



**Cooperative Research Centre  
for Aboriginal Health**

***Framework for Research on Aboriginal  
Health and the Physical Environment***

**Final Report**

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## Chapter 7: Framework for Research on Aboriginal Health and the Physical Environment

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### Executive summary

The Cooperative Research Centre for Aboriginal Health (CRAH) has identified environmental health and health-related infrastructure as priority areas for research. The aim of this project is to provide a framework that will assist in the development of a focused and strategic research program in the area of Aboriginal health and the physical environment.

The research framework was developed through a survey of CRAH partner organisations and other stakeholders involved in research or service delivery in the area of Aboriginal health. The aim of the survey was to identify current and future research interests and elicit views on how research into the physical environment and Aboriginal health could make a meaningful contribution to policy, planning and the delivery of services. A review of the published and unpublished literature on the physical environment and Aboriginal health looked at research that has been conducted to date and pointed to gaps in activity and knowledge.

The survey findings were categorised into three broad areas of research, and respondents ranked these categories closely. The categories were:

- A)** research that enhances our understanding of Aboriginal people's perceptions and behaviour in relation to the physical environment;
- B)** research aimed at understanding the determinants, outcomes and relationships between environmental factors and health outcomes; and
- C)** research that enhances the development and assesses the impact of programs and interventions.

Category A research was given the highest priority by CRAH industry partners. In contrast to this, respondents from research organisations nominated Category B as the top priority.

The current research activities reported in the survey showed that most of the research related to the physical environment is being conducted in the area of housing. There are also projects underway in the areas of hygiene, water supply,

migration and the environment in a broader sense. The majority of these research projects were consistent with the research priorities identified in the survey and the review of the literature.

The review summarised research in each area of the physical environment and highlighted recommendations for research identified in the literature. It encompassed: environmental health, the urban environment, housing, maintenance, crowding, hygiene, water supply, waste disposal and drainage, swimming pools, dog health, roads and transport, energy, communication, climate and temperature, dust, pests and feral animals, land management, food supply, environmental health workforce, and trauma.

The survey and review found that research priorities should be in the urban environment, housing and areas directly related to housing, and water supply and sanitation. Many of the interventions reported in the literature are not based on either good evidence or good knowledge of Aboriginal people's perceptions and needs. This points to the importance of setting research priorities based on existing Category B evidence, and further investigating Aboriginal people's perceptions and needs in order to develop health strategies and actions based on Category A research.

The proposed research framework is based on the three categories of research in each identified area of the physical environment. Because of the complex nature and the multiple factors that influence each component, it may be useful to take an ecological approach to research in Aboriginal health and the physical environment. The ecological approach is guided by appropriate causal concepts based on universal laws (Category B), with the realisation that health and disease are mediated by specific social behaviours at the individual, population and global level (Category A). The best hopes for

making an impact through interventions (Category C) in any of the areas identified in the framework rests upon a coherent strategy that is based on sound research in both Categories A and B. The importance of a more holistic approach to research is evident in the high priority placed on all three categories in the survey and on the expressed need to take a multi-disciplinary approach to research.

The research framework is intended as a guide to setting research priorities for the CRCaH in the area of Aboriginal health and the physical environment.

## Background

The importance of the living environment, particularly housing, for the health of populations has been well established in the public health literature over the past 100 years.<sup>1</sup> There is an increasing body of evidence showing an association between housing quality and morbidity from infectious diseases, chronic illnesses, injuries, poor nutrition, and mental disorders.<sup>2</sup> The NHMRC, through the Aboriginal and Torres Strait Islander Research Agenda Working Group (ATSIRAWG) Road Map, has clearly identified the requirements for a healthy environment and lifestyle that are missing from many communities. These include housing, clean water, sewerage and safe surroundings.<sup>3</sup>

The CRCaH has thus identified environmental health and health-related infrastructure as priority areas for research. The significance of housing and the physical environment as a determinant of health, and the relatively undeveloped state of local and international research in this area, attests to the potential impact of a strong research program. This project aims to provide a focused research framework for Aboriginal<sup>4</sup> health and the physical environment.

<sup>1</sup> D. Mara & G. Alabaster 1995, 'An Environmental Classification of Housing-related Diseases in Developing Countries', *Journal Tropical Medicine and Hygiene*, vol. 98, no. 1, pp. 41–51; T. Agbola & O. A. Akinbami 1995, 'Housing and Health Characteristics: An epidemiological study of a tropical city', in B. Folasade Iyem, Y. Verhasselt & A. Hellen (eds), *Health of Nations: Disease, Medicine, and Development in the Third World*, Ashgate Publishing Ltd, Aldershot, UK; M. Shaw, M. 2004, 'Housing and Public Health', *Annual Review of Public Health*, vol. 25, pp. 397–418.

<sup>2</sup> J. Krieger & D. Higgins 2002, 'Housing and Health: Time again for public health action', *American Journal of Public Health*, vol. 92, no. 5, pp. 758–68.

<sup>3</sup> Aboriginal and Torres Strait Islander Research Agenda Working Group of the National Health and Medical Research Council (NHMRC) 2004, *The NHMRC Road Map: A Strategic Framework for Improving Aboriginal and Torres Strait Islander Health through Research*, NHMRC, Canberra.

<sup>4</sup> We use the term Aboriginal to represent Aboriginal and Torres Strait Islander peoples in this review.

## Methods

The research framework was developed through:

1. A survey of CRCAL core and associate partners in order to:
  - elicit views on how research into the physical environment and Aboriginal health could make a meaningful contribution to policy, planning and the delivery of effective and efficient services;
  - identify current and previously unreported work carried out by relevant CRCAL partners; and
  - identify current and future research interests in the area of the physical environment and Aboriginal health.
2. A review of the published and unpublished literature on the physical environment and Aboriginal health.

## Survey

Contact was initially made with the 'link' people in all CRCAL partner organisations. They were asked to identify individuals in their organisation with an interest in Aboriginal health and the physical environment. CRCAL's intranet email contact list was then used as a basis for circulating the survey to a wide range of stakeholders across Australia. A survey questionnaire was drawn up that asked respondents:

- to list research priorities in order of importance;
- to identify documents that contributed to their rationale;
- to describe the basis on which they had listed the priorities;
- to outline the nature of their interest in this research;
- to provide a description of their planned, current or funded research in this area;
- to identify any publications they have authored that are relevant to Aboriginal health and the physical environment; and
- to identify any additional literature that they see as important to this area of research.

A preliminary analysis of the survey led to the identification of three major themes, or categories, within which the specific research topics could be grouped. The preliminary findings were then disseminated through the original contact list. Recipients were requested to complete a second survey which asked them to:

- prioritise the three listed categories;
- indicate the top three research topics within each category;
- identify any gaps in the preliminary findings; and
- provide additional comments.

The analysis of the second survey involved counting the number of respondents who identified each category as the first, second or third priority. Once the categories had been prioritised, the topics within each category were assessed by counting the number of times each topic was listed as a first, second and third priority. A summary table was drawn up to assess which topics received the most number of nominations for each priority ranking. This provided an overview of the survey findings for all respondents.

Further analysis was conducted to compare the priorities of CRCAL partner versus non-partner organisations, and

service providers versus research institutions. To this end, the respondents were divided into four groups: CRCaH partners involved in research; CRCaH partners involved in service delivery; non-partners involved in research; and non-partners delivering services. The above method of analysis was then followed for each group. From the summary table comparisons were drawn between all respondents belonging to research organisations and those who were service providers. There were also comparisons drawn between partner organisations and non-partner organisations.

The gaps in research priorities identified by respondents were listed and additional comments summarised so as to draw attention to areas that were not highlighted in the original survey.

## Literature review

The literature review on Aboriginal health and the physical environment commenced with a broad reading of the literature on environmental health in the Indigenous Australian context. The main aspects of environmental health were identified and grouped into the following three categories:

**1. The built environment**, that is, all aspects of the environment that are constructed by humans. The built environment encompasses housing, water supply, communication, transport, roads, drainage, waste disposal, energy and swimming pools.

**2. The natural environment**, that is, the surrounding environment in which people live. Humans have an influence over the natural environment, but are not always responsible for direct modification and control. The natural environment includes climate, temperature, land management, pest and feral animals, dust and dog health.

**3. The social environment**, in this instance, refers to the human relationships that mediate the health outcomes resulting from the built and natural environments. These include social capital,<sup>5</sup> environmental health workforce, crowding, maintenance, food supply, trauma and hygiene.

This structure allowed environmental health to be approached broadly by including the immediate living environment as well as the surrounding natural environment. It also allowed consideration of the social processes that are both a product of and an influence on the built and natural environments.

A review of the literature was conducted for the subsections in each category. A search of the in-house database at Menzies School of Health Research, Darwin, was conducted initially to pick out any relevant literature that had already been collected. A search of the electronic databases PubMed and APAIS, as well as the Charles Darwin University library catalogue, was then carried out using a mixture of the following keywords:

- Subsection keyword (i.e. housing, water supply, climate)
- Health
- Aborigin\*
- Indig\*
- Remote
- Australia

A broad search of each subsection was refined until a manageable number of relevant search results were obtained. The articles that were applicable to the topic of Aboriginal health and the physical environment, both in the urban and rural/remote context, were entered into a standard bibliographic database. Review articles pertaining to the same topic in similar contexts internationally (i.e. New Zealand, Canada and America) were also included. References that were identified as important in the survey were also added to the database.

Due to the small amount of literature on environmental health in the urban context, a further search was done of APAIS and PubMed, using the keywords Urban, Health and Aborigin\*.

<sup>5</sup> Social capital is an important aspect of the social environment, and there is a growing literature on social capital and health (e.g. I. Yen & S. Syme 1999, 'The Social Environment and Health: A discussion of the epidemiologic literature', *Annual Review of Public Health*, vol. 20, pp. 287–308. Another group in the CRCaH is reviewing this literature in the context of the social determinants of health.

## Findings

### Survey

#### Overall ranking of research priorities

There were sixteen responses to the first survey. A thematic analysis of the research priorities showed that the identified topics fell into three broad categories. These were:

**Category A:** Research that aims to enhance the understanding of Aboriginal people's attitudes, perceptions, values and behaviour relevant to health and the physical environment.

**Category B:** Research that aims to enhance the understanding of the determinants, outcomes and relationships between environmental factors and health outcomes.

**Category C:** Research that aims to enhance the development of, and assess the impact of, programs and interventions.

There were five specific research topics identified under Category A, ten topics under Category B, and twelve under Category C. The second survey generated twenty-seven responses. An analysis of all responses to the request to prioritise the three categories revealed that they were ranked closely.

Within Category A the top three research priorities were:

- 1) prioritisation and definitions of need;
- 2) the use of housing by Aboriginal people; and
- 3) Aboriginal people's conceptions of the physical environment and public space.

Other lower ranked priorities included hygiene and the effect of dispossession and grief on the perceptions and use of public space.

Within Category B the most important research priorities were considered to be:

- 1) understanding the environmental influences that promote a healthy start to life;
- 2) location and context and how these affect access to health services; and
- 3) research into the environmental influences on lifestyle, for example, smoking, obesity and physical activity.

This third preference was followed closely by environmental influences on alcohol and other drug use. Other priorities, in order of preference, were environmental influences and infectious disease, water quality and quantity, environmental influences and nutrition, the health of the ecosystem, environmental influences and injury, dust and air pollution.

The three most highly ranked research priorities within Category C were:

- 1) self-determination, community control and capacity development interventions relevant to the environment and health;
- 2) broad health/public policy approaches relevant to the environment and health (e.g. healthy settings approaches that address air, water, shelter, sanitation, chronic disease, schools, mental health); and
- 3) strategies to overcome structural barriers to environmental health improvements, including political and economic barriers.

Other research priorities in this category included, in order of nominated preference, behaviour change and skills development, basic infrastructure and related technology, effect of infrastructure aimed at improving child and youth health, workforce initiatives, housing management systems, economic analysis, methodological issues and research capacity, information systems and 'caring for country' programs.

#### Gaps in the research priorities

Respondents to the second survey identified a number of specific gaps in the research priorities listed under each category. In Category A, the effect of land ownership by some, as opposed to no land rights by most, was thought to warrant further investigation. In Category B, it was suggested that research into the physical environment, social capital and connectedness was required. Four gaps were identified

within Category C, the most frequent relating to information. Although there was an existing topic of information systems, the issue of information access and feedback was considered sufficiently different to warrant separate inclusion. The gap in research in the urban context was highlighted. While location/context in Category B encompasses this, it is important to note that research priorities may be different in these diverse areas. The other two gaps were individualism versus collectivism and leadership within the community.

Some respondents also provided additional comments in the second survey. These comments strongly promoted a trans-disciplinary approach to research, involving social scientists, physical environment specialists and health professionals. This should allow for an equal emphasis on qualitative and quantitative data. There was also a strong call to focus on issues that are context and location specific. It was further noted that the influence of the wider community should be taken into account in order to explore ways in which the council, health centre, community store and wider political environment impact on health. Cultural rationality and human

rights were highlighted as potential approaches that could be used to determine research priorities into Aboriginal health and the physical environment.

### Ranking of research priorities by organisation

A further analysis of the second survey was conducted to compare the views of CRCAH partner organisations and non-partner organisations. Table 1 classifies the organisations that responded to the survey, and provides an overview of their responses.

There were seventeen responses from partner organisations and ten responses from non-partner organisations. The categories were ranked closely by both groups. The priorities ranked within each of the categories were also similar for both groups and consistent with the overall ranking of research priorities.

Further analysis was conducted to compare the results from service providers and research organisations. There were fifteen respondents from service provider agencies

**TABLE 1: Survey response by type of organisation**

Organisation type	CRCAH partner	Non-partner	Category ranking
Research organisations	Flinders University Menzies School of Health Research LaTrobe University University of Melbourne Australian Institute of ATSI Studies University of Queensland	Australian National University	Priority 1 = B Priority 2 = C Priority 3 = A
Service organisations	Aboriginal and Torres Strait (ATSI) Services Department of Health and Community Services (NT) Department of Community Development, Sport and Cultural Affairs (NT) Department of Education, Employment and Training (NT) Department of Health and Ageing (Commonwealth)	Department of ATSI Policy (Qld) Wide Bay Division of General Practice (Qld) TAFE (Qld) Mawarnkarra Health Service Aboriginal Corporation (WA) Thursday Island Coordinating Council (Qld) Department of Health and Human Services (Tas)	Priority 1 = A Priority 2 = C Priority 3 = B
Category ranking	Priority 1 = A Priority 2 = C Priority 3 = B	Priority 1 = B Priority 2 = A Priority 3 = C	Priority 1 = A Priority 2 = C Priority 3 = B



**TABLE 2: Current research activities reported by CRCAH partner organisations**

Category A:	Category B:	Category C
Understanding Aboriginal people's perceptions and behaviour	Relationship between the physical environment and health outcomes	Developing and assessing interventions
<ul style="list-style-type: none"> <li>• Water supply and use in Aboriginal communities in South Australia.</li> <li>• Living along the Murray: Nunga perspectives.</li> <li>• Living along the lower Murray River and Coorong: Nunga perspectives.</li> <li>• Feedback of information from the Community Housing Survey.</li> <li>• Indigenous mobility in discrete and rural settlements.</li> <li>• Analysis of Indigenous migration from 2001 census data.</li> </ul>	<ul style="list-style-type: none"> <li>• The living environment, child health, human rights and public health legislation.</li> <li>• 2006 Community Housing and Infrastructure Needs Survey (CHINS).</li> <li>• Water supply and child health.</li> <li>• Input to, and review of, the Indigenous Disadvantage Reports.</li> <li>• The Hygiene Study: childhood infectious disease in remote Aboriginal communities in the NT.</li> <li>• Socio-economic and Environmental Determinants of Health in NT Aboriginal Communities (SEEDH).</li> </ul>	<ul style="list-style-type: none"> <li>• Housing needs analysis.</li> <li>• Research into the design of kitchens and wet areas.</li> <li>• Review of national framework for design, construction and maintenance of Indigenous housing.</li> <li>• Do housing infrastructure improvements reduce child exposure to bacterial pathogens?</li> <li>• Housing Improvements and Child Health (HICH).</li> <li>• Improved hygiene measures for reducing skin, respiratory and diarrhoeal illness in Aboriginal children: a randomised control trial.</li> <li>• Microbial outcome measures for evaluating the impact of hygiene interventions on Aboriginal child health.</li> </ul>

and twelve from research organisations. Service providers showed a clear preference for research on Aboriginal people's perceptions and behaviour (Category A), while this was the third priority for research organisations. The association between environmental factors and health outcomes (Category B) was given top priority by research organisations, but was third preference for service providers. CRCAH industry partners rated Category A research particularly high.

It is interesting to note that CRCAH partners involved in service delivery identified most of the gaps listed above. Most of the additional comments were provided by CRCAH partners, particularly respondents from research organisations.

### Current research activity

The first survey asked respondents to provide a description of their planned, current or funded research in the area of Aboriginal health and the physical environment. There were nineteen current research activities reported by CRCAH partner organisations (Table 2).

Table 2 shows that current reported research into Aboriginal health and the physical environment is evenly spread across Categories A, B and C.

### Literature review

To date, Australian research into Aboriginal health and the physical environment has focused on establishing associations between various aspects of the environment and health outcomes (Category B), and then developing and evaluating the impact of interventions to reduce



associated morbidity and mortality (Category C). However, while there is currently a significant gap in Category A research, there is a slow but growing recognition that the development of successful programs and interventions requires an understanding of Aboriginal people's world view and behaviour. There were specific areas in the literature review where gaps in knowledge surrounding Aboriginal perceptions were identified. These areas included research on water supply, waste disposal, swimming pools, the urban environment, energy, trauma and hygiene. Despite this, the recommendations for research stemming from the literature review continued to focus on Category C research.

## Discussion

### Comparing survey and literature review findings

#### **Priorities identified through the survey compared with those identified through the literature review**

The most striking difference between the survey and the literature review was the priority given to research that enhances the understanding of Aboriginal people's attitudes, perceptions, values and behaviour relevant to health and the physical environment (Category A). To the survey participants, this type of research was as important as that which aims to enhance the understanding of the relationship between environmental factors and health outcomes (Category B), and research that aims to enhance the development and assess the impact of programs and interventions (Category C). CRCAH industry partners rated the need for more investigation of Aboriginal people's perceptions and behaviour particularly highly.

The literature review, on the other hand, revealed a significant gap in Category A research and provided few recommendations for further research in this area, focusing instead on further research into the development and assessment of interventions (Category C). The only exceptions to this were found in research into water supply, waste disposal, swimming pools, the urban environment, energy, trauma and hygiene, where a few researchers acknowledged that an understanding of Aboriginal people's values, priorities and actions could be used to inform and develop more effective health strategies.

A comparison of the literature review and survey also highlights some important considerations regarding future research into specific aspects of the physical environment. The limited research into Aboriginal health in the urban environment appears to be of particular concern given that the majority of the Aboriginal population lives in urban areas. Unlike research in remote areas, the studies conducted in urban settings have focused more on perceptions and behaviour in relation to the physical environment, and there have been few documented interventions. This points to a significant need for further research into environmental health in the urban context.

Housing and the maintenance of houses, particularly in remote communities, has received a substantial amount of attention in the Australian literature. The research priorities highlighted by international reviews on housing and health suggest that further research is required into the precise mechanisms by which housing affects health. On the other hand, the Australian literature has prioritised interventions, based on the assumption that the health–housing connection does exist. If adequate housing is one prerequisite for health, then there is a need for effective strategies to ensure that Aboriginal people have access to safe and affordable housing. Effective strategies are likely to be those based on a good understanding of Aboriginal people's priorities, needs and use of houses. Therefore, it is important that these needs and behaviours are explored in the first instance and are used to inform appropriate housing programs.

It has been difficult to establish a causal association between crowded living conditions and poor health outcomes. Further research in this area was not seen by survey respondents as a priority, neither was research into interventions to change behaviour. There is a perceived need, however, to look at ways in which housing and the wider environment can better meet the needs of Aboriginal families. Although this has been recognised for more than two decades, there seems to have been little action taken.

Hygiene is an important health issue at the interface between housing and people. Both the literature and the survey results indicate that research efforts in this area should be focused on Aboriginal people's perceptions and behaviours in order to change the approach to interventions. Previous attempts at teaching people a different way of thinking have been relatively ineffective, therefore, a stronger emphasis on skills development rather than behaviour change would appear appropriate.

There has been a relatively large amount of literature on the technical aspects of liquid waste disposal in remote areas. This is in stark contrast to the lack of importance placed on solid waste disposal. Given that solid waste is a prominent and visual problem in many communities it is interesting to note the lack of research and interventions in this area. Only one study was identified that looked at Aboriginal people's perceptions of solid waste and this research did not extend to recommendations for interventions. Considering the mainstream unacceptability of solid waste pollution, it would seem that there may be considerable benefit from research into programs and interventions aimed at reducing solid waste pollution in the environment. It is interesting that this was not reflected in either the literature or the survey findings.

There has been a lot of attention given in recent years to dog health programs in remote Aboriginal communities. Yet a substantial amount of research attempting to link dog health with human health has failed to show a clear association. Dog programs designed to improve human health may thus be a waste of health resources. Addressing the underlying causes of human ill-health is more likely to show long-term benefits for both dogs and humans than addressing dog health in isolation.

Energy is an issue that deserves further consideration, as it facilitates many healthy living practices such as cooking and storing food, having hot water to wash, controlling temperature in the home, and enhancing general safety and functioning after dark. Technical energy supply issues have been dealt with in the literature, but there seems to be a lack of information around the use of electricity by Aboriginal people. Research in this area could, therefore, be of benefit.

Nutrition is at the core of human health. There are myriad social issues around food and its supply that require exploration in order to understand Aboriginal people's perceptions and behaviour, and to use this knowledge to develop interventions. However, the social aspect of food is outside the scope of this review. Food in relation to the physical environment is intimately linked with other areas such as energy, water supply, housing and waste disposal. Therefore, research into these areas will have a flow-on effect and may have benefits for food supply, storage and intake.

Within the survey, social issues of trauma were highlighted primarily in terms of domestic violence and alcohol use. Although this is not directly related to the physical environment, it is important to note that these issues were raised and continue to be a concern for many people involved in Aboriginal health.

Notably, there is only a small amount of literature linking health with roads and transport, communication, climate and temperature, dust, and pests and feral animals. These areas were also not given priority by survey respondents. This is not surprising given the magnitude of health problems associated with the more important aspects of the physical environment. In the future, as broader health issues are resolved, these areas may become increasingly important.

### **Research activity compared with identified priorities**

The first questionnaire asked respondents to provide a description of their planned, current or funded research in the area of Aboriginal health and the physical environment (see section 'Current research activity'). When these research activities were mapped against research priorities identified in the survey it showed that current research activity was being conducted equally across categories A, B and C. This is consistent with the close ranking that the three categories received in the second survey.

There was noticeably more research being conducted into housing than any other area, with seven studies underway at the time of the survey. The review identified research into effective health hardware and housing technology as a priority and two current research activities in this area were reported in the survey: research into the design of kitchens and wet areas, and a review of the national framework for design, construction and maintenance of Indigenous housing. The literature also identified a need for longitudinal studies evaluating housing interventions, while the survey identified two current studies examining housing improvements in relation to bacterial pathogens and child health.

Management systems relevant to housing and the community were nominated as fifth priority in Category C. In relation to this priority, there is current research into the feedback of information from the Community Housing Survey. The first Category A priority identified by the survey was prioritising and assessing needs in Aboriginal communities. Two research projects addressing this area were reported: the housing needs analysis, and the Community Housing and Infrastructure Needs Survey (CHINS). Environmental

influences and a healthy start to life was nominated as the top priority for research in Category B, with research in this area involving a study into the living environment, child health, human rights and public health legislation.

Three research projects on hygiene were reported, each focusing on child health in relation to hygiene, consistent with the top Category B research priority—environmental influences and early life.

Three research projects considered the environment from a broad perspective, with two of them examining Nunga perspectives consistent with the priorities outlined in Category A. The third, on socio-economic and environmental determinants of health in Aboriginal communities, encompassed all of Category B, and was, therefore, in line with priorities identified by survey respondents.

There were two studies on water supply identified by CRCIAH partner organisations: a study on water supply and use in Aboriginal communities, identified as a Category A priority in the survey; and a study on water supply and child health, identified as a top priority in Category B, as it examines the environmental influences on child development.

There are two studies identified by CRCIAH partners that do not fit neatly within the priorities identified in the survey or those highlighted in the literature. Both of these studies focus on Indigenous mobility and migration.

Current project activities identified in the survey tend to be consistent with nominated research priorities, with a strong focus on housing in both the literature and projects. This indicates that although housing is important, there is definite scope to expand future research into other areas associated with the physical environment.

## Limitations of the methods

The scope of this review, as well as time and budget constraints, limited the depth of information and analysis on specific topics. The literature on this broad area, particularly the international literature, is immense. Consequently, for non-Australian research, we restricted our search to review papers and did not examine reports of primary research. This will have reduced the sensitivity and specificity of our review, particularly with respect to the international literature. The amount of peer-reviewed Australian Aboriginal literature in this area is relatively small. The extent of grey literature, such as government reports and discussion papers, research theses, consultants' reports, and unpublished community reports, is likely to be much larger but outside the scope of this paper due to time and resource constraints.

The survey was sent to a general and untargeted mailing list, and many of the recipients would have little knowledge or interest in this specific research area. This approach was designed to provide opportunity for input from a wide potential audience, and could be seen as a 'call for expressions of interest'. Given the primary aim of this project and the intention to obtain input from as wide a group as possible, it was not appropriate, nor possible, to construct a sampling frame or a complete list of individuals or organisations that we knew would, or should, provide input. It was expected that many survey recipients would not respond, and it was perceived to be more important that the survey was distributed as widely as possible to scope out the range of views of interested stakeholders. Approximately 10–15 per cent of people on our mailing list responded to the call for input. The exact number could not be calculated because a number of emails were sent to group email addresses. Thus, the findings are based on the responses of those who had sufficient interest in the subject of this survey.

Despite these methodological limitations we feel that our review of the literature has provided us with an overview of research in the area, and an indication of research priorities as perceived by a range of interested parties. The information contained in this scoping project should be a useful guide to the CRCIAH in further developing a research agenda for Aboriginal health and the physical environment.

**TABLE 3: Framework for research on Aboriginal health and the physical environment**

Aspects of the physical environment	Category A: Aboriginal people's attitudes, perceptions, behaviour	Category B: Understanding the relationship between the environment and health outcomes	Category C: Development and impact of programs and interventions
Environmental health			
Housing			
Maintenance			
Crowding			
Water supply			
Waste disposal and drainage			
Hygiene			
Swimming pools			
Dog health			
Urban environment			
Communication			
Roads and transport			
Energy			
Climate and temperature			
Land management			
Pests and feral animals			
Dust			
Environmental health workforce			
Food supply			
Trauma			

### Proposed framework for CRCAH research

Table 3 provides a framework for research into Aboriginal health and the various aspects of the physical environment. Categories A, B and C were developed by drawing out themes from research priorities identified in the first survey. Aspects of the physical environment were identified through the broad literature on environmental health in the Indigenous context.

This framework highlights the different components of the physical environment and outlines the three types of research that might be

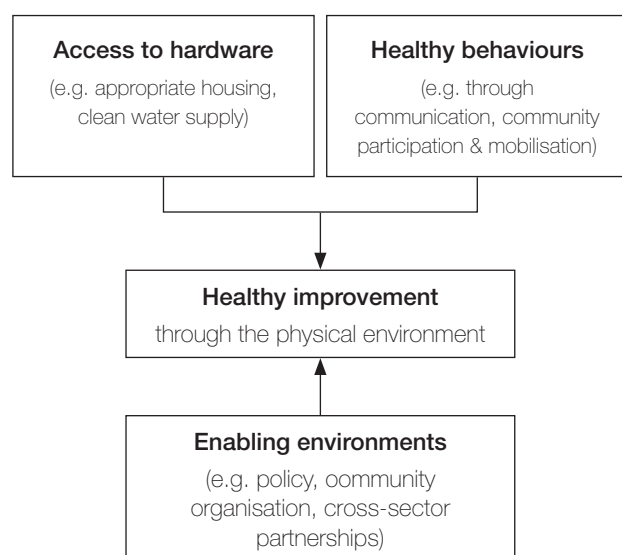
undertaken under each component. The review of the literature and the results from the survey show that priority is not distributed equally within the framework. The lack of research in the urban setting is recognised in the survey, indicating that this is a priority issue. Similarly, housing and the components related to housing (such as crowding, maintenance and hygiene) are emphasised in the literature as well as in the survey, which attests to the potential benefits of a strong research program in this area.

Although this research framework is reductionist, in order to allow for consideration of the many aspects that make up the physical environment, it is important to recognise the complex, interwoven nature and the multiple factors that influence each component. Thus, it is useful to take an ecological approach to research in Aboriginal health and the physical environment. Ecologism attempts to deal

with the true complexities of the biological world through an awareness of the interaction between biological, human and social systems.<sup>6</sup> The ecological approach is guided by appropriate causal concepts based on universal laws (Category B), with the realisation that health and disease are mediated by specific social behaviours at the individual, population and global level (Category A). The best hope for making an impact through interventions (Category C) in any of the areas identified in the framework rests upon a coherent strategy that is based on sound research in both Categories A and B.

Figure 1 outlines the Health Improvement Framework (HIF), which is an integrated approach to research, linking health hardware and behavioural determinants with enabling institutional and policy environments. While the ecological approach allows consideration across all three categories of research, the HIF is important when considering the multiple factors that impact upon interventions aimed at improving health.

**FIGURE 1: Health Improvement Framework<sup>7</sup>**



The importance of the ecological approach, and the usefulness of a framework that encompasses the multiple factors that impact upon health, are highlighted by survey respondents placing high priority on all three categories of research. The call for multi-disciplinary research evident in the survey is also consistent with this ecological approach. It highlights the need to make use of medical scientists, epidemiologists, statisticians, social scientists, economists, political scientists and administrators in the domain of public health. This allows for a broader exploration of the biological mechanisms, the social processes and the most appropriate and effective health strategies in order to make the most gains in Aboriginal health.

## Conclusion

Survey and review findings prioritised research in the urban environment, housing and areas directly related to housing, and water supply and sanitation. The evidence base for interventions has not been given priority in the survey or the Australian literature to the same extent as it has in the international literature. Many reported interventions are not based on either good evidence or good knowledge of Aboriginal people's perceptions and needs. This points to the importance of setting research priorities based on existing Category B evidence, and further investigating Aboriginal people's perceptions and needs in order to develop health strategies and actions based on Category A research.

The proposed framework for research on Aboriginal health and the physical environment is based on the three categories of research in each identified area of the physical environment. While the framework is reductionist by nature, it is important to take an ecological approach to research synthesis and the application of findings. For example, even in highly focused studies it is essential that contextual factors are taken into account, with consideration of how the findings from the research fit with broader health issues. The HIF may be a useful tool for the development and implementation of interventions. The importance of a more holistic approach

<sup>6</sup> M. Susser & E. Susser 1996, 'Choosing a Future for Epidemiology: II. From black box to Chinese boxes and eco-epidemiology', *American Journal of Public Health*, vol. 86, no. 5, pp. 674–7.

<sup>7</sup> Adapted from Environmental Health Project, UNICEF Water Environment and Sanitation, US Agency for International Development, World Bank/Water and Sanitation Project, Water Supply and Sanitation Collaborative Council 2004, *The Hygiene Improvement Framework. A Comprehensive Approach for Preventing Childhood Diarrhoea*, Joint Publication No. 8, Environmental Health Project, Washington, DC.

to research is evident in the high priority placed on all three categories in the survey and on the expressed need to take a multi-disciplinary approach to research.

It is important to note that the proposed framework is not intended to be prescriptive. It does not encompass every aspect of the environment and other areas may deserve consideration. The framework is intended as a guide to setting research priorities for the CRCaH in the area of Aboriginal health and the physical environment.

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