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Up-the-Pipe Solutions: a best practice framework to engage communities in reducing chemical contamination in waste

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## Introduction

Anthropogenic chemicals are fundamental for maintaining our standard of living in modern society. Unfortunately, some chemicals are persistent and can enter waste streams and, ultimately, the environment. Commonly used household products, including pharmaceuticals and personal care products, are notable sources of contaminants. There is potential to reduce the levels of contaminants in waste streams or substitute them with less harmful alternatives by raising awareness. The aim of this study was to develop an 'Up-the-Pipe Solutions' framework to raise awareness within the wider community about the presence and potential risks of the chemicals found in household products.

## Methods

This framework is based on 'The Natural Step' and the concept of essentiality; it recognises the importance of engaging with communities to raise awareness of each individual's contribution to the problem.

## Results and conclusions

Our daily activities and behavioural patterns can have adverse consequences, including the release of persistent contaminants in main waste streams from our kitchens, bathrooms, and green wastes. The 'Up-the-Pipe Solutions' framework was successfully used in a small community to engage with school children, local authorities, and Māori leaders to raise awareness of chemical pollution. The framework provides an opportunity to incorporate social input in the community by empowering their ability to manage pollution on an individual scale.

**Keywords:** waste; chemical pollution; behavioural pattern; The Natural Step; survey; school; emerging contaminants; New Zealand; essentiality