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TITLE: Risks Associated with the Microbiological Quality of Bodies of Fresh and Marine Water Used for Recreational Purposes: Summary Estimates Based on Published Epidemiological Studies

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ABSTRACT:

The current European standards for microbiological quality of bathing water (i.e., all running or still fresh waters or parts thereof and/or sea water [with the exception of water intended for therapeutic purposes and water used in swimming pools]) were issued in 1976 and are currently undergoing revision. In this article, the authors propose parameters for select microorganism indicators to assist in the establishment of public-health-based objectives for fresh and marine water quality. A type-II meta-analysis of the results of 18 published epidemiological studies was implemented in an attempt to characterize the relationship(s) between concentrations of bacterial indicators and rates of acute gastrointestinal diseases among bathers who had used fresh or marine water for recreational purposes. The authors fit multiple linear-regression models, which allowed for random effects across studies, to derive dose-response curves. Several confounders and effect modifiers were controlled for in the analyses. Risks were then estimated for a hypothetical individual who would bathe 20 times/yr in water that contained a given concentration of microorganisms. For fresh-water-associated highly credible gastrointestinal illnesses, a level of 10 fecal coliforms/100 ml water yielded an attributable risk of 0.2 cases/1,000 person-years; a risk of 2 cases/1,000 person-years was found for fecal streptococci. The corresponding yearly attributable risks were 1 and 13 cases/1,000 person-years, respectively, for 100 bacteria/100 ml fresh water. Risks associated with fecal coliforms were found to be lower in marine water than in fresh water. Irrespective of the type of water examined, total coliforms were related only weakly with acute digestive morbidity. Developers of future bathing-water standards should state the level of risk deemed acceptable for public health. The authors of this study maintain that levels of fecal coliforms and fecal streptococci should be used as criteria for infectious risk management associated with bodies of marine and fresh water used for recreational purposes.

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