Abstract

Il concetto di sicurezza alimentare è stato una costante della storia umana sin dai suoi albori. Le prime civiltà del mondo scelsero i suoli fertili e le sponde di fiumi, perché ricchi di risorse alimentari, per stabilire i primi insediamenti. Ne sono prova sia le civiltà Mesopotamiche sia quella Egizia. Dopo aver assicurato alla propria comunità il nutrimento necessario, si concentrarono sullo sviluppo di nuove tecniche per assicurare la stabilità della produzione con efficienza. Gli utensili, l'aratro, le infrastrutture e poi l'irrigazione portarono grandi vantaggi dapprima a questi popoli per poi diffondersi in tutto il mondo civilizzato. Nonostante i benefici produttivi e le scoperte fatte dall'uomo, una forte divisione permane tra le nazioni, i popoli, e le persone che mangiano e quelli che invece mancano di accesso al cibo e ai nutrimenti. La differenza fra questi due gruppi è dipende non da fattori fisici o produttivi ma più da questioni di natura sociale ed economica. Questa consapevolezza ha cambiato di molto il dibattito sulla sicurezza alimentare che invece precedentemente era concentrato invece sulle differenze tecnico produttive tra paesi.

Per questo motivo, il dibattito sulla sicurezza alimentare è cresciuto fortemente da quando negli anni '40 del Novecento fu riconosciuto per la prima volta la necessità di garantire la stbilità e la sicurezza dell'offerta mondiale per i generi alimentari. Una prima occasione per definire la sicurezza alimentare pervenne quando i leader mondiali si riunirono nella storica *Hot spring Conference on Food and Agriculture nel 1943.* Il più importante risultato della conferenza però si vericò però solo due anni dopo nella creazione della *Food and Agriculture Organization of the United Nations (FAO).* Quest'ultima fu ideata come un'organizzazione internazionale, dove le nazioni partecipanti potessero incontrarsi per discutere le misure politiche, e i termini economici aiuti alimentari. La FAO fu un grande successo, e negli anni '60 fu rinforzata dalla creazione di un altro organo internazionale, il *World Food Programe (WFP).*

Il trentennio successivo al dopo guerra fu un periodo di successo per la collaborazione internazionale nel campo alimentare fino al 1972, quando una crisi climatica colpi gravemente la capacità produttiva delle nazioni e causò un calo sensibile delle quantità di cereali nel mercato globale. Dopo due anni di crisi, finalmente la situazione si stabilizzò, ma il mondo aveva ormai appreso il rischio di un'inaspettata crisi climatica per suoi i raccolti. Questa nuova consapevolezza unita, con gli avanzamenti biotecnologici della scienza, trasformò l'agricoltura per un'ennesima volta. Fertilizzanti chimici, diserbanti, e semi resistenti a condizioni climatiche estreme entrarono nel mercato agricolo per aumentare la capacità produttiva dei suoi sistemi. Eppure, solo nel 1986, le *United Nations* riformularono la definizione di sicurezza alimentare per includere anche la dimensione temporale, stabilendo l'importanza di un'offerta alimentare che fosse anche costante nel tempo. Questi progressi raggiunsero il loro apice quando nel 1996 venne convocato a Roma, città già diventata la casa della FAO dagli anni '40, il *World Food Summit.* Di seguito a questo incontro, la Dichiarazione sulla "Sicurezza Alimentare" fu redatta e sottoscritta dai per poi essere riaffermata durante Conferenza di fine Millennio all'inizio del ventunesimo secolo.

Secondo la definizione del *World Food Summit*, lo stato di sicurezza alimentare è raggiunto quando tutte le persone hanno accesso in ogni momento ad un quantitativo di cibo sicuro e nutriente che sia necessario per avere una vita sana e felice. Secondo la FAO, ci sono due dimensioni che compongono la sicurezza alimentare una fisica ed una temporale. La dimensione fisica è poi divisa in tre sottodimensioni: la disponibilità alimentare, accessibilità alimentare e uso e l'utilizzo che si fa degli alimenti, mentre la stabilità dell'offerta rappresenta la dimensione temporale. Le tre dimensioni fisiche illustrano le tre caratteristiche parallele della sicurezza alimentare mentre la stabilità le influenza simultaneamente.

La stabilità è particolarmente importante per valutare se un territorio soffra per l'insicurezza alimentare solo in un breve periodo, o abbia difficoltà strutturali nella natura dell'offerta, e quindi vi siano delle ragioni più profonde per temere l'apparenza cronica di questo fenomeno. La differenza fra queste due caratteristiche è particolarmente importante ed è chiarificata anche dalla differenza che c'è fra insicurezza alimentare cronica e insicurezza alimentare transitoria.

La disponibilità alimentare è sicura raggiunta quando il cibo è fisicamente prodotto in sufficienza per soddisfare tutta la popolazione mondiale. Questa dimensione guarda alla produzione in termini di quantità alimentari assolute collegando le esigenze umane alle capacità produttive dei sistemi alimentari. La disponibilità è considerata come il prerequisito fondamentale per soddisfare la domanda mondiale di cibo, questa dimensione è la più importante perché è necessaria la sua presenza per quella delle seconde due. Nel dibattito che riguarda la sicurezza alimentare, c'è molta apprensione per lo stato dei sistemi alimentari perché si teme che un aumento nella popolazione mondiale sarà seguito di pari passo da parte dei già sovrautilizzati sistemi alimentari globali.

L'accessibilità invece è raggiunta quando "tutte le persone" possono partecipare economicamente nel mercato alimentare. Questa dimensione collega, di fatto, la classe economica alla nutrizione. La povertà è una tra le maggiori cause di malnutrizione sia nei paesi emergenti sia in quelli sviluppati questo. Di fatto, come le statistiche e gli studi sociali stanno dimostrando, la produzione alimentare globale è sufficiente per sfamare l'intero pianeta ma spesso l'insicurezza alimentare, è indipendente dalla disponibilità del cibo, essendo invece dipendente da problematiche d'accessibilità al mercato alimentare.

L'uso e l'utilizzo, invece, riguardano l'effetto di fattori non alimentari sulla sicurezza alimentare all'interno delle mura domestiche. Questi fattori sono ad esempio, l'accesso all'acqua, le tecniche di cottura e le abitudini alimentari ma anche aspetti sociali come l'appartenenza a un gruppo integrato, o non, nell'ambiente circostante ed anch'essi determinano il modo in cui il cibo è consumato.

Altri due fattori determinanti per la sicurezza alimentare in un certo territorio sono l'accesso all'acqua potabile e l'accesso ai servizi igienici. La salute pubblica è collegata a queste due dimensioni, infatti molte malattie tra le cause principali di mortalità infantile sono derivanti dalla presenza o assenza di acqua potabile. La differenza fra un accesso costante e un accesso instabile all'acqua è tra le cause fondamentali delle differenze dello sviluppo internazionale. I paesi che negli ultimi anni hanno perseguito delle politiche pubbliche di espansione dei servizi igienici nazionali hanno ottenuto dei risultati vantaggiosi anche in campo

economico e alimentare. Ad esempio, le statistiche dimostrano che lo sviluppo delle risorse acquifere è in correlazione positiva con la partecipazione scolastica, la salute pubblica e il miglioramento delle condizioni femminili. Fattori che da sempre sono collegati con un miglioramento nelle condizioni socioeconomiche. Il rafforzamento dell'economica nazionale però è solo una delle possibili ragioni sociali che stimolano la creazione di politiche pubbliche volte ad aumentare la sicurezza alimentare. Infatti, valide opportunità per intervenire in maniera effettiva contro la fame globale possono anche essere presenti nell'opportunità di assicurare un maggiore grado di sicurezza per le nazioni. Per comprendere meglio questo via di azione politica è necessario assicurare che il termine sicurezza sia inteso in maniera congrua per essere trasformato in un'agenda politica precisa ed effettiva. Questo perché perseguire la guerra alla fame nel nome della sicurezza rappresenta una scelta non priva di pericoli. Per definire meglio questa linea politica una suddivisione nella definizione di sicurezza è necessaria. Tre dimensioni della sicurezza sono oggi presenti nel dibattito internazionale: la prima è la sicurezza per la nazione, che segue una linea di azione politica volta ad usare il cibo per garantire maggiore potere all'interno dello stato. La seconda, invece, considerala sicurezza alimentare come prerequisito per la stabilità del sistema internazionale. La terza, invece considera la sicurezza come sicurezza dell'individuo e suddivide le aree di azione politica in sette categorie. In queste tre dimensioni coesistono allo stesso tempo molte opportunità d'azione e alcuni rischi per la sicurezza alimentare. In primis, la scelta di usare come razionale politico la sicurezza nazione comporta sia una maggiore visibilità ed interesse riguardo le questioni della sicurezza alimentare ma anche un rischio fondamentale che è rappresentato dalla competizione internazionale fra gli stati. La quale invece di fornire delle misure di collaborazione potrebbe aumentare le politiche di sicurezza interna a discapito degli altri stati minacciando ulteriormente i territori più deboli. La scelta di una linea politica che tratti la sicurezza alimentare come strumento per ottenere una maggiore stabilità internazionale offre opportunità vantaggiose opposte a un problema fondamentale. Ossia, per considerare la sicurezza alimentare come una condizione primaria per la sicurezza internazionale devono essere presenti minacce rivolte all'intero sistema degli stati, che spingano questi ultimi ad azioni immediate. L'assenza di queste condizioni, e la persistenza dell'insicurezza alimentare in paesi che occupano posizioni periferiche nello scacchiere internazionale sono il maggiore impedimento a questa linea politica.

Un'ulteriore opportunità risiede nell'approccio che prende come referente l'essere umano. Prendere quest'ultimo come guida nella linea politica contro l'insicurezza alimentare ha il vantaggio fondamentale di porre la condizione umana al disopra delle preoccupazioni statali ed internazionali superando gli ostacoli precedenti. Tuttavia anche questo approccio potrebbe risultare fallace, dato che in questa dimensione risiede un'intrinseca incapacità di stabilire quale delle sette dimensioni ha la priorità sulle altre. Senza la garanzia che la sicurezza alimentare sia primaria, questa rischia di essere barattata in un possibile *trade-off*.

Globalmente lo stato della sicurezza alimentare ha fatto progressi negli ultimo ventennio. Infatti, il numero totale delle persone che soffrono la fame è diminuito da circa un miliardo nel 1990 a quasi 790 milioni nel 2000. Per valutare lo stato della sicurezza alimentare nel mondo la FAO usa molti indicatori. Due meglio

tutti gli altri rappresentano i progressi raggiunti a livello mondiale e regionale. Il primo è la *prevalenza di persone malnutrite nella popolazione totale (PoU)*, mentre il secondo è la *proporzione dei bambini sotto l'età dei cinque anni che sono affetti dalla malnutrizione (CU5)*. Per primo, il PoU riferisce sui progressi nelle dimensioni della disponibilità e dell'accesso alimentare, mentre il secondo illustra i risultati fatti prodotti nel campo della nutrizione, dell'igiene e dell'accesso all'acqua. La convergenza fra questi indicatori dimostra una crescita inclusiva e stabile nella sicurezza alimentare, mentre un'eventuale divergenza può significare un aumento disproporzionato nella capacità produttiva rispetto alle condizioni igieniche-sanitarie e socioeconomiche.

Come detto, lo stato della sicurezza alimentare è migliorato nell'ultimo ventennio, specialmente grazie ai processi di due regioni asiatiche che storicamente ospitavano grandi parti della popolazione mondiale dei malnutriti. Il Sud Est Asiatico e l'Asia Orientale hanno trasformato con successo la loro potente crescita economica in un'opportunità per ridurre l'insicurezza alimentare.

In Africa, la situazione alimentare è la più drammatica. L'indisponibilità, inaccessibilità e la mancanza di acqua hanno la maggior parte delle responsabilità per il poco progresso raggiunto.

In America Latina i governi sono riusciti a trasformare un *environment* ricco di risorse in un'opportunità per la lotta contro la fame. L'aumento di politiche sociali volte a aumentare la produttività locale sono tra i maggiori fattori scatenanti. Per ultima l'Oceania è la regione dove l'insicurezza alimentare è rimasta all'incirca costante nell'ultimo ventennio. La causa maggiore di questo fenomeno è nella natura della sua composizione geografica dell'Oceania. Per questo, la sicurezza alimentare nel continente oceanico resta significativamente dipendente dal mercato internazionale e dalle condizioni climatiche specialmente nelle regioni formate dalle piccole isole.

Un futuro minaccioso minaccia la condizione della sicurezza alimentare globale: la scarsa produttività dei sistemi alimentare, l'inquinamento globale, l'alto tasso di crescita della popolazione mondiale nei prossimi cento anni. Come risultato molti esperti affermano l'impossibilità di nutrire un numero più altro di persone senza causare serie conseguenze per l''ambiente. Uno sguardo più approfondito alle dinamiche alimentari globali dimostra che questo è un assunto irrealistico. Per primo, non tutto il cibo prodotto è usato per il consumo umano, ma una grande parte viene destinata o al consumo animale o alla produzione di energia biologica. In più, l'industria alimentare sta adattando la produzione a dei *pattern* di consumo che richiedono alimenti più costosi e meno nutrienti a scapito di prodotti che compongono le diete dei paesi più poveri con risultati particolarmente dannoso per l'ambiente e per la sicurezza alimentare.

Questi sviluppi suggeriscono che il *trade-off* tra la preservazione ambientale e quello tra la sicurezza alimentare dei più poveri sia inconsistente, perché in realtà un'altra scelta è in atto, ossia scegliere se nutrire le popolazioni più povere, soddisfare la domanda dei mercati ricchi o preservare l'ambiente.

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Key Trends In Food Security

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Key Trends in Food Security

Index

Introduction

At the present day the debate over food security is a large one involving many challenges and opportunity. In order to grasp the implications underlying food security it is necessary to understand that the nature of food scarcity has physical as well as temporal dimensions. This concept is not a new one; on the contrary it had influenced largely human development during history.

Being a wide and undefined concept after the War World II, a singular definition of food security has been developed through the years. To define food security also involved providing an institutional response to this issue. Throughout the dissertation, I will explain the historical development of the term, its theoretical framework and finally the main trends that are now characterizing food security at the global level.

The first section researches a rationale for action in history, explaining the importance of food resource and agriculture in the greater context of human development. And finally, I will also give an account of the recent history of food security, and of the different meanings the term has took during the different decades of the twentieth Century, with a mention on the creation of *the Food and Agriculture Organization of the United Nations.* In the second section I will investigate the theoretical framework behind food security and its two dimensions: the physical one and the temporal one providing examples of how changes in one dimension affect overall food security. In the third section is entirely dedicated to the issue of safe waters. This is so for numerous reason, for instance because water insecurity is surely linked with nutrition deficits and nutrition-related diseases. Moreover, to enhance water access can result in positive outcomes for food security. In the fourth section, I will explore the relationship between food security and the larger definition of security with the objective to assess whether security can provide attractive incentives for international players to act against global hunger. Next, I will report over the progresses made in the struggle against global and regional hunger using two indicators: the prevalence of undernourished in the population (PoU) and the prevalence of underweight children under five years of age (CU5).

Finally, the last section starts from the assumption that a trade-off is occurring today between ensuring food security for the poorest billion and environmental preservation, and then moves to analyse what factors can cause it in the future.

1. Fighting hunger

a. An historical challenge

From the very beginning, human race had to confront with the necessity of having a constant amount of food available. Major civilizations of the past had chosen lands with fertile soils to settle in their struggle against nature. For instance, the Egyptians settled along the fertile soils of the Nile. And early civilizations in Mesopotamia flourished thanks to the water supplies and agricultural resources available in the Fertile Crescent. Indeed, it is the absence or the presence of food that permits to concentrate on development of society. In the past, food shortages undermined earlier civilizations. The Sumerians and Mayans are just two of many early civilizations that declined apparently because they moved onto an agricultural path that was environmentally unsustainable. For the Sumerians, rising salt levels in the soil as a result of a defect in their otherwise well-engineered irrigation system eventually brought down their food system and thus their civilization. For the Mayans, soil erosion was one of the keys to their downfall, as it was for so many other early civilizations[1].

Numerous revolutions characterized by cyclical upgrades in production technologies transformed agriculture in order to develop a stable food supply. Basic tools, farming techniques as well as irrigation and crops' rotation would be sooner or later adopted to increase productivity. As an example, during the Roman Empire one hectare yielded 300 kilos of cereals on average, while in Medieval Europe one hectare yield on average 600 kilos of cereals.[2] Finally agricultural practices would change forever during the eighteenth century with the Industrial revolution and the introduction of the steam engine. Farmers would triplicate their ability to produce, reaching the average output yield of one tonne per hectare. Eventually, another revolution would come decreasing inputs and doubling outputs. For this reason, nowadays in the United States one hectare of cultivated land yields 2000 tonnes on average.

However favourable, these innovations did not put an end to the problem of global hunger. While they have succeeded in boosting local productivity creating large agricultural surplus in several regions of the world, they came along with heavy distributional challenges that remained persistently unresolved making the world home for some 1.5 billion overweight and obese adults and nearly 870 million people who were chronically undernourished[3] in 2012. Therefore, this is suggesting some of the key factors causing hunger worldwide depends more on quality of the production process than on quantities produced. Unequal distribution had increasingly shifted the debate over hunger towards new horizons, new challenges and opportunities.

In other words, the fight against hunger has never been merely a matter of production. Rather, it is better to say that it involved numerous legacies from the past: poor institutional development, path dependency, international competition along with issue stretching from national poor governability and civil strife to foreign domination. These all together had shaped the patterns of food production through history. Today,

[1] "FULL PLANET, EMPTY PLATES", Brown, 2012.
[2] "El Hambre" Caparrós, 2014
[3] "The Evolving sphere of food security: Global Agriculture and Land Use, Changes in the Twenty-First Century", Rueda and Eric F. Lambin, 2014.

the state of food security and food insecurity still represents past development, but it is also linked to the need for a more egalitarian development in the use of resources.

b. Global hunger: an institutional evolution

As soon as the concept of a global demand for food was developed, becoming a first priority issue for governments and international organizations, world leaders were called upon to define the elements needed to stabilize the supply of food. Nowadays food security has become a more comprehensive concept than it was in the past. But this had required a long institutional road starting from the interwar period to the beginning of the 1990s.

At the outset, in the historic *Hot Spring Conference of Food and Agriculture in 1943*, world leaders were called upon to affirm internationally the need for a "secure, adequate and suitable supply of food for everyone"[4]. As a result, the creation of the *Food and Agriculture Organization of the United Nations (FAO)* in 1945 was promoted to create a framework of right-based international politics acting in the name of hunger eradication.

In the 1950s, opportunities for cooperation increased and made the FAO the key player in the international fight against starvation. The FAO ultimate objective was to function both as directory during emergencies linking donor nations to nations in need and as a forum of discussion where nations can develop effective international policies in agriculture and trade. In the 1960s, the idea of a stable supply of food became increasingly important at the international level and eventually a necessary prerequisite for international development. A new strong organization named the *World Food Program* (WFP)[5] was created with the goal of fighting hunger in collaboration with the elder FAO. These new bodies were a strong institutional response to this issue as they were appointed to monitor the state of global hunger and were working to create synergies favourable to the an improved supply of food.

The food crisis of the 1970s marked a dramatic turning point from the previous framework of international food supply. In 1972, bad weather hit crops across the globe and world food production went down for the first time in 20 years.[6] Despite donors' countries efforts, world cereal reserves hit a 22-year low in 1974. As donors were not able to meet international demand deficit countries, a world crisis was triggered. This resulted in high instability of food supplies and prices on the world market. And then in the 1980s, following the success of the Green revolution in which biotechnologies succeeded in stabilizing productivity against climatic threats, the idea of food security was broadened to include new physical and social elements such poverty alleviation or gender equity. Finally, in 1986[7], the highly influential World Bank report "Poverty

[4] "Achieving food and nutrition security: Paper I", Weingärtner, 2005.
[5] "Achieving food and nutrition security: Paper I", Weingärtner, 2005.
[6] "Reviewing the similarities of the 2007-08 and 1972-74 food crisis" J. Joerin and R. Joerin, 2013
[7] "Poverty and Hunger: Issues and Options for Food Security in Developing Countries". World Bank. 1986.

and Hunger" focused on the temporal dynamics of food insecurity. This concept of food security is further elaborated in terms of: "access of all people at all times to enough food for an active, healthy life"[8].

c. Current definition of food security

Finally, only in the 1990s, as the total number of undernourished slightly surpassed one billion people the fight against hunger became a first priority issue. The human right to adequate food and nutrition was internationally affirmed as a prerequisite in the broad definition of human rights committing national governments to a more proactive role[9] in this fight. This new and extend approach to food security would finally result in the *World Food Summit of Rome in 1996*. The outcome of this meeting was the *Rome Declaration on Food Security*, an eminent document defining for the first time food security as the situation in which "All people, at all times, have **physical**, **social** and **economic access** to **sufficient**, **safe** and **nutritious food** which meets their **dietary needs** and **food preferences** for an **active** and **healthy life**"[10]. According to this new document to define food security is necessary to illustrate how a broad set of social, economic and environmental issues and challenges affect food supply both within and among countries. The declaration states, "This situation is unacceptable […] instability of supply and demand, as well as natural and man-made disasters, prevent basic food needs from being fulfilled. The problems of hunger and food insecurity have global dimensions and are likely to persist, and even increase dramatically in some regions […] given the anticipated increase in the world's population and the stress on natural resources. […] Poverty is a major cause of food insecurity and sustainable progress in poverty eradication is critical to improve access to food. […] Environmental degradation also contributes significantly to food insecurity. […] We acknowledge the fundamental contribution to food security by women, particularly in rural areas of developing countries, and the need to ensure equality between men and women."

The Rome declaration introduced a multidisciplinary approach that still today characterizes food security. It links hunger together with environmental challenges, development targets and social equality in the context of human development. *The Rome Declaration of 1996* bounded world leaders to include in national policies a set of precise in time and well-defined targets to reduce hunger. At the beginning of the twenty-first century, the values and targets of the *Rome Declaration* would be reaffirmed and enhanced in the *Millennium Development Goals* declaring the ambitious target of halving the overall number of world's undernourished.

To conclude, much had been done to understand and adequately respond to the numerous and challenges of food insecurity. In the after war period, the world community approached to global hunger with a single-minded policy action focused on stabilizing food supply increasing food stocks. The creation of two strong international organizations such as the FAO and the WFP represents a strong institutional response to this problem. As a result of the 1972 crisis and the rise of world's undernourished to one billion in the 1990s,

[8] FAO, "Definition of food security": http://www.fao.org/docrep/005/y4671e/y4671e06.htm#fn27
[9] "Achieving food and nutrition security: Paper I", Weingärtner, 2005
[10] WHO definition: http://www.who.int/trade/glossary/story028/en/

world leaders acknowledged the complex nature of chronic food insecurity defining this challenge in the broader context of international development, and including food security among the *Millennium Development Goals* in the 2000s.

2. Theoretical framework of food security

Availability, Accessibility, Use and Utilization and Stability

The definition of food security comprises numerous concepts that differ from the determinants of the global food supply. These are social, physical, and economic factors that influence how people interact with food. Traditionally, two factors influence the conceptual framework of food security: a physical and a temporal factor. The physical determinant is the food flow: Availability, Accessibility, Use and Utilization, while the temporal factor being Stability.[11] Obtaining theses factors together at the same time ensures that food security is stable and widespread. Food is available and accessible leaving only spaces for limited episodes both in number of people and time. In addition, it is necessary for the theoretical framework of food security to give account of the relationship occurring between failures in the supply and health. As a result, the debate over food security has expanded to include aspects of nutrition.

According to 1996 definition of the world summit food security is the situation in which "All people, at all times, have **physical**, **social** and **economic access** to **sufficient**, **safe** and **nutritious food** which meets their **dietary needs** and **food preferences** for an **active** and **healthy life**"[12]. These four dimensions grasp the implications of different macro areas within different issues that are behind global hunger giving accounts over the various layers of the same problem. For example, it can be argued that in some regions chronic hunger is caused not by low availability but poor accessibility to food supply because of widespread poverty.

a. Availability

First, food availability is a combination of domestic food production, commercial food imports, food aid, and domestic food stocks, as well as the underlying determinants of each of these factors.[13] Clearly national food availability refers to the amounts of food stocked at the national level, while regional availability has aggregate regional stocks as a referent. In turn, regional and national productivity are determinants of global aggregate food availability.

Determinants of availability are numerous. They can be material inputs of production such as irrigation, quality of land, quality of seeds and technologies of production. Geographical features such as climatic behaviour and food systems' resilience are fundamental reason for availability in a given territory, as they also determine the yields and outputs in agriculture. As an example, in the past several food crises were triggered by food shortages spurring from sudden climate crisis.

Another noteworthy determinant of food availability resides in management of food. Actually, one third of all food produced is lost during the supply chain. Evidences are suggesting that aggregate food production is actually enough to satisfy global demand[14] although food insecurity is still persistent in many regions of the

[11] "Achieving food and nutrition security: Paper I", Weingärtner, 2005.
[12] WHO definition: http://www.who.int/trade/glossary/story028/en/
[13] Achieving food and nutrition security: Paper I", Weingärtner, 2005.
[14] The Guardian:10 things you need to know about the global food system (http://www.theguardian.com/sustainable-business/food-blog/10-things-need-to-know-global-food-system)

world. While inequality and poor accessibility accounts for much of the disparities in nutrition, inadequate stocking systems, poor technologies, poor trade institutions and infrastructure are causing enormous food losses in low-income countries[15]. For example, a shocking 80% of total South-Eastern Asia rice production is lost annually due to inadequate treatment during the supply chain[16]. Food losses also cause indirect decreases in availability as it causes the waste of land, energy and water resources, which results in even more food insecurity both locally and globally due to rising inputs prices. Consistent shares of food loss are registered also in high-income countries where most of the food is wasted at retail and consumer level causing severe damages to global food security.

b. Accessibility

Access is ensured when all households and all individuals within national households have sufficient resources to obtain appropriate foods for a nutritious diet. Not directly related to food supply, accessibility represents the interaction between the real demand for food and food retail prices in which income and food price plays a fundamental role. Access to food depends on the level of household resources – capital, labour, and knowledge – and on prices.[17] This second dimension illustrates the deep implications of social and economic costs with income and food security. Generally, dietary intakes are very sensible to income changes even in rich countries. The positive correlation between malnutrition - for example obesity - and low levels of income in the Untied States add further emphasis on concerns for accessibility.[18] Poverty is a major cause for the inaccessibility of the food market to consumers.

Rural communities suffering from poverty may experience a different form of inaccessibility as they have less access to overall food than urban communities do. This form of food insecurity may be more geographical in nature. For example, rural populations are forced to go to distant markets in order to collect sufficient food commodities not available at local level, also including basic nutrients as water. Low availability at the local level is worsened by the fact that usually rural poor are also economically prevented from entering food markets. This is a severe issue in a world where slightly less than one third of the people live in absolute poverty with a large share of them living in rural condition as well.

The problem here is that once again national trends in food security are dependent on the larger international economic inequalities. Accordingly, if economic growth will not be accompanied by inclusive economic measures that would improve living conditions of the food insecure, food insecurity will not reduce. Hence, this is the reason why many studies affirm that the fight against hunger is also a war against poverty.

[15] Data on food loss: https://ccafs.cgiar.org/bigfacts/#theme=food-emissions&subtheme=supply-chain
[16] "El Hambre" Caparrós, 2014
[17] "Achieving food and nutrition security: Paper I", Lioba Weingärtner, 2005.
[18] "Poverty and obesity: the role of energy density and energy costs", Am. J. of Nutrition, Drewnowski, 2004.

c. Utilization

Third, use and utilization refers to the importance of non-food inputs in food security – which are social, economic and cultural patterns that affect food consume including adequate diet, clean water, sanitation and health care to reach a state of nutritional well being where all physiological needs are met at the households level[19]. Use and utilization of food in the household are dependent on food management activities such as adequate storage and preparations of ratios to feed every member of the family. In addition, cultural aspects are also important as different social groups go through the nutrition process following different habits and food knowledge.

Moreover, statistics suggest that females are usually more damaged than men by food insecurity due to the fact that usually they do not enjoy a direct and stable form of income. For instance in most developing regions, usually amen provide income while women have to look after the house and children. Evidences illustrate that economic insecurity has a greater impact on women than it does on men in rich countries as well, albeit with fundamental structural differences.[20] It is important to note that even though many problematic issues in food security are very global in nature, data on households' consumption provides key valuable insight about food security at the micro level. For example, elderly people suffer from nutrition deficit because they are not able to prepare a meal, even though there have no problems with accessibility or availability of food. Accordingly, use and utilization provide key information on infants' nutrition.

Furthermore, dietary needs and nutritious food are included in the definition as fundamental prerequisites for a healthy life. Similarly the inclusion of safe food is noteworthy as it refers also to access to safe waters, whose importance is largely underestimated in the everyday debate over food security. As data suggest[21] water is a chief cause of malnutrition and food related illnesses. Eventually investment in water and sanitation are correlated with strong reduction in hunger and malnutrition expanding largely food security. The nutrition indicators are valid instrument as they successfully added the aspects of caring practices and health services & healthy environments to this definition and concept.[22]

d. Stability

Finally, the temporal determinant of food security refers to stability, which affects all three physical elements. Drastic changes in these conditions, such as during periods of drought or social conflict, may seriously disrupt production strategies and threaten the food access of affected households.[23] Stability is particularly important in assessing the determinants of food insecurity to understand the underlying the causes of this phenomenon in a given territory. A it is explained by the distinction between chronic food insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory

[19] "Food security: policy brief, Issue 2" FAO, 2006.
[20] "Poverty and obesity: the role of energy density and energy costs", American Journal of Nutrition, Adam Drewnowski and SE Specter, 2004.
[21] Source: water.org: http //water.org/water-crisis/water-sanitation-facts/
[22] "Achieving food and nutrition security: Paper I", L Weingärtner, 2005.
[23] "Achieving food and nutrition security: Paper I", Lioba Weingärtner,

food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict.[24] As result, the features of stability suggest that the policies to tackle food security must be tailored to suit specific circumstances in the territory suffering from food insecurity.

[24] FAO, "definition of food security": http://www.fao.org/docrep/005/y4671e/y4671e06.htm#fn27

3. Safe waters

One of the corner stones of food security is the presence of absence in the access to safe potable water and sanitation. Safe waters are potable water free from microorganism, chemicals and substance harmful to human consumption. Direct access to water sources is essential to human life and economic security, nonetheless nowadays one person in ten still lacks access to safe waters resulting in around 700 million people suffering from water insecurity globally.[25] According to the *World Health Organization*, inadequate access to water means having nearest water source located one kilometre away. Access to water is a critical challenge for many rural populations worldwide, as it forces people to travel everyday in order to collect water. To make the picture worse, the poor and the rural communities may miss either the transportation means or the adequate systems for stocking water increasing considerably the amount of hour of work needed to keep water supply stable. Moreover, the lack of a domestic source of water that affects some 700 million people globally is cause of an oppressive trade off in food consumption, namely the choice of using water to wash food or to cook it or simply to use it as a drink.

According to the WHO, improving accessibility to safe waters has the positive effect of ensuring environmental sustainability, reducing child mortality and enhancing maternal health against HIV/AIDS and Malaria since water security creates strong synergies between global partners in the fight against poverty, hunger, low primary educational and gender inequality.[26] Reasons for that can be found in the fact that having direct access to water has wide implications in almost every aspect of human life stretching from the micro to the macro level.

Seriously detrimental for the economy, water insecurity is a direct cause of economic underdevelopment and severe poverty in numerous regions of the world. The time spent gathering water around the world translates into $24 billion in lost economic benefits each year.[27] Not only safe waters are sources of improved nutrition and hygiene but they can improve households' consumption helping them to save solid shares of income that, in turn, can be spend on other form of consumption. Finally, when water insecurity becomes severe during dry seasons, it condemns the society to perennial poverty and underdevelopment that economic insecurity in many regions of the world. Notably, Sub Saharan Africa is the region most affected by water insecurity, where most survive on fewer than 25 litres of water per person per day for all of their domestic needs, compared to the 50–100 litres recommended by the *World Health Organization* for meeting basic needs and protecting public health.[28] By contrast Europeans and Americans use even fifteen times more water per person on a daily basis.[29]

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[25] Source: World Health Org http://www.who.int/water_sanitation_health/mdg1/en/
[26] Source Water.org http://water.org/water-crisis/water-sanitation-facts/
[27] Source: Water.Org http://water.org/water-crisis/economics-facts/
[28] [28] "Evolving sphere of food security: Health and Development at the Food-Water Nexus" J. Davis, E. Bendavid, A. J. Pickering, and R. L. Naylor, 2014.
[29] "Evolving sphere of food security: Health and Development at the Food-Water Nexus" J. Davis, E. Bendavid, A. J. Pickering, and R. L. Naylor, 2014.

In addition, the lack of access to potable water and sanitation causes severe form of disease and malnutrition that weakens people, eventually making them unable to work for their subsistence. According to the WHO, 1.6 million people die every year from diarrhoeal diseases attributable to lack of access to safe drinking water and basic sanitation and 90% of these are children under 5, mostly in developing countries.[30] Moreover another 1.4 billion people are affected by water related disease. One in three person globally lacks access to a toilet, making the total number of 2.4 billion people around the world without access to sanitation consequently forcing them to share toilets or worst using open-air latrine with bad effects on public health. This applies especially to infants, who need to be cleaned and washed almost constantly during the first years of life, as they cannot care for hygiene autonomously. In spite of the fact that water access is a fundamental human right, water, sanitation and hygiene related diseases kill nearly 1 million people each year.[31]

Finally, water insecurity has also social issues, as usually women and children in school age have the responsibility for water collection. Particularly, reductions in time spent collecting water have been found to increase school attendance.[32]

The depth and complexity underlying the connection occurring between water, food production, and health open up opportunities for synergistic policies and programs across these domains.[33] Notwithstanding present efforts by governments and international institutions, water insecurity is still largely present at the global level amplifying the broader issue of food security. Since the UN has recognized *the Right to Adequate access to Water and Sanitation* as a precondition for *Human Rights*, as a result any international institution with the goal of reducing food insecurity should include into her political agenda projects aimed at reducing short term and long term water insecurity. International recognition of the right to water is an outstanding result in the field of international relations. Anyway effective interventions to reduce food insecurity need to address the intersection of these water, food, and health constraints, as well as the fundamental economic conditions that cause families to live in persistent poverty.[34] As mentioned above, global efforts to tackle water insecurity are justified by a general increase in social development on different dimensions, in addition there are also economic indicators suggesting the elevate profitability of investments in access to water and sanitation. Indeed every dollar invested in water and sanitation is thought to provide a four-dollar return.[35]

[30] Source: WHO http://www.who.int/water_sanitation_health/mdg1/en/
[31] Source Water.org http://water.org/water-crisis/water-health-facts/
[32] Source: Water.org http://water.org/water-crisis/women-children-facts/
[33] "Evolving sphere of food security: Health and Development at the Food-Water Nexus" J. Davis, E. Bendavid, A. J. Pickering, and R. L. Naylor, 2014.
[34] "Evolving sphere of food security: Health and Development at the Food-Water Nexus" J. Davis, E. Bendavid, A. J. Pickering, and R. L. Naylor, 2014.
[35] Source: Water.Org http://water.org/water-crisis/economics-facts/

4. Exploring the relationship between food and security

The world is still a place of titanic inequality; poverty is widespread while richness is more and more concentrated in specific regions of the world. And within these regions, few nations are richer than others; likewise within their borders national wealth ends in the hands of a few multibillionaires. The many organization supporting international equality are achieving too little, if compared to size of this issue. As a result the countries that had made sensible progress in food security achieved these results mainly through measures of self-help in a context of overall economic growth. Anyway, evidences suggest that this is a small phenomenon indeed limited to a little number of countries. The problem to date is the lack of incentives for national governments to adopt agriculture, trade, and energy policies that could reduce global hunger[36]. One viable incentive to reduce global hunger is to threat food security as a matter of security.

According to Stephen John Stedman, it is impossible to understand what will take for states to solve food insecurity without understanding the broader notion of security. According to him, in the world three main dimensions of security came about from history. The first is national security, the second international security and finally the third is human security. The first two taking states and system of states as referents, while the third take human life as a referent for security.

While the national and international security involve borders' protection, the use of force and war, the human security approach combines the twin beliefs that security is both a natural entitlement of all people and the key factor reducing deadly threats of all sorts such as hunger disease and poverty,

Ultimately, food is a great source of power for states. Historically they had drawn much of their power and international prestige through their productive capacity. And still today, the economy of food is one of the most profitable sectors in the economy. Either nationally or internationally the economy of food convey with itself political challenges and opportunities. For example, national food productivity has deep implication in international policymaking as it can provide alliances and trading partners[37], as well as wars.

The threefold definition of security as national security, international security and human security offers to policymakers a large set of actions to find the most appropriate rationale in the war against hunger. To understand these challenges and opportunities adequately I will analyse separately the three dimensions.

a. The rationale behind national security

In the 1940s and 1950s, early academic study in the field of national security emphasized self-help and focused disproportionately on military power as a bulwark against threats.[38] Without a doubt, national security is considered as the ultimate goal of defence, and still today it is an unfortunate justification for gross human rights violations such as torture. Eventually a strong link between national food security and national security exists. Not surprisingly, nowadays numerous studies illustrate the presence of a strong link

[36] "Evolving sphere of food security: Food and Security", Stedman, 2014
[37] Source: "China, Africa and Food Security" (http://intpolicydigest.org/2015/07/09/china-africa-and-food-security/)
[38] "Evolving sphere of food security: Food and Security", Stedman, 2014

between food security and state building, especially during its early processes. For poor, weak governments today, food insecurity can be a direct threat to national security, indeed most civil wars today occur in weak states that are poor, rife with disease, and food insecure.[39] For example, to secure national governance the Chinese government still considers food and nutrition security as central for the future of China.[40] Therefore, the sustained growth of Chinese economy has been partly translated in improved food security not only for the sake of humanitarianism.

A further example of this can be found in the words of Hans J. Morgenthau. In his book Politics Among Nations (1954), he identifies how the politics of food is intertwined with international power and national security.

> *Another relatively stable factor that exerts an important in influence upon the power of a nation with respect to other nations is natural resources.*
> *To start with the most elemental of these resources, food, a country that is self-sufficient, or nearly self-sufficient, has a great advantage over a nation that is not and must be able to import the foodstuffs it does not grow, or else starve . . .*
> *A decency in home-grown food has thus been a permanent source of weakness for Great Britain and Germany which they must somehow overcome, or face the loss of their status as great powers. Countries enjoying self-sufficiency, such as the United States and Russia, need not divert their national energies and foreign policies from their primary objectives in order to make sure that their populations will not starve in war . . .*
> *Conversely, permanent scarcity of food is a source of permanent weakness in international politics. Of the truth of this observation, India is at present the prime example . . . Regardless of the other assets of national power, which are at its disposal, the permanent decencies in food compel it to act in its foreign policy from weakness rather than from strength.*

One possible interpretation deriving from the words of Morgenthau suggests that national food resources are a source of internal security against international dependency, since a state without the power to meet the internal demand is undoubtedly dependent on the external help. Undoubtedly, states can overcome this instability in the food supply increasing military power, or diplomatic relations with other powers. Yet if food shortages are not overcome by internal food production in the long run, this will cause a cyclical insecurity for the citizens. As history suggests, it is necessary to enjoy large degrees of internal security to claim for the status of international power. Accordingly, developing countries are still facing this troublesome condition. For example, India places enormous importance on self-determination and is fiercely

[39] "Evolving sphere of food security: Food and Security", Stedman, 2014
[40] Source: "China, Africa and Food Security" (http://intpolicydigest.org/2015/07/09/china-africa-and-food-security/)

protective of its freedom of action. Its food and agricultural policies have been motivated by a dream of self-sufficiency that in the worst case of disorder, it should still be able to feed itself[41].

Intending food security as a part of the definition of national security provides possible solutions against global hunger of incentives albeit conveying also political challenges at the same time. To some extent, this can be blamed to the intrinsic unpredictability of the bargaining process within the international arena and to different perceptions in the meaning of security. Eventually the security rationale can incentive states to upscale food national security at the top positions, reducing global hunger. On the other hand, it can be a dangerous path as states may opt for policy measures needed to increase internal security such as food bans for exports and subsidies, and greater international competition over food resources, which reduce further overall food security. As a result, there is no certainty over the fact that if states intend food security as fundamental to national or international security, they can provide exclusively positive outcomes.

Food security gives stability and self-sufficiency for developing states and influences their policymaking in the very first stage of growth. But then once independence is reached, this rationale for food security fades away without much power to influence national and international politics.

b. The rationale behind international security

It is not a novelty to understand food security as a rationale for international policy making. In effect great powers of the past managed to create a well functioning productive food system in order to increase international stability and international governance. For example at the time of the Cold War, when both USA and USSR were in a struggle to secure their leadership over the world, they acted as global economic partners in almost every sector of the economy including of course food production. For the two powers, one source of legitimation was being world's largest producer of cereals meaning eventually that during a time of crisis either USA or USSR would have sustained international demand for staple food. This illustrates how useful is food as a tool to increase both legitimacy of world leadership and fidelity in the international arena.

Nowadays, the predictions of a disproportionate growth in world's population and realistic fears for sudden climatic crisis are calling once again for an immediate achievement of international food security. But, even though the United States remains among the first productive powers in the world, it now seems less interested in such a role seeking national advantages. As it is demonstrated by the decision of the US congress in 2007 to devote more than 40% of overall maize production to biofuels to increase energetic independence.[42]

If during the Cold War, the bipolar division of the world enhanced economic competition with positive spill-overs in food security for the international community as a whole, nowadays the lack of international leadership may be fatal for present day food security. Latest arrived global economic leaders, such as China

[41] "Evolving sphere of food security: Food and Security", Stedman, 2014

[42] " Evolving sphere of food security: global Agriculture and Land Use changes in the Twenty-First Century", X. Rueda and E. F. Lambin, 2014.

or India, are still suffering from unstable food supply. And their internal division mixed with economic inner hyper-inequality pose serious question for their candidacy as international leaders. On the other side, Europe and developed countries are largely food secure but they has no power to match the increasing international demand for without a common effort.

Finally, many studies are demonstrating that food insecurity is both a cause and outcome of civil unrest. The U.S. State Department reported that food unrest in some 60 countries between 2007 and 2009. Among these were Afghanistan, Yemen, Ethiopia, Somalia, Sudan, the Democratic Republic of the Congo, and Haiti.[43] Such links between the price of food and social unrest illustrate the importance of stability in world food production for the international security. As it is that income and educational disparities arising from chronic malnutrition can potentially lead to prolonged civil unrest and conflict.[44]

A possible reason for the lack of incentives in the international security approach derives from the wrong perception of the risks posed by food insecurity to the international system. Since the most food insecure territories are often also politically unstable and economically insecure, there are poor economic advantages for countries to act as global partners. Following this rationale, a war between two countries in Africa, leading to hundreds of thousands of deaths, would not destroy the international system[45] and will be consequently not perceived as risk for the community. The same applies to food security. For instance, a food crisis in Africa may cause millions of deaths; nevertheless, it will not cause any danger for the core of system. Sadly, the international systems acknowledge poorly the need to intervene in favour of those states that are at the periphery of this society. As a challenging future is menacing worldwide food production, the international players must decide whether they care or not for both their own destiny and the low producing countries.

c. The rationale behind human security

In many regions of the world where food is not available people do not enjoy political rights, they live in extreme poverty under metallic roofs in dirty conditions. They lack water access and sanitation, they do not work living a life without hope. They are forced to steal food or to search for it in the dumps. They have numerous children and many of these will not grow over the age of five because of malnutrition. Sometimes these people live in an area of conflict and they are forced to move either by the bombs or worse by civil war. They live a parallel life as they do not treat anybody, they are world's poorest people, too poor even to be considered as a menace.

In the last years, the world has witnessed an increasing care for the least advantaged. There may be economic reasons for this renewed care. First of all, moving people out of poverty means increasing consumption and overall welfare. Another explanation is the human dignity and the equality between the people, and indeed these were the paths chosen by the UN when the human security approach was proposed.

[43] "FULL PLANET, EMPTY PLATES", Brown, 2012.
[44] "Evolving sphere of food security: Food and Security", Stedman, 2014
[45] "Evolving sphere of food security: Food and Security", Stedman, 2014

This approach combined the twin beliefs that security is both a natural entitlement of all people, and a duty for the international community. The UN expanded the definition of security to include seven new dimensions: economic security, health security, environmental security, personal security, community security, and political security. [46]

The problem to relate this dimensions together exists, as they are difficult to obtain both simultaneously and separately, and there is no clear order of priority between them. The first problematic aspect of this definition is a large amount of ideas about security eventually creating a high risk of institutional fragmentation. For example regarding food security, three organizations exist only within the UN. First, there is the FAO with its many regional offices, then the WFP, and finally the I-Fad. Concurrently there are also national, regional and local bodies, and finally lots of private and non-governmental agencies and organizations. All of this mass of organizations barely works together in the field of food security. They result in a never-ending number of newly born intergovernmental agencies, infinite amounts of reports, statistics and policy recommendation running the risk to be wasteful and ineffective, as there exists a little difficulty to synthetize policy action from this international matrass.

Secondly, the lack of a clear order of priority may end up in unpleasant trade-off within these seven dimensions. There are no policy guidelines indicating which dimension is the most desirable, as a result there is more confusion than effectiveness. It may be desirable for food security to be achieved with sustainable farming practise that are safe for the environment, nonetheless studies suggest that many countries have achieved food security at the expense of environmental security, not in conjunction with it. [47]

Case in point, here is the trade-off between food security and health security. During the green revolution of the 1970s, new farming techniques were developed in order to overcome climatic effect on food production. As a result, intensive agriculture became one of the most common techniques in farming, as it was able to increase yields and reduce costs using fertilizer, insecticides, fungicides, and herbicides to growing crops. Intensive farming techniques requiring large use of chemical fertilizer are dangerous for human life and the environment. While being highly productive, improving largely global food security and economic security at the national level, they are responsible for health insecurity at the local level and for environmental depletion both nationally and internationally.

As said above, the human security approach seems dangerous, as an increase in one dimension does not produce a simultaneous increase in the others. Also economic security, achieved through rapid economic growth, may increase the challenges of maintaining food security rising per capita caloric intake, changing diets with more meat consumption, and growing strain on land and water resources and the environment lead to greater difficulties in meeting food demands.[48] Case in point here of the trade-off occurring between the seven dimensions is represented by the rise of the Chinese middleclass. In the last decades, China has experienced a magnificent growth increasing largely national economic security. As soon as national

[46] "Evolving sphere of food security: Food and Security", Stedman, 2014
[47] "Evolving sphere of food security: Food and Security", Stedman, 2014
[48] "Evolving sphere of food security: Food and Security", Stedman, 2014

incomes began to grow the demand for new and more expensive food commodity grew along including meat. The increase of meat demand in china is among the major factors causing global production of meat to rise. The production of meat is obtained through the use of staple crops for animal feed, that are subtracted to the supply for human consumption also increasing their retail price. Moreover, being demand so high and the market so profitable meat is overproduced causing environmental degradation and biodiversity loss.[49]

In effect, neither this last approach provides a perfect unbiased rationale for intervening in global food security. Eventually, it offers two straightforward advantages. First, it promotes a sort of worldwide humanitarian mission that bounds all governments together in fighting security issue that has succeeded in changing contemporary moral sensitivities towards food, civilians in wartime, and the behaviour of warring parties.[50] Second, it guarantees a new framework for intervention in food security asserting that secure access to food is benefit in itself. These advantages gave to global food security much relevance bringing this issue on the forefront of international debate. But the human security approach remains also a challenging one. In other words, it does not provide a clear rationale, it does not account for the actors that have to provide humanitarian help, and neither it gives an account of the priorities for this policy action.

To conclude, none of the three approaches investigated above seems able to lead the fight against hunger alone. First, national security as a tool for international policy-making in food security yields poor benefits and great risk of undesired policy outcomes. Second, international security suffers from poor leadership, because, except for USA, no other countries seem to have the technologies and the economic power to sustain the global food market. And finally there is great uncertainty regarding the humanitarian approach to food security because of poor legitimacy to act, the lack of adequate funding and agreement over shared policy measures, and the risk of institutional fragmentation.

[49] An interesting reading: Limberly P., (2015). Farmageddon: the true cost of cheap meat. Bloomsbury Publishing.
[50] "Evolving sphere of food security: Food and Security", Stedman, 2014

5. The state of food security: global and regional trends

a. Indicators

The international community collects and analyses data on food security to see how national and regional actors perform establishing which factor are influencing the effectiveness of their performance. Recent findings suggest that while short-term food crisis are to be treated with foreign aid, long run development of anti-hunger policies on the other hand offers a more effective strategy to grow productivity of local smallholders. In addition economic growth is effective against hunger if states translate it in increased social protection and inclusion of most vulnerable groups, large investment to revitalize the livelihood of social environment. The combination of these economic measures influences positively the war on hunger in many regions of the world. Evidences of increased food security in Asia and Latin America due to this policy making illustrate further the importance of including the smallholders into national policy making to reduce food insecurity. In the 2015 FAO Report over Food Security, the FAO uses two indicators to describe the present state of food security both among and within countries. First, the number of undernourished in absolute term and the ratio of undernourished to the total population (PoU). And second, the prevalence of underweight children under five years of age (CU5), monitored by the *United Nations Children's Fund* (UNICEF) and the *World Health Organization* (WHO).[51] These two indicators are derived through several measurements that investigate level of food availability, accessibility, use and utilization of resources and finally stability in the supply at the Macro (Global, Regional, National dimensions), Meso (Community dimension) and Micro (Household level).

In addition, to derive the PoU and the CU5, the FAO uses also other indicators that represent the underlying cause of global food insecurity. Depending on their function, of course, indicators differ largely as they stretch from political stability to more economic ones such as GDP Growth, Global cereal production and National income per capita (US $) [52]. As they are sensible to policy intervention in different degrees these indicators guide policymakers in the global fight against hunger directly and indirectly.[53]

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[51] FAO, (2015). The state of food insecurity in the world.

[52] "Achieving food and nutrition security: Paper I", Weingärtner, 2005.

[53] For example, there are seven fundamental indicators used by the FAO to assess the state of global food security in terms of cereal production.

1. Global stocks in relation to probable magnitude of market demand
2. Ability of the five major grain exporting countries to meet the demand for wheat and coarse grains imports (Argentina, Australia, Canada, USA, EU community)
3. Ratio of the volume of closing cereal stocks
4. Changes in cereal production among the major cereal importing countries of China, India and the CIS
5. Changes in aggregate cereal production of the Low Income Food Deficit Countries (LIFDCs),
6. Changes in aggregate cereal production of the LIFDCs, excluding China and India
7. Comparison of export prices for the major cereals

These seven indicators fall within the spectre of international food security as they are used to explain changes in PoU. For example, they are good in assessing availability of food illustrating shifts in global demand caused by an increase in national or regional production. Or they can be good in explaining sudden food shortages due to price inflation and useful tools to investigate changes in PoU due to global food market interactions. Anyway, there is no link between cereal production and the amount of people undernourished in the world; this is so because of the multifaceted nature of food security.

b. Convergence

While PoU indicator refers manly to changes in availability and accessibility of the food chain, the CU5 is used to investigate the utilization made with food. PoU and Cu5 together are to account for the multifaceted nature of food security. While shortages in the national production will decrease availability directly, underweight instead can be caused by a range of different factors – not only calorie or protein deficiency, but also poor hygiene, disease or limited access to clean water. [54] For example, indicators of underweight are many widening from per capita dietary energy supply (kcal/day) to access to safe waters and investment made in the health sector from nutrition indicators. Typical instrument to asses CU5 are households surveys and data are collected by national or international health organizations, in addition to measure of economic growth.

Clearly, the trends resulting from these two indicators differ. They can converge or diverge giving explanations of the same phenomenon under different approaches. Where lack of sufficient food is the main cause of food insecurity the PoU and the CU5 should move synchronously. Where poor food utilization prevails instead, the two indicators are likely to diverge[55]. PoU and CU5' outcomes advise policymakers to use different policy tools to address food security.

If, for example, evidences suggest a sensible reduction in regional PoU caused by increased investment in food production by one single nation, there are no certainties that the CU5 will consequently increase. In effect, when CU5 levels remain invariant, policymakers should focus at policies to increase hygiene and quality of food available to households. Such findings are typical, and they show that in large parts of the world food production has increased without improving accessibility, hygiene conditions or the quality of food. Indeed evidences are showing an increase in the share of obesity in countries historically suffering from low food production such as North Africa, due to increased availability of poorly nutrient foods.

c. Global trends

According to the FAO, Global trends show appreciable reductions in worldwide food security in the last twenty years. The proportion of world undernourished declined from 18.6% in the 1990s to 10.9% in 2014-16. In absolute terms, world's undernourished decreased by 216 million globally, a reduction of 21.4%, notwithstanding a 1.9 billion increase in global population.[56] This resulted in the absolute number of undernourished falling from over one billion people to 796 million. Reasons for that can be found in greater availability of food enhanced by more stable political conditions worldwide, general economic growth and increased social protection for vulnerable groups bringing with them a more livelihood environment and higher disposable income and increased accessibility to the food supply.

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[54] FAO, (2015). The state of food insecurity in the world
[55] FAO, (2015). The state of food insecurity in the world
[56] FAO, (2015). The state of food insecurity in the world

Indeed many progresses have been made but global food security far from being stable is under great pressure from future dangers of a challenging global environment. Poor access to safe water and sanitation, man made and natural disasters along with dangers conflict and civil strife affect many world regions. Sudden environmental crisis and war brought the number of displaced people around the world to 51 million, which is the highest number ever recorded after WWII.[57] Future trends are also worrisome, as evidence suggest, climatic crisis and turbulent weather are predicted to stress food source bringing down productivity. Action undertaken at the global and regional levels should take into account country specificities and exposure to natural and human-induced disasters, especially those of small-island developing states.[58] In addition, world population is steadily increasing at a good pace as an expected two more billion people will inhabit earth in the next hundred years.

In fact while the world has experienced a general growth in food security, many regions of the world remain chronically food insecure showing poor progress in food availability and life conditions making them largely dependent of food aid and imports. The current economic system may further worsen food insecurity because of its vulnerability to price shocks and increase in energy prices that would be translated in higher food prices. Evidence of this is given by the effects of the last economic recession. Increased unemployment and slower economic growth may reduce further food security. To support this idea, there are studies suggesting that the food price inflation of 2008 played a fundamental role in the explosion of "Arab springs" in the North African countries. In other words, statistics that suggest a decrease of global hunger are largely representing the economic growth of rising Asian powers such as India and China. Changes in large populous countries, notably China and India, play a large part in explaining the overall hunger reduction trends in the developing regions[59] while many regions of the world remain chronically food insecure.

d. Regional trends

The assertion that the world is performing better against food insecurity than it did 20 years a go is not only unrepresentative but it is also wrong. A better understanding of the state of food security is achieved when regions are taken as referents. In effect statistics of food consumption are biased suffering from the large numbers of the Asian population. While food security has increased decreasing in absolute number of people suffering from hunger globally, at least two regions of the world (Oceania, Africa) are stagnating in their achievements. More over also inthe sub-regions of Asia and Latin America, there are still high levels of food insecurity.

A further example of that is given by the difference between developed and developing regions. The first being characterized by high levels of welfare and civic care for their citizens enjoys low levels of both undernourishment and malnutrition, due to high economic growth, large access to safe water and investment in sanitation, and finally stable social and political conditions. Developing regions instead share the largest

[57] FAO, (2015). The state of food insecurity in the world
[58] FAO, (2015). The state of food insecurity in the world
[59] FAO, (2015). The state of food insecurity in the world

burden of hunger. They are the home of more or less 780 million people suffering from food insecurity with Africa and Asia occupying the first and the second place respectively. Anyway, also in developing regions food insecurity has enjoyed a sensible reduction with the positive stories of Latin America and South Eastern Asia that reduced both overall undernourishment and malnutrition through politically successful economic measures in the last twenty years.

Africa is the region where the problem of hunger far from being solved is causing deterioration of the social environments. The sub-regions of sub-Saharan Africa are the most affected areas as they are the home of 220 million people suffering from undernourishment, almost 23% of total population living in Sub Saharan Africa[60]. Harsh climatic conditions, especially during dry season in central Africa, heavy dependence on food imports, poor governance and large political instability are all causes of cyclical and severe food shortages. Even if sub regions shows different ratios of undernourishment, the region as a whole is not performing well. Sub regional differences and slow increases in PoU are caused by small increases in GDP due an inadequate utilization of an environment that is rich in resources. Sadly, economic gains are rarely translated in improved livelihood conditions and inclusive development for the poor.

The malnutrition indicator (CU5) is the one giving worst news. Low access to safe waters and low hygiene conditions mixed with poor investments in health infrastructure force sub-Saharan Africa to face dramatic hunger related challenges. Making the picture worst, rates population growth around 2.7%[61] pose serious question about the ability of African regions to cope with the future situation as this rapid population growth will require immediate institutional response by African governments.

Anyway there is also one success story across the African continent, North Africa. In this region, CU5 and PoU indicators are finally converging. North Africa, with 90% of its population having access to improved sanitation and to safe waters, is close to eradicate severe food insecurity. Evidences suggest that North Africa has decreased admirably undernourishment by boosting food accessibility and availability through specific food policies and also through the increase of the use of subsidies for internal consumption and safety nets for the poor. Of course, the risk of political conflict, harsh climatic conditions along with high dependence on imports due to rapid population growth remain great dangers for the stability of food security in the region demonstrating that food security is sensible to variable features of national politics, climate and environment.

Population growth is posing serious question for future food security but in Asia there are several examples showing that if taken in time by political response, it can be managed to have a lower impact on food security. Although Asia is the region of the world with the largest share of world's population and overall highest number of undernourished, it experienced elevate reductions of food insecurity. During the 1990s the Asian continent was largely affected by low availability of food, poor infrastructure and poverty having as a result over 742 million people suffering from hunger[62]. In the last 20 years the overall number of

[60] FAO, (2015). The state of food insecurity in the world
[61] FAO, (2015). The state of food insecurity in the world
[62] FAO, (2015). The state of food insecurity in the world

undernourished decreased to 512 million people due to a better utilization of a resource rich environment resulted in an astonishing economic growth increasing largely livelihood conditions and socio economic opportunities. While the overall reduction depends mostly on the growth of China and the economic boom of Asian tigers economies of South-Eastern Asia, sub regional differences are dependent on the ability of central governments to spread economic well being to every group of the society. Without a doubt, the growth in food security across Asia proves that those models, which include vulnerable groups in the economy, are succeeding in boosting local productivity as well as increasing urban and rural incomes.

An illustrative example of the benefits deriving from inclusive growth models is in the difference between Eastern Asian and South Asian regions. According to the FAO, Eastern Asia reduced much of its food insecurity through policies that had been able to boost local productivity and improve smallholders living conditions. This inclusive growth had also brought about investments in sanitation and water access helping the poor and vulnerable to share the benefits of overall regional growth. As a result, local productivity has boosted food availability and significantly improved access to food. India instead, and Southern Asia in general, was not able to reduce hunger despite high levels of economic growth. But again, given its size and inhabitants, the very particular data on the Asian growth can bias the assessment of global food security.

According to the FAO, the high economic growth of India has not been fully translated into higher food consumption, leaving the poor and the hungry outside the economic miracle. One cause of this failure in the fight against hunger has its roots in inequality. For instance, India has such high levels of national inequality that economic growth is under performing in the war against food insecurity. Over fifty tree billionaires resides in the country accounting for over one third of overall Indian GDP and making India the fifth Nation in terms of billionaires worldwide. Nonetheless India has over 836 million people living in poverty (less than 20 rupees per day)[63] making it the home for the second-highest estimated number of undernourished people in the world. [64] Indeed India's economic inequality is also clearly depicted by the findings of the CU5 indicator. Southern Asia is the region with the highest historical CU5 level[65], and even if water and sanitation has improved they did it too slowly. For example, as evidences suggest, they are far behind the Eastern rates of growth in living conditions: in the last twenty years the rise of the Chinese economy led to high investments in sanitation and water, giving large benefits to the overall population by expanding the access to safe waters by 37%, as well as the access to sanitation by an astonishing 153%[66].

Another well performing is South Eastern Asia where high levels of economic growth had effectively been translated in increased social protection and inclusion for the rural poor making it the best performing region in the fight against hunger in all Asia. Both CU5 and PoU indicators are now converging at fast rates in South-Eastern Asia. The number of undernourished declined by more than half in the last 20 years being now around 60.5 million from 137 million in the 1990s. The PoU decline from an unusual 68.5, and it is now around 10% of the total population. And the CU5 also went down around 20% resulting in larger access

[63] "El Hambre" Caparrós, 2014
[64] FAO, (2015). The state of food insecurity in the world
[65] FAO, (2015). The state of food insecurity in the world
[66] FAO, (2015). The state of food insecurity in the world

to water and sanitation. As long as the increasing economic growth will look to the domestic market reducing inequality, improving sanitation and access to water by including rural populations in the domestic market and by expanding the economic opportunities in internal areas without a doubt, South Eastern Asia will enjoy high levels of food security.

Other parts of Asia show stark differences both among and within regions. For example, food security has increased in Central Asia due to a combination of unique factors. Greater political stability give rise to rapid economic growth after the 2000s due to a resource rich environment bringing down PoU during the last decade in many nations of Central Asia. This factors together with high rates of access to safe waters and improved sanitation reduced further food insecurity in the long run. Anyway, according to the FAO, political turmoil and sudden economic shocks with the risk of high poverty rates remain key factors to be monitored, even though they are rare for the region as a whole.[67] Finally also among the sub regions of Asia, Western Asia is the worst performing where rapid population growth, strong internal differences and the limited presence of devastating conflicts increased the number of undernourished from 8 to 19 million. Political conflict and large difference between countries are affecting Sub regional Food security. Syrian War, Iraqi War, terrorism, civil strife and conflict increased PoU but fortunately they did not increase CU5. Accordingly, hygiene conditions in the region are generally good, with more than 90% of the population having access to clean water sources, and 88% of the population having access to improved sanitation facilities in 2012 (FAO). This increase is largely dependent from progress made in countries such as Qatar, Saudi Arabia, the United Arab Emirates that enjoy inexhaustible oil resource and political stability. Eventually the inclusion of Turkey, a rapidly growing nation, polarizes even more the result between these two groups. Western Asia pattern of negative growth relies on economies that are dependent on large energetic resource and enormous difference in institutional stability.

Moving then to the last two developing regions of the world, namely Latin America and Oceania, findings are less extraordinary. Latin America developing countries have enjoyed a robust progress in overall decrease of PoU. Good economic performance, the growth of output in agriculture, social protection policies[68] and broad based food security intervention, such as the introduction of special programmes for rural families and smallholders mixed with school feeding programs, account for much progress. With regards to malnutrition, CU5 also decreased. The two indicators are converging showing that economic growth has effectively increased social protection resulting in an overall improvement food security. The only difference in the region persists between Southern and Central America. Both CU5 and PoU stagnated in Central America, illustrating that almost no progress had been made in hunger reduction.

To conclude, the developing countries of Oceania have experienced slow progress towards improved food security.[69] Food security in most countries can be severely affected by external shocks such as price hikes, low dietary diversity, low availability of staple foods and climatic crisis. Being these small islands all these

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[68] FAO, (2015). The state of food insecurity in the world

[69] FAO, (2015). The state of food insecurity in the world

factors can stress domestic food source increasing food insecurity in this region. To make the situation worse, given the geographical nature of the developing countries in Oceania, reliable data are difficult to collect. In short, climatic crisis and price hikes at the global level remain the two main factors driving changes in food security in Oceania.

e. Global challenges against food security

At the present day the debate over food security involves much speculation over the impossibility of feeding future generations. Usually one common wrong idea behind this assumption is that food systems have reached their top performing capacity that cannot be further expanded. Accordingly increasing food production can only be achieved at the expenses of the environment. While this may be true for over exploited food sources such global fisheries[70], evidences suggest that there are good possibilities to increase agricultural production in the future. Actually, the effects of economic globalization on the geography of global agriculture has given rise to type of another trade-off, between quality and quantity, namely ensuring the food security of the poor and meeting the ever growing food demand in rich countries and emerging economies.[71]

In the last decades agricultural intensification had been able to satisfy the increasing demand for food commodities. Agricultural intensification—defined as higher levels of inputs and increased output (in quantity or value) of cultivated or reared products per unit area and time—permitted the doubling of the world's food production from 1961 to 1996 with only a 10% increase in arable land globally.[72] Uncertainty exist on the fact that food products can satisfy both the demands coming from the poorest billion and the demand coming from richest at the same time. This is due to its numerous challenges for the environment and low opportunities for food security.

First, the current economic framework behind agricultural production is adapting to changing pattern of global demand, which now requests less staple crops and more expensive food commodities. On the demand side, urbanization, income growth in emerging economies, and the globalization of human diet are responsible for the massive uptake in the consumption of higher value commodities and the relating disregard for staple foods.[73] Widespread economic growth raised incomes transforming the pattern of aggregate demand. Emerging economies are now ready to spend a larger amount of their income for products that are rich in fats and sugars at the expenses of staple crops creating a large and dynamic market for high value commodities. These new patterns of food consumption has come to be known as the Westernization of the human diet – a diet in which fat provides about 30% of increase yields and reduce

[70] In 2010, 53% of fisheries were fully exploited , 28% were overexploited, 3% were depleted, and 1% were recovering from depletion. For more (http://www.fao.org/docrep/013/i1820e/i1820e01.pdf)

[71] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

[72] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

[73] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

transportation costs and create a strong competition for land between cropland, pastures and ecosystems.[74] This had generated a great return, further increasing the incentives for food production and causing more questions about the sustainability of this demand in the long run.

Second, as many studies illustrate, not every species of crop is in a positive relationship with food security, as a result a division exists between staple and non-staple crops. Staple crops are those that form the foundation of people's diets in a specific region, supporting heavily food security worldwide. For instance, staple crops are rice, grain, maize and potatoes. While non-staple crops are crops that usually form a smaller part of dietary intake supplying less energy and more fat to individual diet. Non-staple crop are typically coffee, cocoa and those vegetable that used to extract oil. Eventually, in the last decade the proportion of land used in favour of non-staple crops to staple crops has increased significantly because non- staple crops have varieties of utilizations other than human consumption such as animal feed and biofuels, chemicals and sometimes plastic that makes their cultivation largely profitable. For instance, the land dedicated to non-staple crops increased by 7.6 hectares in the decade between 2000 and 2010.[75] In this process, more costly and less nutrient crops (such as bananas, palm oil and coffee) had replaced other crops. In other words, as non-staple crops provide large economic returns, they can be preferred over staple crops reducing the amount of land available to the cultivation of foods that are at the base of regional diets for many of the world poorest people.

Third, the land available to food is also reduced for the cultivation of many crops that would be used to produce bioenergy further reducing global food availability. The use of grain, corn, maize, sugar cane soybean and other widely cultivated crops to produce bioenergy is becoming largely practiced. As an example, between 1980 and 2005, the amount of grain used to produce fuel ethanol in the United States gradually expanded from 1 million to 41 million tons.[76] The problem is that crops used in the biofuel industry are now subtracting large amounts of land that was previously used for the cultivation of crops for human consumption. The grain turned into ethanol in the United States in 2011 could have fed, at average world consumption levels, some 400 million people. This ability to convert cereals into energy means the price of crops is now more closely tied to the price of oil than ever before.[77] For instance, as the price of oil rises, it causes further incentives for farmers to sell their yields to the biofuel industry; as a result, the price of grain for human consumption will also increase with the risk of greater inaccessibility in the food market. These new trends in the use of food are mighty challenges for food security as they make food prices very dependent on the state of overall economy.

The last issue to be considered is that improved techniques of production linked to aggregate demand for staple crops, non-staple crops, biofuels and meat are having risky effects for the environment. Without a

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[74] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

[75] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

[76] "FULL PLANET, EMPTY PLATES", Brown, 2012.

[77] "FULL PLANET, EMPTY PLATES", Brown, 2012.

doubt, the possibility to feed nine billion people in the next century depends much on the health of our food systems. Overproduction of crops that are only economically advantageous causes farmed lands to reduce their productivity much faster than expected. As a result the trade-off between staple and non-staple crops involves a trade off between the economy on one side and environment and food security on the other. Indeed the substitution of staple crops with animal pastures not only is largely practised at the expenses of the poor but it also depletes ecosystems and reduces natural biodiversity with the risk of further and faster deterioration of food systems in the future. For example, it took just ten years (2000-2010) for palm oil production to double and it keeps increasing in food insecure countries of Asia, Africa and Latin America further damaging their productive environment, as valuable rainforest and peat lands have been replaced to make room for oil palms.[78] The same happens with soybeans, maize, rapeseed in many food insecure countries where the production of staple crop has little profitability.

In addition some worrisome data come from the meat industry which following a rapid expansion in demand has now large environmental impact. For example, deforestation in the Brazilian Amazon is, to a large extent, the result of the increased global demand for meat: directly, as land is cleared to make room for pastures, and indirectly, as this pasture is transformed to produce soybeans that are used in part as animal feed.[79]

To conclude, the trade-off between the lands used for the production of staple crops that will nourish large amounts of the poor or non-staple crops production directed to rich markets, bio energies or pastures is risky for the environment. As evidences suggest, food systems health is mostly dependent on the circumstances affecting the larger environment. New production techniques offered strong answers to fears of prolonged food crises helping food supply to grow in the last 20 years albeit with social and environmental costs. Further as an increasing number of studies suggest, the benefits deriving from increased production has not been fully translated yet in improved food security due to several reasons. Eventually with the growth of emerging economies a new pattern of demand had come about supported by rising national incomes increasing the demand for crops and foods that are poorly nutrient but rich in fats such as meat, chocolate, cocoa, coffee and oils. In addition to the growth in demand for this product, the use of cereals and other crops for the production of biofuels is widely practiced. As a result the price of grain and other food is increasingly linked to other factors than production or local availability bringing food security down in many parts of the world.

Ultimately, the use of staple and non-staple crops to satisfy the demand of rich markets and for animal feed and biofuels not only reduce the availability of many crops fundamental to the human diet but it is also damaging the environment causing deforestation and biodiversity loos. As it had happened in the past, food systems may suffer from this increased competition for land that causes environmental detriment as it can

[78] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

[79] Rueda and Eric F. Lambin, Evolving sphere of food security: Global Agriculture and Land Use changes in the Twenty-First Century

reduce their productive capacity in the long run. As evidences suggest there is much concern over the state of future food security and also because of the environmental impact of food industry.

Conclusion

Finally, de debate over food security has evolved profoundly in the last fifty years moving from exclusive concerns on food production and agriculture to include new issues. The FAO together with other bodies is leading the war on hunger providing accurate statistics and policy suggestion that link the very base of this problem to poverty and social injustice along with environmental depletion.

Nowadays anybody who wants to understand food security must investigate the very nature of this shift as well as acknowledge the well-defined theoretical framework of this definition. The dimensions of Availability, Accessibility, Use and Utilization and Stability provide a well functioning framework of study for anybody interested in this subject. These different dimensions of the same problem illustrate that different causes are reasons for different shortcomings of food distribution over time.

Another important feature of food security is access to water as it is proved by a large set of evidence. Anyway, sadly to say, there is no clearance about who should act against water insecurity. Except for humanitarian approaches, low economic effort had been sustained to unify under one common flag donor countries and vulnerable countries. As a result much progress can be made against water insecurity.

The problem to date is the lack of incentives for national governments to adopt agriculture, trade, and energy policies that could reduce global hunger. One viable incentive to reduce global hunger is to threat food security as a matter of security, even though there are many studies and papers relating security issues to food insecurity, the abovementioned drawbacks pose serious interrogatives over the relevancy of securities measure in the fight of against.

Nonetheless it is important also to acknowledge major progress made in the fight on global hunger. The PoU and CU5 indicators are depicting convergence for almost every part of the world, except Africa and Oceania. These results showing that when economic growth is translated into protective measures towards the internal market and local small holder, also food security improves consequently.

Finally, the trade-off between feeding the poorest billion and satisfying the demand for biofuels as well as the needs of rich markets can be too heavy to be sustained in the long run without the risk of causing never ending food shortages. Without a doubt, the order of priority should favour short-term crisis in the poorest regions then long-term environmental stability and lastly the demand of rich markets

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