

Food Safety and Quality: A Comprehensive Review

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INTRODUCTION & AIM

Food safety and quality are not only crucial for preventing foodborne diseases but also for ensuring that consumers consistently receive high-quality, safe food products. These aspects play a vital role in protecting public health, fostering consumer trust, and supporting global trade. This systematic review seeks to thoroughly evaluate the current practices, risks, and advancements in food safety and quality control throughout the entire food supply chain—from production and processing to distribution and retail. By analyzing recent studies and data from diverse regions and sectors, this review aims to uncover common challenges, such as contamination risks, inadequate hygiene practices, and regulatory gaps. Furthermore, it explores effective strategies and technologies that have been implemented to mitigate these risks, including innovations in packaging, thermal processing, and regulatory frameworks. By identifying both successes and areas for improvement, this review provides valuable insights into how food safety measures can be optimized, hygiene standards can be elevated, and overall food quality can be enhanced for consumers globally.

METHOD

Design

The review followed Whittermore and Knafi's (2005) systematic review methodology, which consists of six steps: problem formulation, literature search, data evaluation, data analysis, data synthesis, and finally, conclusion and presentation of results.

Databases

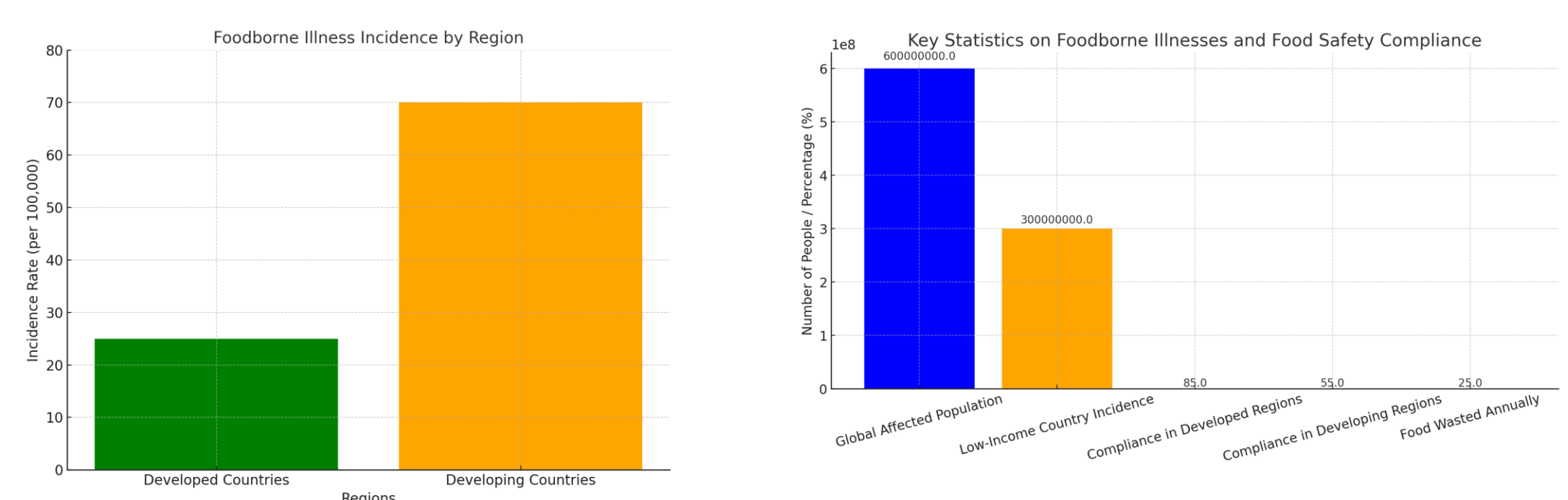
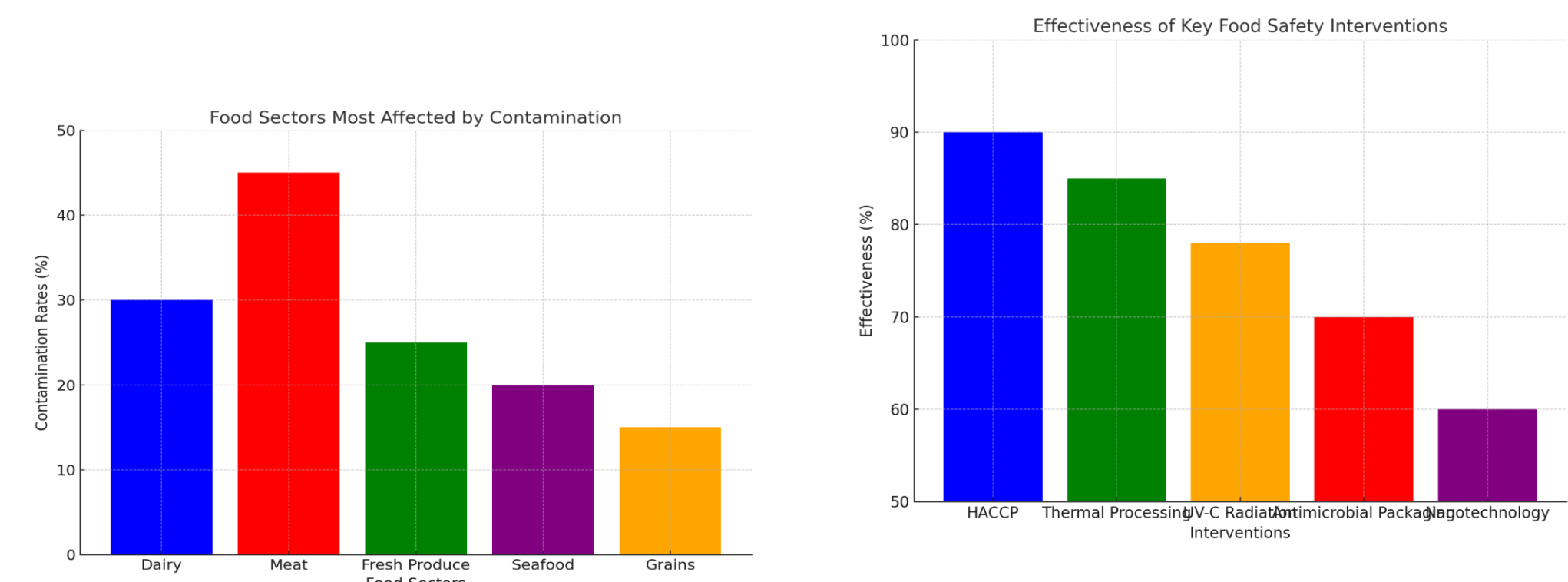
The study utilized PubMed, PsycINFO, Web of Science, Google Scholar, and Scopus databases.

Search terms

A diverse range of search terms was used. This included "food safety regulations", "foodborne illnesses", "hazard analysis critical control points (HACCP)", "food safety standards", "microbial food safety", "food safety management systems", "food quality assessment", "quality control in food production", "sensory evaluation of food", "food quality assurance", "food product development", "food safety and quality management", "food safety practices and quality assurance", "food quality and safety challenges", "food quality metrics", "sustainable food safety practices", "consumer perceptions of food safety and quality", "agriculture food safety", "food processing safety standards". These terms ensured a comprehensive exploration of the topic.

RESULTS & DISCUSSION

This systematic review examined the effectiveness of various food safety and quality control measures across the global food supply chain. By analyzing 20 studies, the review identifies critical interventions, risk factors, and regional disparities in food safety practices. The findings offer valuable insights into the technologies and strategies that have proven effective in minimizing contamination, while also highlighting areas that require further improvement, particularly in developing countries. These results provide evidence-based recommendations for strengthening global food safety systems and enhancing food quality standards.



This systematic review analyzed over 20 studies on food safety, contamination risks, and quality control. Around 30% of foodborne illness outbreaks were linked to contamination during processing, with higher rates in developing regions due to poor hygiene and weak regulations. Advanced safety interventions like HACCP reduced contamination by up to 60%, but adherence to these protocols was inconsistent in areas with weak regulatory frameworks. Foodborne illnesses affect 600 million people globally each year, with a 50% higher incidence in low-income countries due to insufficient infrastructure. Compliance with food safety standards was significantly higher in developed regions (85%) compared to developing regions (55%). Additionally, poor storage practices led to 25% of food being wasted annually, especially in regions lacking cold-chain infrastructure.

CONCLUSION

This review emphasises the critical need for robust food safety and quality control measures, especially in regions where regulatory frameworks remain weak or underdeveloped. While advanced interventions, such as HACCP and antimicrobial packaging, have proven effective in significantly reducing contamination, substantial gaps still need to be addressed, particularly in developing countries. These regions often face challenges related to limited infrastructure, inadequate enforcement of food safety regulations, and a lack of education and awareness on proper handling practices. It will take more than technological innovations to ensure global food safety—it will require a multi-faceted approach that includes targeted investments in education, capacity building, and infrastructure improvements. Additionally, stronger collaboration between governments, international organizations, and the private sector is essential for the establishment and enforcement of consistent regulatory standards across borders. Only through these combined efforts can we create a safer global food system for all.

FUTURE WORK

Future work should focus on improving the implementation and monitoring of food safety protocols, particularly in developing regions where compliance remains low. Research should explore innovative, cost-effective technologies, such as antimicrobial packaging and nanotechnology, that can be widely adopted across different regions. Additionally, future studies should examine the impact of strengthening regulatory frameworks, education, and infrastructure on reducing contamination and improving food quality.

Whittermore and Knafi's Methodology

