

## DIRECT FROM CDC ENVIRONMENTAL HEALTH SERVICES

Foodborne outbreak investigations can be complex, involving investigators from epidemiology, environmental health, and laboratory disciplines. Typically, one role of environmental health investigators is identifying the conditions that enabled or amplified the outbreak (i.e., the factors that contributed to the outbreak). These contributing factors fall into three categories: contamination, proliferation, and survival (Figure 1). For example, if a restaurant worker with norovirus contaminates food with norovirus while preparing it and causes an outbreak, this contamination by the worker is a contributing factor to the outbreak.



High quality data on outbreak contributing factors help identify food safety failures in the outbreak environment. These data can be used to develop and implement immediate interventions to prevent further illness. When aggregated across all outbreaks in the U.S., these data can help inform new policies to prevent more outbreaks. For example, in 2014, the Centers for Disease Control and Prevention (CDC) analyzed data from investigations of foodborne norovirus outbreaks. These data showed that infected food work-

ers and bare-hand contact with ready-to-eat foods were primary contributing factors to norovirus outbreaks. CDC then developed and released specific recommendations for state and local governments and the restaurant industry on preventing these contributing factors and the outbreaks they cause (CDC, 2014; Hall, Wikswo, Pringle, Gould, & Parashar, 2014).

Since 1966, CDC has produced summaries of data obtained from foodborne outbreak investigations conducted by state health departments and reported to CDC ([www.cdc.gov/fdoss/annual-reports](http://www.cdc.gov/fdoss/annual-reports)). These summaries for outbreaks occurring from 1972–1997 included data on five contributing

albeit minimally, and that list has been in place since 2009.

## Revisions to the Contributing Factor List

In 2018, CDC and New York State Department of Health spearheaded a workgroup to revise and improve the contributing factor list. This workgroup was expanded in 2019, prompted by emerging trends in food preparation and by feedback from investigators on needed changes and inconsistencies across states in interpretation and reporting of contributing factors.

The workgroup was comprised of federal and state food safety experts in both epidemiology and environmental health from CDC, Minnesota, New Hampshire, New York, Ten-

nessee, and Wisconsin. Representatives came from CDC's Foodborne Disease Outbreak Surveillance System (FDOSS) and National Environmental Assessment Reporting System (NEARS) that collect epidemiological data and environmental health data on foodborne outbreaks, respectively.

The workgroup collaborated through a data-driven and science-based process to identify and develop needed revisions (Table 1) that can be categorized into four themes:

1. **Restaurants:** Since most outbreaks occur in restaurants, many of the contributing factor definitions were specific to restaurant-related outbreaks and referenced retail federal food safety provisions. Contributing factors, however, can apply throughout the food chain—farms, manufacturers, processors, distribu-

This article is part of the special issue "Contributing Factors and Outbreaks in Food Safety and Environmental Health." The full issue is available at <https://doi.org/10.1093/ehp/28.9.19.89>.

ated a new one that encompassed the two scenarios (i.e., allowing foods to remain out of temperature control for a

**Corresponding Author:** Beth Wittry, Water, Food, and Environmental Health Services Branch, National Center for Environmental Health, Centers for Disease Control and Prevention, 4700 Buford Highway NE, Atlanta, GA 30341. E-mail: xks5@cdc.gov.

**References**

Bryan, E.L. (1978). Factors that contribute to outbreaks of foodborne disease. *Journal of Food Protection*, 41(10), 816–827.

Bryan, E.L. (1988). Risks of practices, procedures and processes that lead to outbreaks of foodborne diseases. *Journal of Food Protection*, 51(8), 663–673.

Centers for Disease Control and Prevention. (2014, June). *Vital Signs: Preventing norovirus outbreaks*. Retrieved from <http://www.cdc.gov/vitalsigns/norovirus/index.html>

Hall, A.J., Wikswo, M.E., Pringle, K., Gould, L.H., & Parashar, U.D. (2014). Vital Signs: Foodborne norovirus outbreaks—United

States, 2009–2012. *Morbidity and Mortality Weekly Report*, 63(22), 491–495.

Lynch, M., Painter, J., Woodruff, R., & Braden, C. (2006). Surveillance for foodborne-disease outbreaks—United States, 1998–2002. *Morbidity and Mortality Weekly Report*, 55(SS10), 1–34.

Weingold, S.E., Guzewich, J.J., & Fudala, J.K. (1994). Use of foodborne disease data for HACCP risk assessment. *Journal of Food Protection*, 57(9), 820–830.

## THANK YOU for Supporting the NEHA/AAS Scholarship Fund

Abdihakim Ahmed

Allen Alexander