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The Promise of Education and Food Security in East Africa

According to the International Fund for Agricultural Development, every 3.6 seconds a person dies of starvation. This finding illustrates the alarming state of malnutrition in the world today, and the frightening truths of poverty and hunger are most evident in the developing regions of Africa, where more than forty percent of the people are unable to obtain sufficient food on a daily basis (IFAD).

There is a multitude of factors leading to food insecurity, including limited availability of arable land; inadequate water supply and other environmental disasters; diseases; conflicts; and insufficient tools and infrastructure for successful agricultural production and transportation. In rural, developing regions, family farmers, who have limited resources to support a large proportion of the population, dominate agricultural production. Thus, the availability of education to family farmers of agricultural research and technologies is crucial to ensuring sustainable food supply.

The acquisition of education allows people to address societal issues, such as hunger, through innovation and the creation of technology. Technological and economic developments stimulate growth in countries, helping reduce the threat of hunger amongst populations. Therefore, increased emphasis on education and specialized knowledge fuels economic and societal progress. However, poverty and hunger, two closely interrelated problems, continue to remain prevalent across the globe. The promotion of education to ensure a stable food supply and means of food production and acquisition is crucial in alleviating poverty and hunger, and operations promoting education and the eradication of hunger must continue and expand in the future.

Before delineating solutions of alleviating widespread poverty in East Africa and strengthening food security, it is important to examine the peoples' way of life. In East African countries, there is a cultural emphasis on large families. According to the United States Agency for International Development (USAID), the average family size in Ethiopia averages about six children. Women generally marry early, around the age of sixteen, and thus they begin to have children at an earlier age, which is one factor in large family size (USAID). In contrast, in Kenya, the average number of children in the family has dropped to around four from around eight throughout the last two decades (NOVA). Kenya's national family-planning programs and promotion of contraceptive use have helped reduce the average Kenyan family size (NOVA).

Another factor limiting family size in East African countries is the availability of food. Shortages of food sources lead to higher mortality rates and may discourage individuals from having numerous children whom they would not be able to feed sufficiently. Maize and vegetables comprise an important part of East Africans' diet and are used in cooking foods such as ugali and matoke that are eaten with meats and stews (World Book Online Reference Center).

Low income and poor living standards are another aspect of lifestyle in East Africa. According to the International Fund for Agricultural Development, about 52% percent of the Kenyan population and 45.4% of the Ethiopian population live below the national poverty line. These statistics indicate the widespread poverty afflicting the people of East Africa. East African

countries are among the poorest in the world, and large percentages of populations living below the poverty line hinder advances in economic development.

A good sign for economic and social development, however, is the improved percentage of literate adults in countries such as Kenya (84.3%) and Tanzania (IFAD). The expansion of programs educating the youth of these countries is crucial in addressing the problems of poverty and hunger. While lack of education engenders a state of poverty, poverty itself in developing countries and rural areas hinders the advancement of education. Poverty forces families to employ children at home and in the fields to provide income for the family (Ahmed 12-13). Impoverished families, in many cases, cannot pay the costs for sending their children to school, and the necessity of earning income for the survival of the family discourages families from educating their children.

However, when these children are not educated, they face the same impoverished economic condition and struggle for food supplies when they are older (Ahmed 12-13). As adults, they lack the knowledge and skills to apply to the creation of technology or in a variety of fields of work. Goklany of the CATO Institute asserts that education closely relates to increased food production and food access, a relationship that also intersects with the relationship between good health and greater wealth (5). Both of these relationships promote progress, promoting economic growth and technological change. If people lack the education that allows them to gain sufficient income and obtain food for survival, the state of poverty and hunger can only worsen. Thus, the programs educating youth in East African countries should expand as a way to address current and future food insecurity.

While education of youth is valuable, the most important factor in increasing food production in East African countries is emphasis upon family farmers. Rural farmers comprise the majority of East African populations. Agriculture is a main source of livelihood for eight out of ten Ethiopians (IFAD). Arable land is necessary for increased agricultural production, and thus, limited availability of fertile land is a major hindrance in guaranteeing adequate food production. Joseph Kinyua, Permanent Secretary of the Ministry of Agriculture in Kenya, explains in his April 1, 2004 report, "Towards Achieving Food Security in Kenya," that small-scale farmers account for 75% of total agricultural production, allowing them to dominate Kenya's agriculture (1). Mr. Kinyua states that "small-scale farmers produce over 70% of maize, 65% of coffee, 50% of tea, 90% of sugar, 80% of milk, 85% of fish, and 70% of beef and related products" on small land holdings of two to three hectares (1).

Because small-scale farmers are vital to food production in Kenya and other East African countries, ensuring their access to markets and ability to export products is vital in increasing agricultural productivity. Peter Hazell, Director of the Development Strategy and Governance Division of the International Food Policy Research Institute, asserts the importance of this claim. Hazell states that "farmers need access to land and labor, appropriate technology, and key inputs like seed and fertilizer, credit, and knowledge" to increase farm production, the first part of a marketing chain (1-2). Hazell explains that "infrastructure and transport systems, market information, and quality and safety standards" are some of the main requirements to provide farmers a means of retailing and exporting food products (1-2). While Kinyua explains that small-scale farmers account for 70% of agricultural output, Hazell states that market chains for Africa's domestic and intraregional trade are struggling because small-scale farmers do not have access to the above-described resources to be able to compete with subsidized imports from foreign countries (1-2). Without access to resources enabling market success, farmers do not have the money or the incentive to produce.

However, farmers' limited access to land, infrastructure, and technology is not the only barrier to improving food and nutrition security. Factors, such as civil conflict; natural disasters; gender inequality in societal roles; diseases; and poverty-related factors such as income and lack of education, also play major roles in limiting food security in Eastern Africa. Graça Machel, President of the Foundation for Community Development in Mozambique and former Expert of the Secretary General of the United Nations on the Impact of Armed Conflict on Children, explains that civil strife is a major cause of food insecurity in East African countries such as Burundi, Eritrea, Somalia, and Uganda (2-6). Many of the conflicts stem from ethnic rivalries and environmental scarcities and concerns, such as drought and famine, deforestation, and the inequitable distribution of natural resources (Machel 2-6).

In an excerpt from the International Food Policy Research Institute's 2020 Africa Conference Brief 10, titled "Breaking the Links Between Conflict and Hunger in Africa," Messer and Cohen outline the direct relation between conflict and food insecurity. They state that conflict "depresses production and income from cash crops and livestock," which subsequently leads to a reduction in food security and strains the livelihoods of those who rely on agriculture to survive (7). According to the Food and Agriculture Organization of the United Nations, conflict cost Africa over \$120 billion worth of agricultural production during the last third of the 20th century (quoted by Messer and Cohen 7). This loss in agricultural production and the destruction of markets in conflict-ridden areas are devastating, compounded with insufficient funding for health, education, and nutrition programs relative to military spending (Messer and Cohen 7). The refugees and internally displaced people arising from civil strife lose their land and possessions, as well as the strength and capacity to work, further limiting food security and people's access to already scarce resources (Machel 2-6).

Wilberforce Kisamba-Mugerwa, Minister of Agriculture, Animal Industry, and Fisheries of the Republic of Uganda, states that countries' failure to establish sustainable food production for populations is due to drought in many instances (4-5). In East African countries, such as Madagascar, Mozambique, Ethiopia, Kenya, Tanzania, Somalia, and Uganda, droughts in parts of the country play a role in food insecurity (Machel 2-6). In Uganda, for example, if the rains stop for three weeks, all the crops that people have planted fail (Kisamba-Mugerwa 4-5). Chronic drought, along with livestock diseases, and animal and crop pests, makes these arid and semi-arid lands vulnerable to food insecurity (Kinyua 1-2).

Food insecurity is also due in part to inequalities in societal gender roles. Asha-Rose Migiro, Member of Parliament and Minister of Community Development, Women, and Children in Tanzania, explains that in East African countries such as Tanzania, women have disadvantaged social roles (1-2). Although women perform most of the agricultural work for the family, the men appropriate income gained from farming, which gives women little power and endangers food security (Migiro 1-2). Women in East Africa tend to carry a heavy workload, caring and preparing food in addition to participating in agricultural activities to provide for the family (Migiro 1-2). This workload naturally becomes heavier and burdensome when resources such as water and wood are scarce.

Another aspect of East African society is the large population infected with diseases. HIV and AIDS inflict countless individuals in these countries. HIV/AIDS is most common among the young and middle-aged Kenyans who are the most productive individuals of society, leading to the death of seven hundred Kenyans each day (IFAD). Security and development in East African countries are threatened by the weakness and deaths of so many productive workers of society, because widows and orphans become even more vulnerable to poverty and food insecurity. A

BBC article describes how every fifteen seconds a child dies from illness due to unsafe water or inadequate access to water, citing that seventy percent of Tanzania's population has no access to protected water sources. Water-borne diseases and lack of sanitation lead to higher death rates amongst populations. A number of other diseases, such as malaria, are widespread throughout Africa. In Mozambique, nine out of ten children younger the age of five are infected with malaria (TIME). The burdens brought about by diseases also strain the livelihoods of the East African people, increasing their weakness and vulnerability to food insecurity.

Education of family farmers is necessary to reverse these factors that lead to reduced agricultural production and food insecurity. Educating farmers about results from agricultural and sustainability research and providing them the technical and financial support to implement methods from this research is crucial in increasing agricultural productivity. Currently, agricultural productivity is falling in East African countries. According to the New Partnership for Africa's Development (NEPAD), a program associated with the Food and Agriculture Organization of the United Nations (FAO), agricultural yields have been level or falling for food grains and legumes, such as maize, millet, sorghum, yams, and groundnuts (peanuts) due to insufficient investment in factors that contribute to agricultural productivity and efficient use of resources. Thus, investment in agricultural research and implementation of effective farming methods would help to increase agricultural productivity and allow African farmers to generate income by becoming successful in market.

Research is justified by its high returns, as a study in Africa carried out by the New Partnership for Africa's Development found that each dollar spent on agricultural research on maize, sorghum, potatoes, beans, wheat and cowpeas, for example, has generated returns ranging from 16 percent to 135 percent. Research generates ideas of more effective farming practices, and farmers must be educated of these new practices in order to increase agricultural yields. Kankonde Mukadi, a Professor at Protestant University of the Congo in Democratic Republic of Congo, addresses the importance and necessity of ongoing agricultural research in achieving food security. Mr. Makudi explains that African governments should allocate a certain percentage of their national budgets to fund agricultural research, in order to investigate farming techniques that could increase agricultural output (2-3). These techniques include agroforestry and crop rotation, to improve soil fertility; domestication of wild animals and plant species; water management; and development of technologies to process and store family farmers' products (Makudi 2-3).

There are many methods for improving environment and increasing agricultural productivity. Jeffrey Sachs, Director of the UN Millennium Project, states that African farmers would be able to triple their crop yields if they had soil nutrients through fertilizers and agroforestry. Recent studies have shown that irrigated agriculture provides forty percent of the world's food production from seventeen percent of the cultivated area, and yields on irrigated land are often two to three times those of lands that are not irrigated (Migiro 1-2). Norman Borlaug, President of the Sasakawa Africa Association and a Nobel Peace Prize Laureate, states that farmers should use technologies, such as drip irrigation and the capture of water in ponds, to collect water to grow enough food in areas with little rainfall (10-14). Mr. Borlaug recommends the establishment of food-for-work types of operations that would employ food-insecure farmers in operations to improve the environment, such as the "planting of trees and grass, forest technology, and agroforestry" to prevent erosion (10-14). Agricultural research results in a variety of methods of increasing food production, and family farmers can use these techniques to augment agricultural productivity.

Another vital result of agricultural research is the harvesting of crops that can withstand drought conditions, can enrich soil with nutrients, and provide important nutritional benefits to people. Mr. Borlaug describes a type of maize called quality protein maize (QPM), that is particularly important to people who have little or no milk and meat to consume, because the maize has protein quality similar to that of skimmed milk (10-14). Quality protein maize varieties and hybrids are grown in East African countries as well, including Uganda, Ethiopia, and Malawi (Borlaug 10-14). This is one example of how harvesting of hybrid and new varieties of crops can be very useful in helping to increase food security in East African countries.

The researchers of the International Crops Research Institute of Semi-Arid Tropics (ICRISAT) have found that small family farmers with no irrigation and no other inputs other than land and labor can grow groundnut (peanut) crops, which is beneficial in arid and semi-arid lands. Another crop known as pigeonpea provides many benefits to people who live in areas prone to drought, because not only do the crop's deep roots allow for conservation and storage of water and nutrients, but also the crop has protein-rich seeds; can improve soil fertility and prevent erosion; and can be used for fuel, fodder, and fencing material (ICRISAT). The chickpea crop can survive in the harshest East African conditions because it is drought resistant and is valuable to the people because it can enrich soil with nutrients through nitrogen fixation with bacteria and can provide protein, phosphorus, and calcium in people's diets (ICRISAT).

When organizations and research institutes, such as the International Crops Research Institute of Semi-Arid Tropics and the Sasakawa Africa Association, find new crops that can survive in the harsh environmental conditions of East Africa and can enrich the soil and provide essential nutrients for humans, then farmers should be educated of these findings and methods of farming. Organizations that conduct research should expand to provide farmers a means of implementing the innovative methods that are discovered, so that knowledge is not contained, but utilized to benefit the people.

When farmers are educated of agricultural research, they can apply the knowledge to implement the effective farming methods to increase food production. Because most farmers in the largely rural, East African countries have little financial support to implement new farming methods and technologies, organizations such as the United Nations, World Bank, and private organizations should invest in programs to financially support the farmers and provide the technologies and infrastructure to enact efficient agricultural methods. Then only will farmers have the incentive to apply the methods found from agricultural research, which will ultimately lead to higher agricultural productivity.

Income generated from increased agricultural productivity would stimulate growth, because farmers would have the financial resources to invest in technologies, hired labor, and more efficient farming practices that would increase agricultural productivity on farms. Agricultural productivity would also stimulate a growth of jobs in industries related to food, which would further develop agriculture and increase production (von Braun 7-8). Growth in agricultural productivity would lead to the growth of the countries' economies, because family farmers could also invest income generated through increased agricultural productivity in other goods and services. Not only would agricultural productivity stimulate economic development, but also improve living standards. Goklany of the CATO Institute asserts that education is a powerful driving force, leading to not only the advancement in technology, but also the spread of knowledge of sanitation, safe drinking water, and nutrition (4). Goklany argues that education is vital for improving overall health and living status. Thus agricultural productivity, resulting from the education of farmers of agricultural research and use of enhanced farming methods, would

stimulate a growth in food production, an increase in income and reduction of poverty, and a promotion of a healthier way of life.

As the international community assists in providing family farmers research, education, and financial support for family farmers, national governments of the East African countries themselves must reform to become more accountable for the livelihoods of their citizens. Machel, former Expert of the Secretary General of the United Nations on the Impact of Armed Conflict on Children, explains that governments must have transparency in decision-making, because citizens, and foremost the women, children, and rural populations that form the majority, are not aware of the governments' decisions and as a result are powerless to bring about change. By increasing participation and representation in government through the promotion of democratic ideals, East African countries' governments would be held accountable for ensuring the needs and rights of their citizens. These governments should ensure the safety of their people by regulating arms trafficking and reducing military spending for conflicts, and instead invest in education, healthcare, and nutrition to improve citizens' living standards. Ensuring food security and improving the lives of East Africans lies in the joint effort of the international community and country governments.

Education of family farmers presents an effective solution when looking ahead to creating sustainable paths toward food and nutrition security. The international community provides immediate food aid to East African countries facing widespread hunger and starvation. However, food aid is merely a short-term solution to the problems of poverty and malnutrition. Educating family farmers themselves and empowering them with the knowledge and the tools for producing healthier and plentiful food is an effective long-term solution, one that will allow farmers to engender economic and social developments to improve their societies. There are so many barriers to improving food and nutrition security, but the wise investment of resources in education and development of research and technology can transform the futures of East Africans—an undertaking that will require the focus and unification of all.

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Existing vulnerabilities in Africa's agricultural and food systems, combined with demand and supply shocks likely to flow from COVID-19, could be heightened unless mitigating actions are taken now. In the pages that follow, we evaluate the potential shocks to African demand for food products, trade in African export crops, and African agricultural and food production. Moreover, in East and West Africa, major planting seasons had largely begun before COVID-19 escalated, and agricultural inputs had already been distributed. These effects have helped to ensure that Africa's agricultural and food systems are largely still functioning, with minimal disruptions in the crisis to date. Nevertheless, the Middle East and North Africa (MENA) region remains one of the areas most vulnerable to a food crisis. MENA countries are among the world's largest food importers: Most depend on imports for over half their needs. This is also the world's most The issue for the region is not food availability, whose numbers are sufficient and stable since 1999-2001. Access to food is the challenge. In 2019, the U.N. Food and Agriculture Organization noted that hunger had risen since 2011 due to conflict and protracted crisis. Some 52 million people in the region were chronically undernourished of which 34 million were in conflict-affected countries. The worst afflicted are Syria and Yemen, although Lebanon and Libya also face a crisis in food security. Food security in Africa Summary Part 1: Africa's position in the world The world needs more food Learning from others: the Brazilian experience The resource pivot: from oil to agriculture Hubs, corridors and islands of competence A once-in-a-lifetime opportunity Part 2: Challenges Population growth, urbanisation and income growth Shortage of land Shortage of water Yield growth potential Climate change. National food security Part 3: Country focus Nigeria Angola Kenya Tanzania Ghana Zambia Mozambique Zimbabwe Sierra Leone. 3 3 6 6 9 10 12 15 16 16 19 21 22 25 26 28 29 36 40 44 48 52 58 62 66. F...