

# CONSUMERS AWARENESS: THE IMPORTANCE OF INFANT FOOD MICROBIAL SAFETY (Part 1)

## Facts: Ensuring the microbial safety of infant food

- Focusing on the risk of contamination in infant formulae
- Preparing safe infant formulae
- Main pathogens in powdered infant formulae



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**FACTS:** Ensuring the microbial safety of infant food is of paramount significance. Over the past two decades, substantial measures have been implemented to enhance microbial food safety. Approaches such as HACCP (Hazard Analysis and Critical Control Points), GHP (Good Hygiene Practices), and tailored guidelines for infant formula producers have played pivotal roles in elevating the safety standards of these products. Despite these advancements, the risk of contamination by harmful foodborne pathogens persists as a potential threat to public health. Isolated incidents of disease outbreaks resulting from contaminated infant formulae are sporadically reported, underscoring the ongoing importance of vigilant monitoring and safety measures. Therefore, the microbial safety of infant food is a top concern for food producers, regulatory bodies, and consumers alike. Infant food is intended for an exceptionally vulnerable segment of the population, which is more susceptible to foodborne illnesses compared to the general population. Preventive measures are rigorously applied throughout production and distribution, grounded in the principles of Hazard Analysis Critical Control Points (HACCP) and Good Hygiene Practices to ensure food safety. However, microbial safety risks in infant foods persist, constituting an ongoing public health concern.

### FOCUSING ON THE RISK OF CONTAMINATION IN INFANT FORMULAE

The food industry and regulatory authorities are committed to delivering safe food to consumers. When it comes to infant food, there is an even greater level of concern and meticulous care throughout the production process due to the nature of the end consumers who are particularly sensitive. The term "infant food" encompasses a wide range of food products, and this diversity has expanded in recent years to align with consumer preferences regarding nutritional qualities, ease of use, environmental sustainability, and ethical considerations. However, at the heart of infant food are Infant Formulae and Follow-On Formulae, primarily intended for children under 12 months of age. The distinction between the two lies in their specific purposes: Infant Formulae serve as either the sole source of nutrition or complement breastfeeding in infants, while Follow-On Formulae are designed for use during the weaning period in combination with other foods. Both types share a common characteristic – they are dehydrated products. This dehydration process renders the products non-sterile, making them potentially susceptible to low levels of microorganisms. In the presence of pathogenic microorganisms, the ingestion of contaminated products can lead to foodborne illnesses in infants. In fact, infant formulae, and to a lesser extent, follow-on formulae, have been linked to outbreaks of foodborne diseases in infants. Consequently, ensuring the microbiological safety of infant food, particularly powdered formulae, is of utmost importance to mitigate the risks to public health.

### PREPARING SAFE INFANT FORMULAE

The production process for infant food formula typically involves several common steps: ingredient mixing (which may involve prior microbiocidal treatment), homogenization, drying, and packaging. There are two primary procedures employed for production: the wet method and the dry method.



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In the wet procedure, the initial steps include mixing and homogenization, followed by the drying and packaging stages. Conversely, in the dry procedure, the ingredients are first subjected to drying, with subsequent mixing and packaging phases. Microorganisms detectable in the final product can originate from the ingredients used or the production facility environment.

Preventing contamination from the environment is crucial, as there is typically no microbiocidal treatment before the product is packaged and consumed. Therefore, adhering to Good Hygiene Practices (GHP) during manufacturing is imperative to ensure the microbiological safety of the end product.

Moreover, the application of GHP during the preparation and use of powdered formulae is equally vital. This is especially significant in healthcare facilities where substantial quantities of infant food may be prepared and, in some cases, stored to meet the diverse requirements of neonates.



(K.Rantsiou - implementation of omics tools for infant food microbial safety)

### **MAIN PATHOGENS IN POWDERED INFANT FORMULAE**

The extensive production and global distribution of infant formula and follow-on formulae, coupled with the relatively low incidence of infections in infants, generally attest to the safety of these products. Nevertheless, issues related to enteric and foodborne diseases hold particular significance for pediatricians because the incidence rates of many commonly reported enteric and foodborne pathogens are highest among infants and young children.

While sporadic cases or foodborne outbreaks resulting from contaminated infant formulae do occasionally occur worldwide, clear evidence of causality links two specific pathogens to illnesses in infants: *Cronobacter sakazakii* (formerly *Enterobacter sakazakii*) and *Salmonella enterica*.

Infections caused by *C. sakazakii* primarily affect neonates, pre-term, underweight, or immunocompromised infants. The range of symptoms spans from severe diarrhea to systemic infections, necrotizing enterocolitis, sepsis, and even meningitis. The mortality rate can be as high as 50%, with the potential for serious, long-term neurological complications (sequelae) (source: [cdc.gov/cronobacter/technical.html](https://www.cdc.gov/cronobacter/technical.html)). The source of *C. sakazakii* has not yet been definitively identified, but consistent reports suggest contamination occurs within the food production plant environment. Consequently, considerable emphasis is placed on preventing such contamination through stringent adherence to good manufacturing practices and good hygiene practices.

*S. enterica* is a well-recognized foodborne pathogen, affecting individuals of all age groups, traditionally associated with animal-derived food products. In recent years, it has become increasingly associated with foodborne outbreaks resulting from the consumption of plant-based foods. Several instances of salmonellosis outbreaks have been traced to dried milk products, and research has revealed that contamination often stems from production issues or the presence of *Salmonella* in challenging-to-maintain-clean areas. In infants, salmonellosis typically manifests as gastroenteritis, but when it becomes invasive (extra-intestinal), it may lead to severe complications, including bacteremia, arthritis, osteomyelitis, and potentially fatal meningitis.

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  - Three European technological SMEs (CremeGlobal, Computomics, BDS)
  - The Union of 49 National European Societies of Pediatric (EPA-UNEPSA)
  - Seven leading European and Chinese academic institutions (WU, UNITO, IRTA, IVV; ZJU, ZAAS, JAAS)



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