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ORIGINAL RESEARCH

Problems with provision: barriers to drinking water quality and public health in rural Tasmania, Australia

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ABSTRACT

Introduction: Access to safe drinking water is essential to human life and wellbeing, and is a key public health issue. However, many communities in rural and regional parts of Australia are unable to access drinking water that meets national standards for protecting human health. The aim of this research was to identify the key issues in and barriers to the provision and management of safe drinking water in rural Tasmania, Australia.

Method: Semi-structured interviews were conducted with key local government employees and public health officials responsible for management of drinking water in rural Tasmania. Participants were asked about their core public health duties, regulatory responsibilities, perceptions and management of risk, as well as the key barriers that may be affecting the provision of safe drinking water.

Results: This research highlights the effect of rural locality on management and safety of fresh water in protecting public health. The key issues contributing to problems with drinking water provision and quality identified by participants included: poor and inadequate water supply infrastructure; lack of resources and staffing; inadequate catchment monitoring; and the effect of competing land uses, such as forestry, on water supply quality.

Conclusions and implications: This research raises issues of inequity in the provision of safe drinking water in rural communities. It highlights not only the increasing need for greater funding by state and commonwealth government for basic services such as



drinking water, but also the importance of an holistic and integrated approach to managing drinking water resources in rural Tasmania.

Key words: Australia, drinking water quality, local government, public health, Tasmania.

Introduction

Clean drinking water is essential to human health and wellbeing. While waterborne disease and related fatality is commonly associated with lesser developed nations¹, critical water-related outbreaks have occurred in recent years in countries such as Canada and the USA². The fundamental goal of drinking water management and provision should be the holistic protection of public health³⁻⁴; however, many populations within Australia are at risk of illness because they are unable to access safe drinking water⁵. While the focus of Australian water quality problems has been on high-profile incidents, such as the 1998 contamination of Sydney's water supply⁶, rural and regional communities within Australia are most consistently affected by poor water quality^{3,7-9}. Given that the provision of safe drinking water is a fundamental driver of public health, addressing drinking water quality issues in rural and regional parts of Australia is increasingly important.

The aim of this research was to report on key issues in the provision, management and regulation of safe drinking water in Tasmania. At present, over one-third of Tasmania's drinking water supplies are unsafe for consumption, according to national guidelines¹⁰. The majority of these supplies are in rural areas. Drawing on qualitative interviews with local government officials responsible for provision of water supplies, this article discusses key constraints in the protection of public health and the delivery of safe drinking water to rural Tasmanian communities.

Defining rural Tasmania

Geographic location has a significant impact on public health. This is most evident in the differences in health

status, health risk factors and access to health services that exist between metropolitan and rural areas of Australia¹¹⁻¹³. However, while rural location is commonly viewed as a tangible site of 'health difference', the conceptualisation of what constitutes rural has been problematic within social health research, with no consensus established¹⁴⁻¹⁵.

The Australian Department of Health and Ageing's *Rural, Remote and Metropolitan Areas (RRMA)*¹⁶ classification system provides a useful reference by which to define and consider the remoteness and accessibility of areas across Australia. Using this classification, half of Tasmania's 28 local government municipalities, including two island municipalities in Bass Strait, contain areas classified 'small rural' (a population of less than 10 000) or 'remote' (population of less than 5000). In respect to water provision, Tasmania's central population areas have water provided from bulk water authorities (there are three large specialist organisations that manage and sell drinking water). However, the dispersed nature of the Tasmanian population means that in most rural and remote areas, the provision and management of drinking water and the protection of public health is the sole responsibility of local government.

Background to the issue: water regulation and public health in Tasmania

Tasmania is the only Australian state to have made the microbiological provisions of the *Australian Drinking Water Guidelines*¹⁷ a statutory requirement under *Public Health Act (1997)*¹⁸. Under this Act, the 'ability to accurately assess the potential health risk from the consumption of drinking water is reliant on microbiological testing'¹⁸. All water providers in Tasmania have obligations under the *Public Health Act (1997)* to protect water quality. This requires them to regularly test their drinking water supplies for



microbiological contamination, particularly the presence of *Escherichia coli*, a significant indicator of pathogenic contamination^{2,5}. Water providers are also required to report annually to the Director of Public Health on the state of their water supplies. This includes a disclosure of any water testing results that did not comply with the requirements of the *Public Health Act (1997)*.

Method

The research reported here is part of a larger study examining the regulation of Tasmania's drinking water. In taking a qualitative approach, we aimed to gain an understanding of how key local government personnel understood issues associated with drinking water provision. Semi-structured interviews formed the basis of data collection (also called focused interviews)¹⁹. These were guided by the key areas of enquiry, but also allowed interaction between the interviewer and participant. This was particularly valuable in probing for additional information and for gaining an understanding of individual perception, and how these may be similar or different according to context or circumstances²⁰. While this research was part of a larger study of all municipalities in Tasmania, the interviews reported here were conducted with 12 local government representatives, from each of the rural local government municipalities in Tasmania. These 12 participants had public health responsibilities for the management of drinking water within their municipality. Interviews were on average one hour in duration, and participants were asked about their public health roles, processes of risk assessment, regulatory responsibilities and the key barriers affecting the provision of safe drinking water in their municipality. The interviews were taped and transcribed.

A thematic analysis was undertaken to interpret the interviews. Thematic analysis is part of an interpretive method that examines and seeks to explain the meanings that emerge from interview data²⁰⁻²². This includes identifying emerging issues and categorising them into themes. For example, the analysis process focussed on what was said in

the interviews, the similarities and differences of statements, and the context in which participants spoke.

Findings and discussion: obstacles to safe drinking water in rural Tasmania

The analysis revealed that one of the most critical determinants of drinking water safety and quality in Tasmania is locality. Participants identified their rural location as significantly impeding their ability to meet regulatory requirements and provide safe drinking water to communities. They focused their attention to the constraints imposed by inadequate water distribution and treatment systems; water testing regimes and limitations; and the effect of competing land uses in protecting water sources.

Inadequate water distribution systems, treatment and resources

All participants identified the importance of adequate water supply infrastructure as the key to providing safe drinking water to communities. However, the majority of participants also acknowledged that their council lacked the adequate infrastructure and resources needed to meet regulatory requirements of the *Public Health Act (1997)*. The building of new, or upgrading of existing water supply infrastructure, such as pipes, treatment facilities and storage reservoirs, was thus seen as integral to maintaining the provision of safe drinking water distribution systems in many parts of rural Tasmania. For example, one participant said:

We have pipes that are literally at least a hundred years old. To replace them would cost hundreds of thousands of dollars but we don't have the money to do that, although it's something that we are going to have to urgently address.

Thus, over half the participants identified inadequate infrastructure as a reason for supplying untreated drinking water to their communities. Eight providers claimed that lack of water supply facilities, such as chlorination and filtration



infrastructure, raised significant concerns about the capacity to adequately protect public health. They pointed out, for example, that councils not treating their drinking water are unable to ensure the elimination of harmful microbiological contaminants such as *E.coli* and *Giardia lamblia* from the water supply, which can cause the onset of short- and long-term health conditions, such as diarrhoea, vomiting and nausea, and gastrointestinal illness. As a result of such issues, all participants discussed the contradictions between the adequate protection of public health as espoused in the *Public Health Act (1997)* and the realities of being able to supply treated water to rural communities. Most participants spoke of the 'liability' existing in providing untreated drinking water to communities because of inadequate infrastructure and resources. This is expressed by two participants when they stated:

Untreated water is a major risk for us, it's a massive responsibility really to supply water, and if it goes wrong it doesn't just make a lot of people sick, it can even kill people. The liability is definitely there.

We have one system that's untreated and comes straight via a dairy farm and I know that's its more than possible if someone drinks that water and gets seriously, seriously ill and it's in the back of my mind that we are accountable.

In minimising the liability and risk existing from providing untreated drinking water, councils in Tasmania must advise consumers in affected areas to find an alternative water source (ie bottled water) or to issue 'boil alert' notices. Boil alerts involve the notification of all households connected to a water supply to boil their tap water for at least 3 min before consumption, so as to kill potentially harmful bacteria. The most recent Director of Public Health's *Annual Report on the Quality of Tasmania's Drinking Water*¹⁰ summarising the results of all water quality testing in Tasmania, detailed that a total of 30 boil alerts were issued in Tasmania for the reporting period. Twenty-nine of these boil alerts were in rural municipalities, with over half being permanently issued within communities to protect consumers. For one particular

council, boil alerts affected 10 of their 11 total public water supply systems in the 12 month report period. As a result of such ongoing problems, the perceived liability and risk existent in providing untreated drinking water to communities had caused three participants to consider shutting down whole water supplies to their community, stating, for example:

This council has two systems that are untreated and that is a nightmare...and this council with my encouragement is saying 'let's cut the pipe, let's stop the supply' because the public liability is existing and that's huge in providing a community with untreated water.

It's become really difficult to supply safe water to some of our smaller townships.

I mean the liability is always there and one day you might get jumped because of that when someone gets sick from drinking the water...and the only alternative is that you do not provide water at all.

Other participants expressed great concern at the consequences of providing unsafe drinking water according to state regulations. This was particularly framed within discourses of legal liability and accountability rather than the provision of basic services such as drinking water. For example:

...If there were a case in Tasmania where local government were liable from someone getting sick and they had an untreated supply and there was a linkage made between that sickness and the water supply...you would find that just about every local government would say 'whoa what are we going to do with these supplies now?'

If something terrible did go wrong then the excuse would never be accepted that we just didn't have the money to support new pipes or a new filtration system. If people are sick or even dead because you



let something poison their supply, you are the one that is liable...

However, the possibility of actually stopping the supply of water to townships was discussed by an additional two participants, who acknowledged the tensions between the exigency of providing basic water services and the threat of legislative non-compliance because of limited infrastructure and resources.

My argument has always been that we have a fairly high quality natural water source and we are far better off giving people that water supply even though it is untreated than saying 'okay we have too much liability giving you untreated water - we are going to have shut off the valve and you no longer have reticulated water'.

Protecting water sources: the effect of competing land and water uses

All participants noted that one of the most important steps in providing safe drinking water is protecting water sources, such as catchments, from contamination. However, the majority of participants ($n = 10$) asserted that competing land and water uses in rural Tasmania was making the protection of drinking water supplies in some Tasmanian municipalities exceptionally difficult. In particular, over half of the participants specifically raised concerns over the effect of industries, such as forestry and their use of chemicals such as herbicides, pesticides and fertilisers on municipal water sources. For example, the aerial spraying of the triazine herbicide, atrazine, to control broad-leaf weeds and grasses in forestry plantations is common in Tasmania, and has been detected in community water supplies²³. Atrazine is banned in countries such as Austria, Denmark, Italy and Germany and its use is heavily restricted in countries such as the USA, largely because of its argued cancer-causing properties²⁴⁻²⁸. In recent years, the use of atrazine in Tasmania has been increasingly debated by the media, environmental lobby groups as well as within political arenas²⁴. In light of such

contention surrounding competing uses for land and water, the majority of participants specifically advocated the need for a more holistic and comprehensive approach to drinking regulation by the Tasmanian state government in order to protect both public health and water sources. For example, as two participants stated:

Once upon a time you didn't even think about where your water had been, now with development, farms and plantations you get thinking about the effect of these kinds of things on supply...

I think that the biggest risk we have here at the moment is probably a lack of knowledge of what's actually going on in catchments...we have no real jurisdiction over forestry or farming...that's unquestionably the biggest risk for me from a public health point of view.

The possibility of chemical contaminants within rural water supplies also raised questions among participants over the adequacy of the testing regimes prescribed by the *Public Health Act (1997)*. At present, the testing of drinking water for chemical contaminants is not mandatory in Tasmania. While adequate testing should enable drinking water contamination to be identified and communicated to the public before consumers are put at risk, participants acknowledged the inherent difficulty of testing for every possible contaminant that could affect the quality of drinking water. Nonetheless, these participants still believed that the testing of drinking water for chemicals was an increasingly pertinent issue that needed to be considered by local government as well as state government in Tasmania, particularly given concerns over the effect of competing land uses on water sources. However, when participants were asked to consider the implications of introducing chemical testing in Tasmania, many showed concern with the potential liability that may exist within local government if unsafe levels of harmful chemicals were to be found in their current water supplies.



I guess for me the really important question you have to ask is well what happens if you really do find this stuff [chemicals] in the water? That would be our greatest dilemma and no-one really wants to address that, but that is when the council would be liable.

Chemical testing is something I have been thinking about for a long, long time and you really don't want to get into it. It's getting to the point that what you don't know is no excuse but it gives us some chance of avoiding litigation...but once you know and you start testing for chemicals and you find something then that's when it gets serious.

Such comments indicate the complex issues associated with testing drinking water, and highlight that knowledge of contamination in itself is problematic when such contamination is not amenable to an easy solution.

Adequate resources

Additional problems relating to the provision safe drinking water in rural areas of Tasmania included the physical and economic feasibility of testing for all drinking water contaminants. For example:

We got a quote to test for one herbicide because we were worried about some forestry activity...it was \$1347 per test and that's just for one possible contaminant, and there are at least a hundred more chemicals that I would ideally like to test for.

All participants identified a general lack of economic resources for water testing and staffing as affecting their ability to provide safe quality drinking. This problem appears to be increasingly perpetuated because local governments are dependent on financial revenue primarily from municipal rates. Given the limited population numbers in many rural municipalities, councils have limited income for all services, including water provision. Added to this, the rate-paying base of many of these municipalities is low,

raising tensions over just how to finance water provision and meet regulatory requirements. As one participant stated:

It's not as simple as going out into these towns and saying okay we are going to fix the water but your rates are going to go up in the process. We tried to do just that with one of our townships a couple of years ago and people said they just couldn't afford a rates rise.

A further problem for rural councils is limited staff numbers. In practice, this often equates to staff taking on multiple roles and responsibilities and, in the words of one participant, 'wearing many hats' within the local government structure. For example:

We don't have an environmental health officer like bigger councils. I do it all myself and I don't believe in putting the responsibility of three men for such an important part of public health on one person...but that's what happens around here.

It comes back to both financial and also staffing resources and that's the difficulty with small supplies - although every consumer should be equally provided for and we are just as accountable to a population of one as we are to a population of one hundred thousand...but it's not as easy as that in practice.

Given the financial restraints impeding smaller councils' ability to manage and provide safe drinking water, all but one participant argued that the state government should provide support for basic services, such as water, as an area of priority. Participants noted the discrepancy between being, on the one hand, accountable to state government legislation, but on the other, receiving no assistance to meet the legislative requirements.

At the moment we are trying to test our water weekly and that a 75 percent increase in cost and there'd nothing in the [Public Health] Act that says how we



are supposed to pay for it...If you ask state government how they expect us to pay for it they will answer 'put your rates up' and then you get residents who can't afford that, there needs to be a greater support of local government.

Conclusion

Clean, safe drinking water is fundamental to the health of all populations, regardless of location. However, within the state of Tasmania, over one-third of the population are unable to access drinking water free from microbiological and chemical contamination. While drinking water can never be entirely risk free²⁸, a comprehensive and holistic approach to the management of drinking water resources is increasingly essential in protecting public health. The findings from this study show that there are a number of critical issues affecting the provision of safe drinking water in rural Tasmania.

First, while adequate infrastructure remains a core necessity for protecting public health, poor or non-existent water supply infrastructure and supply systems remains a problem in many rural and remote areas of Tasmania. This severely constrains the fundamental capacities of local government to provide safe drinking water and to protect public health, and has caused some local government councils to consider stopping the supply of drinking water to some communities permanently. Potential public health solutions may include individualised solutions such as in-line filter systems into households or holistic approaches that take a whole-of-community approach. Other possible solutions include the sustained involvement and contribution of the Tasmanian state government to maintaining and upgrading drinking water supply and treatment systems throughout Tasmania. A more political solution to the issue of water quality may additionally be to locate responsibility for the delivery of safe drinking water with the state government rather than with local governments.

Second, a more comprehensive approach to the protection of drinking water sources, such as catchments, in Tasmania is particularly pertinent. Increasing land and water uses, such as forestry and agriculture, are a growing point of concern for those involved in the management and provision of drinking water in rural Tasmania. These traditional resource based industries are increasingly located in the traditional water catchment areas of Tasmania that provide townships with their drinking water; thus, the possible effects of chemical contaminants in rural water supplies is becoming an important consideration in the protection of public health.

Possible ways of addressing such issues include the introduction of integrated catchment management schemes in Tasmania. This would involve a process whereby the various parties and interests in drinking water are brought together through regional land and water management plans to achieve whole-catchment improvements. This process should include a representative balance of the spheres of government, industry, private land owners as well as community members in deciding how water resources could be better managed.

This study raises the issue of equitable and safe drinking water supplies for all Tasmanians, and indicates that this basic human need is far from being realised in rural Tasmania. Given the potential risk that unsafe drinking water has to affect the health of whole populations, this study has identified the need for water quality to receive greater attention by state and federal governments, ensuring a transparent and holistic approach to the management and regulation of drinking water both within the state of Tasmania and Australia more broadly.

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