


# Chapter 12


## Risk Identification and Intervention Strategies in Health, Water, Food Security, and Livestock for Sustainable Development

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### **ABSTRACT**

*This chapter investigates the important relationship of health, water, food security, sanitation, and livestock productivity within the conceptual structure of sustainable development. By aligning with the United Nations Sustainable Development Goals (SDGs), this analysis highlights the importance of risk management and intervention strategies that address these interlinked sectors to ensure a resilient and sustainable future. The chapter is organized into several sections, each focusing on a key area and its associated challenges, risks, and solutions, especially in developing countries where resources are limited and socio-economic and environmental constraints are raised.*

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## 1. INTRODUCTION

Health and hygiene are integral to sustainable development, as challenges like pandemics, antimicrobial resistance (AMR), and inadequate healthcare and sanitation disproportionately affect low- and middle-income countries (Aslam et al., 2024). The COVID-19 pandemic exposed global healthcare vulnerabilities, emphasizing the need for stronger public health infrastructure and risk management strategies (Benjamin, 2020). Similarly, water scarcity, pollution, and ocean degradation pose severe threats to food security and public health, with case studies such as the Ganges River pollution and the Cape Town water crisis illustrating the consequences of poor water management (Srinivas et al., 2020).

Oceans play a crucial role in climate regulation, yet issues like acidification and overfishing endanger marine ecosystems and food security. Inadequate sanitation further exacerbates public health risks, especially in rural and low-income areas, contributing to the spread of waterborne diseases (Manetu & Karanja, 2021). Examples from India's open defecation crisis and Bangladesh's sanitation improvements highlight both challenges and solutions, such as eco-friendly toilets and decentralized waste management.

Climate change, soil degradation, and unsustainable agricultural practices are increasingly threatening food security, affecting both the quantity and safety of food production (Hossain et al., 2020). Sustainable approaches, such as regenerative farming and agroecology, are essential for building resilient food systems in vulnerable regions like Sub-Saharan Africa and Southeast Asia (Amede et al., 2023).

Additionally, livestock productivity remains crucial for global nutrition and rural economies, yet it faces threats from disease outbreaks, AMR, and environmental degradation due to industrial farming. Sustainable livestock management practices, including rotational grazing and organic feed, offer solutions to mitigate environmental impacts and enhance resilience against climate-related challenges (Erdaw, 2023).

The interconnections between health, hygiene, water resources, food security, and livestock productivity (Figure 1) highlight the complexity of achieving sustainable development (Garcia et al., 2020). Addressing these challenges requires an integrated approach that incorporates risk management, policy interventions, and innovative solutions (Pomaza-Ponomarenko et al., 2023). By strengthening healthcare systems, improving sanitation infrastructure, conserving water resources, promoting sustainable agriculture, and adopting environmentally friendly livestock practices, societies can work toward a more resilient and equitable future (Corvalan et al., 2020). This chapter explores these themes in greater detail, providing insights into effective strategies for mitigating risks and advancing sustainability goals.

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