

## UNDERSTANDING GREYwater USE AROUND THE HOME



### Report to Participants

October 2011

This study was carried out by a team of researchers from Monash University and the University of Melbourne. It was funded by the Victorian Smart Water Fund and Water Quality Research Australia. The study had three parts:

- A survey which collected information about greywater use by Melbourne households during the last 5 years. The survey was carried out by mail, telephone and over the internet.
- A greywater sampling program in a sub-group of households that responded to the survey. Samples were tested for *E. coli* bacteria to assess the level of faecal contamination in different types of greywater. Some samples were also tested for two common 'gastro bugs'.
- A health risk assessment to estimate how many extra cases of illness from a particular gastro bug might be associated with use of greywater for watering lettuce.

This report summarises the main findings of the study.

## Greywater collection and use

- ◆ Over 1600 responses were received for the Greywater Use survey. This was an excellent result – well above our target figure.
- ◆ About two-thirds of those who responded had used greywater in at least one year of the five year period from 2007 to 2011.
- ◆ As expected, fewer households used greywater in 2011 compared to 2010, mainly due to increased rainfall and a relaxation of water restrictions.
- ◆ Greywater was most commonly collected from the laundry, followed by the bathroom. Use of greywater from the kitchen was less frequent.
- ◆ Most households used simple methods such as buckets or a hose from the washing machine for collection and distribution of greywater.
- ◆ Greywater was most commonly used for garden watering, followed by watering pot plants and vegetables.
- ◆ More than one third of households had changed laundry and/or bathroom cleaning products or reduced the amount of product used as a consequence of collecting greywater.



## Greywater quality



- ◆ Three types of greywater were tested for *E. coli* indicator bacteria: washing machine wash water, washing machine rinse water and bathroom water (from bath or shower drain). These *E. coli* indicator bacteria are harmless bacteria that are found in the digestive system of humans and warm-blooded animals. They are used to detect faecal contamination (traces of poo!) in water. Altogether, over 180 greywater samples were tested.
- ◆ Levels of faecal contamination in all types of greywater were variable. Bathroom water tended to have more *E. coli* indicator bacteria than washing machine water, but there was a lot of overlap in *E. coli* levels between the different types of greywater.
- ◆ Over a 100 of the greywater samples were tested for pathogenic *E. coli* – these are ‘bad’ *E. coli* which can cause gastro illness and are different from the harmless *E. coli* indicator bacteria that we all carry in our digestive system. Three samples were found to contain pathogenic *E. coli*.
- ◆ Tests for norovirus were performed on 40 greywater samples (these tests are very expensive so fewer samples were tested). Norovirus was detected in 1 sample.
- ◆ The detection of these gastro bugs in some greywater samples was expected and should not be a cause for alarm. They were chosen for testing because they are the most common causes of gastro in Australia, and there was a good chance of detecting them even with a small number of greywater samples. Most cases of gastro due to these bugs are mild and only last 1 or 2 days.

## Health risk assessment

- ◆ Our study was **not** designed to look at whether gastro illness is more common in greywater users than non-users – to do this we would need to follow the health of several hundred greywater-using households over a whole year and compare them with a similar number of non-using households. The health diary information collected from households who gave greywater samples was used only to help select which samples should be tested for norovirus.
- ◆ We used a modelling approach to estimate the possible risk of infection and illness from norovirus. For the modelling, we presumed that untreated greywater was used to water lettuce. This is a ‘high risk’ use of greywater because water can be trapped among the leaves, and lettuce is eaten without cooking (and sometimes without washing). Other uses of greywater, such as garden watering, are lower risk as water is generally not swallowed. Therefore, our modelling results represent a “worst case scenario” estimate.
- ◆ Under the worst conditions (watering with poor quality greywater on the same day the lettuce is harvested and eaten, lettuce not washed before eating, dry year with high rate of greywater use), we predicted that fewer than 20 extra cases of norovirus illness associated with greywater use might occur in Melbourne over a period of one year. This is a tiny number compared to the large number of illnesses (about 400,000) due to this common gastro bug that occur each year in Melbourne. It is also lower than the number of cases of illness caused by catching a gastro infection from someone else in the same house.



## Conclusions

Overall, the study showed that:

- survey respondents commonly used greywater (especially for garden watering);
- greywater was mainly sourced from the laundry or bathroom;
- gastro bugs occasionally (and not unexpectedly) are found in greywater; and
- even with modelling using a worst-case scenario – the risks of gastro illness associated with household use of greywater are likely to be very low.

**The Study Team would like to thank all the people who participated in the Greywater study for helping to make it a success!**