Water Quality, Nitrates and Health – PHANZ Policy Brief

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Public Health Association members are calling for urgent action to protect the mauri and sustainability of Aotearoa New Zealand's drinking water sources. A stronger, long-term health approach is needed to protect the wellbeing of people and their environment. Public health policy must move to protect water sources from contaminants such as nitrates and ensure kaitiaki can monitor for health effects on people and their environments.

Overview

This advocacy policy brief highlights the relationship between water quality and health outcomes. Access to safe drinking-water is essential to health, acknowledges indigenous relationship with natural resources and is a component of effective policy for health protection and promotion. Nitrate contamination impacts life-sustaining mauri of water and the public health principles protecting health in Aotearoa New Zealand. With management of the country's 'three waters' in transition, it is timely to add a public health focus to help protect communities from degraded drinking water sources and reverse processes that disrupt mauri or life-sustaining capacities.

Adverse health outcomes may occur at concentrations of nitrate in drinking water considerably below currently permitted 50 mg/L, as determined by World Health Organization (WHO) Guideline Value[1] and 'Maximum Acceptable Value' (MAV) of the Drinking-water Standards for New Zealand.[2] Health outcomes for which associations have been shown include bowel cancer,[3,4] preterm birth[5] and congenital abnormalities.[6] Widespread nitrate contamination of groundwater creates an urgent case for robust policy to decrease permitted nitrate levels in drinking water and re-orient the system that enabled it. Integrating public health measures with an indigenous long-term view, a precautionary approach is advocated to recognise water as a life-sustaining resource for future generations.

Background

Our Relationship with Water

Safe drinking water is a fundamental right, essential to human life and a key element of United Nations 2030 Sustainable Development Goals.[7,8] Water contamination in Aotearoa New Zealand has had severe consequences for human health,[9] prompting the focus of increased regulatory, financial and

cultural resource to water reforms. Māori, as Tiriti o Waitangi partners, have a traditional relationship with water as a taonga, with rights of protection and kaitiakitanga reflected in the transformation of water law and policy.[10]

Guiding Frameworks

Te Mana o te Wai is central to Government's Essential Freshwater policies and regulations, enforced through The National Policy Statement for Freshwater Management 2020.[11] This firstly protects the life-supporting capacity of the water, then provides for human health needs, with new requirements to apply a Māori lens to decision-making on freshwater.[11] Te Mana o Te Wai highlights the direct connection between the health of water bodies and the outcomes that support physical well-being, mental and emotional well-being, social well-being, and spiritual well-being, Hauora.[10] Restoring the mauri of water from the degradation of post-colonial activities (including industrialised agriculture) supports a healthy relationship with water and access to safe drinking water.

Action is required within current water reforms to retain a public health focus, such as the ability to track drinking water qualities and impacts on health outcomes. With the transfer of public health drinking water records to the new water authority Taumata Arowai,[12] incorporation of public health priorities for researching and tracking health outcomes related to water quality and contributing environments is urgent.

Nitrate, ecological impacts and scale of pollution

Nitrate is one of the most common drinking water contaminants in Aotearoa New Zealand, largely driven by agricultural activity (nitrogen fertiliser application and livestock waste).[13] Nitrate pollution of freshwater poses an intergenerational challenge due to the extent of the pollution, the lag times to cleanse freshwater sources and the cost of treatment. Between 2014-2018, 44% of the groundwater sites routinely monitored by Ministry for Environment showed nitrate levels above natural levels (i.e. anthropogenic pollution), with 38% of sites worse than 2009-2018, despite environmental regulations.[14] One study of 34 Aotearoa New Zealand water catchments estimated the median lag time was 4.5 years, with some lag times being several decades.[15] Thus, in many areas the peak pollution from agricultural intensification has yet to present in our water bodies, while interventions introduced today may not have noticeable impacts for years. Once a drinking water supply is contaminated with nitrate it is costly and difficult to remove. A recent cost estimate for a nitrate treatment system for Christchurch's water supply was $1,507 million (based on a ~4 mg/L nitrate level), including an estimated $24 million annual operating cost.[16]

Nitrate and direct health impacts

The current regulatory limit for nitrate in drinking water was set to prevent cases of infantile methaemoglobinemia "Blue Baby Syndrome."[1,2] When a baby

drinks formula mixed with nitrate-rich water, nitrate metabolites interfere with blood oxygen-carrying capacity, depriving cells of oxygen.[17] Adverse infant health outcomes are also linked with maternal exposure to nitrate. Increased risk of preterm birth [5] and congenital abnormalities [6], importantly both impacting across the life course, are seen well below the current MAV.

Recent experimental,[18] epidemiological [19,20] and genetic [18,21-23] evidence also implicates nitrate in drinking water in the development of bowel cancer .[24] Nitrate is classified as a probable human carcinogen (class 2A).[24] In the largest study, increased risk of bowel cancer was observed at nitrate levels as low as 3.8 mg/L.[4] Note: The high levels of antioxidants in vegetables (the main source of dietary nitrate) helps explain why we do not see an adverse relationship between nitrate in vegetables and any cancers.[24] Thus, this policy statement follows the International Agency for Research on Cancer recommendations to assess nitrate from dietary sources and drinking water separately.[24]

Despite increasing nitrate levels in groundwater nationally, the majority of registered supplies in Aotearoa New Zealand presently have low levels of nitrate.[25] However, some unregistered bore supplies particularly in Canterbury, Nelson / Marlborough and Waikato, have very high nitrate levels.[25] Current estimates suggest that 800,000 people consume water with nitrate levels above the observed threshold (3.8 mg/L) for increased risk of bowel cancer. [25,26] Concerningly, nationally, trends for nitrate pollution of groundwater show nitrate levels in drinking water are likely to increase [14]. Similarly, nitrate levels in major municipal water supplies are predicted to increase.[27] For example, nitrate levels in Canterbury's aquifers supplying Christchurch City are predicted to increase to 13-33 mg/L under current land use practices.[27]

Direct health implications of nitrate in drinking water still require further research. [28,29] However, robust emerging evidence from interdisciplinary research across several health outcomes, and the potential scale of the problem of nitrate pollution, support recommendation of the precautionary approach.

The PHA supports:

- establishment of a national database for water quality testing, monitoring and record keeping facilitating ongoing research, surveillance and kaitiakitanga.
- development of policies that prioritise restoring the health of the water (Te Mana o te Wai) with sustainable approaches to caring for water recognising its impact on health
- application of the precautionary principle.

PHA actions to support this policy:

- Keep members informed of relevant research, key policy/legislative developments, and consultations
- Influence local and central government policymaking through submissions and participation in policy development forums
- Strengthen relationships with kaitiaki Māori, researchers, aligned advocacy groups, and policy officials and decision makers at local, regional and national levels.

The Public Health Association of New Zealand (PHANZ) is a national association with members from the public, private and voluntary sectors. Our organisation's vision is 'Good health for all - health equity in Aotearoa', or 'Hauora mō te katoa – oranga mō te Ao', and our purpose is to advocate for the health of all New Zealanders. To achieve this, we provide a forum for information and debate about public health action in Aotearoa New Zealand. Public health action aims to improve, promote and protect the health of the whole population through the organised efforts of society. We recognise Te Tiriti o Waitangi as Aotearoa New Zealand's founding document, defining respectful relationships between tangata whenua and tangata Tiriti, and are actively committed to supporting Te Tiriti values in policy and legislation.

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