Impact of National Security on Food Security in Asia; An Empirical Analysis

Final Thesis

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"We dedicated this Research Project to our parents

who continuously guided us and supported us

throughout the course of this Research."

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List of Acronyms

ADB	Asian Development Bank
ADESA	Average Dietary Energy Supply Adequacy
AgVa	Agricultural Value Added
BD	Best Deaths
BoP	Balance of Payments
CS	Cash Surplus
EqD	Earthquake Damage
EqDeath	Earthquake Deaths
EW	External War Deaths
FAO	Food and Agriculture Organization
FDeaths	Flood Deaths
FI	Foreign Investments
GDP	Gross Domestic Product
GDPG	GDP Growth
GNI	Gross National income
GNI	Gross National Income
GNP	Gross National Product
HDI	Human Development Index
LWR	Lutheran World Relief
MNC	Multinational Corporation
NGO	Non - Governmental Organization
OECD	Organization for Economic Cooperation and Development
PA	Public Administration
Pop	Population
PPP	Purchasing Power Parity
PRA	Participatory Rural Appraisal
Rev	Revenue
SA	Surface Area

Ser	Service Sector Value Added
UCDP	Uppsala Conflict Data Program
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
US	United States
USDA	United States Department of Agriculture
VA	Value Added
VSS	Virtual Statistics System

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Abstract

Asia is known as the region with unprecedented economic growth as compared to the rest of the world but this has not improved the food security situation of the region at large. While the region was successful in reaching it MDG targets of halving the number of hungry people by 2015, it failed to decrease the number of undernourished people. It is argued that this strangulation in achieving goals can be attributed to the outdated perspective adopted towards viewing Food Insecurity. Scholars around the globe argue that food insecurity is a result of national level insecurity. Moreover, it also argued that national security should not be limited to the use of military might to protect homeland against rival states. Instead, today's security is multi-dimensional incorporating security at national, community and individual level, as well as addressing being secure from economic and environmental disturbances. This study aims to measure the relationship between national security and food security in Asian countries. For the purpose of this research national security is conceptualized in a holistic way, as an amalgamation of economic stability, environmental stability and minimal internal and external armed conflicts. In order to deduce conclusions, the study makes use of quantitative regression analysis and checks the correlation between the various indicators of national security and food security. Research is based on secondary data collection from databanks including World Bank, UCDP and FAO. The study allows us to explore that economic disruptions as well as deaths caused by conflicts are significantly correlated with food insecurity. Based on the results of the correlation analysis, the study tends to draw recommendations regarding appropriate course of action that can be adopted in the Asian region.

I.   Introduction

"The quest for food security can be the common thread that links the different challenges we face and helps build a sustainable future."– José Graziano da Silva, United Nations Food and Agriculture Organization (FAO) Director-General

Human Security and its growing significance has been greatly emphasized upon by modern political theorists and policymakers, which can also be attributed to the growth of the humanitarian organizations such as the United Nations and the World Bank. Policymakers around the globe are increasingly emphasizing on factors that have been a consistent source of disruption in human development. Food Insecurity is frequently highlighted as one of the troublesome factors. A report by Food and Agriculture Organization (FAO) reveals, that despite of constant battle against hunger, a large number of people still face chronic shortage of essential nutrients that ensure survival. Even today about 795 million people in the world suffer from undernourishment (FAO, 2015). These measures are expected to worsen with the passage of time.

The global climate change and deviations to the ozone layer are expected to worsen the Food Insecurity situation around the globe. Modern environmental threats and increased probability of being struck by natural calamities every year possess a challenge to economies around the globe to manage and track their food supplies more closely. Food productions where on the one hand strongly depend on climatic elements, its utilization on the other hand greatly depends on economic factors. Economic disruptions such as rise in inflation rate, GDP per capita, Tax Revenues etc. tend to influence the purchase of food supplies. Modern challenges attributed to the economic markets including stock exchange failures, bankruptcy and fluctuating stock prices can intensify international threats to hunger by impacting the affordability of an economy.

With the popularity of capitalists' ideas and rapidity in the rate of urbanization, the damage made to the natural environment has been immense which serves as a particular source of environmental insecurity. Annually, we witness an increase in the number of natural disasters as scientists claim that natural disasters have become more common. According to EM-DAT (an emergency database by US Foreign Disaster Assistance), the number of natural disasters has gradually increased from being 78 in 1970 to 348 in 2004 (Than, 2005). In addition to this, the number of conflicts worldwide has been peaking, be it internal or external. Some stakeholders view this as an opportunity to destroy the opponents' agricultural stock ultimately inducing food insecurity. Middle East being a cauldron of various civil and external conflicts posse a spill over threat to food security in the region (Kizilkaya, 2016). Hence, while the complexity of the modern concepts remains, the evolved questions about how the modern threats impact food security around the globe, remains. Thus, security cannot classically be limited to the use of power but shall also include economic and environmental security which will ensure stable food supplies and utilization by the populations.

This research focuses on the importance of soft security as well as hard security, and their interrelation that requires them to be addressed simultaneously in order to curb food insecurity. The aim of the study is to prove the concrete relationship between national security and food security, where national security is not limited to the use of power only but also includes economic and environmental security. Moreover, the exacerbating food insecurity is addressed through focusing on the production of food supplies only, whereas production aspect is only one small component of food security. Other aspects like affordability, distribution and accessibility which have a direct relation with unstable national security are given limited attention.

This has created a gap in research and all the policies that address food security are directed towards 'production' factor, particularly wheat production. Thus, this research gives equal weightage to armed conflicts, environmental security and economic security in exacerbating food insecurity and brings the attention of the policy makers towards how national security has impacted the overall food security (availability, accessibility and affordability) in a broader context. Moreover, the study will fill the research gap between food security and armed conflicts and will establish a link that while armed conflicts lead to food insecurity vice versa is not a necessary consequence. The research will therefore, prove to be of great use while dealing with social development issues by public administrators as well as it will add to the current researches in the field of social sciences

The study follows such that Section I provides a brief introduction of thesis including the main objectives and significance of the study. Section II is the Background chapter, which familiarizes the key concepts that will be used throughout the study. Section III is the Literature Review Section that provides us with insights of the valuable scholarly contribution regarding the relationship between National Security and Food Security. Section IV is the Theoretical Framework chapter, which explains how food security and its dimensions are aligned with famous theories by different school of thoughts. Section V describes the Methodology used for the purpose of this research. Section VI is the Data Analysis section, illustrating the findings of the statistical analysis. Section VII is the Recommendations chapter while Section VIII is the Conclusion.

Asia and Pacific region has been growing economically at a tremendous rate. While the global economy grew by 3.4%, Asian economy far exceeded this rate by growing at a rate of 7.6% between 1990 and 2010 (ADB, 2013). Simultaneously, the population of Asia has also increased at a tremendous rate such that Asia consists of 30% of world's land whereas is home to 60% of the population of the world. In 2013, the Asian population was estimated to be about 4.299 billion (World Population Review, 2015). The rapid growth in population has led to the increase in demand of food commodities that are protein rich and provide essential nutrient to nurture an individual. Consumption of food in Asia has steadily grow up to 2665 kilocalories to per capita as observed in 2009 (ADB, 2013). However, some areas of the region are still marked with food insecurity which can be attributed to absolute poverty leading to undernourishment of populations. Although, the economic growth of the region has been unprecedented, Asia continues to be the cauldron of three-fifth of the world's undernourished population. Moreover, Asia remains vulnerable to various natural disasters which have resulted in increasing food insecurity. In addition to this, attributing to the increasing rate of urbanization and transition to rural economy to an urban one, the decline in rate of agricultural production has also been alarming for the global leaders.

Universally imposed United Nation's Millennium Development Goals (MDGs) included curbing hunger and undernourishment as one of the main goals. Asia and Pacific has been successful in achieving the MDG target that required halving the proportion of people suffering from hunger between 1990 and 2015 (FAO, 2015). However, there have still been differences among various sub regions and countries in Asia when measuring the food security situation. Out of a total

number of 27 countries, 19 ended up achieving the MDG target whereas the remaining 7 did not achieve the target. This means that only 70% of Asia was successful in achieving food security. Remainder of countries did not achieve targets mainly because of the slow economic progress. Out of these 1 country encountered a chronic increase in the rate of undernourishment (FAO, 2015).

On the contrary, Asia failed to achieve World Food Summit's target of halving the number of undernourished people by 2015. 490 million people in Asia still face chronic hunger. This means that around 62% population of the world does not receive essential nutrient for healthy living. At an individual country level, only 6 out of 27 countries in Asia successfully achieved WFS target i.e. halved the number of undernourished people. Two countries were pretty close to reaching the target whereas 14 completely failed to achieve the target. 5 countries faced a degrading rate and experienced an increase in the number of undernourished (FAO, 2015).

The performance of countries differ due to sub-regional variations in economic growth, food yield, infrastructural strength, macro level economy, environmental policy, internal security situation and political and institutional stability. East and South-Eastern Asia relatively performed better than Southern Asia in terms of strengthening food security which mainly attributed to the economic growth and improvement in agricultural policies in these areas.

Southern Asia, however, lagged behind due to poor infrastructure, and violent armed conflicts. The people of Southern Asian have been victims of chronic poverty, lack of education and poor health systems. This population mainly comprises of landless and marginal farmers, indigenous people, ethnic minorities, people with disability and their families, members of female-headed households, and other disadvantaged groups in society (FAO, 2015).

It has been logically calculated that the world production of food units is sufficient to feed everyone human on earth provided that welfare of people is kept into account and the world economy doesn't face any economic or environmental shock. Economically, the problem arises mainly due to lack of income, accessibility problem and insufficient social protection schemes. The problem however, is not restricted to the current availability of food but to ensure continual access to food i.e. sustainable food security that addresses the present as well as future demand of food (FAO, 2015). In order to address the complicated multi-dimensional food security issue in Asia there is a need to understand the conceptualization of food security. The concept is now being addressed as a national security concern for many developed countries. Thus, in order to understand Food Security, there is a need to first understand related concepts

The concept of national security is dynamic which can be attributed to its "amalgamated nature". Traditionally, National Security was defined as the use of power and military might to protect itself opposing forces particularly rival nations. However, with the formation of Human Development Index and the conception of "*Human Security*", National Security has adopted a much larger definition. National Security now refers to the protection of the state and its citizens from all kinds of national crisis, be it economic, natural disasters, conflicts between groups within the state or external conflict.

Hence, for the purpose of this research, broadly termed, National Security comprises of three major components; economic stability, environmental balance and limited or no internal and external conflicts (i.e. shocks and disruptions).

Thus, National Security in modern theory is multi-dimensional. However, in order to understand how the three components (i.e. Economic Security, Environmental Security and Shocks and

Disruptions) amalgamate into National Security, it is important to individually examine the three through the set of indicators used for the purpose of this study.

Economic Security

Economic Security is defined as the condition where the people of a particular country have a continuous source of income such that it supports their standard of living in the present as well as the future. Essential economic components are used to strategize the economic policy including measures to ensure food security. The more effective a strategy is the stable a society will be in ethnic, political and social terms. The factors which are imperative to prevalence of food security are the reserve resources aimed at tackling any imbalance in the food supply.

Moreover, the regional production and socio-economic atmosphere of a country plays an integral role in ensuring food security hence maintaining the reign of national security in a country. Economic factors which comprise the regimen of national security and at the same time play a key role in the integrity of food security situation are few. For the purpose of this study, they are further narrowed down to *GNI per capita, Agriculture Value Added, Tax Revenues, Services, Revenues (excluding grants), GDP growth, GDP at market prices, Foreign Direct Investment and Cash Surplus.*

Economic Security is of particular importance in order to determine the affordability of food units. ***Gross Domestic Product (GDP)*** according to Organization for Economic Cooperation and Development (OECD) is defined as a measure of aggregate production in an economy. It is measured in monetary terms as the value of all the goods and services produced within the premises of a country by various economic entities (residential, industrial etc.) over a particular period of time. GDP estimates are commonly used to determine the growth of an economy and these rates are measured annually and most recently on a quarterly basis. Thus the observed

pattern of GDP followed by an economy is an ideal indicator to determine whether an economy is growing or facing a recession (Manning, 2005). A fairly positive trend in GDP rate ensures that an economy is making progress and the nation is resilient in terms of taking necessary measures if it is under stress. Even if there is lack of food in an economy, a positive GDP rate ensures that the shortage can be tackled by a strong economy backed by fairly positive GDP rate. A lower GDP rate, on the other hand, is an indication of the stressed economy which is unable to deal with food crisis consequently proving to be a threat to national security (World Bank, 2016).

Gross National Income (GNI) is a similar concept which refers to a broader form of assessment of value added to the economy by all the producers and production units is called GNI. Formerly known as GNP, it is calculated by adding all the value that is input by the local producers and the taxes on the products thus acquired as well as the sum of total primary incomes generated by the people abroad. Hence forming a positive correlation with food security and eventually strengthening national security as a whole (World Bank, 2016).

Population is another important economic factor. In order to understand population we must understand the concept of demography. Demography is the statistical study of dynamic populations i.e. the one which change over time.

It comprises of the examination of the size of population, structure of population, distribution and concentration in various regions and changes that occur in the population with the processes like birth, migration, old age and decline (Hinde, 2014). The increase in population shares a negative association with food security because with the increase in population, the number of people to be fed by the same food supply increases and hence the chances of food insecurity are more. The increase in population thus also plays a negative role towards national security thus promoting food insecurity (World Bank, 2016).

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Cash Flows also serve as an important economic factor that is likely to influence the food security situation of a country. Stable cash flow throughout the country assure equal distribution of wealth hence preventing the social conflicts from arising. In almost every region it is a proven fact that food will always be available, provided the resources to afford it are present. Stable cash flow and price control, if co-exists, are indications of equal purchasing power nationwide which can help in achieving an admirable level of food security in an economy (World Bank, 2016).

Tax Revenue is another important economic indicators while studying food security. All the transfers that are compulsory in nature and made towards the central government to be later used for the public welfare are known as tax revenues. Tax revenues tend to strengthen a government economically and hence prepare the economy to deal with a stress that can be a viable factor in causing food insecurity. In addition to this, land area holds significant importance for agricultural production as farmers continuously seeking new land so that their crops may prosper. Surface area of a country can be described as the total area covered. More the surface area available, more will be the opportunity of finding fertile land that will pave the way for increased food crop production, hence catering food insecurity (World Bank, 2016) .

Agricultural Value Added also serves as an important economic indicator and it is measured as a percentage of GDP. The net output of agriculture value added as GDP accumulates outputs from various food production domains such as fisheries, forestry, livestock rearing and crop cultivations. Therefore, more the value is added as a result of agricultural output, lesser will be the chances of Food Insecurity (World Bank, 2016). Moreover, given the importance of the need for investment in the agricultural production, *Foreign Direct Investment (FDI)* serves as an important economic indicator. FDI refers to the investment made by the foreign parties in a particular economy. It is calculated by aggregating the equity capital, reinvestment of earnings

and other capitals. An increase in FDI ensures certainty of a more secure food supply chain, because more the money is available to invest in the agricultural sector, the better the sector will perform (World Bank, 2016). On a global scale, there are numerous variables which can change leading to fluctuation in international food prices resulting in economic downturns and leading to food insecurity and nutritional deficiencies (Sen, 1997)

Economic downturns affect the income levels in a specific region. Income losses and economic downturns harbor food insecurity especially for the poor inhabitants of the region which leads to malnutrition.

Environmental Security

Environmental Security is defined as the protection of individuals and communities against threats posed by environmental factors. Due to challenges such as global warming and climate change, environmental security has emerged as an important talking point for the world leaders and has become an important subject of international relations.

Environmental factors, while play a crucial role in the integrity of an effective national security domain, are also integral for food security since environmental factors come hand in hand with the food production in a specific region. Crops are sensitive towards fluctuations in the environment and thus, they respond differently towards different trends in factors. For the purpose of this research, Environmental disturbances are specifically narrowed down to *Floods, Droughts an Earthquakes*.

Flood is defined as an occurrence of water overflows from the bounds of usual water bodies and the occupation of the low-lying lands by water. Water bodies such as rivers, lakes, and oceans

can be a source of flooding. Another type of flooding known as aerial flooding refers to when the rainwater occupies the low-lying land. Flooding is not considered of any significance until or unless it starts causing destruction to the crops and domestic animals. Flooding results in disruption of agriculture fields, loss of livestock, disruption of communication and loss of lives (Olson, 2000). This has been evident in Pakistan attributing to the monsoon flooding in 2010 resulting in food crop damage worth One Billion U.S Dollars (Batty D. & S. Shah, 2010). Similarly, Bangladesh was also hit by a major flood in 1998 in which the crop loses clocked up to almost 24% of the annual yield.

It was also recorded that a majority of flood stricken household did cut back their daily caloric intake by approximately 227 calories (Ninno, et al., 2003).

Secondly, *Droughts* are also an important environmental factor and pose a major threat to food security of any region. It is defined as a period in which a region receives lower than average rainfall and results in a shortage of water supply. The shortage can occur in groundwater levels, surface water or even atmospheric concentration of water.

A drought may exist over a variety of periods whereas some can extend as long as for years and as low as a few days. Most affected subjects of droughts stand to be the ecosystem and the local agriculture which eventually affects the regional economy (Allen, 2010). Because, droughts may be induced by conflicts and other factors, it is difficult to study its causation. In order to relate droughts with food insecurity and nutrition deficiency the only credible sources to be considered are water table and yields of crop in the effected regions. Droughts also tend to lead to price hikes of food commodities, making food units unaffordable. This has been evident in Russia in 2010 (Wegeren, 2011) and in China in 2011 (Sternberg, 2014).

The third environmental disturbance, highlighted in this study, is ***Earthquake***. Earthquake is defined as the uncontrolled shaking of the surface of the Earth that is apparent and is usually as a result of energy releasing from the Earth's crust via the seismic plates. Seismic waves thus generated can be measured by using seismometers where their magnitude is measured using moment magnitude according to which the earthquakes ranging more than 5 are reported worldwide (Ohnaka, 2013). Destruction caused by intense shaking of the earth results in damage of property, infrastructure etc. A detailed study of the earthquake that shook the northern areas of Pakistan in 2005 reports an elevated child malnutrition rate ranging from acute to chronic in nature (Hamid, et al., 2008)

However, among all the natural disasters the effects of earthquakes in regional food security and nutritional deficiency are secondary in nature, as most of the effects are a result of damage to infrastructure and disruption in basic health, basic utilities and sanitation services.

Shocks and Disruptions

Shocks and Disruptions serves as the traditionally defined component of National Security. Although, literally, it is known as a disturbance in equilibrium of certain nature can be defined as a shock but different fields of science choose to hold a different definition for it. For the purpose of this study, Shocks and Disruptions is used as a label for internal conflicts (i.e. civil war) and external conflicts (i.e. armed conflicts with other countries). ***Internal Conflict*** is defined as an armed struggle between the groups and factions of the same country, while ***External Conflict*** is defined as the use of power or armed struggle against another state, particularly a rival state. Over the period of time as various wars (World Wars, Cold War) have been fought and concluded, the nature of conflicts have been changed drastically all over the globe (Enuka,

2012). The number of ongoing conflicts has either adopted a decreasing trend or has become stagnant. Moreover, the rate of battle related death has also decreased to a great extent. Meanwhile, the effects of conflicts have somewhat remained the same as conflicts have impacted the human development index, economic stability and control of poverty in countries facing conflicts. The nature of conflicts varies and range from interstate, intrastate, to one-sided conflicts. Food security and nutritional intake is often affected by violent conflicts in many different way. Violent armed conflicts can cause damage to infrastructure that serves as an accessibility food commodities and hence, can disturb food supplies. This resultantly, impacts food prices in the regional and international markets equally.

It also becomes a reason for migration of people, resulting into abandoning of a region with potential agricultural capacity while posing a great burden on the food resources of the other regions.

In many cases food insecurity is recognized as a driving force of a conflict but simultaneously, an ongoing conflict actively promotes food security. Thus, the "*conflict and food security paradox*" is never ending. Food insecurity can lead to grave circumstances in a country resulting in chaos, civil unrest and riots (Simmons, 2013).

Food Security

Food Security is defined as the assurance of availability, utilization of and accessibility to continuous food supplies such that it ensures sufficient amount of intake for healthy living. Food security is intricately linked to prosperity of the country, be it through ensuring economic security, environmental security or minimal shocks and disruptions. Food insecurity poses a major risk to individual, community level and national security. Sometimes, the links between these are direct like when an increase in food prices lead to riots and unrest. Food security as a

policy issue reflects the dynamics of global events. The attention paid to the relation between food insecurity and poverty, humanitarian crises, conflicts and climate change, suggests that food security is a national security concern. In order to better understand Food Security, it is decomposed into 3 basic components; *Availability, Accessibility and Utilization*. **Availability** refers to the required quantities of food units which must be of appropriate quality, supplied either domestically or internationally. Availability of food units can be determined through Average Dietary Energy Supply Adequacy (ADESA). ADESA provides us with an index of adequacy of the food supply in terms of calories. Studied along with the emergence of undernourishment, it allows in determining whether undernourishment is because of deficiency of the food supply or because of bad distribution of food commodities. **Accessibility** refers to the convenient means of reaching the markets that sells food commodities and also includes also access by individuals to adequate entitlements to obtain suitable foods for a nutritious diet. Accessibility also serves as a significant economic indicator and can be measured by infrastructural development in an economy that allows physical access to the markets. It can be measured through Gross Domestic Product (GDP) per capita. (PPP) GDP is gross domestic product transformed to international dollars using purchasing power parity rates. This allows us to determine the income levels per capita. **Utilization** refers to the essential units of nutrients that need to be consumed in order to ensure a healthy life. A closely related measure in this regard can be "Prevalence of Anemia among children under 5 years of age". Anemia is a condition in which the number of red blood cells (and consequently their oxygen-carrying capacity) is insufficient to meet the body's physiologic needs. Iron deficiency is thought to be the most common cause of anemia globally, but other nutritional deficiencies (including folate, vitamin B12 and vitamin A), acute and chronic inflammation, parasitic infections, and inherited or

acquired disorders that affect hemoglobin synthesis, red blood cell production or red blood cell survival, can all cause Anemia. Thus, this measure allows us to estimate the malnourishment among children aged under 5 years (FAO, 2015).

III. Literature Review

A significant amount of scholarly contribution and the evolution of the concept of national security has ignited a debate about what the contemporary concept of security is. While the traditional debate focuses on adopting a hard line approach towards defining security, the contemporary debate mainly focuses on incorporating soft components as a part of national security. A large number of studies focus on how the contemporary definition of security is more relevant and applicable as a modern, global phenomenon. On the contrary, advocates of the traditional concept have produced pools of knowledge to support the conventional definitions. The conflict between the two types of theorists has led to blended results when measuring the correlation between food security and national security. However, the subcomponents of National Security have been heavily researched upon in order to check their impact on Food Security, which has also allowed us to identify a number of indicators for the purpose of this research. In addition to this, the definition of Food Security has also been subject to evolution. However, it has faced less criticism and scrutiny as compared to the definition of National Security. Adjusting to the evolved definitions, the focal question however remains whether national security has a significant impact on food security situation of a country.

Food Security has gradually developed as a flexible concept with varying definitions, as is evident in the literature. Due to the utmost importance of the concept, specifically in the field of public policy making, there were over 200 definitions of food security written and published during the period 1982 to 1992 (Maxwell & Frankenberger, 1992).

The persistent evolution of food security as an operational concept in public policy has led to enhanced importance of implied definition of food security used for research purposes.

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Food and Agriculture Organization (FAO), however, successfully established a standardized definition in 1996. Literature shows that historically, Food Security emerged as a concept in mid 1970s as a result of the global food crisis. Food Security was defined as "*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*" in the World Food Summit of 1974 (United Nations, 1975) where focus was drawn on volume and stability of food supplies. In 1983, FAO expanded upon the initial definition to bring a balance between supply side and demand side of food commodities and the new definition included "*ensuring that all people at all times have both physical and economic access to the basic food that they need*" (FAO, 1983). In 1986, the World Bank published its highly influential report "Poverty and Hunger" (World Bank, 1986) which focused on the broadly recognized distinction between chronic food insecurity, which is linked with ongoing or structural poverty and low income levels, and transitory food insecurity, which intricate periods of deepened pressure caused by natural disaster, economic collapse or conflict.

The World Summit held in 1996 continued to make contributions and added complexity to traditional definitions stating, "*Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life*" (FAO, 1996).

This definition has been present in essence to date. However, minute refinement was made in 2001 when Food Security was defined as "a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2002).

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This static definition of Food Security has allowed us to explore 3 major indicators that collectively proclaim a situation being as "food secure". According to Rivera (2003) these include optimal availability, accessibility and utilization of food.

In addition to the aforementioned definitions, Abbaker (2003) identified another type of food security known as creeping food security, which is a relevant and a more applicable concept in modern world. This is referred to as a condition where a community encounters a gradually "deteriorating ecological or socio-economic conditions" subsequently increasing the rate of under and mal nourishment (Abbaker, 2003).

National Security, on the contrary, has evolved drastically as a concept and has faced some strong criticism. Since the Cold War, the concept of security has been increasingly studied and researched upon by the scholars and practitioners. As per the classical formation of the concept, security is known to be as the use of force by the states to counter threats to the territorial integrity and domestic political order (Buzan, et al., 1998). However, with the passage of time, this definition has been strongly criticized on the grounds of being too unilateralist in its emphasis on the use of force and military. Theorists now argue that security is now more than just wars through military means. Rival states may deploy other kind of threats which includes environmental, economic and cultural threats (Jikayinfa & Mofoluwawo, 2010). Moreover, these threats are not only posed by the rival nations but also from non-state actors and natural disasters. This concept is known as comprehensive security (Raab, 2011).

Another more fundamental criticism goes further stating that security cannot be restricted to states only but shall be extended to the individuals and human beings. This concept is known as human security (Jikayinfa & Mofoluwawo, 2010).

The notion of human security does not restricts itself to the traditional questions of peace and war rather draws light upon how to overcome world hunger, mass misery and alarming disparities between rich and poor. Thus, contemporary theorists argue that modern concept of security includes both comprehensive and human security. This modern concept allows us think about security distinct from traditional concept of military and calls for inclusion of environmental security and economic security.

A report by George Grant sheds light upon the relationship between food security and national security. Grant (2012) uses the contemporary concept of security and indicates in his report that National Security refers to Environmental Security, Economic Security and Shocks and Disruptions (being armed conflicts, in specific) (Grant, 2012). The report mentions that availability and the cost at which food supplies are acquired is an issue of domestic policy and national and international security. Thus, national security is illustrated as a multi-dimensional concept showing a reciprocal and simultaneous relationship with food security. Talking about each of the three subcomponents mentioned in the report, Grant (2012) suggests that there are extensive and devastating consequences of interruptions in food supplies which can be attributed to human conflicts and civil unrests. The report claims that there are 60 countries which are either marked with extreme or high risk of food insecurity, are simultaneously underdeveloped and marked with economic and political breakdown. According to the 2011 Food Security Index produced by global risk analysis company, Maplecroft, a number of Arab states including Egypt, Libya, Tunisia and Yemen which faced major up heals during the 2011 are food insecure.

Grant (2012) presents a case of UK and clarifies that UK food chain is vulnerable to agro terrorist attacks due to its characteristics of being open, non-existence of vetting procedures for farm workers and extensive use of contemporary farming practices.

Agro terrorist attacks include firstly, malicious contamination with toxic materials causing ill health and even death; second, sabotage of the supply chain leading to food shortage and thirdly, misuse of food and drink materials for terrorist or criminal purposes (Grant, 2012).

While the report suggests that National Security significantly impacts Food Security, it provides significant evidence of the reciprocal effect as well. This means that there are substantial traces of food security resulting into economic crisis and conflicts. The report by Grant (2012) asserts that higher food prices in industrialized economies will lead to pressures on disposable income with damaging impacts on wider economy while lower income groups will face a reduction in variety of fruits and vegetables needed for a healthy life. On the contrary, in developing countries, higher prices will lead to shortages in supplies of food and threaten the pace of development leading to increased hunger and malnutrition in world's poorest regions, creating a vicious cycle of hunger. The report also suggests that as per the workings of Food and Agriculture Organization, it is predicted that the food prices will rise by an additional 20% by 2020. Rising food prices will reduce the amount consumers spend in other sectors of the economy further harming the already halting economy. Furthermore, low income consumers who already spend a small percentage of their incomes on food, will find it difficult to maintain that share of their income to fulfill their dietary needs if the food prices rise (Grant, 2012).

Literature although provides us with the proof of impact of National Security on Food Security (where contemporary definition of National Security is used) but it is limited in amount. In one of the articles, Ambassador Daniel Speckhard (President and CEO of Luthran World Relief) mentions how the meaning of security differs in different context. Daniel claims that today security means more than just fighting terrorism or weaponry and includes economic and food security that significantly impact personal, community and national security.

The relationship between the two variables can be positive for e.g. in 2008 these links are direct and obvious, such spike in food prices resulted in riots and unrest in various countries, or negative for e.g. the multi-layer drought that struck Syria that converted half of the country into a desert and resulted in a loss of livelihood for more than 800,000 Syrians according to a UN report. This, consequently, led to a spark in Dara'a that resulted in an uprising against the dictatorship and civil war (Speckhard, 2015).

Literature suggests that many factors interact to create food-insecure situations: chronic poverty, low agricultural productivity, high rates of population growth, civil conflict, poor infrastructure, ecological constraints, inappropriate economic policies, limited arable land and even cultural practices developed over many years. These constitute the subcomponents of national security as suggested by the modern definition of security. It is important that we also consider the indicators of environmental security to better understand the correlation between the two. Laczko & Aghazarm (2009) claim that broadly, Environmental Security is divided into two categories: extreme weather events that become the immediate issues at hand for e.g. like tornadoes, hurricanes, tsunami etc. and gradual but non-observable environmental changes that account for bigger risks that are slowly coming into attention and becoming an issue of concern for e.g. soil erosion, desertification etc. (Laczko & Aghazarm, 2009).

Laczko & Aghazarm argue that climate change is producing environmental impacts which is aggravating the vulnerabilities for people conclusively making it difficult for them to survive. Much of the scholarly contribution focuses on how, food security is impacted by extreme weather events. Stephen Devereux in his study suggests that erratic rainfall, droughts and floods negatively impact the crop yields and harvests which reduces the availability of food at the national level resultantly reducing the income from agriculture. This creates a food insecure

situation at the national level (Devereux, 2007). Devereux (2007) also claims that households and economies that have more diversified earing sources are less vulnerable to the adverse impacts of droughts and floods, condition being that the alternative source is not correlated with agriculture or rainfall (Devereux, 2007). Such a hypothesis is also validated in the study by Julius M. Huho and Edward M. Mugalavai on Kenya which highlights that 75% of the country's food requirement is dependent on agriculture, which is threatening attributing to the regularity of droughts and rain fed agriculture system of Kenya. In the past, droughts have led the country to total crop fiascoes and livestock deaths which made Kenya food insecure (Huho & Mugalavai, 2010). Moreover, Devereux (2007) claims that food insecurity occurs as a result of spillover effects i.e. as per indirect impact of weather shocks. Weather shocks like floods trigger harvest disasters as well as a series of knock-on jolts to native markets and societies. In such an instance, operational intervention can moderate the shock and prevent a production tremor from surfacing into a full-blown famine. It takes Malawi as an example which suffered from food crises as a result of this natural disaster (Devereux, 2007). Comprehensively, the study suggests that the effects of floods on food production, labor, food trade and transfers are mostly negative but indirect, putting any country or area at a slow pace of development.

This is also supported in a study by Ashraf, Iftikhar, Shahbaz, Khan & Luqman (2012) which speaks of indirect occurrence of food security. The study contradicts with Devereux's (2007) original hypothesis and claims that migration of people leads to food deficiency resulting in nutritional and health problems which appear to be the most adverse impact of floods. The study validates its hypothesis through a field survey in Punjab, Pakistan (Ashraf, et al., 2013). The case study illustrates that livestock and crop farming being the two major sources of income, were destroyed by floods in Southern Punjab leaving people empty handed.

Resultantly, the region experienced an outburst of diseases due to shortage of clean food and water. An area that previously supported other areas for food provision could no longer support its own residents due to the disaster caused by floods (Ashraf, et al., 2013).

Another study by Israel & Briones (2013) conducted in Philippines, presents unusual results. In contradiction to research results by (Loayza, et al., 2009), (Sivakumar, 2005) and (Long, 1978) who argue that predominant effect of extreme weather conditions on agriculture and food security is adverse, Israel & Briones (2013) claim typhoons, floods and droughts had insignificant impact on agricultural production in Philippines (Israel & Briones, 2013).

Economic Security has also been identified as one of the major soft component of contemporary security. The 1994's Human Development Report highlights economic security as one of the main dimensions of Human Security (UNDP, 1994). There have various studies exploring the impact of economic security on food security. The results however vary depending upon the different indicators employed in each study. Majorly the indicators used to describe the impact on food security are accessibility, availability and affordability.

A study by Rosen & Shapour (2001) claims that low income countries are more food insecure than high income countries which is due to their inability to afford food. Thus, the patterns of income distribution impact the food security situation of a country. The study further suggests that food insecurity takes place in poverty struck rural areas where low income groups reside which has been empirically measured through the malnutrition rates in the subject area. Rosen & Shapor argue that investment in and growth of agriculture sector can improve their income in the short run while in the medium run nutritional intervention can temporarily resolve the food insecurity problem (USDA, 2001). On the contrary, a study by Wambua, Omoke & Mutua (2014) identified some other economic as well as social factors that impact food security.

The study suggests that food security is dominant in developing countries and in dry land ecosystem of sub-Saharan Africa (Kenya, in particular), which can be primarily attributed to droughts and famines. However, Wambua, Omoke & Mutua (2014) observed that socio-economic factors like low education levels leading to unemployable skills, strong cultural beliefs, household income and expenditures, availability of services to ensure access to markets and unfavorable marketing, significantly impact household food insecurity in Tseikuru division of Kenya (Wambua, et al., 2014). Thus, the study exhibits that food insecurity is not solely impacted by economic but by socio-economic factors as well.

Asian Development Bank (ADB) excessively focuses on poverty being a significant cause of food insecurity and carries out research to support policy making for low income countries. A report by ADB (2013) highlight the role of market forces i.e. competing demand along with changes in supply, in determining the food security situation of a country. The report suggests that sustained increase in agricultural productivity is required to prevent increases in food prices, allowing the food commodities to be affordable.

Thus, for this purpose national efforts shall be made to formulate and execute balanced policies to reduce food insecurity that conclusively promote agricultural productivity, price stability, increase the availability of and access to food and ensure adequate nutrition provision (ADB, 2013).

Moreover, a study by Brooks & Mathews (2015) brings another important economic indicator into lime light. Brooks & Mathews (2015) observed that openness in trade, among different sectors in a developing country where hunger and malnutrition are delicate policy issues, has a direct, positive impact on food security, as it results in increased income and contributes to progressive economic growth resulting into improved food security.

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The study concludes that across each dimension of food security, trade openness effects both negatively and positively but overall trade openness has a positive net impact on food security (Mathews & Brooks, 2015).

Food Security is also described as a result of macro-economic and micro-economic effects in various countries. Wiggins, Keats & Vigneri (2009) explain in their report that food price spikes, although seemed to be a result of short term factors, was due to increase in real prices (attributing to falling value of US dollars), rising aggregate demand and monetary expansion. Food security and nutrition intake depends on the income of the poor, local price levels of food commodities, as and general health conditions. The study illustrates that poverty in Zambia increased due to recession induced by structural reforms. Zambia, being characterized by income inequality, focuses on pro poor growth policies and investment in public goods in rural areas while on the development of safety nets for urban poor (Wiggins, et al., 2009).

Talking in terms of purely conventional war i.e. armed conflicts, studies have shown some traces of linkages between armed disruptions and food insecurity. A study by Jeanty and Hitzhusen (2006) suggests that civil wars have a significant association with food insecurity in developing counties such that war and civil strife were prominent in 15 countries which were are hit by severe food insecurity during the early 2001 and 2002. Jeanty & Hitzhusen (2016) claim that armed struggles end up hurting the agricultural and the economic sector of the developing countries ending in a food insecure situation. However, enhancing GDP per capita and using intensive and extensive agricultural practices can improve the food security situation (Jeanty & Hitzhusen, 2006). Furthermore, World Development Report (2011) also provides us with the association between the two variables stating that areas inflicted by armed conflicts comprise of 60% undernourished populations (The World Bank, 2011).

Extending upon the findings of Jeanty & Hitzhusen (2006), Zseleczky & Yosef (2014) also conclude that violent conflicts have a significant impact on food security, as they disrupt food production, trade, access to food, destroy infrastructure that ensure accessibility to the food markets, and elevate food prices. Moreover, they also claim that conflicts lead to out flux of people reducing the number of agricultural labor (Zseleczky & Yosef, 2014). Zseleckzky & Yosef (2014) provides an example from the study of Doocy, et al.,(2011) to support their findings stating that after the 2003 Iraq conflict, 60% Iraqi refugees in Syria and 46% Iraqi refugees in Jordan reported that their household food situation was deteriorating (Doocy, et al., 2011). Some studies however, contradict with the relationship described above and suggest an inverse relationship claiming that violent conflicts are likely to be the cause of food insecurity. Brinkman & Hendrix (2011) assert that food insecurity has a multiplier effect on violent conflicts.

Combined with other causes like political and economic collapse, it serves as a major factor that can erupt a violent conflict. Brinkman & Hendrix (2011) further suggest that food price stabilization measures, safety nets and provision of food assistance serve as means to de-escalate a violent conflict (Brinkman & Hendrix, 2011).

Conclusively, the literature provides us with abundance of scholarly contribution which helps us trace the relationship of Environmental Security and Economic Security with Food Security situation of a country. However, limited study is conducted to determine the relationship between armed conflicts and food security but the literature surely highlights it as an important field to be studied. Furthermore, scholarly contribution has also majorly focuses on food insecurity being a source of violent conflicts while the reciprocal effect has been little emphasized upon. Thus, this research will allow us to add the gaps in the current literature.

IV.   Theoretical Framework

Asian countries that can be traced back to various Income groups (as illustrated in the Appendix 2) can be categorized as food secure or food insecure depending on various factors. The diversity in the number of factors that lead to such classification can also be attributed to popular believes and theoretical suppositions held by Asian countries. Singapore for e.g. is the most developed country in Asia followed by Hong Kong, South Korea and Japan etc. Thus, these countries strongly believe in development and welfare of the society and so more emphasis is paid to addressing the security needs of the residents of the country. The concept has been a source of debate around the globe so much so that it has led to the emergence of major school of thoughts that have been heavily theorizing the role of food security in the development of a country. The continuous discussions have also led to gradual evolution of the concepts of development and other related concepts like food security, national security etc.

As theorized by Simon Maxwell (1996), food security has multiple definitions and multiple terms are used to reflect upon this concept because it reflects the "food problem" as an issue of concern at various levels in the economy i.e. macro and micro level (Maxwell, 1996). Moreover, the variety in defining this concept can also be attributed to its consistency with the post modernism paradigm. Furthermore, the concept of food security has also come into light attributing to development and post development era, and this is of significant importance to the Asian countries because majority of Asian countries are dominated to be of "developing" nature holding significant importance for development theories.

Food Security paradigm for the purpose of this theoretical framework, is mainly formed by three theories that are illustrated below:-

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                          ┌──────────────────┐
                          │  Food Security   │
                          └──────────────────┘
        ┌────────────────────────┼────────────────────────┐
┌──────────────┐        ┌──────────────────┐        ┌──────────────┐
│ Post-Modernist│        │ Post-Developmental│        │ Introduction to│
│              │        │                  │        │              │
│ Perspective  │        │     Theory       │        │ Human Security│
└──────────────┘        └──────────────────┘        └──────────────┘
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Food Security

Post-Modernist Perspective	Post-Developmental Theory	Introduction to Human Security

| - Inapplicability of meta-narrative while formulating food related policies

- Emphasis on Design rather than Planning

- Principle of Collage | - Food Aid doing more harm to countries than benefit

- Priority should be given to locals rather than developmental experts | **Neo-Realists Theoretical Framework**

- Cold War led to under-development of the concept of security

- Need to broaden the scope of security

- However, security at state level still remains most important | **Post-Modernist or 'Critical Human Security**

- State is not the determinant of security

- Security threats shall be expected from a wide range of actors

- Individual level security shall be focused rather than state level |

Figure 4.1 – Theoretical Framework

Food Security: Perspective of Post-Modernists

Post Modernism can be defined as both a movement and an era in the early 20th century that centered itself on various subjects like philosophy, arts, architecture and was mainly a critique of Modernism. Postmodernism was born as a scholarly movement, to challenge several modernist themes that were first expressed during the Enlightenment period.

These themes include the inevitability of human progress, scientific positivism, and the ability to fully understand society not only with one direct answer and methodology but to question the

society with reflexivity and ambivalence; understanding how relativism shapes all sociological thought. While postmodernity has just been thought as a style of thinking, it has also been known as a social condition or socio-political and cultural configuration i.e. a process of development from 19th century modernity which compresses literary theory, linguistics, philosophy and social analysis (Boyne & Rattansi, 1990).

The concept of Food Security has evolved to be consistent with the post-modern paradigm. However, a thorough review of post-modern theories and models emphasizes on programmatic policy. The post-modern paradigm validates the reasons for relating food security mainly to a philosophical and cultural context because post modernism sheds light on numerous core topics that add to the development field. Post modernism perspective also proves to be useful in policymaking which challenges most post modernists to go beyond just deconstruction of ideas and reconstruct them for the purpose of policymaking. This therefore means, that food security is seen as a complex issue with differing contextual meaning. Food security is viewed differently at individual level, household level or community level. Thus, one standardized theory that serves as a "meta-narrative" cannot be applied to all the circumstances, be it derived from the school of modernism or neo-liberalism (Booth, 1995). Thus, Post-Modernism argues that that there is a need to formulate policies that understand the diversity of the food insecurity, its causes, consequences, strategies and circumstances. Thus, inapplicability of a "meta-narrative" calls for continuous research and evolution of the concept of food security.

Moreover, Post-Modernist view also holds the view that state is responsible for the assurance of food security, be it through the provision of social protection or safety nets, especially in times of chronic food shortages i.e. droughts etc. While address the food need of the community through targeted programmatic policy making, Post-Modernists emphasizes on the "design" rather than

"planning" at the community level (Harvey, 1989). This means that policy shall be designed such that households and individuals have a variety of choices, not only to consume food units but to develop livelihood strategies. Post-Modernist's major argument rests on the application of "Principle of Collage". This calls for a need to apply various fields in policy formulation relating to food insecurity. The policy can incorporate for e.g. ideas about people priorities from the field of Participatory Rural Appraisal (Chambers, 1992), ideas about flexibility and innovation in food supply chains from the field of Industrial Development, ideas about planning from the field of Rural Development and ideas about decentralized administration of food supplies from the field of Public Administration (Murray, 1992).

Conclusively, viewing food security from a post-modernists view, it is inferred that there is no standardized "recommendation domain" when it comes to addressing food insecurity because individuals and households have heterogeneous characteristics while individuals have different physiological needs and livelihood strategies. In such a case, Post-Modernist are expected to be inclined towards an extreme case of Neo-Liberalist view, which argues that the market forces should allocate resources, while state shall not interfere in the allocation of resources. While some post-modernists argues that this could hamper the welfare of the poor (Chambers, 1992), others argue that intervention shall not only be the responsibility of the government but of welfare communities as well who are to strengthen "Moral Economy" (Swift, 1984).

Food Security in Post-Development Era

Post development theory is a popular critique of the development theory which strongly insists that the idea and the process of development idealizes and follows the rules of Western and Northern concept. The same is applied to the development carried out in the world. The advent of Post-development theory finds its roots in the 1980s when critics raised their concerns

regarding the idea of development, the development projects and the development theory as a whole (Sachs, 1992). The development theory faces criticism on many fronts starting from the very grass root level to its long term effects. According to the critics, the major evil in the development theory is, handing over the power to the institutions of the development regime which has inevitably led to professionalization of welfare functions. This has resulted in the shift of power to centralized institutions for bringing a "developmental" change in a specific region, instead of the natives who should be in charge of taking decisions. People are put in place, to bring about development, who claims to be experts in the field.

Food Aid is a popular concept, introduced by the developed countries along with many non-governmental organizations, to help combat the food insecurity and nutrition deficiency in the world. It is a one of its kind initiative targeted towards the wellbeing of locals in many underdeveloped and third world countries who are vulnerable to food insecurity every day (Barrett & Maxwell, 2005). Post Development theorists claim that the development theory, in the case of food aid, is doing more harm to the society than good. Regions which are in immense need of the food aid are not getting the slight bit of relief from it. Donovan, McGlinchy, Staatz, & Tschirley (2006) pinpointed that the reason for the failure of Food Aid initiatives is that the timings of the food aid provision coincide with that of the harvest (Donavan, et al., 2006). This leads to the same product available in the market via food aid and the local produce.

Thus, this leads to no apparent relief for the natives and in many cases, the food prices constantly stay high (Mabuza, et al., 2009), hence aggravating the situation of Food insecurity which consequently disrupts National Security as a whole.

To enclose it all in a nutshell, according to the development theory, the power to bring about a developmental change and the nature of the change solely rests in the hands of developmental

experts. It has also been witnessed that despite the purpose of the developmental projects remains to improve the living standards and addressing food insecurity for the people, the projects did more harm than good and not just failed but demonstrated detrimental effects for the locals. W. Sachs (1992) chose to take a more blunt opinion in this matter and termed the developmental projects in the third world countries as "ruin in the intellectual landscape." W. Sachs (1992) blames that in spite of learning the lesson from the nascent failures, the experts in the West, who have been dedicated towards their development ideology, forcefully overstressed upon failed developmental projects until the project was carried out which was either unnecessary or was of no help to the cause (Sachs, 1992).

Massive criticism of the development theory has therefore led to a complex problem. Rahnema & Bawtree (1997) argue that the criticism shall not be taken as a vote to abruptly end all the development around the globe but it should call for the development regimes and the policies it to be revised. The opinion of public should be taken into consideration before launching a developmental project and it should prove to be beneficial to their culture and society. Rahnema & Bawtree (1997) also stress that if the development is necessary then it should be the grass roots levels that should be emphasized the most, in order to bring an impact (Rahnema & Bawtree, 1997).

Kippler (2010) similarly argues that if a developmental project is aimed towards a specific region then it should not be initiated by the sheer force of the power that the people in charge possess, rather it should be as a result of the consensus carried out by the people and mutual decision making (Kippler, 2010). Ziai (2004) proponent post-development theory, argues that people of the community should, at least, have the thought that they are in charge of the development that their opinion matters (Ziai, 2004). Conclusively, the theory is in absolute support of the notion

that grass root problems such as of Food Insecurity and access to nutritious food can be better addressed by transferring power to the people of community who can understand and comprehend these problems better than those at the top level. Consequently, the society can easily come out of the cruel clutches of atrocities like Food Insecurity which simultaneously paves way for National Insecurity.

Built upon the aforementioned theories and their criticism, the theoretical framework ignites the compelling need for appropriate policies to govern the growth and development of a community so that it contributes towards alleviating food insecurity. Growth and development alone are not sufficient to ensure that an individual, community or a nation is secure, even in terms of food consumption. Not only the advancement in food or nutrition policies has an impact on food security but also the policies to improve education and health contribute indirectly towards the food security. Depending upon the need of the region, the aim of growth and development related to food security can be towards education, fortification of food, awareness regarding nutrition or bio fortification.

Resultantly, we can say that the security in terms of food and nutrition has a critical impact on national security and vice versa. A society suffering from low GDP and a relatively low national production eventually ends up facing unrest, chaos and conflicts both at the individual and national level.

Introduction to Human Security

With the release of United Nations Development Report of 1994 and development of Human Development Index by Mahbub Ul Haq (replaced by Human Governance Index now), the foundations of the concept of Human Security were laid. As mentioned earlier as well, Human Security doesn't restrict security to violence and crime but talks of secure livelihoods of the

individuals. Subjects of Human Security are inclusive of Economic Security, Food Security, Environmental Security, Community Security, Political Security and healthy living. Thus, with the emergence of the concept, Food Security has been popularly highlighted as one of the 7 main dimensions of Human Security. Human Security has therefore allowed us to adopt a broadened perspective towards security. For this purpose, there are 2 main approaches in specific: Neo-Realist Theoretical Framework and Post-Modernist or 'Critical Human Security' approach.

The Neo-Realist Approach has been put forward by popular neo-realist theorists like Barry Buzan. Barry Buzan in his famous work "People, States and Fear" claimed that the military approach adopted during the course of Cold War was unilateral in nature and has majorly contributed towards under-development of the concept. He emphasized that the concept of security must be broadened such that economic, social and environmental stability should be added to the primary element of security by force.

Although, Buzan stresses upon different levels of security required in a country, he concludes that the most important amongst the all remains the security at national level. Buzan's theory provides us the most extensive contemporary examination available of human security from a state-combined perspective (Buzan, 1983).

On the contrary, Ken Booth provides the theory based upon the post-modernists approach. Ken Booth also tends to broaden the concept of security defining its limits beyond purely military means. However, Booth stresses that state shall not only be considered as a primary determinant of security and instead other levels of security shall be addressed. Moreover, threats are to be expected from a wide range of actors and not only rival states. This includes non-state actors, such as individuals, ethnic and cultural groups, regional economic blocs, multinational corporations (MNCs) and non-governmental organizations (NGOs) etc. Booth continuously

emphasizes that security at individual level is more important than security at state level (Booth, 1995). Thus, the post-modernists conceptualization does not tend to equate human security and state security; it treats the two as different. As Food Security is highlighted as one of the main components to be addressed in order to achieve Human Security, it is argued that continuous stream of food supplies should be ensured to the individuals. For this purpose, Rajaonarison (2014) argues that measures should be taken to ensure market-led food security guided by market forces (Rajaonarison, 2014). Hence, in order to be "secure", there is a need to study a blend of traditional as well as a modern paradigm so that appropriate course of action can be taken that is perfectly applicable.

<center>**V.   Research Methodology**</center>

This research aims to address the issue of food security and tends to identify the impact of three major indicators that sum into national security. The research belongs to the field of social sciences and holds significant importance for not only social scientists but also for academicians and public administrators because it reveals an important relationship between food security and modern, multi-dimensional national security. Thus, the study can serve as a foundation to various policy options at both national and international level

Research Problem

Food Insecurity and its long lasting impacts have been recognized as an emerging trend around the globe. The issue has been of increasing concern to both the world leaders and the policy makers. According to a report of FAO (2003) "Worldwide around 852 million people are chronically hungry due to extreme poverty, while up to 2 billion people lack food security intermittently due to varying degrees of poverty". Thus, food insecurity is a problem on a global scale and many countries all over the world have meager resources and lack access to food sources that aggravates the whole problem of food insecurity. UN chief shed light on child deaths caused due to hunger and malnutrition: "Six million children die of hunger every year – 17,000 every day" emphasizing the future generations are at risk (UN Chief, 2010). The frequency and intensity of food insecure situations has been increasing ever since the economies around the globe have been facing economic shocks, climatic changes and increased threats of armed conflicts.

As a result, the world leaders are paying more attention to the issue of food insecurity around the globe. However, it can be noticed in the literature review that food insecurity is measured through a limited number of indicators and is analyzed through a limited number of

relationships. While planning and formulating policies, world leaders tend to sideline some important causes of food insecurity which are non-mainstream. Hence, there is a need to analyze food insecurity from a different perspective i.e. as an issue of national concern.

The policy makers tend to ignore the puzzling relationship between national security and food security and in instances where it is recognized, food insecurity is treated as a cause of national security, where national security is strictly defined as an armed struggle.

Limited study is conducted to check the impact of national security on food security. Thus, this study will tend to examine the impact of National Security on Food Security where National Security is defined as a modern concept and takes into consideration indicators of human security; environmental and economic security in particular.

Research Objective

This research aims to establish a relationship between National Security and Food Security through quantitative analysis. The study tends to examine the statistical relationship of each of the subcomponents of National Security on the food security situation of the region. The research will determine whether armed conflicts, be it internal or external, interrupt the accessibility, affordability and utilization of food. In addition to this it will allows us to explore the disturbances in food supplies caused by economic fluctuations. The research will also reveal the impact of environmental shocks on the food security situation of a country.

The conclusion of the research will allow us to anticipate a concrete relationship between national security and food security which will contribute to the existing literature as well as help all the stakeholders, specifically public sector, to view the issue of food insecurity from a new lens, in order to propose appropriate policy options to curb it.

Thus, for the purpose of this study, the research will answer the following research questions:-

- What is the effect of environmental shocks on the affordability and utilization of food?

- What is the impact of economic fluctuations on accessibility and affordability of food?

- How do internal and external armed conflicts influence the intake of food in Asian countries?

- How do economic fluctuations direct the utilization of food in Asian countries?

- What is the effect of environmental shocks on the accessibility of food in Asian countries?

For the purpose of this study, research adopts the following hypothesis:

There is a statistically significant impact of National Security on Food Security.

Null Hypothesis: There is no statistical relationship between National Security and Food Security.

The independent variable for the purpose of this study is National Security. National Security is broken down into 3 indicators which include Environmental Security, Economic Security and Shocks and Disruptions. Each of these can further be broken down into sub indicators. Sub indicators of the three indicators are listed in detail in Appendix 2.

The list includes Revenue (excluding grants, % of GDP), GDP Growth (annual %), GDP at market prices (current US$) Foreign Direct Investment, Net Inflow (BoP, current US$) etc. being indicators of Economic Security; Flood Damage, Earthquake Damage, Drought Damage being indicators of Environmental Security; and External War Deaths, Economic Related War Deaths being indicators of Shocks and Disruptions.

The dependent variable for the purpose of this study is Food Security. The three indicators of Food Security include accessibility, utilization and affordability, which are measured through sub indicators like "Average Dietary Energy Supply Adequacy and GDP per Capita (Purchasing Power Parity)" etc. The study also makes use of use of proxy or outcome indicator in order to yield he results for the purpose of this research. Data that indicated the damages caused to food supplies due to shocks and disruptions was unavailable. Thus, the study makes use of death rates caused by internal and external conflicts and tends to study its correlation with food security.

Data Collection

This research is a quantitative study which makes use of secondary sources of data i.e. archival data in order to assess the relationship between Food Security and National Security. Indicators chosen for the purpose of this research are frequently researched upon frequently by reliable humanitarian organizations for e.g. UN and World Bank. In addition to this, the sample size for the purpose of this research includes 46 Asian countries, thus for such a sample size primary research was not feasible.

Majority of the data is taken from World Bank's Databank, particularly the data for economic indicators. World Bank's data, published through 2 publications popularly known as World Development Indicators and International Debt Statistics, is collected through a collaborative effort between regional development banks, international humanitarian organizations, branches of World Bank and other partners, and ensures electronic exchange of statistical data. World Bank makes use of Virtual Statistical System (VSS) which serves as a portal and links World Bank to other statistical organizations. Economic Data relating to national accounts and balance of payments comes from current reports gathered by the Bank's country management units and data obtained from official sources.

Aggregates are based on the World Bank's regional and income classification of economies. Because of missing data, aggregates for groups of economies should be treated as approximations of unknown totals or average values. Growth rates are calculated as annual averages and represented as percentages. Except where noted, growth rates of values are computed from constant price series. Three principal methods are used to calculate growth rates: least squares, exponential endpoint, and geometric endpoint. The data for shocks and disruptions is collected from UCDP Databank, whereas data for food security related indicators is collected from FAO. Data for environmental shocks is collected from EMDAT (International Disaster Database).

The sample size for the purpose of this study includes all the Asian countries. A list (Appendix 1) of all the countries used for the purpose of this research, is included in the appendices section. The rationale behind choosing Asian countries is their nature of being "developing". Since Pakistan itself is a developing country and is part of Asia, the dynamics of other Asian countries are more or less the same. Beginning from security conditions to economic situation and food availability, almost all developing Asian countries have a similar situation to address. Therefore it will make the research findings more valid if data from countries with similar dynamics will be analyzed. Restricting the research to Asian countries will also delimit our findings from factors that attribute to variability in other regions and moreover, will allow us to explore appropriate policy options that can be implemented in Pakistan. The panel data of Asian countries will reflect upon the affected populations, their nutrition conditions, impact of military activities on food, economic situation, impact of climate changes on food amongst others etc.

The data set used for the purpose of this research is unbalanced panel data which can be attributed to the large amount of data used. Moreover, because the research relied on the secondary sources of data, it limitations relating to the availability of the data.

Given the number of indicators to be used for the purpose of this study, and to check their behavior over the period of time, research makes use of panel data. This is because Panel Data allows us to observe the behavior of entities over time i.e. it serves as a cross sectional time series data. Thus, for the purpose of his study, we made panels of country data from the period 1990-2014. This will allow us to observe behavior of various indicators in different countries, periodically over a defined time frame. Panel data is best applicable here as the combination of time series with cross section country data will enhance the quality of the findings by producing the most comprehensive results using a wide range of indicators.

Panel data is appropriate for this study as it allows us control various factors that otherwise would serve as a limitation to our study. As compared to a simple cross sectional or time series study, Panel Data recognizes each entity for its heterogeneity. Thus, while studying the countries for their national security situation, panel data will address all the other indicators as distinct for each country. This means panel data will address each country for its distinctness. Moreover, Panel Data will also make adjustments to the findings for distinctness of the entities. Furthermore, it will allow us to study the effects that otherwise would not have been detectable. For e.g. while studying the impact of GDP per capita on the affordability of food, panel data analysis will simultaneously incorporate the impact of inflation on affordability as well. Thus, this will not only allow us to test our complicated hypothesis but will also provide us with more valid and reliable results. In this way, we research will be less vulnerable to the limitation of

omitted variables, uncovering the most dynamic relationships which will allow us to make the most accurate predictions.

Research Design

This study makes use of correlational method of research, in order to assess the relationship between different variables. Correlational Research allows us to carry out quantitative statistical analysis to determine a pre-existing relationship between variables. The two variables for the purpose of this research are National Security and Food Security, where National Security is an independent variable while Food Security is a dependent variable. Both the variables are broken down to further indicators, which will be used to check the correlation between the two variables. The relationship between the two variables can be positive, negative or have no effect.

Thus, the correlational method of research will allow us to check the association between National Security and Food Security and allow prediction of outcomes on the basis of interaction between the variables, which will allow us to derive appropriate policy options for the issue at hand. However, correlation doesn't directly imply causation between the variables. The method is appropriate for this study since the motive of the study is to check the impact of National Security on Food Security and to prove how both soft and hard security elements (as defined by the contemporary theorists) significantly influence the Food Security situation in a country or a region. Moreover, the method is useful because limited amount of research is done to check the impact of National Security on Food Security, thus, the method provides us a starting point for the research while referring us a possible relationship between the two. It will also give an idea of the direction the two variables are associated which can be used by later studies to narrow down their findings. The study is done through empirical analysis, which makes use of empirical

evidence (in the form of observations) provided by reliable sources like World Bank. In order to carry out empirical analysis, the study makes use of quantitative techniques.

Empirical Analysis is of extreme relevance when studying the relationship between National Security and Food Security because Empirical Analysis bind theory with practice. This means empirical analysis yields results based on the real world observations, which are contextual (i.e. applicable in real world scenario). This is of great significance because it allows us to draw solutions for contemporary challenges (especially in the case of human security).

Research Method

The technique used under the Correlational Method of Research is Regression Analysis, which is a statistical approach for estimating the relationship between two variables. In order to check the association between National Security and Food Security, the study is based on multiple regression tests carried to check the impact of each indicator on food security. Multiple Regression serves as a power technique which will use multiple indicators of the Independent Variable i.e. National Security in order to check their collective relatedness to Food Security. Multiple Regression is the most appropriate method for the purpose of this study given that we wish to measure the collective impact of a number of indicators on Food Security that allow us to find the most comprehensive and applicable results. Moreover, multiple regression will make use of multiple independent variables, with each controlling for others. For e.g. while we will be checking the relatedness of Food Security to GDP per capita, exchange rate, and inflation, the model will estimate the effect of GDP per capita controlling for exchange rate and inflation. In this way Multiple Regression Method will yield the most comprehensive findings. The indicators used for the purpose of Multiple Regression are listed in Appendix 2. The study makes use of around 200 regressions.

Research Specifications

Y1 = b1(Pop)+ b2(AgVA) +b3(GNI) +b4(EqDeaths) + b5(EqD) + b6(FDeaths) +b7(FD) +b8(EW) + b9(Bd) + b10(Tax) +b11(SA) +b12(Ser) + b13(Rev) + b14(GDPmarket) +b15(GDPG) +b16(FI) + b17(CS) + A

In the above equation, average dietary energy supply adequacy (Y1) is measured against the variables of national security. Pop is the population. Population in simple words can be defined as the total number of persons inhabiting a country, city, or any district or area. Population may have positive or negative relation with the food security. However, in the above model, population has a positive relation with average dietary energy supply adequacy, which is a variable of food security (availability). AgVA represents Agriculture Value Added. It also serves as an important economic indicator and it is measured as a percentage of GDP. The net output of agriculture value added as GDP accumulates outputs from various food production domains such as fisheries, forestry, livestock rearing and crop cultivations. Gross National Income (GNI) is a similar concept which refers to a broader form of assessment of value added to the economy by all the producers and production units is called GNI. Formerly known as GNP, it is calculated by adding all the value that is input by the local producers and the taxes on the products thus acquired as well as the sum of total primary incomes generated by the people abroad. GNI in this case has a negative relation with the average dietary energy supply adequacy. The fourth variable tested EQDeaths is Earth Quake Deaths. Earthquake is defined as the uncontrolled shaking of the surface of the Earth that is apparent and is usually as a result of energy releasing from the Earth's crust via the seismic plates.

Deaths due to shaking of Earth are referred to as the earthquake deaths. While EqD; Earth Quake Damage is the destruction caused by intense shaking of the earth resulting in damage of property, infrastructure etc. Fdeaths and FD are defined as an occurrence of water overflows from the bounds of usual water bodies and the occupation of the low-lying lands by water. Flooding results in disruption of agriculture fields, loss of livestock, disruption of communication and loss of lives and thus the variables are termed as floods deaths and floods damages respectively. Both Earthquake and Flood combines and makes the environmental indicator of the National Security. EW and Bd represents external war deaths and best deaths respectively.

From B10 till b18 all variables gross up to make Economic indicators of the national Security. Where Tax is the Tax Revenue. Tax revenue is the income that is gained by governments through taxation. SA represents Surface Area while Ser is the Services Sector Value added as percentage of GDP. Revenues as a percentage of gdp are denoted with Rev. GDPmarkets and GDPG represent GDP growth and GDP at market price respectively. Economic Growth Rate is the rate at which a nation's Gross Domestic product (GDP) changes/grows from one year to another. GDP is the market value of all the goods and services produced in a country in a particular time period. Foreign investment consists of flows of capital from one nation to another in exchange for significant ownership stakes in domestic companies or other domestic assets. Foreign investment is denoted by FI. CS is Cash Surplus which is defined as revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.

Y2 = b1(Pop)+ b2(AgVA) +b3(GNI) +b4(EqDeaths) + b5(EqD) + b6(FDeaths) +b7(FD) +b8(EW) + b9(Bd) + b10(Tax) +b11(SA) +b12(Ser) + b13(Rev) + b14(GDPmarket) +b15(GDPG) +b16(FI) + b17(CS) + A

In the above equation, GDP per Capita in terms of Purchasing Power Parity (PPP) (Y2) is measured against the variables of national security. POP is the population. Population in simple words can be defined as the total number of persons inhabiting a country, city, or any district or area. Population may have positive or negative relation with the food security. However, in the above model, population has a positive relation with average dietary energy supply adequacy, which is a variable of food security (availability). AGVA represents Agriculture Value Added. It also serves as an important economic indicator and it is measured as a percentage of GDP. The net output of agriculture value added as GDP accumulates outputs from various food production domains such as fisheries, forestry, livestock rearing and crop cultivations. Gross National Income (GNI) GNI is a similar concept which refers to a broader form of assessment of value added to the economy by all the producers and production units is called GNI. Formerly known as GNP, it is calculated by adding all the value that is input by the local producers and the taxes on the products thus acquired as well as the sum of total primary incomes generated by the people abroad. GNI in this case has a negative relation with the average dietary energy supply adequacy. The fourth variable tested (EQDEATHS) is Earth Quake Deaths. Earthquake is defined as the uncontrolled shaking of the surface of the Earth that is apparent and is usually as a result of energy releasing from the Earth's crust via the seismic plates.

Deaths due to shaking of Earth are referred to as the earthquake deaths. While EQD; Earth Quake Damage is the destruction caused by intense shaking of the earth resulting in damage of property, infrastructure etc. Flood FDEATHS and FDAMAGES is defined as an occurrence of water overflows from the bounds of usual water bodies and the occupation of the low-lying lands by water. Flooding results in disruption of agriculture fields, loss of livestock, disruption of communication and loss of lives and thus the variables are termed as floods deaths and floods damages respectively. Both Earthquake and Flood combines and makes the environmental indicator of the National Security.

From TAX till X18 all variables gross up to make Economic indicators of the national Security. Where TAX is the Tax Revenue. Tax revenue is the income that is gained by governments through taxation. SA represents Surface Area while SER is the Services Sector Value added as percentage of GDP. Revenues as a percentage of gdp are denoted with REV. GDPMARKET and GDPG represent GDP growth and GDP at market price respectively. Economic Growth Rate is the rate at which a nation's Gross Domestic product (GDP) changes/grows from one year to another. GDP is the market value of all the goods and services produced in a country in a particular time period. Foreign investment consists of flows of capital from one nation to another in exchange for significant ownership stakes in domestic companies or other domestic assets. Foreign investment is denoted by FI. CS is Cash Surplus which is defined as revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.

Y3 = b1POP + b2X2 +b3GNI +b4EQDEATHS + b5EQD + b6FDEATHS +b7FDAMAGES +b8EXTWD + b9BD + b10TAX +b11SA +b12SER + b13REV + b14GDPMARKET +b15GDPG +b16FI + b17CS + A

In the above equation Y3 is Prevalence of Anemia which is measured against the variables of national security. Pop is the population. Population in simple words can be defined as the total number of persons inhabiting a country, city, or any district or area. Population may have positive or negative relation with the food security. However, in the above model, population has a positive relation with average dietary energy supply adequacy, which is a variable of food security (availability). AGVA represents Agriculture Value Added. It also serves as an important economic indicator and it is measured as a percentage of GDP. The net output of agriculture value added as GDP accumulates outputs from various food production domains such as fisheries, forestry, livestock rearing and crop cultivations. Gross National Income (GNI) GNI is a similar concept which refers to a broader form of assessment of value added to the economy by all the producers and production units is called GNI. Formerly known as GNP, it is calculated by adding all the value that is input by the local producers and the taxes on the products thus acquired as well as the sum of total primary incomes generated by the people abroad. GNI in this case has a negative relation with the average dietary energy supply adequacy. The fourth variable tested (EQDEATHS) is Earth Quake Deaths. Earthquake is defined as the uncontrolled shaking of the surface of the Earth that is apparent and is usually as a result of energy releasing from the Earth's crust via the seismic plates.

Deaths due to shaking of Earth are referred to as the earthquake deaths. While EQD; Earth Quake Damage is the destruction caused by intense shaking of the earth resulting in damage of property, infrastructure etc. Flood FDEATHS and FDAMAGES are defined as an occurrence of water overflows from the bounds of usual water bodies and the occupation of the low-lying lands by water. Flooding results in disruption of agriculture fields, loss of livestock, disruption of communication and loss of lives and thus the variables are termed as floods deaths and floods damages respectively. Both Earthquake and Flood combines and makes the environmental indicator of the National Security.

From TAX till CS all variables gross up to make Economic indicators of the national Security. Where TAX is the Tax Revenue. Tax revenue is the income that is gained by governments through taxation. SA represents Surface Area while SER is the Services Sector Value added as percentage of GDP. Revenues as a percentage of gdp are denoted with REV. GDPMARKET and GDPG represent GDP growth and GDP at market price respectively. Economic Growth Rate is the rate at which a nation's Gross Domestic product (GDP) changes/grows from one year to another. GDP is the market value of all the goods and services produced in a country in a particular time period. Foreign investment consists of flows of capital from one nation to another in exchange for significant ownership stakes in domestic companies or other domestic assets. Foreign investment is denoted by FI. CS is Cash Surplus which is defined as revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.

At the end of the regression, *Hausman Test* was run and it was found that Fixed Effect Analysis was better than the OLS.

Conceptual Framework

Theoretically, the impact of changes in National Security situation in a particular region can be both significant and insignificant. This however, solely depends on each of the individual indicator that sums up to National Security. The framework of conceptual analysis for the purpose of this research is illustrated in the figure below:-
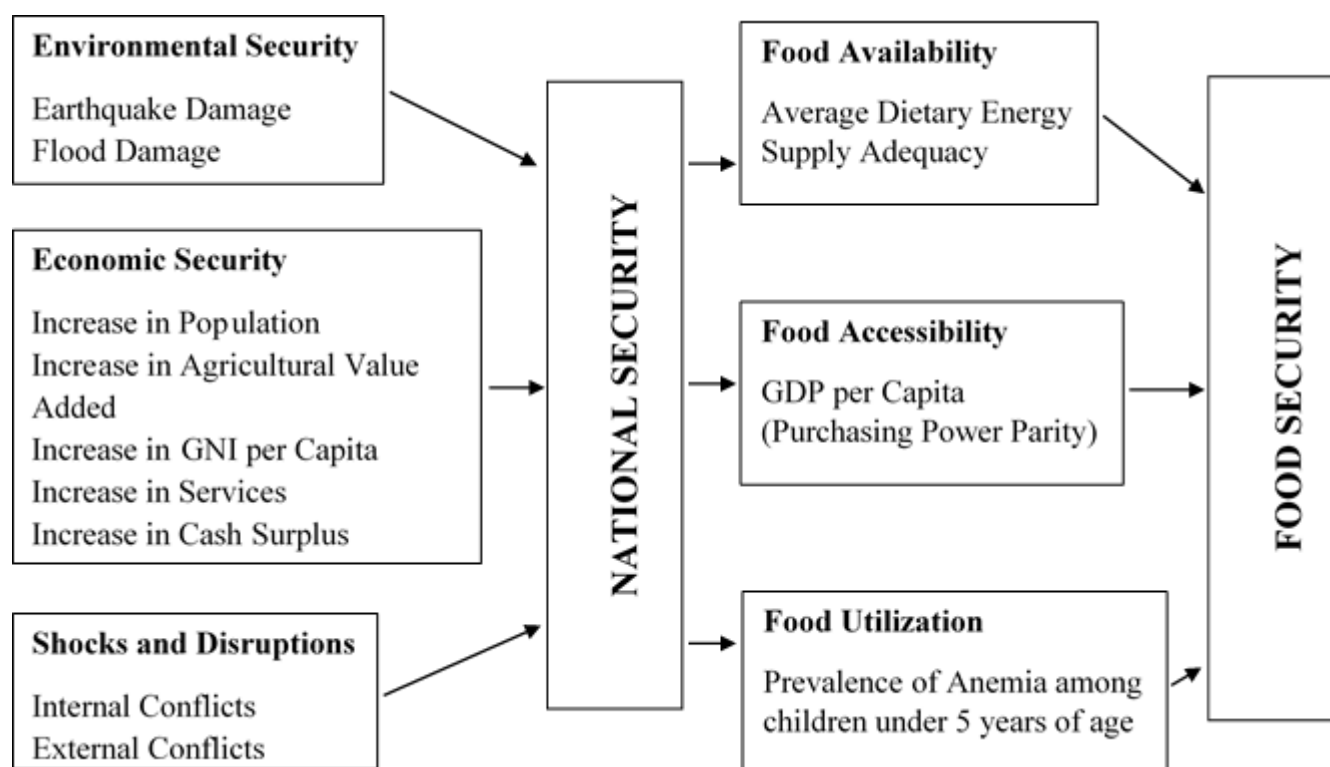
Figure 5.1 – Conceptual Framework

As popularly conceptualized, Earthquakes and Floods tend to cause destruction which varies with their magnitude. Damage caused by Earthquakes and Floods is inclusive of infrastructural destruction as well as human deaths. Infrastructural destruction often leads to accessibility issues such that destruction of roads and bridges will halt accessibility of the people to food markets.

A closely related concept also indicates that due to inaccessibility of the markets, the suppliers may also be unable to supply food units to the market. Natural Disasters such as Earthquakes and Floods may also tend to damage the economic activity such as destroying the agricultural crops of families dependent on crop cultivation for livelihood. This therefore, will result in loss of income for the family which serves as source of food purchase for them as well as it will reduce the national level supply of food units.

On the contrary, food security is popularly believed to be impacted by economic factors. Increase in population will increase the demand for food commodities as there will be a greater number of people to be fed. In such an instance, there is a need to increase food supply otherwise, the region will be marked by food insecurity. Insufficient food intake, results in diseases like anemia etc. Increase in Agricultural Value Added refers to the increase in manufacturing processes of agricultural goods that increase its value. This not only allows a greater variety of food commodities but also ensures that processed food is being made available to the population. Thus, more the agricultural value added the lesser the chances are of populations being left unfed. In one way or another, agricultural value added ensures that greater food units are available for populations to be utilized.

Similarly, increase in GNI indicates an increase in national income which positively impacts the buying ability of the population, increasing the level of affordability of general population. Increase in Cash Surplus, similarly indicates that the government of a particular country has excess resources to address societal issues such as food insecurity and ca increase welfare spending in the economy. This therefore, leads to better chances of curbing food insecurity.

Shocks and Disruptions defined as internal and external violent conflicts in a country tend to negatively impact food security in a country. It is conceptualized that internal and external conflicts tend to halt the development process and disrupt the food supplies. The disruption in food supplies is as per the destruction of infrastructure by violent forces that aim to halt the accessibility of food supplies to the markets so that the rival party's population suffers. Similarly, violent conflicts (be it internal and external) target agricultural crops and food supplies of the rival groups to destroy them and to leave populations vulnerable to the threat of food insecurity.

The above framework although highlights that different factors tend to influence the food security situation of a region both positively and negatively, it is assumed that the net impact of all the three indicators (environmental security, economic security and shocks and disruptions) on food security is immense. This means that the three factors can be closely related to food security and a change in one will cause a significant change in food security situation of a region.

Research Limitations

The research is based on secondary sources of data given the large sample size. Thus, the data availability of all the indicators adopted for the purpose of this research could not be ensured. Indicators for the purpose of this research were streamlined and the ones with data availability were selected. Hence, given the large list of indicators which could possibly be adopted for the purpose of this research, the results are subject to change.

Similarly, for some indicators for which data was available, the number of observations were less. Thus, again the timeline for the purpose of this research was shortened, incorporating a limited number of observations. Moreover, for essential indicators for which data was unavailable proxy indicators are selected. Internal and External conflicts are reflected through the number of deaths caused by internal and external conflicts.

In addition to this, the theme of the research is such that it broadens the scope of the research. There has been rigorous debate relating the definition of National Security that is employed for the purpose of this research. Thus, the subject has the potential to be further researched with the help of primary sources of data to confirm the applicability of the multi-dimensional national security. The theme under which this research has been conducted may be criticized by the scholars of opposing school of thought because to date consensus regarding the modern definition of national security has not been reached. The results of the research are although generated using quantitative analysis, human mind has limited capacity to evaluate and analyze the numbers. Thus, the interpretation of the analysis may be confined by the human ability to analyze quantitative data.

Ethical Considerations

The study is carried out keeping in mind the ethical considerations that ensure that this study does not tends to exploit or manipulate the workings of any other author or organization. The study consists of the most summarized and comprehended knowledge respecting the work of the original author and giving credit to the original author. No data has been fabricated or altered. Secondary data is used as reported by the databanks. The analysis however, is subjected to personal interpretation. No data is changed such that it portrays false or incorrect meaning. The data is portrayed in its purest form.

VI. Data Analysis

The table below is the summary table yielded with the help of correlational analysis run on STATA:-

Variable	Obs	Mean	Std. Dev.	Min	Max
year	1150	2002	7.21424	1990	2014
country	0				
averagedie~a	975	115.5241	16.27375	68	165
gdppercapi~p	1012	18718.08	25489.25	1004	133733.9
prevalence~n	968	39.87035	15.2817	12.2	83.8
bdhigh	237	2084.747	5780.305	25	53948
nonstatebest	109	116.5413	161.084	25	1415
nonstatehigh	109	170.6055	225.1511	25	1425
taxrevenue~p	553	12.97288	7.504026	.0858148	55.55549
surfaceare~m	1150	1041.463	2835.275	0	17098.25
serviceset~p	888	48.9678	13.47682	16.56	87.1
revenueexc~p	541	21.39514	10.39823	3.16	70.58
gdpgrowtha~1	1020	4.88051	7.357241	-64.05	57.82
cashsurplus	488	-1.999549	11.56009	-202.7	29.34
country1	1150	23.5	13.28169	1	46
population	1130	563.5027	326.3426	1	1128
GNI	962	299.0686	164.1305	1	569
agricultur~A	920	452.9696	265.0856	1	912
externalwa~s	237	105.2278	57.49008	1	204
floodsdeath	117	.4134017	.8357801	.001	6.054
floodsdamage	119	2079.757	5490.276	.094	40317
earthquake~s	49	11.62782	28.613	.001	165.708
earthquake~e	39	5666.88	14664.57	.05	85000
gdpatmarke~s	1038	295.9341	967.716	.22	10354.83
foreigninv	1045	5626.799	22557.14	-4550.36	290928.4

Table 6.1 – Summary of DATA (STATA)

The results as shown by the summary table are explained in the next section.

Results

Average Dietary Energy Supply Adequacy, explains Dietary Energy Supply as a percentage of the Average Dietary Energy Requirement (ADER) of the country. It Measures adequacy of the national food supply in terms of calories and helps in understanding whether undernourishment is mainly due to insufficient food supply or due to inappropriate distribution.

The total number of observations tested are 975, the mean is 115.5241 and this implies that in the Asian countries has more than 100% of insufficient food supply. The standard deviation is of the variable 16.27375. This gives information regarding the spread of the distribution of the variable. The minimum and maximum values that are inserted in the data are 68 and 165 respectively.

GDP per capita is another variable that has 1012 observations, and a mean of 18718.08. This implies that most of the countries in Asia have a high GDP per capita which means that the country's output is quite high and the population is relatively less. The spread of the distribution (standard deviation of the variable is 25489.35. The minimum and maximum values inserted in the variable data are 1004 and 133733.9 respectively.

The variable, Prevalence of anemia among children under 5 years of age, has 968 observations and mean of 39.87035, implying that on average 39% of population under the age of 5 in Asian countries are facing anaemia. As compared to African countries the percentage is quite low but there are few countries in Asian region that have a higher percentage of prevalence of anaemia among children under 5 years of age. The data deviates with the value of 15.2817. The minimum value of 12.2 and maximum value of 83.8 indicate the minimum and maximum values that are present in the variable data.

For the variable, bdhigh, the total number of observations is 237 and the mean is 2084.747. This shows that on average there have been a high amount of deaths in the Asian countries due to wars and civil unrest. The standard deviation is 5780.305 and this gives information regarding the spread of the distribution of the variable. The minimum and maximum values that are present in the variables data are 25 and 53948 respectively.

For the variable, nonstatebest, the total number of observations is 109, the mean is 116.5413. This shows the number of deaths due to wars and conflicts. In Asian region the average is higher compared to other countries due to a higher number of conflicts and casualties. The standard deviation is 161.084, which gives information regarding the spread of the distribution of the variable. The minimum and maximum values that are present in the data for the variable are 25 and 1415 respectively.

For the variable, nonstatehigh, the total number of observations is 109, the mean is 170.6055. This shows the number of deaths due to wars and conflicts. In Asian region the average is higher compared to other countries due to a higher number of conflicts and casualties. The standard deviation is 225.1511 which shows the spread of the distribution of the variable. The minimum and maximum values that are present in the data for the variable are 25 and 1425 respectively.

Tax revenue is the income that is gained by governments through taxation. For Tax revenue (% of GDP), the total number of observations is 553, the mean is 12.97288, the standard deviation is 7.504026, displaying the spread of the distribution of the variable. The minimum and maximum values that are present in the data for the variable are 0.0858148 and 55.55549 respectively.

We can derive from the summary table that in Asian countries the Tax revenue as a percentage of GDP on average is low as there are many countries still in the developing stage hence countries which are in developing stage have lower percent of Tax revenue (% of GDP) as compared to countries that are developed. Moreover, such a low percentage of Tax Revenue indicates the inefficient tax collection mechanisms in Asian Countries. Surface area (sq. km) is tested with 1150 observations and the mean is 1041.463 while the standard deviation is 2835.275 reflecting the spread of the distribution of the variable. The minimum and maximum values that are present in the data for the variable are 0 and 17098.25 respectively.

The number of observations for the variable Services, etc., value added (% of GDP) is 888, while the mean is 48.9678 and the standard deviation is 13.4768. The minimum and maximum values that are present in the data for the variable are 16.56 and 87.1 respectively. For the variable, Revenue, excluding grants (% of GDP), the total number of observations is 541, the mean is 21.39514, the standard deviation is 10.39823. The minimum and maximum values that are present in the data for the variable are 3.16 and 70.58 respectively.

The indictor GDP growth (annual %) has a total number of observations amounting to1020 while the mean is 4.88051 and the standard deviation is 7.357241, The minimum and maximum values that are present in the data for the variable are -64.05 and 57.82 respectively. For the variable, cash surplus, the total number of observations is 488, the mean is -1.999549, the standard deviation is 11.56009. The minimum and maximum values that are present in the data for the variable are -202.7 and 29.34 respectively. The indicator population has a total of 1130 observations while the mean is 563.5027 and the standard deviation is 326.3426. The minimum and maximum values that are present in the data for the variable are 1 and 1128 respectively.

For the variable, GNI, the total number of observations is 962, the mean is 299.0686, the standard deviation is 164.1305, the minimum and maximum values that are present in the data for the variable are 1 and 569 respectively. Similarly, for the variable, Agriculture Value added, the total number of observations is 920, the mean is 452.9696, the standard deviation is 265.0856, this is the standard deviation of the variable and this gives information regarding the spread of the distribution of the variable. The minimum and maximum values that are present in the data for the variable are 1 and 912 respectively.

For the variable, external war deaths bd best, the total number of observations is 237, the mean is 105.2278. This implies that on average there have been few events as the observation is quite low, but on average the number of deaths due to external war is quite high. The standard deviation is 57.49008, this is the standard deviation of the variable and this gives information regarding the spread of the distribution of the variable. The minimum and maximum values that are present in the data for the variable are 1 and 204 respectively.

Coming to the indicators of environmental security, for the proxy variable Floods Death the total number of observations is 117, the mean is 0.4134017, the standard deviation is 0.8357801. The minimum and maximum values that are present in the data for the variable are 0.001 and 6.054 respectively. For the variable, Floods Damage, the total number of observations is 119, the mean is 2079.757, while the standard deviation is 5490.276. The minimum and maximum values that are present in the data for the variable are 0.094 and 40317 respectively. The statistical analysis of proxy indicator Earthquake deaths shows the total number of observations being 49, the mean being 11.62782, while the standard deviation being 28.613. The minimum and maximum values that are present in the data for the variable are 0.001 and 165.708 respectively.

On the contrary, the variable Earthquake damage, the total number of observations is 39, the mean is 5666.88, and the standard deviation is 14664.57. The minimum and maximum values that are present in the data for the variable are 0.05 and 85000 respectively.

Statistical analysis of the variable GDP at market prices (current US$) shows the total number of observations is 1038, the mean is 295.9341 while the standard deviation is 967.716. The minimum and maximum values that are present in the data for the variable are 0.22 and 10354.83 respectively. Analysis of Foreign Investment shows that the total number of observations is 1045, the mean is 5626.9341 while the standard deviation is 22557.14. The minimum and maximum values that are present in the data for the variable are -4550.36 and 290928.4 respectively.

Correlation Analysis

Average Dietary Energy Supply Adequacy		
Variables	**Correlation**	**No of Observations**
Population	20.36%	965
Agriculture Value Added	-1.45%	806
GNI per capita, Atlas method (current US$)	-8.42%	834
Earthquake damage	-7.04	46
Droughts Deaths	-100	2
Droughts Damage	15.71%	18
external war deaths bd best	1.48%	233
Prevalence of anemia among children less than 5 years of age	-26.79	836
Flood damages	4.41%	117
GDP per capita	20.59%	902
Floods death	1.32%	109
Tax Revenue	15.30%	553
Revenues % of GDP	10.60%	541
Services Value Added	15.30%	888
Surface Area	48.90%	1150
Foreign Investment	32.80%	1045
Cash Surplus	54.50%	488

Table 6.2 Average Dietary Energy Supply Adequacy (correlation)

According to the analysis, 233 observations established a lesser correlation between average dietary energy supply adequacy and deaths in external wars. This is unexpected results as literature suggests that deaths in wars and average dietary energy supply adequacy are highly correlated. The reason behind obtaining a lesser relation might be the fewer observations available. An insignificant inverse correlation has also been observed between Average dietary energy supply adequacy and agriculture value added in 806 observations. Again an unexpected result might be because of the fact that south Asian countries even having agricultural land are facing severe dietary issues due to difficulty in accessibility and affordability of food. Also, a slight inverse correlation between Average dietary energy supply adequacy and GNI per capita is shown after revealing data from 834 observations. This is an unanticipated result as generally it is believed that they both possess positive correlation. A significant direct correlation exists between Average dietary energy supply adequacy and population after surveying data from 965 observations. This is very obvious and understandable because human beings are highly dependent on food and diet for their survival. A very few number of observations has exposed that the correlation between Average dietary energy supply adequacy and damages caused by droughts is insignificant but cannot be neglected. The anticipated results should be more substantial; it might be because of the fact that the numbers of observations taken are very few. Inconsiderable correlation exists between Average dietary energy supply adequacy and deaths caused by floods. It might be because of the reality that deaths caused by floods in South Asian countries were not affecting greatly to the agriculture of the country and also the information is exposed from 109 observations which are quite little to make a strong statement for analysis.

Average dietary energy supply adequacy and Prevalence of anemia among children less than 5 years of 4age have insubstantial but inverse correlation. Comprehensive data collection revealed that increase in average dietary energy supply adequacy would decrease the prevalence of anemia among children less than 5 years of age. 46 observation has uncovered the correlation between Average dietary energy supply adequacy and damages caused by earth quakes is lesser but inversely correlated. Earthquake damages have overall severe impact but it doesn't have that negative impact on agriculture and energy supply. They have inverse correlation which shows that its impact on energy supply is destructive. Average dietary energy supply adequacy and deaths caused by droughts are vastly correlated and facts showed that it has severe negative impact on rural areas which are the main source of food supply in South Asian region. Farmers and cultivators are poor people, so they are the ones who are actually hit by a drought. But, this data can be over exaggerated as this is taken from just 2 observations. The correlation between Average dietary energy supply adequacy and damages caused by floods is little, taken from 117 observations. This is unexpected results because many findings tell us that agriculture and food supply in these countries are most affected by floods. Another unanticipated result is the positive relation between them. This might be because of many factors like areas most damaged by floods, time period we selected, fabricated or biased survey etc. A positive significant correlation exists between Average dietary energy supply adequacy and GDP per capita. The data revealed from 902 observations illustrates that increase in GDP per capita will increase the purchasing power and economy which will further increase the average dietary energy supply adequacy.

GDP per capita		
Variables	**Correlation**	**No of Observations**
GNI per capita, Atlas method (current US$)	0.69	894
Earthquake deaths	-10.41	44
Earthquake damage	23.78	35
Droughts Deaths	-100	2
Droughts Damage	-6.46	18
bd high	-19.35	215
Prevalence of anemia among children less than 5 years of age	-17.01	905
Average dietary energy supply adequacy	20.59	902
Flood deaths	-15.01	111
Flood damages	-7.81	114

Table 6.3 GDP Per Capita (correlation)

The facts shown in 905 observations established an ordinary but converse correlation between Prevalence of anemia among children less than 5 years of age and GDP per capita. This is explicable because output and growth of the country helps in providing better facilities and necessities such as food, shelter, health etc. Converse correlation is self-explanatory as increase in GDP per capita will definitely decrease the prevalence of anemia among children less than 5 years of age. Prevalence of anemia among children less than 5 years of age and deaths caused by floods are extremely correlated and has positive relation. Survey from 101 observations demonstrates that when floods hit to any country, it brings along a bunch of germs and diseases which increases the threats of prevalence of anemia in newly born children. There is very little correlation exists between Prevalence of anemia among children less than 5 years of age and damages caused by floods. The data revealed from 100 observations shows little unexpected results that damages caused by flood are not that anemic in newly born child. It might be because of many factors such as; area where flood hit, timing of flood, financial condition of country to cope up with those damages etc. The figures from 44 studies illustrate that the correlation between Prevalence of anemia among children less than 5 years of age and deaths caused by earth quakes is inconsiderable. This is anticipated result as earthquakes doesn't produce or turn out any disease; primarily it is a physical kind of destruction or stress. Significant but inverse correlation exists between Prevalence of anemia among children less than 5 years of age and damages caused by earthquake. This is an unexpected result as damages by earthquake does not increase prevalence of anemia among children less than 5 years of age, the reason might behind this result be the destruction of houses and loss of incomes of people who would then not be able to fulfill their basic essentials for their newly born children.

Prevalence of anemia among children less than 5 years of age		
Variables	**Correlation**	**No of Observations**
Population	-16.53%	961
Agriculture Value Added	5.30%	789
GNI per capita, Atlas method (current US$)	12.49%	819
Earthquake deaths	3.53%	44
Earthquake damage	-49.11%	34
Droughts Damage	-5.69%	17
external war deaths bd best	5.81%	207
GDP per capita	-17.01%	905
Bd high	00.94%	207
Average dietary energy supply adequacy	-26.79%	836
Flood damages	2.01%	100
Flood deaths	50.90%	101
Tax Revenue	60.20%	553
Revenues % of GDP	40.60%	541
Services Value Added	15.30%	888
Surface Area	10.60%	1150
Foreign Investment	48.905	1045
Cash Surplus	54.80%	488

Table 6.4 Prevalence of Anemia (correlation)

Prevalence of anemia among children less than 5 years of age and damages caused by droughts has lesser but negative and inverse correlation. This is again an unanticipated result because droughts are the severe form food scarcity which increases the vitamin deficiency in human body especially in rural areas where most people are poor or living below poverty line. It might be because of the fact that the number of observations (17) or span of survey seems very minute. Prevalence of anemia among children less than 5 years of age and average dietary energy supply adequacy has insubstantial but inverse correlation. Comprehensive data collection revealed that increase in average dietary energy supply adequacy would decrease the prevalence of anemia among children less than 5 years of age. The correlation between prevalence of anemia among children less than 5 years of age best estimates of deaths in external wars is inconsiderable while examining 200 observations which are understood as deaths in wars don't have any direct impact on increasing chances of anemia among children less than 5 years of age. Inconsequential inverse correlation exists prevalence of anemia among children less than 5 years of age and population while studying 961 observations. There is also significant negative correlation exists between prevalence of anemia among children less than 5 years of age and agriculture which was observed in 789 observations taken. Growth in agriculture decreases the chances of anemia among children less than 5 years of age.

The facts shown in 905 observations established an ordinary but converse correlation between GDP per capita and prevalence of anemia among children less than 5 years of age and. This is explicable because output and growth of the country helps in providing better facilities and necessities such as food, shelter, health etc.

Converse correlation is self-explanatory as increase in GDP per capita will definitely decrease the prevalence of anemia among children less than 5 years of age. GDP per capita and damages caused by droughts have noteworthy but inverse correlation. The data was exposed from just 18 observations. This is an underestimated result because droughts in South Asian countries have been one of the core issues of these states. It might be because that these results are dependent on many factors such as; time period selected, areas where have caused damages, financial condition of the state etc. The correlation between GDP per capita and GNI per capita is constructively substantial. A very comprehensive survey revealed information taken from 894 observations. GDP per capita and GNI per capita both have a direct relationship, increase in one will increase the other and vice versa. A positive significant correlation exists between GDP per capita and average dietary energy supply adequacy. The data revealed from 902 observations illustrates that increase in GDP per capita will increase the purchasing power and economy which will further increase the average dietary energy supply adequacy. There is a significant but inverse correlation between GDP per capita and deaths caused by droughts. This might be over exaggerated that there correlation is 100 % which would be because of the fact that the total number of observation taken is 2. GDP growth would definitely increase when there is no drought damages and death, when there is no contingency situation created.

Figure 6.1 - Scattered Plot Matrix
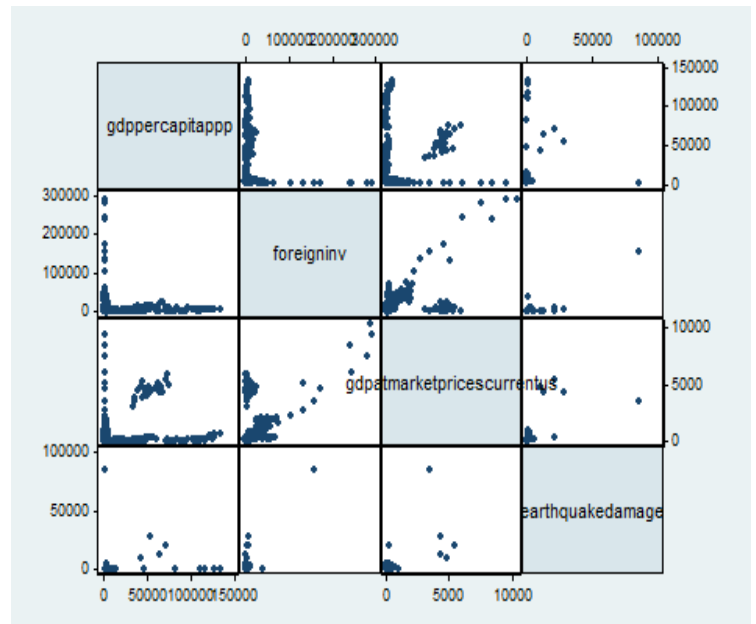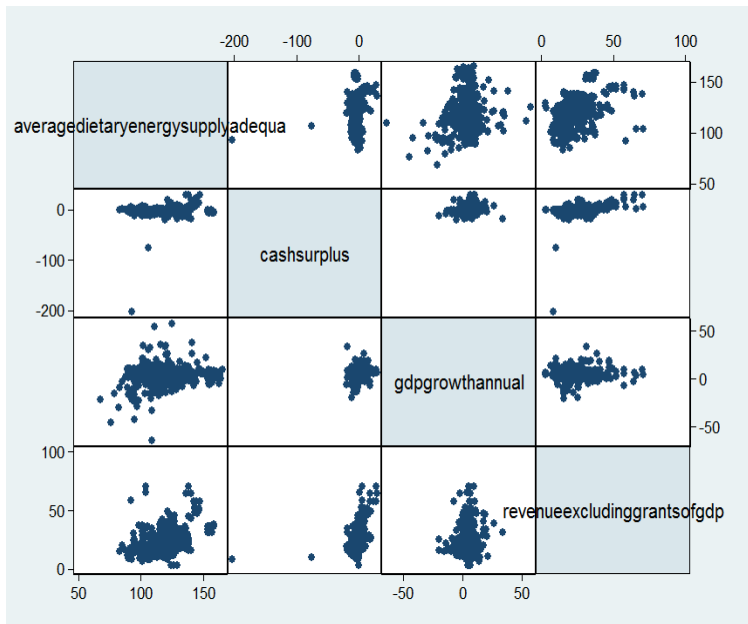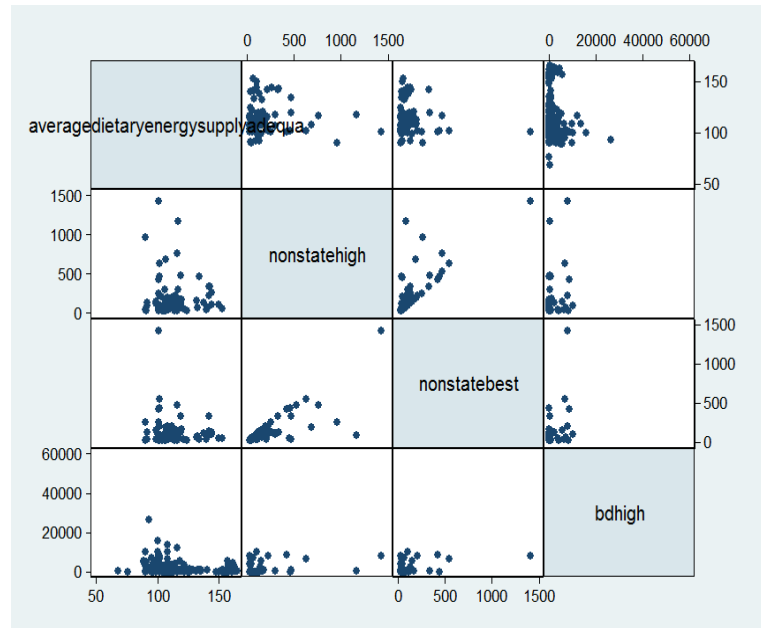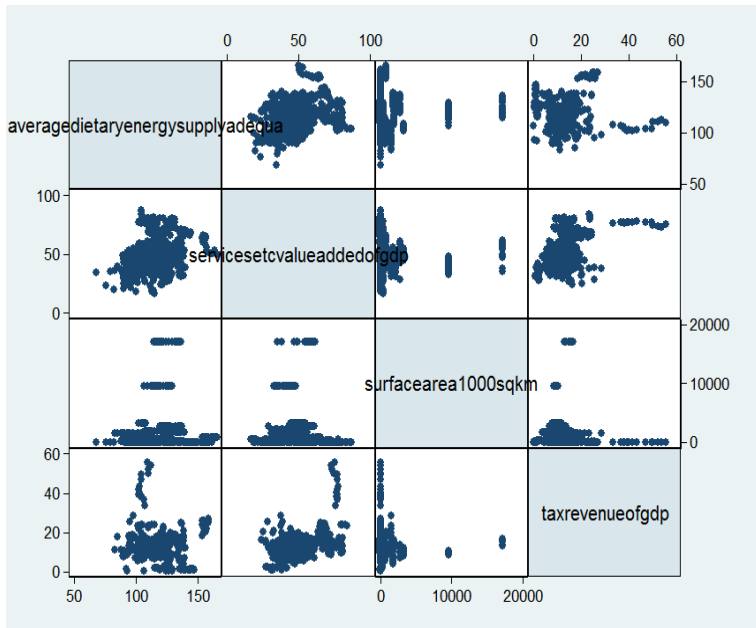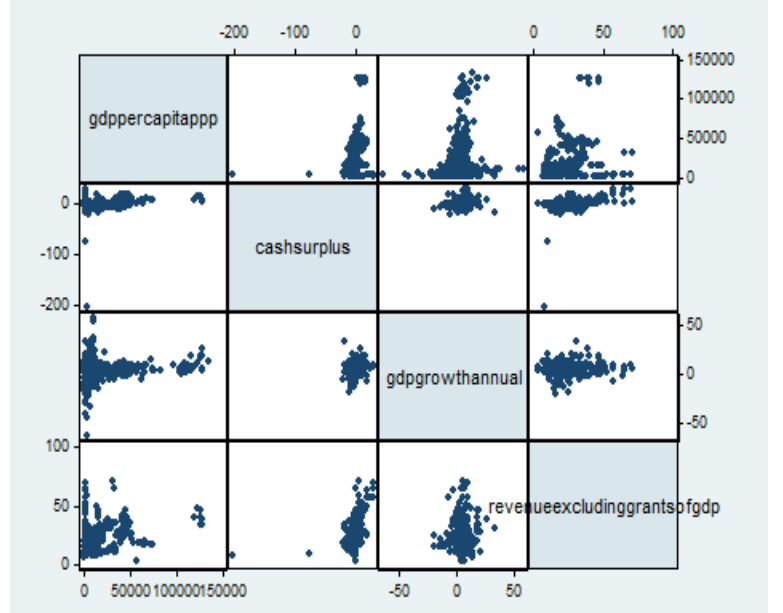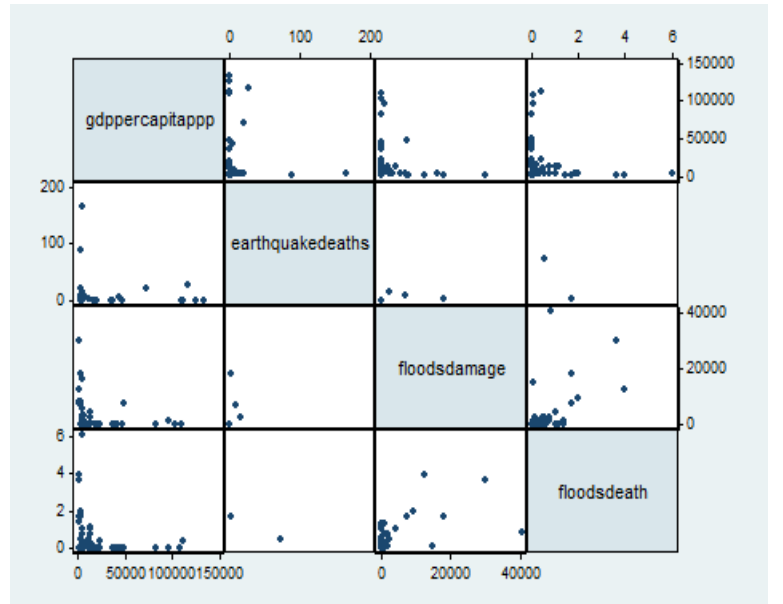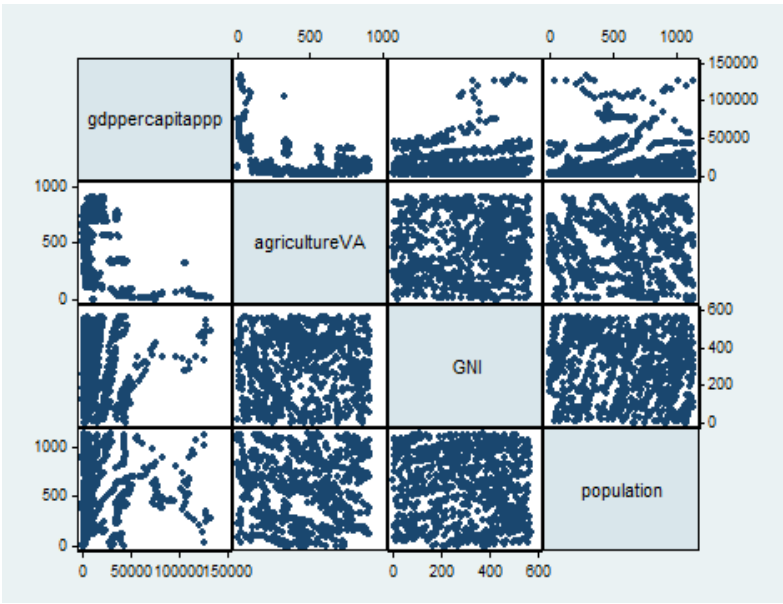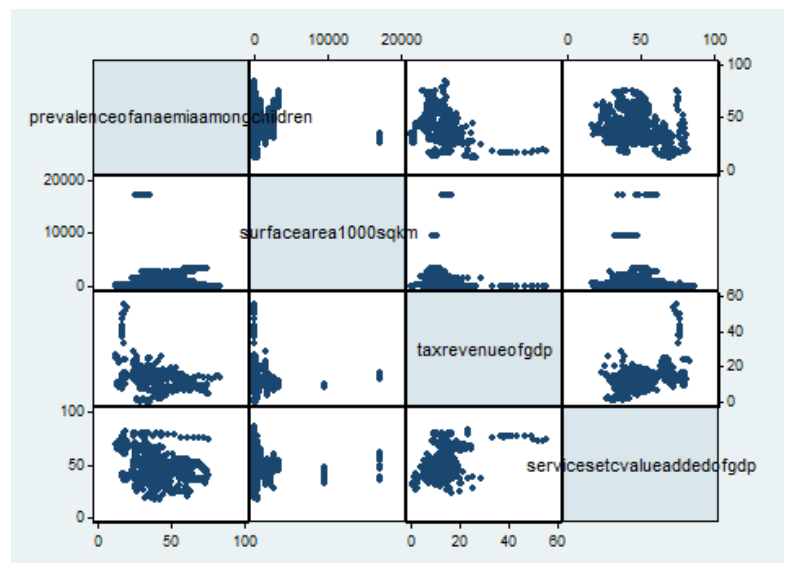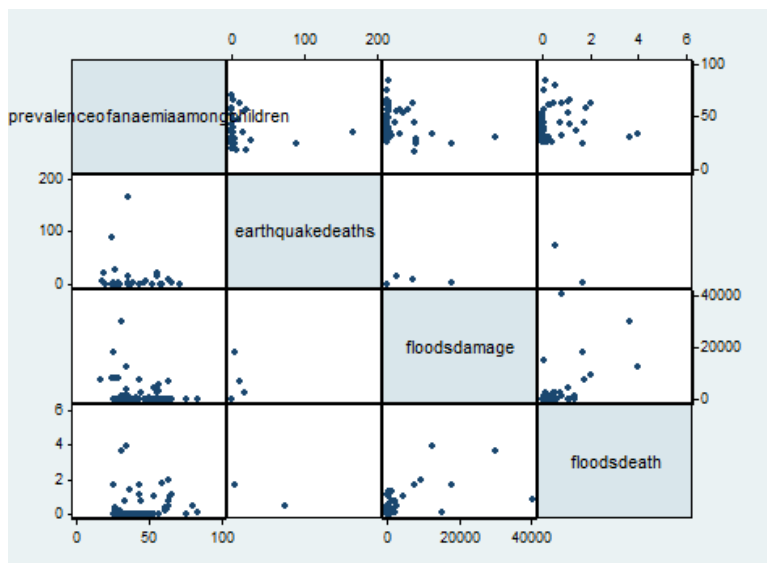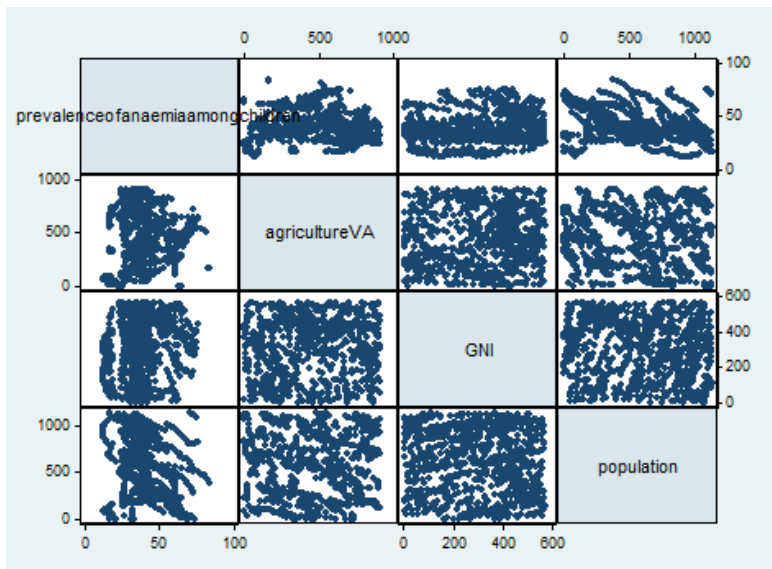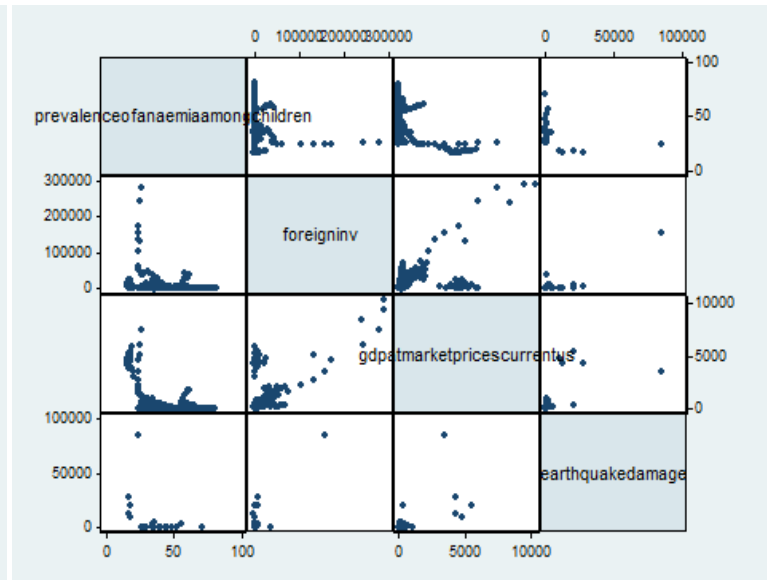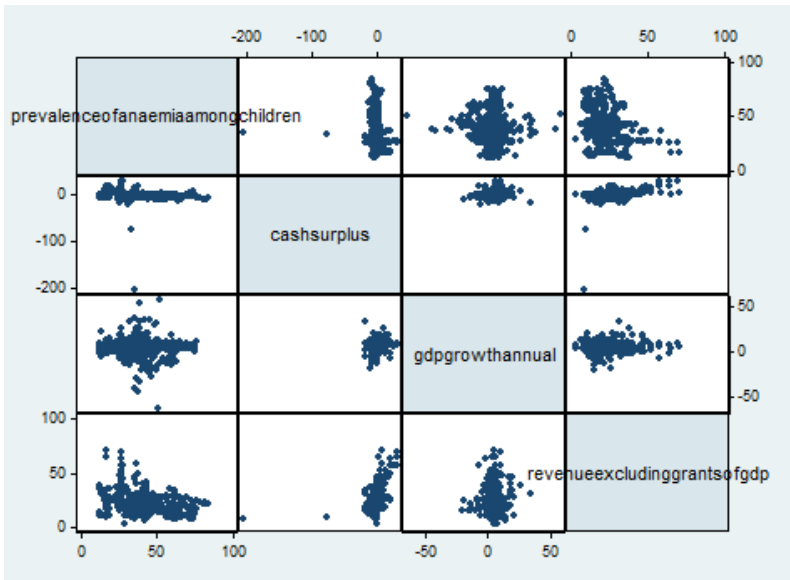
Interpretation and Analysis

Average Dietary Energy Supply Adequacy		
Variables	**OLS**	**Fixed Effect**
Population	0.014***	0.006***
Agriculture Value Added	0.027***	-0.006***
GNI per capita, Atlas method (current US$)	-0.006***	-0.004**
Earthquake deaths		
Earthquake damage		
Floods Deaths		
Floods Damage		
external war deaths bd best	-0.021	
bd high	-0.001*	
Non state best		
Non state high	0.012*	0.008**
Tax revenue (% of GDP)	0.894***	-0.422**
Surface area (sq. km)	0.001***	12.147**
Services, etc., value added (% of GDP)	0.841***	0.163***
Revenue, excluding grants (% of GDP)	1.394***	0.366***
GDP growth (annual %)	-0.723***	0.271***
GDP at market prices (current US$)	0.006***	0.002***
foreign Investment	0.063**	0.148***
Cash Surplus	0.152***	0.161**

* Significant at 10%;   ** Significant at 5%;   *** Significant at 1%

Table 6.5 – Average Dietary Energy Supply Adequacy (Regression Table)

The OLS analysis explains that for every one unit change in the population there will be a 0.0014 unit change in the average dietary energy supply adequacy. Though a general understanding is that increase in population will decrease the dietary energy supply, however due to factors like increase in agriculture value added and gdp growth, the results obtained were different from that expected. Study also revealed that population have a very high level of significance. Agriculture value added as percentage of GDP was also measured against the said dependent variable and it was found that there is a very high significance of the independent variable and if agriculture value added as percentage of GDP changes by 1 unit there will be an increase of 0.027 units in average dietary energy supply adequacy. The net output of agriculture value added as GDP accumulates outputs from various food production domains such as fisheries, forestry, livestock rearing and crop cultivations. Therefore, more the value is added as a result of agricultural output, lesser will be the chances of Food Insecurity. William Rees, an urban planner at the University of British Columbia, estimated that it requires four to six hectares of land to maintain the consumption level of the average person from a high-consumption country. GNI per capita has a significant but inverse relation with a one unit change resulting in a decrease of 0.006 in the average dietary energy supply adequacy. Similarly, the OLS revealed a highly significant inverse relation between the GDP growth (annual %) with a one unit change in gdp growth resulting in a decrease of 0.723 units in average dietary energy supply adequacy. This is because the production, processing, and consumption, of commodities requires the extraction and use of natural resources (wood, ore, fossil fuels, and water); it requires the creation of factories and factory complexes whose operation creates toxic byproducts, while the use of commodities themselves (e.g. automobiles) creates pollutants and waste.

Thus, within the current economic system of "perpetual growth", we risk being locked into a mode of development that is 1) destructive, in the long run, to the environment, 2) a contributing factor to poverty around the world, 3) a contributing factor to hunger amongst such immense wealth and 4) and numerous other social and ecological problems.

Similarly, external war deaths have an inverse relation with the average dietary energy supply adequacy and a one unit change in external war deaths will result in a decrease of 0.021 but has an insignificant impact. This is primarily because wars lead to destruction and damages and thus there is lesser resources left to meet the food requirements. Tax revenue as a percentage of GDP has a highly significant impact with a one unit change leading to an increase of 0.894 units in average dietary energy supply adequacy. Government revenues can be used to implement policies and investments supporting several different aspects of food security, such as agricultural R&D and basic health services and water and sanitation systems which results in making a country more secure in terms of food. One unit change in surface area will have a significant impact and will increase average dietary energy supply adequacy by 0.001. Significance of services value added as percentage of GDP is very high. If there is a one unit change in the independent variable, the dependent variable will change by 0.841 units. GDP is measured in monetary terms as the value of all the goods and services produced within the premises of a country by various economic entities (residential, industrial etc.) over a particular period of time. Instability in markets resulting in food-price spikes can cause transitory food insecurity. Therefore stable growth ensures food security. GDP at Market Prices has a highly significant direct relation with a one unit change resulting in an increase of 0.006 units in the average dietary energy supply adequacy.

Developing countries are making strenuous efforts to attract and facilitate foreign investment into their agricultural sectors. For them, foreign direct investment is seen as a potentially important contributor to filling the investment gap. Foreign investment also has a significant direct relation with average dietary energy supply adequacy, where one unit change in foreign investment will lead to an increase of 0.063 units in average dietary energy supply adequacy.

Cash Surplus also has a significant direct relation. Cash Flows also serve as an important economic factor that is likely to influence the food security situation of a country. Stable cash flow throughout the country assures equal distribution of wealth hence preventing the social conflicts from arising. If the independent variable changes by one unit, the average dietary energy supply adequacy will increase by 0.152 units. Therefore, as expected, more the cash surplus better is the food security condition in a country.

When the data was analyzed for fixed effect the coefficients changed. The analysis explains that for every one unit change in the population there will be a 0.006 unit change in the average dietary energy supply adequacy. This is again due to same reasons as discussed earlier. For example, despite the rise in population, there might be an increase in incomes, which increases the capacity of a household to consume. Study also revealed that population have a very high level of significance. Agriculture value added as percentage of GDP was also measured against the said dependent variable and it was found that there is a very high inverse significance of the independent variable and if agriculture value added as percentage of GDP changes by 1 unit there will be a decrease of 0.006 units in average dietary energy supply adequacy. This is an unexpected result but for a fixed time period factors like price regulations and volatile prices might have a negative impact of average dietary energy supply adequacy and food security in general.

GNI per capita has a significant but inverse relation with a one unit change resulting in a decrease of 0.004 in the average dietary energy supply adequacy. This is again due to the fast development which wastes resources and damages the fertile land. Tax revenue as a percentage of GDP has a highly significant inverse impact with a one unit change leading to a decrease of 0.422 units in average dietary energy supply adequacy. In a fixed period of time, the results can be justified as an increase of tax revenues often requires changes in tax systems and tax legislation, which takes time; and taxes are often collected in arrears. Thus in a fixed period it is difficult to address food security concerns through generating tax revenues. One unit change in surface area will have a significant impact and will increase average dietary energy supply adequacy by 12.147. This is an expected outcome as an increase in surface area means there is more land available for agriculture and more resources are available as well. Significance of services value added as percentage of GDP is very high. If there is a one unit change in the independent variable, the dependent variable will change by 0.163 units. Services may include health, sanitation and education. Increase in these services will ensure better conditions in society thus contributing positively in making society food secure. The regression discovered a highly significant relation between the GDP growth (annual %) with a one unit change in gdp growth resulting in an increase of 0.271 units in average dietary energy supply adequacy. Similarly, GDP at Market Prices has a highly significant direct relation with a one unit change resulting in an increase of 0.02 units in the average dietary energy supply adequacy. Foreign investment refers to the investment made by the foreign parties in a particular economy. It is calculated by aggregating the equity capital, reinvestment of earnings and other capitals.

An increase in foreign investment ensures certainty of a more secure food supply chain, because more the money is available to invest in the agricultural sector, the better the sector will perform. This is empirically proved as foreign investment has a significant direct relation with average dietary energy supply adequacy, where one unit change in foreign investment will lead to an increase of 0.148 units in average dietary energy supply adequacy. It was presumed that increase in cash surplus will lead to better food security situation. Empirically, Cash Surplus also has a significant direct relation. If the independent variable changes by one unit, the average dietary energy supply adequacy will increase by 0.161 units.

GDP per Capita (PPP)		
Variables	**OLS**	**Fixed Effect**
Population	6.155*	3.238***
Agriculture Value Added	7.812***	-0.030
GNI per capita, Atlas method (current US$)		5.019**
Earthquake deaths	-1804.241	-1.858
Earthquake damage	-0.640	0.409
Floods Deaths	-3604.790**	38.117
Floods Damage	-0.635*	0.007
external war deaths bd best	-17.798**	9.060
bd high		
Non state best	-3.981*	
Non state high	-144.524	2.727*
Tax revenue (% of GDP)	698.894***	-140.127***
Surface area (sq. km)	0.601***	-290.051
Services, etc., value added (% of GDP)	209.044***	83.287**
Revenue, excluding grants (% of GDP)	534.202***	-252.027***
GDP growth (annual %)	579.480***	64.067*
GDP at market prices (current US$)	2.196*	1.249***
foreign Investment	484.712***	0.028**
Cash Surplus	874.147***	11.50

* Significant at 10%;   ** Significant at 5%;   *** Significant at 1%

Table 6.6 - GDP per Capita (PPP) – (Regression Table)

When ordinary least squares analysis was done, it was established that for every one unit change in the population there will be a 0.0014 unit change in the GDP per Capita (PPP). These results have 2 reasons. One is a common perception that more the population less will be the gdp per capita. But more influential determinant here is the rate with which gdp increases. If the rate of gdp growth is higher that population growth rate, gdp per capita will increase despite an increase in population. Study also revealed that population have a very high level of significance. Agriculture value added as percentage of GDP was also measured against the said dependent variable and it was found that there is a very high significance of the independent variable and if agriculture value added as percentage of GDP changes by 1 unit there will be an increase of 0.027 units in GDP per Capita (PPP). This is self-explanatory finding as the net output of agriculture value added as GDP accumulates outputs from various food production domains such as fisheries, forestry, livestock rearing and crop cultivations. So, more the agriculture value added as percentage of GDP, more will be the GDP per Capita. Since   GNI per capita has a significant but inverse relation with a one unit change resulting in a decrease of 0.006 in the GDP per Capita (PPP). Earthquake deaths have an insignificant inverse relation with a one unit change in Earthquake deaths causing a decrease of 1804.241 units in GDP per Capita (PPP).

Earthquake damage has a highly insignificant impact with one unit change in earthquake damage resulting a decrease of 0.640 units in GDP per Capita (PPP). Similarly, floods death has a significant inverse relation with one unit change causing a decrease of 3604.792 units in GDP per Capita (PPP). Moreover, Floods damage also has a slight significance with an inverse relation. One unit change in floods damage leads to a decrease of 0.655 units in the GDP per Capita (PPP). External war deaths have an inverse relation with the GDP per Capita (PPP) and a one unit change in external war deaths will result in a decrease of 17.798 units.

All these factors are destructive in nature. The results obtained met the expectations. Since these variables are destructive in nature, the more they are more will be the loss to the economy, which is reflected in the decline in GDP per Capita.

Tax revenue as a percentage of GDP has a highly significant inverse influence with a one unit change leading to decrease of 698.894 units in GDP per Capita (PPP). Though tax revenues does contribute to the economy, but to increase tax revenues, strict legislation is required which discourages investments. Thus lesser investments yield lesser revenues. Moreover, one unit change in surface area will have a significant impact and will increase GDP per Capita (PPP) by 0.601 units. This is an expected outcome as an increase in surface area means there is more land available for agriculture and more resources are available as well. Significance of services value added as percentage of GDP is very high. If there is a one unit change in the independent variable, the dependent variable will change by 209.044 units. The OLS revealed a highly significant relation of Revenue (%age of gdp) and GDP per Capita. If Revenue (%age of GDP) changes by one unit, GDP per Capita (PPP) will increase by 534.202 units. There is a highly significant direct relation between the GDP growth (annual %) with a one unit change in gdp growth resulting in an increase of 579.480 units in GDP per Capita (PPP).

Moreover, GDP at Market Prices has a slightly less significant direct relation with a one unit change resulting in an increase of 2.196 units in the GDP per Capita (PPP). Foreign investment also has a significant direct relation with GDP per Capita (PPP), where one unit change in foreign investment will lead to an increase of 484.712 units in GDP per Capita (PPP). Cash Surplus also has a significant direct relation. If the independent variable changes by one unit, the GDP per Capita (PPP) will increase by 847.147 units. Since all these indicators are contributors in GDP, increase in these indicators will contribute positively in GDP per Capita (PPP).

The Fixed Effect analysis explains that for every one unit change in the population there will be a 3.238 unit change in the GDP per Capita (PPP). Study also revealed that population have a very high level of significance. There is a common perception that more the population less will be the gdp per capita. But more influential determinant here is the rate with which gdp increases. If the rate of gdp growth is higher that population growth rate, gdp per capita will increase despite an increase in population. Since time is fixed, the effect of population on GDP is not as expected. Agriculture value added as percentage of GDP was also measured against the said dependent variable and it was found that there is a highly significant inverse relation of the independent variable and if agriculture value added as percentage of GDP changes by 1 unit there will be a decrease of 0.030 units in GDP per Capita (PPP). GNI per capita has a significant direct relation with a one unit change resulting in an increase of 5.019 in the GDP per Capita (PPP).

Earthquake deaths have an insignificant inverse relation with a one unit change in Earthquake deaths causing a decrease of 1.858 units in GDP per Capita (PPP). Earthquake damage has a highly insignificant impact with one unit change in earthquake damage resulting an increase of 0.409 units in GDP per Capita (PPP). Similarly, floods death has a insignificant relation with one unit change causing an increase of 38.117 units in GDP per Capita (PPP). Moreover, Floods damage also has an insignificant relation. One unit change in floods damage leads to an increase of 0.007 units in the GDP per Capita (PPP). External war deaths have a direct relation with the GDP per Capita (PPP) and a one unit change in external war deaths will result in an increase of 9.066 units. All these factors are destructive in nature. The results obtained met the expectations. Since these variables are destructive in nature, the more they are more will be the loss to the economy, which is reflected in the decline in GDP per Capita.

Tax revenue as a percentage of GDP has a highly significant inverse influence with a one unit change leading to decrease of 140.127 units in GDP per Capita (PPP). Moreover, one unit change in surface area will have a significant inverse impact and will decrease GDP per Capita (PPP) by 290.05 units. The fixed effect regression revealed a highly significant inverse relation of Revenue (%age of gdp) and GDP per Capita. If Revenue (%age of GDP) changes by one unit, GDP per Capita (PPP) will decrease by 252.027 units. . Though revenues in general and tax revenues in particular does contribute to the economy, but to increase revenues, strict legislation is required which discourages investments. Thus lesser investments yield lesser revenues. Significance of services value added as percentage of GDP is very high. If there is a one unit change in the independent variable, the dependent variable will increase by 83.287 units. There is a highly significant direct relation between the GDP growth (annual %) with a one unit change in gdp growth resulting in an increase of 64.067 units in GDP per Capita (PPP). However, GDP at Market Prices has a slightly less significant direct relation with a one unit change resulting in an increase of 1.249 units in the GDP per Capita (PPP).

Foreign investment also has a significant direct relation with GDP per Capita (PPP), where one unit change in foreign investment will lead to an increase of 1.249 units in GDP per Capita (PPP). Cash Surplus also has a significant direct relation. If the independent variable changes by one unit, the GDP per Capita (PPP) will increase by 0.028 units. Since all these indicators are contributors in GDP, increase in these indicators will contribute positively in GDP per Capita (PPP).

Prevalence of Anameia among Childeren		
Variables	**OLS**	**Fixed Effect**
Population	-0.010***	-0.022***
Agriculture Value Added	0.0003*	0.012***
GNI per capita, Atlas method (current US$)	0.012***	-0.004***
Earthquake deaths	0.005	-0.004***
Earthquake damage	0.000	0.000
Floods Deaths	6.199	0.671
Floods Damage	-0.002*	-0.001
external war deaths bd best	0.093***	0.014*
bd high		
Non state best		
Non state high		
Tax revenue (% of GDP)	-0.747***	0.793***
Surface area (sq. km)	0.000	1.781***
Services, etc., value added (% of GDP)	-0.299***	-0.462***
Revenue, excluding grants (% of GDP)	-0.348***	0.553***
GDP growth (annual %)	0.729*	-0.194
GDP at market prices (current US$)	-0.004**	-0.002
foreign Investment	0.000***	0.000***
Cash Surplus	-1.378***	0.452*

* Significant at 10%;   ** Significant at 5%;   *** Significant at 1%

Table 6.7 – Prevalence of Anemia among children (Regression Table)

The analysis explains that for every one unit change in the population there will be a decrease of 0.010 unit change in the Prevalence of Anemia among Children. Study also revealed that population have a very high level of significance. This is an expected result. It is self-explanatory that more the population more will be the chances of cases related to prevalence of anemia. Agriculture value added as percentage of GDP was also measured against the said dependent variable and it was found that there is a very lesser significance of the independent variable and if agriculture value added as percentage of GDP changes by 1 unit there will be an increase of 0.003 units in Prevalence of Anemia among Children. GNI per capita has a significant direct relation with a one unit change resulting in an increase of 0.012 in the Prevalence of Anemia among Children. Earthquake deaths have an insignificant relation with a one unit change in Earthquake deaths causing an increase of 0.005 units in Prevalence of Anemia among Children. Earthquake damage has a highly insignificant impact with one unit change in earthquake damage resulting a change of 0.000 units in Prevalence of Anemia among Children. Similarly, floods death has an insignificant relation with one unit change causing an increase of 6.199 units in Prevalence of Anemia among Children. Moreover, Floods damage also has a slight significance with an inverse relation. One unit change in floods damage leads to a decrease of 0.002 units in the Prevalence of Anemia among Children. External war deaths have a direct relation with the Prevalence of Anemia among Children and a one unit change in external war deaths will result in an increase of 0.093 units. All these factors are destructive. The consequences of such events not only involve material damages, but also affect the health. Different diseases spreads as a result of such events therefore, more such events will lead to an increase of Prevalence of Anemia amongst other diseases, which eventually impacts the utilization of food by people.

Tax revenue as a percentage of GDP has a highly significant inverse influence with a one unit change leading to decrease of 0.747 units in Prevalence of Anemia among Children. The OLS revealed a highly significant inverse relation of Revenue (%age of gdp) and GDP per Capita. If Revenue (%age of GDP) changes by one unit, Prevalence of Anemia among Children will decrease by 0.348 units. It is an expected result as more revenue is generated more is available to spend on health services.

Moreover, one unit change in surface area will have a significant impact and will change Prevalence of Anemia among Children by 0.000 units. Significance of services value added as percentage of GDP is very high. It is a common understanding, that better the services, lesser will be the health related cases. In this model particularly better services will increase the utilization of food. If there is a one unit change in the independent variable, the dependent variable will decrease by 0.299 units. There is a significant direct relation between the GDP growth (annual %) with a one unit change in gdp growth resulting in an increase of 0.729 units in Prevalence of Anemia among Children. However, GDP at Market Prices has a significant direct relation with a one unit change resulting in an increase of 0.004 units in the Prevalence of Anemia among Children. Foreign investment also has a significant relation with Prevalence of Anemia among Children, where one unit change in foreign investment will lead to a change of 0.000 units in Prevalence of Anemia among Children.

Cash Surplus also has a highly significant inverse relation. If the independent variable changes by one unit, the Prevalence of Anemia among Children will decrease by 1.387 units.

The Regression analysis for fixed effect explains that for every one unit change in the population there will be a 0.022 unit decrease in the Prevalence of Anemia among Children. Study also revealed that population have a very high level of significance.

Agriculture value added as percentage of GDP was also measured against the said dependent variable and it was found that there is a very high significance of the independent variable and if agriculture value added as percentage of GDP changes by 1 unit there will be an increase of 0.012 units in Prevalence of Anemia among Children.

GNI per capita has a significant but inverse relation with a one unit change resulting in a decrease of 0.004 in the Prevalence of Anemia among Children. Earthquake deaths have an insignificant relation with a one unit change in Earthquake deaths causing an increase of 0.001 units in Prevalence of Anemia among Children. Earthquake damage has a highly insignificant impact with one unit change in earthquake damage resulting a change of 0.000 units in Prevalence of Anemia among Children. Similarly, floods death has an insignificant relation with one unit change causing an increase of 0.671 units in Prevalence of Anemia among Children. Moreover, Floods damage also has an insignificant inverse relation. One unit change in floods damage leads to a decrease of 0.001 units in the Prevalence of Anemia among Children. External war deaths have a direct relation with the Prevalence of Anemia among Children and a one unit change in external war deaths will result in an increase of 0.014 units. Since all these factors are destructive in nature the results obtained met the expectations. Increase in these variables will result in the loss to the economy, which is reflected in the decline in GDP per Capita.

Tax revenue as a percentage of GDP has a highly significant influence with a one unit change leading to an increase of 0.793 units in Prevalence of Anemia among Children. Moreover, one unit change in surface area will have a significant impact and will increase Prevalence of Anemia among Children by 1.781 units.

Significance of services value added as percentage of GDP is very high. If there is a one unit change in the independent variable, the dependent variable will decrease by 0.462 units. The regression revealed a highly significant inverse relation of Revenue (%age of gdp) and Prevalence of Anemia among Children. If Revenue (%age of GDP) changes by one unit, Prevalence of Anemia among Children will decrease by 0.553 units. There is an insignificant inverse relation between the GDP growth (annual %) with a one unit change in gdp growth resulting in a decrease of 0.194 units in Prevalence of Anemia among Children. Similarly, GDP at Market Prices has an insignificant inverse relation with a one unit change resulting in a decrease of 0.002 units in the Prevalence of Anemia among Children. These factors contribute positively to the economy. Increase in these variables means that governments have more revenues and better services. Combining all these variables together, countries can fight against anemia and can ensure better food utility in the region. Thus increase in these varibles shows empirically a decrease in prevalence of anemia.

Foreign investment also has a highly significant direct relation with Prevalence of Anemia among Children, where one unit change in foreign investment will lead to a change of 0.000 units in Prevalence of Anemia among Children. Cash Surplus also has a significant direct relation. If the independent variable changes by one unit, the Prevalence of Anemia among Children will increase by 0.452 units.

Findings

This chapter is the amalgamation of all the data collected through secondary sources dividing into three sub topics (Food Availability, Accessibility and Utility) which have been the core of this research study. In order to analyze the impact of National Security, our research was broken into three broad areas of national Security (economic, environment and shocks and disruptions).

Before elaborating on our findings, it must be clarified that the data for our results was extracted from secondary sources; first we run a general regression analysis and second we analyzed the fixed effects of national security indicators on three main components of food security.

Economic indicators have a positive and significant relationship with the food availability. It can be theorized that better economic situation have a positive impact on food security. Population density may have either a positive or negative impact on food security depending on how the agricultural sector is affected. The results suggested that having more people in a country wont decrease the food availability due to importance of other factors as well.

The estimated coefficients on *GDP Growth* have the expected sign and are highly significant despite the cautious warning put forth by Smith and Haddad (2000) that when both income and variables that income determines are included in a regression model, the coefficient on income drops significantly and become statistically insignificant. However, still the study found out positive relation of revenues (income) on food security. These results are consistent with the argument that economic development is conducive to food security.

The environmental variables show a negative sign but are significant in 2 models only; GDP per Capita and Prevalence of Anemia. The sign indicates that environmental variables have negative impact on food security. This result is as expected as increase in earthquake damages, floods damages and deaths will result in population more prone to diseases and have less productive land. More explanation for this result can be found in Meier and Rauch (2005) with which this result is consistent.

Lastly the estimated coefficients on External War Deaths have an inverse relation and high significance. The results suggests that external war deaths have more detrimental impact on countries unable to i. make available the per capita food availability minimum level set by USAID or FAO, ii. Low GDP per Capita and iii. high prevalence of anemia. The estimated coefficients on External War Deaths imply that one more battle related death will increase food insecurity.

The net impact of the three indicators on food security is positive. This means that if increase the level of economic security and control internal and external conflicts we will be able to improve the food security situation, be it in a country or a region. The research although statistically prove that environmental indicators have an insignificant impact on food security, but its impact will be diminished by the enormous significant impacts of economic security and shocks and disruptions on Food Security.

VII.   Recommendations

Based on the statistical analysis and its interpretation, this research allows us to derive some recommendations to resolve the negative impacts of the changes in national security on food security.

Need for Targeted Operations

Asia comprises of a large region inclusive of countries of different nature. The region is a blend of high income, middle income and low income countries. Along with this, there are other differences such as demographic factors, governance issues etc. Thus, each country shall be treated differently when it comes to addressing food insecurity. Moreover, each country is to be targeted on the basis of the impact of national security levels on food security which tend to be different attributing to various factors. This will therefore be aligned with Post-Modernists view of unstandardized meta-narratives.

As a result, each country shall carry out the annual assessment in order to identify and fully understand their food requirements. This shall not only be limited to facts and figures but should include a detailed analysis of causation of food insecurity so that proper sources of the issue can be traced back and thus, be addressed. However, quantitative analysis conducted for the purpose of this research shows that more the value added in the agricultural output of a country more the country will be food secure. Thus, conducting need assessments at national level to identify areas with maximum agricultural capacity, governments can attempt to improve the crop yields in order to ensure national level food security. For this purpose, croplands shall be assessed in order to ensure the level of fertilizers and pasture required in order to produce the required number of yields.

Involving the Private Sector in curbing Food Insecurity

As per the neo-liberalist view, there is a need of market intervention when addressing food insecurity in a particular country. The quantitative analysis shows that economic indicators play a vital role in addressing food insecurity. For this purpose, private actors can play a major role in addressing accessibility, affordability and utility of food units. Private Organizations can invest in infrastructural projects locating them in remote or rural areas which can enhance the accessibility of areas to the markets. Moreover, private sector organizations can also be set up to ensure that food commodities are conveniently transported to essential markets, easing the accessibility for the food units. The biggest role that the private sector can play in addressing food security is increasing investment in food items. This means influencing the quantity of the food items such that supply side problems relating to food insecurity can be solved. Moreover, these organizations can also play a major role in provision of supplements in order to curb undernourishment among population. Private Sector can develop a partnership with the public sector in order to train the farmers, maintaining health and environment to ensure all the dimensions of food security are addressed.

Empowering Poor

If economic growth directly takes account of the poorest segments of the population then there will be an immediate economic benefit as their incomes rise. Raising poor people's incomes is expected to upshot in great benefits to nutrition (certainly relative to additional income in richer groups). This is because the additional resources purchased with this additional income are more likely to be basic necessities, including food and health care, which have large nutritional pay-offs. This may be termed 'equitable growth', or 'growth-with-equity' (Dreze and Sen (1989) call it 'growth-mediated security').

As the key asset of the poor is their labor power, growth which is labor-intensive is more likely to be equitable. Equity is supported through improving access of poor people to land, credit, technology, infrastructure and services. Equitable growth improves income distribution within countries. On the other hand, growth in which a comparatively even income distribution is not sustained, or in which pre-existing income maldistribution is not reduced, is not equitable and is likely to be less beneficial to nutrition e.g. Brazil. Labor-intensive, equitable growth will also be more efficient in alleviating poverty than a more conventional 'trickle down' growth strategy in low-income countries (i.e. the unit decrease in poverty incidence will be greater per unit GDP increase).

Increasing Agriculture Value Added

Through analyzing data we came to a conclusion that Agriculture value added as percentage of GDP has a high significance with the dependent variable. This means that if there is a positive change in agriculture value added as percentage of GDP it will lead to an increase in average dietary energy supply adequacy. Hence we can recommend that countries should not only focus on manufacturing sector but should also focus on primary sector such as such as fisheries, forestry, livestock rearing and crop cultivations. Countries should invest more in the agricultural sector, by subsidizing or giving grants to encourage production in the primary sector. An example of this could be that in Pakistan State Bank gives out loan target to commercial banks specific to agricultural sector only. These loans are given out by the banks at a very low interest rate. Hence once agriculture output will increase it will help in the mitigation of food insecurity.

Focusing more on Dietary Needs during a Conflict

There is substantial empirical evidence that conflict has a negative impact on food security. The impact may be minor but we found through analyzing data that, External war deaths have an inverse relation with the average dietary energy supply adequacy, an increase in external war death would lead to decrease in average dietary energy supply adequacy, this is mainly because wars lead to destruction and damages and thus there is lesser resources left to meet the food requirements. Although this impact is minor but the countries which are involved in external wars or conflicts should consider taking actions so that there is no impact on food security. One way in which this could be done is that the government should give aid to people who are effected by the conflict so that the resources needed to meet the food requirements is fulfilled.

Focus on Improving GDP

A higher GDP is indicative of strong economic background of a country and in the case of most Asian countries, a major chunk of GDP is comprised of input from the agriculture sector. Whilst GDP ensures prolonged food security and it is also crucial in promising basic food security as the countries with least GDP are generally food insecure as well. So, it is crucial to dedicate a sufficient percent of the budget to devise measures and policies in order to strengthen food security which eventually strengthens the GDP itself. Moreover, a stringent check must be emphasized upon the trade balance that will help promote the regional crops produced by local farmers hence appreciating their efforts. Local farmers play a major role in the input to GDP from the agricultural sector.

VIII. Conclusion

For Asian countries, food security is a major concern. Over the coming decades, the difficulties in improving food security will become more severe. National efforts are therefore, central to food security. Achieving food security requires measured and balanced policies that promote agricultural productivity and price stability, increase the availability of and access to food, and ensure adequate nutrition, especially for children.

Increased production of food items in the region is necessary for food security. More preferably, such an increase in production needs to be attained through policies that safeguard striking profits to producers and offer affordable prices to the consumers. The enhancement of productivity through increased investment in agricultural research and extension can play a crucial role in this respect. The Regional Food Security Programme needs to develop a research agenda for regional level agricultural issues and prioritize research projects to be financed. At a regional level in order to achieve the desired food security level, modalities for sharing the technologies developed, genetic resources, and research and training facilities must be settled. International donors and member states should contribute necessary financial resources for regional research efforts and also enhance support to the national agricultural research systems.

The study based on empirical connections concludes that Economic indicators have a positive and significant relation with the food availability. It was theorized that better economic situation have a positive impact on food security. Population density may have either a positive or negative impact on food security depending on how the agricultural sector is affected. The

results suggested that having more people in a country wont decrease the food availability due to importance of other factors as well.

The estimated coefficients on GDP Growth have the expected sign and are highly significant despite the cautious warning put forth by Smith and Haddad (2000) that when both income and variables that income determines are included in a regression model, the coefficient on income drops significantly and become statistically insignificant. However, still the study found out positive relation of revenues (income) on food security. These results are consistent with the argument that economic development is conducive to food security.

The environmental variables show a negative sign but are significant in 2 models only; GDP per Capita and Prevalence of Anemia. The sign indicates that environmental variables have negative impact on food security. This result is as expected as increase in earthquake damages, floods damages and deaths will result in population more prone to diseases and have less productive land. More explanation for this result can be found in Meier and Rauch (2005) with which this result is consistent. The estimated coefficients on indicators of Shocks and Disruptions have an inverse relation and high significance. The results suggests that external war deaths have more detrimental impact on countries unable to i. make available the per capita food availability minimum level set by USAID or FAO, ii. Low GDP per Capita and iii. high prevalence of anemia. The estimated coefficients on External War Deaths imply that one more battle related death will increase food insecurity.

Food security requires cooperation beyond national borders and internationally coordinated responses. There are three broad areas where global and regional cooperation can help ensure

food security and reduce extreme price volatility: (i) establishing emergency food reserves and aid, (ii) sharing market information, and (iii) promoting trade.

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X. Appendices

Appendix 1 – Country List

Country Name	Income Group
Afghanistan	Low Income
Armenia	Lower Middle Income
Azerbaijan	Upper Middle Income
Bahrain	High Income: NON OECD
Bangladesh	Low Income
Bhutan	Lower Middle Income
Brunei	High Income: Non OECD
Cambodia	Low Income
China	Upper Middle Income
Cyprus	High Income: Non OECD
Georgia	Lower Middle Income
India	Lower Middle Income
Indonesia	Lower Middle Income
Iran	Upper Middle Income
Iraq	Lower Middle Income
Israel	High Income: OECD
Japan	High Income: OECD
Jordan	Upper Middle Income
Kazakhstan	Upper Middle Income
Korea, Dem. Rep.	Low Income
Kuwait	High Income: NON OECD
Kyrgyzstan	Low Income
Laos	Lower Middle Income
Lebanon	Upper Middle Income
Malaysia	Upper Middle Income
Maldives	Upper Middle Income
Mongolia	Lower Middle Income
Nepal	Low Income
Oman	High Income: OECD
Pakistan	Lower Middle Income
Philippines	Lower Middle Income
Qatar	High Income: NON OECD
Russia	Upper Middle Income
Saudi Arabia	High Income: NON OECD
Singapore	High Income: NON OECD
Sri Lanka	Lower Middle Income
Syria	Lower Middle Income
Tajikistan	Low Income
Thailand	Upper Middle Income
Turkey	Upper Middle Income
Turkmenistan	Upper Middle Income
United Arab Emirates	High Income: NON OECD
Uzbekistan	Lower Middle Income
Vietnam	Lower Middle Income
Yemen	Lower Middle Income

Appendix 2 – List of Indicators

DEPENDENT VARIABLE Food Security	INDEPENDENT VARIABLE National Security
Indicators of Food Security: - Average Dietary Energy Supply Adequacy - GDP per Capita (Purchasing Power Parity) - Prevalence of Anemia among children under 5 years of age	*Indicators of National Security:* **Economic Security** - Tax Revenue (% of GDP) - Surface Area (sq. km) - Services, etc., Value Added (% of GDP) - Revenue, Excluding Grants (% of GDP) - GDP Growth (annual %) - GDP at Market Prices (current US$) - Foreign Direct Investment, Net Inflow (BoP, current US$) - Cash Surplus - Population (Thousands) - GNI per Capita, Atlas method (Current US$) - Agriculture Value added (as a %age of GDP) **Environmental Security** - Floods Death - Floods Damage - Earthquake deaths - Earthquake damage **Shocks and Disruptions** - External War Deaths (Best Death Rate) - External War Deaths (Best Death Rate – High) - Non State Conflict (Best Estimate of Deaths) - Non State Conflicts (Highest Estimate of Deaths)

Appendix 3 - Map of Asia

Appendix 4 - STATA

```
. pwcorr averagedietaryenergysupplyadequa externalwardeaths agricultureVA GNIpercapita population, obs sig

             averag~a extern~s agricu~A GNIper~a popula~n

averagedie~a   1.0000

                 975

externalwa~s   0.0148   1.0000
               0.8224
                 233      237

agricultur~A  -0.0145   0.0861   1.0000
               0.6816   0.2386
                 806      189      920

GNIpercapita  -0.0842  -0.0141   0.0629   1.0000
               0.0150   0.8368   0.0655
                 834      215      859      962

  population   0.2036  -0.0518   0.0451  -0.1197   1.0000
               0.0000   0.4270   0.1721   0.0002
                 965      237      920      962     1130
```

```
. pwcorr gdppercapitappp prevalenceofanaemiaamongchildren floodsdeath floodsdamage earthquakedeaths earthquakedamage, obs sig

             gdpper~p preval~n floods~h floods~e earthq~s earthq~e

gdppercapi~p   1.0000

                1012

prevalence~n  -0.1701   1.0000
               0.0000
                 905      968

 floodsdeath  -0.1501   0.5090   1.0000
               0.1159   0.0000
                 111      101      117

floodsdamage  -0.0781   0.0201   0.5837   1.0000
               0.4088   0.8429   0.0000
                 114      100       56      119

earthquake~s  -0.1041   0.0353  -1.0000  -0.2188   1.0000
               0.5012   0.8203   1.0000   0.7812
                  44       44        2        4       49

earthquake~e   0.2378  -0.4911   0.4332   0.5073   0.3949   1.0000
               0.1689   0.0032   0.5668   0.3830   0.0459
                  35       34        4        5       26       39
```

```
. pwcorr gdppercapitappp prevalenceofanaemiaamongchildren droughtsdamage earthquakedamage bdhigh GNIpercapita, obs sig

             | gdpper~p  preval~n  drough~e  earthq~e   bdhigh  GNIper~a
─────────────┼──────────────────────────────────────────────────────────
gdppercapi~p |  1.0000
             |
             |    1012
             |
prevalence~n | -0.1701   1.0000
             |  0.0000
             |     905      968
             |
droughtsda~e | -0.0646  -0.0569   1.0000
             |  0.7990   0.8284
             |      18       17       19
             |
earthquake~e |  0.2378  -0.4911       .    1.0000
             |  0.1689   0.0032       .
             |      35       34        0       39
             |
      bdhigh | -0.1935   0.0094  -0.2779   0.0427   1.0000
             |  0.0044   0.8926   0.5051   0.8953
             |     215      207        8       12      237
             |
GNIpercapita |  0.0069   0.1249   0.0414  -0.0827   0.0546   1.0000
             |  0.8360   0.0003   0.8745   0.6368   0.4256
             |     894      819       17       35      215      962
```

```
. pwcorr externalwardeaths GNIpercapita droughtsdeaths earthquakedeaths prevalenceofanaemiaamongchildren floodsdamage, obs sig

             | extern~s  GNIper~a  drough~s  earthq~s  preval~n  floods~e
─────────────┼──────────────────────────────────────────────────────────
externalwa~s |  1.0000
             |
             |     237
             |
GNIpercapita | -0.0141   1.0000
             |  0.8368
             |     215      962
             |
droughtsde~s |      .     1.0000   1.0000
             |      .     0.0000
             |       0        2        2
             |
earthquake~s |  0.0321   0.2797       .    1.0000
             |  0.9095   0.0693       .
             |      15       43        0       49
             |
prevalence~n |  0.0581   0.1249       .    0.0353   1.0000
             |  0.4054   0.0003       .    0.8203
             |     207      819        0       44      968
             |
floodsdamage |  0.2098   0.0378       .   -0.2188   0.0201   1.0000
             |  0.2193   0.7047       .    0.7812   0.8429
             |      36      103        0        4      100      119
```

```
. pwcorr averagedietaryenergysupplyadequa droughtsdamage floodsdamage population agricultureVA externalwardeaths, obs sig

              |   averag~a  drough~e  floods~e  popula~n  agricu~A  extern~s
--------------+------------------------------------------------------------
averagedie~a  |    1.0000
              |
              |      975
              |
droughtsda~e  |    0.1571    1.0000
              |    0.5335
              |       18        19
              |
floodsdamage  |    0.0441         .    1.0000
              |    0.6372         .
              |      117         0       119
              |
  population  |    0.2036   -0.2800   -0.1384    1.0000
              |    0.0000    0.2457    0.1332
              |      965        19       119      1130
              |
agricultur~A  |   -0.0145   -0.4432   -0.2035    0.0451    1.0000
              |    0.6816    0.0856    0.0412    0.1721
              |      806        16       101       920       920
              |
externalwa~s  |    0.0148    0.2013    0.2098   -0.0518    0.0861    1.0000
              |    0.8224    0.6327    0.2193    0.4270    0.2386
              |      233         8        36       237       189       237
```

```
. pwcorr droughtsdamage agricultureVA externalwardeaths var9 floodsdeath averagedietaryenergysupplyadequa, obs sig

              |   drough~e  agricu~A  extern~s      var9  floods~h  averag~a
--------------+------------------------------------------------------------
droughtsda~e  |    1.0000
              |
              |       19
              |
agricultur~A  |   -0.4432    1.0000
              |    0.0856
              |       16       920
              |
externalwa~s  |    0.2013    0.0861    1.0000
              |    0.6327    0.2386
              |        8       189       237
              |
        var9  |         .         .         .         .
              |         .         .         .
              |        0         0         0         0
              |
 floodsdeath  |   -1.0000   -0.2496   -0.0559         .    1.0000
              |    1.0000    0.0164    0.8000         .
              |        2        92        23         0       117
              |
averagedie~a  |    0.1571   -0.0145    0.0148         .   -0.0132    1.0000
              |    0.5335    0.6816    0.8224         .    0.8915
              |       18       806       233         0       109       975
```

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```
. pwcorr averagedietaryenergysupplyadequa gdppercapitappp prevalenceofanaemiaamongchildren floodsdeath earthquakedeaths droughtsdeaths, obs
> sig

             |  averag~a gdpper~p preval~n floods~h earthq~s drough~s
-------------+------------------------------------------------------
averagedie~a |   1.0000
             |
             |      975
             |
gdppercapi~p |   0.2059   1.0000
             |   0.0000
             |      902     1012
             |
prevalence~n |  -0.2679  -0.1701   1.0000
             |   0.0000   0.0000
             |      836      905      968
             |
 floodsdeath |  -0.0132  -0.1501   0.5090   1.0000
             |   0.8915   0.1159   0.0000
             |      109      111      101      117
             |
earthquake~s |  -0.0704  -0.1041   0.0353  -1.0000   1.0000
             |   0.6421   0.5012   0.8203   1.0000
             |       46       44       44        2       49
             |
droughtsde~s |  -1.0000  -1.0000        .        .        .   1.0000
             |   1.0000   1.0000        .        .        .
             |        2        2        0        0        0        2
             |
```

```
. pwcorr bdhigh droughtsdeaths floodsdeath population prevalenceofanaemiaamongchildren agricultureVA, obs sig

             |   bdhigh drough~s floods~h popula~n preval~n agricu~A
-------------+------------------------------------------------------
      bdhigh |   1.0000
             |
             |      237
             |
droughtsde~s |        .   1.0000
             |        .
             |        0        2
             |
 floodsdeath |  -0.0342        .   1.0000
             |   0.8770        .
             |       23        0      117
             |
  population |  -0.1551  -1.0000  -0.2844   1.0000
             |   0.0169   1.0000   0.0019
             |      237        2      117     1130
             |
prevalence~n |   0.0094        .   0.5090  -0.1653   1.0000
             |   0.8926        .   0.0000   0.0000
             |      207        0      101      961      968
             |
agricultur~A |   0.0334   1.0000  -0.2496   0.0451   0.0530   1.0000
             |   0.6483   0.0000   0.0164   0.1721   0.1366
             |      189        2       92      920      789      920
             |
```

	averagedietaryenergysupplyadequa
externalwardeaths	-0.006
	(1.06)
agricultureVA	-0.008
	(5.09)**
GNIpercapita	-0.002
	(1.34)
population	0.003
	(1.65)
_cons	115.241
	(27.62)**
N	179

	averagedietaryenergysupplyadequa
cashsurplus	-0.035
	(0.47)
gdpgrowthannual	0.088
	(1.61)
revenueexcludinggrantsofgdp	0.380
	(6.03)**
surfacearea1000sqkm	0.001
	(0.69)
_cons	107.440
	(33.42)**
N	407
* p<0.05; ** p<0.01	

	averagedietaryenergysupplyadequa
foreigninvmillion	0.148
	(3.07)**
gdpatmarketpricescurrentmillionu	0.002
	(1.04)
gdpgrowthannual	0.023
	(0.47)
agricultureVA	-0.007
	(5.13)**
externalwardeaths	-0.006
	(1.22)
_cons	117.541
	(127.47)**
R2	0.37
N	183
* p<0.05; ** p<0.01	

	averagedietaryenergysupplyadequa
cashsurplus	0.002
	(0.02)
gdpgrowthannual	0.097
	(1.80)
revenueexcludinggrantsofgdp	0.366
	(5.76)**
surfacearea1000sqkm	19.914
	(4.11)**
_cons	-21,984.765
	(4.09)**
R2	0.17
N	407
* p<0.05; ** p<0.01	

	gdppercapitappp
population	6.155
	(1.80)
cashsurplus	230.307
	(2.92)**
agricultureVA	-34.048
	(9.05)**
floodsdamage	-0.330
	(0.50)
_cons	28,114.521
	(10.84)**
R2	0.23
N	350

* p<0.05; ** p<0.01

	gdppercapitappp
nonstatebest	6.456
	(0.74)
surfacearea1000sqkm	0.601
	(4.57)**
agricultureVA	2.833
	(0.96)
earthquakedeaths	-432.484
	(0.62)
_cons	4,521.272
	(2.67)*
R2	0.33
N	54

* p<0.05; ** p<0.01

	gdppercapitappp
nonstatebest	-3.198
	(0.86)
nonstatehigh	1.089
	(0.41)
surfacearea1000sqkm	0.530
	(3.96)**
taxrevenueofgdp	698.849
	(3.37)**
servicesetcvalueaddedofgdp	209.044
	(3.22)**
_cons	-13,760.195
	(3.65)**
R2	0.52
N	61

* p<0.05; ** p<0.01