

**HEALTH RISK ASSOCIATED WITH  
CONSUMPTION OF UNTREATED  
RAINWATER IN METROPOLITAN  
SOUTH AUSTRALIA**

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## Summary/abstract

Climate change, increasing population and economic development have resulted in an imbalance between availability of, and demand for, potable water supplies worldwide. In Australia below average rainfall has led to severe drought over the past 12 years; consequently water restrictions have been introduced to reduce water demand, and alternative sources of water such as rainwater are being considered to supplement traditional water supplies. Currently, 2.5% of the population in capital cities use rainwater as the primary water source; however some health authorities do not endorse rainwater for potable use when a reticulated system exists. Traditionally, rainwater has not been considered a safe drinking water option since the quality is highly variable. Several observational studies have found an association between rainwater consumption and adverse health outcomes; however the level of risk cannot be accurately established through observational studies.

This thesis aims to provide scientific evidence that will enable a better understanding of the health risks associated with rainwater consumption using a double-blinded randomised controlled design. The scope of the thesis is limited to gastrointestinal illness which is the most likely health risk of rainwater associated with rainwater use. A nested case control design was also used to investigate risk factors for gastroenteritis among rainwater consumers. Data on recruitment, tank characteristics and maintenance, and water quality are also provided.

The results of the randomised trial show that, among regular users, consumption of untreated rainwater does not play a significant role in community gastroenteritis. Since direct ingestion delivers the largest possible dose, it would present the greatest health risk. These findings alone may be insufficient to change policy regarding rainwater consumption but at a minimum should guide policy makers to consider endorsing expanded household rainwater use, including showering/bathing where consumption is at most inadvertent.

The case control study enabled determination of risk factors for gastroenteritis amongst this niche population. The findings, particularly the contribution of beef as a risk factor for illness, and the protective effect of salad prepared and consumed at home, add to the body

of knowledge regarding gastrointestinal risk factors in non-outbreak settings.

The quality of harvested and stored rainwater depends on maintenance and management practices implemented. The results of the tank survey show that the majority of households employed at least one of the recommended strategies. Longitudinal data on the microbiological quality of harvested rainwater is provided and are correlated with practices implemented and rainfall. The findings show that implementation of at least four strategies results in improved microbial quality. In addition, increases in microbial counts 24hrs after rainfall indicate a potential health risk.

In summary, this research has provided novel information on the suitability of rainwater as a potential alternative water source in urban areas. Overall, the data show that while harvested rainwater quality exhibits a high degree of variability, the risk of illness is low; however, it cannot be stated unconditionally that rainwater is safe for drinking. Nevertheless, rainwater use can be expanded for indoor non-potable purposes where inadvertent or accidental ingestion of small quantities may occur.