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Hunger Solution: One-Dimensional and Multi-Dimensional Food Security Programs

Abstract. Addressing hunger requires many different programs to tackle this issue. These programs need to be organized in an effective way, and so far, no evidence exists of attempts made to categorize hunger solution programs. This study takes the first step in suggesting a new approach to hunger program categorization. The two categories suggested are one-dimensional hunger programs and multi-dimensional hunger programs**.** The first category emphasizes a solution focused on one channel of activity to address the hunger problem. The second category emphasizes that hunger is a complex, multi-dimensional problem that requires a multi-pronged solution, working simultaneously through several channels to address hunger. This study tests six food security programs, discusses each profile's working plans, and determines which category each program applies to. Categorization makes the study of hunger programs much easier and helps to identify similarity between proposes solutions. It has a practical side too. For example, it could serve as a basis for developing other new ideas for this issue or help to compare and determine effective programs or solutions. The two categories offered in this study for food security programs could also be easily applied to other hunger programs.

Keywords: categorization, classification, one-dimension, multi-dimension, food security

JEL Classification: Q18

Introduction

Global hunger solutions present different approaches and concepts to address the problem, with most efforts focusing on poor rural populations in developing countries. One well-known solution to reduce hunger is a food security program[2]. This concept, promoted by the Food and Agricultural Organization of the United Nations (FAO), is set out in the second Sustainable Development Goal (SDG 2). It explicitly aims to eradicate hunger, to achieve food security and improved nutrition, and to initiate sustainable agriculture by 2030 (Weingärtner, 2000).

The importance of food security is growing because the agricultural sector has been found to be about twice as effective in reducing poverty and hunger when compared to other sectors. Thus, the focus of hunger solution programs has been on developing food security solutions. These solutions for food security are presented in the research literature and usually recognized by the agency that promotes them. The fact that there are no classifications in this field is very surprising, since these days, the classification of information is found to be an important tool for many reasons (Hunter, 2000).

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[2] Food security - "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences in order to lead a healthy and active life." This definition gives greater emphasis to the multi-dimensional nature of food security and includes "the availability of food, access to food, biological utilization of food, and stability [of the other three dimensions over time]" (FAO, 2006). http://www.fao.org/3/a-ax736e.pdf.

So far, there is no evidence of any attempts to categorize food security programs. This article therefore takes a first step by presenting a new simple approach to categorizing and examining various hunger solution programs. It focuses mainly on food security solutions, but other hunger solution programs could easily find their place in one of the two different categories offered here.

This study will attempt to present two categories for food security programs. Firstly, the *one-dimensional food security program* emphasizes a focus on one channel of activity believed to eradicate hunger. Agricultural intervention in its different forms is considered to be a one-dimensional model, for example. Secondly, the *multi-dimensional food security program* highlights that hunger is a complex, multi-faceted problem that requires a multi-pronged solution. It works simultaneously through several channels to achieve food security. Such efforts may involve support for family farmers, school meal programs, better food access, and so on.

Demonstrating this simple categorized tool for food security, six different food security programs will be discussed as a case model, showing how each program's profile and action/working plans fit into each category. In order to promote the above idea (categorized food security solutions), this article discusses the following issues that are important to achieve this study's goal: (1) FAO food security history and the FAO's leading food security concept; (2) classification for food security solutions as an important tool for hunger programs; (3) the categorization of six different food security programs; and (4) summary and conclusion discussion of three issues.

The second issue points out two facts: (i) that no attempts have previously been made to categorize food security programs and (ii) that some programs have quite similar approaches and working plans. These emphasize the need for classification.

The four sub-issues related to issue (4) above are (i) the practical application aspect of classification in food security programs; (ii) some suggestions for how to improve this basic concept; (iii) an emphasis on how other hunger solution programs could easily find their way into one of the two different categories offered here.

Literature review

Food security

The concept of food security was first promoted by the FAO to fight the world hunger problem in developing countries. According to the World Development Report (WDR) of 2008, three out of four poor people in developing countries lived in rural areas in 2002 (WDR, 2008). Moreover, access to quality, nutritious food is fundamental to human existence and has a wide range of positive impacts, including economic growth and employment; poverty reduction; trade opportunities; increased global security and stability; and improved health and healthcare (Torero, 2014).

After World War I, world hunger grew in developing countries, but most efforts focused on people in European countries. Before World War II, the need for some form of multilateral global food security arrangement had already been recognized by the League of Nations (D. J. Shaw, 2007). This subject later re-emerged with the creation of the FAO. Following President Roosevelt's call for "freedom from want," the FAO defined freedom from want as "a secure,

an adequate, and a suitable supply of food for every man." Consequently, the main goal of the FAO between 1945 and 1970 was "to ensure humanity's freedom from hunger." Over the years, different bodies were established to help achieve world food security. Food security was defined in the 1974 World Food Summit as the "availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices." The essential elements of food security are the availability of food and the ability to acquire it (Shaw, 2007).

The concept of food security has taken on more significance with the worst global food crisis in modern times occurring at the beginning of the 1970s, which led to the UN World Food Conference of 1974. Actions taken on some of the more prominent resolutions include the international undertaking on world food security; an international grain reserve system; and an international emergency food reserve. In 1976, Edouard Saouma, the new FAO director-general from Lebanon, placed food security as the central focus of the FAO's work. The programs during this time included: the Food Security Assistance Scheme; the Special Action Program for the prevention of food losses; and the expansion of national and regional food-storage facilities. One of his most important steps, made in 1983, was revising the FAO's concept of world food security by adding a third pillar ("access to food by the poor") to the existing two pillars of "increased food production" and "stability of food supplies".

During the 1990s, a series of international conferences took place, mostly related to world food security. At the 2005 World Summit at the United Nations, world leaders reiterated their commitment to achieving the millennium goals as set out at the 2000 summit. This was an important turning point in understanding hunger as a global issue rather than as a local problem. Furthermore, the crisis of world hunger has brought a new response to such a massive problem, and it has resulted in the creation of the goal to end world hunger in its many different forms.

As the post-2015 development agenda reveals its nature, the international community has stepped up its determination to make certain that food and nutrition security lie at the center of the fresh development framework. Potential ways to combat hunger include food-based methods, but there are also other solutions with wider concepts to address the problem.

Classification and food security programs

The quest to take action against hunger and provide food security resulted in organizations coming up with different ways of tackling this issue. Not only did countries and organizations present different ideas—many offered programs with quite similar approaches and working plans. These programs present a great deal of information that needs to be organized in an effective way. It therefore seems reasonable to question whether these programs should be classified, but first we need to discuss the importance of classification for food security programs.

E. Hunter (2002) defined classification as the grouping together of similar things according to common qualities or characteristics. In the field of hunger problems, classification is mostly connected to an international standard for classifying the severity of food insecurity and disasters, which is called the Integrated Food Security Phase Classification. The existing food security phase classifications are:[3] Emergency, Warning,

[3] Existing Food Security Phase Classifications- http://www.fao.org/docrep/010/i0275e/i0275e.pdf

Watch, and No Alert (IPC Global Partners, 2008). Classification is a basic concept in many different fields, such as in biology and various fields of applied biology. In addition, classification plays a key role in the project management field. Moreover, classification is often used interchangeably with categorization. In fact, in the vast majority of different studies, these two terms are used in the same sense (Niknazar, Bourgault, 2017). This work builds on the existing work on classification and views classification and categorization as having the same meaning.

The importance of classification in the case of biology and other fields like project management could be easily translated to the field of hunger programs. Possible reasons for this could include making the study of hunger programs much easier; projecting a clear picture of all programs at a glance; and helping to clarify the basic concepts of the different programs offered in literature. Therefore, classification is a useful means to increase clarity and enhance the understanding of different issues. In addition, it could have practical applications, such as serving as a basis for the development of new ideas for this issue.

Different food security solutions/programs presented in the research literature are mostly recognized by the agencies that promote them, and one of the leading agencies in this field is the FAO. It has well-known programs for food security:[4] (1) the Special Program for Food Security (SPFS), which has a two-phase approach (FAO, 2008); (2) the twin-track approach (FAO, 2002); and (3) Zero Hunger, which is a broad, integrated strategy (FAO, 2011a).

Other leading programs for food security include the WFP's emergency-assistance program, which is built around different targets. It involves providing the right assistance to the right people at the right time and in the right way; working in close partnership with internal and external stakeholders; and finding a balance between speed and quality (WEP, 2018). The National Institute of Food and Agriculture (NIFA) also tries to address hunger and food security. Its programs are based on community food security, such as (1) the Community Food Projects Competitive Grant Program (CFPCGP) which has three topic areas, namely Community Food Projects, Training and Technical Assistance Projects (T&TA), and Planning Projects; and (2) the Crop Protection and Pest Management Program (CPPM), which supports projects that will increase food security and respond effectively to other major societal challenges (NIFA, 2017). The Canadian International Development Agency (CIDA) also has various programs that engage with global poverty and hunger reduction through international development. Its strategy is to achieve food security in developing countries, and its programs include meeting basic needs, finding sustainable solutions, and encouraging innovation (CIDA, 2013). It can be noted that the basic concepts behind these programs are very similar, and they have a common working plan, such as promoting agricultural and rural development; providing direct, immediate food aid to fight hunger; and supplying agricultural training.

One-dimensional and multi-dimensional programs

The various dimensions of hunger have attracted different solutions from various organizations and agencies, resulting in numerous approaches to eradicate hunger. Two basic approaches can be distinguished in those hunger solutions. The first is based on the

[4] This will be discussed later as a test case.

assumption that food deficiency is the main cause of hunger in developing countries. The second approach is based on the assumption that world hunger comes from an inability to get food to those who need it. This work refers to the first approach as a one-dimensional hunger solution model, which emphasizes a focus on one channel of activity to eradicate hunger. The second concept is the multi-dimensional hunger solution model, which sees hunger as a complex, multi-faceted problem that requires a multi-pronged solution**.** It therefore works simultaneously through several channels of activities related to hunger. These two categories are applied to six examples.

One-dimensional Hunger Programs: Food subsidies, Food Aid, Sustainable Agriculture

Food Subsidies: Agricultural input subsidies were mainly applied in African agriculture after the 2008 global food prices crisis, when many countries witnessed severe food shortages and civil riots. The debate about subsidies has since shifted toward how to improve the efficiency and effectiveness of using them. Therefore, the core concern is the design and implementation of smart subsidies (targeted subsidies).

Food subsidy programs in developing countries have different objectives, including improving the real purchasing power and nutritional status of the poor. They also take many forms, such as being directly financed by government or indirectly supported through fiscal or exchange rate policy, and they are generally applied and targeted to specific population groups (Shaw, 2007). Five major subsidy programs were implemented by different African governments with the overarching goal of increasing agricultural output and productivity. These included subsidizing agricultural mechanization services through support for the establishment and operation of Agricultural Mechanization Service Centers (AMSECs); subsidizing fertilizers through a national fertilizer subsidy program (FSP); establishing and managing block farms that benefit from subsidized mechanization services, inputs (fertilizers, improved seed, and pesticides), and extension services; and stabilizing output prices through the establishment and operation of a national food buffer stock company (NAFCO) (Benin et al., 2013).

Targeted subsidies demonstrate a one-dimension character, as the solution focuses on one channel of activity, which in this case is various agricultural efforts, such as farm-support subsidies for agricultural output and productivity; the subsidization of agricultural mechanization services; the subsidization of fertilizers; and the establishment and operation of the national food buffer stock company.

Food Aid: Food aid has long been one of the many responses to global hunger and food security. Food aid provides immediate relief to countries with a food security problem (Murphy, McAfee, 2005). It includes all forms of food-support interventions to abate food insecurity in any country. Modern food aid began in the USA with the passage of United States Public Law 480 (PL 480) in 1954 (Awokuse, 2011).

Under the broad heading of food aid, the World Food Program (WFP) recognizes three categories of aid based on the different ways in which the aid is meant to contribute to food security: (i) program food aid, (ii) project food aid, and (iii) emergency food aid. Program food aid involves the transfer of food from one country to another as a form of economic support. Project (targeted) food aid is provided on a grant basis for hunger-related development, disaster relief, or nutrition programs, mainly by the WFP or through non-

government organizations (NGOs). Examples of project food aid include food for work (FFW), food for training (FFT), and school meal programs. Emergency food aid is intended for the direct, free distribution of food to people facing famine or an acute food shortage as a result of natural or human-made disasters. Food aid is also categorized by the way the food is sourced. This occurs in three ways: direct, triangular, and local transfers. Direct transfers involve food aid donations that originate in the donor country, while triangular transfers describe the purchase of food aid from one country (not the donor's) for use as in another country. Local transfers, meanwhile, refer to the procurement of food in the recipient country (Murphy, McAfee, 2005; Awokuse, 2011; FAO, 2002).

It is clear that food aid programs are clearly fulfilling the one-dimensional program criterion by only providing food assistance, albeit in different forms.

Sustainable Agriculture: Opinions about how to improve global food security tend to focus solely on increasing food production. Linking sustainable agriculture with food security mainly concerns the rural poor in developing countries. Different organizations—such as the International Food Policy Research Institute (IFPRI), the World Bank, and the FAO – have concluded that food production will have to increase substantially over the next few decades to feed an increasing global population, and the sustainable intensification of agriculture offers significant opportunities to improve food production (Pretty, 2007; Clarke, 2006). Sustainable agriculture is multi-functional within landscapes and economies. It produces food and other goods for farm families and markets, but it also contributes to a range of public benefits, such as clean water, wildlife, carbon sequestration in soils, and flood protection (Pretty, 1999).

A number of organizational and national bodies are currently promoting sustainable agriculture in its various aspects. The most prominent organizations dealing with this issue are the FAO, the Committee on Agriculture (COAG), and the National Sustainable Agriculture Coalition (NSAC) (United Nations, 2017).

Applying sustainable agriculture to the various aspects of food production means that there is a focus on the current and future needs of farmers. Even though sustainable agriculture's strategy and policy addresses multiple dimensions of agriculture, it is categorized as a one-dimensional food security program.

Multi-Dimensional Hunger Programs: Zero Hunger and the FAO's Twin-track and SPFS

Zero Hunger Program: The Zero Hunger Program is a Brazilian program to reduce hunger in the country. Its basic concept is that the hunger problem derives from insufficient income to buy food on an ongoing basis in sufficient quantity and quality. In Brazil, the paradox is that millions of families do not have enough food in a country where food is plentiful. The hunger problem in Brazil has been found to be difficult to tackle through compensatory policies based on food donations alone, as has been the case traditionally (FAO, 2011b)[5,6].

In January 2003, the Zero Hunger Program (Fome Zero) was launched by the Brazilian Federal Government with the aim of ensuring food security to all Brazilians. This

[5] As well in other part of the world with the same hunger problem.
[6] For example, donations of food baskets.

program's strategy involves four lines of action: (i) access to food; (ii) a strengthening of family farming; (iii) income generation; and (iv) social empowerment, mobilization, and oversight. In practical terms, the Zero Hunger Program, consists of a set of over 30 complementary programs designed to fight the immediate and underlying causes of hunger and food insecurity. Thus, this program involves three simultaneous courses of action: an expansion in the actual demand for food; measures to lower food prices; and emergency programs to assist the portion of the population excluded from the market (FAO, 2011b).

The Zero Hunger Program emphasizes its multi-faceted strategy for simultaneous action, including improved access to food, a strengthening of family farming, enhanced income generation, and articulation, mobilization, and social control. Therefore, the Zero Hunger Program demonstrates how a multi-dimensional program can be effective through multiple levels of simultaneous actions.

The FAO's Food Security programs: The FAO has supported a variety of programs and measures to strengthen food security. Two different approaches used by FAO include the direct and indirect approaches to achieving food security. In the direct approach, the FAO sets out the key principles to achieve food security goals, and the participating country needs to comply with them. The FAO's set of rules for achieving food security are based on the following four pillars: availability, access, stability, and utilization. The FAO's twin-track food security program presents such an approach (discussed below). In the indirect concept, meanwhile, countries that join a program formulate their own national food security strategies within a framework provided by the FAO's special program. This program links the FAO's field of activity around the program with the key objective of food security. The FAO's Special Program for Food Security (SPFS) presents such an approach (also discussed below).

The FAO's twin-track program: The goal of achieving food security for all is at the heart of the FAO's work, as demonstrated in the World Food Summit (1996). To achieve food security, all its four pillars (as mentioned above) must be fulfilled simultaneously. To make this a reality, the FAO developed the twin-track approach as a conceptual framework (FAO, 2011a).

The twin-track approach builds on the fact that hunger is both a result and a cause of poverty. The first track creates opportunities for the hungry to improve their livelihoods by promoting development, particularly agricultural and rural development, through policy reform and investments in agriculture. The second track involves direct and immediate action to fight hunger. Its leading programs improve the immediate access to food by the hungry, thus increasing their productive potential and allowing them to take advantage of the opportunities offered by development. Both tracks are intended to be mutually reinforcing, and the positive interaction between them leads to achieving food security. The FAO also recognizes the relevance of good governance for increasing food security. Good governance is underpinned by principles such as efficiency and effectiveness, responsiveness, accountability, and transparency (FAO, 2011a; FAO, 2006).

The FAO's twin-track program is clearly a multi-dimensional program, with its core elements including the promotion of rural development and productivity enhancement, better income-earning opportunities, and good governance.

The FAO's Special Program for Food Security (SPFS): The motivation for this program came from the FAO's (2008) study, which pointed out that the main problem of food security is the growing world population, especially in developing countries. It found that well-targeted actions are needed to improve food security. This study also highlighted

that chronic undernutrition and food insecurity are principally the results of: (a) low agricultural productivity, often resulting from flawed policies or technological and institutional limits; (b) seasonal influences on food supplies, often resulting from variations in rainfall and a general lack of water for agricultural activities; and (c) a lack of working opportunities outside farms, which in turn leads to lower, more uncertain income levels in rural and urban settings. Therefore, the FAO's SPFS aims to improve nations' food security through rapid increases in food productivity and improved access to food (Dooley, 2004; FAO, 2008; FAO, 2011).

A unique concept in the SPFS program is its special program management, where each government is responsible for the actual design and implementation of its own program. The SPFS includes at its core the objectives of increasing farmers' net incomes, raising employment in rural areas, and promoting social equity. More specifically, it also seeks to (i) improve the management practices and technology of farmers; (ii) help smallholders to share better farming methods; and (iii) implement policy reforms that will relieve any bureaucratic constraints and promote conditions that are more conductive to greater off-farm employment, increased farm incomes, and higher food production (FAO, 2008).

The SPFS's key principles present different leading subjects conducive to achieving political, social, economic, and agricultural growth, such as adopting appropriate policies and regulations; providing training, extension, and information services; and investing in research, roads, and irrigation. In addition, it involves increasing the production of staple food crops while protecting natural resources and biological diversity. All these demonstrate SPFS' multi-dimensional character.

Summary and Conclusion

Categorization/classification is a basic tool in various research areas, such as biology and project management. Classification is of a great importance, and it is a useful way to increase clarity and enhance understanding about different subjects. It also has the potential for use in practical applications. Examining the literature related to different solutions for the global hunger problem revealed no evidence of any attempts to categorize hunger solution programs, or in our case, food security programs. Moreover, the similarity in the approaches and working plans of various programs indicated a need for classification. Most hunger solution programs presented in the research literature are recognized by the agencies promoting them. This study takes a first step by presenting a new simple approach for categorizing and examining various hunger solution programs. More specifically, this study presented two simple categories: one-dimensional and multi-dimensional programs. Six food security programs were used as test cases, and the results are presented in Table 1.

Table 1 shows a clear picture of all the programs at a glance, and it helps in understanding the basic concepts underpinning each program. Such presentation could make the study of hunger programs much easier, as well as help identify which programs offer similar solutions. Classification has practical applications as well. For example, it could serve as a basis for developing new hunger solutions, leading to new insights and promoting more new hunger solutions. In addition, it could be used as a tool to compare solutions and identify the most effective program or solution for the hunger problem in developing countries. In other words, classification could be an effective tool for tracking and analyzing different countries' progress and achievements over time under different

categories and policies, namely one-dimensional and multi-dimensional programs. Thus, it can act as a tool to create more economically effective solutions for the hunger problem in developing countries, where billions of dollars are invested in various solutions. This study's model for categorizing food security programs could be easily applied to other hunger programs, such as the United States' Agency for International Development (USAID); The Hunger Project; Food for the Hungry; Community Alliance with Family Farmers (CAFF); and Freedom from Hunger.

Table 1. One-dimensional and Multi-dimensional programs

Program	Concept	Working plan				
		Various agricultural development efforts	Food aid/ cash	Farming skills	Social/ government involvement	Addresses disaster
One-dimensional programs	Food deficiency issue					
1. Food subsidies		X				
2. Food aid			X			
3. Sustainable agriculture		X				
Multi-dimensional programs	Inability to get food					
1. Zero Hunger		X	X	X	X	
2. FAO's Twin-Track		X	X		X	X
3. FAO SPFS		X		X	X	

Source: Author's own elaboration.

Suggestions for further research include looking at how many hunger solutions/programs have been implemented in the twenty-first century, worldwide. Extending this research and categorizing all of these different programs may revel new insights into the factors addressed by each program. Such research could lead to new conclusions about future programs' suitability for specific goals, populations, and times.

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