Research Output Journal of Biological and Applied Science 6(1):36-40, 2026

ROJBAS Publications ONLINE ISSN: 1115-9200

https://rojournals.org/roj-biological-and-applied-science/ PRINT ISSN: 1115-6120

https://doi.org/10.59298/ROJBAS/2026/613640

The Impact of Livestock and Agriculture on Diarrheal Disease in Rural Communities

Bwanbale Geoffrey David

Faculty of Pharmacy Kampala International University Uganda

ABSTRACT

Diarrheal diseases remain a major global health concern, disproportionately affecting rural populations in low- and middle-income countries (LMICs). This review explores the complex relationship between livestock, agricultural practices, and diarrheal disease transmission in rural communities, with a focus on zoonotic and environmental pathways. While livestock and agriculture provide essential sources of nutrition, income, and food security, they also pose significant public health risks when sanitation and hygiene are inadequate. Evidence indicates that close human–animal interaction, poor waste management, and contaminated water sources contribute to the spread of enteric pathogens such as *Escherichia coli*, *Campylobacter*, and *Cryptosporidium*. Children under five years of age are particularly vulnerable due to their behavioral exposure and underdeveloped immunity. The review emphasizes the importance of integrating water, sanitation, and hygiene (WASH) interventions with improved livestock management and environmental health strategies. It advocates for a One Health approach that recognizes the interconnectedness of human, animal, and environmental systems. By promoting cross-sectoral collaboration, strengthening rural health infrastructure, and improving public awareness, it is possible to mitigate diarrheal disease risks while sustaining agricultural productivity and community well-being.

Keywords: Diarrheal diseases, livestock, agriculture, zoonotic transmission, rural health.

INTRODUCTION

Diarrheal diseases remain a leading cause of morbidity and mortality worldwide, particularly affecting children under five years of age in low- and middle-income countries (LMICs) [1]. According to the World Health Organization (WHO) [2], diarrheal diseases account for approximately 525,000 child deaths annually, with the highest burden observed in rural and resource-limited communities. These diseases are primarily caused by pathogens such as bacteria, viruses, and protozoa, which are often transmitted through contaminated water, food, and environmental surfaces. In rural communities, however, an additional and often overlooked risk factor contributing to diarrheal disease transmission is the close interaction between humans, livestock, and agricultural environments.

Livestock and agriculture play a vital role in the livelihoods of rural populations, providing food security, income, and employment. Livestock, including cattle, goats, sheep, and poultry, contribute essential nutrients such as protein, vitamins, and minerals to human diets. Agricultural activities, including crop farming and irrigation-based agriculture, also support rural economies by providing both subsistence and cash crops [3]. Despite these benefits, evidence increasingly suggests that livestock and agricultural practices can inadvertently facilitate the spread of infectious diseases, particularly diarrheal illnesses, through zoonotic and environmental pathways. Zoonotic diseases—those transmitted from animals to humans can result from direct contact with animals, handling of animal waste, consumption of contaminated food, and exposure to contaminated water sources [4].

The relationship between livestock, agriculture, and diarrheal disease is complex and multifaceted. On the one hand, livestock production enhances nutrition and economic stability, improving overall community health. On the other hand, inadequate sanitation, poor hygiene practices, and unregulated animal husbandry can increase exposure to

pathogenic microorganisms. For example, open defecation by animals near households, improper disposal of manure, and contamination of drinking water sources are common scenarios in rural settings that significantly elevate diarrheal disease risk [5]. Additionally, agricultural irrigation using contaminated water may facilitate the spread of enteric pathogens, further exacerbating the burden of diarrheal illnesses. Understanding these dynamics is essential for developing effective interventions that balance the health benefits of livestock and agriculture with the associated public health risks [6].

Despite the critical role of livestock and agriculture in sustaining rural livelihoods, the inadvertent health risks associated with these practices have not been fully addressed in public health strategies. In many rural communities, children, women, and other vulnerable groups are frequently exposed to environments contaminated by animal waste, pathogens, and unclean water, leading to repeated episodes of diarrheal disease [7]. This persistent exposure not only contributes to high morbidity and mortality but also undermines nutritional status, cognitive development, and long-term health outcomes in children.

Current public health initiatives in many LMICs often focus on water, sanitation, and hygiene (WASH) interventions but may overlook the contribution of livestock and agricultural activities to diarrheal disease transmission. The limited integration of agricultural and livestock management practices into health promotion strategies has created a knowledge gap regarding the pathways through which farming activities contribute to disease risk [8] . Without a clear understanding of these mechanisms, interventions may fail to address the root causes of diarrheal disease in rural communities. Moreover, the absence of context-specific evidence makes it challenging for policymakers to design targeted strategies that simultaneously promote agricultural productivity and safeguard public health. This review aims to synthesize existing evidence on the relationship between livestock, agricultural practices, and diarrheal disease in rural communities. It seeks to examine how livestock exposure contributes to diarrheal infections, especially among children under five, and to explore the influence of agricultural activities such as irrigation, crop farming, and manure management on disease transmission. The study identifies key household and environmental risk factors and evaluates current interventions designed to mitigate these impacts. It also proposes integrated approaches that balance agricultural productivity with public health goals. Guided by specific research questions, the review provides critical insights into the mechanisms linking livestock and agriculture to diarrheal disease, emphasizing the importance of One Health strategies that integrate human, animal, and environmental health. Its findings hold significant implications for policymakers, health practitioners, and agricultural stakeholders, offering pathways to reduce child morbidity, improve nutrition, and promote sustainable rural livelihoods. Ultimately, this study underscores the need for holistic, evidence-based interventions to enhance health outcomes while sustaining agricultural development in rural areas.

Association between Domestic Animal Exposure and Diarrheal Disease

A growing body of evidence indicates a strong association between domestic animal exposure and diarrheal disease, particularly among children under five years of age in low- and middle-income countries (LMICs). A systematic review and meta-analysis published in *BioMed Central* revealed that young children who frequently interact with domestic animals such as chickens, goats, cows, dogs, and pigs are nearly twice as likely to develop diarrheal diseases compared to those with limited or no contact [9]. This elevated risk is largely attributed to zoonotic transmission, where pathogens are transferred from animals to humans through direct contact, contaminated soil, water, or food sources. In many LMICs, domestic animals are kept within or near household compounds due to limited space, poor sanitation infrastructure, and socio-economic reliance on livestock for food and income. Consequently, animal feces often contaminate the living environment, creating ideal conditions for the transmission of enteric pathogens such as *Escherichia coli*, *Campylobacter*, *Salmonella*, and *Cryptosporidium*. Children, due to their developing immune systems and exploratory behavior, such as playing on the ground and putting objects in their mouths—are particularly susceptible to infection. The findings highlight the urgent need for integrated approaches combining water, sanitation, and hygiene (WASH) interventions with animal husbandry and environmental health strategies to mitigate this risk. Promoting safe animal management practices, improved household hygiene, and public health education can significantly reduce diarrheal disease burden in vulnerable populations while supporting sustainable coexistence between humans and animals [10].

Risk Factors in Livestock-Keeping Households:

Risk factors in livestock-keeping households have been increasingly recognized as significant contributors to the transmission of diarrheal diseases, particularly in low- and middle-income countries. Studies conducted in Cambodia and Ethiopia highlight several interconnected determinants that elevate disease risk among families engaged in animal husbandry [11]. One of the primary factors is inadequate sanitation practices, such as the lack of access to clean water, poor waste disposal systems, and insufficient handwashing facilities. These conditions create an environment conducive to fecal contamination, facilitating the spread of enteric pathogens. Additionally, close physical contact between humans and animals, often a daily occurrence in households where livestock live within or near family dwellings, increases exposure to zoonotic microorganisms present in animal feces, saliva, or

contaminated surfaces. Improper handling of animal waste further compounds the problem, as dung is often used for fuel, fertilizer, or building material without adequate treatment or protection. This exposure pathway enables the transmission of pathogens such as *Escherichia coli*, *Campylobacter*, and *Cryptosporidium*, which are common causes of diarrheal infections. Moreover, children in these households are particularly vulnerable, as they frequently play in contaminated environments and have underdeveloped immune systems. Socioeconomic constraints, limited awareness of hygiene practices, and insufficient veterinary or public health services exacerbate these risks. Overall, the close human–animal interface, combined with poor sanitation and hygiene conditions, underscores the need for integrated "One Health" approaches that address environmental, animal, and human health interactions to reduce diarrheal disease burden in livestock-keeping communities [12].

Nutritional and Health Impact

Livestock production plays a dual role in influencing household nutrition and health, offering both benefits and potential risks. On one hand, livestock provides essential sources of protein, micronutrients, and income that can significantly improve dietary diversity and food security. The sale of animal products such as milk, eggs, and meat allows households to access other nutritious foods and healthcare services, thereby enhancing overall well-being [13]. However, the close interaction between humans and animals, particularly in rural and low-income settings, can create serious public health challenges. Poor management of animal waste, contaminated water sources, and inadequate hygiene practices contribute to environmental pollution and the spread of zoonotic diseases. These conditions can lead to higher incidences of diarrheal diseases, parasitic infections, and malnutrition, especially among children who are more vulnerable to infections. Studies published in *Frontiers* emphasize that exposure to livestock-related pathogens often undermines the nutritional benefits of animal-source foods by increasing nutrient loss through illness and impaired absorption. Additionally, livestock rearing can exacerbate water contamination through runoff containing fecal matter and antibiotics, further affecting community health [14]. Therefore, while livestock production remains vital for rural livelihoods and nutrition, it is essential to adopt integrated approaches that promote sustainable animal husbandry, sanitation, and hygiene. Ensuring proper waste management, safe water use, and community health education can help mitigate these risks, enabling households to maximize the nutritional advantages of livestock while minimizing health hazards.

Implications for Public Health

The findings underscore profound implications for public health, particularly in rural communities where poor sanitation, close human-animal interactions, and limited healthcare access heighten vulnerability to diarrheal and other zoonotic diseases [15]. Addressing these challenges requires comprehensive and sustainable interventions that go beyond treating infections to tackling their root causes. Improving sanitation infrastructure, such as ensuring access to clean water, constructing and maintaining hygienic latrines, and promoting waste management, can drastically reduce the transmission of pathogens responsible for diarrheal diseases. Equally important is promoting safe animal handling and livestock management practices, as improper contact with domestic and wild animals often facilitates the spread of zoonotic pathogens. Public health campaigns that raise awareness about the importance of hand hygiene, food safety, and environmental cleanliness can empower communities to adopt preventive behaviors [16]. Furthermore, integrating the One Health approach, which acknowledges the interconnectedness between human, animal, and environmental health, is essential for effective disease surveillance, early detection, and response. Collaboration among veterinarians, medical practitioners, environmental scientists, and policymakers can enable a holistic understanding of disease dynamics and support coordinated interventions. For instance, monitoring water sources shared by humans and animals, or controlling animal vectors, can preempt outbreaks before they escalate. Investing in community health education, coupled with strengthening local healthcare systems, can enhance disease reporting and response capacity. Ultimately, adopting an integrated, multisectoral framework grounded in the One Health concept not only mitigates the burden of diarrheal and zoonotic diseases but also contributes to overall health resilience, food security, and sustainable rural development [17]. By bridging gaps between public health, veterinary, and environmental sectors, these interventions can foster healthier communities and promote long-term well-being across both human and animal populations.

CONCLUSION

The relationship between livestock, agriculture, and diarrheal disease in rural communities is complex, reflecting both the benefits and risks of agrarian livelihoods. While livestock and farming activities provide critical sources of nutrition, income, and food security, they also serve as potential pathways for pathogen transmission when sanitation and hygiene are inadequate. The review highlights that poor waste management, contaminated water, and close human–animal contact significantly contribute to diarrheal disease burden, particularly among children under five. These findings emphasize the urgent need for integrated strategies that align agricultural productivity with public health goals. Implementing the One Health approach, which recognizes the interdependence of human, animal, and environmental health, is vital to reducing disease risks and enhancing rural resilience. Strengthening sanitation infrastructure, promoting safe animal handling, improving water quality, and investing in health education can

collectively curb diarrheal infections. Furthermore, collaborative efforts among policymakers, health practitioners, and agricultural stakeholders are essential to develop sustainable, evidence-based interventions that ensure both community well-being and environmental protection. Ultimately, balancing agricultural development with health safeguards offers a sustainable pathway toward healthier, more resilient rural populations.

REFERENCES

1. Hartman, R.M., Cohen, A.L., Antoni, S., Mwenda, J., Weldegebriel, G., Biey, J., et al.: Risk Factors for Mortality among Children Younger than Age 5 Years With Severe Diarrhea in Low- and Middle-income Countries: Findings From the World Health Organization-coordinated Global Rotavirus and Pediatric Diarrhea Surveillance Networks. Clin Infect Dis. 76, e1047–e1053 (2022). https://doi.org/10.1093/cid/ciac561
2. Diarrhoeal disease, https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease
3. Ogban G. I, Ndueso E. M, Iwuafor A. A, Emanghe U. E, Ushie S. N, Ejemot-Nwadiaro R. I(2020). Basic Knowledge of Childhood Diarrhea and Health-seeking Practices of Caregivers of Under-five ChildreninCalabar-South, Calabar, Nigeria. *Asian Journal of Medicine and Health, 18, (4), 12-23. https://doi.org/10.9734/ajmah/2020/v18i430195*.
4. Zhang, T., Nickerson, R., Zhang, W., Peng, X., Shang, Y., Zhou, Y., et al.: The impacts of animal agriculture on One Health—Bacterial zoonosis, antimicrobial resistance, and beyond. One Health. 18, 100748 (2024). https://doi.org/10.1016/j.onehlt.2024.100748
5. Critchley J. A, Ejemot-Nwadiaro R. I, Ehiri J. E, Arikpo D, Meremikwu M. M (2015). Hand washing promotion for preventing diarrhea. *Cochrane Database of Systematic Reviews, 9, 9. Art. No.: CD004265. DOI: 10.100.*
6. Falkenberg, T., Saxena, D.: Impact of Wastewater-Irrigated Urban Agriculture on Diarrhea Incidence in Ahmedabad, India. Indian J Community Med. 43, 102–106 (2018). https://doi.org/10.4103/ijcm.IJCM_192_17
7. Awor P, Wamani H, Bwire G, Jagoe G, Peterson S (2012). Private sector drug shops in integrated community case management of malaria, pneumonia, and diarrhea in children in Uganda. *The American journal of tropical medicine and hygiene, 87, (5), 92, doi: 10.4269/ajtmh.2012.11-0791*.
8. Alum EU, Obeagu EI, Ugwu OP. Enhancing quality water, good sanitation, and proper hygiene is the panacea to diarrhea control and the attainment of some related sustainable development goals: A review. Medicine (Baltimore). 2024 Sep 20;103(38):e39578. doi: 10.1097/MD.0000000000039578. PMID: 39312342; PMCID: PMC11419503.
9. Association between domestic animal exposure and diarrhea prevalence in under- five children in low- and middle-income countries: a systematic review and meta-analysis | BMC Pediatrics | Full Text, https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-024-05084-4
10. Awor P, Wamani H, Bwire G, Jagoe G, Peterson S (2012). Private sector drug shops in integrated community case management of malaria, pneumonia, and diarrhea in children in Uganda. *The American journal of tropical medicine and hygiene, 87, (5), 92, doi: 10.4269/ajtmh.2012.11-0791*.
11. Asakura, S., Khieu, B., Seng, S., Pok, S., Ty, C., Phiny, C., et al.: Frontiers | Diarrhea illness in livestock keeping households in Cambodia: An analysis using a One Health framework. https://doi.org/10.3389/fsufs.2023.1127445
12. Ugwu, O. P. C., Alum, E. U. and Uhama, K. C. (2024). Phytochemicals and Vitamins as Adjunct Therapies for Diarrhea in Diabetic Patients. Research Invention Journal of Research in Medical Sciences. 3(2):27-37.
13. Chen, D., Mechlowitz, K., Li, X., Schaefer, N., Havelaar, A.H., McKune, S.L.: Benefits and Risks of Smallholder Livestock Production on Child Nutrition in Low- and Middle-Income Countries. Front Nutr. 8, 751686 (2021). https://doi.org/10.3389/fnut.2021.751686
14. Ugwu, O. P. C., Alum, E. U. and Uhama, K. C. (2024). Role of Phytochemical-Rich Foods in Mitigating Diarrhea among Diabetic Patients. Research Invention Journal of Scientific and Experimental Sciences. 3(1):45-55.
15. Stufano, A., Schino, V., Plantone, D., Lucchese, G.: Occupational zoonoses, neurological diseases, and public health: A one health approach. Infect Med (Beijing). 4, 100184 (2025). https://doi.org/10.1016/j.imj.2025.100184
16. Cao Ba, K., Kaewkungwal, J., Pacheun, O., Nguyen Thi To, U., Lawpoolsri, S.: Health Literacy Toward Zoonotic Diseases Among Livestock Farmers in Vietnam. Environ Health Insights. 14, 1178630220932540 (2020). https://doi.org/10.1177/1178630220932540
17. Alum, E. U., Obeagu, E. I., Ugwu, O. P. C. Curbing Diarrhea in Children below five years old: The sub-Saharan African Standpoint.*J. New Medical Innovations and Research.* 2024;5(1); DOI:10.31579/2767-7370/083

CITE AS: Bwanbale Geoffrey David. (2026). The Impact of Livestock and Agriculture on Diarrheal Disease in Rural Communities. Research Output Journal of Biological and Applied Science 6(1):36-40. https://doi.org/10.59298/ROJBAS/2026/613640