

# CAN POULTRY PRODUCTION ADDRESS FOOD INSECURITY IN SUB-SAHARAN AFRICA?

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Poverty continues to play a large role across most African countries, more than elsewhere in the developing world, and malnutrition has long been a challenge in sub-Saharan Africa (SSA) with uneven progress throughout the region (Claude Saha, 2008). However, agriculture remains the greatest contributor to SSA's economy (Dercon and Gollin, 2014), employing approximately 65 to 70 percent of Africa's labor force (Roseboom et al., 2016). Unfortunately, agriculture is marked by its low productivity in the region (Chauvin et al., 2012). Even though large numbers of livestock are found in SSA, their levels of productivity vary greatly due to lack of consistent improvements in factors that negatively affect productivity such as disease, poor feeds, and lack of improved genetics (Millar and Photakoun, 2008). While the demand for livestock products in SSA is increasing rapidly, this **demand is not being matched** by similar growth in livestock production (Herrero et al., 2014). The rapidly increasing world population will be consuming two-thirds more animal protein by 2050 than it does today (Salvage, 2011), making livestock production strategically important to improving the well-being of society in the SSA region. However, increasing the livestock production sector will be affected by competition for natural resources, particularly water and land (Mengesha, 2012; Thornton, 2010).

## FOOD INSECURITY ACROSS SUB-SAHARAN AFRICA

There is an increasing need for sustainable food production systems that can ensure adequate food availability for poor and vulnerable population groups, particularly smallholder farmers with limited access to resources and those residing in remote locations, as well as for the empowerment of women, children, and youth (Food and Agriculture Organization of the United Nations (FAO), 2018). While commercial, larger scale poultry operations are becoming more common, the village poultry production system, practiced by 80 percent of the world's rural population (Wong et al., 2017), has the potential to ensure food and nutritional security on a sustainable basis, particularly in low- and middle-income countries. **Thirty percent of the world's population** was affected by moderate to severe food insecurity in 2020, with most of this population living in low- and middle-income countries (FAO et al., 2021). More than half of the world's undernourished population is found in Asia (418 million), and more than one third are in Africa (282 million) (Singh et al., 2022). There are differing levels of hunger among different groups, societies and countries related to the numerous constraints that include economic, political, social, and environmental variables and the interaction of all these variables (Idamokoro and Hosu, 2022). Despite the numerous constraints related to addressing hunger in the world, the importance of food security for everyone cannot be overemphasized, and village poultry production is one key to sustainable food security in the developing world.

Most rural smallholder farmsteads and an increasing number of commercial operations engage in poultry production in several regions of Africa, making poultry an integral source of protein, food security and revenue generation (Schneider et al, 2016). However, almost 25 percent of people in SSA were estimated to be undernourished in 2017, representing about one-third of the 821 million people suffering from chronic hunger globally (FAO et al., 2018). Two distinct poultry production systems operate in most developing countries of Africa: (1) a labor-intensive commercial system with a high degree of specialized management and biosecurity, and (2) a more simple, subsistent, traditional village poultry production system (Adene and Oguntade, 2006; FAO, 2006). According to Harrison et al. (2024), the main systems of production in Zambia were traditional for local chickens (87 percent) and intensive (70 percent and 44 percent for broiler and layer chickens, respectively). Most food in SSA is produced by smallholder farmers even though this group is the most vulnerable to food insecurity and poverty. This makes **smallholders a critical entry point for agriculturally oriented interventions** to lessen food insecurity.

In Zambia for example, the livestock sub-sector is an important component of agriculture. The sub-sector has much potential, as it can contribute to economic diversification, food security and nutrition, improved rural livelihood and sustainable income generation (Harrison et al., 2024). The livestock sub-sector in Zambia is largely cattle, goats, sheep, pigs, and poultry. Poultry includes chickens (broilers, layers, and local village chickens), quails, guinea fowls, ducks, geese, pigeons, and turkeys, kept for economic significance (Abadula et al., 2020; Adie and Asante, 2012). The RALS (2019) affirmed that over 80 percent of smallholder households owned at least one chicken; making chickens the most common type of poultry/livestock owned by most smallholder households in Zambia (Harrison et al., 2024).

As a result, poultry production has the potential to play a significant role in the economy of Zambia and other SSA countries because of its widespread distribution and the likely impact of interventions on the livelihoods of smallholder individuals and households. The demand for animal protein sources is much greater than the supply, and that demand is expected to grow because of the increasing human population (MoFNP, 2022; Sianangama et al., 2022; Zambia Statistics Agency, 2022). Compared to other livestock species, poultry are small, easier and less expensive to acquire, and are widespread in distribution across SSA. In addition, Banda and Tanganyika (2021) indicated that women are more involved in the management of smaller-sized livestock such as poultry, sheep, and goats. Poultry can therefore serve as an important developmental tool in poverty alleviation and food insecurity reduction.

Food insecurity currently poses a significant threat to much of the world's population, particularly in SSA. Considering the predicted increase in human population in Africa, which is expected to double its current population of 1.2 billion to more than 2 billion by 2050, food insecurity concerns may soon worsen (Khalid Anser et al., 2019). Furthermore, the world's demand for animal source protein is expected to double in the same period, resulting in more threats of undernourishment in SSA (FAO, 2017). In addition, ongoing health and socioeconomic impacts of the COVID-19 pandemic will likely further deteriorate the nutritional status of the most vulnerable population groups in the future. Ironically, while we face food insecurity in much of the world, **one-third of the food produced globally is either lost or wasted** (World Bank, 2020). Reducing food loss and wastage is critical to improving food security, as is addressing climate change issues, and reducing the pressure and stress currently on the environment that detrimentally affects food production capabilities.

Africa's food security and food production systems are at a monumental crossroads. Numerous challenges and issues, including extreme weather events and climate change, recurrent outbreaks of pests and diseases, and limited availability and adoption of yield-enhancing technologies, have exposed weaknesses and fragilities in Africa's food systems, undermining the continent's ability to meet the food demand of a growing population (Dessalegn, 2023). Adding to the challenges in recent years has been the COVID-19 pandemic and the war in Ukraine that has disrupted the supply chain for agricultural inputs, fuel, and food. Africa faces the heaviest burden of global malnutrition (FAO, 2022a), and as a result, food security on the continent continues to worsen, with over 20 percent of the continent's population (roughly 257 million people) undernourished (Armstrong, 2022). Furthermore, Africa is not on track to meet its goal of ending hunger by 2025 (African Union, 2021). East Africa alone lost close to two million livestock in one year due to recurrent drought and low response capacity (Bloomberg, 2022). Africa's food production systems must become more resilient to guarantee access to healthy, safe, and affordable diets for everyone.

While food security is critical to end hunger and malnutrition in SSA, **food sovereignty may be a more vital goal** to seek to attain. This would increase the availability of affordable food and assist multiple countries in reaching several of the United Nations Sustainable Development Goals (SDGs), including SDG 2 (zero hunger), SDG 3 (good health and wellbeing), SDG 5 (gender equality), SDG 8 (decent work and economic growth), and SDG 10 (reduced inequalities) (Eziakonwa, 2023). Food sovereignty speaks to the ability of a country to feed itself. In Africa, this must involve increasing production and ensuring that farming systems are more resilient to price and environmental shocks (Eziakonwa, 2023). Food sovereignty in Africa is about more than production and trade. It is also about ensuring that the continent's food production is not held hostage by natural environmental or market disruptions.

The use of technology, fertilizer, and improved farm management practices could revolutionize Africa's food sector (Eziakonwa, 2023), allowing many African countries to reverse their dependence on food aid and imports. Free or inexpensive food imports have made local food production in Africa less competitive and shifted consumer preferences away from local brands in favor of foreign ones. As a result, the cumulative effects of import dependency have meant that Africa is now the **most food-import-dependent region in the world**, dedicating more than 13 percent of its import expenditure to buying food and agricultural commodities (Regional Bureau of Africa, 2022). Revolutionizing current food production capabilities in Africa will improve the continent's long-term future developmental aspects. The increased agricultural productivity would also positively impact women and girls, helping Africa improve progress toward SDG 5 (gender equality). Increasing food production would also contribute to SDG 8 (decent work and economic growth), especially for women and girls, particularly regarding poultry production which is often the responsibility of women and girls.

## **POULTRY'S ROLE IN FOOD SECURITY**

According to the FAO (2022b; 2023), poultry is the world's primary source of animal protein. Globally, poultry meat is expected to represent **41 percent of all protein from meat sources** by 2030 (OECD/FAO, 2021). Poultry is contributing a substantial amount to livestock production in SSA that ranges from 12 percent in Eastern Africa to 45 percent in both Central and Southern Africa (Erdaw, 2023). Village chicken production has been projected to be one of the most sustainable means of promoting food security by a large percentage of people globally (FAO, 2014a; Desta, 2021). Village chicken production has been integrated with human subsistence for thousands of years, enhancing diets, income, and food and nutrition security for much of the world's rural poor population (Alders and Pym, 2009). In addition, village chicken production increases food security in additional ways such as improving nutrient utilization and recycling soil nutrients, adding to mixed farming practices, contributing to the empowerment of women, and assisting in accessing health care and opportunities for education (Wong et al., 2017).

Village poultry production systems, composed primarily of chickens, account for most poultry production in low- to middle-income countries (Gilbert et al., 2015; Rajkumar et al., 2021). Although village poultry systems often have low productivity, they play critical roles in the food and nutritional security of rural people in fragile and resource-poor ecosystems (Chaiban et al., 2020; FAO and IFAD, 2022). Animal source food (including chicken) with its high concentrations of bioavailable nutrients is particularly essential for young children, pregnant and breastfeeding women with high nutritional requirements, and chronically ill and elderly individuals (Kumaresan et al., 2008; Olaoye, 2011; Wong et al., 2017). Furthermore, as mentioned previously, village chicken production is an **important income generator for women** (Quisumbing et al., 1995), who often own and manage village poultry and utilize them as an essential element of female-headed households (Bagnol et al., 2013). Singh et al. (2022) reported **10 important factors concerning village poultry farming**. The list includes:

1. Village poultry can survive in harsh and inclement climatic conditions. They are resilient to climate change and better adapt to different environments.
2. Village chickens convert waste material such as kitchen waste, vegetable waste and green grass into high-quality animal protein.
3. Village poultry farming involves minimal initial investment.
4. It provides employment to rural poor farmers, women, unemployed youth, and older family members along with subsidiary income.
5. Eggs and meat from village poultry farming command a high price as compared to those from commercial poultry farming.
6. Products from village poultry production are a good source of high-quality animal protein and hence a source of food and nutritional security to vulnerable communities.
7. Village poultry may well-integrate with other agricultural operations such as poultry-fish integrated farming systems.
8. Manure from village poultry is a rich source of soil nutrients and can be utilized to enhance soil fertility, particularly in small to medium scale vegetable production.
9. Village poultry are often owned and managed by women of the household, with the sense of ownership and income empowering rural women.
10. Village poultry consists of native and indigenous birds, which are well-adapted to the local climate and are more disease resistant and parasite tolerant/resistant than exotic or introduced poultry species. There is high genetic and phenotypic diversity in indigenous chickens that can be used as a base resource for further improving the productivity of village chickens.

However, importation of more productive breeds of improved chickens has become an emerging trend across much of SSA and is a major area of focus for numerous developmental aid projects as a tool for poverty reduction (Pius and Mbagi, 2018). Efforts such as the African Chicken Genetic Gain Project have tested and made available high-producing, smallholder farmer-preferred genotypes, both indigenous and imported, that are likely to increase smallholder chicken productivity in Africa. In Tanzania, for example, dual-purpose Kuroiler and Sasso breeds are now well-accepted by smallholder farmers because of their higher meat and egg production relative to indigenous breeds in the common scavenging production system (Pius et al., 2021).

The rapidly increasing demand for meat protein on a global scale is one of the greatest challenges facing food production systems today. In large part because, as people become wealthier, they consume more animal protein. For a variety of reasons (feed efficiency, time to market age, land required, etc.), the **poultry sector has been the largest contributor** to the growth of the animal industry in recent years. However, increases in poultry production may sometimes have adverse effects on the environment, such as climate change and increased risk of zoonotic diseases. Therefore, these possible effects should be considered as policies related to poultry sector expansion are developed across SSA (Daghir et al., 2021), particularly policies impacting biosecurity and disease prevention and management practices.

Much of the global increase in poultry production in recent years has resulted from genetic improvements in commercial poultry breeding stock. However, maintaining genetic diversity is a critical factor in ensuring productivity and adaptability of livestock breeds, adapting to climate change, and improving long-term food security throughout the world. It is well-documented that smallholder production systems in most tropical countries represent a unique (and often untapped) reservoir of genetic resources (Cao et al., 2021). In addition, several indigenous chicken breeds have been reported to possess both **superior levels of genetic variation** relative to commercial breeds and **unique phenotypic traits** signifying valuable local adaptations (Pius et al., 2021). Many of these indigenous breeds are better adapted to harsh environmental climates, poor nutritional regimes, and diseases compared to improved exotic breeds, thereby increasing their resilience to the challenging and changing ecological terrains across Africa (Okpeku et al., 2019).

A major challenge today is how to best design programs that take advantage of the improved genetics of exotic chickens while still maintaining the unique and rich assortment of genetic resources found in indigenous chickens and use both to address food insecurity across SSA. This is true in part because chicken producers face several challenges, not the least of which is access to a **safe, abundant, and affordable feed supply** in terms of consistent protein, energy, vitamin, and mineral sources (Ravindran, 2013). Feed costs are often 65 to 70 percent (Ravindran, 2013) and may reach up to 80 percent of a smallholder farmer's total production costs (Githigia et al., 2012), leaving little room for resource-poor farmers to see a profit.



## CHALLENGES TO VILLAGE POULTRY PRODUCTION

The role of small-scale, low-input village or indigenous chicken production in improving the livelihoods of vulnerable households has been noted, and the importance of indigenous chickens in national poverty reduction strategies in developing countries is well recognized (Hailemichael et al., 2016). Chickens are the **most common species of domestic fowl** in the world, accounting for approximately 90 percent of total poultry production (FAO, 2014b). Chicken is also the only livestock that is regarded as being **under the independent control of women** in many rural settings as most women can make independent decisions on the sale or slaughter of village chickens without having to consult their spouses (Dumas et al., 2017; FAO, 2014c). In addition, the village production system places few additional time demands on women (Quisumbing et al., 1996), and the minimal input requirements and flexible production system contributes to village poultry popularity (Milkias et al., 2019). Birds often scavenge and forage on their own for much of their food and require little time or financial commitment from their smallholder caretakers (Figures 1 and 2).



Figure 1. Village chickens at rest.



Figure 2. Housing for village chickens.

Unfortunately, **multiple constraints cast a shadow over the production of village chickens** by smallholder farmers. Poultry diseases (particularly Newcastle disease), predators, high cost and limited availability of feed ingredients, poor housing structures, inadequate nutrition, lack of Extension services and trained personnel, lack of market access and limited management and production information are only some of the numerous constraints that smallholder farmers face (Anyona et al., 2023). In addition, local chickens take longer to mature and reach market weight. The average age of maturity for cockerels (at first mating) and pullets (first mating) are 24.6 weeks and 27.5 weeks, respectively (Moges et al., 2010), and this is largely attributed to their genetical makeup, system of management and poor nutrition. Chickens reared under the scavenging/extensive system of management, cover long distances and expend more energy in their search for food which is often of poor quality resulting in minimal weight gains. Additionally, the production capacity for village chickens is low, and farmers are unable to break-even and consistently meet the consumers' demand for poultry products. According to Moges et al. (2010), indigenous chickens' low number of eggs laid/clutch of 16 (ranged 8-28), and number of total clutch periods/hen/year of 4 (ranged 2-6); and yearly egg production under farmer's management condition of 60 eggs/hen (ranged 24-112) restricts production capacity. Furthermore, Moges et al. (2010) reported the average number of eggs incubated/hen was 13; hatchability performance was 82 percent; young chicks' survivability was 61 percent (ranged from 0-100); and young chicks' mortality was 40 percent. Despite the contradiction between high hatchability (82 percent), high mortality was attributed to seasonal disease outbreaks (84 percent) and predation (11 percent) in local chickens (Moges et al., 2010).

Constraints often transcend boundaries and their impact on chicken production can vary greatly at the regional, local, and even household levels related to strong influence from sociocultural, economic, environmental, institutional and gender factors. More importantly, gender analysis in chicken production indicates that men and women are impacted differently by these constraints (Anyona et al., 2023). Constraints are often compounded for women by the patriarchal nature of society and socially constructed gender roles that increase their vulnerability relative to men (Panda, 2016). Their decision-making power over several production factors is also curtailed by cultural norms and unequal power relations within the household (Macharia et al., 2018).

Despite the constraints, village poultry production, including improved productivity through appropriate interventions, can be a source of sustainable food production (Singh et al., 2018; Rajkumar et al., 2021). One important intervention is the aforementioned introduction of improved dual-purpose genetic breeding stock for increased meat and egg production in isolated rural areas. There has been increasing focus on **improved poultry genetic stock suitable for village-type production** systems in Africa and Asia. These varieties that offer higher production potential — even on a low plane of nutrition — were developed specifically for village production systems in resource-poor areas and fragile ecosystems (Singh et al., 2018; Rajkumar et al., 2021).

Dumas et al. (2016) reported that improved intervention programs (including Newcastle disease vaccination programs and good housing and management practices) boost village chicken production as a practical measure to promote food security, social, agricultural, and ecological resilience among financially constraint populations, and this improvement resulted in the rise of the average flock size of village chickens reported by local households. Unfortunately, vaccination, which is effective in preventing numerous chicken diseases including Newcastle disease, is **rarely practiced by smallholder farmers** (Njue et al., 2006) for numerous reasons.

This is the case even though Newcastle disease mortality rates of 100 percent affect village poultry production in many locations worldwide (Ashraf and Shah, 2014; Osti et al., 2017). In many areas, this is exacerbated by the low availability of Extension and veterinary services and trained Extension personnel combined with the high costs of vaccination. Newcastle disease outbreaks worldwide are associated with a variety of factors, including lack of biosecurity, inadequate vaccination and poor vaccination programs, lack of an adequate vaccine cold chain, antigenic variation, maternal antibody inhibition of live vaccines, short duration of the immune response and immunological suppression (Dimitrov et al., 2016). However, significant growth in the size of flocks and the profitability of poultry have been achieved through effective Newcastle disease vaccination programs (Harrison and Alders, 2010). Engaging **women as community vaccinators** can be a critical success factor for the sustainability of vaccination programs. Training community vaccinators has shown to be an effective approach to addressing animal health issues at the village level (Campbell et al., 2018).

Other interventions include skill enhancement, health prophylaxis measures, implementation of an on-farm biosecurity program and efficient market linkages (Singh et al., 2022). Education and empowerment of farmers can contribute to strengthening the knowledge of holistic agroecosystem management, improve decision-making management skills, facilitate group collaborations and encourage local innovation, especially by women and young people (FAO and IFAD, 2022). Anyona et al. (2023) indicated a targeted approach to address the constraints that takes into consideration gender- and region-specific differences is necessary. Indeed, women often have limited to no benefits from Extension services or trainings in new technologies that could increase their agricultural productivity (Figure 3). In addition, most remote areas of developing countries often have limited Extension and veterinary personnel and services that cannot cover the vast areas effectively, which hinders farmers' access to critical services and information (FAO, 2014b). The major challenges to the provision of Extension services in Africa's rural communities are lack of relevant trained personnel, limited logistical support (particularly transport) and large operational areas covered by a single Extension officer. Therefore, a **long-term development approach** should identify locally appropriate strategies for scaling up successful practices, which could include model farms, demonstration sites, Extension services and farmer field schools, more recruitment and training to increase the number of Extension personnel, among other approaches (Kurz et al., 2023).



**Figure 3.** Extension meeting with village poultry clientele in Tanzania.



To adequately address food security, there is a need to develop strategies that enhance the resilience of the most vulnerable households in developing regions of the world. One suggested strategy is creating jobs and employment opportunities that enhance the income of resource-poor households (Ayoo, 2022). Although most rural households are subsistence based, they often generate income by selling surplus crops and livestock products to cover other expenses. Poultry production can play an important role in this regard, as it is **most rural households' primary livestock production activity** (Birhanu et al., 2023). In addition, because women play major roles in poultry production, poultry production helps reduce inequality by enhancing their income and control over a household's limited resources.

Moderate to severe food insecurity was **10 percent higher among women than among men** in 2020 (FAO et al., 2021). Income from the sale of village poultry products is often the main source of income for female-headed households. In Africa, most women have access to village poultry but may not have full control over ownership and decision making, thereby depriving them of economic benefits (Gueye, 2000). However, the involvement of women farmers has resulted in positive and significant improvement in the family financial situation. Adoption of improved management practices resulted in increased flock size, increased household income, increased household food security and increased decision-making power for women (Alders and Pym, 2009). For example, women in Africa were able to purchase goats and cattle by selling excess poultry, empowering them with resources that were previously denied to them (Singh et al, 2022).

The increasing trend in higher food prices has become the primary global social and economic concern in the past few decades as it makes the cost of basic household food more expensive for resource-poor households (Birhanu et al., 2023). In 2019, the high cost of healthy diets and persistently high levels of income inequality put healthy diets out of reach for approximately 3 billion people, particularly the poor, throughout the world (Singh et al., 2022). Poverty and **inequality are underlying causes of food insecurity and malnutrition**. Income inequality in particular increases the likelihood of food insecurity, especially for socially excluded or marginalized groups (FAO et al., 2021). Currently, moderate to severe food insecurity affects more than **30 percent of the world population**, with most of this population living in low- to middle-income countries (Singh et al., 2022).

Village chicken farming can increase food security by changes in best management practices to increase chicken production. There exists a wealth of indigenous knowledge and practices related to village chicken production, which, together with the correct interventions incorporating improvements in the production of village chickens such as nutrition (from domestic and environmental waste), housing, management, and genetics/improved germplasm, have the potential to achieve sustainable production for the benefit of food insecure populations (Idamokoro and Hosu, 2022). Village poultry productivity can be increased by the introduction of improved germplasm (Singh et al., 2018; Chaiban et al., 2020), as there is a need to develop dual-purpose birds with genetic potential for enhanced growth and egg production. In addition, the birds should resemble indigenous birds with multicolored plumage, longer shanks, higher productivity, adaptability to varied agroclimatic conditions and better immunity (Kumaresan et al., 2008; Rajkumar et al., 2021). Also, these birds should have the **ability to perform well on a limited nutritional plane** with a meat texture and flavor similar to local indigenous chickens (Singh et al., 2022) as these qualities are preferred over exotic, improved commercial breeds.

## SUMMARY

Poultry production offers a **potential means to improve food security** and generate income and employment for resource-poor smallholder farmers in many regions of the developing world. Commercial poultry operations continue to gain a foothold across SSA, although most poultry production still occurs at the local village level. However, numerous constraints stand in the way of making commercial and village poultry production a sustainable method to fight food insecurity. Disease, predation, low market pricing, high input costs, lack of appropriate and consistent vaccination programs, lack of an adequate vaccination cold chain to ensure vaccine quality, lack of collateral and capital, lack of markets, lack of access to Extension and veterinary services and information are all constraints that must be overcome. The production of village chickens can be improved with changes to management and best practices to increase chicken production for food. There is a wealth of indigenous knowledge and practice related to village chicken production that should be harnessed together with recognized local cost-effective interventions to improve production of village chickens in the areas of nutrition, housing, management, and genetics that have the potential to achieve sustainable production for the benefit of food insecure people. Indigenous acquired wisdom and knowledge is an essential resource to improve food security in developing countries. Keep in mind the importance of **involving the local community** at every step along the village and commercial poultry production paths to achieve maximum acceptance and buy in of new interventions, management practices and technologies. With the collaborative support of all stakeholders including government, research institutions and community organizations, combined with indigenous wisdom and improved, cost-effective interventions, poultry production has the potential to sustainably address food insecurity and improve the livelihoods of smallholder farmers in developing countries around the world.

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