Reviewer's report

Title: A Prospective Study of Rural Drinking Water Quality and Acute Gastrointestinal Illness

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Reviewer: Dr Paul Hunter

Level of interest: A paper whose findings are important to those with closely related research interests

Advice on publication: Accept after revision, which I do not need to see

This is a very interesting paper, which sought to determine the relationship between gastrointestinal illness and water quality in small rural supplies. The study is well designed, though as they authors state the sample size was probably too small to identify a statistically significant result.

1. Apart from the issue of sample size, my main criticisms about the study design relate to the case definition of diarrhoeal disease and the assessment of faecal contamination of the water supplies. The case definition used in this study is rather vague compared to that used in other studies of gastrointestinal illness such as the UK Acute Infectious Diarrhoeal Disease and the US FoodNet studies. This will make comparison with other studies difficult. However, it is difficult to see how this can be corrected at this stage, though perhaps the authors could raise these issues in the discussion.

2. My second point relates to the reliance on just two water samples to define faecal contamination. In our experience the microbial quality of individual small untreated water supplies can vary dramatically over short periods of time. It is also a shame that the authors did not do faecal streptococcal counts, especially as these indicators seem to have a closer association with gastrointestinal illness. Should be discussed.

3. The title for table 5 needs to be clearer as it is not obvious that this excludes cases with high heterotroph counts. Do not use the term background bacteria when there is a correct technical term.

4. (Major point) In paragraph 2 of the Background section, the authors state that "studies worldwide have been unable to demonstrate associations between drinking faecally contaminated water and acute gastrointestinal illness". This is a very distorted view of the world literature. There are very many reports
of outbreaks and sporadic disease linked to drinking faecally contaminated water. I will accept that most of these studies have looked at specific infectious diseases rather than self-reported diarrhoea as in this study.

5. The finding that there was no association between total coliforms and illness is in-line with most other studies that investigated this issue. Total coliforms are not a useful marker for faecal contamination. As has already been discussed there was an increased risk associated with E. coli counts, though this did not achieve statistical significance, probably because of the sample size, there were only 50 supplies positive for E. coli.

6. Perhaps the most interesting finding was the effect of age on risk of illness. The author's findings suggest that individuals exposed to drinking water with high faecal indicator organisms suffer an increased risk during childhood, but by the time adulthood is reached such individuals have a lower risk of illness. This observation is in-line with opinion and observation expressed by a number of authors in recent years. It is a shame that the authors have not discussed the literature on this issue. The authors could have made a lot more of this issue.

7. (Major point) Perhaps my main criticism of this paper relates to the final paragraph. The authors state that this study suggests that consuming contaminated water does not increase individual risk of AGII. This is a very bold statement and one that is not supported by their own results, especially as there was an elevated risk associated with E. coli (though not statistically significant) and the authors did not examine for faecal streptococci (probably the best marker of health risk associated with faecal pollution). It may be that they authors are making their statement based on the total coliform results. If this is the case, they are at fault in using these as indicators of faecal pollution.

In conclusion, I think the paper certainly deserves to be published after the authors have made a number of alterations and asked themselves more carefully what conclusions can be drawn from their results.

Competing interests:

None declared.