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Improving agriculture and food security in Africa: Can the one health approach be the answer?

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Abstract

The menace of food insecurity precipitated by climate change, zoonotic diseases and natural disasters poses a great threat to the sub-Saharan African region. Promoting food security and sustainable food systems is a priority for enhancing development in Africa. Holistic techniques such as *one health* approach recognises the linkages between the health of people, animals and the environment, and foster collaboration among various disciplines and stakeholders to address complex challenges. This review explored one health as a holistic approach in contributing to improved food security and sustainable food systems in African agriculture. Reviewed studies provided ample evidences demonstrating the robustness of one health approach as a multidisciplinary approach capable of increasing food production while enhancing health and environmental sustainability. The one health approach is not without challenges, however its capacity to encompass education and capacity building, policy formulation and execution, funding, advocacy and collaborations among multiple disciplines, makes it a veritable tool to improving food security and food systems in Africa. Achieving the balance between food production, food security, healthy living, and sustainable utilisation of natural resources in providing for the existing population while preserving the benefits for future generations hinges on integrative actions such as one health approach.

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Introduction

Agriculture is at the forefront of providing requisite solutions to food insecurity and alleviating global hunger and malnutrition. The demand for dairy and meat products, fruits and nuts, vegetables and staple foods continues to increase in developing countries owing to their increasing population and low standard of living (FAO, 2017b). The Food and Agriculture Organisation (FAO) proposed that about 50% increase in agricultural investments is expected by 2050, to allow for a sufficient supply of food for about 9.2 billion people (FAO, 2017b). Therefore, agricultural production must be intensified to meet up with increasing demand and to achieve food security, whilst ensuring the sustenance of the animal-human-ecosystem interface. The sub-Saharan African (SSA) countries are not left out in solving this puzzle; Tanzania and Zambia proposed Vision 2025 and Vision 2030 respectively, which are targeted at providing sustainable solutions to food security challenges through enhanced dietary diversification and household income (Alders et al., 2014). In most African communities, livestock plays a major role in daily livelihood, and households closely interact with their animals in various ways, including shared housing and routine husbandry practices (e.g., herding, milking, and deworming). Despite the key role of livestock in the livelihood of the populace in SSA, there is a high risk of transmission of zoonotic pathogens and diseases between animals and humans, due to the close human-animal interface, predisposing them to infectious diseases (Munyua et al., 2019). There is no gain in saying that the increased demand for food has put pressure on our natural resources culminating in environmental degradation, pollution, and loss of landscape, masking the goal of sustainable food production. Thus, zoonotic diseases, climatic change, and natural disasters are the biggest threats to

food security in developing countries particularly, SSA (FAO, 2015).

The outbreak of zoonotic diseases is often a huge threat to the health and safety of humans, animals, as well as the ecosystem. The epidemiology and transmission rate of various infectious diseases to a great extent negatively impacts food security, economic trade, public health, and society at large (Shurson et al., 2022; Rizzo et al., 2021). For instance, African Swine Fever (ASF) has about a 100% fatality rate (FAO, 2019). Natural disasters could pose favorable conditions for the multiplication of pathogens, along with the contamination of soil, water, and the environment with heavy metals (Wu et al., 2017; Andrade et al., 2018). Natural disasters such as floods, earthquakes, hurricanes, and wildfires disrupt the agricultural mechanism for food production, utilization as well as access to food. Climate change variability has led to sharp declines in crop yield, and the emergence of novel pest and diseases, increasing food safety and food supply chain constraints (Hammond et al., 2015). There is an interrelationship among these variables (zoonotic disease, climate change, and natural disasters), with multiplier effects that exceed the destruction of crops and livestock, loss of soil biodiversity, multiplication of pathogens, deteriorating the health of crops, animals, and humans (MacLachlan et al., 2018). Developing countries including SSA countries are mostly susceptible to natural disasters and the attendant economic impact. A ten-year research (2003-2013) by FAO investigating the impact of natural disasters demonstrated that an estimated 25% of disaster-related losses were traced to the agricultural sector, which negatively impacted agricultural commerce, agricultural-related employment, and inflated food prices, culminating to food insecurity (FAO, 2015). The impacts of climate change have also been associated with the devastating effects of diseases and natural disasters on the agricultural sector, this has resulted in severe implications for food security, the livelihood of the people, and the global economy. It is pertinent to safeguard public health and agricultural production from these negative variables (diseases, natural disasters, climate change).

Poverty alleviation and food security are anchored on sustainable agricultural production, which demands an integrative and inclusive approach, such as, the *one health* approach. Adoption of one health approach does not only focus on the prevention and control of emerging infectious diseases but it supports environmentally friendly practices that would promote food production. There is the need to adopt a multi-disciplinary approach that will engage researchers, governments, and industries in solving these problems. The essence of targeting one health as a multi-disciplinary approach is because, it is a machinery that can increase sustainable practices that will boost agricultural production, while ensuring the health and welfare of humans, animals, and the ecosystem. The establishment of one health initiatives by various countries and organizations such as the FAO, United States Center for Disease Control (CDC), One Health European Joint Programme (OHEJP), and World Health Organization (WHO) lends supportive evidence to the critical value of this approach for food security (FAO, 2011). The review highlights one health approach as a timely and strategic approach for addressing the multi-faceted challenges of African Agriculture towards improving food security and food systems in Africa. In this review, we discussed the challenges of agricultural production and food insecurity in Africa, integration of one health approach in African agriculture, and underlying concerns towards one health adoption in African agriculture.

The challenges of agricultural production and food insecurity in Africa

By 2050, the total human population is projected to reach 10 billion (Hickey et al., 2019). As the human population increases, the challenges in accessing nutritious and healthy foods also manifest prominently, especially hunger and chronic malnutrition which are the present-day threats facing the rapidly growing African population. The prevalence of hunger and malnutrition is very high in several African countries (FAO et al., 2018). The SSA countries have increasingly experienced food insecurity, with about 27% of its population living in extreme food insecurity, poor health, and livelihoods (FAO, 2017b).

Despite the net increase in agricultural production over the past two decades, and some SSA countries contributing as net exporters of agricultural products, the rate of undernutrition in children and malnutrition have not drastically reduced in several African countries (Bagnol et al., 2016). Undernutrition is a product of diverse factors and till date, limited research attention has been paid to nutrition-specific, health-based approaches aimed at improving food systems and livelihood-based interventions. The SSA countries face the risk of food insecurity due to rapid population growth, climate change, and over-dependence on imported goods. These challenges lead to land fragmentation from population pressure in urban and rural areas, and the limited number of subsistence farmers is unable to support food security in these areas. Also, the regional environmental variations, persistent incidence of diseases and pathogenic infection, the outbreak of food-borne pathogens, and emerging infections constitute threats to food security and the food system in Africa. This makes it an arduous task to attain the sustainable development goals and it threatens the gains made in nutrition and food security in Africa (Rogawski et al., 2018; Braimoh, 2020). These factors have contributed to the non-accomplishment of nutrition indicators in Africa (Vipham et al., 2020). Thus, it is crucial for nursing mothers and their children to have adequate nutrition since the proper balance of both macro- and micro-nutrients is essential for short- and long-term health (Kaput, 2010). The context of these ill achievements is that gender disparity and cultural issues have been inadequately addressed in most studies linking agriculture and nutrition (Hawkes et al., 2012). Also, food insecurity in SSA may be linked to the fact that more than half of the farming populace are old, while most youths rescind participating in agriculture as a business. This shortage of farmers and the unwillingness of the youths to engage in agriculture also contribute to the food supply variability in Africa (Figure 1).

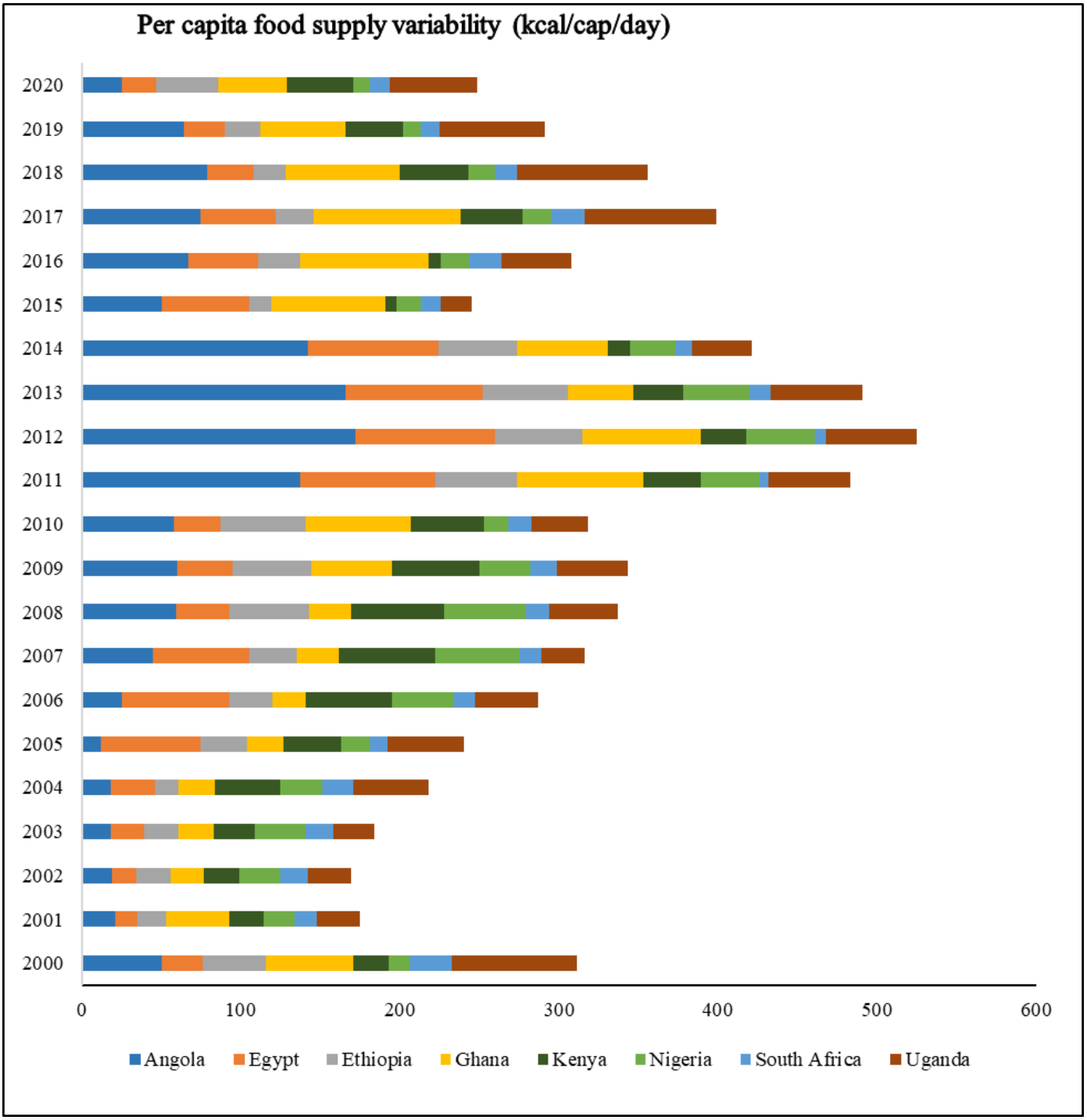

Figure 1. Variability in per capita food supply in selected African countries from 2000-2020

It was estimated using data on dietary energy supply from FAO Food Balance Sheet (FBS) to measure annual fluctuations in per capita food supply (kcal), represented as the standard deviation over the previous five years per capita food supply. Food supply variability is developed from a combination of instability and responses in production, consumption, trade and storage, as well as changes in government policies including trade restrictions, subsidies and taxes, stockholding, and public distribution (Lele et al., 2016). Source of data: FAOSTAT (2022)

Conventionally, investments in food security from a crop yield perspective focus mainly on the production of staple crops and this has generated positive outcomes in various African countries. However, this has not harnessed the nexus between food security and the availability of highly nutritious foods such as those from animal sources. A recent database compilation showing the investments of donors in food safety and capacity building indicated that different international donors channeled their investments in promoting accessibility to overseas markets for trade activities, to the detriment of market development in SSA (Vipham et al., 2020). Unfortunately, only a few of these investments addressed the needed improvements of the local markets and food systems. This consideration is necessary to advance public health and food security since most households purchase food from local markets (Vipham et al., 2020). The recent COVID-19 pandemic and its associated lockdowns and stay-at-home orders across Africa reawakened the need for a holistic and all-encompassing approach for sustained agri-food supply chains. While nations were battling to contain the COVID-19 pandemic, the number of vulnerable populations at risk of famine became exacerbated as a consequence of disruption in food supply chains. To meet the population demand for food by the year 2050, food production levels will need to be increased and food security enhanced (Garcia et al., 2020). However, achieving food security amid the increasing human population must not be a threat to the natural ecosystem, since this target must be achieved while protecting the natural resources and the environment for future generations. Therefore, food insecurity and its menace on the populace and economy could be counteracted by adopting food security strategies and actions which hinges on the integration of one health approach in agriculture.

As proposed by Watts and Bohle (1993), food security may be achieved through the implementation of national food policy goals which include, the creation of opportunities for food production and employment, protection of consumers from erratic market price fluctuation and distorted demand and supply chain, adequate food supply via importation or production, and the monitoring, storage, and distribution of food during scarcity. These policies are often not fully implemented due to challenges and risks cutting across food value chains including zoonotic diseases, climate change, natural disasters, and antimicrobial resistance. Achieving food security requires an equilibrium between consumers, the environment, and the ecosystem as each plays a key role. A strategic tool for food security would be the adoption of one health approach in agriculture; which would facilitate a well-established and functional extension network cutting across all components of food and agriculture, engaging strategies and actions that promotes food security which is in line with global sustainable development goals, while striking a balance between food supply chains, animal, environment, and consumption. Food safety is key to sustainable food security but this is hardly achieved in Low and Middle Income Countries (LMIC) of SSA. This is owing to poor database management for recording infectious diseases, sources, and diagnosis, and inadequate infrastructure for substantial investigation into disease causatives (animals, environment, unsafe water, and food) (Grace, 2017). Consequently, creating a broader concept of one health that incorporates food system, cultural, and societal awareness is paramount (Garcia et al., 2020). The bottom line for achieving food and nutrition security strongly depends on improved agricultural and food production systems. This influences the availability, cost, quality, and diversity of food since food and nutrition security entails the utilization, stability, access, and availability of food at all times (Tanumihardjo et al., 2020). There are evidences that food security can be improved when there is existence of healthy livestock and prevention of disease outbreak in SSA (Adesogan et al., 2020). Most often, it appears

that the focus of one health revolves around zoonotic disease control, and the need for collaborative sharing of infrastructure and resources for human and animal health systems, however, the totality of agriculture tends to be neglected in this summation (Danielsen, 2013). Thus, it is important to emphasize that linking agriculture with one health is fundamental for sustainable food security and economic growth in Africa.

Agriculture is the foremost enterprise and it is fundamental for economic development, especially in Africa. The African environment is such that the livelihood of most rural households is dependent on crop and livestock farming (Kamani et al., 2015). Agriculture is heavily relied upon for nourishment, survival, income generation, and food security. However, animal and human health must be ensured along with the maintenance of a sustainable environment. Moreso, zoonotic diseases pose a significant health risk to both humans and animals since infections become heightened within the human-animal-environment interface. Animal-derived food products, including meat, milk, and eggs, can contribute substantially to mitigating hunger, malnutrition, and food insecurity. However, about 25–30% of production losses in the livestock value chain result from livestock epidemics and diseases (FAO, 2017a). Approximately 75% of Emerging Infectious Diseases (EIDs) emanate from animal origin, and this is closely related to the frequency of anthropogenic activities and the proximity of human-animal interactions. There is ample evidence showing that wildlife exploitation through hunting and trading activities promoted close interaction between wildlife and humans, damaged wildlife habitats, and facilitated the transfer of zoonotic diseases (Johnson et al., 2020). Research has also shown that by 2050, an increase in human population and income generation in Africa will lead to a concurrent rise in the demand for livestock and animal-derived foods, with an increased frequency of interaction at the livestock-wildlife-human nexus (FAO, 2017a). Expectedly, this will exponentially increase the risk of zoonotic infections into the human population (FAO, 2017a; Johnson et al., 2020). This highlights the need to gain insight into the existence of EIDs that emanate from the human-animal-ecosystem interface, and the need to address the outbreak of infectious diseases and their management in Africa (Hanin et al., 2018). Therefore, the trio of human, animal and environmental health is closely linked with agricultural production systems. Furthermore, the incidence of hunger, malnutrition, disease outbreak, natural disasters and climate change destabilizes the balance of the trio interface, culminating in food insecurity.

To solve these challenges, the adoption of one health approach in Africa's agricultural system to actualize sustainable food production, ensure food safety and security, as well as environmental protection is necessary. Whilst efforts to categorically put a definition to "one health approach" has produced several and varied responses, the common agreement on one health approach is that it involves the intricate relationship between/among humans, animals, and ecosystems, being promoted as a transdisciplinary and collaborative approach towards global health and environmental sustainability (Okello et al., 2014). This approach is also capable of reducing threats to global health by holistically addressing the close relationships between humans, animals, and the environment for collective and sustainable actions (Okello et al., 2014; Otu et al., 2021). This can be achieved by creating a collaboration between different stakeholders to promote adequate turnover of cheap and nutritious food for the rising population via increased agricultural production (Giller, 2020). Countries like Tanzania and Zambia promoted community collaborations between social scientists, economists, ecologists, and health specialists in the crop, animal, and human sectors, with the sole aim of boosting the food value chain, food security and overcoming food security challenges. Consequently, human nutrition has improved

through increased domestic income and feed diversity (Alders et al., 2014). Agricultural programmes targeted at enhancing conventional crop-livestock systems, may present sustainable resolutions to the present demographic challenges, which drive the need for increased food, enhanced livelihood, and decreased migration in Africa. International interventions such as the United States Agency for International Development (USAID) Feed the Future Innovation Lab for Livestock Systems (LSIL) have collaborated with African countries such as Rwanda, Ethiopia, and Burkina Faso on various projects which encompass multiple food safety systems to combat malnutrition and safeguard public health (Vipham et al., 2020). Based on the understanding of ecosystem linkages to health impacts, one health has been proposed as an integrative approach in responding to emerging and endemic infections (Cunningham et al., 2017). Thus, one health is an integrative, collaborative, transdisciplinary, and multisectoral approach implemented at various sub-national, national, regional, and global levels to address emerging, ongoing, or potential health threats at the human-animal-environment interface (WHO, FAO, OIE, 2019). This approach is geared toward promoting the integration of national food security strategies and actions, and it facilitates innovative pathways between food security and human nutrition. In Africa, one health plans have become operational in several countries and cross-sectoral institutions. Table 1 provides a summary of one health initiatives in various African countries and their work focus.

Table 1. One health initiatives in various African countries and work focus

One health initiative	Country	Focus	Reference
One Health Research, Education and Outreach Centre in Africa (OHRECA)	Across sub-Saharan African countries	To improve human, animal and ecosystem health through capacity building, policy advise and strengthening of local, national, regional and global networks on one health in sub-Saharan Africa.	ILRI 2020
Inter-ministerial Zoonotic Disease Unit (ZDU)	Kenya	To establish collaborations and structures that adopt one health approach in zoonotic epidemic and endemic disease surveillance, and to promote public health research in Kenya.	Munyua et al 2019, Onyango et al 2019
Field Epidemiology and Laboratory Training Program (FELTP)	Kenya	The FELTP programme provides training for the development of a one health workforce in the country particularly in the government structures, to strengthen collaboration and participation in joint disease surveillance and outbreak in the human and animal health sectors.	Onyango et al 2019
The Alliance for Accelerating Excellence in Science in Africa (AESA),	Across Northern, Eastern, Western, Southern and Central African countries	An Africa-based academic platform with a strategic focus on health and wellbeing, environment and climate change, policy and governance, natural sciences and social sciences and humanities to enable Africa-based research agenda.	Kamani et al 2015
The Coordinating Office for the Control of Trypanosomiasis in Uganda (COCTU),	Uganda	An inter-ministerial platform involved with policy co-ordination and oversight of all human and African trypanosomiasis control in Uganda.	Okello et al 2014, Rwego et al 2016
The Southern African Centre for Infectious Disease Surveillance (SACIDS)	Democratic Republic of Congo, Mozambique, South Africa, Tanzania, and Zambia.	SACIDS promotes a trans-sectoral approach to help address the management of infectious diseases in Southern African countries.	Hanin et al 2018, Rwego et al 2016
Afrique One	Chad, Ivory Coast, Ghana, Tanzania, Uganda, and Senegal	A consortium of university and research institutions that aim to promote training, and awareness in one health, ecosystem and population health research.	Kamani et al 2015, Rwego et al 2016
Regional Universities Forum			RUFORUM

Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)	Western, Central, Eastern, and Southern Africa	RUFORUM's mission is targeted at strengthening African universities to promote research and collaborations among farmers, researchers, research institutions and governments.	2020, Rwego et al 2016
One Health Central and Eastern Africa (OHCEA)	Democratic Republic of Congo, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda, Cameroon and Senegal	It is a network of institutions related to public health and veterinary medicine, with the aim of fostering one health approach.	Onyango et al 2019, Rwego et al 2016
Nigerian Field Epidemiology and Laboratory Training Program (NFELTP)	Nigeria	It is a service-oriented training program operated by Ahmadu Bello University in Zaria and the University of Ibadan in Ibadan to assist in the development of a one health workforce in the country.	Rwego et al 2016
Animal and Human Health for the Environment and Development (AHEAD)	South Africa	AHEAD programs focus on the health, conservation and development challenges arising within an environmental and socioeconomic context.	Rwego et al 2016
Bill and Melinda Gates Foundation (BMGF) for Rabies Elimination Projects	South Africa and Tanzania	It targets elimination of rabies incidence by vaccination of domestic dogs, promoting the additional benefits to human health.	Okello et al 2014
National One Health Steering Committee (NOHSC)	Ethiopia	It co-ordinates one health stakeholders at various levels to facilitate multisectoral collaboration and the establishment of an institutionalized one health platform in the country.	Onyango et al 2019
The Biosciences Eastern and Central Africa-International Livestock Research Institute (BecA-ILRI)	Eastern and Central African countries	BecA-ILRI supports multidisciplinary research in food safety, animal health, human health, and environmental and occupational health.	Rwego et al 2016
PREDICT consortium	Across Northern, Eastern, Western, Southern and Central African countries	They investigate and identify animal reservoirs for new emerging infectious diseases that could become a threat to human health, especially in rodents, non-human primates, and bats.	Rwego et al 2016
Nigeria Avian Influenza Emergency Control Preparedness and Response Project	Nigeria	It targets the alleviation of Highly Pathogenic Avian Influenza (H5N1) threat to human health, and simultaneous promotion of poultry production nation-wide.	Okello et al 2014
The National Technical Committee on Avian Influenza (NTCAI)	Uganda, Kenya, and Egypt	To support multisectoral collaboration for avian influenza control through trainings, joint workshops, and establishment of sub-units at the state and local government levels.	Okello et al 2014, Rwego et al 2016
African Field Epidemiology Network (AFENET)	Uganda, Ghana, Nigeria, Burkina Faso, Democratic Republic of Congo, Tanzania, Ethiopia, Zimbabwe	To train field epidemiology and laboratory management to prepare member states for infectious disease outbreaks.	Rwego et al 2016
One Health Regional Network for the Horn of Africa (HORN)	Ethiopia, Somalia	It is a multidisciplinary and international partnership targeted at improving individuals and institutional research capacities, particularly on human and animal health concerns, and promotes a one health regional network for sharing knowledge and information.	Onyango et al 2019

Achieving sustainable agricultural production and food security is not without challenges and compelling oppositions. Threats at the human-animal-environment interface such as zoonotic diseases, AMR, food safety and security can pose severe risks to the triad of animal, human and environmental health and may result in far-reaching impacts on economies and livelihoods in Africa (Figure 2). Adoption of one health integration approach may be the key to improving sustainable agriculture in Africa.

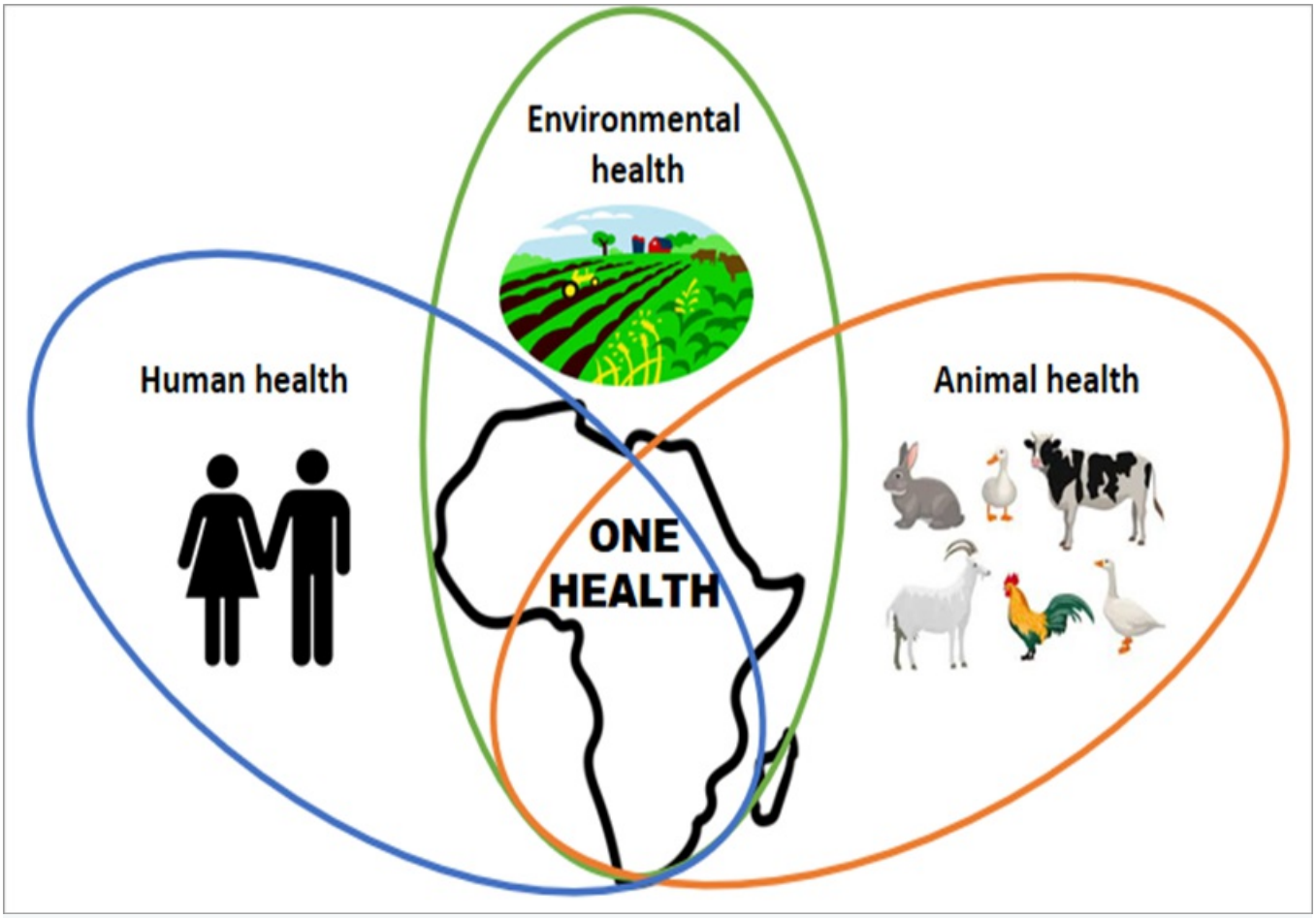

Figure 2: One health, an approach for addressing human, animal, and environmental health challenges in Africa.

Source: Authors

Underlying concerns towards one health adoption in African agriculture

One health approach is an interdisciplinary collaboration that cuts across diverse disciplines within and beyond the health sciences to attain optimal health for the people, animals, and the ecosystem (Asokan & Vanitha, 2017; Conrad et al., 2013). It is, however, met with numerous concerns in its adoption in African agriculture. One of the setbacks confronting the adoption of one health in Africa is the lack of drive for intra-Africa collaboration. Most African researchers are inclined to sole disciplinary research which ultimately threatens learning networks for conducting transdisciplinary research across the continent (Barlow et al., 2011). This setback also impairs the opportunity for strategic communication among researchers from diverse fields. Another challenge in the adoption of the one health approach is financing, as well as the adoption of policies that will promote its practice. Generally, finance is a major challenge in African agricultural research which is required for capacity building and various infrastructural set-ups. Okello et al. (2014) noted that for one health to be successfully adopted and sustained in Africa, it needs to be politically endorsed, funded at the national level, and promoted to the utmost advantage to the people.

Also, inadequate education and training programmes is another challenge faced in the adoption of one health in African agriculture. In Africa, there are a limited number of trained personnel who have an in-depth understanding of the one health approach to conduct educational training programs and sensitize the public about its advantages. For one health advocacy and adoption in African agriculture, there is a need for sufficient, efficient, well-trained, and competent one health practitioners (Allen-Scott et al., 2015; Min et al., 2013; Ribeiroa et al., 2019). Besides, there is a need for field training with support from institutions across the African continent (Allen-Scott et al., 2015; Hutchins et al., 2014). Thus, to increase interest in one health approach, it should be prioritized and embedded in university curricula with competent structures for research and practise (Barrett et al., 2011; Conrad et al., 2013).

Integrating the *one health approach* in African agriculture

The COVID-19 pandemic offers the opportunity for stakeholders at all levels to realize the importance of one health approach, and to place agri-food systems at the center of one health actions. Resilient and sustainable agri-food systems are the potential panacea to multi-layered challenges, including Africa's response to pandemics. Diet-related deaths are estimated at 11 million globally and contribute to about 35% of mortality in Africa (African Union, 2015; Rampa, 2020). Thus, sustainable agri-food systems would promote healthier diets and support stronger immune systems against human health threats, such as COVID-19. Local food supply chains have been disrupted, limiting access to food in Africa when the COVID-19 pandemic hit the continent (Garcia et al., 2020). Although the COVID-19 death tolls recorded across Africa have been comparatively low, the lockdown and stay-at-home measures by various governments exacerbated the economic conditions of smallholder households and consumers. In some countries, foods were distributed by governments to citizens during the stay-at-home orders.

The recent fall army worm (FAW) and locust outbreaks in some African countries raise the critical issue of transboundary challenges of pests and disease transmission (Garcia et al., 2020). Natural disasters such as bush fires and floods threaten food safety and security. These events produce causeways for contamination of air, water, and the environment by unleashing pathogens, chemicals, heavy metals, and other pollutants (Knorr et al., 2017; Wu et al., 2017; Woo et al., 2020). These among other things necessitate the adoption of an integrative multi-stakeholder approach to address these challenges. The one health approach is practically relevant to tackle these impacts in Africa by assembling multidisciplinary teams of experts from the agri-food sector, academia, health, industry, and government agencies (FAO, 2011; Mackenzie & Jeggo, 2019).

The agenda 2063, African Continental Free Trade Area (AfCFTA), and Comprehensive Africa Agriculture Development Programme (CAADP) are people-driven frameworks involving research institutions, farmers' associations, governments, and the private sector to revitalize Africa's agriculture and accelerate Africa's development. The CAADP is aimed at boosting agri-food investments to stimulate growth in the agricultural sector and to foster public-private partnerships at the continental, regional and national levels for increased investments, improved coordination, share knowledge, and to promote joint efforts in the sector (African Union, 2016; AUDA-NEPAD, 2020). The African Union Department of Agriculture-New Partnership for Africa's Development's (AUDA-NEPAD) Community of Practice provides a space for multi-stakeholders to share best African practices and leadership that have the potential to engender inclusive economic

growth, benefit smallholder farmers, boost food production, and end hunger across the continent. These continental initiatives should integrate the one health approach in the implementation of their programmes and activities to ensure holistic agri-food development across the continent while guaranteeing the health of the populace.

Intra-Africa regional trade constitutes 27% of total agri-food exports and 17% of total agri-food imports (AUDA-NEPAD, 2020), indicating that Africa still depends on global imports and is thus exposed to global market shocks. The AfCFTA recently ratified in 2019 is positioned to support and sustain the food value chain in Africa via a common market (AUDA-NEPAD, 2020). Effective AfCTA implementation is contingent on emerging innovations and approaches such as the one health approach. The ongoing international partnerships spearheaded by the African Union and accompanying preparatory processes with interested partners and stakeholders could accelerate the design of an African roadmap to provide continental leadership. This leadership would help address the interconnectedness between human, ecological, and animal health, starting with improving the agri-food system (AUDA-NEPAD, 2020; Rabinowitz et al., 2013; Rampa, 2020). The need for extensive adoption and integration of the one health approach in continental, regional, and country-specific initiatives is immediate, where it would serve as a fulcrum for programme implementation across SSA. Improving food security, health, and economic wellbeing requires adopting strategies that facilitate the one health approach in African agriculture. Table 2 provides a summary of some strategies that can enhance one health approach in African agriculture.

Table 2. Strategies for facilitating the one health approach in African agriculture

Strategy	Specific actions
Advocacy	One health approach can be promoted through avenues such as mainstream and social media platforms, government and private institutions, and research and educational institutions. Further steps in one health advocacy would require the development of a platform for cohesive learning and interaction. Such a platform should encourage one health ideals and opportunities to promote long-term strategies and practices that establish human and animal health infrastructures in Africa and foster safe food production and marketing practices.
Education/Capacity building	Developing and strengthening the capacity, skills, and ability of Africans to facilitate one health in agriculture on the continent requires locally-available management and technical skills. This involves the need to develop the capacity of veterinary and animal production personnel, build cross-sector networks to balance food security and natural resources management, increase access to technical information and promote research-extension linkages. One health literacy can also be achieved by facilitating education and training programmes at various levels of academia, government, community, and non-governmental organizations.
Policy and funding	Facilitating one health approach in African agriculture will entail improving policy support and access to funds. African countries therefore need to work together to leverage funding and support one health initiatives, and enhance evidence-based one health policy formulations and implementation.
Collaboration	One health stresses the linkages between human, animal, and environmental health, as well as the need for interdisciplinary communication and collaboration to address health issues including emerging zoonotic diseases, climate change impacts, and at the human-animal interface. Reinforcing intra-Africa collaboration between institutions, countries and organizations by enhancing medical, veterinary and environmental cooperation and integration of activities across Africa is critical for improving healthy and safe food production.

Conclusion

The world is a global village wherein the action and inaction of a part of it can affect every other part either positively or negatively. Thus, there is the need to join forces in bridging the gaps and finding a common ground to solve global challenges. There is a need for a multidisciplinary and interdisciplinary approach by researchers, scientists, policy makers, industry practitioners and key stakeholders in the field of science, medicine, engineering, and social science to foster research on food production. In Africa, food production has to go beyond the subsistent level, and the challenges of disease and stress resistance to feed the ever-growing population. Adoption of modern techniques and skills to solve the problem of food insecurity, as well as, food production systems that protect biodiversity and safeguard the ecosystem is paramount. The availability and affordability of healthy food to boost human immunity thereby reducing disease incidence is fundamental. Also, there is the need for policies that promote healthy food production and affordability through controlled pricing and better storage facilities. Hence, collaborative research-driven actions are required for improving food production and food security. Consistent advocacy and education to enhance the adoption of the *one health approach* in the agri-food sector in Africa will inherently boost food production, improve public health, and ensure environmental sustainability.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

Not applicable

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

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