



Public Health
England

Protecting and improving the nation's health

Water Fluoridation

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What is the evidence to the dental health benefits of fluoridated water?

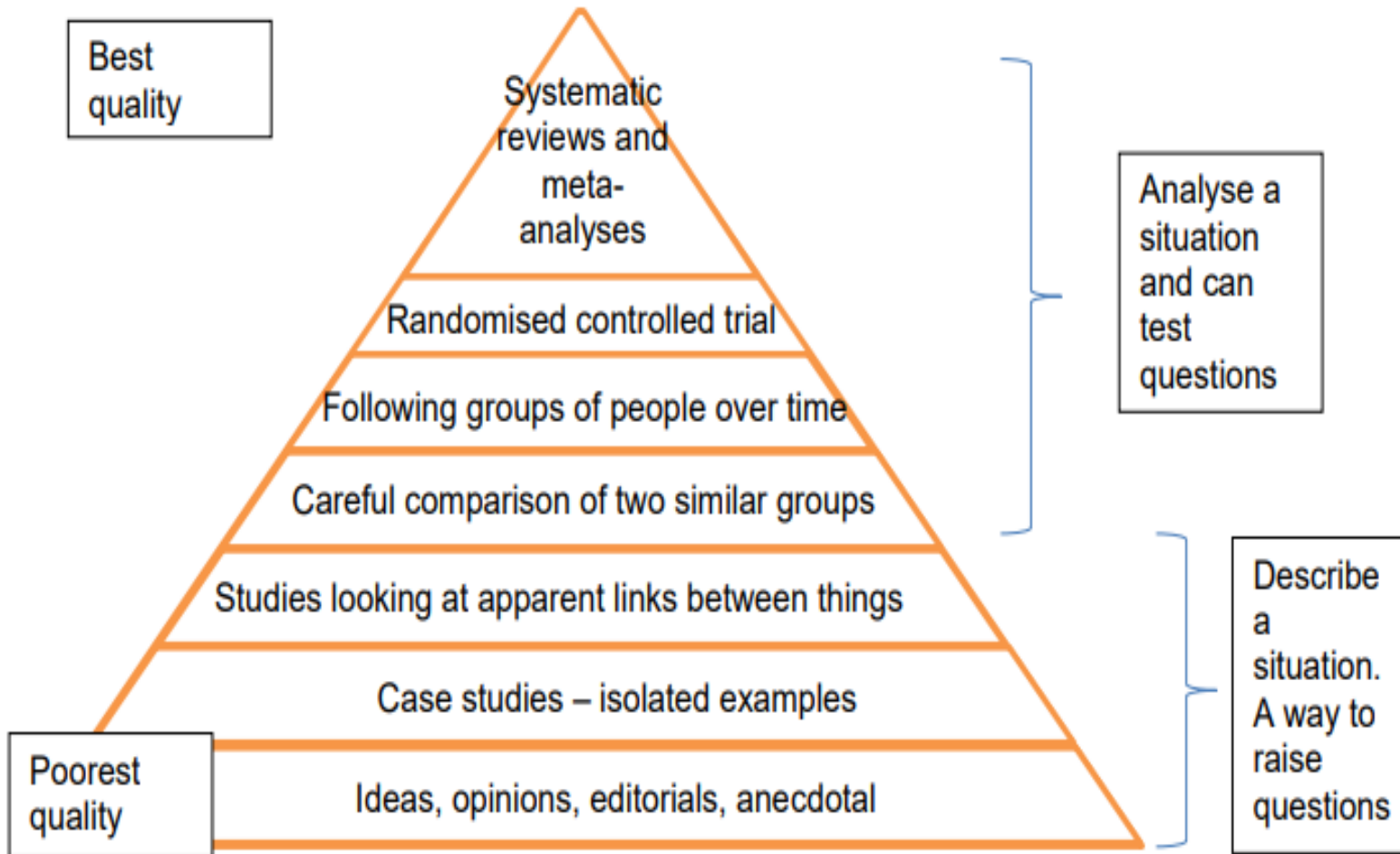
Is there evidence of harm?

What do we mean by *evidence*?

- Blogs?
- Information on websites?
- Scientific papers?
- Youtube?
- Official publications?

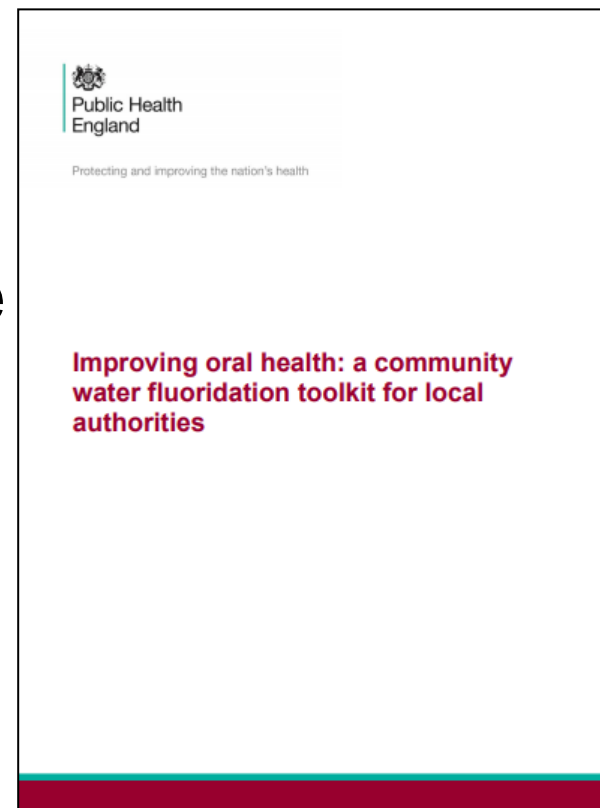


Evidence Hierarchy



Is CWF effective?

- Strong evidence base – 9 evidence reviews since 2000 (see PHE 2016 toolkit) plus one in 2017 & two in 2019
- PHE monitoring reports 2014, 2018 show contemporary reductions in decay levels (and impacts) between fluoridated & non-fluoridated communities



2018 PHE monitoring report

- 5yr olds - odds of experiencing decay were reduced by 23% in the least deprived areas and 52% (95% CI 47%-56%) for five-year-olds living in the most deprived areas (2014 report also looked at 12-year-olds, showing reduced decay levels)
- Hospital admissions for removal of decayed teeth in 0-19yr olds 59% lower

2018 PHE monitoring report

- The reduction in the number of 5yr olds experiencing decay greater in more deprived areas (more disease to prevent) narrowing differences in dental health between more and less deprived children.
- A larger number of the most deprived 0-19yr olds benefited from reduced hospital admissions, lessening differences between more and less deprived communities.

Is the evidence base perfect?

- Less known about impact on adolescents and adults – fewer studies but approx. 25% reduction reported for adults
- One recent systematic review (Cochrane 2015) commented that studies of the impact of implementing new schemes “before and after” often pre-date the widespread availability of F-toothpaste - limited recent research opportunities in England
- Quality of hospital admission data

What about dental fluorosis?

- Higher levels of dental fluorosis seen in fluoridated areas – but apparently of no/mild aesthetic concern.
- No significant difference in satisfaction with appearance of teeth, or where it does cause concern, there is an equal level of dissatisfaction due to other factors e.g. trauma, orthodontic malalignment or decay.
- Possibly improves with age
- Sense check – are fluoridated areas filled with brown-toothed children complaining about their smiles?

Harmful to health?

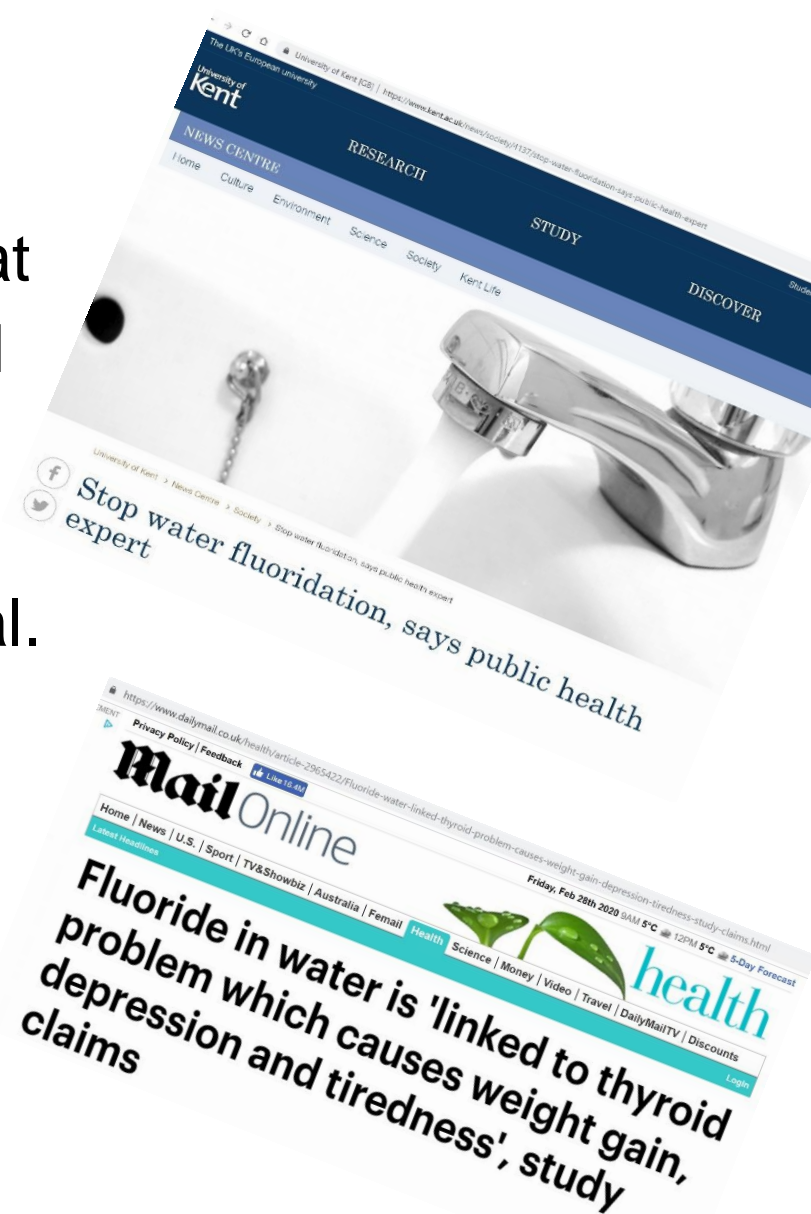
- Numerous evidence reviews since 2000 - no evidence of harm to health from fluoridated water
- PHE monitoring reports 2014, 2018 show no evidence of harm to health.

Harmful to health?

- Crowded publication arena with highly variable quality of outputs – caution needed in interpreting single studies.
- Peer review of papers prior to publication is essential, but notoriously flawed.
- Assessing new research can take longer than the time to produce and disseminate it - constant ongoing lag between new research being published and assessment by the wider scientific community.

Example:

- Paper published by researchers at Kent University in 2015 purported to show link between water fluoridation and hypothyroidism. High quality peer-reviewed journal.
- U. Kent press release says “Stop Fluoridation” (still on Uni. Website). Lead researcher presented at LA OSC with similar message
- Widely reported in press (and still cited now)



- The same Journal later published two commentaries which were highly critical of the paper, in particular the underlying hypothesis, research methods and authors' conclusions. British Dental Journal published a third critical commentary.
- 2 years later the original authors respond to the criticisms, stating that they did not show fluoridation causes hypothyroidism and their paper was not intended to discuss the merits of water fluoridation (this response is itself subject to further criticism)
- The paper has been included in 3 subsequent evidence reviews:

Ireland HRB 2015 - *The quality level is low. There are three reasons for assigning a low-quality rating. First, the study design assigned was incorrect. Second, the control for confounding was incomplete. Third, the authors infer a causal relationship rather than a theoretical relationship. (HRB 2015, page 85)*

Australia NHMRC 2017 - *This study had some serious limitations which restricted drawing conclusions based on its finding. this study did not change the overall evidence about the effect of fluoridated water on thyroid function. (NHMRC 2017, Information Paper, page 52).*

Canada CADTH 2019 - *Overall, there was insufficient evidence for an association between water fluoridation at the current Canadian levels and thyroid function. (CADTH 2019, Health Technology Assessment, pages 177-178)*

CDC (2018)

Expert panels consisting of scientists from the United States and other countries, with expertise in various health and scientific disciplines, have considered the available evidence in peer-reviewed literature and have not found convincing scientific evidence linking community water fluoridation with any potential adverse health effect or systemic disorder such as an increased risk for cancer, Down syndrome, heart disease, osteoporosis and bone fracture, immune disorders, low intelligence, renal disorders, Alzheimer disease, or allergic reactions.

Canadian CADTH (2019)

There was evidence that there may be no association between water fluoridation at the current Canadian levels and bone cancer, total cancer incidence, hip fracture, Down syndrome, and IQ and cognitive function. There was insufficient evidence to draw a conclusion for an association between water fluoridation at the current Canadian levels and other reported health outcomes. Several limitations of the evidence in the current review were identified, and, therefore, caution is warranted in interpreting the evidence.

Summary

- Significant dental health benefits continue to be observed
- Increase in dental mottling but not of any public health impact from this
- No credible scientific evidence of harm to health after 70+ years experience