

# Antimicrobial Resistance and Poultry Production in Developing Countries



Antibiotics are natural, synthetic, or semi-synthetic substances that kill or interfere with the growth of microorganisms, specifically bacteria. They are used to treat or prevent infections in humans and animals. Antimicrobial drugs, such as antibiotics, are essential to protecting animal health in livestock production systems. However, their misuse and/or abuse can cause antimicrobial resistance (AMR), which is when microbes acquire the ability to tolerate one or more drugs we rely on to treat microbial infections. This publication considers AMR and poultry production in developing countries amid challenges of food insecurity, gender equity, shortage of Extension personnel, and lack of educational/training opportunities for smallholder farmers (particularly women).

## Antimicrobial Use

Animal agriculture in developing countries is increasingly important. As many countries transition to more intensive farming practices, antimicrobial use increases, resulting in an **increased risk of antimicrobial resistance** in animals and humans. This is particularly true across Africa, where livestock (especially poultry) is economically important.

Since the 1950s, antibiotics have been used in food animal production to treat and prevent disease. They have also been used as feed enhancers and growth promoters. While some regions and countries, including Europe and the U.S., have banned the use of antibiotics as growth promoters, other countries with fewer regulations, particularly in the developing world, still use them for this purpose.

Globally, more than 70 percent of antimicrobials produced on Earth are used in food-animal production, including poultry. The Food and Agriculture Organization (FAO) reported a global increase in egg and poultry meat production worldwide, with a total of 87 million tons of eggs and 123 million tons of poultry meat (37 percent of total meat production) in 2017. However, this **intensive poultry production in resource-limited settings may come with increased antimicrobial usage** that could increase AMR if biosecurity safeguards are lacking.

Antibiotic use in many low- to middle-income countries has reached and exceeded levels observed in high-income countries, and agricultural intensification could lead to a 67 percent increase in antimicrobial use by 2030, predominantly led by low- and middle-income countries. Africa is no exception; like other developing regions, use of antimicrobials in many African countries remains largely unregulated. Furthermore, poor antimicrobial use practices contribute to antimicrobial residues in food of animal origin.

## Poultry Production and AMR

Poultry is one of the **fastest growing meats consumed per capita** in the world. In the last 50 years, the annual global poultry growth rate was 5 percent. In contrast, it was 1.5 percent for beef, 3.1 percent for pork, and 1.7 percent for small ruminants. Chickens account for about 90 percent of global poultry production, amounting to approximately 23 billion chickens. This number has increased about five times in 50 years.

Antibiotics are **frequently used in food animal production in developing countries** (including much of Africa) to promote animal well-being and growth. Many of these antibiotics can be purchased over the counter. **Antibiotic use in food animals can enhance animals' overall health** and promote their general output, but the practice can also lead to **emergence and subsequent dissemination of AMR traits and antimicrobial-resistant bacteria**. The challenges of AMR are particularly problematic in developing African countries given the hardship of disease challenges, alongside livelihoods and living conditions that include numerous close interactions between humans and livestock.

Studies in developing countries provide evidence that AMR is transmitted among people, animals, and the environment. For example, in Tanzania, similarity in resistant enteric bacteria in people, animals (livestock and wildlife), and the environment have been found. In addition, *salmonella* in people and animals in Uganda has shown similar patterns. Antimicrobial residues have been reported in several African countries, including Egypt, Ethiopia, Ghana, Kenya, Nigeria, South Africa, Sudan, and Tanzania.

In many developing, low-resource settings, applying intensive poultry farming practices may increase the disease threat and preexisting health burdens, which could potentially lead to regional outbreaks or global disease pandemics. In addition, **local smallholder farmer poultry systems have numerous constraints**, including adequate poultry nutrition programs, matching genetic breeding stock to the environment, predator control, infrastructure and capital, education and training programs, governmental policies, farm groups and organizations, and biosecurity risks.

In addition, developing regions **lack poultry educational and training** opportunities for smallholder farmers and **do not have enough qualified Extension personnel** to deliver the training. Without proper education, training, assistance, and oversight, **small-scale poultry production can be a double-edged sword** at times, inadvertently exacerbating poverty and food insecurity.

However, despite issues and constraints, numerous studies highlight how smallholder farmer **poultry production has enhanced economic stability, increased food security, and improved gender equity**. Furthermore, researchers in Mozambique reported that village poultry provided poverty alleviation and economic stability among rural populations burdened by HIV/AIDS. In Bangladesh, large poultry operation models were scaled down and women's groups were appointed as managers. This intervention proved so successful that it was later adapted in other countries.

### Gender Equity and Poverty Issues

Interventions aimed at **improving gender equity** are very important in many developing countries. According to the World Bank, there are 900 million poor people worldwide **living on less than \$1.90 (U.S.) per day**. About half of them depend directly on livestock for their livelihoods. Some 290 million poor smallholder livestock keepers are estimated to be women, largely caretakers of poultry and small ruminants.

The FAO has indicated **priority should be given to improving conditions of women** working in the livestock sector to help improve gender equality in agricultural populations. However, this is difficult because women have limited access to educational training opportunities in general and AMR training specifically.

Poultry production offers a pathway to poverty alleviation and economic development in many developing countries. It is estimated that 250 million to 300 million people depend on livestock for their income and livelihood, with livestock representing an average of 30 percent of the agricultural gross domestic product (GDP) and approximately 10 percent of the total GDP. Poultry can contribute to three major pathways out of poverty:

- increasing resilience
- improving smallholder productivity
- increasing market participation

### Sustainable Development Goals

The United Nations (UN) recently launched the 2030 Agenda for Sustainable Development that established 17 sustainable development goals (SDGs) to mitigate impacts of human pressure on the planet. These SDGs have stimulated increased development of poultry husbandry programs, and many fit well with smallholder farmer poultry systems (Table 1).

These programs are often led by international aid agencies, developmental agencies, and nongovernmental organizations that invest in smallholder farmer poultry systems. Smallholder farmer development **poultry programs have been widely implemented** in recent years to promote economic stability, increase food security, and improve gender equity, particularly in developing and resource-limited locations.

### Antibiotic Alternatives Needed

Managing antimicrobial resistance is a challenge with the constraints placed on food and agricultural production systems by a growing population, pressure on natural resources, challenges associated with climate variability and change, and demands of ensuring food security/safety in a global economy. The problem is particularly challenging across many developing African countries where **antibiotics are frequently used not for disease treatment but to promote food animal well-being and growth**. While this practice may provide some benefits to producers and consumers at large, a major concern is that repeatedly exposing animals to small doses of antibiotics is **contributing to AMR**.

For example, a recent study evaluating antibiotic application in food animals in Rwanda revealed that up to 97 percent of smallholder farmers use antibiotics, mainly for disease prevention and growth promotion. The study also indicated that most farmers **have limited expertise on antibiotic use** in food animals, calling attention to the need for educational and training programs.

**Table 1. Contributions of smallholder poultry to the UN sustainable development goals.**

Contribution of Smallholder Poultry System	Sustainable Development Goals Met
Increasing availability, accessibility, use, and stability of supply of food and nutrients.	2. Zero hunger 3. Good health and well-being
Smallholder farmer poultry can be kept by vulnerable groups, giving them access to a source of income. Community-supported models for Newcastle disease prevention can provide employment, particularly for women, and increased production can promote rural economic growth.	1. No poverty 8. Decent work and economic growth
Targeting a livestock species and production system that is largely under women's control allows improvements to small-scale poultry production systems that can preferentially benefit women, promoting their empowerment. Income under women's control is also more likely to be used to support their children's education.	5. Gender equality 4. Quality education
To efficiently and sustainably use natural resources while achieving adequate nutrition globally, high-income countries must decrease food waste and consumption of calorie-dense, nutrient-poor foods, while low- and middle-income countries increase their consumption of nutrient-rich foods. Small-scale poultry is nutritious and locally available, typically with a short supply chain. Measures to improve poultry health and welfare will improve production efficiency and ensure sustainability.	12. Responsible consumption/production
Small-scale poultry production does not require land clearing, contributes positively to ecosystem health, and can reduce loss of biodiversity by being a rich pool of genetic diversity and an alternate protein source to bushmeat.	15. Life on the land

Adapted from Mottet and Tempio (2017) and Wong et al. (2017).

Antibiotic **alternatives must play a larger role in food animal production** to lessen the threat of AMR in both developed and developing countries. In addition, in developing countries around the world, over-the-counter availability of antibiotics and antibiotic use in animal feed should come under increased monitoring and regulation to ensure that antimicrobials are used for treatment of sick animals, not as prophylactics. Improved farm biosecurity is another important alternative intervention that focuses on preventing entry and spread of disease on the farm, thereby lessening dependence on antibiotics for disease control and prevention.

## Summary

Use of antimicrobial drugs in food-producing animals yields healthier and increasingly prolific animal production. However, emergence of antimicrobial-resistant bacteria is likely linked to antimicrobial drug use in humans and animals. Increased use of antimicrobials corresponds to increased emergence of antimicrobial-resistant bacteria.

Unfortunately, many smallholder farmers across developing countries make decisions on antimicrobial use with little or no assistance from Extension or animal health personnel, who are often inaccessible or nonexistent because of distance, logistical, or financial considerations. This underscores the **need for additional Extension personnel and increased outreach** and educational efforts.

Addressing AMR at the global level will require efforts from both the developed and developing world. However, **interventions in the developing world will likely differ from those of the developed world because of unique cultural and socioeconomic factors** affecting emergence of AMR in the developing world.

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