Food for Public Health Series

Rise of Antibiotics Resistance and Its Public Health Implications in Africa

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Introduction

Antimicrobial resistance (AMR) is a growing threat to African food systems. It has now become one of the top 10 global public health threats, in which disease-causing microbes no longer respond to antibiotics treatments. If AMR is left unchecked, it is estimated to claim up to 4.1 million African lives by 2050 (1). This is not only a medical problem but a food system challenge from farm to fork across the continent.

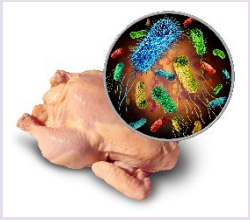
In many parts of Africa, antibiotics are used in food production to prevent animal diseases and promote growth. However, the widespread unregulated use of

these drugs has led to drug residues and resistant bacteria entering the food chain (2). Small-scale farmers usually lack knowledge of proper antibiotic use or withdrawal periods which are the waiting time for drugs to clear from animal products resulting in meat, milk, and fish carrying trace antibiotics. These practices don't just expose consumers to antibiotic residues, they also encourage the spread of antibiotic-resistant bacteria from animals to humans. This misuse of antibiotics poses notable long-term public health risks.

The impacts are evident in a Cameroonian study that discovered multidrug-resistant bacteria in fish sold for human consumption (3). In practical terms, an everyday meal could expose people to infections that do not respond to common antibiotics. Such scenarios are becoming increasingly common, linking farm practices to difficult-to-treat infections in the community. Facing AMR challenges in Africa will require greater awareness, responsible antibiotic use, and strong policies for African nations to curb this impending crisis.

How Food Systems Contribute to AMR in Africa

Food systems, from farm to fork, play a significant role in the rise of antimicrobial resistance (AMR) across Africa. Misuse of antibiotics in agriculture and poor handling of food allow resistant bacteria to flourish and spread to people. Key contributing factors include:



Excessive Antibiotic Use in Farming:

Livestock, poultry and aquaculture are fed with antibiotics on an excess scale without proper veterinary controls (4,5). A study in Nigeria found that 80% of fish farmers administered antibiotics, even in the absence of disease (6). Similarly, in Rwanda's small-scale dairy farms, 85.7% of farmers reported using antibiotics without any veterinary prescription, typically purchasing drugs easily from local shops (2). According to another recent study in Cameroon (7), 70% of beef and 69% of raw milk samples tested positive for antibiotic residues, indicating frequent drug misuse on farms. Another study in Ghana identified *Salmonella* bacteria on chicken eggs from informal markets and these *Salmonella* isolates were highly resistant to common antibiotics like ciprofloxacin (over 90% of strains); some strains were even characterized as multidrug-resistant (8). The findings show that excess use of antibiotics contributes to the persistence of resistant bacteria in the food supply.

Poor Sanitation in Food Handling:
AMR is also caused by poor sanitation in food processing and in retail facilities. Resistant bacteria can spread when there is inadequate sanitation during animal slaughter, processing, and retailing of food. In Kenya, a study found that 38% of bacteria in raw pork and poultry meat were multi-drug resistant, due in part to poor market hygiene (9). If hygiene is not improved, then consumers can be exposed to drug resistant bacteria in their everyday foods. In street markets in Ghana, *Staphylococcus aureus* and *Escherichia coli* were found on the hands of food handlers making the risk of cross-contamination significantly higher (10). Resistant bacteria thrive where there is improper meat storage, insufficient washing of fresh produce, and cross-contamination during the preparation of food.

Gaps in Regulation and Oversight:
While many African countries have regulations on antibiotic use, enforcement is weak (11,12). For instance, in Nigeria, antibiotics are openly being purchased by the farmers without regard to veterinary prescriptions that are legally required (13). In Tanzania, antibiotics were readily available without prescription, making it easy for farmers to misuse these drugs (14). In Kenya, dairy regulations exist, but milk sold through vending machines is rarely tested for antibiotic residues, exposing consumers to potential risks (15). Surveys indicate that across multiple African nations, antibiotics remain widely available for purchase without a prescription, enabling routine misuse in food production (14). Strengthening regulations, enforcing withdrawal periods, and improving farmer education are crucial to preventing AMR from further spreading through the food supply.

Public Health Burden and Risks of AMR in Food

Antimicrobial-resistant (AMR) bacteria in food can cause infections that antibiotics could struggle to cure. When someone eats food contaminated with antimicrobial resistant strains like *Salmonella* serovars or *E. coli*, they can develop an illness that is much harder to treat (16). Common antibiotics may not work for such infections leading to prolonged onset of symptoms. In severe cases, doctors may have to resort to stronger medications and patients still face a higher risk of complications and/or higher rate of death.

A recent study in Nigeria identified rare serovars of non-typhoidal *Salmonella enterica* from farm personnels, cattle and abattoir environments which had multi-drug resistance characteristics in humans and animals (17). Some researchers also identified a strain of invasive non-typhoidal *Salmonella* that was resistant to all drugs except for ciprofloxacin and ceftriaxone in the Democratic Republic of Congo, expressing concerns about foodborne infections that might not be untreatable with common antibiotics (18). Drug resistant *Salmonella* Enteritidis, commonly linked to poultry and poultry products, is also emerging in sub-Saharan Africa as it has the ability to cause many foodborne infections that lead to invasive life-threatening illnesses.

AMR foodborne infections pose the greatest threat to children, older adults, and individuals with compromised immune systems (such as those affected by malnutrition or HIV) (19). These groups are less able to fight severe illnesses. Infants and young children already suffer a disproportionate share of serious foodborne diseases in Africa. In 2017, sub-Saharan Africa accounted for 79% of the world's invasive *Salmonella* bloodstream infections (20), which often strike immunocompromised children.

Individuals with drug-resistant infections often face extended hospital stays and need more intensive medical treatment. Treating these illnesses is expensive for families and hospitals, and sickness can mean missed work for patients and caregivers. According to the World Bank, AMR could impose an extra US $1 trillion on annual health care costs by 2050 globally (16). This urgency to control AMR in the food supply makes it a key issue for African countries that might already struggle with resources and may cause them to have to divert funds from other needs to manage antimicrobial resistant outbreaks.

Solutions: What Can We Do?

Everyone has a role to play in fighting AMR in our food systems. Below are targeted steps for different groups to help reduce the spread of antibiotic resistance through food.

Consumers Should:

1. Practice Safe Food Handling by adhering to the "4 Cs" *e.g.* cleaning, cooking, chilling, and avoiding cross-contamination to minimize exposure to harmful bacteria (21). Wash hands, utensils, and surfaces after handling raw meat, and cook foods thoroughly to kill bacteria.
2. Stay informed by learning about AMR and advocating responsible antibiotic use in both healthcare and agriculture. Avoid pressuring doctors or vets for antibiotics when not needed because responsible use in both humans and animals help keep antibiotics effective.

Food Producers & Industry Should:

1. Use antibiotics only under veterinary supervision and avoid their use for growth promotion. When treatment is necessary, they should choose appropriate and prescribed drugs only and always observe withdrawal periods, so no unsafe residues remain in meat, milk, fish, or eggs (22).
2. Establish strict sanitation rules in farms, slaughterhouses and the food processing facility, to prevent contamination.

Policymakers & Regulators Should:

1. Provide financial and regulatory support to strengthen surveillance through monitoring systems to monitor antibiotic use and the occurrence of resistance patterns in the food supply chain (23).
2. Enforce regulations by implementing and upholding laws that control antibiotic usage in agriculture and ensuring compliance through regular inspections. Many African countries have developed AMR action plans, but these need funding and enforcement to be effectively implemented.

3. Promote public awareness and antimicrobial stewardship by launching educational campaigns to highlight the risks of AMR and the importance of responsible antibiotic practices. They should also support and incentivize the use of alternatives (such as vaccines, probiotics, or improved farm management) that may reduce the need for antibiotics.

By taking these steps, all stakeholders can contribute to reducing the spread of AMR in Africa's food systems.

Key Takeaways

1. AMR in food poses a significant threat to public health in Africa.
2. Collaborative actions from consumers, producers, and policymakers are essential to combat this issue.
3. Implementing responsible antibiotic use and stringent hygiene practices in Africa can mitigate the spread of resistant bacteria

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