USING QUANTITATIVE MICROBIAL RISK ASSESSMENT (QMRA) FOR SAFE GREYWATER REUSE

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Background and Aims: Use of greywater for irrigating home gardens may potentially decrease domestic water consumption by over 50%, while contributing to sustainable garden irrigation in arid regions and in times of drought. Despite these important advantages, greywater reuse may also hold potential risks for public and environmental health. Pathogens in the water may spread disease through direct contact, consumption of produce, or may be transferred by vectors such as mosquitoes. The aim of the current study was to assess risks associated with on-site greywater reuse.
Methods: A quantitative microbial risk assessment (QMRA) framework (Haas et al, 1999) was used for the assessment of three pathogens; Rotavirus, Pseudomonas aeruginosa, and Staphylococcus aureus. Different theoretical and empirical exposure and risks scenarios were tested.
Results: Given the correlation between Rotavirus and *E. Coli* (WHO, 2006), it was postulated that in a single household, a maximum level of 10^2 *E. coli* CFU/100 ml is safe based on the World Health Organization acceptable risk of $1.4*10^{-3}$ for Rotavirus infection. The risk from *P. aeruginosa* and *S. aureus* in the tested exposure scenarios was so low, that it seems unnecessary to include them in the regulations. To reduce exposure level and consequently the risk, barriers such as sub-surface drip irrigation, prohibition of irrigation of vegetables that are consumed raw, and washing hands with soap, should be used.
Conclusions: As long as basic regulatory rules are maintained, greywater reuse in a single household poses little risk to public health. A similar approach should be taken towards the establishment of quantitative risk assessment for environmental pollutants such as salinity, organic matter and metals.
References:

Haas CN, Rose JB and Gerba CP. Quantitative Microbial Risk Assessment. John Wiley & Son: New York, 1999.
WHO. Guidelines for the Safe Use of Wastewater, Excreta and Greywater. In WHO, Ed. 2006.