

## PH 061442: MAJOR: PUBLIC HEALTH

KEYWORDS: HOUSEHOLD DRINKING WATER / SAFE STORAGE/  
DIARRHOEA / MAE LA TEMPORARY SHELTER / THAILAND  
VALERIE DAW TIN SHWE: A RANDOMIZED CONTROLLED TRIAL  
OF A HOUSEHOLD DRINKING WATER STORAGE INTERVENTION  
TO ASSESS ITS IMPACT ON MICROBIOLOGICAL WATER QUALITY  
AND DIARRHOEAL DISEASES AT MAE LA TEMPORARY SHELTER,  
TAK PROVINCE, THAILAND. THESIS ADVISOR: ROBERT  
SEDGWICK CHAPMAN, M.D., M.P.H., 144 pp.

**Background:** Diarrhoea has accounted for nearly 66% of total clinic visits at Mae La temporary shelter, Thailand, 40% of which occurred in children under five years old. As chlorinated water is provided for only a few hours each day, residents must collect and store water in their homes. Traditional practices of drinking water handling carry high risks of microbial contamination. Use of a drinking water storage container with a lid and spigot (safe container) may prevent contamination and thus reduce diarrhoeal diseases. The main objective of this study was to assess whether diarrhoea incidence declined after introduction of such containers into households in Mae La.

**Methods:** A randomized controlled trial was conducted among 400 households with at least one child under five years old, over a period of four months between 2009 and 2010. Intervention households received safe containers, while control households did not. Field workers used standardized questionnaires to collect baseline and follow-up data. Households were visited twice weekly during the three-month follow-up. Recent occurrence of diarrhoea in children under five was ascertained, and residual chlorine levels in drinking water were measured. *Escherichia coli* (*E. coli*) levels in drinking water were also measured monthly. The effect of intervention on diarrhoea incidence was analysed by chi-square tests and survival analyses. (After completion of the study, control households were also provided with safe containers.)

**Results:** There was about a 70% reduction of diarrhoea incidence in children under five in the intervention households compared with control households. Hazard ratios from Cox models reflected this difference, and indicated a substantial reduction in diarrhoea risk in association with use of safe containers. Other factors associated with increased diarrhoea risk were lack of formal education of primary caregivers and main source of drinking water. Baseline *E. coli* isolation rates were high and similar in intervention and control households. During follow-up, *E. coli* isolation declined steadily in intervention households, but not in control households.

**Conclusions:** Children under five, if living in households provided with safe storage drinking water containers, are better protected against diarrhoea. Prior to this study, *E. coli* contamination of drinking water was very common, suggesting little or no protection from chlorination. Results suggested that intervention-associated reduction in diarrhoea incidence was partly attributable to reduction in *E. coli* exposure. Safe water storage water containers are effective, affordable means of reducing childhood diarrhoea risk in Mae La and likely elsewhere in the developing world.

Field of study: Public Health Student's signature \_\_\_\_\_

Academic year: 2010 Advisor's signature \_\_\_\_\_