

The environment

- Human health and the environment are inextricably linked.
- The main contributors to air pollution in cities are industry and motor vehicles and wood-burning heaters. In the last 10 years in Sydney:
 - the number of days on which levels of ozone in the air have exceeded permissible levels has fluctuated;
 - levels of particulate air pollution have peaked at the time of bushfires.
- A range of indicators of the quality of drinking water, and of water used for recreation, are monitored continuously. The majority of households in NSW use public water supplies. Recent testing of drinking water indicates that:
 - drinking water supplied by the Sydney and Hunter Water Corporations meets Drinking Water Guidelines and is of good quality;
 - although the overall compliance rate for rural water supplies is high, results from individual supplies vary substantially;
 - the level of fluoride in drinking water supplied by the Sydney and Hunter Water Corporations stayed within the required limits for the majority of samples tested in 2005. More than three quarters of the samples in rural water supplies met the fluoride standards in 2005;
 - poisonous inorganic chemicals were detected in concentrations lower than required limits in 2005.
- Leaded petrol has been the main source of exposure to lead for most NSW children, except for those living near major sites for lead mining and processing, such as Broken Hill. In recent years:
 - blood lead levels among preschool children living in Broken Hill have declined steadily;
 - Aboriginal children in Broken Hill have blood lead levels higher than non-Aboriginal children.
- The Housing for Health program aims to assess, repair, and replace health hardware so that houses are safe and the occupants have the ability to carry out healthy living practices. Surveys conducted on 182 houses 6–12 months apart identified major improvements in key areas of safety, and facilities such as working showers and laundries, as a result of the program.

In this chapter

- Air quality—Regional Pollution Index
- Air quality—Indoor air
- Water quality—Microbiological quality
- Water source
- Healthy Living Practices in Aboriginal houses

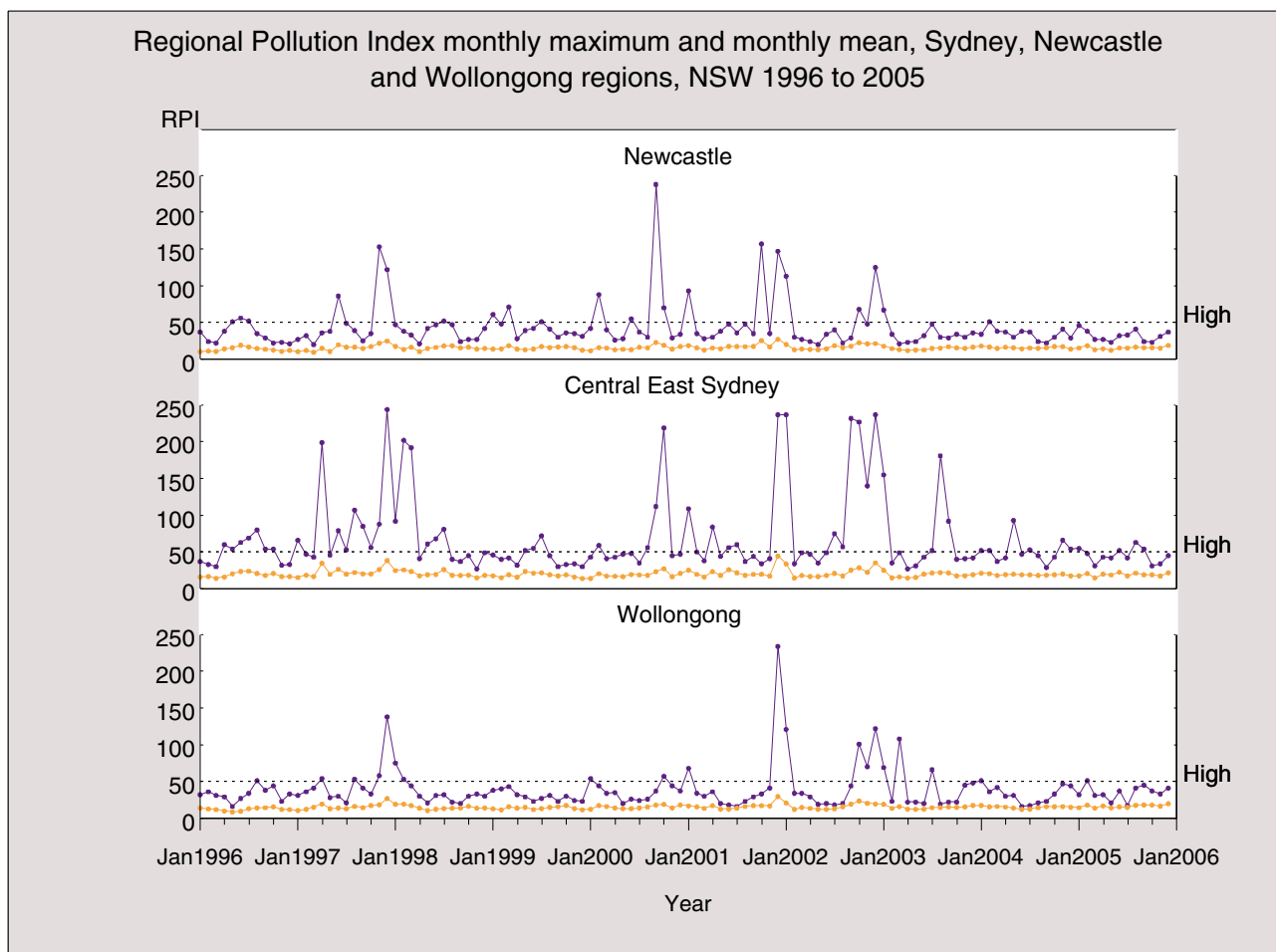
Introduction

Human health and the environment are inextricably linked. In rural areas, issues as diverse as land use, agricultural practice, water quality and biodiversity, all affect human health. Similarly, air and water quality, transport choice, urban form, and environmental health infrastructure underpin the health status of people in the urban and built environments. Increasingly, the effects on human health of global phenomena such as population growth and climate change are also recognised at a local level.

Responsibility for the management of environmental health hazards is deployed across three tiers of government. The Commonwealth and States work cooperatively to set environmental standards for drinking water and air quality. In NSW, the NSW Department of Environment and Conservation has carriage of legislation governing controls on air and water quality, chemical hazards, and contaminated land. The NSW Department of Health has specific responsibilities in relation to drinking water; and a variety of infectious hazards linked to premises and the built environment including *Legionella* in public air conditioning systems, tattooing and the funeral industry. The NSW Department of Health and Public Health Units in Area Health Services work in partnership with local government to manage these hazards effectively. The NSW Department of Health also manages statewide programs such as the Aboriginal Environmental Health Program, the NSW Drinking Water Monitoring Program and the Arboviral Disease Program. Increasingly, the NSW Department of Health is becoming involved in assessment of the health effects of major developments within NSW.

This chapter presents an overview of some important indicators of environmental health status in NSW, including air and water quality, blood lead levels and the Housing for Health program. It has been designed to complement rather than duplicate the comprehensive information presented in the triennial NSW Department of Environment and Conservation's *New South Wales State of the Environment* reports.

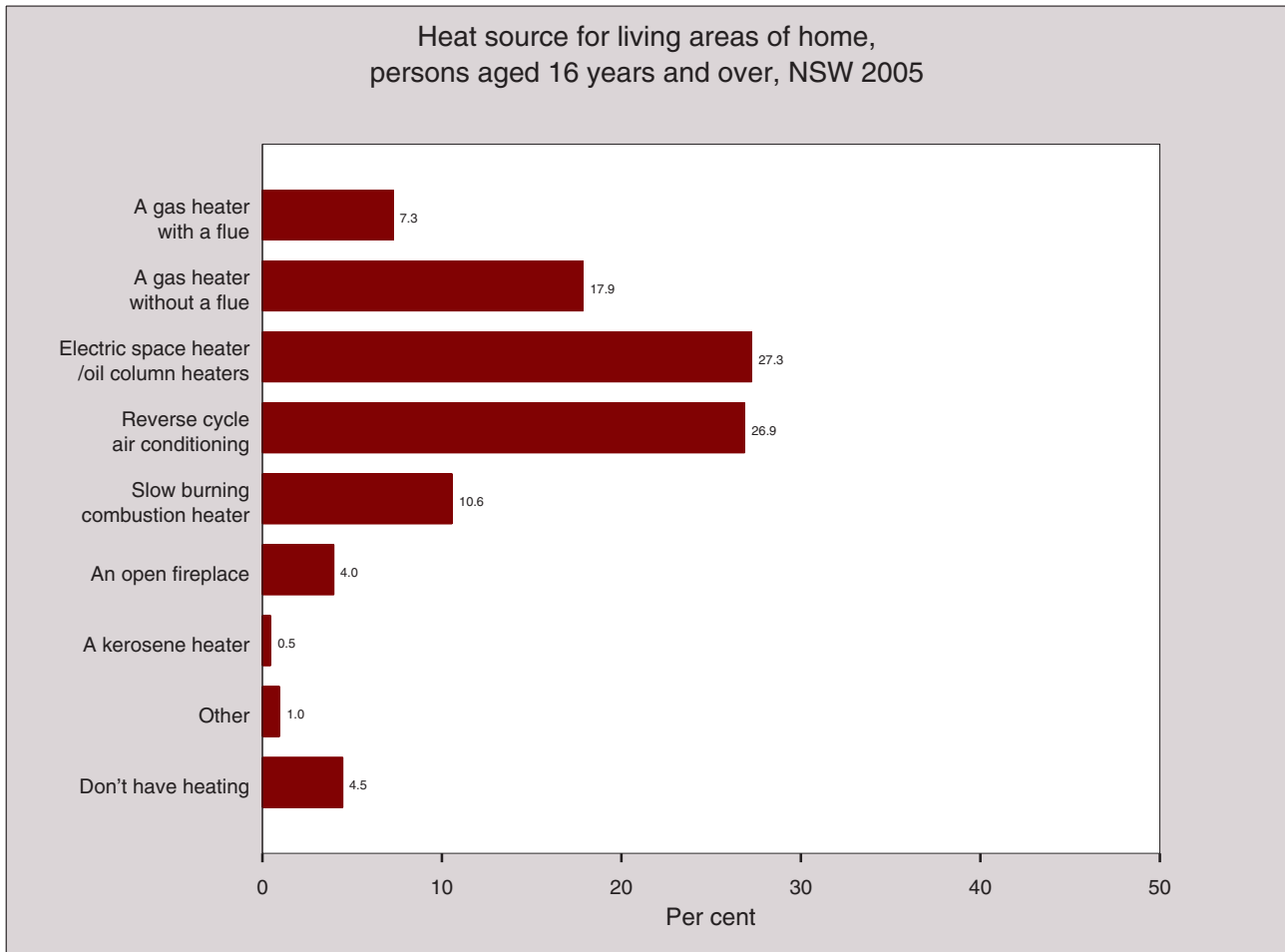
All data tables for this report, and more indicators on these and other subjects, are available in the web version of "The Health of the People of NSW" at www.health.nsw.gov.au/public-health/chorep/



Note: RPI data is reported twice daily on the Department of Environment and Conservation website <http://www.environment.nsw.gov.au/air/airdata.htm>. This graph shows the monthly maximum and monthly mean RPI.

Source: NSW Department of Environment and Conservation incorporating Environment Protection Authority.

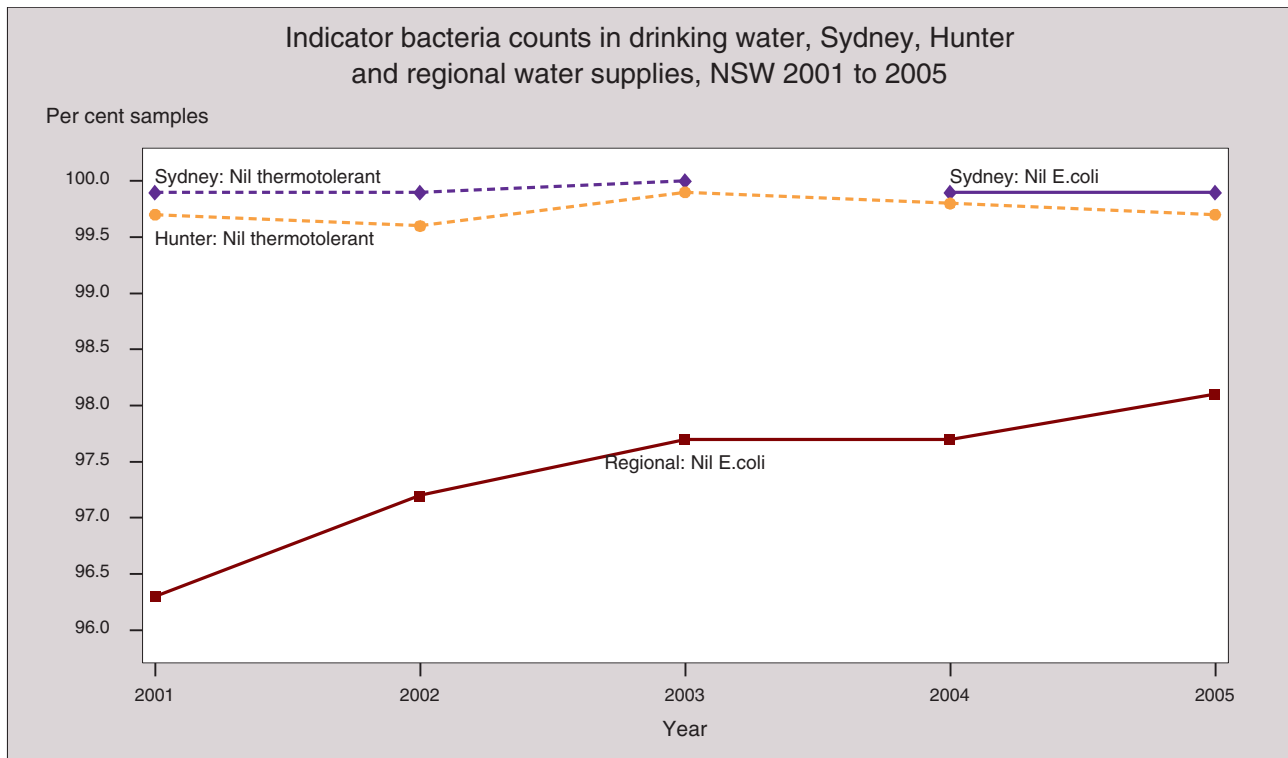
- The Regional Pollution Index (RPI) has been developed by the NSW Department of Environment and Conservation (DEC) to provide twice daily reporting of pollutant levels in Sydney, Lower Hunter and Illawarra. The RPI is produced for three regions in Sydney (Central Eastern Sydney, North Western Sydney, and South Western Sydney); three sites in the Lower Hunter (Newcastle, Wallsend and Beresfield); and two sites in the Illawarra (Wollongong and Albion Park).
- The RPI is based on three pollutants: fine particles (measured by visibility), nitrogen dioxide and ozone. The RPI reports on the highest pollutant in comparison to its highest permissible level. A high RPI indicates that at least one of the three pollutants has exceeded its permissible level during the reporting period. Using information about forecast weather conditions, the DEC also provides a forecast of pollution levels for the Sydney region the following day.
- The peaks shown on the graphs are in the main associated with bushfires. The usual contributors to air pollution in these three cities are industry and motor vehicles, with significant contributions from wood heaters overnight in the winter.
- The NSW Government's 25-year air quality management plan, *Action for Air*, began in 1998, was revised in 2001 and updated in 2006 (EPA, 2006). The plan relies on linked strategies such as *City of Cities: A plan for Sydney's future*, the *NSW Greenhouse Plan* and the *State Infrastructure Strategy New South Wales 2006–07 to 2015–16*. Promotion of 'active transport' started in the original *Action for Air* continues throughout the later documents. Active transport includes walking, cycling and using public transport instead of private vehicles. This not only generates less pollution but also improves health through increased physical activity. Further information about physical activity can be found in the health-related behaviours chapter.



Note: The question used to define the indicator was: What is the usual way you heat the living areas of your home? Estimates are based on 8,295 respondents. 85 (1.01%) were not stated (Don't know or Refused).

Source: NSW Population Health Survey (HOIST). Centre for Epidemiology and Research, NSW Department of Health.

- Burning fuels (like natural gas or wood) in the home releases products of combustion, which include water vapour, carbon monoxide, and other gases. In homes where this occurs, it is important to ensure adequate ventilation and proper maintenance of appliances.
- Unflued gas heaters and open wood fires are 2 sources of home heating that release products of combustion indoors (Sheppard V et al, 2006). The 2005 NSW Health Survey included questions about the usual methods for heating homes. Respondents to this survey reported that unflued gas heating was the usual method for 17.9% of homes, and open wood-fires were used by 4.0% of homes. These proportions are respectively lower and higher than in 2002 where the corresponding figures were 19.4% and 3.2%. The 2005 survey results also showed an increase in the use of reverse cycle air conditioning of almost 7% from 2002 (from 20.1% to 26.9%).
- A study of school children aged eight to 11 years in Belmont, New South Wales showed that being exposed to fume-emitting heaters in the first year of life was associated with an increased risk of asthma symptoms (Phoa et al, 2004). If confirmed in other settings, this finding would require a review of the range of heating types that are appropriate for use in households in which young children live.



Note: Presence of bacteria *Escherichia coli* (*E. coli*) is the most reliable and specific indicator of recent faecal contamination in drinking water.

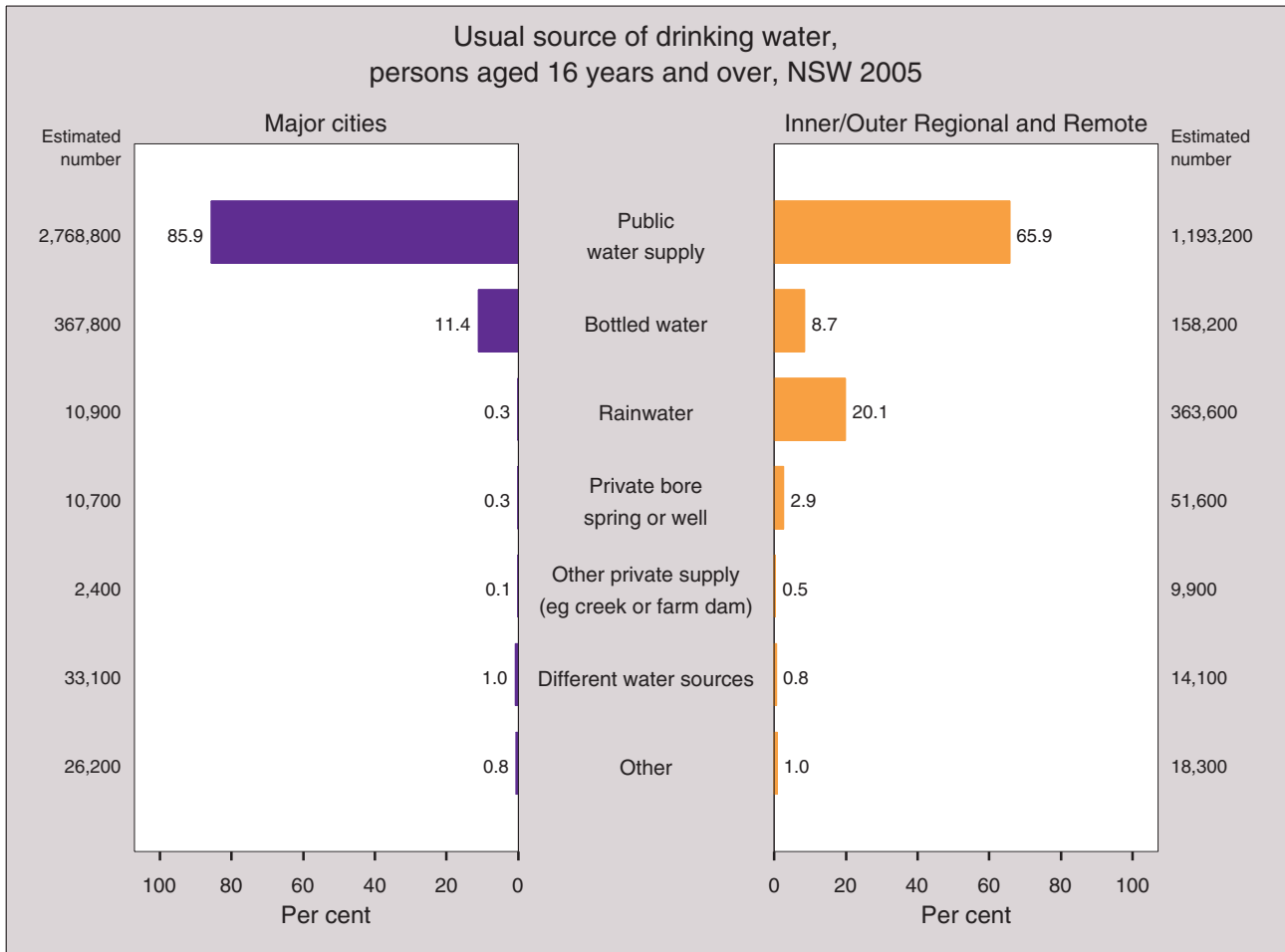
Source: Sydney Water and Hunter Water Corporations (Quarterly Reports) and NSW Health Drinking Water Monitoring Program (Database).

- Drinking water supplies in NSW are monitored for possible faecal contamination. This monitoring is performed by water utilities with oversight by NSW Health. *Escherichia coli* (*E. coli*) or thermotolerant coliforms are monitored as indicators of faecal contamination. Pathogenic microorganisms may enter the water supply as a result of faecal contamination.
- The Australian Drinking Water Guidelines 2004 (the Guidelines) (NHMRC, 2004) state that at least 98% of samples should contain no *E. coli* or thermotolerant coliforms. The Guidelines also recommend minimum sample numbers for monitoring of water supplies based on the population and complexity of the supply. Water testing results from the Sydney and Hunter Water Corporations indicate that drinking water meets the Guidelines and is of good quality.
- The NSW Health Drinking Water Monitoring Program was introduced in October 2000 to assist regional and rural water utilities to apply

the Guidelines. Under the Program, free drinking water analysis is available to water utilities through NSW Health laboratories.

- The NSW Drinking Water Database stores information and monitoring results for regional and rural water supplies. The Database has been operational since 1 January 2001 and results from the NSW Health Drinking Water Monitoring program are entered on a daily basis.
- The results from testing in rural and regional water supplies indicate that 97.7% and 98.1% of samples complied with the Guideline value for *E. coli* in 2004 and 2005 respectively. Compliance with Guideline recommendations for monitoring frequency varies widely throughout the State.

All data tables for this report, and more indicators on these and other subjects, are available in the web version of "The Health of the People of NSW" at www.health.nsw.gov.au/public-health/chorep/

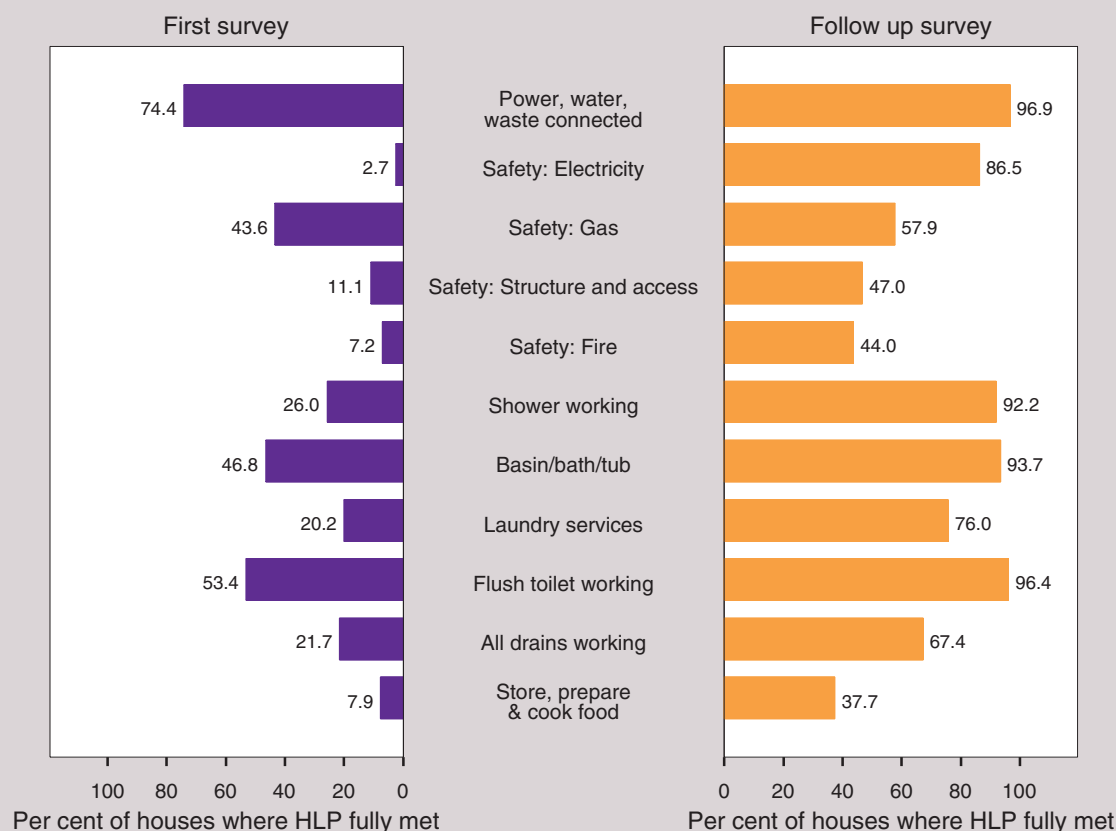


Note: Postcodes were grouped according to Australian Standard Geographical Classification (ASGC) Remoteness categories on the basis of Accessibility/Remoteness Index for Australia (ARIA+ version) score.

Source: NSW Population Health Survey (HOIST). Centre for Epidemiology and Research, NSW Department of Health.

- Public drinking water supplies in NSW are routinely monitored to ensure drinking water meets the Australian Drinking Water Guidelines (NHMRC, 2004). In regional areas, local councils supply and monitor drinking water. There are many more tests conducted on tap water than bottled water (NSW Department of Health, 2002).
- In the 2005 NSW Health Survey, participants were asked about their usual source of drinking water.
- In metropolitan areas 85.9% of people obtained their drinking water from a public water supply, 11.4% from bottled water and 0.3% from rainwater. In total 1.0% of metropolitan residents obtained their drinking water from a combination of sources, and less than 1% obtained their drinking water from a private bore, well, spring or other private supplies (such as creeks or farm dams) or other sources.
- In regional and remote areas of NSW, 65.9% of people obtained their drinking water from a public water supply, 20.1% from rainwater and 8.7% from bottled water. In total 3.4% of residents in regional and remote areas obtained their drinking water from a private bore, well, spring or other private supplies (such as creeks or farm dams), and 0.8% obtained water from a combination of sources.

Healthy Living Practices (HLP) fully implemented by type of practice, houses in selected Aboriginal communities, NSW 2004-05 to 2005-06



Note: HLP= Healthy Living Practice. Follow up survey is conducted 6–12 months after the first, baseline survey. 182 houses were included in analysis. 54 houses had gas connected and were assessed for gas safety.

Source: Healthy Living Practices baseline (Fix1) and follow up (Fix2) Surveys, Environmental Health Branch, NSW Health Department.

- The Housing for Health program aims to assess, repair or replace health hardware so that houses are safe and the occupants have the ability to carry out healthy living practices. It aims to improve the health status of Aboriginal people, particularly children (Pholeros P et al, 1993). Housing for Health has been delivered to Aboriginal communities in NSW through the Aboriginal Communities Development Program. Between 1998 and 2005, 34 community projects have been conducted under this program.
- Two surveys were conducted on 182 houses in 7 Aboriginal communities in NSW approximately six to twelve months apart in the years 2004–05 to 2005–06.
- The first survey involved the collection of data that identified problems in the key areas of safety (electrical, gas, structural and fire) and healthy living practices (including facilities for washing people, washing clothes, removing sewage and waste and improving nutrition) and on-the-spot maintenance. This was followed by a capital works program and follow-up survey to assess improvements and a further maintenance program.
- Between the 2 surveys major improvements were demonstrated in houses in some areas, for example there was a 83.8% improvement in electrical safety and 66.2% improvement in working showers. More than 95% of all houses had power, water and waste removal connected and flush toilet working.
- Each of the healthy living practices (HLP) is made up of a number of criteria, which all need to be met to consider a house improved with respect to that practice. For example, the HLP: store, prepare and cook food has 15 criteria including adequate cooking facilities, bench space and cool storage. Occasionally, the criteria are beyond the scope of the program's funding capacity and while some improvements have been made (stoves and kitchen taps repaired etc) because other criteria have not been met (fridges) this area shows the most modest result (29.9% of houses improved from 7.9% to 37.7% of all houses).

For more information

Australian Institute of Health and Welfare. *Indigenous housing needs 2005- a multi-measure needs model* Canberra: AIHW, 2005. Available at www.aihw.gov.au/publications/index.cfm/title/10166.

Balding B, Lesjak M, Kennedy C. *Blood lead trends in children aged less than 5 years, 2005*. Greater Western Area Health Service, 2006, unpublished.

Bell ML, Dominici F, Samet JM. A meta-analysis of time-series studies of ozone and mortality. *Epidemiology* 2005; 16: 436–445.

Boreland F, Lyle DM. Lead dust in Broken Hill homes: effect of remediation on indoor lead levels. *Environmental Research*. 100(2):276–83, 2006.

Department of Environment and Conservation. *New South Wales State of the Environment 2003*. Sydney: Department of Environment and Conservation, 2003. Available at www.environment.nsw.gov.au/SOE/soe2003/index.htm. The next edition of the report is expected at the end of 2006.

Department of Environment and Conservation. *Air pollution economics. Health costs of air pollution in the Greater Sydney Metropolitan Region*. Sydney: DEC, 2006. Available at <http://www.epa.nsw.gov.au/resources/airpollution05623.pdf>.

Department of Environment and Conservation. *Woodsmoke*. Available at www.environment.nsw.gov.au/woodsmoke/index.htm.

Department of Family and Community Services. *National Indigenous Housing Guide* (2nd edition) Canberra: Commonwealth of Australia, 2003.

Department of Industry, Tourism and Resources website at www.industry.gov.au/resources/petr_statistics/index.html.

EnHealth Council is the peak Environmental Health body in Australia. EnHealth website enhealth.nphg.gov.au.

Interdepartmental Lead Taskforce. *New South Wales Lead Management Action Plan*. Sydney: NSW Environment Protection Authority, 1994.

Jalaludin B, Chey T, O’Toole B, Smith W et al. Acute effects of low levels of ambient ozone on peak expiratory flow rate in a cohort of Australian children. *Int J Epidemiol* 2000; 29: 549–557.

Jalaludin BB, O’Toole BI, Leeder SR. Acute effects of urban ambient air pollution on respiratory symptoms, asthma medication use, and doctor visits for asthma in a cohort of Australia children. *Environmental Research*. 95(1):32–42, 2004.

Levy JL, Carrothers TJ, Tuomisto JT, Hammitt JK and Evans JS. Assessing the public health benefits of reduced ozone concentrations. *Environ Health Perspect* 2001; 109: 1215–1226.

Lewis P, Hensley M, Wlodarczyk J et al. Outdoor air pollution and children’s respiratory symptoms in the steel cities of New South Wales. *Med J Aust* 1998; 169: 459–63.

Lippman M et al. The U.S. Environmental Protection Agency Particulate matter Health Effects Research Centers Program: A midcourse report of status, progress and plans. *Environ Health Perspect* 2003; 111: 1074–1092.

Lyle D, Balding B, Burke H, Begg S. NSW lead management program in Broken Hill. *NSW Public Health Bull* 2001; 12(6):165–167.

Mannes T, Jalaludin B, Morgan G, Lincoln D, Sheppard V, Corbett S. Impact of ambient air pollution on birth weight in Sydney, Australia. *Occupational and Environmental Medicine*. 62(8):524–30, 2005.

Morgan G, Corbett S, Wlodarczyk J, Lewis P. Air Pollution and Daily Mortality in Sydney, Australia, 1989 through 1993. *Am J Public Health* 1998; 88: 759–764.

Morgan G, Corbett S, Wlodarczyk J. Air Pollution and Hospital Admissions in Sydney, Australia, 1990 to 1994. *Am J Public Health* 1998; 88: 1761–66.

NSW Department of Environment and Conservation website at www.environment.nsw.gov.au.

NSW Department of Health. *Unflued gas heaters*. Sydney: NSW Department of Health, 2004. Available at

www.health.nsw.gov.au/pubs/2004/pdf/gas_heaters_fs.pdf.

NSW Department of Health. *Wood smoke from wood-fired home heaters*. Sydney: NSW Department of Health, 2003. Available at www.health.nsw.gov.au/pubs/factsheet/pdf/wood_smoke_pub.pdf.

NSW Department of Health. *Air pollution and health*. Available at www.health.nsw.gov.au/public-health/ehb/hazards/air-pollution.html.

NSW Department of Health. *Air pollution health alerts—ozone*. Available at www.health.nsw.gov.au/living/airpollution.html.

NSW Department of Health. *Indoor air pollution*. Available at www.health.nsw.gov.au/public-health/ehb/hazards/indoor.html.

NSW Department of Health. *Outdoor air pollution*. Available at www.health.nsw.gov.au/public-health/ehb/hazards/outdoor.html.

NSW Department of Health. Water Quality and Health website at www.health.nsw.gov.au/public-health/ehb/water/drinkwater.html.

NSW Environment Protection Authority. *Action for Air*. Sydney: EPA, 1998. with *Action for Air, 2006 update*. Sydney: EPA, 2006. Available at: www.environment.nsw.gov.au/air/actionforair/execsum.htm.

NSW Environment Protection Authority. *Beachwatch and Harbourwatch State of the Beaches Sydney-Hunter-Illawarra 2000–2001 Report*. Sydney, NSW EPA, 2001.

National Environment Protection Council website at www.ephc.gov.au.

National Health and Medical Research Council and Natural Resource Management Ministerial Council. *Australian Drinking Water Guidelines 2004*. Canberra: NHMRC, 2004. Available at: www.nhmrc.gov.au/publications/synopses/eh19syn.htm.

National Health and Medical Research Council. *Revision of the Australian guidelines for lead in blood and lead in ambient air. Report of the 115th session of the NHMRC*. Canberra: AGPS, 1993. Available at www.nhmrc.gov.au/publications/_files/115th.pdf.

New South Wales Consolidated Acts. *Fluoridation of Public Water Supplies Act 1957*. Available at www.austlii.edu.au/au/legis/nsw/consol_act/fopwsa1957400/.

New South Wales Consolidated Acts. *The Code of Practice for the Fluoridation of Public Water Supplies 2002*. Available at www.austlii.edu.au/au/legis/nsw/consol_reg/fopwsr2002491.txt.

Phoa LL, BG Toelle, Ng K, Marks GB. Effects of gas and other fume emitting heaters on the development of asthma during childhood. *Thorax*.59(9):741–5, 2004.

Pholeros P, Rianow S, Torzillo P. *Housing for Health: Towards a Health Living Environment for Aboriginal Australia*. Healthabitat: Newport Beach, 1993.

Pope CA, Burnett RT, Thun MJ, Calle EE et al. Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate air pollution. *JAMA*2002; 287: 1132–1141.

Public Health Division. The Sydney Water Incident: July–September 1998. *N S W Public Health Bull* 1998; 9(8–9): 91–94.

Sheppard V, Morgan G, Corbett S. NSW Indoor Air Survey. Part I: Sources and concentrations of pollutants in homes in New South Wales; Part II: Concentrations of nitrogen dioxide in homes in New South Wales; Part III: Particulate matter concentrations in homes in New South Wales. *Environmental Health* 2006; 6(3): 15–41.

The Department of Environment and Conservation Lead Reference Centre. Available at: www.epa.nsw.gov.au/leadsafe/publications.htm. Publications include advice for home renovators.

The Hunter Water Corporation website at www.hunterwater.com.au.

The Sydney Water Corporation website at www.sydneywater.com.au.

Transport Population Data Centre. *2002 Household Travel Survey Executive Summary. 2004 Release*. Sydney: NSW Department of Infrastructure, Planning and Resources, 2004.

Watson BK, Sheppard V. Managing respiratory effects of air pollution. *Australian Family Physician*. 34(12):1033–6, 2005.

