



# Global prevalence of intestinal protozoan parasites among food handlers: A systematic review and meta-analysis

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## ABSTRACT

Food handlers with improper personal hygiene practices have a significant role in transmitting foodborne parasites, including intestinal protozoa. The current systematic review and meta-analysis aimed to evaluate the global prevalence of intestinal protozoan parasites among food handlers. Multiple databases (PubMed, Scopus, Pro-Quest, Web of Science, Science Direct, and Google Scholar) were explored for relevant literature published from 1988 to April 2022. Pooled prevalence was estimated using the meta-package in R (version 3.6.1). One hundred thirty-eight papers, including 259,364 individuals, were considered in this study. The global pooled prevalence (95% confidence interval) was 0.143% (0.118–0.170%). The highest pooled prevalence was observed in the Western Pacific WHO Region (0.318%, 0–1.000%). The most prevalent protozoa was *Blastocystis hominis* (0.077%, 0.046–0.115%). Moreover, among different countries, Gambia had the highest pooled prevalence (0.501%, 0.459–0.544%). The prevalence of intestinal protozoan parasites estimated in the present study revealed that food handlers highly impact the global population. Periodic stool screening is necessary for food handlers to prevent intestinal protozoan infection. Additionally, a health education programme to raise awareness regarding food hygiene is recommended.

## 1. Introduction

As a significant cause of disease epidemics and transmission, contaminated food is regarded as a severe risk to public health (Kadariya et al., 2014). Foodborne diseases represent a significant concern, affecting one-third of the world's population with 2 million deaths annually. These diseases, which are commonly considered neglected, are caused by biological (bacteria, viruses, parasites) and chemical (chemical contaminants, biotoxins) agents (Sander et al., 2020). Although less attention is given to parasitic pathogens as causal agents of foodborne diseases, they are involved in humans' enormous burden of

foodborne microbiological infections (Kitvatanachai et al., 2021). Food contamination with some intestinal parasites is a public health concern (Ogolla, 2018; Saravanan et al., 2021). Globally, almost 3.5 billion people are infected by intestinal protozoan parasites. 1.7 billion annual diarrheal disorders occur due to protozoal infections, and intestinal protozoa are the origin of many foodborne diseases (Li et al., 2020). The diarrhoea may be chronic or severe, with manifestations including nausea, vomiting, abdominal cramps, mild fever, anorexia, weight loss, and fatigue (Badri et al., 2022a; Eslahi et al., 2021a). The typical transmission route of these parasites is faecal-orally and through the ingestion of eggs and cysts, or directly from human to human due to the

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