

## **Pathways for exposure to waterborne pathogens and state transitions among exposed hosts: a conceptual framework for waterborne disease surveillance**

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Surveillance for waterborne disease is a critical tool for defining the health risks associated with waterborne pathogens. Unfortunately most surveillance systems only detect cases of extremely severe disease or extremely large outbreaks of less severe disease. The data from these systems is of limited use for estimating incidence rates of waterborne infectious disease.

Conventional risk factor epidemiology focuses on the individual as the unit of exposure. Because of the critical importance of secondary spread and the role of herd immunity in defining the impact of a specific exposure, the spread of infectious disease must be studied at the level of the community. In this paper, we describe a conceptual framework for describing the incidence of waterborne infectious disease based on the pathways for exposure to pathogens and the state transitions among exposed hosts. With this structure, we demonstrate that understanding patterns of secondary spread is essential to defining rates of waterborne infectious disease.

Epidemiological studies that focus exclusively on the individual may be both costly to conduct and will yield inaccurate estimates of the risk of infectious disease attributable to drinking water. We outline how this model can be used as the basis for estimating rates of waterborne infectious disease using relatively simple and inexpensive surveillance tools.

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## **Drinking water consumption habits of the population of Santiago, Chile**

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A survey of 1200 people in the Santiago Metropolitan Area was conducted in order to determine the drinking water habits of the population and estimate their exposure to copper in the drinking water. The presence of copper in drinking water is partly caused by slow dissolution of copper plumbing pipes. The maximum concentration of copper in drinking water occurs after water has stagnated in the copper pipe, a process that usually occurs at night.