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Water, sanitation and hygiene in remote Indigenous Australia: A scan of priorities

A discussion paper from The University of Queensland and WaterAid Australia

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The University of Queensland and WaterAid Australia
July 2017

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EXECUTIVE SUMMARY

In remote Australian Indigenous communities, the ‘familiar story’ of poor water, sanitation and hygiene-related health challenges continues – despite documentation of this situation during the past thirty years. The representatives interviewed in this scan strongly recommended to stop perpetuating this story:

‘This is not new stuff. You know, you can look back and do some research for decades and what I’m telling you today is what was being said 20 years ago, so it’s not like any of this is new’ (NGO representative #1).

In parallel, they also called for providers to raise their expectations for the standard of these services in all Australian locations – including remote communities:

‘Non-indigenous people who go out to communities quickly lower their expectations to what’s the prevailing norm ... You’re in Australia now, so the benchmark is an urban [clinic] in Darwin or Sydney, not a clinic at the back of Jakarta’ (research representative #2).

This discussion paper presents a scan of the current status of water, sanitation and hygiene services and challenges in remote Australian Indigenous communities. It was conducted to make explicit the challenges requiring attention and to propose questions to stimulate discussion as to how various stakeholders can respond to these challenges. It was guided by examples of initiatives that have improved WASH services and behaviours.

In 2011 there were about 116,000 people living in remote, discrete Indigenous communities. The 2016 *Overcoming Indigenous Disadvantage* report identified that health outcomes for remote Indigenous communities were compromised by a range of environmental health factors within homes and communities. Water, sanitation and hygiene challenges such as poor water quality, limited access to safely managed water, hygiene status and marginal living conditions, have been seen as contributing to these continuing health disparities.

The research to inform this scan was conducted by The University of Queensland after being approached by WaterAid Australia about the need for research that identified the actions required to ensure that Australia meets the targets of the United Nations’ Sustainable Development Goal 6 (SDG 6) for ‘access to water and sanitation for all’ by 2030, to which Australia committed in 2015. To undertake this scan, interviews were conducted with staff from 17 organisations providing water, sanitation and/or hygiene services to three or more communities in mainland Australia, including state and territory government departments (6), and Indigenous (4), research (3), utility (2) and non-government (2) organisations, located across the Northern Territory, Queensland, South Australia and New South Wales.

TOPLINE RESULTS

The results outlined in this report can be summarised as:

- The status of drinking water was influenced by adherence to Australian Drinking Water Guidelines, which was more likely in areas where centralised utilities operated across the whole state or territory. However, contamination of drinking water remains a risk where monitoring regimes are not rigorous and consistent. The use of bore water is problematic as it may contain naturally high levels of microbial and chemical contaminants. This can also make the water unpalatable, and cause a preference for sugared drinks.

- The status of sanitation (wastewater treatment) has improved with the increasing installation of centralised wastewater treatment replacing onsite septic tanks. These systems are effectively managed by centralised utilities that have increased service level, decreased response times for repair, and subsidised costs. Where implemented, the approach of ‘fit for purpose, fit for place’ has resulted in wastewater treatment options being technologically, socially and environmentally appropriate. Despite these improvements, concerns remain regarding self-certification of wastewater installations in the NT, irregular wastewater output monitoring regimes, incompatible items flushed down toilets, and high turnover of wastewater management staff in communities. An additional sanitation issue is waste management, where increased availability of waste bins and the regular emptying and cleaning of bins could improve sanitation levels.
- The status of hygiene and related health issues is the area of greatest need for dedicated programs and funding– especially as chronic infections in early childhood are often linked to vulnerability to other diseases in later life. Significant overcrowding (e.g. 20 residents in a three-bedroom house) limits the ability of individuals to maintain personal and environmental (clothing, bedding and infrastructure) hygienic conditions, which can negatively affect their health. Some girls are missing school each month – potentially due to a lack of knowledge and products for menstrual hygiene management. Australia is the only high-income country that still has endemic cases of trachoma, a preventable eye infection.

A range of effective contributions have enhanced the status of water, sanitation and hygiene. This includes ongoing programs to fund long-term and well-maintained water and wastewater treatment services; to repair and upgrade health infrastructure in communities; to build new housing in communities with insufficient accommodation; and to ensure functioning hardware in homes to enable effective washing and cleaning.

VIEWING THE RESULTS

Theorising these findings can be most effectively illustrated through four ‘concentric’ layers. This is illustrated in **Figure 1** (and repeated as **Figure 2**). The core layer of individual healthy behaviours in the home is influenced by the layer of population size in the house – and the effects of overcrowding. The next layer is the functionality of the ‘health hardware’ (e.g. toilets, taps, washing machine, cleaning equipment) that influences whether the house’s residents can perform these health behaviours. The outer layer is the availability of water and wastewater services to the community to provide a source of clean water and remove the risk of contamination. These concentric layers of water, sanitation and hygiene services operate in the context of two important foundations: a strong desire to live on traditional ‘Country’ in these remote settings, and the persistent traumatic legacy of colonisation – which continues to offer Western-style solutions and services. This Figure illustrates both the current effective contributions of services, and the ‘cracks in the system’ that affect WASH status at each of these layers.

Fig

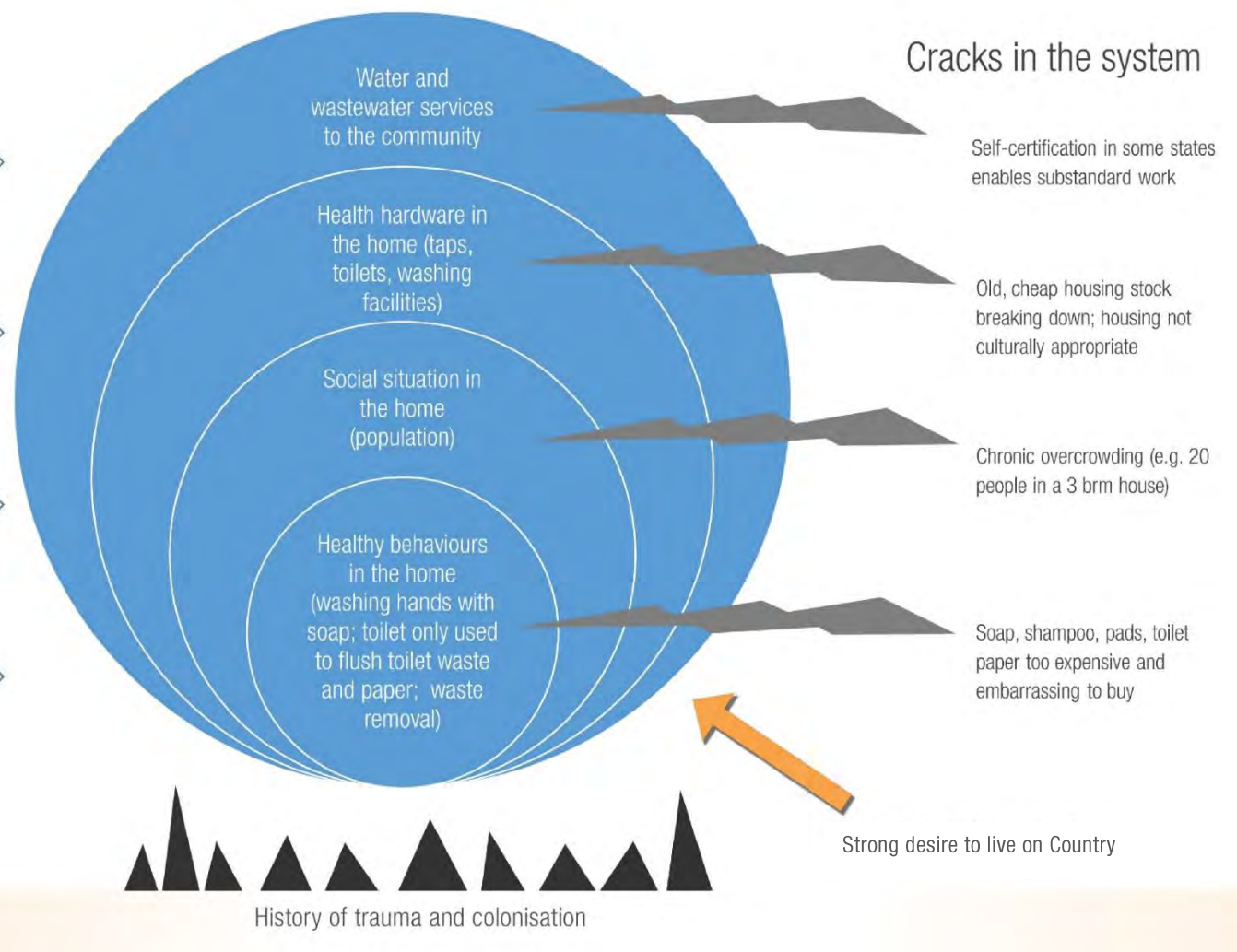
Effective contributions

Some government programs provide well-funded, long-term service delivery; some utilities provide high-quality, well-maintained services

Some government programs provide regular and thorough health hardware maintenance to whole community

New housing being built in growing communities

Culturally and situationally-appropriate health promotion and education- to complement other layers



Given these interlinked influences between the layers, a systems approach to this environmental health issue can provide a holistic approach to action, and bring together the range of agencies providing these services at each layer. This was articulated by an interviewee who stated:

[It's about] being respectful and having some knowledge about what the issues are that people face ... being gentle around why it's hard to have toilet paper in your house all the time and have soap in your house all the time. It's not about blaming people, it's about finding a way and prioritising what's the most important thing to do and again helping with access to that.

(Indigenous organisation representative #3)

DISCUSSION QUESTIONS TO PROGRESS ACTION ON WASH IN AUSTRALIA

The publication of this scan is intended to inform and progress the discussion and decisions of both protective as well as risk factors that affect WASH service provision to these Australian communities. This report posits key discussion questions for national, state and local government policymakers, health organisations, water utilities, and others:

Drinking water:

- Q For water utilities and state governments: Is sufficient funding and training available to increase the capacity and retain local staff to manage their water and wastewater treatment in-community?
- Q For state and territory governments: What existing programs could be replicated in other parts of Australia to improve the level and quality of water and wastewater service provision?
- Q For water utilities and departments of health: How can monitoring regimes be strengthened in remote locations and with minimal staff?
- Q For departments of health: How can water palatability be improved avoid residents increasing their consumption of soft drink and other sugared drinks?
- Q For water utilities: How can water utilities delivering services to remote communities be centralised and strengthened outside of WA, NT and SA?

Sanitation (wastewater treatment):

- Q For water utilities and state and territory governments: How can wastewater treatment technologies be designed as 'fit for purpose, fit for place' to ensure they are technologically, socially and environmentally appropriate?
- Q For state and territory governments: Are there sufficiently-funded programs to continue to replace onsite septic tanks with centralised wastewater treatment in remote communities? Can funding be increased to ensure adequate monitoring and system upgrades?
- Q For water utilities, schools, essential service officers and health clinics: How can the understanding of toilet use be improved to prevent inappropriate items being flushed down the toilet?

Hygiene and health:

- Q For NGOs and state and territory governments: How can civil society organisations work with communities to strengthen their understanding of how to access support from statutory bodies with responsibility for maintenance and service levels?
- Q For communities, water utilities, and state and territory governments: How can remote communities be better equipped or enabled to tackle and solve their own WaSH issues – and to ensure that solutions consider and integrate indigenous values and perspectives?
- Q For state and territory governments: How can support be provided to communities to build on-ground capacity to address maintenance issues?
- Q For state and territory governments: How can new housing construction rates be funded and increased to relieve overcrowding, while ensuring higher-quality, robust materials and designs for the preferred living styles of the Indigenous residents?
- Q For state and territory governments: How can long-term funding be provided for health hardware repair programs to ensure ongoing health improvements in existing housing stock? What existing programs can be replicated and adapted?
- Q For state and territory governments, NGOs and service providers: What measures can be put in place to improve access to, and use of, health and hygiene products such as soap, toilet paper and washing powder – addressing affordability as first priority?
- Q For all service providers: What collaboration and funding opportunities exist to provide cross-agency, long-term healthy behaviour promotion that is culturally-sensitive and integrated across all levels of WASH service provision – to improve the long-term wellbeing of community residents?
- Q For local government and health clinics: What environmental health improvements can be introduced across the community to reduce dust and flies and thus reduce the prevalence of trachoma eye infections?
- Q For schools and health clinics: What funding and information is required to provide menstrual hygiene management education, subsidised products and waste facilities to increase school attendance for girls, increase dignity during menstruation and reduce toilet blockages?
- Q For universities and NGOs: What training could be developed and delivered to provide adequate skills, education and exposure for external staff who intend to work in remote Indigenous communities?

The authors and partners of this discussion paper welcome the opportunity to engage on these questions to create collaborative, long-term, high-impact improvements in remote Indigenous communities that raise water, sanitation and hygiene service and access to that of urban Australia. In doing so, Australia will be responding to the UN Sustainable Development Goal 6 of ensuring ‘water and sanitation (and hygiene) for all’.

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KEY DEFINITIONS AND STUDY SCOPE

Water, sanitation and hygiene (WASH)

The United Nations' current sustainable development agenda outlines the need for safe management of drinking water and faecal waste, and the attainment of hygiene (UN 2015).

- For drinking 'water', the UN agenda seeks to achieve universal and equitable access to safe and affordable drinking water for all by 2030 (UN Water 2016).
- For 'sanitation', the evaluation indicators focus on two main elements: a basic sanitation facility that is not shared, and where excreta are safely disposed *in situ* or transported and treated off-site (WHO and UNICEF 2015).
- 'Hygiene' refers to infrastructure and technologies, cleaning products, services and behaviour that contribute to health-related, hygienic outcomes (WHO and UNICEF 2015).

Health hardware

'Health hardware' refers to 'the items and facilities considered essential for maintaining adequate personal health' (Browett, Pearce et al. 2012), p.1), such as functioning bathroom, kitchen and laundry facilities. These are predominantly related to water-based hygiene functions, and link to 'healthy living practices', several of which are enabled through water: washing people, washing clothes and bedding, removing waste safely (including toilet waste), improving nutrition (including through a functioning kitchen), reducing overcrowding (and associated pressure on the hot water and septic systems), and reducing dust (Pholeros, Rainow et al. 1993).

Discrete, remote Indigenous communities

The focus of this scan was on discrete, remote communities on mainland Australia that are permanently inhabited by a predominantly Indigenous population, also known as the First Peoples of Australia, and including Aboriginal and Torres Strait Islanders (referred to as 'Indigenous' people in this discussion paper).

A discrete Indigenous community is formally defined as a geographic location with physical or cadastral boundaries, inhabited predominantly (greater than 50% of usual residents) by Aboriginal and/or Torres Strait Islander peoples, and where housing or infrastructure is managed on a community basis (ABS 2007). Australian Bureau of Statistics data from 2014-15 estimated the total resident population of Aboriginal and Torres Strait Islanders as 3% (about 686,800) of the Australian population (ABS 2016). Of this Indigenous population, about 21% resided in remote or very remote areas (ABS 2016).

A 'remote' or 'very remote' area is classified according to the Accessibility/Remoteness Index of Australia. Population data from 2011 calculated that the total population in Australian remote Indigenous communities (including those on island communities as well as the mainland) amounted to 116,588 (ABS 2012). The majority of these populations were located in the states and territories of the Northern Territory (NT), Western Australia (WA), Queensland (Qld) and New South Wales (NSW). This is displayed in

Table 1.

Table 1: Population estimates of discrete, remote Indigenous communities, 2011 (ABS 2012)

Remoteness	NT	Qld	WA	NSW	SA	Vic/Tas	Australia
Remote	11,436	10,639	11,071	4,855	1,211	61	39,273
Very remote	34,103	19,573	16,789	2,730	4,120	0	77,315
Total	45,539	30,212	27,860	7,585	5,331	61	116,588

The estimates of remote community populations provided by the interview respondents were that the Northern Territory has 72 major and discrete communities with populations from 100 to 6000 people (n.b. that the 400 smaller NT ‘outstations’, also known as a ‘homelands’, of fewer than 100 people each, were excluded from this scan due to the differences in governance, service delivery and history). Western Australia has 274, Queensland has 40, and NSW has 61 discrete remote Indigenous communities.

Environmental health

The World Health Organisation defines ‘environmental health’ as ‘all the physical, chemical, and biological factors external to a person, and all the related factors impacting behaviours ... It is targeted towards preventing disease and creating health-supportive environments’ (WHO 2017). An environmental health study, such as this scan, considers the effects on personal and community-level health and wellbeing from the standards and risks presented by drinking water quality, wastewater management, and hygiene levels. The intention of this study approach in environmental health is to improve the understanding of risk exposure and identify prevention strategies to improve environmental and human health (UQ SPH 2017).

INTRODUCTION

This discussion paper undertook research on the current status of water, sanitation and hygiene (WASH) services in remote Australian Indigenous communities for the purposes of identifying where further efforts and research may be required. It was conducted as a scan of issues through interviews with Indigenous and other organisations that work within multiple communities. The context for this research was the documentation of the ongoing health, housing and social challenges faced by remote Indigenous communities (Bailie, Stevens et al. 2010).

The study was undertaken to inform prioritisation of actions linked to the attainment of the United Nations' Sustainable Development Goal 6 (UN SDG 6), with an ambition to 'ensure access to water and sanitation for all' by 2030 (UN 2015). Of relevance to this scan are three specific SDG 6 targets and associated indicators regarding water, sanitation and hygiene:

- SDG 6.1: 'By 2030, achieve universal and equitable access to safe and affordable *drinking water* for all' (evaluated by indicator 6.1.1 'Proportion of population using safely managed drinking water services');
- SDG 6.2: 'By 2030, achieve access to adequate and equitable *sanitation and hygiene* for all and end open defaecation, paying special attention to the needs of women and girls and those in vulnerable situations' (evaluated by indicator 6.2.1, 'Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water');
- SDG 6.3: 'By 2030, improve water quality by ... halving the proportion of *untreated wastewater* ...' (evaluated by indicator 6.3.1 'Proportion of wastewater safely treated' (UN 2015, UN Water 2016).

As a signatory to the UN SDGs, the Australian Government is obliged to address WASH-related aspects of the SDGs within and beyond its own borders (UN 2015). When considering the issues of water, sanitation and hygiene for Australian citizens, evidence indicates that many remote Indigenous communities have less-than-adequate access – which differs considerably from rural and urban settings (AG WA 2015, Hall, Shannon et al. 2016).

The results of this scan are anticipated to inform and assist national, state and local government policymakers, health organisations that provide services into these communities, water utilities providing water and wastewater treatment, and others involved in seeking to improve the health and wellbeing outcomes (which align with UN SDG 3– health and wellbeing) of these Australian communities.

This research was internally funded by The University of Queensland through the Global Change Institute's Sustainable Water program. In-kind support for access to participants and guidance on the focus of the research has been provided by project partner WaterAid Australia.

BACKGROUND

The complex social and environmental determinants of health and wellbeing inequalities between Indigenous and non-Indigenous Australians are widely documented, and are acknowledged as being particularly challenging in more remote and isolated communities (McDonald, Bailie et al. 2008, McDonald, Slavin et al. 2011, Foster and Dance 2012, Clifford, Pearson et al. 2015). Socio-economic factors contribute to these continuing health disparities, coupled with specific WASH challenges such as poor water quality, limited access to safely managed water, limited hygiene infrastructure and marginal living conditions. Physical and social barriers, including failures in ‘health hardware’ in the home (such as functioning taps, showers and toilets) and poor hygiene conditions have been identified as key underlying factors contributing to risk of infection and disease transmission in remote communities (McDonald, Bailie et al. 2009).

Although investment in, and access to WASH services have improved in recent years in remote Indigenous communities in Australia, many residents continue to experience challenges with drinking water quality, adequate and continuous sanitation services, and associated health issues (Clifford, Pearson et al. 2015). In late 2016, the seventh *Overcoming Indigenous Disadvantage* review and report card identified that health outcomes for Indigenous communities – particularly those in remote and very remote locations – were compromised by a range of environmental health factors within homes and communities (SCRGSP 2016). Concerns raised regarding the quality of infrastructure and services include whether health hardware in remote communities met equivalent standards in non-Indigenous communities (SCRGSP 2016). The report concluded that improving access to clean water, functional sewerage and electricity services in the home environment were priority areas for action (SCRGSP 2016).

STATUS OF DRINKING WATER SERVICE PROVISION

In remote communities across Australia, the choice of drinking water sources can often be limited, and variable in terms of location, access and availability. Water supply to remote communities is impacted by economies of scale, higher delivery costs, level of demands, high maintenance costs, low cost recovery levels, and uncertainty around consumer willingness to pay for improved service levels (Willis, Pearce et al. 2015).

While there is almost universal access to water for drinking and household use reported in remote communities, the consistency of access, supply and quality within the home can be hindered by a range of factors including the status of household ‘health hardware’. Functioning health hardware is essential for delivering sufficient water in each home, as it enables healthy living practices and is affected by water quality, including naturally occurring minerals that increase water hardness (Browett, Pearce et al. 2012).

Water management also affects the quality of drinking water available. For example, data regarding the 274 remote Indigenous communities in Western Australia indicated that the quality of drinking water supplied to some communities did not meet Australian standards approximately 30% of the time (OAG 2015). Further, *E. coli* and/or *Naegleria* microbes were detected in at least one community each month over a two-year monitoring period (OAG 2015). A study of the microbial water-borne disease, *Cryptosporidiosis*, found a disproportionately high incidence in remote Indigenous communities, compared to the non-Indigenous urban population in Western Australia (2002-2012) (Hublin, Combs et al. 2017). A total of almost 25% of the nearly

3000 notified cases occurred in Australian Indigenous people (Hublin, Combs et al. 2017), although they constitute only 3.8% of the WA population (ABS 2013). Other enteric pathogens identified in contaminated water in remote Indigenous communities include *Salmonella*, *Shigella*, *Campylobacter*, *E. coli* and *Rotavirus* (Clifford, Pearson et al. 2015).

In the Northern Territory, Queensland and Western Australia, groundwater is the principal source of drinking and household water supply for the majority of discrete remote and very remote Indigenous communities (ABS 2007). This can include high rates of naturally occurring contaminants. For example, the water supply for some WA remote communities exceeded Australian standards for nitrates and uranium in 2015 (OAG 2015).

STATUS OF SANITATION (WASTEWATER TREATMENT) SERVICE PROVISION

In 2006, the majority of remote Aboriginal communities relied on septic tanks as their main sewerage system, while a smaller number used pit toilets and a handful of communities did not have any organised sewerage system (ABS 2007). This has now changed following the implementation of state- and territory-funded programs. The Council of Australian Governments' (COAG) Strategy on Water and Wastewater Services in remote (including Indigenous) Communities has provided national funding for centralised water treatment infrastructure. From this funding, the Queensland Government secured more than AUD\$8 million for a capacity-building program to improve indigenous councils' capacity to provide secure and safe drinking water and wastewater services to remote communities (DILGP 2015). Elsewhere, the NSW Government collaborated with the NSW Aboriginal Land Council to establish the Aboriginal Communities Water and Sewerage Program and provide funding for the maintenance, operation and repair of water supply and sewerage systems. This investment of approximately AUD\$200 million over a 25 year period is being delivered in 61 eligible Indigenous communities (NSW Office of Water 2017).

Despite the improvement of these wastewater services, there has been evidence of poor maintenance of wastewater treatment facilities. For example, a 2015 audit from Western Australia noted a high number of communities that did not meet national standards – with reported drinking water contamination from sewage-derived *E. coli* or *Naegleria* sp. microbes at least once in 68 communities in the two-year period of reporting (AG WA 2015).

STATUS OF HYGIENE AND RELATED HEALTH SERVICE PROVISION

Remote communities continue to experience hygiene-related diseases at rates higher than the wider Australian population (Foster and Dance 2012). A significant impact on healthy living practices is overcrowding. In 2014-15, 38% of the Indigenous adult population in remote areas and very remote areas were living in overcrowded conditions, almost three times the rate than in non-remote areas (13%) (ABS 2016). Notably, 28% were living in a dwelling in which one or more of the facilities for washing people, clothes and bedding, for safely removing waste, and/or for enabling the safe storage and cooking of food was not available or did not work (ABS 2016). The construction of houses has been a major focus for improving the health of remote Australian Indigenous peoples, however there has not been an associated focus on promoting health-related hygiene and behaviour change (McDonald, Bailie et al. 2008).

Within the home, very few households in central Australian remote communities were found to possess soap on a regular basis (Foster and Dance 2012). This is despite evidence showing strong links between education and hand-washing with soap in the prevention of childhood

diarrhoeal disease (McDonald, Slavin et al. 2011). Practitioners, advocates and researchers working in WASH have found behaviour change can reduce water-related diseases by levels greater than that of infrastructure improvements alone if soap and water are available and affordable. Washing hands with soap can reduce diarrhoeal disease by up to 47% (Foster and Dance 2012).

A specific hygiene-related health impact is the persistence of endemic trachoma, an eye infection, in remote and very remote Indigenous communities. Trachoma is caused by a bacterium that inflames the eye, and recurrent infections cause scarring of the eye and structural changes to the eyelid that can result in blindness (Warren and Birrell 2016). Trachoma is often correlated with a range of WASH-related factors including irregular washing, limited access to clean water and overcrowded housing (Warren and Birrell 2016). Trachoma is primarily found in communities in the NT, SA and WA, but was also identified in NSW and Qld in 2008, where it had previously been thought to have been eliminated (Cowling, Liu et al. 2016). The annual trachoma survey in 2013 found that identified 'at-risk' and remote communities had incidences of trachoma of 84% in children aged 5–9 years and 30% in adults aged 40 years or over (Cowling, Liu et al. 2016). Affected individuals were mainly treated with azithromycin medication. In addition, health promotion was conducted in 128 remote Indigenous communities, providing school- and community-based activities that promoted facial cleanliness (Cowling, Liu et al. 2016).

To increase facial and body washing, and thus possibly reduce the risk of trachoma and other hygiene-related health issues, swimming pools have been installed in many communities. A review of the health outcomes of these pools on community residents' health reported evidence of reduced prevalence of ear infections (including otitis media), reduced skin sores, and reduced antibiotic prescriptions from health clinics (Warren and Birrell 2016). There is emerging interest in water parks as a way to avoid the more expensive management and requirements for trained lifeguards. However, research is emerging that indicates water parks can present a contamination risk due to low water volume (which can increase concentration of biological contaminants) and user behaviour (from users drinking, washing and toileting in the water) (Nett, Toblin et al. 2010).

A personal health-related hygiene issue for all women and girls is menstrual hygiene management (MHM), defined by the World Health Organisation and UNICEF as: 'women and adolescent girls using a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period, using soap and water for washing the body as required, and having access to facilities to dispose of used menstrual management materials' (Sommer, Cherenack et al. 2015). For many girls and women in remote areas, physical barriers to MHM include the absence of adequate water and sanitation amenities during menstruation, which are often compounded by psycho-social barriers such as cultural taboos and privacy issues (Sommer and Sahin 2013). These barriers can limit the capacity of women and girls to effectively manage their periods and to participate in routine social activities like school and work (Sommer and Sahin 2013).

METHOD

Qualitative interviews were conducted for this scan with representatives of key organisations providing water, sanitation and/or hygiene to three or more discrete, remote communities in four states or territories of mainland Australia (excluding outstations, due to scope limitations). Rather than review a specific community, a diversity of situations and viewpoints was sought as a basis for a scan of needs. This broader approach was able to identify whether there are issues of WASH in communities that might benefit from greater prioritisation in terms of government policy, funding of technologies or health engagement, or other benefits.

The resulting 17 interviews are detailed **Table 2**. The sample includes representatives from state and territory government (6), Indigenous (4), research (3), utility (2) and non-government (2) organisations. Only one representative was interviewed per organisation, except for one case where two representatives from the same organisation were interviewed together, at their request. Their combined responses are listed with a single identifying code.

Table 2: Summary and total number of interviews conducted

Interviewee organisation type	No.	Interviewee jurisdiction	No.	Interviewee organisation focus*	
Government	6	Northern Territory	8	Health and Hygiene	10
Indigenous	4	Queensland	3	Drinking Water	5
Research	3	South Australia	3	Sanitation/Wastewater	5
Water utility	2	New South Wales	2	Indigenous	5
Non-government (NGO)	2	Australia	1	*(n.b. focus can be multiple)	
TOTAL	17	TOTAL	17		

A diversity of states and territories and organisational types were sought. The organisations were identified through the authors' and partner's professional networks and contacts. If individuals were known within the organisation, they were approached directly by email. If no contacts existed, the invitation for an interview was sent by email to the organisation's manager.

The resulting sample size of 17 organisations is not intended to be representative, nor were responses sought to a standardised questionnaire. Instead, qualitative interviews provide detailed responses to open-ended interview questions, in order to secure 'deep' and detailed accounts and perspectives, and to describe both observed issues and solutions (Fontana and Frey 2000). This approach requires a smaller sample size than quantitative methods due to focused case study approach, applied theory and strong focus on dialogue– all of which provide a smaller sample size while delivering higher 'information power' or detail and depth (Malterud, Siersma et al. 2016). The final sample size is achieved once 'saturation' has occurred and no further new information is revealed during subsequent interviews (Charmaz 2006).

The questions asked to interviewees were regarding their perceptions of whether the drinking water, wastewater treatment and hygiene services met the needs of the community residents. They were also asked about their familiarity of the UN SDGs with regard to their organisation's activities. These questions were intentionally broad to enable interviewees to share their

perceptions from their organisation's speciality, service and locality. Additional questions were asked based on the interviewees' responses to explore the interviewee's areas of specialty, their perceived 'successes' of programs and initiatives, and the priorities of the organisation. This open-ended interviewing approach is common for a qualitative approach to data-gathering (Fontana and Frey 2000). The project and main questions were reviewed for cultural and other sensitivities by researchers with extensive experience in Indigenous research contexts.

The project received ethical clearance from the University's Human Research Ethics Committee (reference #2016001540). All interviewees consented to the interview, and were assured that their responses would be de-identified. This approach was used to enable the interviewees to enable open reflection on WASH issues and needs, and thus share a broad range of perspectives, criticisms and suggestions that may otherwise have been restricted if individuals and organisations had been identified. All interviewees were offered the opportunity to review and revise their printed transcript prior to analysis.

All interviews except one were conducted by telephone to limit the project costs; one interview was conducted by email at the request of the participant. As all interviewees were representing an organisation, it was assumed that they would have working fluency in English and familiarity with engagement by telephone, with the intention that responses were not adversely affected through the medium of the telephone. Each interview lasted about 45 minutes.

The interviews were transcribed, and the transcripts analysed using qualitative social science methods to elicit the emerging themes in a method derived from grounded theory (Hoepfl 1997, Charmaz 2006). The resulting themes formed the sub-headings used in the Findings section, which presents a summary of the relevant information provided by interviewees. Quotes from the interviewees are provided to illustrate the key points raised. In this way, the qualitative approach provides a detailed description of the current status and issues arising regarding water, sanitation and hygiene services in remote Australian Indigenous communities. The quotes are attributed using an identity code to avoid identification of specific individuals and organisations. However, where this comment may reveal the identity of the organisation and individual interviewed, the identity code has been withheld.

After analysing the interviews, literature was sought to inform the Background Section of this discussion paper. This literature was intentionally compiled retrospectively, rather than compiled in advance to avoid potentially biasing the interview questions. To illustrate specific topics, four short case studies are provided regarding programs identified by the interviewees as being effective. Information for these case studies was drawn from publicly-available documents.

FINDINGS

This section presents the findings of the WASH scan on remote Australian Indigenous communities. Each of the three subsections, covering water, wastewater and hygiene, include a summary box of noted successes, continuing challenges and questions for discussion that emerged from the analysis of the interview responses. Quotes are provided to exemplify the issues raised from specific interviewees, although the same topic was often raised by many interviewees.

DRINKING WATER

Summary box: Drinking water

Noted successes:

- Water providers seek to follow the Australian Drinking Water Guidelines and aim for high quality, safe and potable water.
- Centralised, state-wide water utilities can provide superior water supply service and maintenance.
- Meters have been successful in detecting 'hot spots' of extremely high water consumption (e.g. 1500L/person/day) due to leaks and behaviours.

Continuing challenges:

- Monitoring regimes can be weakened due to the remote location and minimal staff.
- Contamination can occur from microbes and naturally-occurring elements found in bore water.
- Bore water for drinking can have an unacceptable taste and colour, with implications on consumption– including an increase in soft drink consumption; bore water can damage tap function.
- There is high turnover of skilled water and wastewater management staff on-ground in communities.

Questions for discussion:

- Q For water utilities and state governments: Is sufficient funding and training available to increase the capacity and retain local staff to manage their water and wastewater treatment in-community?
- Q For state and territory governments: What existing programs could be replicated in other parts of Australia to improve the level and quality of water and wastewater service provision?
- Q For water utilities and health departments: How can monitoring regimes be strengthened in remote locations and with minimal staff?
- Q For health departments: How can water be improved for palatability and avoid residents increasing their consumption of soft drink and other sugared drinks?
- Q For water utilities: How can water utilities delivering services to remote communities be centralised and strengthened outside of WA, NT and SA?

Sources of water

For mainland remote communities, the major sources for drinking and household water are bore water or storage dams. Some communities in the Northern Territory have expressed a strong desire for rainwater tanks as an alternative to these drinking water sources, despite living in areas with low rainfall. The dams and other natural water sources require protection from wild animals through fencing and potential culling.

Drinking water treatment

The Australian Drinking Water Guidelines provide a common baseline for treatment, risk management and monitoring of drinking and household water supplies. Drinking water in remote communities can be provided through basic chlorine disinfection of bore or reservoir water, ultraviolet secondary disinfection, or advanced treatment systems. These more expensive, high-tech micro-filtration and reverse osmosis treatments are installed for supplies with high levels of naturally-occurring contaminants, such as nitrates and uranium, in the deep bore water supplies. For communities in tropical areas of Northern Australia, heavy rainfall during the monsoon season can necessitate a 'boil water' alert.

Some utilities and government programs have increased funding of new water treatment services and infrastructure over the past decade to ensure safe, reliable supply, including to address microbial health risks. This necessitates a debate over the 'fit for purpose, fit for place' guiding principle, to ensure that the sophistication of the treatment technology is appropriate for the capacity in the community to maintain the treatment. An interviewee described the challenge as:

A lot of the communities have good quality drinking water, at least initially ... we often quickly see a lack of maintenance, meaning that everybody goes back to using their old water source – because the big fancy system doesn't work (research representative #1).

Drinking water quality

Drinking water supplies are at risk of both microbial contamination and chemical contamination by naturally-occurring elements in deep artesian (bore) sources. The microbial risk from both unmaintained infrastructure and behaviours were described by an interviewee as being linked to waterborne health issues:

It's quite chronic in cases ... [because] storage tanks [are] ... rarely replaced ... They're going to rust, they're going to corrode ... Water supplies are 100 % a [health] problem (Indigenous organisation representative #1).

The chemical contaminants in water, predominantly arsenic, cadmium, nitrates, uranium and barium, tend to increase towards inland Australia, where monsoonal rains do not replenish supplies. Although these are naturally-occurring, their presence can require the installation of advanced water treatment technologies due to the health risks from excess concentration.

All interviewees mentioned a knowledge of the Australian Drinking Water Guidelines, and also relevant state legislation and government agency requirements. These are used to direct monitoring regimes, develop local water quality management plans, and audit water utilities to achieve compliance. The monitoring data is generally publicly accessible from the organisations

responsible for these supplies. The monitoring regimes are structured to trigger swift intervention if contamination is detected.

Despite these positive intentions, several interviewees raised concerns with the on-ground accuracy and frequency of water monitoring regimes. These are challenged by the remote locations, minimal staff, infrequent transport for the water samples and a lack of oversight of the staff responsible (which is often the community-based Essential Services Officer). These issues were perceived to contribute to unsafe water supplies and ill-health in community residents. An interviewee described how samples can be taken too infrequently for adequate monitoring:

Even with the best and biggest communities we've got, you've got the Essential Services Officer that's taking the monthly water samples. ... In reality, he's probably going to take time off over Christmas and New Year. So, at best you're probably getting 10 samples. (Indigenous organisation representative #1).

Water palatability and aesthetics

The monitoring programs are intended to provide 'safe' water to communities. However, the palatability and aesthetics of water can be poor for communities reliant on bore water. The negative aspects of bore water were noted to also be experienced by nearby 'mainstream' towns, which draw on the same aquifer supply. An interviewee described the properties of this bore water:

Hardness and total dissolved solids, ... generally salinity ... pH is actually slightly too low ... iron, a little bit of manganese ... the consequences [on the water are a lack of lather] in terms of washing, [a build-up of scale] in terms of appliances ... (water utility representative #2).

The interviewees were divided over whether the taste of water was acceptable to Indigenous people in remote locations. Some considered that it was not a problem as the residents had 'grown up' with the water. Others noted that Indigenous people had traditionally sourced water from 'soaks or surface water', so were unused to it. Despite this difference, many interviewees commented that alternative drinks were preferred by both Indigenous and non-Indigenous residents in remote communities. This was described by an interviewee:

The water is quite hard ... people don't want to drink it because it doesn't taste very good, so then they start substituting it for other things like soft drink or cordial or something like that ... you do find, when you travel bush, all the whitefellas are drinking bottled water (Indigenous organisation representative #2).

Management of water services

Responsibility for providing both water and wastewater supplies and treatment is often provided by water utilities or other service providers to the property boundary. From there, the remote community manages the water to the house water meter, and the house-based water functions are managed by the housing provider. A number of interviewees reflected on the Northern Territory's centralised utility model of Power and Water NT, which was seen as an effective model to combine all water (and power) provision across the Territory. This model was able to harmonise monitoring and maintenance across the discrete and remote communities as well as towns that receive their services. Less effective was the high turnover in staff in remote

communities around Australia, which limited the ability to maintain the water treatment infrastructure *in situ*. An interviewee described this situation:

You get quite a changeover of staff, so no-one gets to manage the treatment plant to the level required to bring suitable quality of water ... there was one stage there where [a community] gave up on the treatment for a while because [they] couldn't get anyone appropriately qualified to manage it, and so they had to rely on tank water ... [We need people] from the community to come together [to] train them up collectively (government representative #6).

Water consumption

Interviewees noted that water infrastructure in remote communities is designed for a high amount (around 1000 L/person/day) and that many remote Indigenous communities have an even higher daily water consumption of up to 1500 L/person/day. This high level of expected and actual consumption was explained as not due to high personal use, but rather due to a range of habitual and also infrastructural reasons. This included undetected leaks, use of sprinklers over long periods (left on over the weekend; placed on rooves to cool the house), as well as some low awareness of water-saving and low sense of responsibility due to not being responsible for paying the water bill.

The long-term sustainability of water resources was recognised as a limiting factor for the future of remote communities, especially those with increasing population growth. This was described by an interviewee:

The ultimate sustainability of that [groundwater] source ... is linked to the viability in that community. Due to that strong relationship between the community and the land on which it's situated, relocating [the community] obviously isn't an option for them from their perspective ... but their community [needs to] continue to be sustainable within the context of the water source that's available (water utility representative #2).

To manage high water demand in these communities, one organisation described what they perceived to be an effective environmental education program. Local residents were trained in the topic and were encouraged to speak to fellow residents to encourage a perspective of local 'ownership' of water consumption. However, such programs appeared to be uncommon, with the majority of interviewees describing technological solutions for reducing water consumption. Water meters are being increasingly installed to identify leaks, and regularly installed in new housing. In some communities, pilot testing of meters has been linked with larger databases to identify high consumption and trigger a response, described as:

Metering is installed in] six or seven communities ... [to identify] who are the large users. Smart meters seem to have pretty sophisticated software that ... identify usage patterns that are indicative a leak, or a tap being left on, or these sorts of things that flag those users directly (water utility representative #2).

Effective Case Study 1: NSW Aboriginal Communities Water and Sewerage Program

The NSW Aboriginal Communities Water and Sewerage Program is a partnership between the NSW Government and the NSW Aboriginal Land Council (NSWALC) that began in 2008 and represents a \$200 million investment over a 25-year period (NSWALC 2009). The partnership formed after evidence showed inadequate drinking water quality standards and sanitation infrastructure posed health risks to many discrete Indigenous communities (NSWALC 2009). The purpose of the partnership is to provide joint and ongoing funding for water and sewerage infrastructure operation, maintenance and monitoring in selected former Indigenous missions and reserves across NSW – reaching a total population of 6000 (NSWALC 2009).

Key aims of this ongoing program are improving the health and well-being of Indigenous community members through the delivery of safe drinking water and effective sewerage services at an equivalent standard to the broader community (NSWALC 2009). Financial and technical expertise is delivered to the program in partnership with the NSWALC and local councils (NSWALC 2009). Long-term service agreements with local water utilities are negotiated to implement routine maintenance programs, address repair backlogs and undertake emergency works (NSWALC 2009).

The transfer of service provision from local Aboriginal Land Councils to local water utilities under the service agreements has enabled the detailed evaluation of existing water and sewerage infrastructure and the development of management plans for each community (NSWALC 2009). These risk-based water and management plans have enabled better understanding and control of risks which in turn has led to safer and more sustainable drinking water (Byleveld, Leask et al. 2016). Regular monitoring and reporting on drinking water quality is now in place, and emergency and capital works have been undertaken in many communities (Byleveld, Leask et al. 2016). Regular community engagement associated with the program is carried out by local public health units and through Aboriginal community participation in four-monthly inspections and reviews (Byleveld, Leask et al. 2016).

Since the implementation of the program, services have been improved in 41 communities, and all 61 remote NSW communities now receive water and sewerage services at an increased level than prior to the onset of the program (NSWALC 2009).

SANITATION (wastewater treatment)

Summary box: Sanitation

Noted successes:

- Uptake of centralised wastewater treatment technologies has increased in recent decades, replacing onsite septic tanks.
- Wastewater treatment technology is being selected for installation based on being 'fit for purpose, fit for place' in many locations, to ensure it is technologically, socially and environmentally appropriate.
- Single water utilities that provide services across an entire state/territory can improve service provision, reduce response time and cross-subsidise costs.
- There is increased focus and effort to build the capacity of local organisations to manage wastewater treatment.

Continuing challenges:

- 'Self-certification' of septic installations in the NT risks non-compliant installations with health risks.
- Wastewater output monitoring regimes are not always rigorous, and can be irregular.
- Inappropriate items (e.g. clothing, nappies, and feminine hygiene products) are flushed down the toilet, causing blockages and risking damage to treatment plants.
- There are challenges with waste management (e.g. availability of waste bins; regular emptying and cleaning of bins).
- Ongoing maintenance and increased installations in wastewater treatment facilities is required.

Questions for discussion:

- Q For water utilities and state and territory governments: How can wastewater treatment technologies be designed as 'fit for purpose, fit for place' to ensure they are technologically, socially and environmentally appropriate?
- Q For state and territory governments: Are there sufficiently-funded programs to continue to replace onsite septic tanks with centralised wastewater treatment in remote communities? Can funding be increased to ensure adequate monitoring and system upgrades?
- Q For water utilities, schools, essential service officers and health clinics: How can the current reasons for toilet blockages be resolved to maintain toilet functionality long-term?

Wastewater treatment techniques

Current sewage management in remote Indigenous communities ranges from open defaecation to septic tanks and centralised treatment in ponds. According to interviewees, open defaecation can occur when installed wastewater treatment systems have broken down. This can be from overuse in crowded homes, blockages in the pipes from nappies and other non-flushable items, or a lack of public amenities in the community. The situation with open defaecation was described by an interviewee:

The thing is, what are you going to do if you've got 20 or 30 people [living in a house]? ... Things are going to start to break down and eventually they do. ... [Then] they don't use the toilet and they go outside (government representative #4).

The more remote communities remain serviced by septic tank and absorption drain systems. Interviewees commented on the risks of design faults, irregular monitoring inspections, and a lack of maintenance, all of which increased the risk of sewage contamination into the local environment. The health risks associated with septic tanks were described by two interviewees:

[There are risks] having onsite [septic] systems ... if there's blockages or overflow right there in someone's back yard ... if the lids are cracked and they often are ... they offer an opportunity for kids to fall in them (government representative #3).

I've seen all sorts of disasters, particularly with septic tanks, where it's just overflowing because it's poorly constructed in the first place, or it's getting used by 10 people rather than three and it's not designed for that (research representative #1).

Some interviewees based in the NT raised concerns about the local approval process that allows for 'self-certification' of septic installations. An interviewee observed:

[in one NT] remote Indigenous community ... I personally dug up and exposed septic tanks and leach drains [at] 31 houses. I did not find one house that complied... I'm not saying that all plumbers in the Northern Territory do not comply ... [but putting in] an absorption drain is going to cost you a fortune and the logistics are enormous. So, if you can get away with not putting that aggregate in, fine. ... and if you've got a concrete septic tank, or even a fibreglass or plastic septic tank, it's probably going to crack and fracture on the way out. ... are you going to say, 'darn it, we'll put it in anyway and no one's going to know?' (Identity withheld).

In recent years, less septic systems have been installed in communities. This has shifted the responsibility from the housing provider or the department of health managing the tanks, to community-scale wastewater treatment that are managed by community organisations or a central water utility. The National Aboriginal Health Strategy (1989) provided a strong impetus to this shift, as described by an interviewee:

[under the] National Aboriginal Health Strategy ... there were a significant number of ... wastewater treatment system upgrades ... from the mid-90s until 2005 ... housing stock in ... communities went from being 30% on septic systems down to about 5% ... water and wastewater became much more under control than they were previously (government representative #3).

The technologies and structures for centralised wastewater treatment differ in each location. In SA, many communities use septic tank effluent disposal systems (STEDS). In NSW, centralised wastewater treatment occurs in many communities under the state-wide Aboriginal Communities Water and Sewerage Program, which uses a range of technologies including oxidation ponds or onsite sewerage management. This program is an AUD\$250 million program over 25 years, structured as a partnership between the New South Wales Aboriginal Land Council and the New South Wales State Government to manage much of the operation, monitoring and maintenance of water and sewerage in Indigenous communities. In the NT, the centralised water utility, Power and Water NT, operates conventional gravity sewer systems with pump stations and ponds in 53 of the 72 communities to which they provide services. This single NT service provider was described positively by interviewees who engaged closely with them and found the centralised model effective:

When I talk to them about a water upgrade ... of a community, I deal with one hydrologist, one water quality specialist, one group of people that are specifically skilled up for dealing with remote communities and delivering services there, and contractually engaged with Aboriginal central services, using the same model contract through all 72 communities (Identity withheld).

At the community level, [there's an] an essential services officer ... they're [the] direct troops on the ground. Then ... service coordinators sitting in [the] major centres ... [Then] universal SCADA [Supervisory Control and Data Acquisition] coverage ... provides the capacity to have remote monitoring of systems ... [with] real-time visibility of how systems are operating and what's going on (Identity withheld).

The selection of wastewater treatment options was described by several interviewees as needing to be 'fit for purpose, fit for place', to ensure that the technology is appropriate, that the community is engaged and can describe their needs, and that the local environment is suitable for the selected technology. These three aspects were detailed by interviewees:

- **Technologically appropriate:** *'some infrastructure ... is kind of over-engineered, too technical for a remote community. ... you've got to be realistic with the skillsets that are going to operate it. And with the high-tech stuff, a whole lot of extra cost and risk and things like that'* (government representative #2).
- **Socially appropriate:** *'wastewater treatment needs to be done really sensitively, but with really robust systems ... done with consultation, sensitivity and robust materials'* (research representative #1).
- **Environmentally appropriate:** *'I think it would be unwise to prescribe a single [wastewater treatment] technology. You actually need to look at the site and the condition of the site, the loading on the sewerage system and what would be the best solution in that location'* (government representative #1).

Treated wastewater is often discharged under licence into the local environment. Some communities are utilising this water for irrigation of community areas, such as school and community playing fields. However, such reuse and discharge can create health risks, where discharge water has been contaminated. One such example was described by an interviewee:

... the overflow from the sewerage was being pumped onto the school oval and into the creek where the kids swam. ... [It shows how] practices around maintenance and use of infrastructure ... can create health issues (Indigenous organisation representative #4).

Monitoring the wastewater outputs was identified as critical, but the monitoring regime was not always viewed as ideal by interviewees – due to the challenge of ensuring regular testing. This was described by an interviewee:

[Regarding] ongoing monitoring to see if they are meeting the standard ... you've got to take samples and ... sometimes you can't even meet the timelines required ... It may not be achievable. And then having someone who's got the ability and skills to collect a sample in the right way maybe is another part of the problem (government representative #6).

Continuous maintenance and an increase in demand for wastewater treatment facilities was described as an ongoing concern. Population growth in remote communities has previously led to increased pressure on wastewater treatment facilities, as described by two interviewees:

Generally, our [Indigenous] towns are growing. ... but water supply, sewerage and sanitation is so very important and we're not keeping up with it in a number of areas ... The infrastructure is starting to get old, it has not been upgraded. ... currently we have six towns who are absolutely at capacity (government representative #4).

That sewerage lagoon was not adequate for the expansion of the community [and it] ... overflowed ... [Then there was] the problem with mosquito breeding from the overflow of the effluent (Indigenous organisation representative #1).

Improving the water and wastewater treatment facilities has been noted to sometimes attract additional residents to the community, as described by an interviewee:

Sometimes ... once you improve the situation on a community, you can all of a sudden create a Catch-22 where you attract more people into the community. Then the original design of the sewerage system isn't big enough (Indigenous organisation representative #1).

Currently, as remote communities grow through new public housing, development conditions in most areas require an extension of the capacity of the wastewater treatment facility for the anticipated population increase. The interviewees were aware that upgrading wastewater treatment to centralised services was a high-cost investment, and that remote communities and their residents rarely had the capacity to fund these:

Nobody can afford it. ...The National Water Initiative says 'user pays'. Well you know, you can't provide it (research representative #3).

The communities are so small and financially disadvantaged ... we can't assume that every community would be in a position to pay for the program, in the same way that urban residents in larger towns would pay their water rates to a council. ... [and] it's a disproportionate amount that is required (government representative #1).

To fund such treatment plant upgrades, many programs involve a long-term state or national government funding commitment. An alternative model, which is implemented in SA, WA and NT, enables the single state-owned utility to cross-subsidise services.

Toilet blockages from flushed items

Challenges remain in the use of reticulated wastewater treatment facilities, and in the required ongoing maintenance, staff capacity and funding. One challenge that was raised by the majority of the interviewees was the high rate of blockages in the waste pipes from the household toilet to the treatment plant. Blockages were noted as being more of an issue in remote communities than in the general community, as described by an interviewee:

Gross solid does appear to be much more of an issue in remote communities than you would see in populated towns (water utility representative #2).

The items that were noted to be blocking pipes included excessive amounts of toilet paper in a single flush and non-flushable items such as clothing (particularly underwear), items used for menstrual hygiene (both feminine hygiene products and alternatives, such as rags), and babies' nappies. Three reasons were suggested by interviewees to explain this high rate of flushed items:

- **A lack of toilet paper/ lack of ability to buy toilet paper:** *'[people wipe with] various pieces of clothing ... [because] purchasing [toilet paper is] very expensive. Especially if you've got 18 people in your house and you go through a pack of toilet paper a day'* (Indigenous organisation representative #3).
- **Culture-based privacy:** *'people have continued to [flush non-flushable items] while they don't have an alternative or an alternative they feel comfortable with... A lot of clothing, particularly underwear and stuff, is seen as disposable... people will wear it for a few days and then chuck it away... people don't like to hang underwear out on the line where other people can see it'* (research representative #2).
- **A lack of waste bins in bathrooms and/or regular emptying of bins.**

To manage blockages, the main solution mentioned has been to install macerators and back-up pumps at the 'end of the pipe' and prior to the wastewater treatment. This was described by an interviewee:

Macerators... can be used for dealing with these gross solids ... so if you do have a pump that gets blocks by some rag, or something, [we've] got a standby pump there as well (water utility representative #2).

Staffing and maintenance challenges

The maintenance of the installed wastewater treatment is highly dependent on the staff both in the communities and those who liaise with these on-ground officers. The lack of skilled officers to manage wastewater treatment plants was described by many interviewees, including:

The plants themselves have the capacity to treat to a very high standard, but because of the complexity it's very hard to achieve that standard because of breakdowns and the lack of capacity of people to treat them ... they don't have the right people with the right skill sets and ability to manage these sewerage [plants] (government representative #6).

An additional issue for on-ground staff is the high rate of staff turnover, described in the Findings section on drinking water. In response, some programs have focused on recruiting and

training local staff, where on-ground and local staff can identify, report and potentially repair plant problems, described by one water utility representative as:

[We employ a] Water Services Officer on each remote community. The role of this Officer is primarily monitoring and reporting – as distinct from operational, with most operations undertaken by contracted expertise (water utility representative #1).

The interviewees acknowledged that training and employing local residents could be difficult. Two interviewees stated:

Shifting the responsibility to maintain equipment to a community sounds great, but there's also challenges around there about just people's capacity to do that (NGO representative #2).

The [installed water and wastewater] infrastructure didn't see through its useful life. It didn't get through to what would be expected, because the communities often were not supported with operation maintenance and monitoring. They didn't have the technical knowledge and skills (government representative #1).

One response to increase local staffing capacity – and to increase the sustainability of the wastewater treatment plant– has been to build the capacity of the local organisations. This was described by an interviewee:

Water [and] wastewater infrastructure is really expensive. ... \$15 million pieces of infrastructure. Government sometimes, historically, build and walk away and make assumptions that the Council... will be interested, look after it, maintain it well ... [there is a need for] providing practical capacity-building support [so our program] provides wastewater treatment and drinking water treatment services, as well as capacity-building to maintain these services through all councils, including the indigenous councils (Identity withheld).

Effective Case Study 2: The Toilet Book

In 2000, the Waltja Tjutangku Palyapayi Aboriginal Association in Alice Springs, NT, published the 'Toilet Book'. The 14-page book contains pages on the infrastructure a new house should contain, the different types of toilets installed in communities (pit and flush), how to operate a flush toilet (including which items should not be flushed), maintenance of the 'toilet room' (including a waste bin and regular cleaning), and where and how to access assistance for toilet breakages or blockages. The language is unambiguous, and written for readers who may speak English as a second language or have low literacy. The text is interspersed with clear diagrams.

The Toilet Book was the outcome of a collaboration of communities and individuals from NT organisations including health services, local government and Aboriginal organisations. It was published both in hard copy and electronically, and distributed widely through communities as well as through organisations providing wastewater and health-related services to remote communities.

Although this resource is no longer available, its positive impact was recalled by several of the interviewees.

HYGIENE AND HEALTH

Summary box: Hygiene

Noted successes:

- An approach that considers hygiene as an environmental health problem can provide community-wide, durable health benefits for residents more than an individual-level clinical approach.
- Repairing ‘health hardware’ (e.g. taps, toilets, and bathroom and kitchen facilities) in houses can improve health and wellbeing by increasing the ability to wash, flush toilets and prepare food, leading to increased school attendance, work productivity and nutrition.
- New housing is being constructed in communities with capacity-level populations.
- In recent years, a more community-centric approach has started to be adopted to amplify the concerns and preferences of community representatives.
- Health-related hygiene education programs exist to promote healthy living habits, food hygiene, pet management, and toilet use.

Continuing challenges:

- Chronic infections in early childhood are often linked to vulnerability to other diseases in later life.
- Significant overcrowding (e.g. 20 residents in a 3 bedroom house) limits the ability to maintain healthy hygiene levels of people, clothing, bedding and infrastructure.
- Many remote community houses have very poor hygiene levels, in part due to overcrowding and lack of housing maintenance; this negatively affects the health of the residents.
- Some girls are missing school each month due to a lack of products to enable menstrual hygiene management, possibly exacerbated by poor awareness or shame.
- Australia is the only high income country that still has cases of trachoma, a preventable eye infection.
- Cultural considerations are required as most current approaches to manage water, sanitation and hygiene are mostly ‘Western solutions’.
- Some community members’ perception of ‘normal’ hygiene and health includes chronic eye and other infections.

Questions for discussion:

- Q For NGOs and state and territory governments: How can civil society organisations work with communities to strengthen their understanding of how to access support from statutory bodies with responsibility for maintenance and service levels?
- Q For communities, water utilities, and state and territory governments: How can remote communities be better equipped or enabled to tackle and solve their own WaSH issues – and to ensure that solutions consider and integrate indigenous values and perspectives?
- Q For state and territory governments: How can support be provided to communities to build on-ground capacity to address maintenance issues?
- Q For state and territory governments: How can new housing construction rates be funded and increased to relieve overcrowding, while ensuring higher-quality, robust materials and designs for the preferred living styles of the Indigenous residents?
- Q For state and territory governments: How can long-term funding be provided for health hardware repair programs to ensure ongoing health improvements in existing housing stock? What existing programs can be replicated and adapted?
- Q For state and territory governments, NGOs and service providers: What measures can be put in place to improve access to, and use of, health and hygiene products such as soap, toilet paper and washing powder – addressing affordability as first priority?
- Q For all service providers: What collaboration and funding opportunities exist to provide cross-agency, long-term healthy behaviour promotion that is culturally-sensitive and integrated across all levels of WASH service provision– to improve the long-term wellbeing of community residents?
- Q For local government and health clinics: What environmental health improvements can be introduced across the community to reduce dust and flies and thus reduce the prevalence of trachoma eye infections?
- Q For schools and health clinics: What funding and information is required to provide menstrual hygiene management education, subsidised products and waste facilities to increase school attendance for girls, increase dignity during menstruation and reduce toilet blockages?
- Q For universities and NGOs: What training could be developed and delivered to provide adequate skills, education and exposure for external staff who intend to work in remote Indigenous communities?

Interviewees were asked to describe any health-related hygiene issues that they had observed of concern in remote Indigenous communities. This section details the range of issues that were raised, including housing-related and personal hygiene issues. This section is followed by recommendations for appropriate engagement to improve community and individual health. This includes taking a holistic, systems approach that many of the interviewees described as being crucial to success. This later section also provides views on behaviours that contribute to improved health are described, and a review of current and past 'WASH education' efforts is provided.

Overall, hygiene was described by interviewees in two ways: regarding the transmission of disease, and regarding the social setting in which health is impacted by hygiene status and behaviours. On disease transmission pathways, children are thought to be the main transmitters – due to their close physical interactions. This transmission awareness was raised by interviewees with the knowledge that early, chronic infections during childhood are often linked to vulnerability to other diseases in later life. This was described by an interviewee:

If you have some sort of skin condition under the age of ... five ..., by the time you get into your mid to late ... 30s or around there, you are at an increased risk of renal disease (Indigenous organisation representative #2).

The remainder of this section considers the social settings that contribute to health-related hygiene issues.

Housing-related hygiene issues

Housing featured in a range of health-related hygiene comments from interviewees. This included comments regarding the population size in the home, the need to repair 'health hardware' to provide water and remove waste, the need for new and quality housing, and the consideration of more appropriate housing designs.

Overcrowding

Population growth in remote Indigenous communities has resulted in many communities having an excessive number of people living in each house. This was described by all interviewees, including:

[In some communities] you're looking often at housing situations where you've got upwards of 20 plus people in a three-bedroom home. [One community] used to have 148 houses for about ... 3000 people. So, you're averaging about 18 people per house (Indigenous organisation representative #1).

These populations were often high, but the interviewees explained that the residents per house fluctuated, especially in the NT. The interviewees all took a holistic, systems approach in their explanations of how overcrowding in homes affects both the health of residents. Keeping the house and the residents clean were noted as major difficulties by interviewees – both in terms of cleanliness of the facilities as well as the privacy required:

Look, a house is only as clean as the dirtiest person (government representative #2).

Because you have overcrowded houses, people in a house won't want to shower. Like, there's certain issues around use of a shower ... for women in particular, they just don't feel comfortable ... being in a towel or in the bathroom ... So there's these sort of cultural issues which makes certain activities kind of a bit awkward in a crowded space (NGO representative #2).

Hygiene difficulties from overcrowding included the cost of washing supplies, when used by a large number of the house's residents. This is a challenge in addition to the cultural expectations of sharing assets among family members:

When you've got 20 people in your house, do you have the ways and means to keep a supply of shampoo, soap even where the facilities are working? Once again, am I going to put my \$5 bottle of shampoo in the shower recess when there's 20 other people and in the first day it's gone? ... Indigenous culture of course is kinship and it's sharing.

So, to lock your goods away ... they're running the risk of their culture and their society saying, "Hey, our kinship structure is 'what's yours is mine and what's mine is yours'" So, you've got all those dynamics playing a part as well (Indigenous organisation representative #1).

Such high populations per house can affect the ability of the toilet and washing facilities to function where overused– as described by an interviewee:

The thing is, what are you going to do if you've got 20 or 30 people? The house would need two, three, four toilets– otherwise things are going to start to break down and eventually they do (government representative #4).

Health hardware

As defined in the Background section, 'health hardware' is the mainly water-based, in-home infrastructure that enables the washing of people and clothes, and improves the ability to prepare food (Pholeros, Rainow et al. 1993). The interviewees provided a range of responses that reflected their understanding of direct link between functioning health hardware and the hygiene and health of the community residents. This was described by two interviewees:

If you simply do not have the facilities working, then no matter what race, nationality, culture, whatever: if you do not have those facilities then you cannot obviously achieve the hygiene ... you need (Indigenous organisation representative #1).

If you want to improve [social] outcomes for people, they need to be able to have a shower, have a good workable toilet, and wash their clothes ... [in] all the public housing, there are no washing machines it's really important for [hygiene, so] a lot of services just go around washing people's blankets (Indigenous organisation representative #2).

Providing health hardware in the work place can improve worker productivity and health. One organisation described how they provided laundry facilities for uniforms, as well as shower blocks and breakfast food. This reflected their awareness that these aspects were often lacking in the homes of the employees and were creating a barrier to attend work.

The interviewees described the current status of health hardware in the houses of remote communities where they worked. They described the hardware as being absent or insufficient, damaged by bore water, or of low quality:

- **Absent or damaged health hardware:** *'inside the houses you find that people don't have the ... hardware to be able to practice safe hygiene behaviours ... in the bathroom the showerhead is probably broken, the taps are broken. In the laundry the washing machine is not functioning, again taps are broken. The kitchen is blocked and the toilet is blocked' (NGO representative #1).*
- **Health hardware damaged by bore water:** *'The water, because it is quite hard, it calcifies showers and things like that, and taps ... so people don't tend to wash because their shower and things aren't working. ... [A tap in one home] was so calcified that you couldn't turn it off' (Indigenous organisation representative #2).*
- **Low quality health hardware:** *'[Health hardware infrastructure] needs to be more industrial strength than household strength ... we get the extremes with climate, particularly in the north where there's cyclones, and heat, and humidity. If you take*

culture out of it, and even health issues, just the design for the climate has been criticised' (Indigenous organisation representative #4).

The maintenance status of health hardware was described as poorly maintained by many interviewees, including the following:

In the 70s ... all the infrastructure, big infrastructure went into communities [now,] at the same time, the infrastructure all started to break down (research representative #2).

The major issue is poor construction and maintenance of housing. ... And so, very quickly ... pipes get blocked ... washing machines stop working. So, basically things like the capacity to wash kids, wash bedding and so on, gets impacted on really quickly (research representative #1).

Many communities were described by interviewees as waiting significant lengths of time for repairs to their health hardware:

If [the] toilet system packs up ... you might wait months for a plumber to come out ... The community quite rightly would say, "We're not going to get a plumber out for a \$1 part, so we're going to wait until there's a number of jobs to substantiate a plumber coming out" (Indigenous organisation representative #1).

This lack of repair was identified as being the responsibility of specific agencies that owned and managed the houses, as described by an interviewee:

It's up to the tenants to tell the landlord – whether that is the state or the Council – that there are leaks. And then, it's up to the timeliness of the landlord, either council or state, how quickly they'll get to that particular leak (government representative #2).

Despite this identified responsibility, interviewees provided two reasons as to why communities were living in homes without functioning health hardware:

- **Lack of perceived agency to request maintenance:** *'White people kind of know how to get the toilet fixed ... how to access somebody to fix it, or that they have a right for it to be fixed ... I think with indigenous housing, it's probably more difficult for people to complain [about broken health hardware] ... It's about understanding how the systems work – about knowing who to contact and who to harangue to get stuff done'* (research representative #1).
- **Lack of capacity to make repairs:** *'With some communities, there's very little on-ground capacity for some of the maintenance that's required. So very often, small problems just get left, and left, and left ... It's not until it's completely broken and you've got a catastrophic problem that it's fixed'* (Indigenous organisation representative #4).

In response to this awareness of the link between public health status in remote communities and poorly functioning or absent health hardware, a number of programs have been established to provide these services to communities in a systematic or *ad hoc* manner. Three such programs were described by interviewees:

- **Housing for Health:** *Housing for Health is a oneoff assistance to the local housing provider to essentially get ... houses up to a standard where they can ... support health and safety... [They] do a very thorough and rigorous survey of each house ... including the ability to wash people, clothing, bedding ... plumbers and electricians [are] follow along behind ... When [they] leave a community, the houses may not look much better*

but they should be safe, people can wash themselves, their clothes, their bedding, they can go to the toilet and remove the waste safely and they can prepare and cook a feast in the house (identity withheld).

- **Healthy Community Assessment Tool:** *We have done some trials of an environmental health tool called the HCAT [Healthy Community Assessment Tool] ... to give a snapshot of how the environment impacts on the health of the community. What we found from that tool [was that] ... communities rated their water and sanitation ... supplies as satisfactory, but inside the house in was far from satisfactory (identity withheld).*

Washing machine repairs: *[One program] put a washing machine mechanic in the team and he went from community to community repairing people's washing machines as a way of tackling scabies.... It's a much better approach than spending millions on trying to develop a vaccine ... Scabies is a parasite; it's not an infection (research epresentative #3).*

Effective Case Study 3: Healthhabitat's nine healthy living practices

In 1985, an applied research project led by Healthhabitat assessed housing safety and the living conditions of the Anangu people in north-west South Australia. It identified a range of 'healthy living practices' required to keep people healthy within their households and community. The resulting nine healthy living practices (HLPs) are:

1. Washing people – especially children – once a day;
2. Washing clothes and bedding regularly;
3. Removing wastewater from living areas safely;
4. Improving nutrition, food storage and preparation;
5. Reducing the negative impacts of over-crowding;
6. Reducing the negative impacts of animals, insects, and vermin;
7. Reducing the health impacts of dust;
8. Improved temperature control in the living environment; and
9. Reducing hazards that cause minor trauma (Pholeros, Rainow et al. 1993)

Prioritising the maintenance of housing infrastructure and functioning health hardware (for example, working showers and toilets) were found to be critical to sustaining and enabling the HLPs (Healthhabitat 2013). Building on this, Healthhabitat launched the Housing for Health Guide (the Guide) in 2013 to provide an evidence-based toolkit and operational guidance for implementing HLPs at the household level (Healthhabitat 2013).

Using a place-based environmental health approach and a design focus for poverty reduction and health improvement, this program initially targeted Indigenous Australians living in remote, rural, urban, and suburban settings. Project teams comprising more than 75% Indigenous people worked within communities to assess houses on an individual basis, fix health hardware and to test health hardware function after repairs had been made (TEDx 2013). This standardised testing ensured that the average investment of \$7500 per house has achieved its intended return and, most importantly, that the house function has improved (TEDx 2013).

Since 1997, the nine HLPs have provided the basis of the NSW Department of Health's 'Housing for Health' program. To date, this program has engaged with a range of communities, and conducted repairs 96,000 items in 3479 houses to improve both safety and health. An evaluation of this program in 2010 determined that the residents living in homes repaired by the program had 40% less hospital separations for infectious diseases than the rural NSW Aboriginal population who did not receive such repairs (NSW Health 2016).

New housing

New housing is being built to reduce overcrowding in current homes. This has been an ongoing focus for the past 30 years, as described by two interviewees:

By the early 80s it was really evident that the major problems of Indigenous health were around public health infrastructure... So through the 80s ... almost all of the health funding was invested in public health infrastructure support. So it was roads, it was housing, it was sewerage, water supply (Indigenous organisation representative #4).

With the Commonwealth program, through the national partnership agreement on indigenous remote housing ... there's been about \$1.2 billion in establishing new houses in these communities (government representative #2).

However, many interviewees described how any growth in new housing was not occurring at same the rate as community population growth, causing a continuous shortage:

The investment in housing needs to increase dramatically, and in recent years it has ... [but] housing has not kept up with the population. ... When families are having so many kids and you're not building more houses then suddenly you've got 20-25 [people] in them (government representative #4).

Design of housing

Many interviewees identified that the quality of existing and new housing can be poor. This was described by an interviewee:

It is true that a lot of the remote Indigenous communities are the most expensive places to build houses, because just getting the materials there, wet season, transport [costs] ... [But] they tend to be the cheapest, low quality, small little brick boxes– so in no way cater for the sheer volume of both residential and visiting populations (Indigenous organisation representative #4).

In response to the apparent mismatch between housing design and materials with the needs of the community, many interviewees proposed changes to housing design that would ensure higher-quality materials for more robust use. They proposed designs suited for larger populations, such as additional bathroom and kitchen areas for houses with extended family members, and also designs that reflected the preferred living styles of the Indigenous residents. Interviewees noted that preferred use might be to enable beds on the verandas in hot weather, more integrated showering facilities that have suitable privacy, and cooking facilities for bush foods, rather than conventional and small ovens.

Despite these recommended design changes, one interviewee cautioned that homes still need to be human-centred and 'welcoming'. He stated:

[When improving housing,] you actually have to be a bit careful about making places look too industrial ...[or] too institutional ... Most people just want to live in a house that looks like everyone else's (government representative #5).

Specific personal hygiene issues

Menstrual Hygiene Management

A specific health-related hygiene topic that emerged from some of the interviews was that of the management of menstruation for girls and women, often referred to in the development and health sectors as ‘menstrual hygiene management’ (MHM). MHM was alluded to by a range of interviewees when discussing toilet blockages from non-flushable items– namely sanitary pads, material and underwear that was used in place of the formal products. Only four interviewees directly described MHM issues.

MHM was initially raised by an interviewee in the context of health hardware– namely the need for privacy in functioning bathrooms with lockable doors to enable adequate bathing, particularly during times of menstruation. This discussion then broadened into the current observed context of MHM, where an apparent lack of knowledge around, and products and facilities to manage, menstruation were leading to girls not attending school for several days each month. This was described by an interviewee:

Mothers and grandmothers have said that girls are missing school when they have their periods ... because they don't want to change [pads] at school ... [at schools] often there's no soap, ... there's often no rubbish bins or there's one rubbish bin outside the toilet which is really embarrassing to use. In terms of the infrastructure that I can put in place to help girls, it's rubbish bins, it's soap, it's running water and toilets that flush, and privacy (Indigenous organisation representative #3).

The interviewees described the impacts on school attendance– and other community activities– during the time of menstruation as due to one or several issues. This included a lack of knowledge about menstruation, cultural issues of ‘shame’ around the topic for some specific cultural groups, the lack of MHM in health education, the issues of buying feminine hygiene products in remote communities, and the alternatives that are used in place of such products. Each of these contextual issues is described in quotes from the interviewees:

- **For some groups, cultural ‘shame’ prevents discussion:** *‘There's a lot of shame around it ... [Also,] traditional forms of learning [aren't] necessarily functioning within families for everything ... Traditionally, it's a grandmother's role, ...but a lot of grandmothers experienced mission times where there was very strong puritan Christian values around your body, which meant you don't talk about it’ (Indigenous organisation representative #3).*
- **MHM is a low priority in health education:** *‘there's such a demand on every single [health education] resource available and everything is under-resourced. If you're dealing with someone's diabetes and if you're dealing with chronic illness, [then] menstruation is not [seen as] a sickness ... [MHM education] is missing in the [remote] regions and it is a serious concern that has an impact on girls' and women's lives. ... [including] being able to go to school’ (Indigenous organisation representative #3).*
- **Buying MHM products can be embarrassing and expensive:** *People aren't going to the shop and buy it, because they're tiny places and people will know that you've bought*

it because you're menstruating ... There's sort of a bit of ... stigmatising or feeling ashamed (research representative #2).

Access to pads can be really expensive at local shops: \$10 a packet ... [depending on] how it's located in the store ... there are cases of women stealing – who would never normally steal – but they're just so embarrassed that they steal pads (Indigenous organisation representative #3).

- **Alternatives are used as MHM products:** *'underwear is another thing that can be used and flushed down ... the local plumbing services say there are a lot of problems with not just tampons being flushed, but various pieces of clothing' (Indigenous organisation representative #3).*

Previous and current efforts have sought to make MHM products available to girls and women more discretely through medical clinics and schools, or in more discrete locations within the local shop. This was described by an interviewee:

Many years ago, the health centres used to give [pads and tampons] out. But it's a cost ... no one's got the money to ... give it away. So, people have to buy it now (research representative #2).

For both the education of and the logistical provision of products, an interviewee described how 'outsiders' to the community can provide a neutral presence that can alleviate the shame that may otherwise arise from interaction on this topic with familiar people:

[Having an external educator on MHM is helpful] not because [they] don't know this stuff, but because it helps having someone neutral and from outside so that [they're] not too shy ... [With] shop purchasing ... depending on who's working at the cash register, if it's a male then it's definitely a no – you just don't buy anything [for MHM] ... So, sometimes, in some instances, having a white fella worker can be really helpful because it's just neutral (Indigenous organisation representative #3).

Effective Case Study 4: Menstrual Hygiene Management

In central Australian Indigenous communities, many women and girls experience challenges to menstrual hygiene management (MHM) products and knowledge, which can impact on their quality of life and also on their ability to access services and opportunities (CAYLUS 2016). In 2015 – 2016, the Central Australian Youth Link-Up Service undertook a participatory based approach with various communities to develop and publish a practical toolkit aimed at enabling MHM and supporting communities and their organisations to develop more girl friendly spaces.

The resulting 'MHM in central Australia' is a resource designed for use by teachers and trusted community members to deliver MHM education, practical solutions and support to girls and women in addressing their MHM needs and challenges at the school, family, and community level. It provides suggestions in a culturally-sensitive manner regarding creating 'girl-friendly' environments and spaces for MHM conversations and education to occur (CAYLUS 2016).

Eye infection (trachoma)

Eye infections, such as trachoma, were detailed in the Introduction, and described by an interviewee:

Australia is the only developed country that has trachoma, and trachoma is mostly in Indigenous communities (NGO representative #1).

Trachoma is transmitted by infected individuals through contact. It can occur in homes and schools, mostly passed through children. Interviewees described how trachoma infections were often viewed by remote community residents as either normal– due to long-term familiarity with the symptoms– or as a lower priority to more acute diseases. These perceptions were described by an interviewee as a challenge to preventive and curative measures:

- **Trachoma perceived as ‘normal’:** *‘it’s really challenging because trying to communicate that having crusty eyes and a snotty nose is not normal when actually in [remote Indigenous] culture it is completely normal ... They will say things like, “When I was young and we were living in camp, ... we always had snotty faces and dirty eyes and Granny would just rip a corner of her skirt and wipe our faces”’ (NGO representative #1).*
- **Trachoma is a low health priority:** *‘trachoma is not a priority to most Indigenous people. They have higher priorities ... rheumatic heart disease, otitis media, Norwegian scabies ... a whole range of diarrhoeal diseases and nits ... So trachoma is down on their list ... because ... they suffer acute health concerns, but also you need at least 150 infections of trachoma to be able to be at risk of blindness ... [Many] are so deeply traumatised with mental issues and drug and alcohol, so trachoma is a tiny little speck in the whole picture’ (NGO representative #1).*

Trachoma is preventable through facial hygiene. The efforts to reduce or eliminate trachoma have included both a clinical (drug-reliant) approach and an environmental health approach. This combination responds to the World Health Organisation (WHO)’s strategy, as described by an interviewee:

The WHO strategy for eliminating trachoma is called SAFE, so S for screening, A for antibiotics, F for facial cleanliness, and E For environmental health (research representative #2).

‘Mass drug administration’ was perceived by one interviewee as having reduced the prevalence of trachoma infection, while others described the ongoing need to reduce dust that irritates and damages the eye and provide washing facilities. This was described by an interviewee:

To stop the spread of a disease like trachoma, you need population-based housing improvements... You need to maintain a sort of a community level of health hardware in a house in order to have an impact on disease transmission (NGO representative #1).

Effective Case Study 5:

The Fred Hollows Foundation Trachoma Elimination Program

The infectious eye disease, trachoma (caused by the bacterium *Chlamydia trachomatis*) is the world's primary cause of blindness and one of 18 neglected tropical diseases – impacting more than one billion people (ICTC 2017).

Australia is the only developed nation listed by the World Health Organisation where trachoma has not been eradicated – and is mainly identified in remote Indigenous communities (Warren and Birrell 2016). Facial cleanliness is connected to reduced incidences of trachoma, and the causal factors relative to unhygienic patterns of behaviour (including access to clean water, issues of overcrowding and awareness) necessitate attention within remote Indigenous communities (Warren and Birrell 2016).

In the 1970s, the incidence of trachoma was prevalent in more than 50% of the Australian Indigenous population. The National Trachoma and Eye Health Program was launched in 1975 by the Fred Hollows Foundation with the aim of eliminating trachoma and preventable blindness in Indigenous communities. Over a two-year period, 27,000 people were treated for trachoma within these communities (FHF 2017).

By raising awareness of eye health issues alongside the screening, diagnosis, and treatment of eye diseases in remote communities and establishing eye care programs and training in rural areas, the success and uptake of this \$1.4 million federally funded initiative was largely attributed to community engagement and Indigenous participation in its implementation. Indigenous field officers travelled in advance of the ophthalmology teams to inform and engage with the targeted communities. The results and benefits of the program were that the incidence of trachoma was halved within the communities visited (FHF 2017).

Despite the success of the initial eradication program, trachoma continues to persist in some remote Australian Indigenous communities. The Foundation continues its efforts on trachoma by working with local partner organisations in communities to both integrate eye care into the primary health care system, and to raise the profile of eye care as a public health issue on a regional and national level (FHF 2017).

Body washing through community swimming pool use

Swimming pools in remote communities were described by several interviewees as a means to increase personal hygiene through body washing:

We recognise the importance of swimming pool installations due to the demonstrated benefits to hygiene, particularly amongst children (water utility representative #1).

Before they go in the pool, the [kids] have got to go through the showers and a squirt of shampoo on their head before they go past (Indigenous organisation representative #2).

However, other interviewees perceived that personal hygiene was not increased by the presence of a pool, as they can be contaminated, are not used all year round, and do not provide hygiene access for those who require the greatest level of hygiene.

Beyond the debate on the contribution of community pools to improving personal hygiene, interviewees raised challenges for pool management, including that the pool is only open during school terms, thus not providing benefits during the holiday season; that there are limited trained lifesavers available for community pool employment; that significant funding as well as trained capacity are required for pool management; and that water resources are often scarce in remote communities. However, pools were also described as providing an important social contribution to communities beyond their hygiene potential. The positive contributions from community swimming pools were described as socially beneficial by providing exercise, relief from extreme temperatures, a reduction in using the household hose to cool down, and for increasing school attendance if the 'no school, no pool' policy is enforced during school terms. One interviewee noted a reduction in alternative and risky swimming behaviours – such as swimming in wastewater treatment lagoons.

An increasingly popular alternative to the challenges with pools is the introduction of 'water parks' with fountains. These were described by an interviewee:

[Water parks] have a couple of benefits: they don't need a lifeguard, so they're more sustainable from a community perspective, but they also are potentially more sustainable from a [water] demand perspective as well (Water utility representative #2).

Improving health-related hygiene behaviours

The conduct of health-related hygiene behaviours in remote communities were described by interviewees as being influenced by cultural considerations, as well as the availability of functioning health hardware within homes. In seeking to implement hygiene-focused health behaviour changes, the interviewees recommended that the 'bigger environmental context' was first fully understood. Their comments reflected the understanding that infrastructure and structural changes were required before any behavioural changes could be expected. The importance of having appropriate infrastructure *before* recommending behaviour changes was emphasised by interviewees from the government, research and non-government sectors:

As a female Aboriginal elder on one of the communities said to me ... "How can we wash hands when we don't have hand basins that work and we don't have showers that work and we don't have the infrastructure?" You can have all these great programs and all these great ads on TV, but if you don't have the basic infrastructure enabling those people to wash their hands, then all you're doing is just basically offending them (Indigenous organisation representative #1).

It's unethical in a way to then ask them to carry out those practices if they don't have the water to be able to do it (NGO representative #1).

Some interviewees mentioned the infrastructural improvements that they had seen, such as sinks in school bathrooms to enable handwashing after toilet use. However, other impacts had created new limitations to hygiene. An interviewee described how a water shortage led to infrastructural impediments to body washing:

[During the drought] they were shipping in all these [water] cartons ... they were 10 litre cartons or something like that, which is extremely inconvenient, of course, if you want to wash (government representative #4).

The structural changes required were often financial. This included the consideration of a price signal to encourage greater water use efficiency (and reduce wastage). Currently, tenants of publicly owned housing do not pay for their water usage, and this was seen by one interviewee as limiting the perceived value of this resource. Another financial aspect, which contrast with the above suggestion, is the high cost of health items, such as soap, toilet paper and feminine hygiene products in the single community shop. The high prices can lead to these items not being priority purchases for residents on government pensions.

Infrastructure changes required before behaviour changes

The way in which many of the interviewees described the interlinkages of hygiene activities on personal and community health can be considered a systems approach to an environmental health issue, as described in the Key Definitions section. This approach was reflected in many comments by the interviewees, including:

There's no point in talking to someone about hygiene if you've got no washing facilities, ... [improving health hardware] makes sure the house ...[is] able to support healthy living and then there's the next step which is actually how you use the house and how you do that (government representative #5).

You can only engineer a solution for so long and then you need to start looking at some of the other factors ... The next stage would be hygiene and the factors that go behind that (government representative #3).

Several interviewees cited data that linked environmental 'health hardware' improvements in the home to reduced community illnesses and improved social wellbeing. This was described by an interviewee:

The feedback we're getting back from council is they ... feel if we can put the [housing, water and wastewater treatment] infrastructure in properly and do that correctly there will be a flow on of social outcomes (government representative #6).

The improvements in community health has also been documented through changes in hospital admissions, in order to provide evidence for the environmental health approach. This was described by two interviewees:

[After health hardware improvements,] we undertook a health outcomes analysis which showed a 40% reduction in hospital admissions from the program ... we looked at gastro, respiratory, skin infection (government representative #5).

By being able to geocode the houses that had had [health hardware improvements], they were able to demonstrate ... a substantial decrease in hospital admissions ... with those houses that had had these very simple things done for them. ... things like making sure the shower worked, the toilet worked, there was a place to store unprepared food (research representative #1).

This systems approach to an environmental health issue is in contrast with the purely 'clinical' approach, which may not consider the broader contextual issues. In particular, the research organisational representatives provided detailed perspectives on the limitations of the clinical approach, including:

The clinicians were looking for a vaccination against scabies ... but the social environmental health officers were looking to make sure that everybody had a washing machine (research representative #3).

The clinical approach ... doesn't actually address the underlying problem, which in most cases are poor construction of housing, overcrowding, those sorts of issues ... Environmental health is rarely seen as the answer, and yet I think that it really is. ... There's some really clear data now that indicates that basic things like a working toilet and a working shower and a working laundry makes an enormous difference (research representative #1).

Despite this support for a systems approach, the clinical model was perceived to be the dominant approach to hygiene-related health problems. This was described by an interviewee:

With the launch of the National Aboriginal Health Strategy, health became less focused on this broader environment in which health happens, to diabetes and cardiovascular disease and renal disease. ... They took the deficit model of ill health, and where the differences were greatest (Indigenous organisation representative #4).

Key health-related behaviour changes

Once the infrastructural aspects have been implemented, the interviewees recommended a focus on improving health-related behaviours in the home. Their recommendations encompassed the three categories of washing laundry, cleaning homes and washing bodies. An interviewee recommended that some of these behaviours should be promoted through health promotion activities, rather than assuming that they will occur once the above infrastructural and structural changes have occurred:

You can have brand new homes, [but] that doesn't necessarily guarantee that people will suddenly raise their personal and domestic hygiene (government representative #3).

On washing laundry, impediments include non-functioning washing machines, expensive laundry detergent, and a lack of regular laundry routines. This was described by an interviewee:

Laundry is a hard one. ... washing machines break very quickly, often because they overload them by putting blankets ... in the wash ... Soap powder is very expensive in the remote communities ... 2kg soap powder costs you like over \$20. ... [Also,] people aren't big on washing [laundry] ... because of the big household ... People don't wash [laundry] every day (research representative #2).

On keeping homes clean, interviewees described the health benefits from clean beds elevated from the floor, and the importance of removing dog faeces from human contact.

On washing bodies regularly, the interviewees described the need to prioritise soap purchasing and use, and to regularly clean faces for optimal personal health outcomes:

- **Increasing the priority of soap purchase:** *'Soap isn't considered to be an essential purchase ... they'll prioritise other items over personal hygiene items such as soap ... [It] really impacts some people's ability to have the necessary equipment to be able to adequately carry out personal hygiene' (government representative #3).*

- **Increasing regularity of face washing:** *'You can go out to communities and you can see those face-seeking flies which are one of the lower kind of transmitters of trachoma coming off human faeces, and crawling all in and out of kids' eyes'* (NGO representative #1).

Culturally engaged health promotion

Prior to engaging with Indigenous people in remote communities on any form of health promotion or education, the interviewees noted that there were three crucial aspects to consider: that there is an enduring trauma from the colonial history, that residents are strongly attracted to live on their traditional land ('Country'), and that the approaches being used in most settings to manage water, sanitation and hygiene are very much 'Western' models:

- **The impact of colonisation** that persists today was described by an interviewee: *'Where I come from and my ideas and what I bring to a community, how I communicate ... A lot more respectful work can happen when that's looked at'* (Indigenous organisation representative #3).
- **The attraction of remote community locations** for residents is to maintain a strong connection to their ancestral (or more recent mission-based) home: *'The fundamental thing is people want to live on Country. Not everyone, [but] – particularly in remote Australia – it's a big thing to live on Country and be close to Country ... That's sort of at that heart of this key issue of providing services to remote areas of Australia for Indigenous people'* (NGO representative #2).
- **The 'Western' models of development** inform the definition of water, sanitation and hygiene services in the current models of delivery to the remote communities: *'You can't ignore the fact that you can provide the hardware, you can teach people to wash their hands and all of that, but at the end of the day it's a Western practice in a Western model that's been inflicted on Indigenous people, and they've been forced to accept it. It kind of assumes that there is no place for Indigenous ways'* (Indigenous organisation representative #4).

The interviewees stated that each remote community has a unique history and diversity – particularly in northern Australia. In addition, many community residents do not speak English as their first language, so communication can create both misunderstanding through translation as well as the dominance of the colonial language, English, being used. Despite these and many other cultural aspects strongly influencing engagement, the interviewees described how few people working in remote communities had the relevant cultural experience – and how difficult it was to 'study' this. This was described by an interviewee:

There's such a lack of education about working in remote Australian communities and there isn't much in place for people to learn. So even if you do Indigenous studies at uni [as I did] ... there was very little to prepare me for remote communities ... People with very little experience and no relationship with the place come in and don't know who they're talking to or are not very reflective about what they're saying (Indigenous organisation representative #3).

The interviewees recommended approaches for working remote communities through partnership with local residents, with a local staff member for most local engagement. This approach was described by an interviewee:

People from the community [are] working on that team ... Their job is they know all the dynamics in the community, they know who can talk to who, who can't talk to who, for either cultural or other kind of reasons. They know all that stuff, they know who doesn't get on and who gets on, and at various times people in the community teams can't go into someone else's house ... they guide us through all of that, they know how it works (government representative #5).

Hygiene and health promotion delivery

In developing and delivering future hygiene-related health promotion messages, the interviewees described the current level of many community residents' hygiene knowledge, existing programs, and recommendations on how to ensure delivery is culturally appropriate, as well as realistic – given the status of functioning water and sanitation infrastructure.

The level of knowledge of community residents regarding hygiene and health was summarised by interviewees as being affected by cross-cultural miscommunication; competing against higher health priorities; and needing to build familiarity with the water and wastewater systems:

- **Cross-cultural communication:** *'[When] trying to talk to community members, people will often just tell you what they think you want to hear' (government representative #3).*
- **Higher-level health priorities:** *'Links [need to be] made to all those other diseases about safe hygiene and effective use of water in the households, [and] how that will have an impact on reducing things like rheumatic heart disease, which [Indigenous Community Workers] are all really concerned about' (NGO representative #1).*
- **Familiarity with installed water systems:** *'The reasoning behind some of [the failures in wastewater treatment like septic tanks] is the lack of education that goes into people using such systems ... Things like not teaching people how best to use them' (government representative #4).*

Existing hygiene education programs named by interviewees included programs on health and hygiene habits, food hygiene, pet management, toilet use, and water literacy:

- **Personal health and hygiene:** *Malpa [Project]... did a program called 'Young Doctors' ... The whole thing [was] about nutrition, but also about hygiene and environment and health ... In the Northern Territory they have 'No Germs on Me' and in NSW [they] have 'Mr Germ' (government representative #5).*
- *The Indigenous Health [Equity] Unit at Melbourne Uni ... do health promotion and education around washing your face (research representative #2).*
- **Food hygiene:** *'[Housing for Health] will measure the temperature of the fridge and freezer because it gives an opportunity to have a discussion with them about food hygiene ... It might be a three or four minute discussion, but it might be the only three or four minute discussion that they have in their life about food hygiene' (identity withheld).*

- **Pet management:** *'There were materials developed up and people would do like outreach stuff in communities just sort of saying, "You can have pets, that's good but they can't sleep in the house, [and] they can't sleep on the same bed as people might sleep on"' (NGO representative #2).*
- **Toilet use:** *'There's a book called The Toilet Book, which is both a bit of a general description about what happens underground, where the wastewater goes, and also some guidance on what does go down toilets and what doesn't go down toilets ... It's just part of the broader [approach to] improving people's understandings of the implications of putting things down toilets that might block them' (water utility representative #2).*
- **Water literacy:** *'[There's the] 'bore to tap' education program' (water utility representative #1).*
- When reflecting on previous and current hygiene and health promotion programs and educators, some interviewees were quite critical with the approach that has sometimes been taken. An interviewee said:
 - *There's quite a lot of colonial punitive thinking around [community development, that]... "People just need to pull their socks up and get their own stuff together"... [External workers might be] well-meaning, maybe, but not necessarily conscious of where [their] thinking is coming from. Or where [their] prejudice is coming from – which might just be not being aware of people's systems and their strengths (Indigenous organisation representative #3).*

In recent years, a more community-centric approach has started to be adopted to amplify the concerns and preferences of community representatives. Two interviewees described these changes:

One of [our state] policies is try and put responsibility for good health management back at a community level as opposed to having it at a state bureaucratic level (government representative #6).

We have a community liaison group who is ... heavily involved with the [Essential Services Officer]. We also have a demand management group who are largely about liaison with the community about ... water (water utility representative #2).

The interviewees recommended that future health promotion should firstly identify existing programs – and build on the successful aspects of them, should ensure messaging is culturally appropriate and respectful; and should include messages that are effective. These are described by interviewees in the quotes below:

- **Build on successful previous and existing programs:**

I would urge caution to those that seek advocacy to be most respectful and understanding of what's already in place ... Take the time to understand what has been invested and what is being invested – before you jump in (government representative #1).

[There are] Indigenous community workers based in the clinics, who live and work in the communities, so we buy some of their time, we top up the salary of the coordinator [to add hygiene promotion activities] (NGO representative #1).

- **Create culturally appropriate messages from an Indigenous perspective:**

Be relevant: *'[creating] awareness for providing something that they have no access to any of the things that they're being informed about ... just becomes an abstract, [an] impossible thing ... [we need] less education which is not adequately informed ... [it's a problem when] resources and educational materials which are created far from the existing systems and infrastructure used and accessed by the people receiving said 'education' (Indigenous organisation representative #3).*

Be respectful: *'it's easy to fall into messaging that is heard as another white person telling them their kid's face is dirty when they can't see any dirt and therefore, again, they are a bad parent, they are not good enough – that kind of thing' (NGO representative #1).*

- **Ensure key effective aspects to hygiene and health promotion:**

Avoid messages that 'blame': *'There can be sensitivity with Indigenous people when there might be some inference that, somehow, they're not educated or they have unclean habits' (government representative #1).*

Focus the promotion on women: *'[My priority to change is] educating women in communities, because in many ways they bear the main responsibility for children and present that understanding of hygiene' (government representative #6).*

- **Deliver the hygiene promotion across all possible agencies:**

Hygiene promotion [is] ... fragmented across the Health Department ... [Department of] Housing ... [we need to] strategically bring these different groups together with what [the] community needs are – to roll out aspects of hygiene and hygiene promotion ... [Otherwise] we just seem to not gain traction on that issue from just one agency's perspective (government representative #3).

We share all our resources through the national Working Group on Indigenous Torres Strait Islander Environmental Health (government representative #5).

SUMMARY OF FINDINGS

This scan sought to identify existing gaps where Australians are not able to access adequate WASH services – to identify areas of action to attain UN SDG 6 for all. The findings of this scan can be most effectively summarised as being contingent on four ‘concentric’ layers within a system. This is illustrated in **Figure 2**. The Figure identifies that healthy behaviours in the home are influenced overwhelmingly by the layer regarding of population size in the home – and the effects of overcrowding. In turn, the functionality of the health hardware influences whether the house’s residents can routinely perform these desirable health behaviours. Surrounding the inner layers is the availability of water and wastewater services to the community. These four, interlinked levels of WASH services operate in the context of two important foundations: a strong desire to live on traditional ‘Country’ in these remote settings, and the persistent traumatic legacy of colonisation – which continues to offer Western-style solutions and services.

This Figure is presented with examples of effective contributions that have enhanced the WASH status at each of these layers: some government programs are continuing to fund long-term and well-maintained water and wastewater treatment services (see Case Study 1); other government programs are providing health hardware repairs and upgrades in communities (see Case Study 3). To reduce the prevalence of overcrowding, new housing is being built in communities that are at capacity populations. At the central layer of the Figure, health promotion efforts to increase hygiene-related healthy behaviours have been introduced (see Case Studies 2, 4 and 5).

‘Cracks in the system’ that affect WASH status at each of these layers are also included in this Figure. At the water and wastewater service layer, self-certification in some jurisdictions can enable substandard work. At the layer of health hardware, existing homes can be old, poorly maintained and/or have cheap infrastructure that does not function; hygiene-related whitegoods such as washing machines may not function. At the house population level, overcrowding appears to be chronic in many communities, with regular mentions of up to 20 people in a three-bedroom home. At the central layer of healthy behaviours, the cost, access and availability of items such as soap, toilet paper and feminine hygiene products often remains prohibitive. The importance of taking this systems approach to understanding the interlinkages between each of these four layers was described by an interviewee:

[It's about] being respectful and having some knowledge about what the issues are that people face ... being gentle around why it's hard to have toilet paper in your house all the time and have soap in your house all the time. It's not about blaming people, it's about finding a way and prioritising what's the most important thing to do and again helping with access to that (Indigenous organisation representative #3).

In providing this WASH scan, the intention is to make explicit the challenges requiring attention and to propose questions to stimulate discussion as to how various stakeholders can respond to these challenges. These challenges and questions are guided by examples of initiatives that have improved WASH services and behaviours that are detailed throughout this paper. As can be viewed by the length of the featured text at the start of each section within the issues section, the ‘H’ (hygiene) part of the WASH acronym has the greatest number of current challenges. This is despite the dominant focus on water and sanitation in SDG 6, where hygiene is a subset of the sanitation target of SDG 6.2 (UN 2015). Furthermore, hygiene was absent in the earlier Millennium Development Goal Target 7.3 to ‘halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation’ (UN 2013).

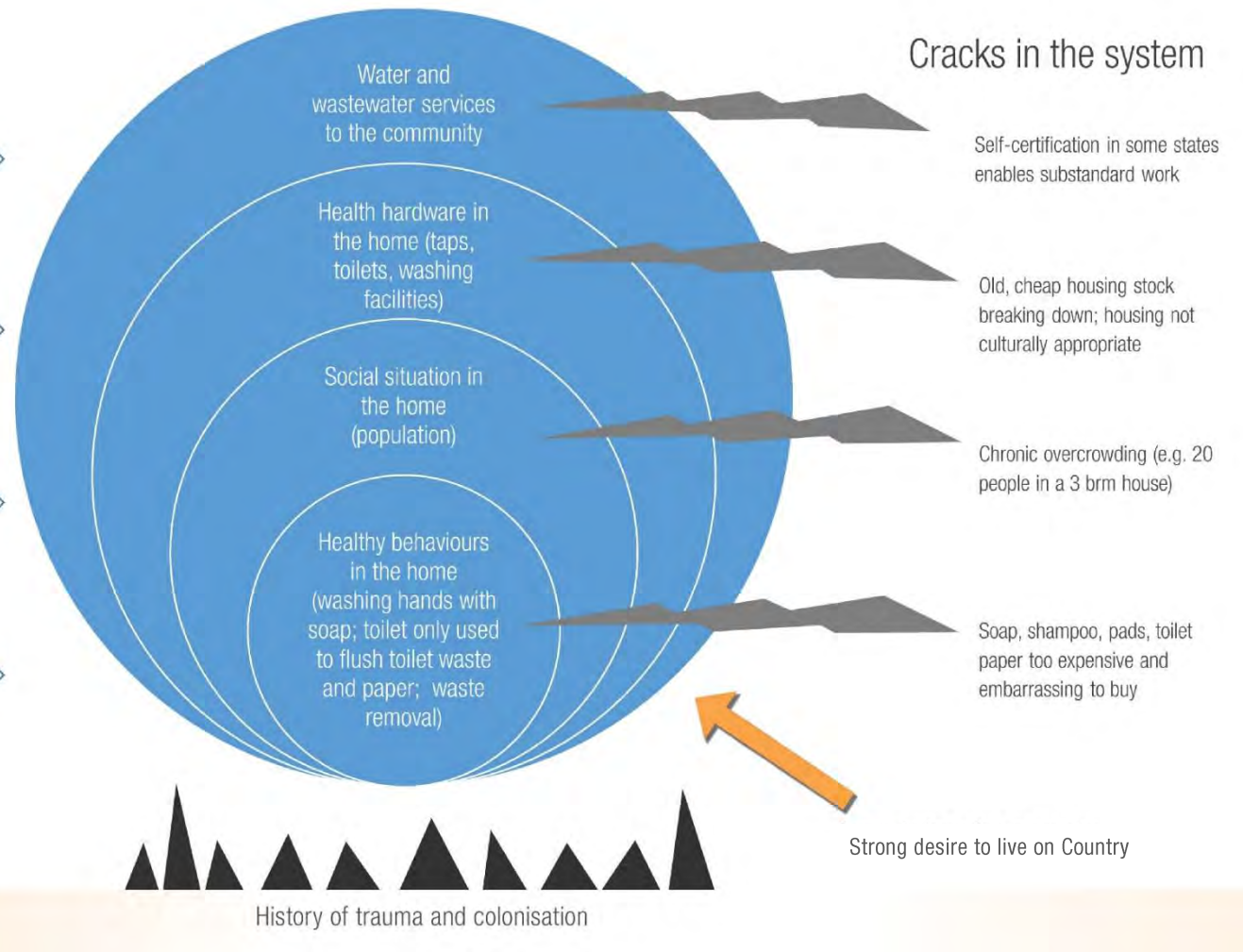
Effective contributions

Some government programs provide well-funded, long-term service delivery; some utilities provide high-quality, well-maintained services

Some government programs provide regular and thorough health hardware maintenance to whole community

New housing being built in growing communities

Culturally and situationally-appropriate health promotion and education- to complement other layers



ACHIEVING UN SUSTAINABLE DEVELOPMENT GOAL 6 IN AUSTRALIA

This scan of water, sanitation and hygiene status in remote Indigenous communities was undertaken within the context of the United Nations' Sustainable Development Goals (SDGs) – especially SDG 6. The interviewees were all asked whether their services were informed by, or revised since, the introduction of the SDGs in late 2015. Very few of the interviewees were familiar with the SDGs, and none of their organisations had changed their policies or programs since the SDGs were launched. Interviewees from state and territory government agencies did note that their jurisdictional level is not directly influenced by the UN – unlike the Australian Government. Instead, their agencies responded to legislation that is influenced by national-level policies, and this would ultimately relate to UN-level ambitions. For example, two interviewees stated:

[My work is involved with the SDGs] indirectly in terms of ensuring compliance with the Australian Drinking Water Guidelines– which are based upon the WHO guidelines and enshrined in [state government water legislation] (water utility representative #1).

The legislation I'm operating under came into play in 2009, so it's only when that legislation gets reviewed or changed that it would probably pick up anything that's common under some UN declaration (government representative #6).

The interviewees expressed an openness to know more about the SDGs, and they desired guidance on how such goals could be implemented on-ground. When considering them, several interviewees saw value in the SDGs leveraging political attention to water, sanitation and hygiene services in remote communities. An interviewee summarised this as:

I think the Australian Government... has a big interest in [SDG 6 in Indigenous communities] in many ways, because it is ultimately the Prime Minister who reports on 'Closing the Gap' on meeting the needs for the health and equity for Indigenous people (government representative #1).

Some final key observations that summarise the need and pathway to best delivery of these WASH services in remote Australian Indigenous communities within the context of SDG 6 were provided by the interviewees. These refer to an intention to discontinue the current low WASH status that has been documented over the past several decades. Instead, they call for an increased ambition for WASH status in these remote communities, and to conduct all future WASH initiatives through in-community partnerships. These are described with quotes from interviewees:

- **Address and action – rather than continue – the 'familiar story' of poor water, sanitation and hygiene standards in remote communities:** *'This is not new stuff. You know, you can look back and do some research for decades and what I'm telling you today is what was being said 20 years ago, so it's not like any of this is new' (NGO representative #1).* This comment in part refers to the 'UPK' report from Healthabitat in the 1980s that recommended public and environmental health aspects should be prioritised through the nine 'health living practices' (NHC, SAHC et al. 1987).

- **Raise expectations for WASH services in remote communities:** *‘What you find is, non-Indigenous people who go out to communities quickly lower their expectations to what’s the prevailing norm. ... we get nurses who ... go and work in a remote community and when they get to the clinic, they say, “Why how wonderful! Where I worked in Indonesia, we didn’t even have some monitors.” [But] you have to say, “Hang on, that’s the wrong benchmark. You’re in Australia now, so the benchmark ... is an urban [clinic] in Darwin or Sydney, not a clinic at the back of Jakarta”’* (research representative #2).
- **Take time to create the right partnerships:** *‘Look, to make something like this work, it takes some years to listen and to see what’s happened, and to survey the conditions. ... We brought together a working group that included Indigenous community representatives, Indigenous organisations ... all the interested government agencies and all levels of government ... [The long lead time] provided a case for change. It provided the time to document the need and to develop a course of action that would address the need. [and also] there’s certainly relationship-building’* (Identity withheld). This comment corresponds to the observations and recommendations featured throughout this scan from a number of interviewees for a cross-agency collaboration on initiatives that address all four layers of interlinked WASH issues detailed in **Figure 2**.
- **Enable hygiene-related health behaviours through providing appropriate infrastructure and funding, and through collaborations between relevant organisations:** *‘[Hygiene] is to do with people’s behaviour, but it’s also to do with the infrastructure that’s provided before behaviour sets in. You need to be careful about where the blame goes’* (Research representative #3). This comment references the importance of functioning health hardware in homes.

Additional research and capacity-building may be required to progress these findings to policy responses and actions. For universities, quantitative research and ongoing monitoring can continue to quantify problems, identify tested solutions and further inform policy and program development to assist to inform the above questions. For international non-government organisations specialised in WASH, they could consider collaboration with Aboriginal organisations to effectively address WASH challenges– especially regarding hygiene-related health challenges. For state and territory governments, research funding may need to be invested to increase the range of innovative, interlinked options to improve the status of WASH in remote Indigenous communities. For the Australian Government, funding could be extended to enhance approaches for data collection to provide an evidence base for improvements in WASH in remote Indigenous communities.

Throughout this discussion paper, key questions for consideration by national, state and local government policymakers, health organisations, water utilities, and others have been posed. The authors of this discussion paper welcome the opportunity to engage on these questions to create collaborative, long-term, high-impact improvements in remote Indigenous communities– and thus respond to the UN Sustainable Development Goal 6 of ensuring water and sanitation (and hygiene) for all.

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