# A systems-based approach to analyse three norovirus outbreaks in hospitality settings

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A systems-based approach can assist the response to complex safety-related issues by taking both human factors and organisational aspects into consideration. Systems-based approaches, such as AcciMap, have been used in a wide variety of domains to investigate why a food safety incident occurs (e.g. bovine spongiform encephalopathy (BSE) in the UK). Moreover, other water- and foodborne outbreaks have been investigated using this approach. Norovirus is the most common cause of viral acute gastroenteritis outbreaks worldwide, associated with international hospitality settings such as hotels. With an estimated 685 million episodes and 210,000 deaths worldwide every year, this is a significant global socioeconomic and public health concern. A systems-based approach allows in-depth analysis of the system in which an issue occurs, providing insights into the errors or chain of events causing the accident. However, there is limited literature on food safety incident analysis using such approaches. This study aims to provide a stronger theoretical knowledge base of the subject and enhance understanding of the contributory factors leading to norovirus outbreaks to prevent future ocurrence. This research applied an AcciMap approach to analyse and graphically represent the contributing factors and interactions between different levels. The findings of the AcciMap analysis revealed that factors such as communication issues, managerial flaws in water systems management and public health regulations were common systemic failures at the government and physical/individual levels in the three analysed outbreaks. Thus, norovirus outbreaks were not the outcome of a single causal factor but a chain of events and interactions that occurred across a complex system.