

Water supply and Aboriginal and Torres Strait Islander health: an overview

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Aboriginal and Torres Strait Islander people have lived successfully on the Australian continent for at least 40 000 years. Their quest for water, based on an intimate knowledge of their environment, particularly in arid Australia, was a skilled and specialised endeavour. Following the European occupation over 200 years ago, the Aboriginal and Torres Strait Islander population decreased rapidly due to the ravages of colonisation. Introduced infectious diseases, such as smallpox, typhoid fever, leprosy, and venereal disease, were a major factor in increased mortality and morbidity; tribal land displacement and massacre of some communities was another major factor. The current health status of Aboriginal and Torres Strait Islander people is poorer than that of other Australians. Their pattern of mortality and morbidity shows the burden of both infectious and lifestyle diseases. This poor health status is associated with wide-ranging socioeconomic disadvantage. The environmental living conditions of many

Aboriginal and Torres Strait Islander people remains an impediment to major health improvement. The lack of adequate and safe water supplies is an important factor in the continued poor health status of many communities. A recent national survey of housing and infrastructure needs of Aboriginal and Torres Strait Islander population centres has improved our understanding of the current water supply situation.

Providing a safe adequate water supply alone will not automatically result in any significant improvement in health. Many other factors are involved. However, *safe water is the doorway to health and health is the prerequisite for progress, social equity and human dignity* (Napalkov, 1992). This paper examines the relationships between water and health and why the many national surveys and enquires have failed to secure a noticeable and sustainable benefit among Aboriginal and Torres Strait Islander people.

Introduction

The Australian land mass is relatively arid, with 80% having a median rainfall less than 600 mm per year and 50% less than 300 mm. There is a wide range of climatic zones, from the tropical regions of the north, the arid expanses of the interior, to the temperate regions of the south. With a limited supply of surface water, about 60% of Australia is totally dependent on groundwater (Australian Bureau of Statistics, 1992a).

Aboriginal and Torres Strait Islander people have lived successfully on the Australian continent and associated islands, under a wide variety of environmental conditions, for at least 40 000 years. The quest for water has always been an important concern for Aboriginal and Torres Strait Islander people, particularly in arid Australia (Magarey, 1895). Johnston (1941) writing about the travelling routes of traditional Aboriginal people in western South Australia noted:

‘... Routes lead mainly from one water supply to the next one in the general direction which is being followed ... The utilisation of a route varies according to the water supplies along it — in other words the track chosen depends on the season and upon the weather conditions in that land of extremely scanty and unreliable rainfall. The availability of animal and plant food is also largely dependent on the water supply ... supplies are derived from rock holes (rock waters), soaks or wells, claypans and dams, as well as from dew and from certain trees ... Rock holes occur especially on granite outcrops, the cavities formed by natural weathering being sometimes deepened as a result of aboriginal activity. Soaks and wells may be located along water-courses or adjacent to rocky outcrops, or in situations in

sandhills where there is an underlying layer of clay, e.g. Ooldea Soak, or more or less impervious sandstone forming the floor of a basin ... Small bodies of water are frequently protected from evaporation or from pollution by carrion, dingoes, etc, by being covered with rocks or timber, or by being filled with sand ...’

Aboriginal and Torres Strait Islander lifestyle and culture have undergone enormous change and disruption since European occupation over 200 years ago. Their health status and population size declined rapidly after the initial colonisation.

J.H.L. Cumpston, the first Commonwealth Director-General of Health, described some aspects of Aboriginal health during this period in his unpublished 1928 historical epidemiological study *Health and Disease in Australia* (Lewis, 1989). He wrote:

‘The Aborigines who inhabited the country before its settlement by the English colony ... suffered from individual maladies but there is no record of epidemic or endemic illnesses affecting them before European settlement.’

This changed as they were exposed to the ravages of introduced diseases, such as smallpox, typhoid fever, leprosy, tuberculosis, hydatid, and venereal diseases.

This paper reviews the relationship between the current health status of Aboriginal and Torres Strait Islander people and their water supply, using international knowledge of the water and human health nexus where appropriate.

The authors write from a perspective reflecting their backgrounds in community development, primary health and epidemiology, health policy and administration, chemistry and resource management, ekistics, technology and human rights.

This mix of authors indicates the relative complexity of the problems and reflects the realisation that a sole focus on public health, groundwater science and technology or Aboriginal desires and aspirations will not yield a benefi-

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cial and sustainable outcome. Similarly, the imposition of rules and standards is unlikely to contribute significantly if viewed as an issue alone without a broader philosophical examination of why the standards and rules exist.

Aboriginal and Torres Strait Islander health

Demography

Aboriginal and Torres Strait Islander people were 1.53% of the total Australian population in 1991 (Table 1). Torres Strait Islanders numbered 28 624, or, 0.17% of the total Australian population, the largest number of which reside in Queensland.

Figure 1 shows the urban/rural distribution of Aboriginal and Torres Strait Islander people in 1986: 33% lived in rural areas (population centres <1000), 24% in major urban centres (population >100 000), and 42% in other urban centres (population 1000–99 999). The Northern Territory differed from this overall pattern in that 69% lived in rural areas.

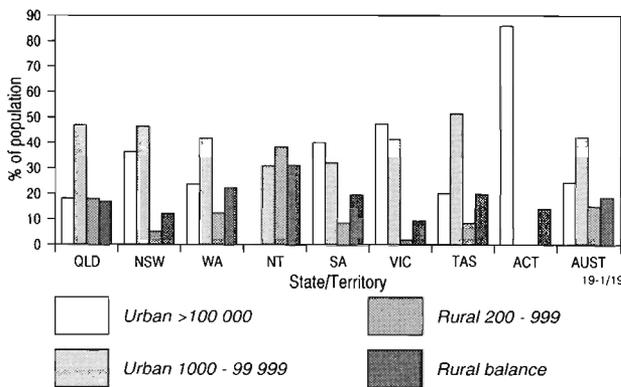


Figure 1. Urban and rural distribution of the Aboriginal and Torres Strait Islander population in 1986 (Australian Bureau of Statistics, 1991).

Figure 2 shows the marked difference in age structure between the Aboriginal and Torres Strait Islander population and the total Australian population, there being more younger and fewer older people in the former.

Health status

The National Aboriginal Health Strategy Working Party (NAHSWP, 1989) pointed out the health status of Aboriginal and Torres Strait Islander people is significantly lower than that of other Australians.

The third biennial report of the Australian Institute of Health and Welfare (AIHW, 1992) documents this health inequality, and shows Aboriginal and Torres Strait Islander people have:

- a life expectancy at birth 15–17 years less;
- a standardised mortality ratio of 2.5–4.4;
- a higher age-specific death rate (e.g. the 35–44 year age group for males and females have rates 11.4 and 8.6 times higher, respectively);

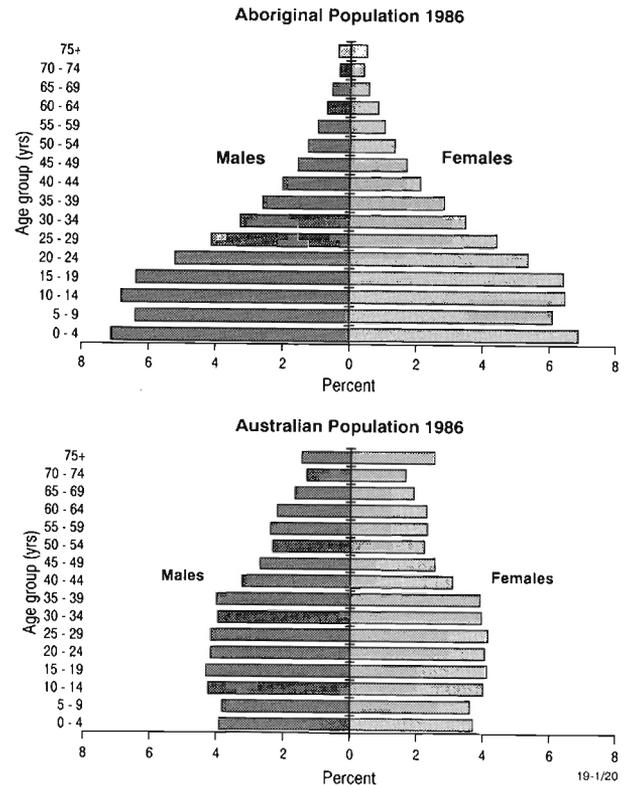


Figure 2. Age and sex profile of the Aboriginal and Torres Strait Islander and total Australian population in 1986 (Australian Bureau of Statistics, 1991).

- babies on average 150–350 grams lighter;
- an infant mortality rate 1.9–3.8 times higher; and
- a higher standardised hospital admission rate for all age groups;

compared to the total Australian population.

The complex nature of these health inequalities is shown by a detailed examination of the mortality and morbidity data.

Mortality

Figure 3 shows prominent causes of premature death are diseases of the circulatory system (predominantly degenerative conditions, such as ischaemic heart disease and cerebrovascular disease), external causes of injury and poisoning (includes motor vehicle accidents, injuries purposefully inflicted by others, suicide, homicide), and diseases of the respiratory system.

The ratio of observed to expected deaths of Aboriginal and Torres Strait Islander people is much higher for infectious and parasitic diseases (International Classification of Diseases: ICD 001–139, WHO, 1977) than for any other group of diseases or conditions, being 13.3 for males and 23.8 for females (AIHW, 1992).

Morbidity

Aboriginal and Torres Strait Islander morbidity patterns

Table 1. Aboriginal and Torres Strait Islander population by State and Territory in 1991 (Australian Bureau of Statistics 1992b).

State/Territory	Aboriginal and Torres Strait Islander population			
	Total	% Total Aboriginal & Torres Strait Islander population	% Total State/Territory population	% Total Australian population
NSW	68941	26.8	1.2	0.41
QLD	67012	26.0	2.3	0.40
WA	40002	15.5	2.5	0.24
NT	38337	14.9	21.9	0.23
VIC	16570	6.4	0.4	0.10
SA	16020	6.2	1.1	0.09
TAS	8683	3.4	1.9	0.05
ACT	1768	0.7	0.6	0.01
Australia	257333	100.0	—	1.53

are indicated to some extent by the national hospital separation statistics which record the principal diagnosis made during each hospital stay. Figure 4 shows that prominent causes of excess hospital separations are respiratory diseases, injury and poisoning, ill-defined conditions, skin, infectious and parasitic diseases (NHS, 1992).

The Aboriginal and Torres Strait Islander and non-Aboriginal standardised hospital separation rate ratios are higher for infectious and parasitic diseases (ICD 001–139) than for any other group of diseases or conditions, being 9.1 for males and 8.3 for females (NHS, 1992).

Regional morbidity patterns can be estimated from publish-

ed reports of Aboriginal and Torres Strait Islander controlled health services. There are more than sixty of these services throughout Australia providing primary health care.

For example, the Nganampa Health Council (1992) reported that respiratory (16.2%), skin (13.4%), ear (9.7%), eye (8%), trauma (4.9%), diarrhoea (3.3%), diabetes (2.6%), hypertension (2.2%), and urinary tract infection (1.9%) problems accounted for a large proportion of total consultations at the six remote area clinics on the Anangu Pitjantjatjara Lands in northern South Australia.

Tharawal Aboriginal Corporation (1992) reported that respiratory, skin, endocrine/nutritional, musculoskeletal, infectious, ear, parasitic/fungal, and digestive problems accounted for most consultations at their medical clinic in southwest Sydney.

The causes of this lower health status are obviously complex, and will vary according to the circumstances at each Aboriginal and Torres Strait Islander population centre throughout Australia (Bartlett & Scrimgeour, 1989).

Environmental health

Environmental health (Last, 1987) can be defined as:

‘... the aspect of public health concerned with all the factors, circumstances, and conditions in the environment or surroundings of humans that can exert an influence on human health and well being.’

The consistent excess of respiratory, skin, ear, eye, infectious, and parasitic problems observed in the Aboriginal and Torres Strait Islander health data implies that inadequate physical living conditions are an important contributing factor to the health inequality.

The presumed central importance of the provision of improved water supplies for Aboriginal and Torres Strait Islander health improvement is well documented (HRSCAA, 1979; RACO, 1980; DAA & DTC, 1982; Nganampa Health Council, 1987; NAHSWP, 1989; Hollows, 1989; Pholeros, 1990; Griffiths & Henderson, 1991; Davis & Kirke, 1991).

The House of Representatives Standing Committee on Aboriginal Affairs (HRSCAA, 1979) said:

‘It is universally accepted that the attainment of a satisfactory standard of health in any community

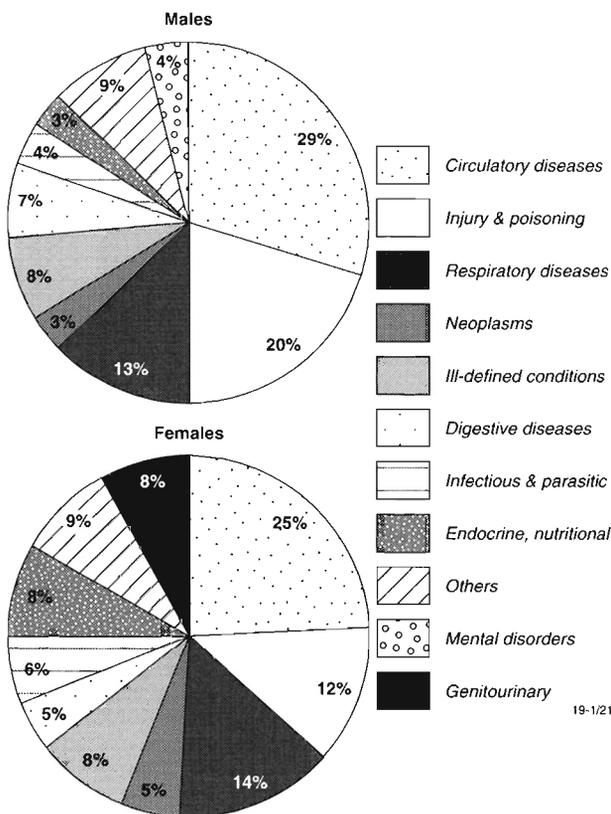


Figure 3. Contribution of specific causes of death to the excess mortality experienced by Aboriginal and Torres Strait Islander people (AIHW, 1992).

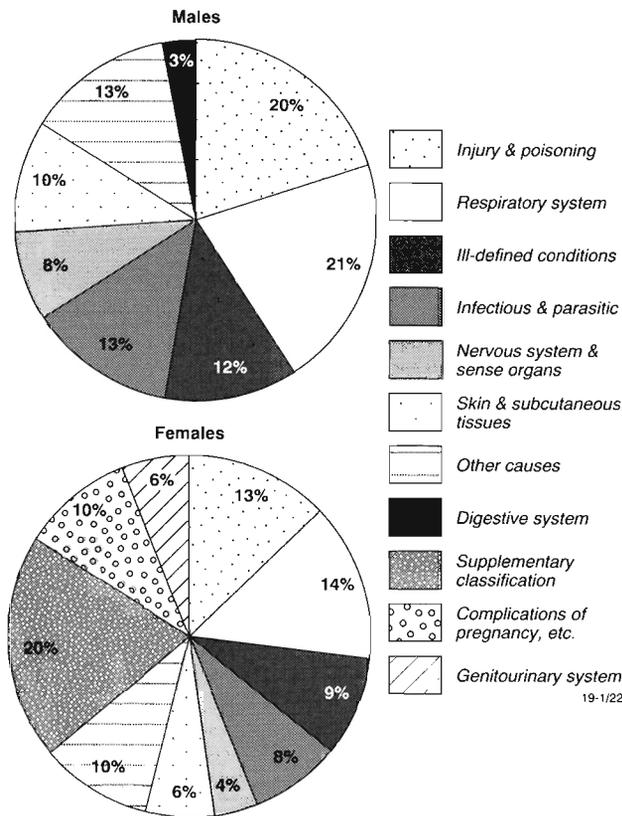


Figure 4. Contribution of specific causes to the excess hospital separations experienced by Aboriginal and Torres Strait Islander people (NHS, 1992).

depends on the provision of certain basic amenities including *water supply, sanitation and sewerage facilities*, housing and electricity. The high incidence and recurrence of many infectious diseases amongst Aboriginals ... result largely from their unsatisfactory environmental conditions.'

The National Aboriginal Health Strategy Working Party (NAHSWP, 1989) said:

'Integral to health systems infrastructure are support services such as *sewerage, water supplies*, communication, etc. These environmental health facilities were mentioned in almost all community consultations and were common in the submissions received by the Working Party. Safe and adequate water supply, improved number and design of houses, shelter, dust control and other environmental factors are vital to sustain improvements in Aboriginal health and well being ... Without question the inadequacy of sewerage and water supply systems are a major factor in the poor health status of Aboriginal people ...'

The Aboriginal and Torres Strait Islander Commission (ATSIC, 1992a) stated:

'The Government ... will provide up to \$232 m over five years to lift unacceptable health and infrastructure standards in Aboriginal communities ... Funds will be used: to address urgent needs in Aboriginal and Torres Strait Islander communities, such as housing, *water, sewerage*, electricity, communications and roads; ...'

International and Australian experience shows the provision of a clean, adequate water supply does not automatically result in significant health improvement. There are many other factors to consider as well (NAHSWP, 1989; Huttly, 1990; Walker, 1992). Nevertheless, it is a vital step towards health improvement.

Water and health

Recent international initiatives have focussed world attention on the issues of water supply, sanitation and health. The WHO adopted the goal of *Health for All by the year 2000* in 1980 with an emphasis on *primary health care*, a component of which is water supply and sanitation (WHO, 1978). The United Nations launched the International Drinking Water Supply and Sanitation Decade in 1980, and in 1990 held the World summit for children, which included a year 2000 goal of *safe water and sanitation for all families* (UNICEF, 1991).

The Aboriginal and Torres Strait Islander Commission (ATSIC, 1992a) stated:

'The objective of the National Aboriginal Health Strategy is the gaining of equity in access to health services and facilities for Aboriginal and Torres Strait Islander people by the year 2001.'

The major health recommendation of the Royal Commission into Aboriginal Deaths in Custody (RCADC, 1991) was for the implementation of the National Aboriginal Health Strategy.

Water is essential for human life. The *minimum intake* required to sustain life depends on many factors (for example age, sex, body weight and surface area, ambient temperature and humidity, diet, physical activity, culture, clothing, health status), but a range of 2–5 litres per capita per day is widely accepted (WHO, 1971; USEPA, 1976; Saunders & Warford, 1976; NAS, 1977; Davis & Kirke, 1991).

The relationship between water supply and health was recognised in ancient times. '*Airs, Waters, Places*', a treatise attributed to the Greek physician Hippocrates in the 5th century BC, has many references to water (Lloyd, 1978). Despite a large international literature examining the nexus between water supply and health (Saunders & Warford, 1976; NAS, 1977; McJunkin, 1982; Blum & Feachem, 1983; WHO, 1984b; Esrey & Habicht, 1986; Kerr, 1990; Pickford, 1991; Esrey & others, 1992; WHO, 1992), it remains difficult to quantify the relationship accurately. The 1976 conclusion of an expert panel (World Bank, 1976) remains pertinent today:

'Other things being equal, a safe and adequate water supply is generally associated with a healthier population. This has been unequivocally demonstrated for urban areas and in varying degrees for rural situations. The difficulty lies in measurement rather than in qualitative trends. The problem with collecting field observations on the health effects of water supply is that on a cross-section basis other things are never equal. On a through-time basis other things usually cannot be held constant or accurately controlled. Consequently, it is extremely difficult to identify and measure exactly the health effects of improved water supply, and there is a limit to the precision attainable. Furthermore, even if a case were found where governmental, physical, envi-

ronmental, economic, cultural and educational factors which affect health could be reasonably controlled, the detailed findings of a health and water supply study are unlikely to be transferable from that particular setting to situations elsewhere.'

Whilst water can cause suffering and death, an acceptable, accessible, safe, reliable and adequate (50 litres per capita per day minimum) water supply can facilitate a hygienic environment that prevents or limits the spread of many diseases (McJunkin, 1982).

The World Health Organization (WHO, 1984b) stated:

'The most common and widespread danger associated with drinking-water is contamination, either directly or indirectly, by sewage, by other wastes, or by human or animal excrement.'

Of the diseases caused by or related to water and excreta, infectious diseases predominate.

Water-related diseases can be grouped into four categories (Bradley, 1974): *water-borne* (e.g. fluorosis, methaemoglobinaemia, dysenteries, diarrhoeas, campylobacter enteritis, giardiasis), *water-washed* (e.g. scabies, trachoma, gastroenteritis, diarrhoeas, dysenteries, pediculosis, sepsis and ulcers), *water-based* (e.g. enteric disease, leptospirosis, tularemia) and *water-related insect vector diseases* (e.g. malaria, dengue fever).

There are *no national data to quantify the extent of waterborne disease* in the Aboriginal and Torres Strait Islander population.

The mortality and morbidity data reviewed earlier showed the low life expectancy and illness suffered by Aboriginal and Torres Strait Islander people due to infectious and parasitic disease. Whilst this is a broad group of diseases (ICD 001-139), poor environmental living conditions, including availability and use of water, would have contributed to this health inequality (refer to, for example, RACO, 1980; Torzillo & Kerr, 1991; Munoz & others, 1992).

Diarrhoeal disease, often associated with a lack of water and poor hygiene, is unquestionably a serious health problem for Aboriginal and Torres Strait Islander people, particularly infants and young children (Gracey, 1992). Diarrhoea is the most common reason for presentation of children to clinics in central Australia (CARPA, 1991).

The findings of a recent study (Craun, 1992) of waterborne disease outbreaks in the United States may offer a useful guide for Australia, given the two countries have a comparable standard of living and health status.

Concerning the causes of outbreaks, Craun stated:

'During 1981-1990, contaminated, untreated groundwater or inadequately disinfected groundwater was responsible for 43% of all reported waterborne outbreaks, and contaminated, untreated surface water or inadequately treated surface water was responsible for 24% of all reported outbreaks. *Contaminated groundwater has consistently been responsible for more waterborne outbreaks than contaminated surface water. In each decade since 1920, 43-56% of all outbreaks were caused by contaminated groundwater, against*

14-37% by contaminated surface water. Contaminated, untreated groundwater has declined in importance as a cause of outbreaks, and inadequate or interrupted disinfection has increased in importance, causing 17-27% of all outbreaks since 1971. Prior to 1971, only 2-6% of all outbreaks were caused by inadequate disinfection of groundwater. The increased occurrence of outbreaks in disinfected groundwater systems may be due to increased use of disinfection with little or no effort to reduce or eliminate sources of contamination. The lack of attention to providing effective, continuous disinfection is also important.'

Concerning the aetiology of outbreaks, 95.9% were caused by infectious agents and 4.1% by chemical agents (Fig. 5). Four cases of methaemoglobinaemia, presumably all caused by high nitrate, were reported since 1971, with one case resulting in death. Craun (1992) points out that since 1971 giardiasis was the most frequently identified aetiology.

Contaminated groundwater was frequently associated with particular agents, causing 82% of hepatitis A and 60% of campylobacteriosis outbreaks. Contaminated groundwater also caused 48% of viral gastroenteritis, 27% of shigellosis, and 13% of giardiasis outbreaks.

These United States findings are of interest given the importance of groundwater in Australia (AWRC, 1987) and its common use as a source of drinking supply in Australia's arid zone (Wade, 1992) particularly for Aboriginal and Torres Strait Islander people (see below).

The World Health Organization (WHO, 1984a) and Australian agencies (NHMRC-AWRC, 1987) have pre-

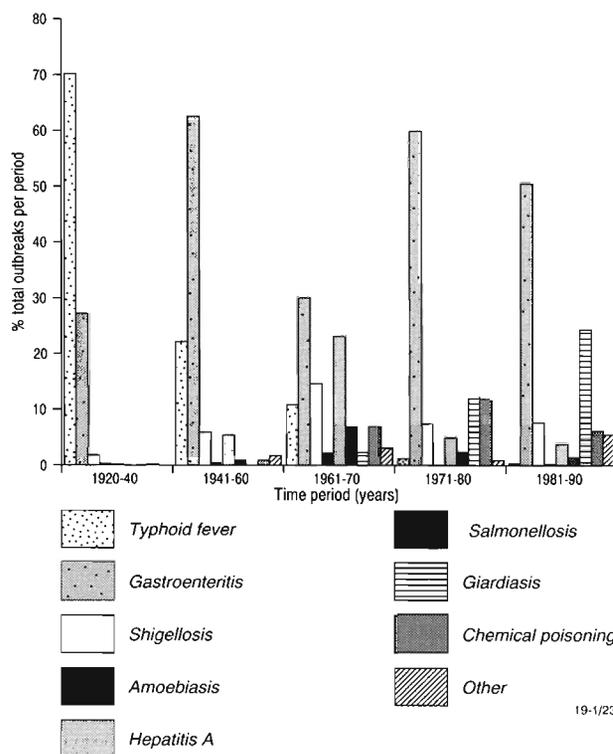


Figure 5. Aetiology of waterborne disease outbreaks in the United States over the period 1920-1990. There were 1702 outbreaks, with 542 018 cases of illness and 1089 deaths during this period (Craun, 1992).

pared detailed guidelines for drinking water quality. Both have engaged in extensive revision of their guidelines. Revised Australian (NHMRC–AWRC, 1992) and World Health Organisation (WHO, 1992a) drinking water guidelines are now available in draft form.

Aboriginal and Torres Strait Islander water supplies

A lot has been written about the health of Aboriginal and Torres Strait Islander people. For example, refer to Thomson & Merrifield (1988) for a list of references up to 1985.

The National Aboriginal Health Strategy Working Party (NAHSWP, 1989) said:

‘... this state of affairs has been documented on many occasions and there is considerable literature describing Aboriginal ill health ...’

However, much less appears to have been written about contemporary Aboriginal and Torres Strait Islander water supplies. What does exist is often in government or consultants reports, not easily accessible for wider scrutiny (e.g. various South Australia Department of Mines and Energy groundwater and drilling reports). Torres Strait Islander people have serious water supply concerns in their unique living environment, aptly reflected in *The Rime of the Ancient Mariner* by Samuel Taylor Coleridge (1772–1834):

*Water, water, every where
And all the boards did shrink;
Water, water, every where
Nor any drop to drink.*

Falkland (1991, 1992, 1993) has written extensively on the hydrology and water resources of small islands that has direct relevance to the Torres Strait Islands.

Useful articles most relevant to communities in arid areas appear in several workshop, conference and seminar proceedings and papers (e.g. Knott & McDonald, 1983; Foran & Walker, 1986; Mansell & others, 1990; RADG, 1988). Other articles have particular relevance to the unique environment of the Torres Strait Islands (Falkland & Custodio 1991; Falkland, 1992, 1993).

Apart from Walker (1990, 1992) and Davis & Kirke (1991), our understanding of the complex issues involved in the provision of water supplies to many Aboriginal and Torres Strait Islander people is inadequate.

Water quality

More has been written on the health aspects of drinking water which has direct relevance to Aboriginal and Torres Strait Islander water supplies.

Wade (1990, 1992) has discussed water supply problems for small communities and reviewed the health aspects of Australian groundwater drinking water supplies.

Following the discovery of extensive areas of Australia where there are nitrate-rich groundwaters, concern was expressed about the possibility of nitrate in this water causing methaemoglobinaemia in infants (Johns & Lawrence, 1973; Lawrence, 1983). There has been consid-

erable debate about this question in relation to Aboriginal and Torres Strait Islander communities and Soong & Maynard (1990) have reviewed the health background of this issue.

There has been no verified case of methaemoglobinaemia in Aboriginal and Torres Strait Islander infants.

The NHMRC–AWRC (1987) guideline limit of 45 milligrams per litre of nitrate in drinking-water was subsequently revised (NHMRC, 1990; NHMRC–AWRC 1992) to allow the use of water with higher levels of nitrate (greater than 100 milligrams per litre for non-potable needs; 45–100 milligrams per litre for all uses except the make-up formulas for bottle-fed babies under three months of age).

The reasons given for this change by the Council (NHMRC, 1990) were:

‘Council noted that high-nitrate groundwaters were of common natural occurrence in Australia and that their use was essential for maintenance of hygiene, particularly for communities in the arid zone;’

and

‘Council considered that the supply of water to small communities was of paramount importance and that use of water with elevated nitrate levels should be reassessed.’

Water quantity

To date, we have had little accurate quantitative information about the overall water supply situation for Aboriginal and Torres Strait Islander communities.

McDonald (1992) has reported the overall water consumption at a number of Aboriginal communities in central Australia. Calculations from his data show the mean water consumption (litres/person/day \pm standard deviation) by seven communities with a population 300–1000 was 876 \pm 457 (data for Ali-Curung was omitted because it seemed unusually high), and by fourteen communities with a population of less than 100 was 710 \pm 311. For comparison, the mean per capita water consumption for Alice Springs, Tennant Creek and Yulara was 1400 \pm 212. Thus, water consumption was relatively high and variable by the Aboriginal communities, but less than the towns with a large non-Aboriginal population. The coefficient of variation was 52.2% (300–1000) and 43.8% (<100) for the two groups of Aboriginal communities and 15.1% for the predominantly non-Aboriginal towns.

There is international evidence that increased water usage for personal hygiene can significantly improve some measures of health (Esrey & others, 1992).

The Aboriginal and Torres Strait Islander Commission (ATSIC) has recently completed Stage 1 of a national survey of housing and community infrastructure needs (ATSIC, 1992b). The survey had nine questions related to the water supply of discrete communities, including outstations/homelands. We have analysed the data from 907 discrete communities (ATSIC, 1993), and some summary observations are shown in Table 2.

Groundwater is an important source of supply for many

Table 2. Water supply of Aboriginal and Torres Strait Islander discrete communities in 1992 (ATSIC, 1993).

State/Territory	Communities surveyed ¹	Groundwater was a source ² (%)	Water quality does not comply with NHMRC guidelines ³ (%)	Water restrictions in the past 12 months ⁴ (%)	No water supply maintenance ⁵ (%)	Insufficient water supply for next five years ⁶
NSW&ACT	67	10	6	34	13	22
VIC&TAS	2	50	50	50	0	50
QLD	81	44	36	56	22	44
SA	96	84	22	71	8	36
WA	179	70	19	9	14	41
NT	482	66	46	30	13	51
Australia	907	63	34	33	14	45

1. Number of discrete communities surveyed.
2. Percentage of communities that used groundwater as a source of water.
3. Percentage of communities whose source of drinking water does not comply with NHMRC guidelines.
4. Percentage of communities that had water restrictions applied at any time in the past twelve months.
5. Percentage of communities in which the water supply system is not maintained.
6. Percentage of communities with a water supply system unable to meet the housing needs over the next five years.

Aboriginal and Torres Strait Islander people. Tables 2 to 5 show groundwater is the most frequently relied on water source, particularly in South Australia, Western Australia and the Northern Territory. It was used by 63% of discrete communities surveyed.

The quality of water available for use by a significant number of Aboriginal and Torres Strait Islander people, particularly in Queensland, the Northern Territory and Western Australia, as shown in Tables 2 and 6, is less than the accepted Australian standard. Thus, 17% (14 616 people) of the population living in discrete communities relied on water not complying with the NHMRC guidelines on water quality. Only 38% of communities had a qualified person doing regular water testing.

The quantity of water available for use is not satisfactory for a significant number of people as shown in Tables 2 and 7 and Figure 6. Water restrictions occurred during the past twelve months in 33% of the discrete communities surveyed; equipment breakdown was one reason for water restrictions in 62% of these communities. The appropriateness of the equipment used to supply the water should be questioned given the high failure rate.

A significant number of communities (14%) did not have a maintained water supply system, and 45% said their water supply infrastructure was inadequate to meet their housing needs over the next five years.

The ATSIC national survey has thus provided, for the first time, comprehensive quantitative data on the water supply situation for Aboriginal and Torres Strait Islander people throughout Australia.

Environmental health in practise — a water supply case-study: an Aboriginal Community Council perspective

Essential Service delivery, which include water supplies to remote Aboriginal communities, involves quite an array of state and federal authorities as well as regional and community-based organisations. The hierarchy of this involvement tends to set the state level bureaucracies in control by virtue of their funding role or their responsibility for implementing services which meet prescribed standards or guidelines. This means that the bureaucrats or functionaries located in the state capital somewhat remote from the community largely determine and control what, how,

where, and when services will be provided. Sometimes, for various reasons, this does not work out very well and despite the concerns for standards observance some of the products fail, and up and down the line various parties become disenfranchised, not the least being the end users, that is the consumers.

Table 3. Source of water supply: types used by the discrete communities surveyed (ATSIC, 1993).

Source of water supply	Number of communities	Percentage of total sources*
Bore water	568	63
Rainwater tank	165	18
Extension of town water supply	159	17
River water/lagoon	125	14
Carted water	94	10
Catchment reservoir	18	2
Dammed waterway	7	1

* Note that many communities are dependent on more than one source of water.

Table 4. Source of water supply: groundwater as percentage of total sources used by discrete communities within each State/Territory (ATSIC, 1993).

State/Territory	Groundwater as percentage of total sources used
SA	84
WA	70
NT	66
VIC&TAS	50
QLD	44
NSW&ACT	10

Table 5. Source of water supply: State/Territory distribution of discrete communities that used groundwater (ATSIC, 1993).

State/Territory	Number of discrete communities	Percentage
NT	317	55.8
WA	126	22.2
SA	81	14.3
QLD	36	6.3
NSW&ACT	7	1.2
VIC&TAS	1	0.2
Australia	568	100.0

Table 6. Discrete communities where the quality of water available for human consumption did not comply with NHMRC guidelines (ATSIC, 1993).

State/Territory	Communities affected	Population affected*
VIC&TAS	1	38
NSW&ACT	4	71
SA	21	776
QLD	29	4283
WA	34	1241
NT	222	8207
Australia	311	14616

* The population affected is about 17% of the estimated total population of the 907 discrete communities surveyed about water supply, and represents about 6% of the total Aboriginal and Torres Strait Islander population recorded in the 1991 Census.

The following version of events in regard to the water supply at a remote Aboriginal community might give some idea of what can happen.

The community has a mains water supply consisting of a pumped groundwater source that is treated by a reverse-osmosis desalination plant. The product water deemed to be suitable for drinking purposes is reticulated to houses and various infrastructure buildings. Not a lot of consideration had been given to rainwater catchment and storage in the overall plan or design for water needs. Rainwater, according to the relevant authorities, is not a supply responsibility.

Although prior to mid-1992, few Aboriginal occupied houses had a functional rainwater tank, the majority of staff houses and school buildings were equipped with tanks.

Despite the mains water supply being deemed suitable for drinking, a steady stream of people could be observed obtaining rainwater either from the school tanks or from the source in closest proximity to where they lived. Towards the end of summer, most rainwater tanks were severely depleted and some had become contaminated. At the community store, a number of people, particularly aged pensioners, were buying imported spring water at three dollars fifty a bottle in order to get drinking water. These events indicated that people chose not to drink mains water, and were going to considerable effort and expense to obtain alternative sources of water. The explanation for this activity was that the mains water was avoided because the community believed it made people sick. Complaints about the water were raised with the local operator whose

response was the plant was functioning according to the manufacturers specifications. Complaints to senior state officials met with the response that there was nothing wrong with the water, it met the guidelines, and was better quality than the capital city water. Despite such an obvious lack of confidence in the supply on the part of the consumers, senior state level responses continued, more or less, to be confined to defence of the technology and maintaining custodial proprietorship over the water supply. The actual concerns of the consumers and those at community level attempting to respond to health implications seemed to rate an indifferent dismissal.

Similar circumstances prevailed throughout subsequent developments when the community-based health service initiated water tests as part of an environmental health survey. This exercise involved several state authorities.

The results of these tests were initially passed between senior state officers and the plant manufacturer, and were withheld from the community based health service. Only after persistent inquiry were they able to obtain the results.

The main problem which emerged from this sequence of events appeared to be the difficulty the community had in getting the authorities to take these concerns seriously. The community was not seeking to lay blame with any particular body; they just wanted the real nature of the problem understood and some remedial action taken where possible. Unfortunately, efforts to bring about such action were not enhanced by the uncertainties and confusion that apparently exists within the state apparatus as to who is responsible for what. The authorities seem unable to provide a simple and workable communication framework between either themselves or the consumer. Until the issues are dealt with, unnecessary misunderstandings will continue.

To overcome these problems the following needs to occur:

- reduce the remoteness factor by regionalising the operations of the relevant state authorities — this would provide better access and more frequent contact between authorities and consumer;
- qualify clearly the responsibilities between the authorities and develop some clearly defined protocols on how those responsibilities are to be met and by whom;
- develop a water management plan which involves

Table 7. Discrete communities that experienced water restrictions during the previous twelve months (ATSIC, 1993).

State/Territory	Communities affected	Population affected	1	2	3	4	5	6	7	8
NSW&ACT	23	3354	15	5	2	4	1	—	—	4
VIC&TAS	1	38	—	1	—	1	1	—	—	—
QLD	45	16691	28	21	14	7	15	2	4	8
SA	68	2207	8	57	2	6	5	23	1	1
WA	17	1854	8	12	5	3	7	5	2	1
NT	146	10126	10	90	54	16	13	7	2	35
Australia	300	34270	69	186	77	37	42	37	9	49

Reasons for water restrictions

1. Drought
2. Equipment breakdown
3. Lack of storage
4. Inadequate reticulation
5. Water source exhausted
6. No wind
7. No fuel
8. Other

relevant regional authority personnel and community personnel which is set up with a clear charter of objectives. This should include assessing both ground-water and rainwater supply needs and monitoring of health implications in respect to both; and

- increase consumer awareness at the community level with regard to water supply and management issues. This can be done through locally produced educational (e.g. videos) material, with an emphasis on local participation.

Concluding remarks

This overview of water supply and Aboriginal and Torres Strait Islander health has demonstrated that most people concerned with public health agree that a safe, adequate, and acceptable water supply is an important, but not sole, pre-requisite for good health. However, it is also acknowledged that housing, sanitation, personal and community hygiene, education, respect for other cultures, meaningful employment, policy and practise are all in the complex health equation. Water is only one component!

The review of recent public health data indicates Aboriginal and Torres Strait Islander health has proved refractory to major improvement, despite considerable expenditure and effort by many people, agencies and governments over the past twenty years.

The only sensible option now is to implement the National Aboriginal Health Strategy, although the most important factor leading to this conclusion is that it should be used because it was determined largely by Aboriginal and Torres Strait Islander people themselves. The objective of the National Aboriginal Health Strategy is to gain equity in access to health services and facilities for Aboriginal and Torres Strait Islander people by the year 2001.

However, it is clear that pursuit of a model principally focussed on technology inputs and medical outcomes is likely to lead to further distress both for Aboriginal and Torres Strait Islander people and for governments.

The World Bank (1976) expert panel found that a safe and adequate water supply is generally associated with a healthier population, a finding which has been unequivocally

demonstrated for urban areas and in varying degrees for rural situations. The expert panel goes on to show that it is always going to be difficult to directly associate water supply and health, particularly in remote communities. The conundrum develops when we realise that many Aboriginal and Torres Strait Islander people live in rural and remote communities, particularly in the Northern Territory. In short, therefore, the hypothesis or the linkage is not easily testable. In addition to having a poor hypothesis, we observe there is no national data to quantify the extent of waterborne disease in Aboriginal and Torres Strait Islander communities and that, apart from the writing of a couple of workers, our understanding of the issues involved in the Aboriginal interface with water is also inadequate.

In the face of this evidence, it is rather surprising that we persist with policies, models and programs whose outcomes are so difficult to evaluate. Of late, some writers have been indicating that there are a range of other factors which could assist and which may be amenable to a closer evaluation.

Consider diarrhoeal disease and Aboriginal and Torres Strait Islander water supplies. The occurrence of diarrhoea is not necessarily a sign of a lack of water, although it may be associated with it. Diarrhoea also occurs in situations where water is accessible, but the level of service or the delivery of that water may be questionable. Certain life-style practices within the living environment of a particular community may well be better indicators of the likely presence of diarrhoea rather than lack of water. In attempting to re-focus the question, we are looking towards the human perspective rather than a medical or technological perspective.

Taken one step further, microbiological contamination of groundwater generally does not occur naturally. Contamination occurs because of some form of human activity. The prevention or risk avoidance of contamination is therefore dependent on the human activity and any acceptable interface modification.

Analysis of the ATSIC data on housing and infrastructure indicates the majority of problems with water supply relate to technical breakdowns or the need for outside service personnel to rectify problems in supply. The lack of technical support renders the supply in-operative for periods of time. Rarely has it been found that an inadequate design in the first instance was at fault or that inadequate groundwater or surface water protection from a technical point of view was at fault. Invariably the human factors are the ones which make the difference.

Under these circumstances, it is clear the appropriateness of equipment and the high failure rates require further skilled consideration of the interface of Aboriginal and Torres Strait Islander people with this technology. The case-study which is presented reinforces this view and suggests some fairly immediate options in relation to particular issues raised in the case-study.

Recognising the difficulties involved in continuing to view Aboriginal and Torres Strait Islander water and sanitation from a medical or technical viewpoint alone, the Human Rights and Equal Opportunity Commission (HREOC) is currently examining issues of water equity, and how that is achieved in a cross-cultural situation, particularly in situations of remoteness and isolation. There is a concern as to what equity really means for Aboriginal and Torres

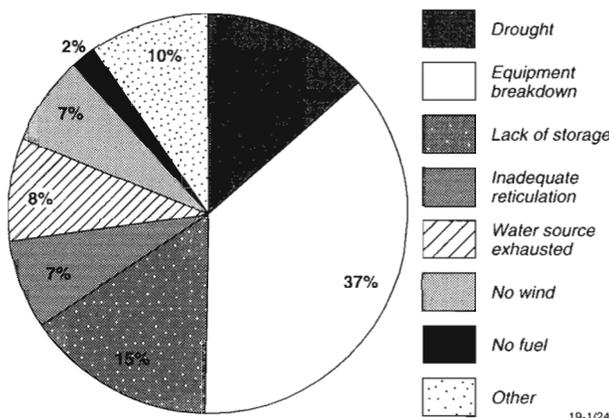


Figure 6. Percentage contribution of each reason to the total breakdown of supply across Australia (ATSIC, 1993).

Strait Islander people. They are also considering self-determination and what the true practise of self-determination could mean or should mean within the context of the broader framework of Aboriginal aspirations. The establishment of standards of quality and service in relation to water and sanitation, and the implications that these externally derived standards, have for the quality of life in Aboriginal and Torres Strait Islander communities are also under review. In attempting to come to some conclusions on these matters, the HREOC is working closely with Aboriginal and Torres Strait Islander leadership in order to work through the complex issues involved in re-focussing the problem away from medical and technical issues back towards the human and community issues and responsibilities that provide for sustainable water supplies.

Upon reviewing the impact of past investment in technical inputs and the public health outcomes, this paper is arguing for the need to re-focus the logic in the provision of water (and housing, being the interface point in general between water and Aboriginal people) back on people and community. The challenge is to redirect some of the money which is channelled through technical agencies for infrastructure development towards some of the less-technical agencies, including Aboriginal organisations who can examine problems of the interface between people, water and sanitation and propose programs which provide for increased opportunity for Aboriginal self-determination, true equity for Aboriginal and Torres Strait Islander people; equity defined and determined on their terms not by a predominantly urban western technological culture. Whilst not denying the role of technological inputs in the provision of water, international experience appears to be indicating that unless the human dimension of water supply is uppermost in the design, a sustainable water supply (and by implication improved health) is not achieved without considerable expense.

It is very easy to allow the figures and the anecdotes of technical failure to dominate discussion and reaction to Aboriginal and Torres Strait Islander health. It is far more difficult to find ways of sharing the complex value systems which underlie the establishment of standards, technologies and medical outcomes. What this paper indicates is that unless this occurs, and it may occur in the context of the National Aboriginal Health Strategy although there appears to be little evidence of that at this stage, it may well be that reports that have been prepared in the last five years will be re-written inside different covers twenty years hence.

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