On the other hand, non/off-farming activities were common livelihood options majorly practiced by food insecure households (Yishak G., et. al., 2014).

Moreover, 12 variables out of 25 were found to be significant at 10% level of significance and these significant variables include family size, education, farm land size, frequency of visits by extension/development agents, access to off/non-farm activities, access for credit, use of fertilizer, safety net participation, cooperative membership and lastly agro ecological location as most crucial determinants affecting food security condition of households. In line with this, family size was found to have a negative and significant impact on food security status of the households. Lastly, the study revealed that governmental and other concerned bodies need to design appropriate development policies and strategies in line with crucial significant variables to bring sustainable livelihood enhancements and in attaining household food security goals (Yishak G., et. al., 2014).

Figure 2.6 Agricultural production spatial distribution in Tigray region (1992-2006)



Source: Tagel G., (2008)

In the above figure 2.6, Tagel G., (2008) assessed policy interventions impacts in ensuring food availability across various districts in Tigray region through changes in agricultural productivity in the years between 1999 and 2006. Accordingly, the results revealed a positive production yield in the various sub sectors of agriculture. The detailed assessment has shown a remarkable improvement in agricultural production of majority of the districts since 1999.

Conclusion

The concept of food security has been given a huge emphasis and its conceptual framework has passed through an enormous evolution and dazzling changes. Currently, the recent food security conceptualization has tried to incorporate various aspects from the initial micro faces of individual and household levels. The focus of food security conceptual development has in general shifted

from global figures to micro (household and individual) levels. Accordingly, a consensus has been reached where food security can exist when all people have physical and economic access to safe, sufficient and nutritious food to meet their dietary needs and preferences for an active and healthy life at all times. Here, there are four components which are evolving on food security concept; access, availability, utilization and stability.

Furthermore, there are various measurement methods and indices to assess food security condition of households and individuals. The preference and selection on which food security measurement index and dietary diversity indicator to employ, the objective or theme of a particular study or project is decisive. Provided with a short term dietary diversity enhancement or relationships to enhanced household income conditions are to be considered, the Household Dietary Diversity Score might be a right tool to employ and given an emphasis on a particular members of a household like children or pregnant women Individual Dietary Diversity Score might be a right tool to employ. Finally, provided with a longer term sustainability and impact in the quality of food consumption and diversity are to be considered, the food consumption score may be employed as a right tool. Thus, in this particular study, household food consumption score, Months of Adequate Household Food Provisioning and Body Mass Index have been selected and incorporated as a proxy indicators of food security status of smallholding farmers in the selected study areas.

Ethiopia is one of the highly drought prone area with the highest prevalence of undernourishment in Africa. The Government of Ethiopia has been implementing strong initiatives and programs to address food insecurity problems. One of the significant investments made by the government include Productive Safety Net program coupled with other initiatives to improve livelihoods and long lasting solution to food insecurity. Even though the country has a huge

potential to develop the agricultural sector with its crucial and abundant resources such as water and fertile land, still the country's agricultural sector remains to be sensitive to shifts in weather due to the high dependence on subsistence rain fed system. This particular study, has incorporated various independent variables to assess determining factors of livelihood strategies and food security status in the selected study areas. These include age, education and sex of the household head, household size, farm land size, fertility level, total livestock ownership, number of oxen, credit access, fertilizer use, participation in social/peasant organizations, market related access, participation off/non-farm activities, use of irrigation and improved seeds, access to safety net and development agents and etc.

Relevance of the Study

Food security and livelihood related issues are one of the many crucial burning issues of smallholding farmers in Kilte Awelalo Woreda. Keeping in consideration the significance of assessing the urgent needs regarding food security and livelihood in Northern Ethiopia, the literature revealed that various studies and surveys have been conducted in this regard. However, this study is distinct with the measurement indices employed to assess food security and livelihood conditions and to decide on specific variables for intervention. The study is relevant in its grassroots approach to see the determining factors of food security and livelihood in the study areas for an enhanced policy interventions.