

SUMMARY OF PACKAGED ICE SAFETY RESEARCH

Author / Publication	Year	Key Findings
Clemson University	2017	The human handling of ice (and lemons) can easily cause them to become contaminated with bacteria and other pathogens. Ice is a particularly effective conveyor of bacteria. When hands were contaminated with E. coli, the bacteria were transferred to the ice 100 percent of the time.
BBC News	2017	Samples of iced drinks from Starbucks and two other UK chains — Costa Coffee and Caffè Nero — contained "varying levels of the bacteria."
Beykent University	2017	Transfer of bacteria from contaminated ice holding bins or scoops to ice may be an issue. This study reported finding E. coli in 6.7 % of ice samples, and 22 % of ice chest samples but no positive E. coli from water samples used to make the ice.
California State Polytechnic University	2016	Samples of packaged ice produced on-site at retail locations in California were collected, analyzed, and compared with packaged ice produced by members of the International Packaged Ice Association (IPIA). A staggering 56% of the on-site packaged ice samples were positive for yeasts/molds growth, and 19% of the packaged ice samples produced on-site did not meet the IPIA/PIQCS microbiological limit at 500 TPC per ml and absence of coliform/E. coli.
UNLV	2016	Ice and water samples were collected from Las Vegas, Nevada food establishments and analyzed using EPA standard methods. A total of 19 of the 28 samples collected exceeded the EPA limit for HPC, and two out of 14 ice samples also contained E. coli.
Canadian Institute of Public Health Inspectors	2016	To investigate the microbiological quality and handling practices of ice served in selected food premises in downtown Toronto, Ontario, 64 ice samples were collected from Five samples (7.8%) tested positive for total coliforms, all of which were sampled from the customer service areas.
University of Georgia	2014	Researchers in Georgia examined the microbiological quality of packaged ice produced and bagged at retail locations and compared those results with ice produced by manufacturers that comply with the IPIA/s standards. Over 25 percent of the ice samples from retail store producers and self-serve vending machines showed unsatisfactory levels of contamination.
Science Direct	2011	100 ice samples were collected in Epirus, Greece, and evaluated for their physical, chemical and microbiological properties. Total and fecal coliforms and spores of <i>C. perfringens</i> , were detected in one third of the samples.

Federal University of Sao Paulo	2004	Diarrheagenic E. coli has been found in commercial ice produced in Brazil. In the study of the microbiological quality of commercial ice, 50 Escherichia coli isolates belonging to different serotypes were found.
Rutgers University	2002	During food preparation, bacteria on hands can be transferred to raw foods from hands and indirectly from other surfaces. This study simulated factors that influence the levels of bacteria on foodservice workers' hands.
Adolfo Lutz Institute of Sao Paulo	2002	To evaluate the microbiological content of commercial ice and ice used to refrigerate fish and seafood, 60 ice samples collected at six different retail points in the city of Araraquara, SP, Brazil, were studied. The presence of high numbers of coliforms and pathogenic strains suggested that commercial ice and ice used to refrigerate fish and seafood may represent a potential hazard to the consumer in the community.
United Kingdom	2000	In a survey of over 3,500 samples of ice used to cool drinks from retail and catering premises examined, the microbiological quality of ice used to cool drinks was poorer when melt water was present in the ice buckets. Ice used in food displays was more contaminated than ice used to cool drinks, with 23% containing coliforms
University of Florida	1999	In a statewide survey, ice samples purchased at retail stores were evaluated for labeling information and microbiological, chemical, and physical quality. One ice sample exceeded the state regulatory limit for aerobic plate count. Yeasts and molds were detected in 12% of the samples.
Fendler, Dolan & Williams	1998	Cross contamination in food service may play an important role in foodborne illness. Ice is a known transmission vector of pathogenic microorganisms in human foodborne illness.
Journal of Hospital Infection	1997	A survey was undertaken in response to a report of a clinical infection which had been related to an ice-making machine on a hospital ward. A detailed study of the ice microflora of 27 ice-making machines was performed. Escherichia coli was detected in three samples but in very low numbers.
Iowa	1994	A study in Iowa showed 8 samples (36%) exceeding the TPC limit, 15 (68%) with positive coliforms, and 13 (59%) with positive mold species. All of the unsatisfactory samples did not comply with the IPIA's PIQCS guideline.
The Journal of Infectious Diseases	1992	Contaminated ice was a prominent transmission vector for spreading the 1991 cholera epidemic in Peru causing 7922 illnesses, 17 deaths and also expanding throughout Latin America.
Center for Disease Control	1990	From 1986 to 1988, 24 states and Puerto Rico reported 50 outbreaks of illness due to water that people intended to drink, affecting 25,846 persons. A large multistate outbreak caused by commercially produced ice made from contaminated well water caused illness with Norwalk-like virus among an estimated 5,000 persons.
American Thoracic Society	1988	Between October 15 and November 18, 1985, 5 patients on a medical ward of the Albany, VA Medical Center became colonized with Mycobacterium fortuitum. Exposure to ice from the ice machine, but not to potable water, was associated with colonization with M. fortuitum

Society for Healthcare Epidemiology of America	1986	Thirty-two clinical specimens submitted to the laboratory during a 12-month period from July 1980 to June 1981 were reported to be culture-positive for <i>Mycobacterium gordonae</i> , an organism generally found in soil and water.
Cambridge University Press	1985	The cold water dispensers of 14 hospital ice machines were cultured monthly over a 1-year period. Positive cultures for <i>Legionella</i> bacteria were obtained from 8 of 14 dispensers. Although no epidemiologic link to disease was made, these primary water sources serve as possible reservoirs for disease.