

Is drinking untreated rainwater a risk to health?

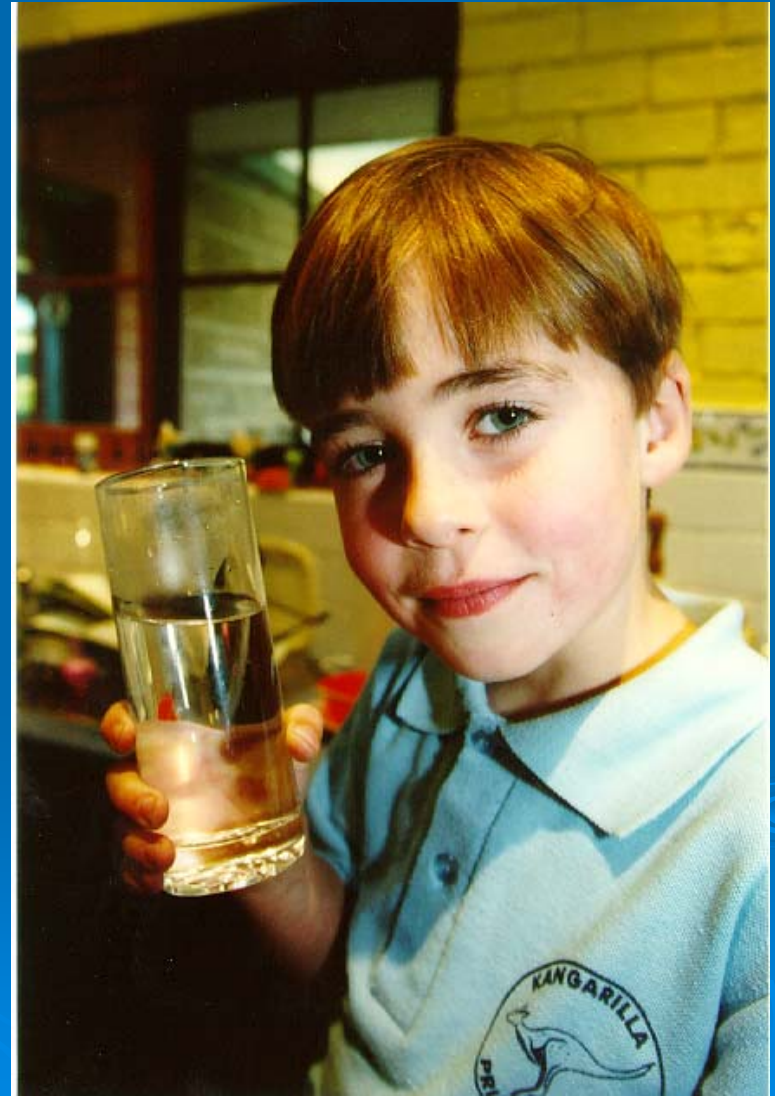
**Consumption of tank rainwater and the
risk of gastroenteritis among young
children in Rural South Australia**

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Introduction

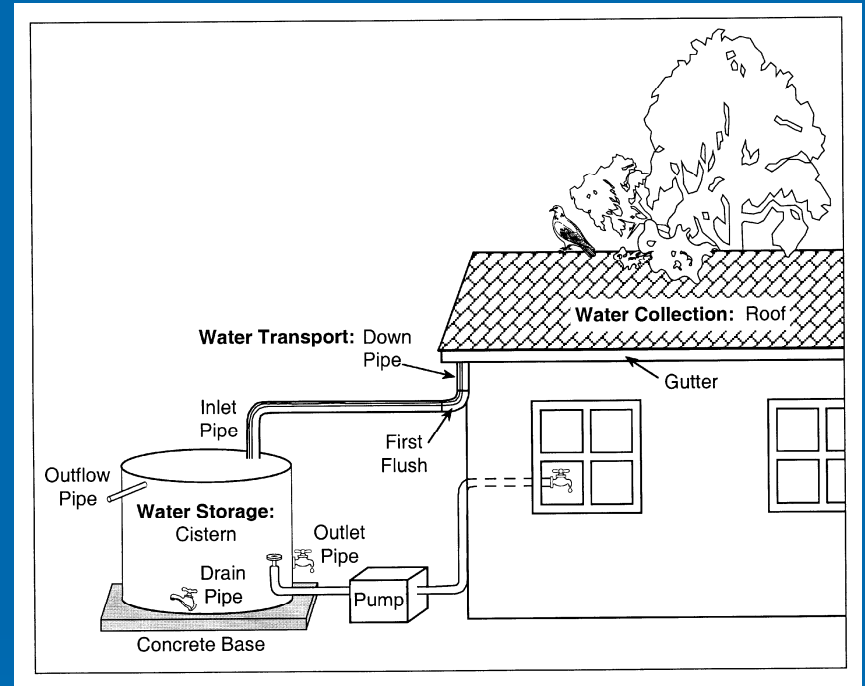
- Background
- Prevalence Survey
- Cohort Study

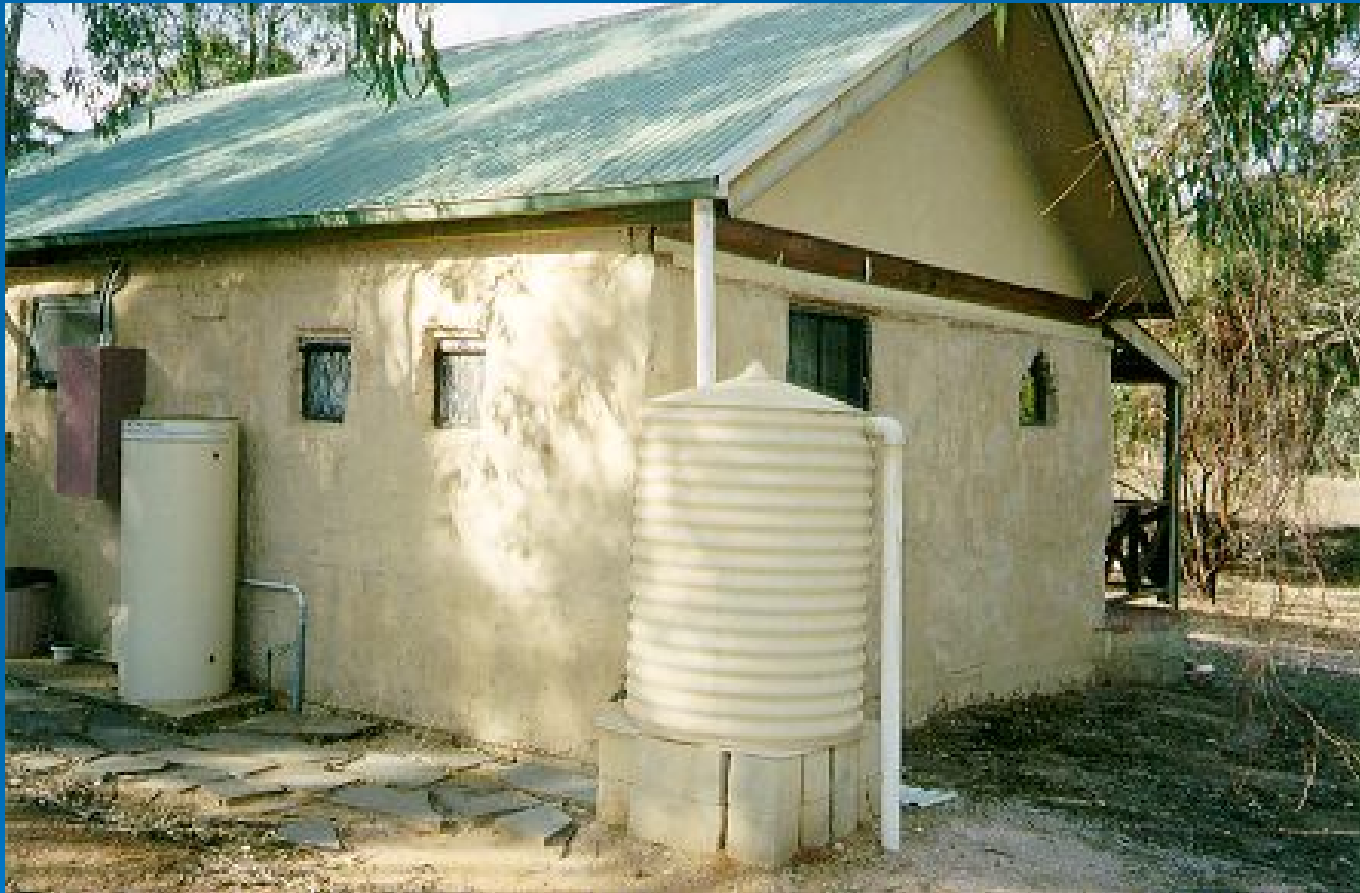
Photograph courtesy of
The Advertiser Newspaper



Background

- Community preference for tank rainwater as drinking water
- Dept of Health wanted to promote tank rainwater use, but
- Limited information on the health risk associated with its consumption

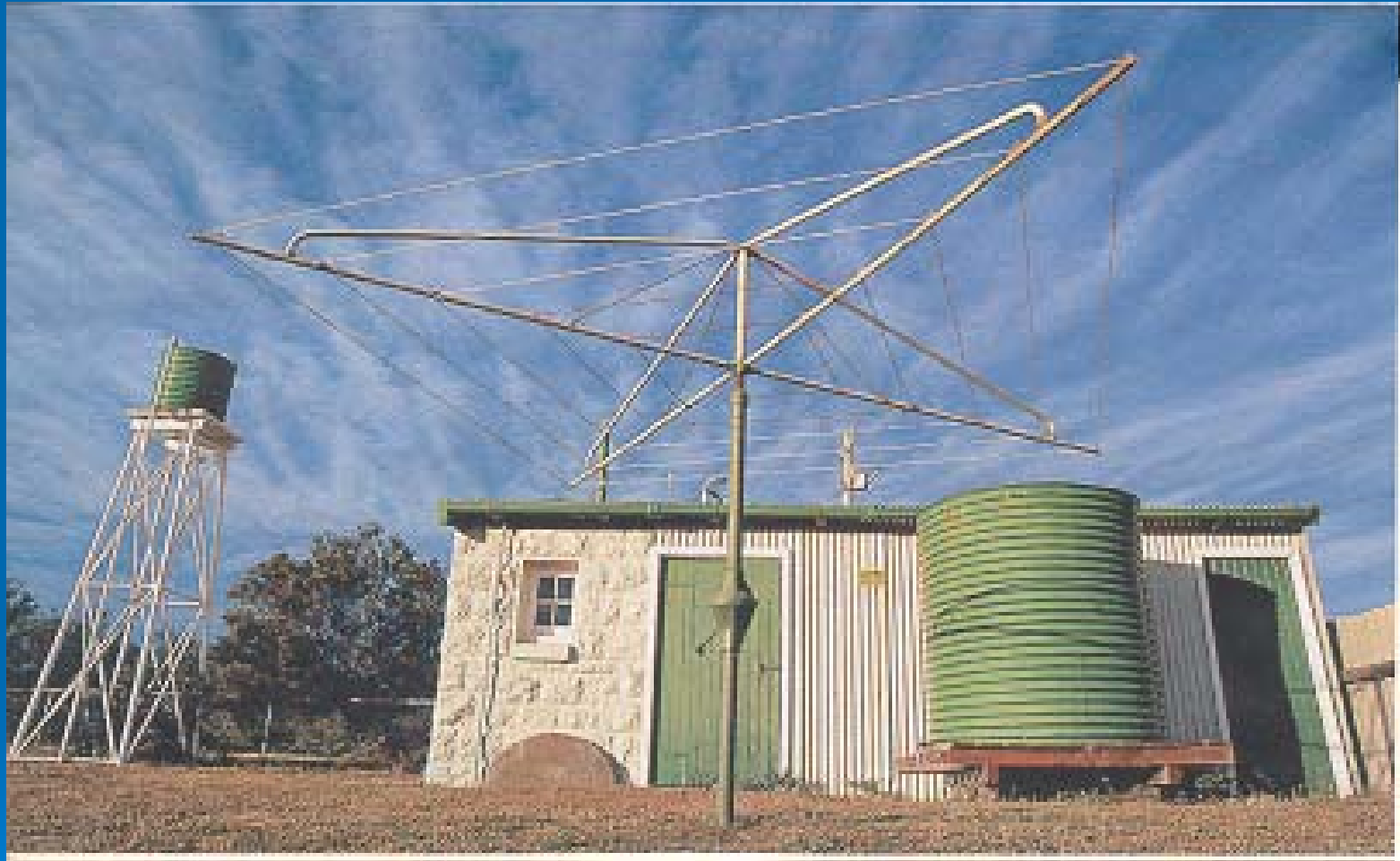














Aim

- **To determine whether the risk of gastroenteritis among children who drank tank rainwater differed from that of children who drank treated public mains water**
- **in the Adelaide Hills and rural South Australia**

SA Tank Rainwater studies

- **Cross-sectional survey of 9,543 4yr-old children**
- **Cohort Study of 1,015 rural children aged 4-6 years**



Photograph courtesy of The Advertiser newspaper

Methods - Sample Selection

9,543 Responses to Prevalence survey



3,413 Children in Adelaide Hills and Rural SA



1,960 Number willing to be involved in further study (57%)



797 exclusions



1,163 Parents approached to participate in Diary study



739 drank RW only

108 drank RW & PM for cooking only

225 drank PM

91 drank PM plus bottled water



1,015 participants

Methods

- **1015 invited to participate, 965 completed all components (95%)**
- **Data collected via**
 - **Baseline questionnaire**
 - **Daily diary for 6-week period between February to June, 1999**
 - **Telephone interviews**
 - **At end of week 3**
 - **At end of week 6**

Gastroenteritis

- **Highly Credible Gastrointestinal Symptoms (HCGI)**
 - Vomiting and/or liquid bowel movements
 - OR
 - Nausea and/or soft bowel movements combined with abdominal cramps

(Payment et al., 1991)

Outcome

- **First day of each new episode of HCGI**
- **Child not in risk set while**
 - symptoms continue
 - during 7 day symptom- free period
- **n=35,545 days-at-risk**

Statistical methods

- **Random effects logistic regression modelling**
- **Confounders included on basis of biological plausibility**
- **Other risk factors significant on univariate analysis**
 - **eg respiratory illness, antibiotics, gastro contact.**

Response

- **982 (96.8%) completed at least 1 component**
- **965 (95.1%) completed all components**
- **97% completed diary daily or every couple of days**

Incidence of first episode

- **4.9 HCGI/child-year**
(95% CI 4.5 –5.4)
- **Definition highly sensitive but not specific**
- **63% episodes 1 day in length**

DESCRIPTIVE RESULTS 1

Table 1: Main Source Of Drinking Water- Tank Rainwater Diary Study.

Water Type	n	%
Tank rainwater only	398	41.3
Tank rainwater & public mains	316	32.8
Public mains only	144	14.9
Public mains & bottled water	30	3.1
Tank rainwater & bottled water	19	2.0
Tank rainwater, public mains and bottled water	57	5.9
Total	964¹	100

1. One child drank only fruit juice or milk during the diary period.

DESCRIPTIVE RESULTS 2

- **97% of RW group had drunk RW for 1 or more years**
- **87.5% did not treat water at point-of-use**
- **7.5% first flush diverters**
- **In tanks older than 2 years, sludge never removed in 42% of tanks**
- **65% gutters cleaned in the last year**

DESCRIPTIVE RESULTS 3

➤ Knowledge of bowel movements

- **mostly** **69.4%**
- **when alerted** **20.8%**
- **sometimes** **8.3%**
- **limited or none** **1.5%**

Perceived risk to health by water type- Diary Study, 1999 (n=982)

Water Type	Level of Risk			
	Low	Medium	High	Not sure
	%	%	%	%
Public Mains	50.4	22.4	11.9	15.3
Rainwater	65.5	20.5	8.2	5.8
Bott/ Spring	80.4	6.3	0.9	12.4

Among PM group – 30% thought RW a high risk

Among RW group -19.4% thought PM a high risk

Modelling Results

Risk of HCGI by water source, adjusted for other risk factors

Risk Factor	OR	95 % C I
<i>Water Source</i>		
PM alone	1 .00	
RW alone	0.84	0.63 – 1.13
PM plus RW	0.95	0.71 – 1.26

Adjusted for sore throat, cold or influenza; earache; antibiotic use; contact with ill persons; pets; swimming; takeaway food consumption; rating of risk to health

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<i>First day of antibiotics</i>		
No	1.00	
Yes	4.71	2.23 – 9.93
<i>First day of earache</i>		
No	1.00	
Yes	2.77	1.28 – 5.98
<i>Sore throat</i>		
No	1.00	
First day	3.44	2.35- 5.02
Ongoing day	2.27	1.81– 2.87



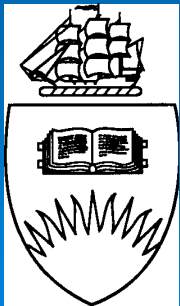
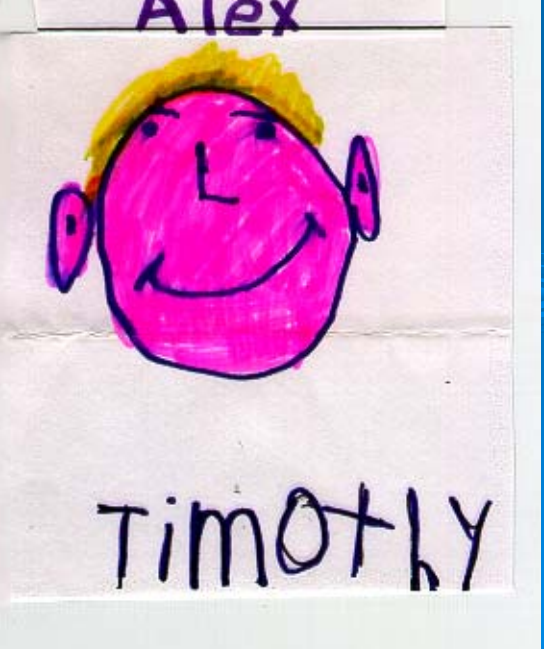
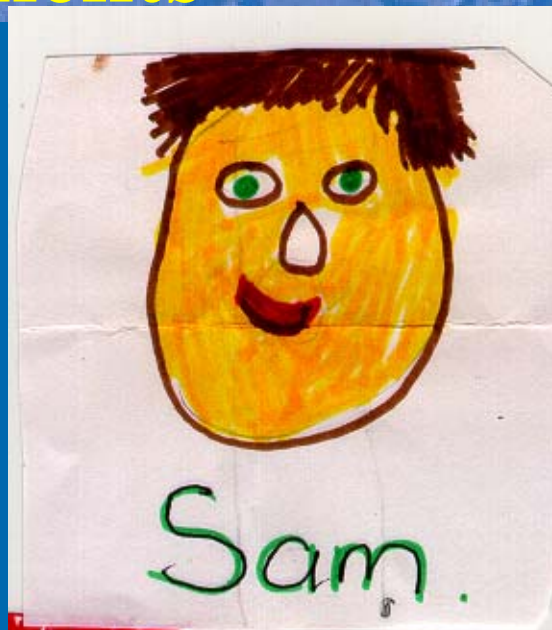
Discussion

- Incidence of HCGI among children is high and presents a considerable burden on the community
- Tank Rainwater does not appear to be a risk factor for HCGI among young children who drink tank rainwater **regularly**
 - Even though tank maintenance poor
- Possibility of an acquired immunity amongst rainwater consumers
- Other health impacts of tank rainwater?
- Role of public mains

10 years on

- RCT of rainwater in SA - Monash University
- 300 volunteer households in Adelaide that were given a filter to treat their rainwater
- Half were sham
- rates of gastroenteritis between both groups were very similar

Acknowledgments



FUSA

DHS