Article type: Editorial

Home Page URL: https://www.alliedacademies.org/journal-bacteriology-infectious-diseases/

Foodborne Pathogens: Surveillance and Control of Salmonella, Shigella, and Campylobacter.

Yajing Fang*

School of Food and Biological Engineering, Jiangsu University, China

***Correspondence to**: Yajing Fang, School of Food and Biological Engineering, Jiangsu University, China. E-mail: fang_y@197.com

Received: *03-Jan-2024, Manuscript No. AABID-25-169067;* ***Editor assigned:*** *05-Jan-2024, Pre QC No. AABID-25-169067 (PQ);* ***Reviewed:*** *15-Jan-2024, QC No. AABID-25-169067;* ***Revised:*** *23-Jan-2024, Manuscript No. AABID-25-169067 (R);* ***Published:*** *31-Jan - 2024, DOI: 10.35841/ aabid-8.1.171*

Introduction

Foodborne diseases remain a major public health concern worldwide, with pathogens like *Salmonella*, *Shigella*, and *Campylobacter* responsible for millions of cases of gastroenteritis and systemic infections annually. These bacteria are transmitted primarily through contaminated food and water, and their control requires robust surveillance systems, effective prevention strategies, and coordinated global efforts [1, 2].

Children under five are particularly vulnerable, with diarrheal diseases caused by these pathogens contributing significantly to childhood mortality As food systems become increasingly globalized, understanding and managing these pathogens is more critical than ever [3].

According to the World Health Organization (WHO), nearly one in ten people globally fall ill each year due to contaminated food, resulting in approximately 420,000 deaths. In the WHO South-East Asia Region alone, foodborne diseases account for more than 150 million illnesses and 175,000 deaths annually [4,5].

Salmonella is one of the most common causes of foodborne illness. It includes typhoidal strains (*S. typhi* and *S. paratyphi*) and non-typhoidal strains (*S. enteritidis*, *S. typhimurium*) that cause salmonellosis. Transmission typically occurs through consumption of contaminated eggs, poultry, meat, and dairy products. Surveillance data show that *Salmonella* infections are widespread and often underreported [5, 6].

In developing countries, the prevalence among food handlers ranges from 3.1% to 8.2%, posing a significant risk for transmission. The pathogen's zoonotic nature complicates control efforts, as it can persist in animal reservoirs and enter the food chain at multiple points [7, 8].

Unlike *Salmonella*, *Shigella* is primarily transmitted via the fecal-oral route and is closely associated with poor sanitation and hygiene. It causes shigellosis, characterized by bloody diarrhea, fever, and abdominal cramps. *Shigella* species are highly infectious—only a small number of organisms are needed to cause disease [9, 10].

Conclusion

Outbreaks often occur in densely populated areas, refugee camps, and institutions like schools and prisons. Surveillance is challenging due to the pathogen's rapid spread and the mild nature of many cases, which go unreported. Antibiotic resistance in *Shigella* is also rising, complicating treatment and increasing the need for vaccine development.*Campylobacter*, particularly *C. jejuni* and *C. coli*, is the leading cause of bacterial gastroenteritis worldwide. It is commonly found in raw poultry, unpasteurized milk, and untreated water. Infections can lead to severe diarrhea, fever, and in rare cases, Guillain-Barré syndrome—a serious neurological disorder.

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Citation: Fang, Y. Foodborne Pathogens: Surveillance and Control of Salmonella, Shigella, and Campylobacter. 2024; J Bacteriol Infec Dis 8(1):171

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Citation: Fang, Y. Foodborne Pathogens: Surveillance and Control of Salmonella, Shigella, and Campylobacter. 2024; J Bacteriol Infec Dis 8(1):171