



The Impact of Trade Liberalization on Nutritional Status in Bangladesh

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List of Acronyms

FAO	Food and Agriculture Organization
WHO	World Health Organization
UNICEF	United Nations International Children’s Emergency Fund
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
AFTA	Association of South East Asian Nations’ Free Trade Agreement
GDP	Gross Domestic Product
CBN	Cost of Basic Need
HHIE	Household Income Expenditure Survey
DHS	Demographic and Health Survey
WFP	World Food program
SAP	Structural Adjustment Policy
WDI	World Development Indicator
BBS	Bangladesh Bureau of Statistics
MDG	Millennium Development Goal
H-O	Heckscher-Ohlin
AoA	Agreement of Agriculture
WTO	World Trade Organization
FAOSTAT	FAO Department of Statistics

Abstract

The present study examines the relationship of nutritional status with trade liberalization in the context of Bangladesh using time series data from 1990 to 2010. Average tariff rate is used as the key variable to measure the openness of the economy. Other than key variable of trade liberalization, the study employs four variables namely real GDP, agricultural land, value of imported food and reserve of foreign exchange to assess the availability and accessibility to food that improve the dietary energy intake.

Many empirical studies have addressed the consequences of malnutrition with relation to international trade. However, this study pays attention to some new variables to investigate the relationship between nutrition and trade liberalization in the context of Bangladesh. The empirical result shows that trade openness has positive and significant impact on per capita daily energy supply. The key variables that significantly influence the nutritional status of the country are real GDP and value of imported food. Real GDP shows robust and positive association with nutritional status since with rising GDP people are able to diversify their food consumption to fulfil their nutritional requirement. The study finds the value of imported food is significant and the impact is according to our expectation.

Relevance to Development Studies

Globally malnutrition exists as a major concern since 815 million people (12.5% of total world population) are living chronically undernourished. Though FAO claims world food production is sufficient to meet the world demand, people do not have access to available food due to lack of entitlement. Empirical evidences support that malnutrition is hindrance to individual as well as overall development process. Theoretically, international trade helps long run economic growth. Thus, trade can take the salient role of moving food from surplus to deficit area and improve the entitlement to food through economic development. Although the role of trade on malnutrition is empirically well documented, however, country specific studies do not pay much at-

tentiveness on the role of foreign reserve, value of imported food and agricultural land to assess the availability and accessibility to food which is included in this study. So, it is expected that the study will contribute to empirical evidence on addressing malnutrition with international trade.

Keywords

Nutrition, Malnutrition, Food security, Hunger, Trade liberalization, Calorie intake, Bangladesh, Time series.

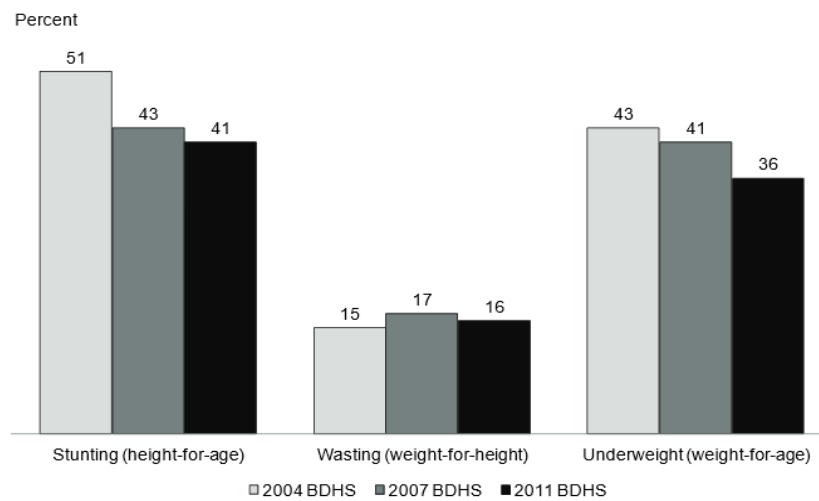
Chapter 1: Introduction

1.1 Background of the study

FAO (2013) data shows that the world food production is enough to meet the current population demand, however one eighth of global population still do not have enough food to fulfil their minimum daily dietary requirements (United Nations 2013). Global concern regarding malnutrition is also reflected in Millennium Development Goals (MDGs) by United Nations. MDGs set eradication of extreme poverty and hunger as one of the foremost targets as around 850 million people in the world are currently facing hunger on a daily basis (FAO 2011). Despite the general worldwide reduction in food insecurity, the situation of undernourishment is severe in most of the developing countries. Moreover, South Asia is considered as the habitation for poor and malnourished people in the world (FAO 2005). Bangladesh is one of the densely populated South Asian countries with malnourished people (UNICEF 2014).

On average Bangladesh has GDP growth rate of 5 percent over the last three decades. At the same time, the country has high level of poverty and malnutrition concentration (DHS 2011). According to DHS 2011, there is substantial level of malnutrition prevalence among Bangladeshi children. The latest DHS data shows overall 41% children less than five years age are stunted with 15% are severely stunted and 36% are underweight with 10% severely underweight. Although the trend is declining (Fig 1.1) and wasting is at moderate rate (16 %), yet this points out prevalence of acute nutritional shortfalls. FAO seems correctly perceived that economic growth is necessary, but it is not sufficient alone to accelerate the reduction of hunger and malnutrition prevalent in the world (FAO 2012).

Figure 1-1: Trends in nutritional status of children under age 5 in year 2004, 2007, 2011



Source: Bangladesh Demographic and Health Survey (2011:167)

In spite of its growing agriculture sector, Bangladesh is continuously fighting against malnutrition of its increasing population. It is challenging for the country to provide sufficient food to its 140 million people and it is one of the major difficulties to deal with. Besides providing food, another important task is to ensure the supply of adequate safe and nutritious food both at national and household level. In Bangladesh the overall food and calorie intake is increasing (Figure1-2); however, malnutrition and nutrition status is not satisfactory. Nearly one fourth of the population lives below national poverty line (World Bank 2013). Additionally, malnutrition prevalence in terms of height for age and weight for age is also very high- 41.4 percent and 36.8 percent respectively (ibid). Nevertheless, malnutrition status of Bangladesh is improving and is considered potentially secure (Chowdhury et al 2006, McCorriston et al 2013, IFPRI 2013).

A country can provide food to the population either by self-sufficiency or self-reliance strategy. For self-sufficiency in food, a country depends on the domestic production of food in order to satisfy the domestic demand. But country relying on self-sufficiency program needs to safeguard the production of domestic farmers through some protection measures (FAO 2003). For the second strategy of self-reliance, domestic food security depends on the food from global market and international trade. As it is difficult to rely on only one strategy for sufficient food, most of the countries, especially the developing countries depend on the combination of both the strategies. For achieving

sufficient supply of food, they depend not only on domestic production of food but also import food from global market. Similarly, Bangladesh follows both of the strategies. Besides domestic production, Bangladesh depends on net imports of food, food aid and national food stock in order to meet the demand of food for its population¹. Thus, it is not necessary that a country would produce all its food required to fulfil the demand of its population, rather it can rely on global supply of food. FAO (2003) also argue in favor of this that better food availability is achievable through involving to global market. Therefore, the self-reliance strategy has been immensely implemented since international trade become more flexible nowadays. This strategy is implemented not only by the food deficit countries, but also by the countries where agriculture is the major component of their GDP (FAO 2003). By adopting the policy of importing food they can utilize their resources to the production of other cash crop for export. Accordingly, many countries reform their trade policy to be more open in order to have wider access to international market and increase export competitiveness (FAO 2003).

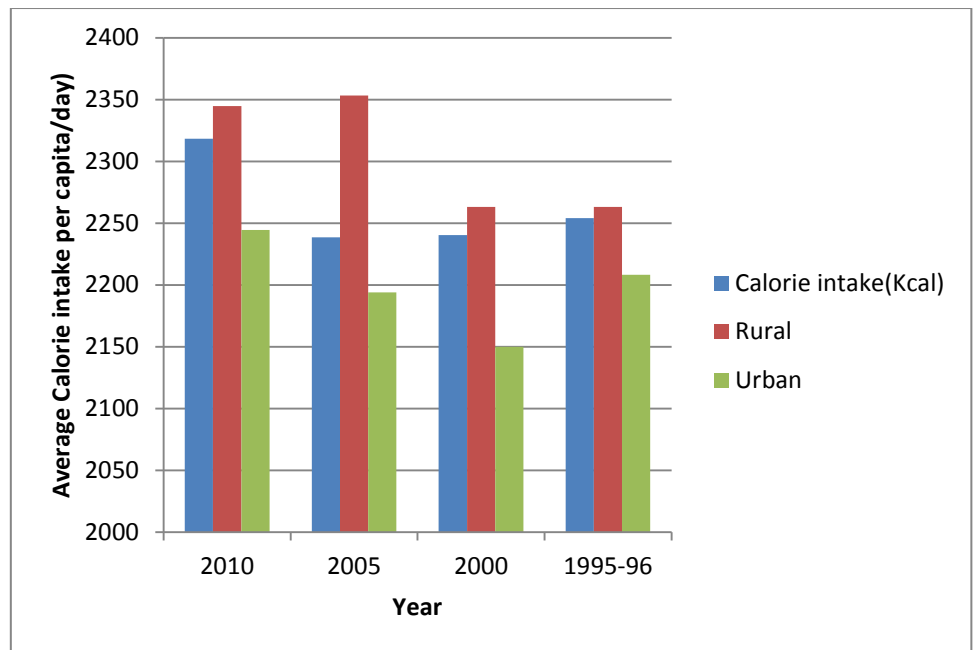
According to Household Income Expenditure (HIE) survey 2010 average calorie intake in Bangladesh was estimated 2318 K cal per capita per day which is nearly 80 Kcal higher than estimation of 2005 HIE survey. Bangladesh achieved a rapid reduction in child under nutrition rate over the last two decades (UNICEF 2005, Heady et al 2014). Even Bangladesh now has lower stunting rate than its neighbouring countries like India and Pakistan, despite both of these country enjoy higher national income. India recorded stunting rate 47.5 percent in its 2005-06 HIE survey and Pakistan 44.8 percent according to 2012 HIE survey where as in Bangladesh stunting rate is now 41.3 percent (Heady et al 2014).

The impact of International trade on country's achievement in faster reduction of malnutrition and increase calorie intake remains largely overlooked and understudied (Heady et al 2014). This paper explores the gap of knowledge by analyzing the heterogeneous change in nutritional status and also explores the

¹ On the national scale domestic food production and import has increased while food aid has decreased. Food Aid declines from about 600,000 MT in 90s to about 300,000 MT in 2004 (Mishra & Hossain 2005)

impact of trade openness on this outcome in Bangladesh. For this purpose, the paper considers different factors related to malnutrition and trade openness such as gross domestic product (GDP), agricultural land for domestic food production, price of imported food, foreign exchange reserve required to import, and average tariff rate. Domestic production and net import of food together determines the domestic food supply.

Figure 1-2: Average calorie intake per capita per day



Source: Bangladesh Household Income Survey 2010

1.2 Statement of the Problem

Bangladesh has attained self- sufficiency in food grain production, especially in rice production over the last three decades (Chowdhury et al 2006, McCorrison et al 2013). Doubling the rice production, improvement in the roads and infrastructures and rise in real income not only shifted the economic development but also the food economy. The common causes of inadequate food in different countries are drought, crop failure, political and tribal unrest, inflation, sharp losses of employment, variation of international price and foreign exchange income, diminishing trend of productive resources as well as

limited access to resources (Uzma and Butt 2004, World Bank 1986). All these factors can deprive majority of a population from acquiring sufficient amount of food which lead to a situation of malnutrition. The experience of Bangladesh is similar. In Bangladesh, agricultural production still subject to flood, drought, pests, diseases (both crops and live stock) and other natural calamity. Moreover, the production of other food has not increase sufficiently along with rice production. In Bangladesh more than 44 million people (31.5 % of total population) facing acute poverty living below food consumption based poverty line (World Bank 2013). People of this group fail to consume sufficient food to fulfil minimum calorie per capita per day along with other necessities. In addition to the inability to an access to food, poor infrastructure may cause constraint to access to food when food can't transfer from surplus to deficit area. Inability may also arise due to poor purchasing power, that is, lower income or higher price of foods. Apart from this calorie deficit, people also fail to consume a balanced basket of food with required nutrients. In Bangladesh more than 50 percent calorie intake comes from cheap cereals and potatoes shown in table 1-1 (Hossain et al 2005, Household Income Expenditure Survey 2010). The dietary imbalance is due to insufficient production of non-cereal food, low income, high price and lack of nutritional knowledge. Food poverty and nutritional education are considered as constraint to people to access to required quantity and quality of food and ensure proper nutrition.

Trade liberalization is assumed to be the driving force of economic development of the developing countries. It is argued that liberalized international trade influence long run economic growth (Chile and Talukder 2013, FAO 2005). Per capita increases of income, price stability, efficient use of resources, development of rural infrastructure is integrated part of long run growth. Thus it is expected that with international trade availability and accessibility to food will improve. Access to international food supply is one of the best ways to avoid local production shortage and price hikes (Keer 2014). Foreign trade allows to access to better and less costly commodities including food, transfers technology and foreign investment. All these benefits increase overall economic activity and income of the participating country. In order to improve trade performances, now a day, almost all countries liberalize trade. Thus, it can be assumed that participation in world trade may have positive nutritional out-

come. At the same time, the flipside of increased openness to international trade is that some countries have to stop production of certain commodities as cheaper goods become available. The adjustment cost of the reallocation of productive resources which can diminishes the potential benefit of trade liberalization. The adjustment of economy may increase unemployment, decrease productivity of the agricultural sector, price volatility and the increased concentration and agglomeration of the food system may throw small and marginal farmers out of their livelihood (Stamoulis and Zezza 2003, Chile and Talukder 2014). The purpose of the paper is to assess the impact of trade liberalization on nutritional improvement.

Table 1-1 : Average per capita per day intake (grams) of major food items in 2005 and 2010 HIE Survey

Food items	2010	2005
Cereals	463.9	469.2
Potato	70.3	63.3
Vegetables	166.1	157.0
Pulses	14.3	14.2
Milk/milk product	33.7	32.4
Edible oil	20.5	16.5
Meat, eggs	26.2	20.8
Fish	49.5	42.1
Spices	66.0	53.4
Fruits	44.7	32.5
Sugar/Gur	8.4	8.1
Miscellaneous	36.5	38.2
Total	1000	947.7

Source: Household Income Expenditure Survey (HIE) 2010

1.3 Relevance and Justification

There is no ambiguity that malnutrition is a manifestation of poor achievement of human rights for basic needs. The result of deficiencies of macro and micronutrients at the childhood is long lasting and has consequences on subsequent growth, morbidity, cognitive development, educational attainment and productivity in adulthood. Thus, improved nutrition is an investment as it is important for survival as well as physical and cognitive development and productivity of a nation's population. A country said to be food secure if there is no or very low prevalence of undernourished population. Undernourishment as described by FAO is 'a state, of continued inability to acquire enough food, defined as a level of food intake insufficient to meet dietary energy requirements' (FAO 2014). A pre-determined threshold of energy is necessary for moderate activities, and the level is different for each country, depending on the demographic composition (i.e. age and gender, weight and physical activity) (FAO 2001).

Using cost of basic needs (CBN) method, Household Income Expenditure Survey (2010) set the nutritional requirement of 2,122 kcal per capita per day for a Bangladeshi individual. Calorie intake below this level is defined as 'extreme poverty' (HIES 2010). Bangladesh is far from achieving this target for its total population. Though the average calorie is quite high (2318 kcal) however, more than 50 million people going hungry every day (World Bank 2013). World Food Program report (2009) estimated that nearly half (45 percent) of the country's population was food insecure (< 2122 kcals/person/day), and nearly one-quarter (23.9 percent) of the population was considered as severely food insecure (consuming less than 1805 kcals/person/day). The number of hungry people in Bangladesh is larger than most other countries globally and nearly half of children in Bangladesh are underweight which make it one of the most severe cases of malnutrition in the globe (Mishra and Hossain 2005). Moreover, Bangladesh is prone to both chronic and transitory food insecurity. It is irony since agriculture is one of the major sectors in Bangladesh economy, which use more than 70% of total land area and employ 45 percent of the total labor force (World Bank report 2014 and Chile & Talukder 2013), cannot assure the food availability. Government mainly depends on import to stabilize the domestic food price.

As discussed above, in order to achieve the food availability Bangladesh has to depend on the imports of food. Less restriction on trade can change the trade pattern. The unweighted average tariff rates of agricultural products decline to 15 percent in 2002-03 from 55 percent in 1991-92 (Alam 2004, World Bank 2013). Besides, there is a very low rate of subsidies on agricultural exports. All these measures help availability of food either by import or by production. At the same time these also indicate the level of agricultural trade openness in Bangladesh.

However, greater volatility in the consumer price in the post liberalization period hurt the potential benefit of the deficit producers and deficit sellers in Bangladesh (Chile and Talukder 2013, Alam 2004). It has been argued that domestic price become more vulnerable to global shock with more open trade. Therefore, in addition to 31.5% poor who are the most food insecure people in Bangladesh, 45% people who are employed in the agriculture sector also become vulnerable due to integration of international trade as their product cannot compete with the increasing cheap imported crop. Thus, though the availability of food has positively affected due to import, malnutrition situation may not have the same change because of unstable domestic price in the country. Rise in food price decrease the purchasing power of the consumer and forced them to adjust the quality of their consumption. As a result this might result a lower nutritional intake. The average intake of food showed a declining pattern after trade liberalization in Bangladesh according to HHIE survey 2010 shown in table 1.2.

Table 1-2: Average food intake (grams)

survey year	Residence		
	National	Rural	Urban
2010	1000.0	1000.5	985.5
2005	947.8	946.3	952.1
2000	893.1	898.7	870.7
1995-96	913.8	910.5	930.8

Source: Bangladesh Household Income Survey 2010

1.4 Objective of the Study and Research Question

The nexus among malnutrition and trade are tricky as well as diverse at the same time (Raihan 2008, FAO 2010). At the national level, the outcomes of trade reform on malnutrition do not indicate consistent pattern. Exactly what will be the effect depends upon the country's specific circumstances and reform it undertakes. Raihan (2008) claims that Bangladesh experienced higher growth in 1990 than in 1980 which is contributed by trade openness. Reduction of tariff helps Bangladesh to increase its food grain production, but fall in food intake was seen at the beginning of trade openness (HIES of Bangladesh, 2010).

The objective of this research is to analyze the influences of trade liberalization on nutritional security in Bangladesh. For this, the study will address following questions:

- i. How the change in average tariff rate affects domestic food supply?
- ii. How does tariff reduction influence domestic food consumption?

1.5 Organization of the Paper

The rest of the paper is organized as follows: Chapter 2 explains the basic trade theories and conceptual framework of food security; and discusses the linkage among trade liberalization and food security. This chapter also provides literature review of previous studies that analyze the impact of trade liberalization on food security. The Chapter 3 presents the condition of food security and trade in Bangladesh. . Chapter 4 describes the research methodology including the model specification and data used in this study. Chapter 5 analyses the empirical result and findings of this research. And finally, chapter six provides the summary and conclusion of the research.

Chapter 2: Conceptual Framework and Literature Review

2.1 Analytical Framework

Trade openness has direct and indirect influence on food availability and accessibility (Thow & Hawkes 2009, Dijk 2011²). Theoretically five features of trade liberalization were recognized as important to under nutrition (Babindra et al 2001, Pinstrup & Andersen 1987, UNSCN 2004). According to the authors trade liberalization affects via following avenues. First, one of the main arguments for trade liberalization is that it enhances economic growth, thus increase household income. Trade also affects government purchasing ability to import food from abroad by lowering barriers and increasing foreign exchange through agricultural exports. Second, effects on the price of food are identified as one of the vital intermediate outcome of trade liberalization on nutrition. International trade mechanism permits the lowest cost producer to settle the world price which leads to cheaper food. Third, trade liberalization has promoted food availability through increase of domestic production. Fourth, trade liberalization expands the market by encouraging export, creating employment opportunity especially for that segment of population who are at the risk of under nutrition in rural areas. Labor market and employment scope for women also encouraged by trade liberalization-thus affecting their nutritional status and that of their children. Fifth, trade liberalization influences the distribution of food by reducing the fluctuation of food supply and price. With more access to border food supply become more responsive to demand and supply to people in need.

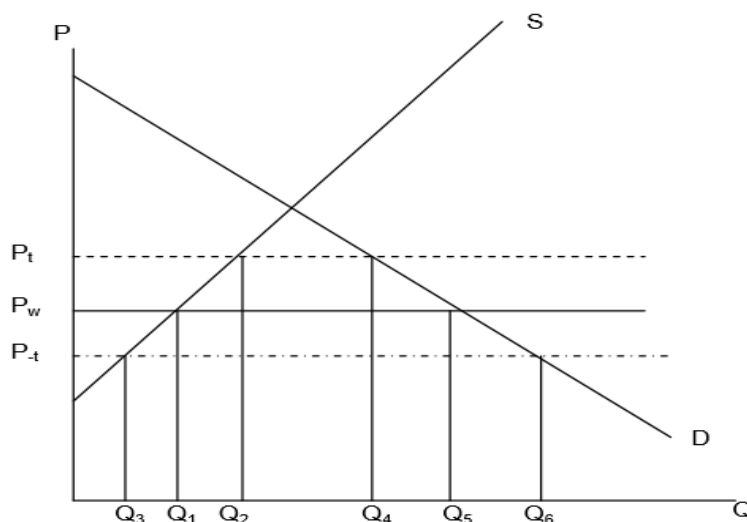
The above mentioned impacts of trade can be analyzed on the basis of partial equilibrium model of a small open country emphasis on the issues associated with food security vis-à-vis malnutrition outcome. Outcome of trade reforms may vary across countries depending on the ‘starting point’ (McCorriston et al 2013:15).The words ‘starting point’ mentioned by authors indicate whether the domestic price is above or below the world price. Effect on mal-

² Cited by Herath (2014)

nutrition will be diverse if the local price is above the international price than it is below. Suppose, due to some trade restrictions policy domestic price is above the international price. Trade liberalization will push domestic price down to world price since by assumption world price cannot be affected by small nation's policy (Salvatore 2001). Reduction of domestic price due to liberalization will influence production, consumption as well as trade of the country. Decline of price will increase the consumers' accessibility to commodities, thereby increase consumption. Domestic production (supply) will be affected adversely with lower price. However, trade will increase with lower price which will improve the food availability. Overall impact is increases of consumption due to expansion of food availability and fall of self sufficiency. On the contrary, when the domestic price is smaller than the world market price, trade reform will force the price up to the world market price, and effect will be opposite: augment domestic production and self sufficiency, but total consumption will fall. Self sufficiency will increase because of an increase in domestic supply and a decrease in import, but will have a negative impact on total availability of food, thereby, adversely affecting consumption and nutrition.

The following figure explain the partial equilibrium analysis of trade liberalization in a small open country in which P=Price, Q=quantity, D=demand and S=supply, P_w =world price and P_t =domestic price.

Figure 2-1: Effect of Change of Tariff on Production, Consumption & International Trade in a small open country

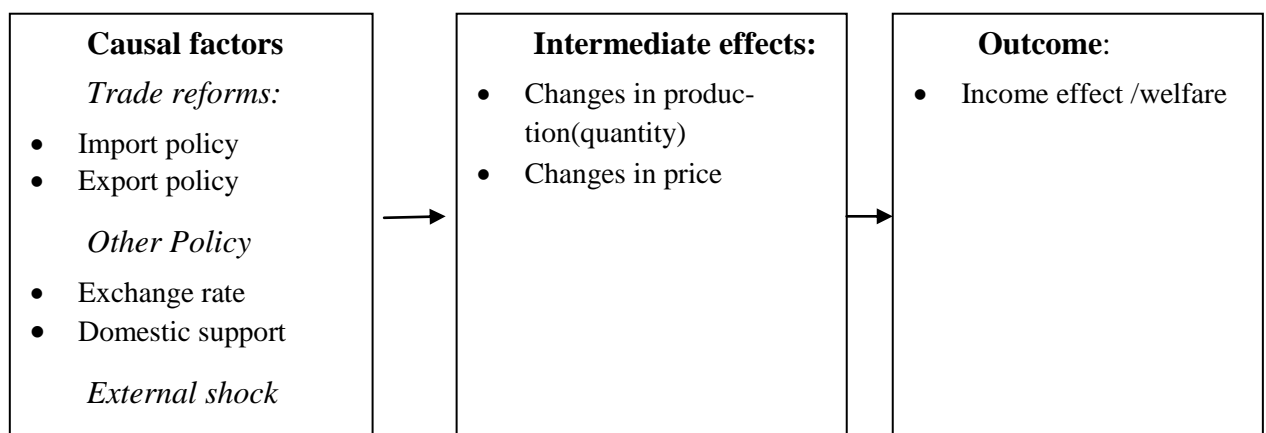


Source: McCorriston et al (2013)

In figure 2-1, domestic price (P_d) is assumed to be above world price (P_w) due to some restrictive trade policy. It is also assumed that policy taken by the small economy will affect neither world price nor the rest of the economy since the volume of trade is small compared to the world trade (Salvatore 2001). With trade liberalization, domestic price moves towards world price. Thus, trade liberalization will decrease domestic supply from Q_2 to Q_1 , increase imports from Q_2Q_4 to Q_1Q_5 and self sufficiency of the economy will drop due to increase of import from $0Q_2/0Q_4$ to $0Q_1/0Q_5$. Considering all effects, availability of food increases as shown in the figure by the increase in consumption from $0Q_4$ to $0Q_5$. When domestic price lies below to the world market price, trade policy liberalization will force the domestic price up to world price. Overall effects are opposite of the above: domestic production increases from Q_3 to Q_1 , import reduces from Q_3Q_6 to Q_1Q_6 , self sufficiency of the economy will enhance ($0Q_3/0Q_6$ to $0Q_1/0Q_6$) and total consumption will decline from $0Q_6$ to $0Q_5$.

In order to isolate the impact of trade liberalization on malnutrition it is worthwhile to have a framework through which it is possible to interpret different empirical studies. In order to do so this study use FAO's conceptual framework that was developed to use the analysis of trade liberalization and food security. As stated above nutritional outcome comes through food security, this framework is also appropriate to analyze nutritional outcome.

Figure 2-2: Framework to linking trade to nutritional outcome



Source: FAO conceptual framework (2003)

Reforms

According to FAO framework, a wide range of policy reform may be important to consider for food security. Moreover, bilateral and multilateral trade reforms would produce different results. In case of unilateral trade reform, policy is implemented domestically to detriment of the other country as it benefits only the domestic country. However, multilateral trade reform changes policies in both countries. Multilateral reform may have influence world market price and may also have a possible impact on the malnutrition of the importing country. However, it will not be easy to isolate the effect of trade liberalization on agricultural sector from a package of reform; similarly, not considering other reforms may show a misleading result of trade liberalization on malnutrition (McCorrison et al 2013)

Intermediate effects

The intermediate effects occur from trade and other policy reforms. The main focus of the intermediate effect is to link the ‘availability’ of food to its ‘accessibility’ criteria. This will be done through the change in domestic production and prices that are a consequence of reform policies. Here the focus will be given on the production and price of food and agricultural commodity rather than on the prices of all other commodities of the economy.

Outcome

Final part is related to nutritional outcome. Average per capita calorie intake and malnutrition and/or poverty indicators are used as a proxy to measure food security. While the attention of intermediate effect is on the ‘availability’ and ‘accessibility’ to food, malnutrition is mainly focused on the ‘utilization’ aspect that is proper use of food.

2.2 Dimensions of Malnutrition problem

Malnutrition and hunger both are the manifestation of household’s exposition to shock and also dominant indicator of food insecurity, poverty and also indication of deprivation of basic necessities of the society (Mazumder 2012:1). The term malnutrition represents the imbalance between the obtained food nutrients and what actually requires. Thus, apparent causes of malnutrition are

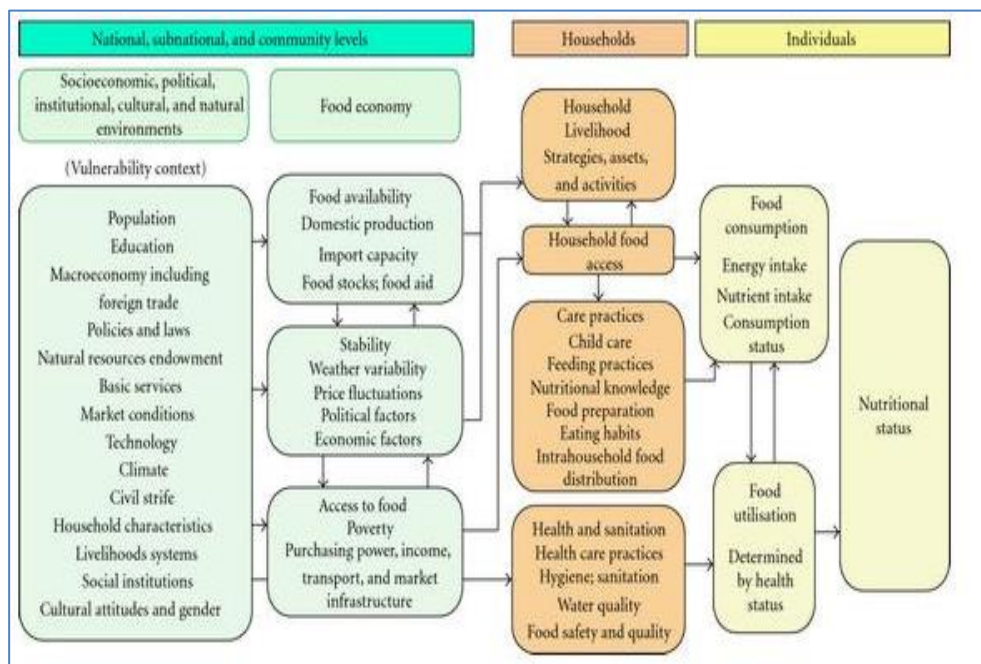
inadequate food intake and disease, however, rudimentary factors are poor maternal and child care practices, household food insecurity and inadequate health services (WFP 2012). Under-nutrition and over-nutrition are the two forms of malnutrition where under-nutrition refers to the intake of insufficient nutrients and over-nutrition describes the opposite (Müller and Jahn 2009). Dietary energy intake is necessary for growth and it retains the optimal health, psychological activity, and happiness. Required level of energy is need for long term good health and at the same time, the balance of dietary energy intake for an extended period is a prerequisite for steady state. The essential level of energy is different for different individual depending on the collective health features (FAO 2001). These features are different for developing countries than those of developed countries. For example infectious diseases, diarrhoeal and respiratory infection are very common in developing countries. Carbohydrates, fats, proteins and ethanol are the sources of dietary energy. Among these sources carbohydrate and fat act as main source of energy in developing countries.

Garret et al (1999) assumes that the determinants of food security and nutritional status are dissimilar for Mozambique. However, they found food security and malnutrition, even the magnitude of effect is very close. Mkandawire and Maltosq (1993)³ relate food insecurity to malnutrition by defining food insecurity as the presence of malnutrition and hunger. Over the last few decades nutrition is at the top of the global development agenda. According to FAO estimation in 2000-02, total 852 million people are undernourished in the world and among the undernourished people more than half of the total number, 61 percent are inhabitants of Asia and the Pacific (FAO 2005).

Due to increasing importance of nutrition WHO and UNICEF (2012) in their joint report identify nutrition as a fundamental pillar for the social and economic development as malnourishment has several life threatening effect. Multilevel factors of malnutrition and the long term vulnerability to nutritional shocks are better understandable through the main facets of food economy: availability, stability and accessibility as explain in figure 2.3.

³ Cited by Herath(2014)

Figure 2-3: Conceptual framework of vulnerability and Nutritional Status



Source: FAO/FIVIMS (2000)

According to FAO (2012) malnutrition and hunger are powerful indicators for food security. The components of food economy-food availability, stability and access to food are considered as vital that can influence nutritional outcome (Fig 2.3). Food security is a flexible as well as multi-dimensional concept. As an operational concept the term has been redefined many times which identifies the complexities in it. During the global food crisis of mid 1970s food security arose as a concept in the international discussion. Initially the main focus of the food security concept was on the supply side of food. In 1974 World Food Summit defines food security 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”⁴⁴. At that time price stability of the basic food stuff at the local and international level drew little attention with the supply side problem (Faridi & Wadood, 2010). The World Bank further elaborated the concept of food security as “Access by all people at all times to enough food for an active and healthy life” (The World Bank 1986: 8) Now the term has been analyzed at global, national, regional, local and individual levels where the importance is given to the supply of food

⁴⁴ Cited from FAO 2003:27

compared to the requirements of these levels (McCorrison et al 2013). New ideas are being incorporated to broaden the narrow definition of food security. At the World Food Summit 1996 FAO defines food security more complex and comprehensively, “food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.”. (FAO 2005: 80).

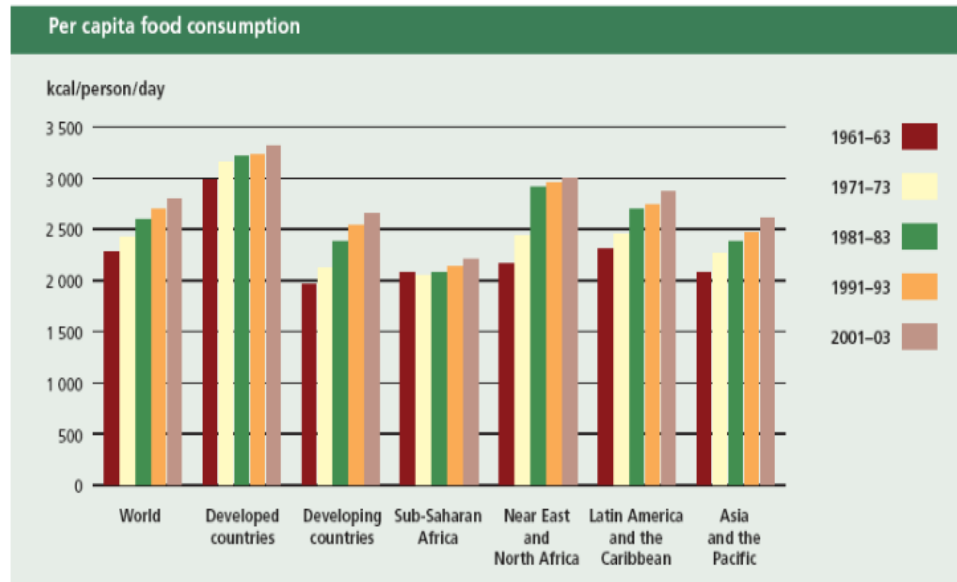
This new definition tries to negotiate a balance between demand and supply side along with nutritional requirements. The literature outlines basic four fold components to define the necessary conditions for food and nutrition security. These dimensions are food availability, access to food, stability of food supply and food utilization (Figure 2.3).

Food Availability (Classical approach)

The classical approach gives emphasis on the availability and supply of sufficient and nutritious food to fulfil the dietary requirements of an active life of an individual. Availability refers to supply of food from all sources such as local production, import, existence of food stock and food aid. Thus, availability determines the supply side of the concept which is related to the physical existence of enough food for all and hence it is the first condition to achieve food security. According to FAO (2007) global food supplies are more than sufficient(Figure 2.4) to provide all individuals with required calories need for active and healthy life provided that food were distributed equally. However, this abundant food is not distributed equally. So about 870 million people (15% of world population) are living undernourished having less calorie intake than required (FAO 2012). Thus sufficient supply of food at the international or national level cannot assure the micro level food security i.e. availability of food does not necessarily imply access to food by all. During mid 1960s Asian green revolution successfully increased domestic food (cereal) production, yet household nutrition status did not improved much and many people suffer from starvation. Since unavailability of food is one of the constraints in improving nutritional status, all factors related to food chain from production to consumption is integral part of malnutrition. Broadly, constraint to accessibility to

the available food is one of the main causes of the people starvation. Therefore, for nutrition it is crucial to ensure the accessibility to the available food.

Figure 2-4: Available food for consumption (kcal/capita/day)



Source: FAO (2007)

Accessibility (Entitlement approach)

Inadequate supply of food is not always the cause of starvation, inability to physical and economic access to food can be the constraint for having sufficient food. In 1983, FAO incorporates the ‘accessibility’ dimension to the idea of food security with the inspiration of trailblazer work of Sen (1981) of ‘entitlement’. The entitlement approach supports the view that ‘hunger is caused by a lack of income, not of food supply’ (Drèze and Sen 1989; Sen 1981). Despite an ample supply of food, Sen shows that starvation and malnutrition arise due to lack of entitlement. According to this approach,

“The food security problem is seen as a problem both of supply and of lack of effective demand amongst the poor. A range of socioeconomic factors (household income, and economic assets, prices, demographic factors and socio cultural factors) is sought that determine access to food” (Yaro 2004: 25).

FAO (2008) also analyzed lack of physical and economic accessibility to food on the basis of policy issues like income, expenditure, market structure and prices.

Access depends on income level of household, purchasing power, existence of transport and market infrastructure and food distribution systems of a country (FAO 2005). Poor infrastructure can increase the input price and also the transportation cost to domestic or global market. Moreover, inadequate infrastructure creates regional poverty since people live in an isolated area do not have access to market hence inhibit economy activities. In addition, lack of infrastructure is obstacle to receive better health facilities and education; consequently people in isolated area are more vulnerable to malnutrition and food insecurity. Therefore, even though sufficient production of food, food insecurity will persist if people do not have the income to purchase it or if the price is very high.

Utilization

Nutritional status of individual is determined by the food utilization. Utilization refers to the proper use of food. Nutrition does not depend only upon the quantity of food we consume to get calorie but also on the micro nutrient of food and dietary diversity. FAO (2005) defines utilization aspect as the safe and healthy food, access to clean water, health and sanitation. Utilization includes the existence of appropriate food processing and storage practices, adequate knowledge and application of nutrition and child care and adequate health and sanitation services (FAO 2000). Access to food or elimination of starvation cannot guarantee good status of health since balance and diverse food is the principal requirement for it (Pellegrini and Tasciotti, 2014). Therefore, nutritional education is vital for ensuring the food value in the developing countries. Adequate knowledge on nutrition, food preparation and diversification of diet can help to have balance food practice. Overall, feeding practice, dietary diversity, and intra household distribution of food refers to the utilization criterion.

Stability

Even if the above three criterion are fulfilled, periodic inadequate access to food can make people food insecure and thereby raising the risk of malnutrition. Stability depends on domestic food production, income, market structure, government and private transfer policy. Adverse weather, price fluctuation,

political and economic factors like unemployment, fluctuation of food price can be responsible for sporadically inadequate access to food. Factors related to risk and uncertainty is described as ‘stability of the other three dimensions over time’ (FAO 2008: 1). This aspect indicates that individual food security can change over time. Time related food insecure depends upon the duration; usually they are transient and chronic. Transitory food insecurity refers to a sudden fall in the ability to produce or access food to maintain a balance nutritional position (FAO 2008:1). This type of food insecure happen because of sudden and unexpected shocks such as natural or human induced disaster that affect food supply, price or household income. Usually this is temporary in nature. When temporary shocks occur repeatedly it would decline the household living standard and eventually resulting into chronic food insecurity. Chronic food insecure occurs when people are not able to meet their minimum food requirements over a sustained period of time (FAO 2008) or when it is persistent. This type of food insecure is mostly due to poverty and insufficient access (physically and economically) to productive resources over a sustained period of time (FAO 2008). Seasonal food security is a situation lies between chronic and transitory food insecurity. Seasonal food insecurity is usually predictable and follows a known incident hence has some similarities to chronic food insecurity. However, the time span is limited for seasonal food insecurity, hence viewed as transitory food insecurity. This type of insecurity is connected with the seasonal variation of climate, cropping patterns, work opportunities and diseases (FAO 2008).

Linkage between Malnutrition and Poverty

The linkage between malnutrition, hunger and poverty are very close. Hunger is the state of food deprivation. According to FAO “all hungry people are food insecure, but not all food insecure people are hungry, as there are other causes of food insecurity, including those due to poor intake of micro-nutrients” (FAO 2008:3). Malnutrition is defined by FAO (2009) as the imbalance in consumption of macro- and/or a micro- nutrient which may be an outcome of food insecurity whereas poverty is considered as the underlying cause of hunger and malnutrition. State of undernourished is equivalent to sufferings from food starvation (FAO 2008).

More than one billion people live on one dollar per day and are facing extreme poverty (FAO 2005) usually consume less than 2,100 calories per day (Ahmed et al 2007). Even if a person consumes enough calories, this does not guarantee appropriate intake of essential micronutrients such as vitamins and minerals. Micronutrient malnutrition often called “hidden hunger” is not easily visible from clinical signs of a wasted body. FAO (2005) estimates the number of malnourished people in developing countries is 815 million. Among them the two-thirds of total population are from Asia (Table 2.1). Concentration of poor people is also high in Asia.

Table 2-1: Food and Hunger indicators by region

	East Asia	Latin America & Caribbean	East & north Africa	South Asia	Sub-Saharan Africa	Developing countries
Per capita food consumption (kcal/person/day)						
1964-66	1 957	2393	2290	2017	2058	2054
2000-02	2 874	2 848	2975	2397	2247	2659
Millions of people undernourished						
1990-92	275	59	25	291	166	817
2000-02	152	53	39	301	204	815
Millions of people in poverty (\$1/day)						
1990	472	49	6	462	227	1218
2001	271	50	7	431	313	1089

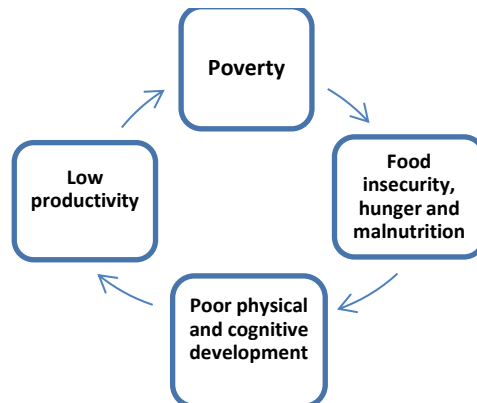
Source: FAO 2005

Linkage between Poverty, Malnutrition and Productivity

Explicitly malnutrition demonstrates inadequate attainment of human rights of basic food. Good nutrition is a prerequisite for individual well being and development of a country. However, good nutrition is not only a determinant of development, but also an outcome (UNICEF &WHO 2012). The two way relationship between nutrition and development is equally applicable to malnutrition and poverty. Micronutrient deficiencies at the early age hamper optimal

physical growth and cognitive development. Poverty causes low productivity through malnutrition and poor physical and cognitive development. Thus improving nutrition is a form of investment on human capital which enhances productivity and contributes to long run economic growth (ibid).

Figure 2-5: Interrelation between poverty, malnutrition and productivity



Source: FAO (2008)

Correlations between Trade Liberalization and Access to food

It is always difficult to demonstrate the existence of precise relationships between international trade and nutritional status. This is partly because of the complex “multi factorial etiology” of nutrition (Fleuret & Fleuret 1980:250) and partly because of the highly variable and diverse outcomes of increased integration to international trade. The debate over this correlation lies at the very root of the economy and the exact effect depends upon the economic features of the particular country. Fleuret & Fleuret (1980) identified the core reasons of consumption related malnutrition: 1. Inadequate food production caused by shortage of land, labour, capital or any one of these 2. Some people do not have access to food or the appropriate kind(s) of food provided that production is adequate 3. Cultural factors such as diet preferences, intra household distribution cause unhealthy diet pattern even with sufficient food production 4. In spite of having enough food production and overall income levels, certain categories of the population are constrained by other social and economic factors to make consumption decisions that are inconsistent with good nutrition. Sen (1981) emphasises on the lack of entitlement to food as a main reason of mal-

nutrition. The problem of entitlement is not related with inadequate production of food; rather some people cannot afford enough food or the appropriate kind(s) of food due to deprivation of a source of income. The classical development theories argue that free trade benefits economic growth and thus growth negatively affect hunger and malnutrition by creating scope of income and access to food. This view maintains that protection on trade reduce world welfare since liberalized or less restrictions on trade enhance more efficient use of resources. Thus trade plays an important role in raising production and income and help to get rid of the vicious circle of poverty. This will also help to create a 'vicious circle of raising productivity' (FAO 2005). Additionally; trade opens the door to flow produced goods to surplus to deficit area. Open trade also increase overall incomes through the benefits to exporters and importers. These are the main channels through which trade can assure better food security. During 1990s depletion of tariff and exchange rate movement increase the food imports in many African countries as explain in FAO (2005) report. Some countries import more because of the reduction of food production at that time. Yet, import of food does not assure the good nutrition. Among Kenya, Morocco, Senegal and Tanzania, only Kenya avoided nutrient decline. Per capita food production and per capita nutrients availability exhibits strong relation. Effect of lower production on rural income and the relying of nutrition on income level hamper other countries nutrient availability. Thus the critics argue that free trade model gives benefit to powerful, hamper the multilateral trade negotiation process. So trade liberalization ultimately hamper food security as scale intervention and size concentration throw the marginalize farmers out of the system, creates unemployment and poverty (Chile and Talukder 2014). According to this view trade liberalization protect the smaller part of the society at the expense of the many.

In the trade-food accessibility relation, first linkage occurs at the border (FAO 2005). When a country reduces its tariff as a liberalize policy this will lower the market price of imports at the country's border. The transmission of price from border to local market to producer, consumer and house hold depends on country's infrastructure and geographical factors. Price changes in domestic market change the relative price. In response to change in price households alter their consumption habit, change their working hour even their job.

Household's long term investment in human capital can be affected. In the long run free trade boost up the productivity, investment in market institutions, infrastructure, technology and human capital and all these are better policy for achieve a long term growth (The State of Food Security and Trade, FAO 2005). Critics, on the other hand, claim that open trade adversely affects growth, especially in the short run. Liberalized trade in developing countries interrupt market, reduce the incentive for local production and make poor people more vulnerable to international shocks. Chile and Talukder (2014) claim that scale intervention and size concentration due to increased trade throw the marginalize farmer out of the system, creates unemployment and poverty.

2.3 International trade theories

International trade is one of the most important economic activities and now a day's almost all the countries in the world involve in it. There are several factors behind the involvement of international trade: (1) To expand the market of a country's commodity; (2) To obtain foreign exchange for finance domestic development; (3) The differences in supply and demand across the country for a particular product; (4) The difference in relative cost in producing a particular product; (5) Differences in natural resources endowment between countries (Krugman and Obstfeld 2003, Salvatore 2001). Moreover, according to Salvatore (2001) international trade provides benefit for the countries specialize in producing the goods and services –production of goods and services become more efficient. A country's development will more connected with the development of other countries. International trade is one of the major benefactors to ensure the access to food upon which a country's food security as well as nutrition depends (Kerr 2011).

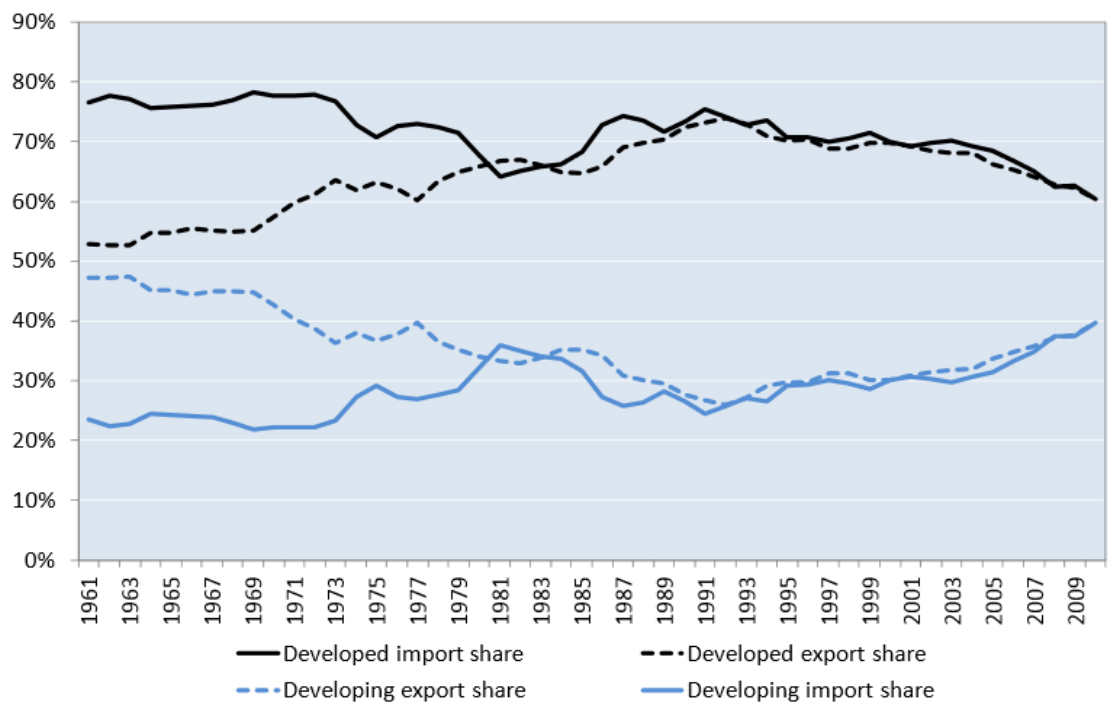
According to the absolute advantage theory by Adam Smith, absolute advantage is the basis for international trade between two countries. In general, absolute advantage theory states that if a country is more efficient (has an absolute advantage) in producing a commodity 'A' compared with other countries, but is less efficient (having absolute disadvantage) to produce commodity 'B'; then, both of them can gain profit by specializing in the producing and exporting the commodity that has an absolute advantage and trade with a com-

modity that has an absolute disadvantage. Through this process, resources in both countries can be used in the most efficient way and the production of both commodities will increase. The increase in output will measure profit of specialization of production for the two countries to trade (Salvatore 2001). In 1817, David Ricardo introduced Law of Comparative Advantage in his book “Principles of Political Economy and Taxation”. This law has some correction over Smith’s theory of absolute advantage. According to the comparative advantage theory, productivity differences is the basis for international trade between countries, and even if one country has absolute disadvantages in producing all commodities compared to other country, but both countries still can benefit from mutual trade (Salvatore 2001). This could be attained if a country that has absolute disadvantage in both commodities specializes in producing and exporting a commodity that has smaller absolute disadvantages. Conversely, the other country that has absolute advantages in both commodities also specializes in producing commodity that has greater absolute advantage.

Another important theory of international trade is the Factor Endowment theory by Eli Heckscher and Bertil Ohlin or well known Heckscher-Ohlin (H-O) theorem. This theory was developed from the Ricardian model. Similar to Ricardian model, it illustrates trade between two countries that produce two goods. In addition to Ricardian model it assumes two factors of production—labour and capital. The theory states that each country will specialize in production and export the commodity which uses relatively intensive factors of production available in the country and import the commodity which use relatively scarce and expensive factor of production (Salvatore 2001). This theory asserts that in labour abundant countries the relative price of labour intensive product to capital intensive product is lower than in capital-abundant countries (FAO 2003). Furthermore, according to factor price equalization theorem of Heckscher-Ohlin, international trade tends to equalize prices of homogeneous factors of production in both countries that engage in trade either in relative or absolute terms. In essence, the theory of Heckscher-Ohlin trade explains that international trade takes place based on the comparative advantage of each state. This theory also highlights the effects of international trade on price or income level of each factor of production. The Heckscher-Ohlin (H-O) model serves the most recognized basis for the pattern of international trade with dif-

ferent factor endowment. Commonly developing countries are regarded as labour abundant country and producer of agricultural commodities since agricultural goods are labour intensive goods. Thus, very often it is argued on the basis of H-O theory that developing countries are net exporters of agricultural goods while the developed countries are net importer. However, world trade pattern shows that developed countries hold the lion share of world agricultural trade (Figure 2.6). Thus, considering trade pattern it can be argued that agricultural goods are not labour intensive rather developed countries controls the power of product differentiation by holding abundant arable land, natural resources and improved technologies. Hence, at the present time developed countries are the principal food producer of the world since they have the advantages over factors of production and the technology of production. As a result of higher productivity, food price is relatively lower in developed countries. The price difference induced them to export food where it is short and this “expertise to arbitrage will at the end moderate food price” (Kerr 2011: 48).

Figure 2-6: Developed and developing⁵ country shares of world agricultural trade



⁵ Developing countries include transition economies

Source: Brooks & Matthews (2013) based on FAOSTAT data

2.4 Effects of Trade liberalization: Empirical Evidences

International trade reform is one of the several factors that can affect the dimensions of malnutrition. Hawkes (2007) claims the global decline of the proportion of child and adult undernourishment due to international economic integration. The author also claims that trade liberalization influence under nutrition through its effect on food security and poverty (Hawkes 2007). The primary impact of trade liberalization is on the employment of the population who are more vulnerable to malnutrition (particularly rural dwellers and women), household income, food price and food imports and exports (ibid). These factors influence income and thus food entitlement. However, at the aggregate level trade reform creates some losers as well (McCorrison et al 2013).

International trade can improve food security through different channels as described by Brooks and Mattheve (2013). According to the authors international trade utilize resource efficiently, transfer products from surplus to deficit area, increase income of exporters (in the form of higher prices than would be received in the absence of trade) and importers (through lower prices than would otherwise be paid) and overall rise of per capita income (Brooks and Mattheve, 2011:1, Hawkes 2007). Empirical evidence shows that after 1995 the share of food import of developing countries has rose in the world trade (FAO 2005). The factors behind the stimulation of food trade include population and economic growth, foreign exchange liberalization as well as reduction of trade hindrances (ibid).

International trade can benefits all except those are forced to adjust suggested by Hailu (2010). The author express this view as he found the Agreement of Agriculture (AoA) of WTO favors the producers of developed countries at the expense of developing countries including Africa. The author claims that trade reform policy have limited the agricultural sector of the country and erode domestic production. He found the food security situation of African countries worsen by the removal of the restrictions on market access. Even, many African countries become net food importers from net exporters after the imple-

mentation of the policy. Trade liberalization do not have the positive result on food and nutritional status as described by Panda and Kumar (2009). In India food security and nutritional status of the poor do not improve following trade liberalization though GDP growth and income poverty reduction was observed (Panda & Kumar 2009). According to their study bottom 30 percent of the population both in rural and urban areas suffer a decline in calorie and protein intake from stimulation of trade reform (Panda & Kumar, 2009). Due to limited reforms of trade policy consumers price increases faster in urban area than in rural area. Moreover, price of all food commodities increase than the non food commodities which in turn affect the accessibility to food of the individuals. In addition to this, domestic producers face difficulties as cheaper imported commodities capture larger proportion of total supply (Hawkes 2007). Cervantes-Godoy and Dewbre's study⁶ has pointed the positive impact trade reform on agriculture sector contributes higher malnutrition depletion in developing countries than its impact on manufacturing and service sector. Herath (2014) in his study found favourable influence of trade reform on foreign trade in China which causes the foreign trading growth rate higher than GDP growth rate during reform period. Yet, impact of trade liberalization on food security is not significant. The experience of South East Asian countries is positive on the level per capita daily dietary energy supply after formation of association of South East Asian Nations' Free Trade Agreement (AFTA). Nepal has gone through extensive trade liberalization during 1980s and 1990s. In post liberalization period Nepal has experienced positive outcome regarding undernourishment, but stunting outcome is worst according to Pyakuryal et al (2005). The authors assume shortage of complementary policies is responsible for the uneven outcome.

⁶ Cited by Herath (2014)

Chapter 3: Overview of Malnutrition and Trade Liberalization in Bangladesh

3.1 Trade Liberalization in Bangladesh

International trade liberalization implies the process of removing or reducing tariff (such as duties, surcharge and export subsidies) and non tariff barriers (such as regulations, quotas) that prevent the free flow of goods and services between trading countries (Chile & Talukder 2014, Eicher et al 2009). Over the last 40 years developing countries has executed trade liberalization with the hope of growth stimulation. Theoretically, unrestricted access to regional and international market can bring benefits by expanding the market, increasing the demand for domestically produced goods and services, gains from economies of scale, and increase economic growth rates due to short run gains from efficient resource allocation. After the independence, import regulations, high import tariffs, export taxes, quantitative restrictions and an overvalued exchange rate were the major features of trade policy of Bangladesh. Bangladesh has gone through a major trade policy reform during 1980s at the behest of IMF and World Bank as a part of Structural Adjustment Policy (SAP). The main objectives of the policy were to improve the position of the country's balance of payment and create a protected domestic market for the domestic manufacturing industries (Raihan 2008). Reform undertook by liberalizing the input markets at early 1980s (Hasan 2012). Mainly two resonance of reform take place between late 1980s and early 1990. At the beginning of 1980s subsidies on agricultural inputs were reduced along with liberalized input trading .In 1990s reform comprised imports of inputs, private trading in grain markets and public distribution of grains. Both input and output markets become entirely liberalized over a period of fifteen years (ibid). Chile and Talukder (2014) and Raihan (2008) has explained the features of international trade policy into three phases. In first phase of 1972-1980, restrictions on international trade included controls over both agricultural exports and imports along with non-tariff barriers (NTBs), heavy duties and fixed exchange rate system. According to Raihan (2008) Bangladesh followed import substituting industrialization policy with some key objectives- protect the country's infant industries, reduce the balance

of payment deficit, manage limited foreign exchange efficiently, prevent the country from international capital market and exchange rate shocks, minimize fiscal imbalances and attain higher economic growth and self sufficiency. The second phase is called the ‘moderate import liberalization’ period (Raihan 2008:4) which begun at 1981-1990 by relaxing the tariff and non- tariff barriers on agricultural trade. Denationalization, deregulation, withdrawal of price controls and noteworthy liberalization of agricultural input -output markets are also feature of this phase. The third phase which started at 1991 was characterized by considerable reductions of NTBs and average tariffs on agricultural trade and investment, switched from fixed to flexible exchange rate system and large scale privatization of input procurement and distribution process of agricultural sector. According to Chowdhury , Farid and Roy (2006:2) early 1990s is the period of ‘extensive liberalization’ as both agricultural input and output markets, private imports of fertilizer and grains were liberalized at this period.

The transition of food and agricultural policy of Bangladesh exhibits similarities to Indonesia (Chowdhury et al 2006).During 1988-1992 liberalization of fertilizer and minor irrigation equipment notably increase the area under irrigation at the dry season resulting in boost up of rice production (ibid).Both rice and overall food grain production growth rate was significantly larger in post liberalization period which outstripped population growth rate (table 3-1). In most cases there is almost a twofold growth rates of agricultural production in the post liberalization period.

Table 3-1: Growth rates in pre –and post-liberalization periods (%)

Growth rate of rice & all food grain	Pre-liberalization periods (1980/81-1992/93)	Post liberalization periods(1993/94-2003/2004)
Rice production	2.61	4.78
Food grain production	2.46	4.66
Rice supply per capita	0.47	3.21
Food grain supply per capita	0.148	3.063
Import ratio of national food grain availability	10.4	10.2

Source: Chowdhury et al (2006)

The major changes in agriculture and food policy under the liberalization is shown in the following table⁷.

Table 3-2: Major changes in Agriculture and Food Policy in Bangladesh

Year	Important Changes
1979	The World Bank provide an important document ‘Food Policy Issues’ that holds all the prime policies and issues in controlling food sector of the country.
1980	Public Food Distribution System was reformed. Rural rationing and distribution through safety-nets (food for work, vulnerable group development) were started.
1982	Food policy monitoring unit (FPMU) was established according to the suggestion of the World Bank in Food Policy Issues.
1988	Government omitted the standardization requirement on imported irrigation equipment and allowing low cost imports from China and South Korea.
1992	For the first time private imports of all type fertilizer were permitted by the government.
1993	Imports of wheat and agricultural inputs such as seeds, power tiller were liberalized.
1995	the restriction on rice/food grain import by the private sector was removed
1996	Bangladesh implemented the Uruguay Round Agreement on agriculture.

Source: Chowdhury et al (2006) and Ministry of Food and Disaster Management (2008)

⁷ The table includes only landmark changes

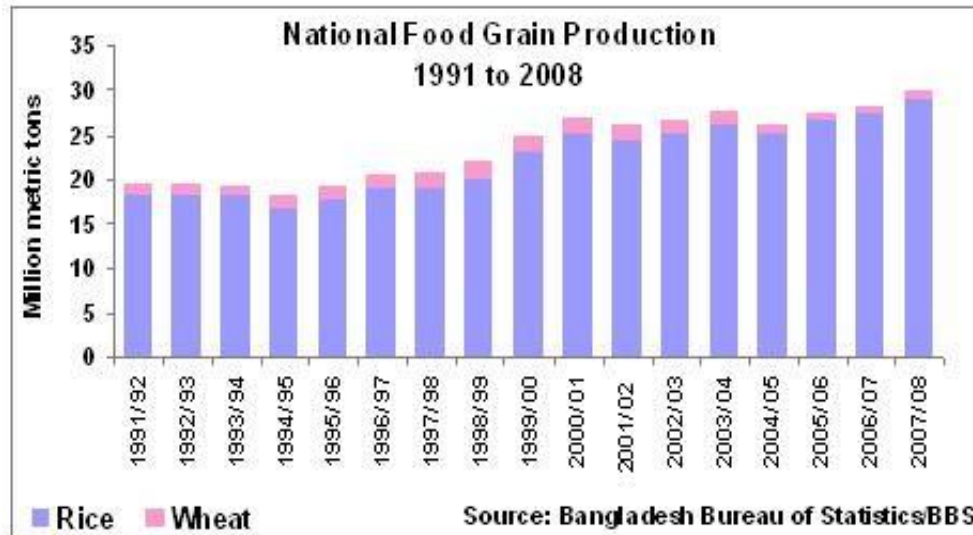
3.2 Overview of Nutritional Status:

Over the last five decades the number of undernourished people has declined in developing countries from 37 percent of the total population to 17 percent (FAO 2005). However, the absolute number of undernourished is moving at slower rate due to population growth. At the same token, in Bangladesh proportion of under nourished has declined from 35 percent in 1990-92 to 30 percent in 2000-02, but the number of people undernourished people has increased from 39.2 million to 42.5 million over this time (FAO 2005).

Bangladesh experienced famine in 1974, just three years after its independence. From this experience of famine all government irrespective of their ideology keep food availability as one of the important agenda. Food economy of Bangladesh has been improving since 1990 and Bangladesh is now a food self-sufficient country (Hossain et al 2005, Akhter et al 2013). The reasons explained by the authors are twofold- increase of rice production by 20 to 35 percent (Fig 3.1) and development in roads and communication structures. During 1990s Bangladesh rice production was higher than target requirements of 454 gm/person/day. Bangladesh depends on import for other cereal and non cereal foods such as wheat, pulses, oilseeds, fruits etc to meet the domestic demand. Wheat consist a major portion in Bangladesh's import since production trend is decreasing (Figure 3-1). Bangladesh imports significant amount of other food items to fulfil domestic need. According to Mishra and Hossain (2005) 70% of pulses and 66% of edible oil demand are met by import. In spite of all these efforts, nutritional scenario has not changed enough. Nutritional status depends on multiple factors. These are grossly related to dietary intake, health and care. These factors are modified by the food security, health and care facilities available in the country. In addition to lower production of non cereal foods, low income, food preference and less nutritional knowledge are also responsible (Hossain et al 2005). According to HHIES (2010) report, at the national level 69.8 percent of the total calorie received by an individual come from cereals of which rice alone contributed 62 percent. The percentage share of cereals declined in consumption to 69.8 percent in 2010 from 73.1 percent in 2005 mainly due to decline in per capita per day rice consumption by 19.6 grams between 2005 and 2010 (HHIE report 2010). The consumption of calo-

rie rich food do not increase much to compensate for the calorie deficit resulting from lower consumption of cereals.

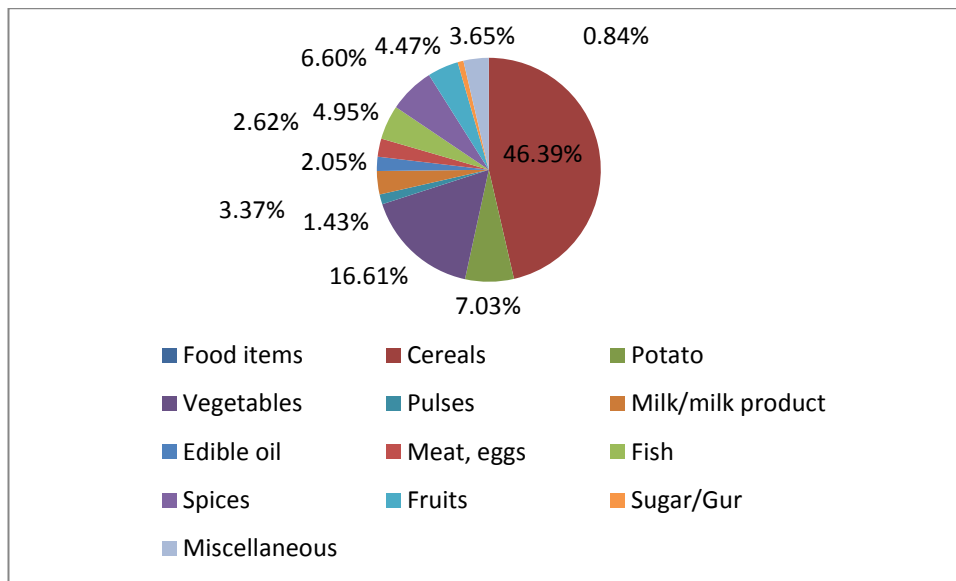
Figure 3-1: National food grain production (1991-2008)



Source: Bangladesh Bureau of Statistics

In developing country usually rural poor are more vulnerable to under nutrition. The reasons explained by Herper (1986) are smaller farm size, more land less families whom do not have any source of income. In Bangladesh almost 43 percent of total population lives on less than \$1.25 per day. People spend 66% of total income for food consumption over total consumption (food and non-food) by the lowest income quintile of the population in 2000 which increased to 68 % in 2005(World Bank 2013, FAOSTAT). Yet, consumption is less than 1805 kcal/person/day (Hossain et al 2005) which is the minimum level of energy intake for a healthy and productive life suggested by Bangladesh Bureau of Statistics (BBS), below this threshold of calorie consumption people are termed as undernourished. In addition to lower calorie intake, above 90 percent of rural population of the country is not receiving enough vitamin A. Women, especially at the reproductive age, are suffering from severe iron deficiency (Akhter et al 2013). Poorer segment of population usually have less access to animal product, fruits and vegetables, thus, suffer from inadequacy of vitamin A, zinc, calcium and other micronutrients (ibid). The proportion of major food items are show in following figure.

Figure 3-2: Percentage of major food consumption



Source: Author’s calculation (Data extracted from HHIE Survey 2010)

Child Malnutrition

DHS (2010) uses three anthropometric indices to measure child nutrition in Bangladesh -height-for-age, weight-for-height, and weight-for-age. Children’s nutritional status shows improvement since 2004(DHS 2010).According to the survey, stunting and underweight rate has reduced 10% and 7% respectively from 2004 to 2010. However, wasting pattern was found opposite. Wasting rate has risen from 15% in 2004 to 17 % in 2007 and turn down to 16% in 2011. Again, the survey finds variation of these measures depending on area of living, gender and income of household. Rural children suffer more from malnutrition than those of urban. This is well documented in literature that child malnutrition is lower in urban than rural area. In a study of thirty six developing countries, Smith et al (2005) come to conclusion that more socioeconomic conditions leads to better nutrition to urban children than those of rural. An inverse relationship is found between family’s income and the indices. In Bangladesh preschool children are most exposed to under nutrition than the other family members suggested by Akhter (1993). The report of Ministry of food and disaster management (2008), BBS (2005) confirms another important fact that malnutrition prevalence do not limit among the poor household of the country. Child malnutrition is largest among the lower income quintiles (46-50%), it is also large among the richest income quintiles (33%) (The of Min-

istry of food and disaster management (2008). Poor households are undernourished due to inability to access to nutrition enriched food .On the other hand, the wealthier people has the access, but they do not choose the proper basket of food.

Table 3-3 shows the overall status of the above mentioned indices in Bangladesh in 2010.

Table 3-3: Malnutrition Status of Children (2010)

	Area			Gender		Wealth quintile	
	National	Rural	Urban	female	male	highest	Lowest
Height-for-age (stunted)	41%	43 %	36%	42%	41%	26%	54%
Severely stunted	15%	--	--	--	--	--	--
Weight-for-height (wasting)	16%	16%	14%	15%	16%	12%	17.5%
Weight-for- age (underweight)	36%	39%	28%	39%	34%	21%	50%
Severely under-weight	10%	--	--	--	--	--	--

Source: Demographic and Health Survey (2010)

Prevalence of anaemia is another sign of malnutrition among young children and pregnant women. Insufficient dietary intake of nutrients needed for haemoglobin synthesis, such as iron, folic acid, vitamin B12, is the most general cause of anaemia (Pinstrup et al 2001). About 21% to 51% of children in Bangladesh suffer from different level of anaemia (DHS 2010). Female and children in urban area have less prevalence of anaemia.

Women Nutritional Status

Anthropometric measures of nutrition of ever married women, height and BMI (body mass index) has increasing moderately since 2004(DHS 2011). It is

surprising that ‘a double burden of malnutrition⁸’ is turning up in the country due to economic development accompanied with income inequalities (BBS 2005). Prevalence of chronic energy deficiency (BMI<18.5) which leads to lower productivity and less resistance to illness, is 24 percent among women aged 15-49 and overweight (BMI≥ 25) in the same age group is 17 percent (DHS 2011). Deviation is visible with age, area and income. Women in higher age group, urban and highest wealthy quintiles are more likely to be obese than those of lower age group, rural and poor (DHS 2011). There is no clear pattern of anaemia prevalence among women by age. However, it increases with the number of children ever born increases (DHS 2011).

Men Nutritional Status

The DHS (2011) use two anthropometric measures of men’s malnutrition- height and weight. According to the survey 67% of men have normal BMI while 27% are undernourished and 6% are overweight. There are large fluctuation in BMI depending on the context .For instance young ever married (age 20-29) and rural men are presumably more undernourished than higher aged and urban men. At the national level 32% of rural men are undernourished whereas it is 18% in urban area.

The change of overall nutritional indicators suggested by FAO is shown in following table.

Table 3-4: Status of nutritional indicators of Bangladesh (1992-2010)

Year	Prevalence of food inadequacy ⁹ (%)	Number of people under-nourished ¹⁰ (million)	Depth of the food deficit ¹¹ (kcal/person/day)
1992	41.2	36	247
1993	41.8	37.4	252
1994	43.5	39.8	264
1995	45.6	42.6	277
1996	46.6	44.2	279

⁸ The coexistence of under nutrition and overweight in the same population.

⁹ Percentage of the population that is at risk of not covering the food requirements associated with normal physical activity.

¹⁰ Number of people under risk of undernourishment.

¹¹ Indicates how many calories would be required to lift the undernourished from their status, everything else being constant.

1997	46.2	44.2	270
1998	44.4	42.6	251
1999	41.2	39.3	222
2000	37.3	35	189
2001	33.3	30.5	158
2002	30.6	27.7	140
2003	28.9	26.2	129
2004	28	25.5	124
2005	27	24.7	118
2006	26.5	24.4	116
2007	26.2	24.3	114
2008	26.4	24.8	115
2009	26.4	25.1	116
2010	26.7	25.7	119

Source: FAO STAT (2013)

Despite the improving national nutritional status, there is significant variation in rural urban nutrition level. According to HHIE report (2010) rural people on average take more calories (2344.6 kcal /capita/ day) than those of urban people (2244.5 kcal/ capita/day). This happens mainly due to the fact that rural people consumed more rice on average which is calorie rich than the urban people. However, Child Nutrition Survey of Bangladesh (2000) confirms that rural residences are more related to both underweight and stunting.

National food Policy

The Ministry of Food and Disaster Management of Bangladesh approved the National Food Policy (NFP) in 2006 to address the problem related to food availability, accessibility and nutrition of food. At the beginning in 1997 the policy was initiated to address the issues related to food diversification, and nutrition. According to the report of Ministry of Food and Disaster Management (2008) the policy has three main objectives and 12 more specific strategies. First objective is adequate and stable supply of safe and nutritious food. Second, increase purchasing power and access to food of the people. Third, Adequate nutrition for all individuals, especially women and children. In order to achieve these targets several steps are taken for efficient and sustainable rise of

food production, efficient market, price stabilization, transitory stock management, employment generating income growth, supply of sufficient nutritious food for vulnerable groups, provide safe drinking water and improved sanitation and safe quality food .

Chapter 4: Methodology and Model Specification

4.1 Data

In order to identify the impact of trade liberalization on malnutrition time series data of 1990 to 2010 is used. Secondary data used in this study are collected from FAO statistics division database (FAOSTAT), World Bank and the Tariff commission of Bangladesh. Data for real GDP, agricultural land area, imported food prices, foreign reserves are collected from World Bank Development Indicators (WDI) of the World Bank database and average tariff schedule from Tariff commission of Bangladesh. Per capita daily dietary energy supply is based on the Food and Agriculture Organization of the United Nations Statistical Database (FAOSTAT). The multiple regression analysis is employed to find the trade impact on nutritional status. Nutritional status depends on individual food consumption and food utilization. According to the FAO/FIVIMS (2000) conceptual framework (Figure 2.3) food consumption and food utilization are supported by food economy which comprises three dimensions namely food availability, stability and access to food. To achieve the vital objective of the study per capita daily dietary energy supply is taken as dependent variable to measure the food consumption and utilization of food which represent the nutritional status. A set of independent variables which influence the per capita daily dietary energy supply are used to capture the impact of trade reform in time series regression model. Average tariff schedule is employed to capture the degree of openness of the country. The economic and geographic factors which can influence the per capita dietary energy supply are represented by the control variables of the regression analysis. Some variables have a number of missing observations (per capita daily dietary energy supply, openness), but this is less than 10% of the observations. These variables are recorded where dot (.) represents the missing value.

4.2 Model specification

As mentioned earlier, food security confirms nutritional adequacy of diet for all time and the state of health confirms the utilization of food, together deter-

mines the nutritional security of an individual. Therefore the actual responsible factors of nutrition security are dietary intake of macronutrients (energy, protein, fat etc.) and micronutrients (vitamins, iron, iodine etc.) and the health condition of individuals. This study gives emphasis on the dietary intake of macronutrient as a determinant of nutrition. Moreover, since the exact effect of trade depends upon each country's specific circumstances and also whether trade policy is according to other national policy (FAO 2005), the empirical model has identified a set of independent variables which can influence the degree of nutrition of a country. A country's food security performances measure its nutritional status (FAO/FIVIMS 2000). Based on literature it is assumed that national food security can be measured by per capita daily dietary energy supply, prevalence of undernourishment or by global hunger index provided by IFPRI (FAO 2005, Mathew 2013, Herath 2014). Here in this study food security is measured by per capita daily dietary energy supply. This variable refers to the amount of food, expressed in kilocalories (kcal) per day, consumed by an individual. Low calorie intake indicates a person is not taken sufficient nutrient to perform his/her daily activities and vice versa. Openness is used as a proxy for trade liberalization. High value of openness implies countries integration to the global market is deep, which suggests trade restriction is low (OECD 2011). Average tariff rate is deploying to capture the openness in this study. The empirical model considers number of control variables which are significant in determining the degree of food availability, stability and access at the national level in addition to trade liberalization variable. Based on the study of Herath (2014) the study formulates its empirical model. Our functional specification assumes real GDP, agricultural land area, imported food prices, amount of and foreign reserves available are key variables to identify the influence of liberalization on the level of food security of a country. By considering these entire determinants, empirical model is constructed and presented in the following equation.

$$\log PDES_t = \beta_0 + \beta_1 \log Y_t + \beta_2 \log AL_t + \beta_3 MFP_{t-1} + \beta_4 \log FRM_{t-1} + \beta_5 Open_t + \varepsilon_t \dots (1)$$

Here, $t = 1990$ to 2010 . The response variable (*PDES*) in this equation refers to the per capita daily dietary energy supply in period t which is measured by real GDP (Y), agricultural land area (AL), the price of imported foods (MFP), the foreign reserve (FRM) and the degree of trade openness ($Open$). Further, ϵ_t is the error term of the time series regression model.

4.3 Description of Variables:

The dependent variable is per capita daily dietary energy supply (*PDES*) which is measured by kcal/capita/day. The calculation of FAO's dietary energy supply refers to each country's average supply of food calories available for consumption as a percentage of average dietary energy requirements for the population (FAO 2012). Calorie provides energy to human being for their regular activity and calorie intake shows a person's nutrition adequacy. According to the FAO (2012) hunger portal and Bangladesh Bureau of Statistics (BBS) the average minimum daily energy requirement is about 1,805 kilocalories (7,500 kJ) per person. In the dataset data are given as percentage of value (3 years average). Thus year associated with each observation of *PDES* is the last year of 3 year average.

Trade openness generally employs to measure the integration of the domestic economy to international trade. It is a proxy to trade liberalization. Trade openness can also be measured by the ratio of total merchandise trade to GDP (OECD 2011). However; the volume of trade can be larger depending on the country's location or size of the economy. For this reason, this study uses average tariff rate to quantify the openness of the economy. Thus, lower value of tariff rate suggests that trade restriction is low (OEC 2011) refers high level of openness which implies countries more integration to the global market. The data on average tariff rate is collected from Bangladesh Tariff Commission.

Real GDP or inflation adjusted GDP indicates the real change of income of a country. This study uses the GDP at constant price to capture the availability of resources in the country. Real GDP data are collected from WDI database. Data are in constant 2005 U.S. dollars and the dollar figures for GDP are converted from domestic currencies using 2000 official exchange rates.

This study considers agricultural land area as a percentage of total land area of the country. Agricultural land refers to the share of land area that is arable, under permanent crops, and under permanent pastures. However, the double cropped areas are counted once. Holdings of land are one of the determinants of accessibility to food (Garrett 1999). In Bangladesh agricultural land is so far heavily burdened because of population growth. Thus, land area growth has been a significant factor for agricultural growth in addition to High Yielding Varieties (Chowdhury et al 2006). At the household level possession of land is an important factor for child nutrition. In Bangladesh 50.4 -51% of children were stunted in the families possessing less than 1 acre of land (Child Nutrition Survey of Bangladesh 2000). Data on agricultural land collected from WDI database.

The value of imported food captures the availability dimension. In Bangladesh imported food contributes a large proportion of food supply (Chowdhury et al. 2006). Price of food depends on supply and quantity and quality of food consumption depends on the price of food. Data collected from WDI database and the figures are given in current US dollar.

Foreign reserves comprise special drawing rights, reserves of the country held by the IMF, and holdings of foreign exchange under the control of monetary authorities. Gold holdings are not included in the reserve. Bangladesh depends on import of different foods such as wheat, pulses, edible oil, spices etc. Reserve of foreign currency is important for financing the import of food from global market .It is also important for importation of machinery, technical knowhow for agriculture and industrial set up. Higher reserve means larger capacity of import. Data collected from World Bank WDI database is in current U.S. dollars.

4.4 Hypothesis

Empirical studies found mix result on food security due to trade liberalization (McCorrison et al 2013, Chile and Talukder 2013).The issue remains in the centre of debate and controversy. However, theoretically trade openness improves accessibility to food both in direct and indirect way. Directly channel trade enhance domestic food supply and thereby increase availability. Increase

supply improves the accessibility to food by negatively effecting food price. Again, indirectly trade enhance long run growth, reduces poverty, increase the availability and accessibility to food. Based on this view the study hypothesized that trade openness and food security is positively correlated. With regard to real GDP, it is expected to be positively related to food supply. Since increased national income can be spent for the enhancement of nutritional determinants. Thus, it is expected that increase in real GDP would improve the malnutrition status. Similarly, for value of imported food it is assumed that higher price would worsen consumption; hence, the study expects that the relationship between price and nutrition is negative. The more land area is used for agriculture production the more food will be produced. Hence, expects a positive relationship. Foreign reserve are used for food import .So, the larger the foreign reserve the higher the supply of food and level of nutrition. Openness, measured by tariff rate is assumed to be positively related to nutrition since lower import tariff support domestic country to trade more with rest of the world.

Table 4-1: Measurement and expected sign of dependent variables used in the analysis

Variable	Measurement	Expected sign
Real GDP(Y)	Constant 2005 U.S. dollar	Positive
Agricultural land	Percentage of land area	Positive
Value Imported food	Current U.S dollar	Negative
Amount of foreign reserve	Current U.S dollar	Positive
Openness	Average tariff rate in percentage	Positive

Chapter 5: Analysis and Findings

5.1 Summary Statistics:

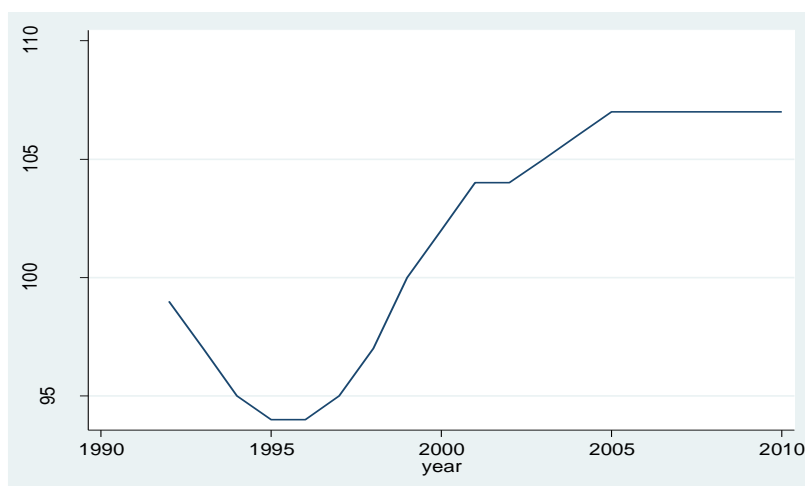
The aim of the study is to find whether integration to international trade influence nutritional status in Bangladesh. Descriptive statistic on nutrition and independent variables used in the analysis is presented in table 5.1. This study use time series data set from 1990 to 2010. The summary of data shows that on average approximately 102% of average dietary requirements of food calorie are available for the people of Bangladesh over the estimated period which is above the minimum figure of calorie requirement referred by FAO. The daily dietary energy supply was falling at the beginning of liberalization period till 1995 as shown in Fig 5.1. After that daily dietary energy supply exhibits an increasing trend from 1995 to 2005 and maintains a steady pattern after 2005 till 2010. Average real GDP in this time period is approximately 49.33 billion dollar. Regarding agricultural land area, data shows on average 72 percentage of total land area is used for the purpose of agricultural during the period 1990-2010. The proportion of land used for agriculture played a key role for achieving the self sufficiency in rice production in 1990s. On the case of foreign currency reserve Bangladesh has average of 3.26 billion dollar to fulfil its import demand over this stipulated period of time. Value of imported food shows that each year Bangladesh on average imported 1.19 billion dollar food from global market. Coming to the main independent variable trade openness, measured by the unweighted tariff rate is approximately 21percent on the average which seems considerable low.

Table 5-1: Descriptive statistics

Variables	N	Mean	SD	Min	Max
Per capita daily dietary energy supply	19	101.789	5.116	94	107
Real GDP of the country	21	49.333	16.188	29	81.5
Agricultural land	21	72.597	2.387	70.991	79.787
Foreign reserves (current US\$)	21	3.264	2.796	0.66	11.17
Value of Imported food	21	1.19	1.01	0	4.10
Trade Openness	20	23.41	13.499	14.9	70

Source: Author's calculation

Figure 5-1: Average dietary energy supply adequacy (%) (3-year average)



Source: Author's calculation (data from FAOSTAT (2014))

5.2 Regression Result

In Bangladesh food grain production starts increasing since mid 1970s and at the end of 1990 Bangladesh has achieved self sufficiency. At this year Bangladesh passed the target threshold in food grain production (Hossain et al 2005). The policy of trade reform start implementing at the same period. This section provides empirical evidence whether trade openness affects nutrition of the country based on availability and accessibility to food.

In estimating the effects of trade liberalization on nutrition, the regression result of empirical model is summarized in table 5.2. From the table it is noted that the key variable of the study trade openness which is used to find the trade liberalization effect is statistically significant at 5% level of significance with expected sign which implies trade openness has positive influence on nutrition of Bangladesh. The independent variables explain 96 % variation of dependent variable of the model. Among the control variables, real GDP and amount of value of imported food are statistically significant variables whereas agricultural land, reserve of foreign exchange is turn out insignificant in determining nutritional status. Real GDP and value of imported food are statistically significant

at 5% level of significance with expected sign. The result of the study indicates that real GDP is positively correlated to nutrition; growth of country's income is important for reduction of malnutrition. The result for the value of imported food shows the higher value of imported food negatively effects nutritional status which is according to our expectation

For correcting the presence of heteroscedasticity and autocorrelation in the regression estimates, Durbin-Watson d statistics is used. For this, following Gujarati (2003) we assume that ε_t follows normal distribution. We also assume that the regressors are strictly exogenous. The estimated Durbin-Watson d-statistics, 1.287 is far from the centre $d=2$. Given 15 observations and 6 regressors (including constant term), the lower bound (d_L) = 0.447 and upper bound (d_U) = 2.472 at 5 % level of significance. Since the d statistics lies between the lower and the upper limit, the decision goes to indecisive zone, hence there is no evidence of presence or absence of positive first order serial correlation (Gujrati 2003:471).

Table 5-2: Estimates of Multiple Regression Model

Dependent variable: *lnPDES*

Independent variables	Coefficients	t-statistics
Constant	0.657 (3.206)	0.20
Real GDP (<i>lnY</i>)	0.345*** (0.0375)	9.21
Agricultural land (<i>lnAL</i>)	0.868 (0.7493)	1.16
Amount of foreign reserve (<i>lnFRM</i>)	-0.0205 (0.0135)	-1.52
Value of Imported food (<i>lnMFP</i>)	-0.0526** (0.0231)	-2.46
Trade Openness (Open)	0.0020** (0.000671)	2.99
Observations(n)	15	
R ²	0.9620	
DW statistics(6 , 15)	1.286	

***p<0.01,**p<0.05,*p<0.1

Source: Author's calculation

The Trade openness

With the incentive of trade liberalization Bangladesh's merchandise trade increase nearly twofold in 1990s and increase of exports was sufficient enough to offset imports (World Bank 1999). However, proportion of food import reduces significantly after 1990s (WDI 2013). The reason was the achievement of self sufficiency in food grain production, specially rice production by Bangladesh in 1990s as claimed by Hossain et al (2005). At that period rice production was higher than the expected level of production. According to the estimation presented in table 5.2 openness influence nutrition significantly. Thus, we can say that affect of trade openness was not direct to enhance food grain import rather it helps importation of other foods, inputs and technology that helps increase in the food production.

The Effect of Real GDP and Value of Imported Food

In addition to trade openness as key independent variable, a number of control variables are employed to assess the accessibility and availability of food. Real GDP, representing the accessibility to the food, is significant. The result is consistent with the prior hypothesis. With rises in GDP people are able to diversify their food consumption to fulfil the nutritional requirement, hence will improve the nutritional level. Thus, calorie intake deficiency decline with rise in income.

To assess the availability of food, value of imported food is included as control variable is found significant. However, the result is not according to the hypothesis that assumes positive relationship between value of imported food and nutrition. Besides domestic production food supply of the country depends on import from global market. Bangladesh imports mainly wheat, edible oil, sugar, leguminous vegetables, spices, fruits etc (Imports data 2014, bridgat.com). Small farmer's income depression causes by more import can be a possible explanation of the negative outcome.

The Effect of Agricultural Land and Foreign Reserve

Area under agricultural land is not significant in this study. The result suggested that agricultural land area does not significantly affect the nutritional outcome in Bangladesh because land under cultivation are used optimally and only

small amount of fallow land are available. Hence, production increase is subject to higher yields. Finally, the foreign exchange reserve do not found significant for nutritional improvement.

Chapter Six: Conclusion

The government of Bangladesh has been giving particular attention to World Food Summit (WFS) target of reducing the undernourished people of the country by half by 2015. In spite of these efforts, almost 43 percent of total population lives on less than \$1.25 per day and consume less than 1805 kcal/person/day which is the minimum energy required by an individual suggested by FAO and BBS. According to the definition of nutrition, it depends on ability to acquire enough food and the level of food intake sufficient to meet dietary energy requirement for performing daily activities. The capacity to acquire food depends on the availability as well as accessibility to food. The study considers both in qualifying nutrition at the national level of the country. In order to mitigate the domestic food shortage Bangladesh depends on international market. Trade liberalization was promoted in this country by the World Bank and IMF during 1990s through structural adjustment policy (SAP). Economic growth and development was anticipated with liberalization. It was expected that trade liberalization would reduce poverty, increase food availability and thus play a role in reducing malnutrition in the country. However, the outcome of trade liberalization is mixed depending on number of factors including the pace, the liberalization extend, preliminary conditions, availability of complementary policies etc.

The study has been carried out with the objective of assessing effect of trade liberalization on malnutrition in Bangladesh. Malnutrition is representing in this study by per capita daily dietary energy supply. Trade liberalization indicator used is openness which is the average tariff rate of the country. The smaller tariff rate implies high openness-intense integration to international market. In addition, a set of control variables used to capture the influence the availability and accessibility to food.

The findings of the study suggest that trade openness is statistically significant and have positive effect on per capita energy supply. This result is favour of the argument that trade openness enhance economic growth which leads to increase of income. With increased income people will have better access to food. Better access implies improved food intake and hence increase in nutri-

tion. The findings of the study further provide the evidence how the daily dietary supply respond to the real GDP and value of imported food. As expected, real GDP of the country has affirmative influence on nutrition. Increase in real GDP shows increase of country's resource. This resource can be utilized for the improvement of infrastructure to facilitate the transfer of food from surplus to deficit region and also for providing subsidized food for the poor segment of the country. Thus, real GDP enhance both availability and accessibility of food. The value of imported food negatively influences nutritional status. This findings support the argument that removal of import barriers increase the supply of imported food which raise the competition in domestic market. Small and marginal producers who are not able to survive with the competition lost their means of income. Since the largest number of people in Bangladesh employed in agriculture (48% according to World Bank 2012) and majority of them are marginal farmers, more import of food adversely affects their means of livelihood, hence accessibility to food and nutrition.

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