Health and the environment

This section presents indicators relating to the environment that have the potential to influence health. These include indicators of air quality, cooling tower water samples testing positive for Legionella, legionellosis notifications, water quality, fluoridation and days with high ultraviolet radiation (UVR) index.

Health and the environment

In this chapter

- air quality (ozone)
- air quality (particles as PM_{10})
- air quality (particles as $PM_{2.5}$)
- air quality (visibility reducing particles)
- smoke-free households with dependant children
- legionellosis notifications
- *Legionella pneumophilia* cases
- legionellosis cases associated with outbreaks
- cooling tower water samples tested positive for *Legionella*
- cooling tower water samples in higher ranges for heterotrophic colony count (HCC)
- unintentional carbon monoxide poisoning hospital admissions
- localities compliant with *Escherichia Coli* water quality standards
- fluoridation
- hot days above 35 degrees Celsius
- fire weather risk
- daily ultra violet radiation (UVR) levels
- SunSmart programs

Summary

In the early 1980s, it was common for the ozone objectives not to be met in Melbourne. Significant improvement has occurred since then. In recent years the frequency with which the objectives are not met is approximately only one day every two years. In 2005 four-hour ozone air quality index was classified as 'good' or 'very good' on 98 per cent of days.

Melbourne typically meets the national goal for air quality, measured in terms of particles as PM_{10} and $PM_{2.5}$. In recent years (for example, 2003), Melbourne has also been adversely affected by drought related impacts (particles from dust storms and bushfires). Data from 2006 will also show a bushfire impact. For the majority of stations within Melbourne, PM_{10} is typically 'good' or 'very good' for 90 per cent of days during the year. In 2005, Box Hill was influenced by dust from construction work adjacent to the monitoring station. In 2005 levels were 'good' or 'very good' for 90 per cent of days during the year for particles as $PM_{2.5}$.

The long-term trend for visibility in the Melbourne region indicates that during the last 20 years, visibility problems have become less frequent. Over the last fifteen years, however, there was no overall reduction in the number of days exceeding the air quality objective. In 2005, for the majority of stations within Melbourne, visibility is typically 'good' or 'very good' for 90 per cent of days.

Estimates from the *Victorian population health survey* indicate that, among households with depandant children, the proportion of current smoker respondent households that were reported to be smoke-free has increased, from 66.9 per cent in 2003 to 79.1 per cent in 2006.

Notifications for *Legionellosis* have been relatively steady since 1999, with a large outbreak of more than 100 cases in April and May 2001 being associated with the Melbourne Aquarium. In 2006, there were 69 notifications of suspected or probable *Legionellosis* reported to the department. Outbreaks of legionellosis (defined as two or more cases with a common exposure) are one of the indicators used to gauge the success of the interventions component of the Government's Legionella Reform Strategy. The number of legionellosis cases associated with outbreaks has varied from a minimum of 0 cases in 2001 to a maximum of 132 cases in 2000.

Notified cases attributed to *Legionella pneumophilia* have fallen from a high of 239 in 2000, to 70 in 2004 and 51 in 2006.

The percentages of cooling tower water samples taken by the department that have tested positive for *Legionella* has declined from 9.5 in 2000, to 5.6 in 2004, and 2.8 in 2006.

The percentages of cooling tower water samples taken by department that failed to meet or exceeded the prescribed standards for heterotrophic colony counts has decreased since 2000.

Between 1999 and 2006 there were 90 hospital admissions in Victoria due to unintentional carbon monoxide (CO) poisoning. Admissions for unintentional poisonings represented 10.2 per cent of total CO poisonings (all intents) admissions during this period.

The water quality standard for *Escherichia coli* (*E. coli*) states that 98 per cent of samples collected over any 12-month period should contain no *E. coli* per 100mL of drinking water. For the 2005–06 reporting period, only 471 out of 493 water sampling localities (95.54 per cent) met the *E. coli* standard.

Prior to 2004 approximately 74 per cent of the Victorian population had a fluoridated drinking water supply, with most of these people living in metropolitan Melbourne. In 2007, the percentage has increased to 77 per cent.

Annual average temperatures have generally been increasing in Australia since the 1950s. In Melbourne, the frequency of hot nights (20°C and over) has increased substantially more than the frequency of hot days (35°C and over).

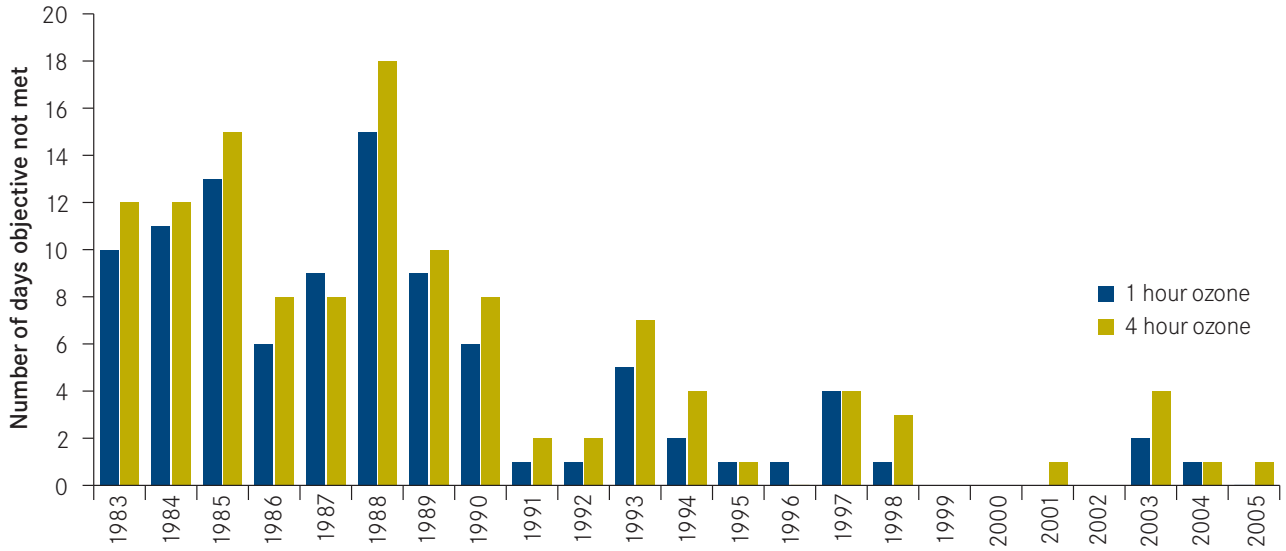
The Forest Fire Danger Index (FFDI) is derived from analysis of factors such as drought, air temperature, wind speed, and relative humidity, and used to quantify fire weather risk. The annual cummulative FFDI is used to measure the relative strength of fire weather risk during a given fire season. Long-term records of annual cumulative FFDI levels reveal a positive trend for each of 5 weather stations (Melbourne Airport, Mildura, Sale, Bendigo, and Mt Gambier), indicating that bushfire risk is tending to increase over time.

The UV Index is an indication of the maximum daily level of ultraviolet radiation (UVR) received at ground level. In Victoria, a UV Alert is issued by the Bureau of Meteorology when the UV Index is forecast to reach or exceed 3 (moderate and above), a level that can damage your skin and lead to skin cancer. In 2006, the number of UV index days that reached or exceeded 3 was 248.

In 2005, 84 per cent of Victorian primary schools and 65 per cent of Victorian early childhood services (excluding playgroups) were participating in the SunSmart Schools Program.

Air quality (ozone)

Number of days not meeting the ozone objective in Melbourne (worst station), 1983–2005



	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
1-hour ozone	10	11	13	6	9	15	9	6	1	1	5	2
4-hour ozone	12	12	15	8	8	18	10	8	2	2	7	4

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1-hour ozone	1	1	4	1	0	0	0	0	2	1	0
4-hour ozone	1	0	4	3	0	0	1	0	4	1	1

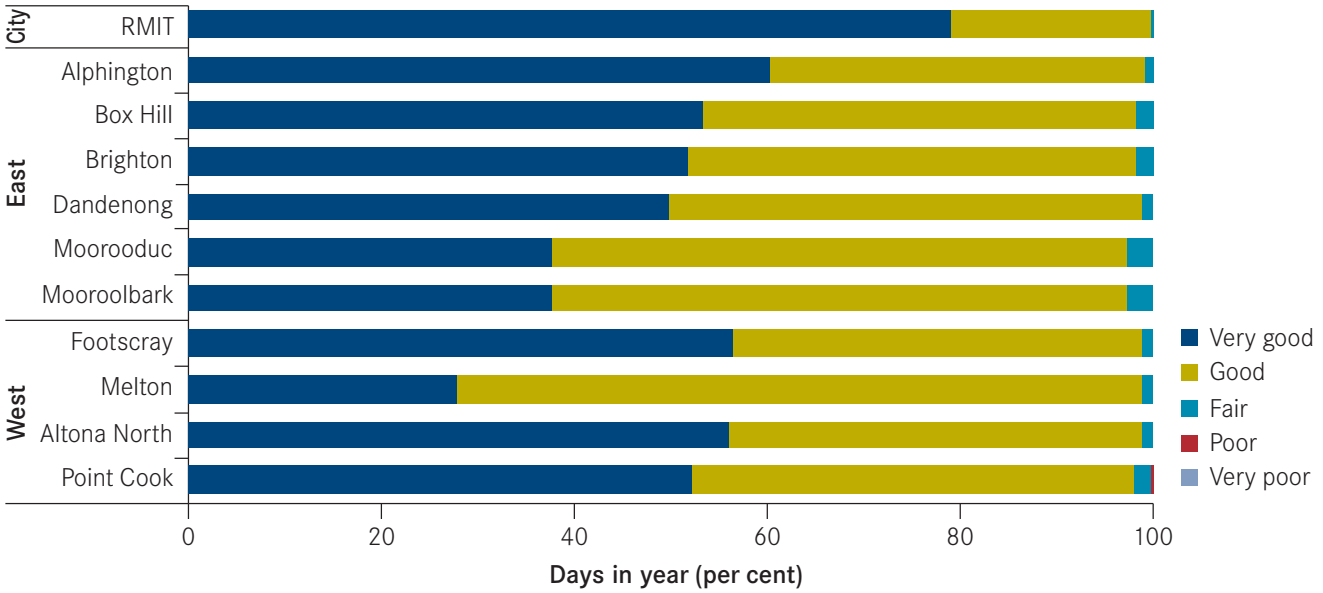
Ozone is a naturally occurring gas that is common in the lower atmosphere. Ozone is also a pollutant, being the main ingredient in summer smog. Exposure to high levels of ozone can result in increases in asthma attacks and hospitalisations for heart and lung conditions. In the lower atmosphere (the air we breathe), ozone is found naturally in low concentrations. Higher concentrations of ozone are formed when chemical reactions between certain pollutants (nitrogen dioxide and hydrocarbons) take place in the presence of sunlight. Ozone is only a problem between late spring and early autumn, when there is enough warmth and sunlight for the reactions to occur. Note that ozone in the air we breathe should be distinguished from ozone in the stratosphere (the ozone layer), which has the beneficial effect of absorbing harmful radiation.

The current national objectives for ozone are 0.10 parts per million for a one-hour average and 0.08 parts per million for a four-hour average. The goal is to have no more than one day a year (by 2008) where the objectives are not met (as measured at each monitoring site).

In Melbourne, in the early 1980s, the ozone objectives were frequently not met. Significant improvement has occurred since then. In recent years we typically only see a day not meeting the objectives approximately once every two years. This is mainly due to progressive improvements in vehicle emission standards.

Exceptional ozone events may occur if bushfire smoke is blown towards the city; several such events occurred in 2003, however, most ozone events are a result of pollution generated in the urban area. A similar bushfire effect will be observed in monitoring data from 2006.

Air quality index for four-hour ozone in Melbourne, 2005



The annual distribution of the four-hour ozone air quality index varies by location. Days of 'very good', 'good' and 'fair' air quality meet the air quality objective, while 'poor' and 'very poor' days exceed the objective. Ozone levels are typically classified as 'good' to 'very good' on over 98 per cent of days at each of the monitoring sites in Melbourne.

For more information

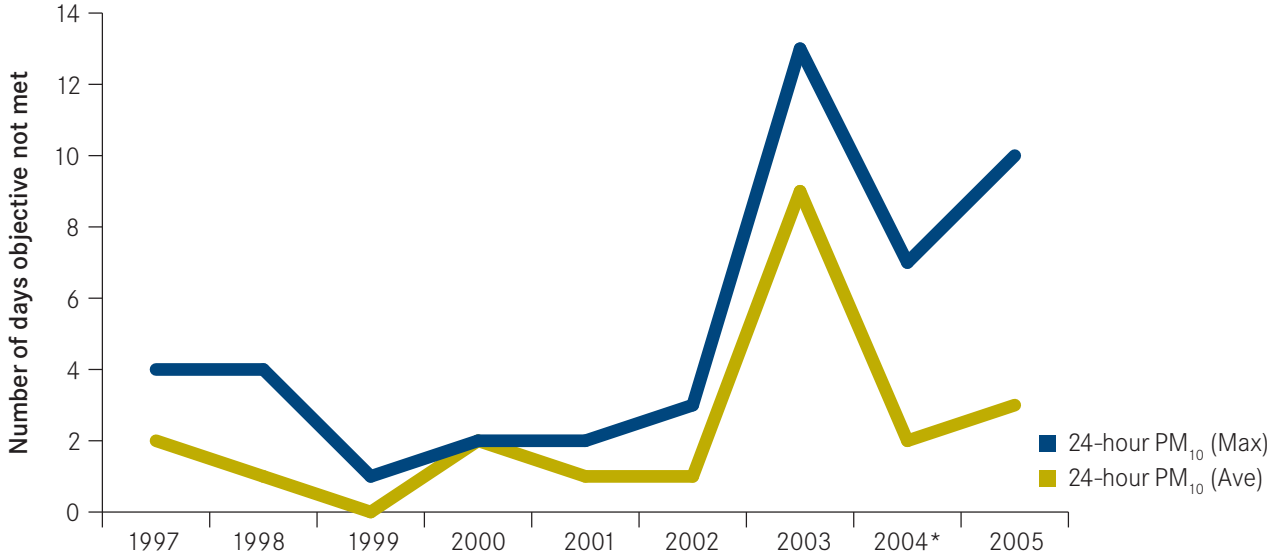
Environment Protection Authority (EPA), 2003, *Victoria's air quality–2005*, EPA Publication 1044:
www.epa.vic.gov.au/Air/Monitoring/monitoring_reports.asp

Contact

Environment Protection Authority
Manager, Air Quality Studies
EPA Victoria
Phone (03) **8458 2381**

Air quality (particles as PM_{10})

Maximum and average number if days not meeting particles (PM_{10}) objective in Melbourne, 1997–2005

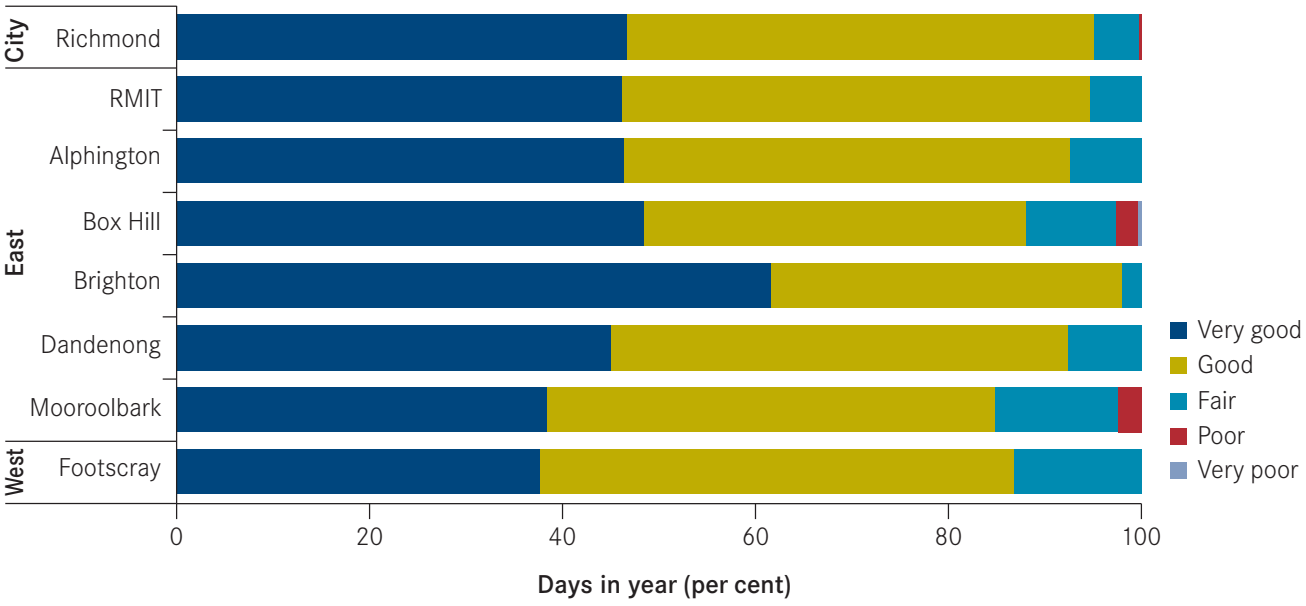


Note: Excludes data from Box Hill.

Particles smaller than 10 micrometre (PM_{10}) (less than one-tenth the width of human hair) can exacerbate existing respiratory and cardiovascular disease, which can lead to increases in hospitalisations and premature mortality. The national objective for PM_{10} is a one-day average of 50g/m^3. The goal is to have no more than five days a year (by 2008) where the objective is not met (as measured at each monitoring site).

The major sources of particles in an urban environment are motor vehicles (particularly diesel powered), industry and wood combustion for heating. Days where the objective is not met are highly dependent on weather conditions. In recent years (for example, 2003), Melbourne has also been adversely impacted by drought-related impacts (particles from dust storms and bushfires). Data from 2006 will also show a bushfire impact. In years without dust or bushfires issues, Melbourne typically meets the national goal for particles as PM_{10}.

Air quality index for PM_{10} in Melbourne, 2005



The annual distribution of daily PM_{10} during 2005 in terms of EPA's Air Quality Index varies by location. Days of 'very good', 'good' and 'fair' air quality meet the air quality objective, while 'poor' and 'very poor' days exceed the objective. For the majority of stations within Melbourne, PM_{10} is typically 'good to very good' for 90 per cent of days during the year. In 2005, Box Hill was influenced by dust from construction work adjacent to the monitoring station.

For more information

Environment Protection Authority (EPA), 2003, *Victoria's air quality–2005*, EPA Publication 1044:
www.epa.vic.gov.au/Air/Monitoring/monitoring_reports.asp

Contact

Environment Protection Authority
Manager, Air Quality Studies
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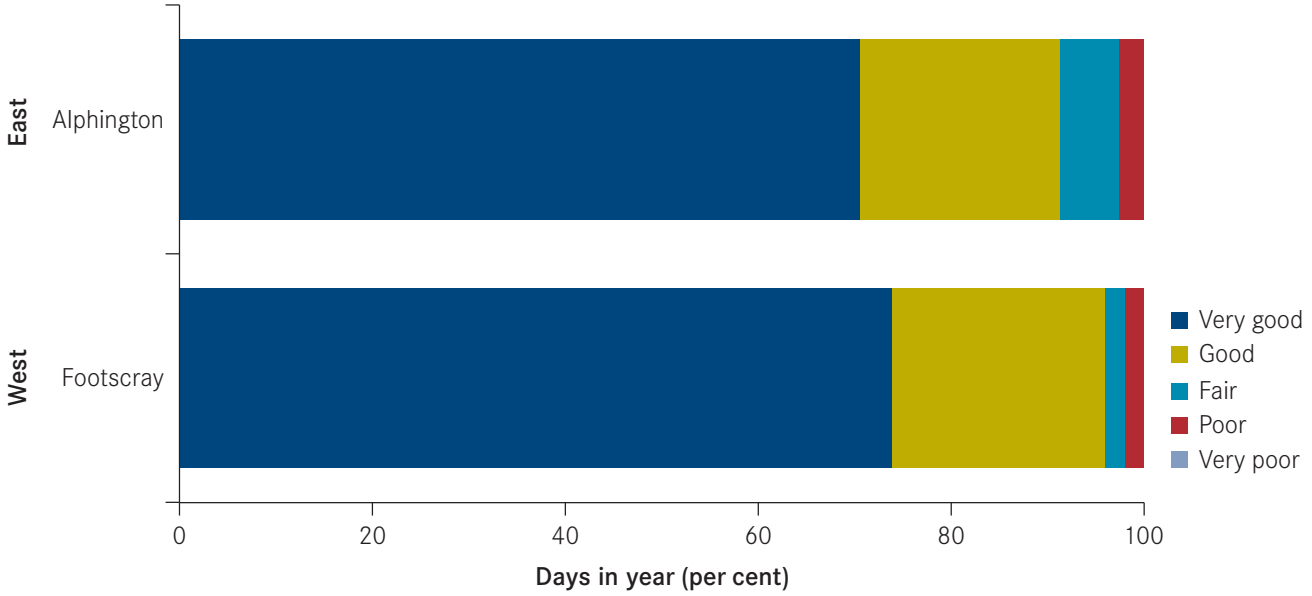
Phone (03) **8458 2381**

Air quality (particles as $PM_{2.5}$)

Fine particles, measured as particles smaller than 2.5 micrometre ($PM_{2.5}$) can penetrate deeply into the lungs and exacerbate existing respiratory and cardiovascular disease, which can lead to increases in hospitalisations and premature mortality. The National Environmental Protection Measures (NEPM) specifies advisory reporting standards for $PM_{2.5}$, with a daily (25µg/m^3) and annual (8µg/m^3) objective. EPA is monitoring $PM_{2.5}$ to collect data that will enable a review of the NEPM (this review commenced in 2005).

Fine particle problems are mainly a concern in Victoria during autumn and winter, when the use of domestic solid fuel heaters without emission-reducing technology (for example, old wood heaters) and open fires contribute significantly to elevated particle levels. Peak summer particle levels are dependant on weather conditions and events such as bushfires and dust storms. The major source of fine particles in an urban environment is motor vehicles.

Air quality index for $PM_{2.5}$ in Melbourne, 2005



The annual distribution of daily $PM_{2.5}$ during 2005 in terms of EPA's Air Quality Index (the particles as $PM_{2.5}$ are measured on a one day in three cycle) varies by location. Days of 'very good', 'good' and 'fair' air quality meet the air quality objective, while 'poor' and 'very poor' days exceed the objective. $PM_{2.5}$ levels are typically 'good to very good' for 90 per cent of days during the year, similar to that of visibility.

For more information

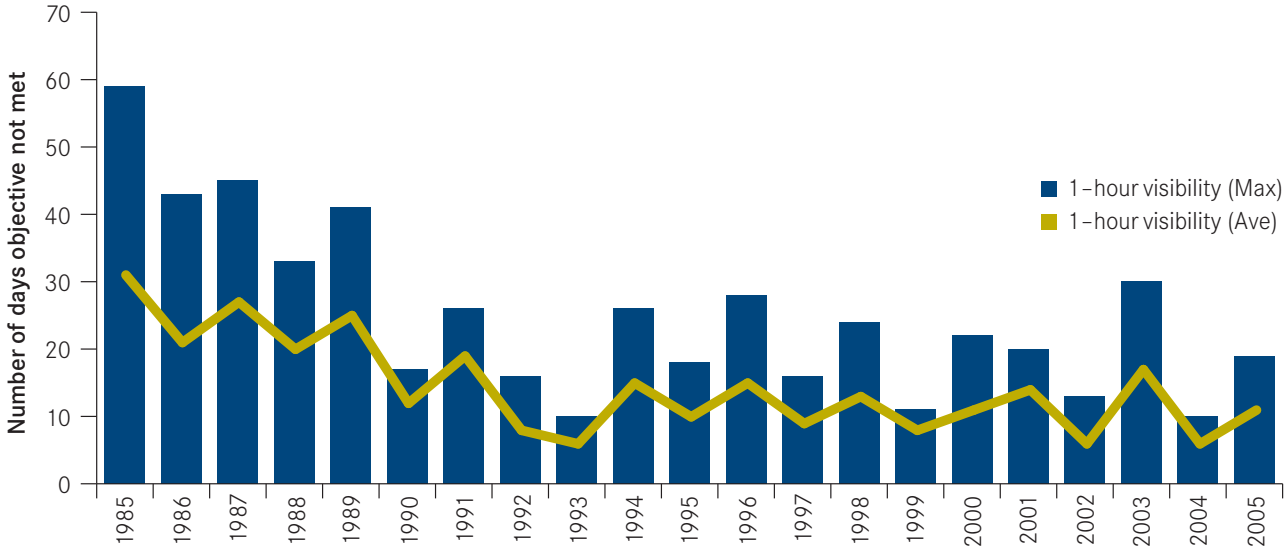
Environment Protection Authority (EPA), 2003, *Victoria's air quality–2005*, EPA Publication 1044:
www.epa.vic.gov.au/Air/Monitoring/monitoring_reports.asp

Contact

Environment Protection Authority
Manager, Air Quality Studies
EPA Victoria
Phone (03) **8458 2381**

Air quality (visibility reducing particles)

Number of days visibility objective not met in Melbourne, 1985–2005



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1-hour visibility (Max)	59	43	45	33	41	17	26	16	10	26	18
1-hour visibility (Ave)	31	21	27	20	25	12	19	8	6	15	10

	1996	1997	1998	1999	2000	2002	2001	2003	2004	2005
1-hour visibility (Max)	28	16	24	11	22	20	13	30	10	19
1-hour visibility (Ave)	15	9	13	8	11	14	6	17	6	11

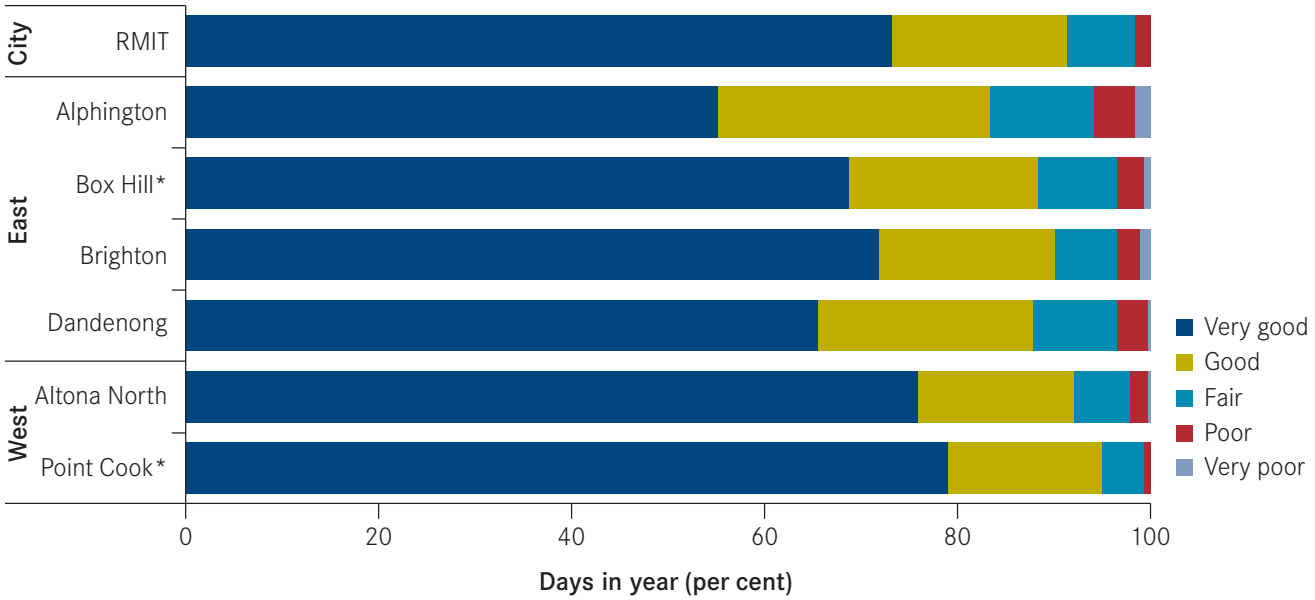
Visibility reducing particles are particles that reduce visual distance and aesthetic enjoyment. The reduction in visibility is typically associated with particles less than 2.5 micrometre ($PM_{2.5}$). These particles can penetrate deeply into the lungs. The Environment Protection Authority (EPA) has a state objective of maintaining a one-hour visibility level of at least 20 kilometres. The goal is to have no more than three days a year (by 2008) where the objective is not met (as measured at each monitoring site).

Visibility problems are mainly a concern in Victoria during autumn and winter, when the use of domestic solid fuel heaters without emission-reducing technology (for example, old wood heaters) and open fires contribute significantly to elevated particle levels.

The long-term trend for visibility in the Melbourne region indicates that during the last 20 years, visibility problems have become less frequent. Improvements are a direct consequence of controls placed on industry, motor vehicles and backyard burning, and the efforts of the community in response to EPA education and communication programs. Over the last fifteen years, however, there was no overall reduction in the number of days exceeding the air quality objective.

Days where the objective is not met are highly dependent on weather conditions and events such as bushfires. Drought-related impacts (dust storms and bushfires) during the summer of 2003, for example, contributed to a marked increase in the number of poor visibility days. Data from 2006 will also show a bushfire impact.

Air quality index for daily visibility in Melbourne, 2005



Note: * Annual data capture below 75 per cent.

The annual distribution of daily minimum visibility during 2005 in terms of EPA's Air Quality Index varies by location. Days of 'very good', 'good' and 'fair' air quality meet the air quality objective, while 'poor' and 'very poor' days exceed the objective. For the majority of stations within Melbourne, visibility is typically 'good to very good' for 90 per cent of days during the year.

For more information

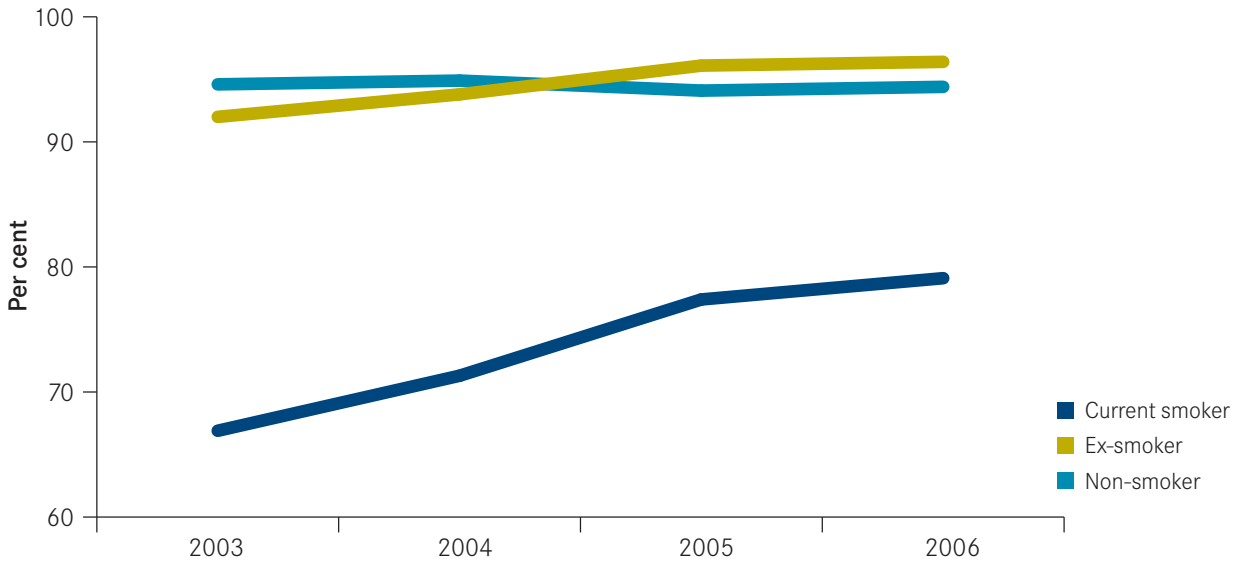
Environment Protection Authority (EPA), 2003, *Victoria's air quality–2005*, EPA Publication 1044: www.epa.vic.gov.au/Air/Monitoring/monitoring_reports.asp

Contact

Environment Protection Authority
Manager, Air Quality Studies
EPA Victoria
Phone (03) **8458 2381**

Smoke-free households with dependant children

Smoking status and maintenance of smoke-free households with dependant children, Victoria 2003–2006



Prevalence of maintaining a smoke-free household where there are dependant children, by respondent's smoking status

Year	Current Smoker		Ex-smoker		Non-smoker	
	Per cent	SE (%)	Per cent	SE (%)	Per cent	SE (%)
2003	66.9		92.0		94.6	
2004	71.3		93.8		94.9	
2005	77.4		96.1		94.1	
2006	79.1		96.4		94.4	

Source: Department of Human Services, *Victorian population health survey*, 2003–2006.

Tobacco smoke is a significant environmental contaminant of indoor air. Exposure to environmental tobacco smoke is associated with increased health risks. Children who live in households with smokers have an increased risk of respiratory disease and are more likely to experience the symptoms of asthma (ADHAC, 1998; Cook & Strachan, 1999). Household exposure to tobacco smoke is also an independent risk factor for sudden infant death syndrome (Blair et al, 1996).

Respondents to the *Victorian population health survey 2006* were categorised according to their smoking status (current smoker, ex-smoker and non-smoker) whether their households were smoke-free, and by household type. Among households with depandant children the proportion of current smoker respondent households that were reported to be smoke-free has increased, from 66.9 per cent in 2003 to 79.1 per cent, in 2006. However, this percentage remains significantly lower than that for households with depandant children where the respondent was classified as an ex-smoker or a non-smoker. In 2006, 96.4 per cent of ex-smoker respondent households and 94.4 per cent of non-smoker respondent households were reported to be smoke-free.

References

Australian Department of Health and Aged Care (ADHAC). 1998. *National drug strategic framework 1998-99 to 2002-03*, Canberra.

Blair PS, Fleming PJ, Bensley D, Smith I, Bacon D, Taylor E, Berry J, Golding J & Tripp J 1996, 'Smoking and the sudden infant death syndrome: results from 1993–95 case-control study for confidential inquiry into stillbirths and deaths in infancy', *British Medical Journal*, Volume 313, pp. 195–8.

Cook, DG., Strachan, D.P., 1999, 'Health effects of passive smoking – 10: summary of parental smoking on the respiratory health of children and implications for research', *Thorax*, Volume 54, pp. 537-66.

For more information

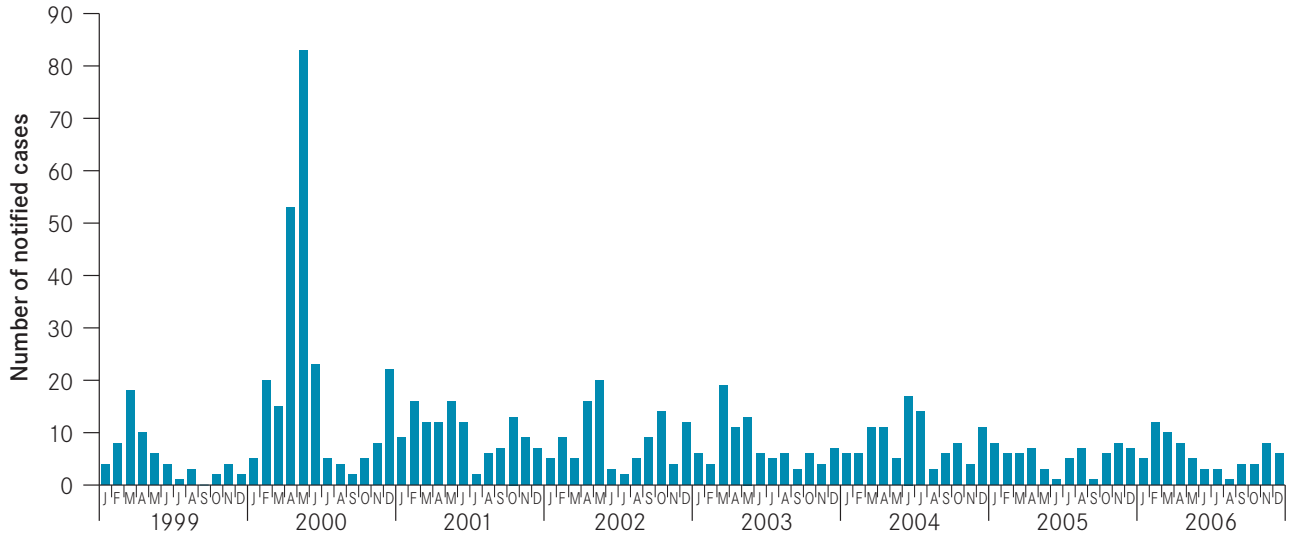
Department of Human Services, Health Intelligence Unit, Public Health, *Victorian population health survey 2006*, Melbourne: www.health.vic.gov.au/healthstatus

Contact

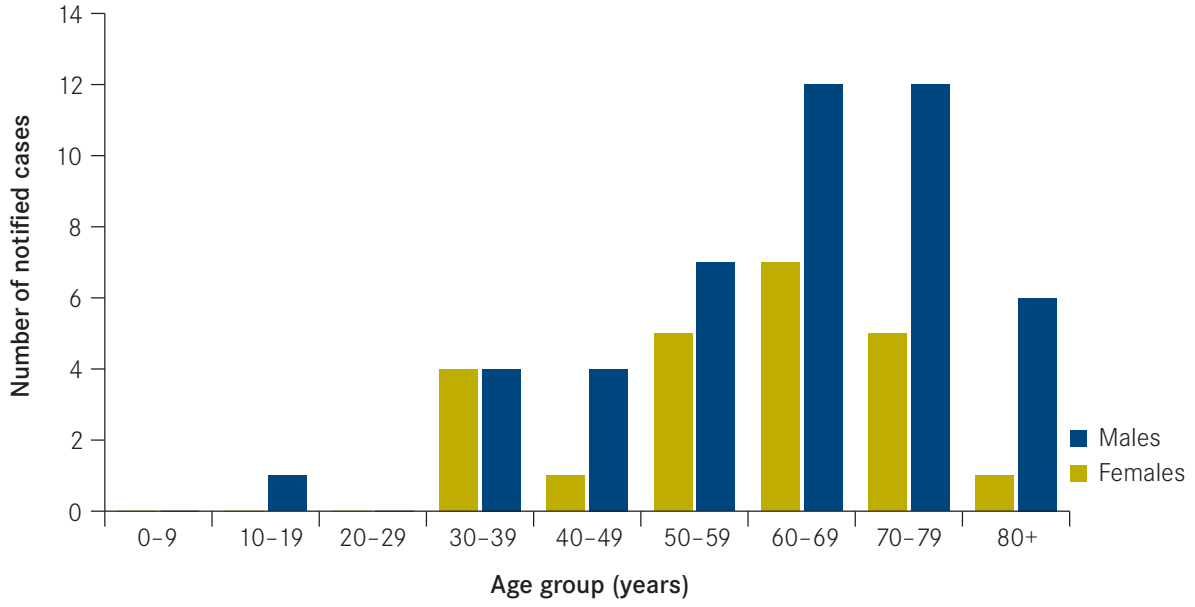
Loretta Vaughan
Health Intelligence Unit, Office of the Chief Health Officer
Public Health Branch, Department of Human Services
Phone (03) **9096 5286**
Email Loretta.Vaughan@dhs.vic.gov.au

Legionellosis notifications

Notified cases of comfirmed and probable legionellosis, Victoria, 1999–2006



Notified cases of comfirmed and probable legionellosis, by age and sex, Victoria, 2006



Legionellosis is an acute bacterial disease caused by one of several species of Legionella bacteria. *L. pneumophilia* is the most common species affecting humans, with the usual clinical manifestation being pneumonia.

Notifications have been relatively steady since 1999, with a large outbreak of more than 100 cases in April and May 2001 being associated with the Melbourne Aquarium. In 2006 there were 69 notifications of suspected or probable *Legionellosis*.

The age and sex breakdown of notified cases of confirmed and probable *Legionellosis* reflects the usual pattern of increasing incidence from young adulthood, with males being affected more commonly than females.

For more information

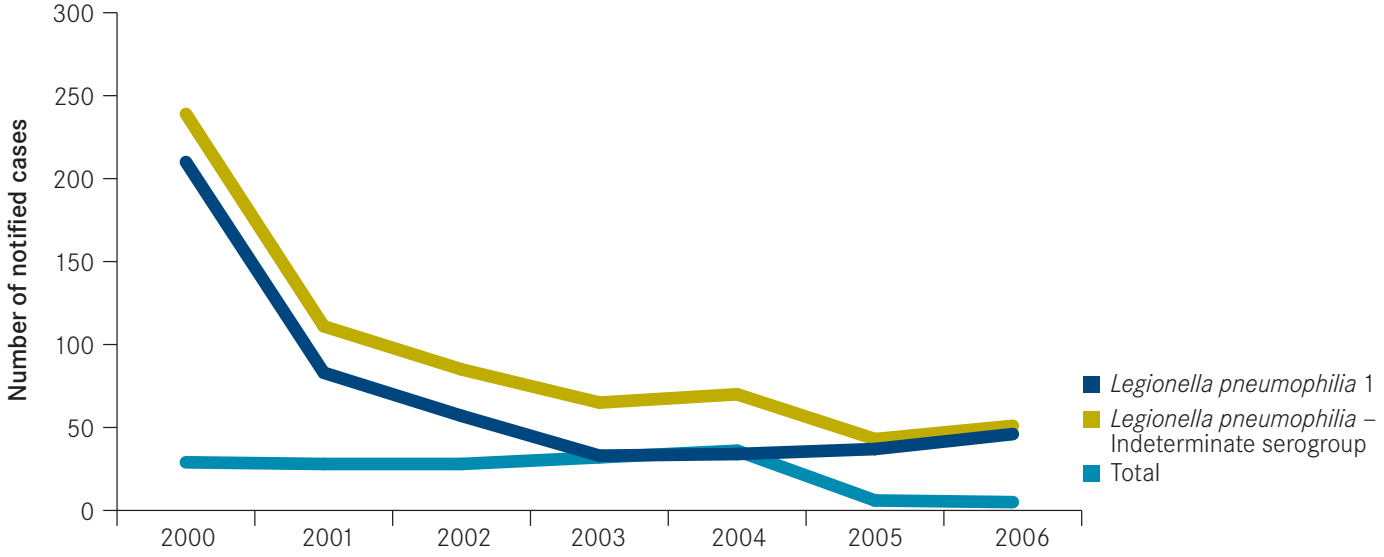
Victorian Government Health Information, *Infectious Diseases Epidemiology and Surveillance*:
www.health.vic.gov.au/ideas/surveillance/

Contact

Communicable Disease Control Unit
Public Health Branch, Department of Human Services
Phone **1300 651 160**
Fax **1300 651 170**
Email infectious.diseases@dhs.vic.gov.au

Legionella pneumophilia cases

Cases of legionellosis attributed to *Legionella pneumophilia*, Victoria, 2000–2006



		2000	2001	2002	2003	2004	2005	2006
Cases of legionellosis attributed to *Legionella pneumophilia*	*L. pneumophilia* 1	210	83	57	33	34	37	46
	L. pneumophilia – indeterminate serogroup	29	28	28	32	36	6	5
	***L. pneumophilia* – total**	**239**	**111**	**85**	**65**	**70**	**43**	**51**

Note: Number of cases of legionellosis attributed to *L. pneumophilia* and notified to Department of Human Services under the Health (Infectious Diseases) Regulations 2001. The figures include both confirmed and probable diagnoses. Separate figures are shown for *L. pneumophilia* serogroup 1, *L. pneumophilia* indeterminate serogroups, and total *L. pneumophilia* notifications. The figures for 2000 include 125 cases of legionellosis associated with the Melbourne Aquarium outbreak. The above figures do not include other species of Legionella, such as *L. longbeachae*, which have not been associated with outbreaks of legionellosis in Australia.

Source: Notifications of Infectious Diseases, Department of Human Services, *Victorian Summary Report* (prepared for general release).

Legionellosis is a potentially fatal respiratory disease caused by bacteria belonging to the genus Legionella. It particularly affects the elderly, those with chronic ailments and the immunocompromised.

Cases of legionellosis attributed to *L. pneumophilia* are health outcome indicators which are one of the measures used to gauge the success of the Government's Legionella Reform Strategy. The strategy has been progressively implemented since 1 March 2001.

Until recently, each phase of the strategy's implementation has seen a marked reduction in the number of cases of legionellosis attributed to *L. pneumophilia* in Victoria. Notified cases attributed to *L. pneumophilia* have fallen from a high of 239 in 2000, to 111 in 2001, 85 in 2002, 65 in 2003 and a slight increase to 70 in 2004, 43 in 2005 and 51 in 2006. While the trend was generally downward since the new legislation was introduced, some fluctuations are expected.

For more information

Department of Human Service, Notifications of Infectious Diseases, *Victorian Summary Report*:
www.health.vic.gov.au/ideas/surveillance

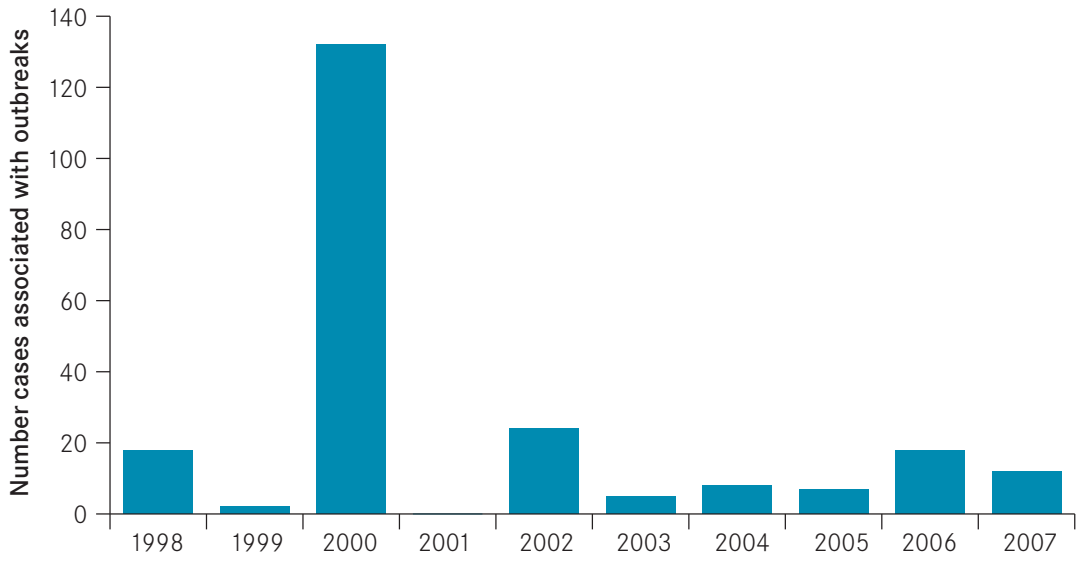
Victorian Government Health Information, Environmental Health, *Legionella*:
www.health.vic.gov.au/environment/legionella

Contact

Environmental Health Unit
Public Health, Department of Human Services
Phone **1300 761 874**

Legionellosis cases associated with outbreaks

Legionellosis cases associated with outbreaks, Victoria, 1998–2007



Source: Department of Human Services, Communicable Diseases Control, *Notifiable Infectious Diseases Surveillance (NIDS) Report*, April 2008.

A legionellosis outbreak is generally suspected where two cases have a common exposure (i.e., they are linked to within 100 metres of the same geographical location in their incubation periods and their dates of illness onset are within 14 days of each other).

As a guide, two confirmed or 'probable cases based on PCR (polymerase chain reaction)' are considered to have a common exposure if:

- the date of illness onset for one case is within 14 days (before or after) of the date of illness onset of the other; and
- both cases have been exposed to the same source during their incubation periods; and
- both cases are of the same Legionella species (i.e. *pneumophila, micdadei* or *longbeachae*).

However, due to the lack of reliability of serology, cases based on serology may be considered to be linked to the same geographical location with cases of a different species if there are more than two cases involved and after discussion with Manager General Surveillance. (Legionella Protocol, Communicable Diseases Control, Department of Human Services, July 2004).

Outbreaks of legionellosis are one of the indicators used to gauge the success of the interventions component of the Government's Legionella Reform Strategy. The strategy has been progressively implemented since 1 March, 2001.

The data reveals that, over the period shown, the number of legionellosis cases associated with outbreaks has varied from a minimum of 0 cases in 2001, to a maximum of 132 cases in 2000. All outbreaks during this period were attributed to *Legionella pneumophila* Serogroup 1.

For more information

Department of Human Services, Notifications of Infectious Diseases, www.health.vic.gov.au/ideas/notifying

Victorian Government Health Information, Environmental Health, Legionella, www.health.vic.gov.au/environment/legionella

Contact

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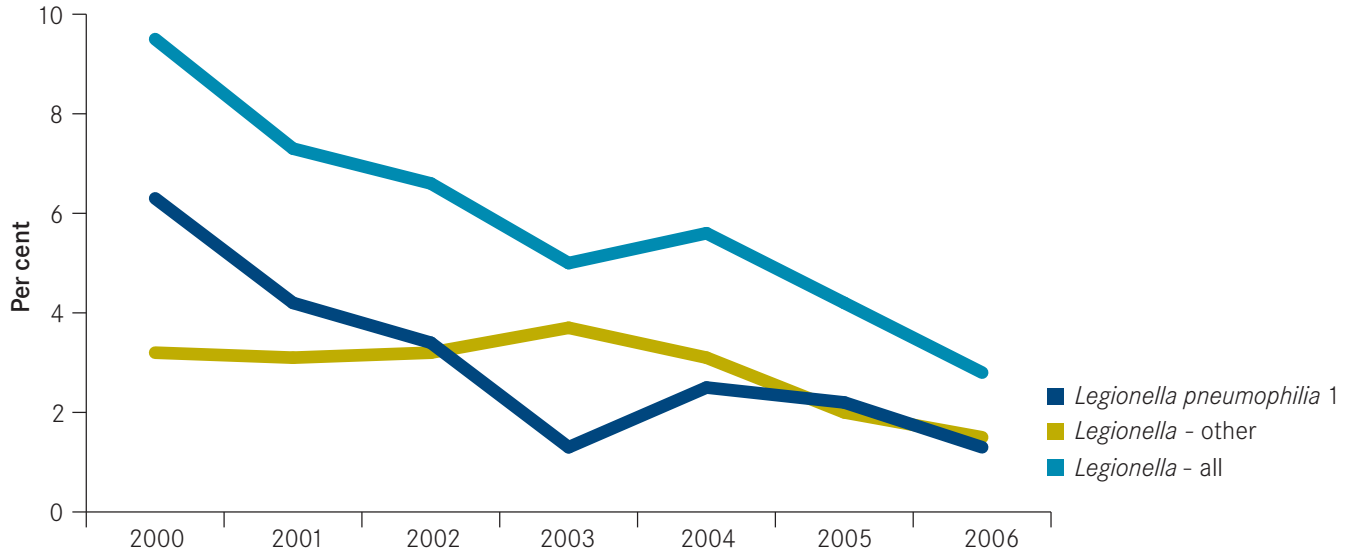
Cooling tower water samples tested positive for *Legionella*

Cooling tower water samples taken by the department that tested positive for *Legionella*, Victoria, 2000-2006



		2000	2001	2002	2003	2004	2005	2006
Percentages of cooling tower water samples that tested positive for Legionella:	*L. pneumophilia* 1	6.3	4.2	3.4	1.3	2.5	2.2	1.3
	Legionella – other types and serogroups	3.2	3.1	3.2	3.7	3.1	2.0	1.5
	***Legionella* – all positive results**	**9.5**	**7.3**	**6.6**	**5.0**	**5.6**	**4.2**	**2.8**

Note: Percentages refer to cooling tower water samples taken by Department of Human Services that, on testing according to Australia Standard AS3896, were shown to be positive for *Legionella*. The threshold limit of detection by this method is 10 *Legionella*/mL. Separate figures are shown for pneumophilia serogroup 1, *Legionella* other types and serogroups, and *Legionella* all positive results. During the above period, the number of samples taken by Department of Human Services p.a. varied within the range of 430 (year 2000) to 1,243 (2006). During the same period, the average number of cooling towers sampled p.a. varied within the range of 5 per cent (2000) to 19 per cent (2004) of towers.

Source: Data pre 1 April 2001–Microbiological Diagnostic Unit, Department of Microbiology and Immunology, University of Melbourne. Data since 1 April 2001–Victorian Government Health Information website, Environmental Health, *Legionella* www.health.vic.gov.au/environment/legionella

The percentages of cooling tower water samples taken by Department of Human Services that tested positive for *Legionella*, are exposure-based indicators which are measures used to gauge the success of the Government's Legionella Reform Strategy. The strategy has been progressively implemented since 1 March 2001.

Under the strategy, Department of Human Services undertakes targeted sampling of the recirculating water of cooling tower systems throughout Victoria. The sampling may occur as part of a routine visit by Department of Human Services staff to a site with a cooling tower system; as part of an investigation into a case of *legionellosis*; or when investigating a complaint concerning the operation of a cooling tower system.

Until recently, each phase of the strategy's implementation has seen a marked reduction in the number of Department of Human Services cooling tower water samples that, on testing, were shown to be positive for *Legionella*. The percentages of *Legionella* positive samples were 9.5 in 2000, 7.3 in 2001, 6.6 in 2002, 5.0 in 2003, a slight increase to 5.6 in 2004, 4.2 in 2005 and 2.8 in 2006. While the trend has been generally downward since the new legislation was introduced, some fluctuations are expected in the trend.

For more information

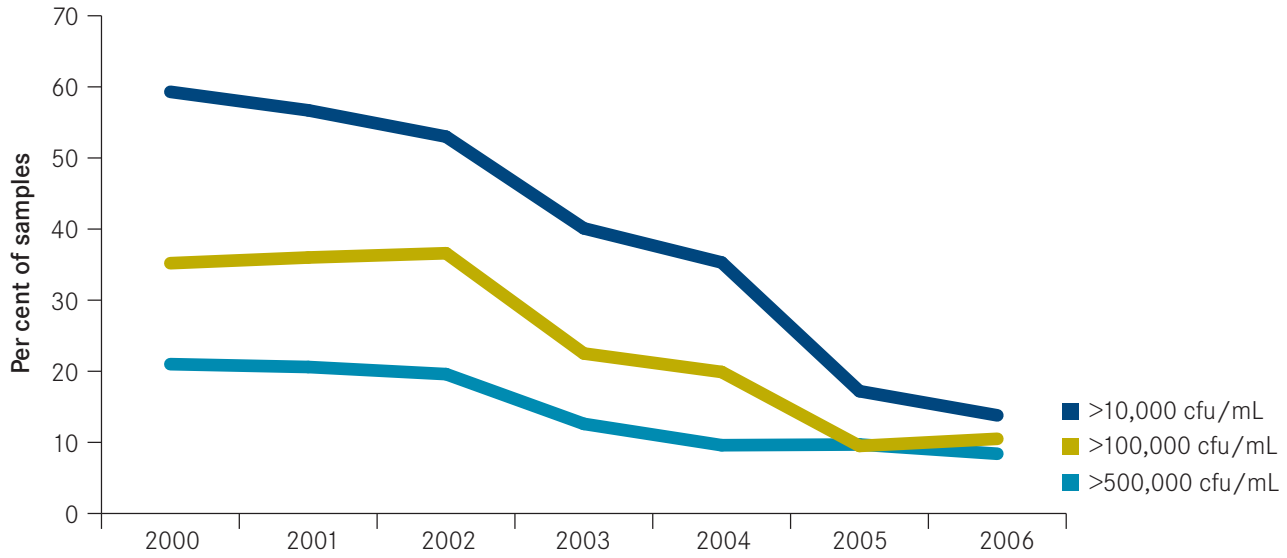
Victorian Government Health Information website, Environmental Health, *Legionella*
www.health.vic.gov.au/environment/legionella.

Contact

Environmental Health Unit
Public Health, Department of Human Services
Phone **1300 761 874**

Cooling tower water samples in higher ranges for Heterotrophic Colony Count (HCC)

Cooling tower water samples taken by the department, by range of heterotrophic colony count (HCC), Victoria, 2000–2006



		2000	2001	2002	2003	2004	2005	2006
Percentages of cooling tower	>10,000 cfu/mL	59.3	56.7	53.0	40.1	35.3	17.2	13.8
water samples in different ranges	>100,000 cfu/mL	35.2	36.0	36.6	22.5	19.9	9.5	10.5
for HCC:	>500,000 cfu/mL	21.0	20.6	19.6	12.6	9.6	9.7	8.4

Note: Percentages refer to cooling tower water samples taken by Department of Human Services that, on testing according to Australian Standard *AS4276.3.1* were found to have Heterotrophic Colony Counts (HCC):

1. exceeding 10,000 colony forming units per millilitre (cfu/mL), that is, more than 10 per cent of the current maximum level specified in the Health (Legionella) Regulations 2001.
2. exceeding 100,000 cfu/mL, that is, in excess of the current maximum level of 100,000 cfu/mL specified in the current *Health (Legionella) Regulations 2001*.
3. exceeding 500,000 cfu/mL, that is, in excess of the previous maximum level of 500,000 cfu/mL specified under the since replaced *Health (Infectious Diseases) Regulations 1990*.

During the above period, the number of samples taken by Department of Human Services per annum varied within the range of 430 (year 2000) to 1,243 (2006). During the same period, the average number of cooling towers sampled per annum varied within the range of five per cent (2000) to 19 per cent (2004) of towers.

Source: Data pre 1 April 2001–Microbiological Diagnostic Unit, Department of Microbiology and Immunology, University of Melbourne. Data since 1 April 2001–Victorian Government Health Information website, Environmental Health, *Legionella*: www.health.vic.gov.au/environment/legionella

The percentages of cooling tower water samples taken by Department of Human Services that failed to meet or exceeded the prescribed standards for HCC are exposure-based indicators which are measures used to gauge the success of the Government's *Legionella Reform Strategy*. The strategy has been progressively implemented since 1 March, 2001.

Under the strategy, the Department of Human Services undertakes targeted sampling to ascertain the HCC of the water of cooling tower systems throughout Victoria. HCC is a useful indicator both of the efficacy of biocidal treatment of cooling tower water, and the general cleanliness of cooling tower systems.

Until recently, each phase of the strategy's implementation has seen marked positive improvements in the percentages of Department of Human Services cooling tower water samples that, on testing, were shown to surpass or fail to comply with prescribed standards for HCC. While the trend since the new legislation was introduced has been consistently positive, some fluctuations can be expected in the figures in the future.

For more information

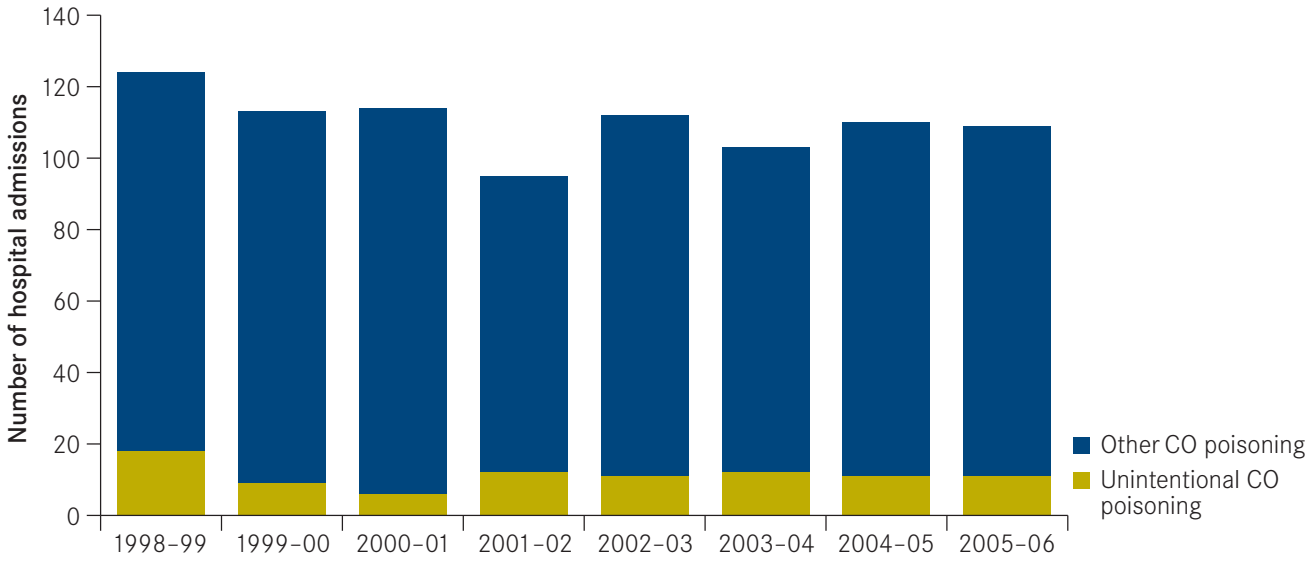
Victorian Government Health Information website, Environmental Health, *Legionella*
www.health.vic.gov.au/environment/legionella.

Contact

Environmental Health Unit
Public Health, Department of Human Services
Phone **1300 761 874**

Unintentional carbon monoxide poisoning hospital admissions

Unintentional carbon monoxide poisoning hospital admissions, Victoria, 1999-2006



Note: CO = carbon monoxide.

Unintentional CO poisoning hospital admissions

	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Unintentional CO poisonings	18	9	6	12	11	12	11	11
Other CO poisonings	106	104	108	83	101	91	99	98
Total CO poisonings	124	113	114	95	112	103	110	109
Per cent of CO poisoning admissions recorded as unintentional	14.5	8.0	5.3	12.6	9.8	11.7	10.0	10.1

Source: Department of Human Services, Victorian Admitted Episodes Dataset (VAED), 1998–99 to 2006–07, based on analysis undertaken by the Victorian Injury Surveillance Unit.

Carbon monoxide (CO) is an invisible and non-irritating poisonous gas that has no odour or taste and can cause serious illness or death. It binds to the haemoglobin rendering the red blood cells unable to carry oxygen. The brain and the heart are most susceptible to toxicity because they depend most heavily on oxygen to function. High levels of CO exposure have been associated with cardiovascular effects, neurobehavioural effects, developmental effects in utero, and death. The early symptoms of CO poisoning are frequently misdiagnosed as flu or viral illness.

CO is produced whenever organic fuels are burned, including oil, gas, kerosene, wood, coal charcoal and petrol. Household items and appliances that burn these types of fuels are usually safe when they are in good condition, serviced on a regular basis and used properly (i.e. as per the manufacturer's instructions). However, if an appliance is faulty, has a blocked flue, or is used incorrectly, or in an inadequately ventilated space, it could produce levels of CO that are potentially dangerous to life and health.

Between 1999-2006, 90 episodes of care due to unintentional CO poisonings were recorded in the Victorian Admitted Episodes Database (VAED). Unintentional poisonings represented a relatively small percentage (10.2 per cent) of total CO poisonings (all intents) during this time interval.

For more information:

Energy Safe Victoria (ESV): www.esv.vic.gov.au
Phone **1800 069 588**

Contact

Victorian Injury Surveillance Unit (VISU)
Monash University Accident and Research Centre (MUARC)
Phone (03) **9905 1908**
Fax (03) **9905 1809**
Email visu.enquire@muarc.monash.edu.au

Localities compliant with *Escherichia coli (E.coli)* water quality standards

Escherichia coli (*E. coli*) is a bacterium that can occur in water supplies as a result of faecal contamination from human, animal or vegetative sources. Detecting *E. coli* in treated drinking water supplies can also indicate that the disinfection process is inadequate or has failed.

The water quality standard for *E.coli* states that 98 per cent of samples collected over any 12-month period should contain no *E.coli* per 100mL of drinking water.

Under the *Safe Drinking Water Act 2003*, water authorities collect and report on this indicator to the Environmental Health Unit of the department. All drinking water sampling localities are monitored weekly for the presence of *E. coli*.

For the 2004–05 reporting period, 451 out of 473 water sampling localities (95.35 per cent) met the state's water quality standard for *E. coli*.

For the 2005–06 reporting period, 471 out of 493 water sampling localities (95.54 per cent) met the *E. coli* standard. Water localities that did not comply with the standard in either reporting period were Clunes, Sea Lake, Corryong (High level), Corryong (low level), Tawonga, Tawonga Ranch Road, Mount Baw Baw and Mount Buller (low level).

For more information

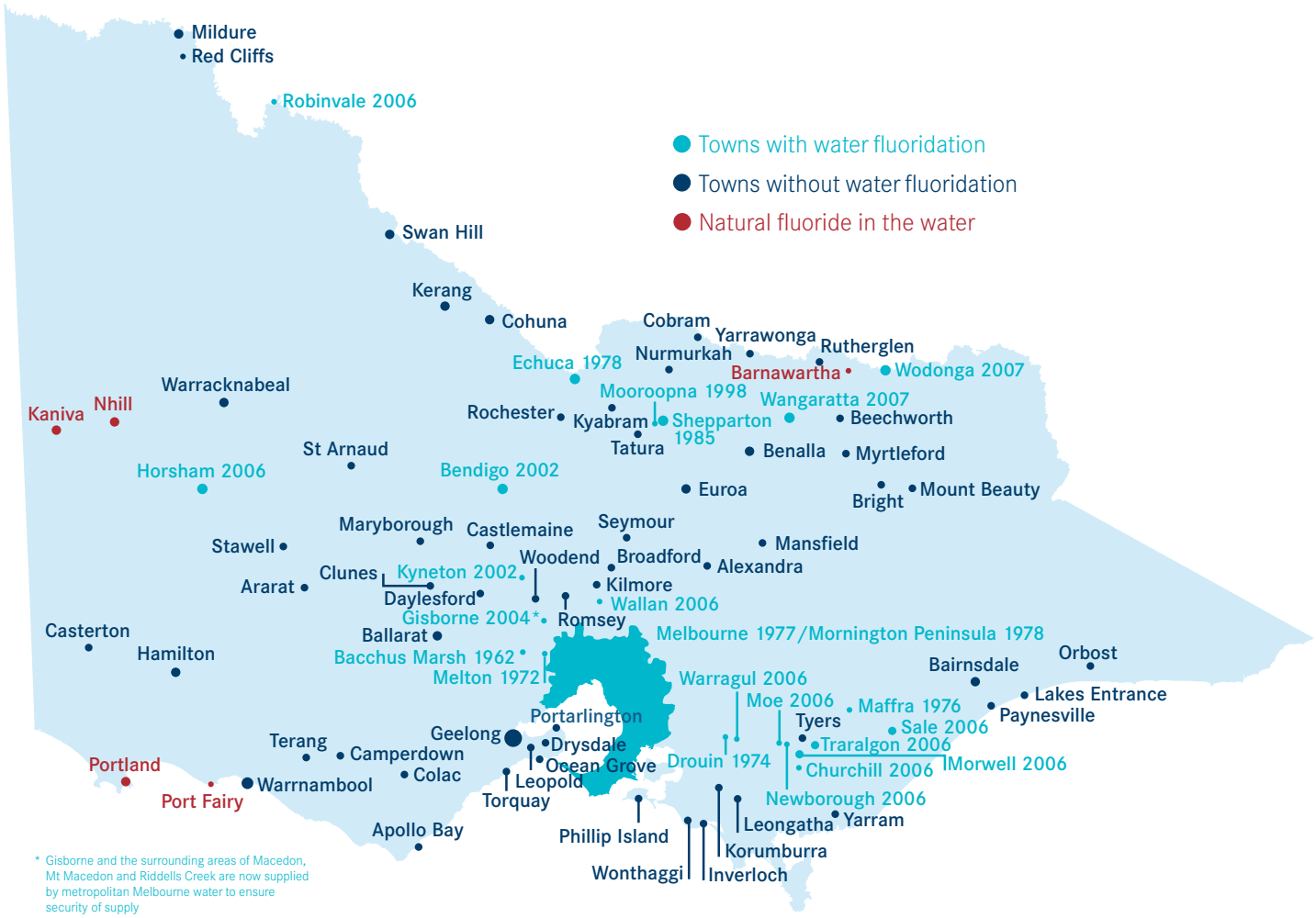
Environmental Health website: www.health.vic.gov.au/environment/water/drinking.htm

Contact

Drinking Water Regulatory Section
Environmental Health Unit
Public Health, Department of Human Services
Phone **1300 761 874**

Water fluoridation

Water fluoridation in Victoria, and dates of introduction



Water fluoridation is the adjustment of the natural level of fluoride in drinking water to around 1 part per million (1 mg/L), the optimal level that helps to protect teeth against decay. In late 2007 the National Health and Medical Research Council (NHMRC) published *A systematic review of the efficacy and safety of fluoridation*. This review stated that fluoridation of drinking water remains the most effective and socially equitable way of providing everyone with the decay-preventing benefits of fluoride.

School dental service data show that children living in fluoridated parts of Victoria have considerably less tooth decay than those living in non-fluoridated areas.

In 2004–05, across Victoria there were almost 5,000 children under the age of 10, including 250 two-year-olds, who required general anaesthetic for treatment of their dental decay. In non-fluoridated areas of Victoria, three times as many people per capita required a general anaesthetic in hospital for treatment of decay than in fluoridated areas.

Following community engagement programs over the past three years, the towns of Sale, Morwell, Moe, Traralgon, Warragul, Robinvale and Horsham were all fluoridated in 2006. Wangaratta and Wodonga were fluoridated in 2007.

Prior to 2004 approximately 74 per cent of the Victorian population had a fluoridated drinking water supply, with most of these people living in metropolitan Melbourne. In 2007, the percentage has increased to 77 per cent. The map shows the fluoridation status of Victorian towns and cities.

For more information

Environmental Health Unit: www.health.vic.gov.au/environment/water/fluoridation.htm

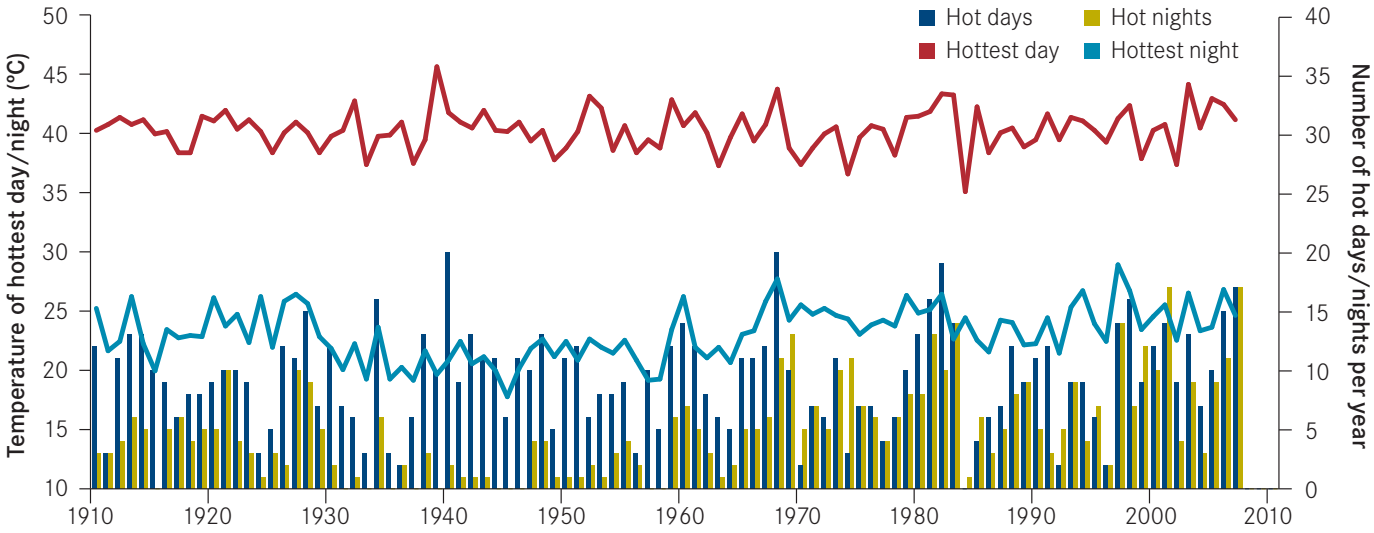
National Health and Medical Research Council (NHMRC), 2007, *A systematic review of the efficacy and safety of fluoridation*, Canberra: Australian Government.

Contact

Water fluoridation information line
Environmental Health Unit
Public Health, Department of Human Services
Phone **1800 651 723**

Hot days above 35 degrees

Hot days and nights, Melbourne, 1910–2007



Note: 'Hot days' are defined as days with maximum daily temperature of 35°C and above. 'Hot nights' are defined as days with a minimum overnight temperature of 20°C and above.

Source: Bureau of Meteorology, Measured from Melbourne weather station 86071: ftp://ftp.bom.gov.au/anon/home/ncc/www/change/HQdailyT/

Annual average temperatures have been generally increasing in Australia since the 1950s. These changes have also seen an increase in the frequency and duration of hot weather events, and a decrease in extreme cold events. The frequency of hot nights (20°C and over) has increased substantially more than the frequency of hot days (35°C and over). The hottest year on record for Victoria was recorded in 2007, which was approximately 1°C warmer than the long-term average. In Melbourne, the hottest day of 2007 was recorded during a prolonged hot weather event on New Year's Eve.

Hot weather can produce a range of adverse health events in populations, from relatively minor complaints such as cramps or exacerbation of existing chronic conditions, such as cardiovascular or pulmonary disease, to potentially fatal heat-related illnesses such as heat stroke. Groups in the community who are most at risk of developing heat-related illnesses include the elderly, very young children, people with chronic health conditions and people who are socially isolated.

Population responses to hot weather vary from place to place, based on factors such as acclimatization, the proportion of the population with specific risk factors, topography and degree of urbanisation. Climate change is expected to increase the frequency and magnitude of hot weather events in Victoria. With an ageing population, vulnerability to hot weather events is also expected to increase.

For more information

Collins, D., Della-Marta, P., Plummer, N. and Trewin, B., 2000, Trends in annual frequencies of extreme temperature events in Australia, *Australian Meteorological Magazine*, 49, 277–92.

Department of Human Services, *Climate change and health: An exploration of challenges for public health in Victoria*: www.health.vic.gov.au/environment/climate

Contact

Environmental Health Unit
Public Health, Department of Human Services
Phone **1300 761 874**

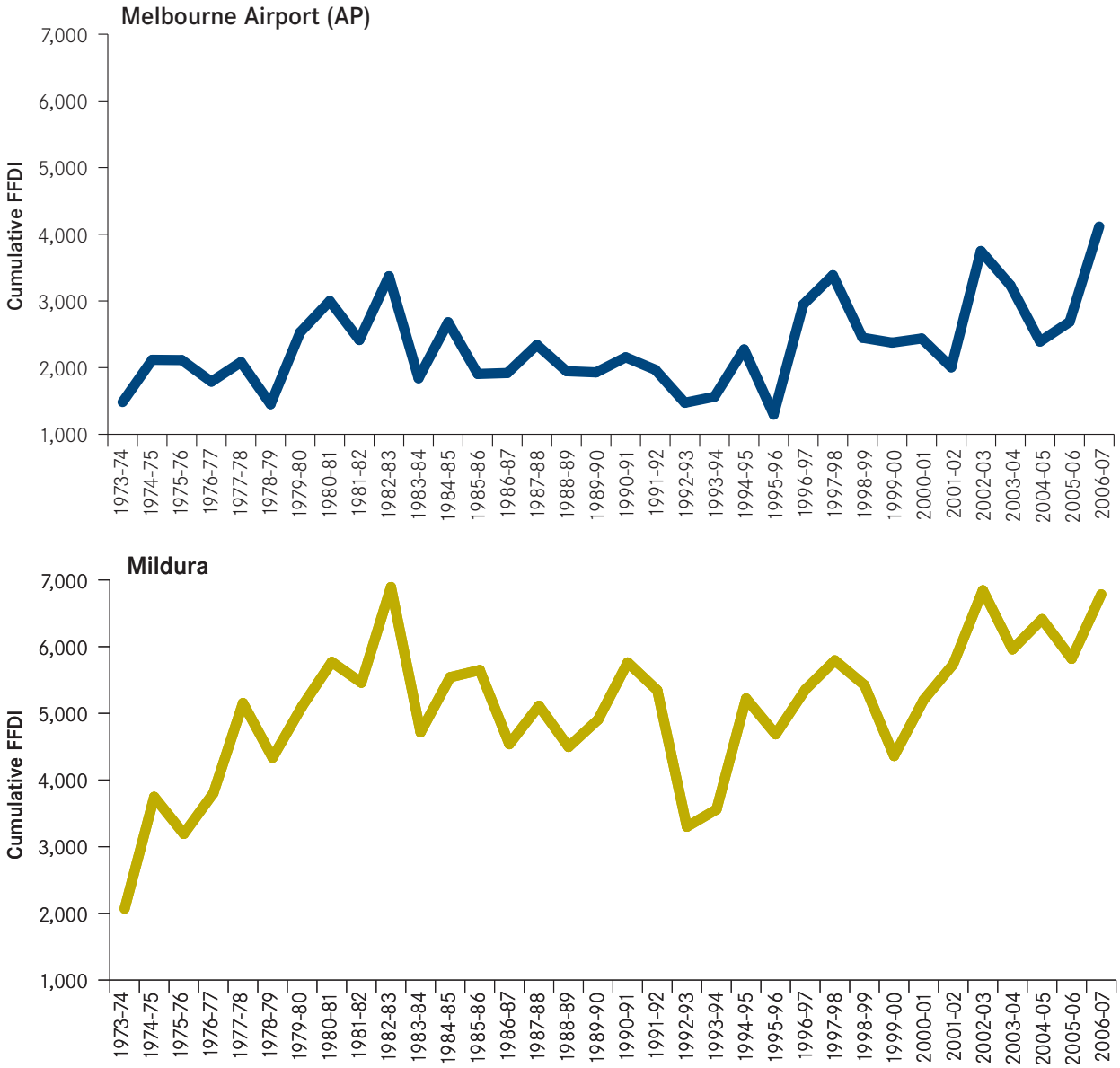
Fire weather risk

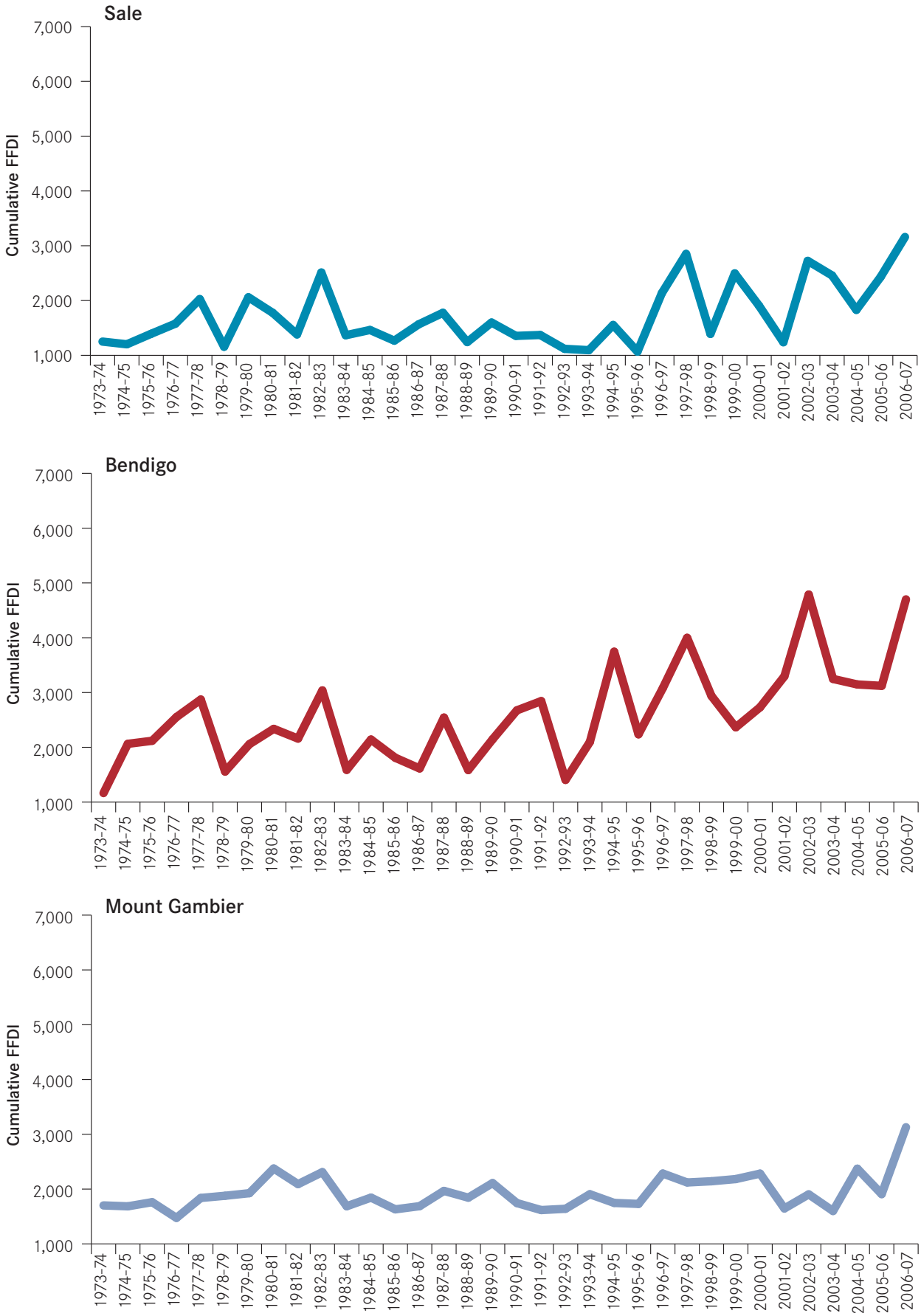
As climate change becomes a reality, one of the projected impacts is an increase in dangerous fire weather days. Overall, bushfire seasons are expected to be more extreme, with the possibility of more frequent and/or intense bushfires. This has major implications for the health of Victorians. Bushfires can cause death, injury, heat-related illness, contamination of drinking water, food safety risks (associated with disrupted power supply), stress and exhaustion. Furthermore, bushfire smoke contains fine particles and gases that can be breathed deep into the lungs. Children, the elderly, smokers and people with pre-existing illnesses such as heart or lung conditions (including asthma) are sensitive to the effects of breathing in fine particles.

The Forest Fire Danger Index (FFDI) is one of two primary indices used to quantify fire weather risk. An FFDI reading is derived from analysis of a combination of factors, including: drought, air temperature, wind speed, and relative humidity. To measure the relative strength of a given fire season, the annual cumulative FFDI is used. This represents a summation of the daily FFDI values over an entire year, defined from July through to June as this better encompasses a continuous fire season in southeast Australia than the calendar year.

Long-term records of annual cumulative FFDI reveal a positive trend for each of the 5 weather stations, indicating that bushfire risk is tending to increase over time. This trend is especially evident over the past 10 or so years.

Cumulative forest fire danger index (FFDI) at selected weather stations, 1974–2007





Source: Lucas, C, Hennessy, K, Mills, G, and Bathols, J. (2007) *Bushfire Weather in Southeast Australia: Recent Trends and Projected Climate Change Impacts*. Bushfire Cooperative Research Centre. Melbourne.

For more information

Lucas, C., Hennessy, K., Mills, G., Bathols, J., 2007, *Bushfire weather in southeast Australia: recent trends and projected climate change impacts*, Consultancy report prepared for The Climate Institute of Australia, Melbourne: Bushfire Cooperative Research Centre.

Contact

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Bushfire Cooperative Research Centre, Bureau of Meteorology
Phone (03) **9669 4783**
Fax (03) **9669 4660**
Email c.lucas@bom.gov.au

Daily ultraviolet radiation (UVR) levels

Australia has the highest incidence of skin cancer in the world, partly due to our geographical location and also our outdoor lifestyle. Over 1,500 Australians die from skin cancer each year and more than 380,000 Australians are treated for non-melanoma skin cancers each year. Skin cancer costs the health system around $300 million annually, the highest costs of all cancers. Skin cancer is still the most common type of cancer in young people and there is evidence to suggest that continuous exposure to the sun early in life as a child or teenager can significantly increase the risk of melanoma later in life. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) measures the levels of solar ultraviolet radiation (UVR) in Melbourne by recording the levels of solar UVR on a horizontal surface every 10 minutes during daylight hours.

In 1995 the joint recommendation of the World Health Organization (WHO), the World Meteorological Organization, the United Nations Environment Programme, and the International Commission on Non-Ionizing Radiation Protection was to standardise the reporting of UVR levels to the public. From this meeting they developed the UV Index, which is a number relating to how much solar UVR reaches the ground, based on the potential for skin injury. As the numbers are standardised, a UV Index of 8 in Melbourne is equivalent, for example, to a UV Index of 8 in Brisbane or Perth or London. The UV Index may be either a prediction or a measurement. Where continuous measurements are available, a 5-10 minute average is used to display the UV radiation levels during the day. One UV Index unit represents 25 mWm-2 of UV radiation.

In 2002 the UV Index categories were revised to improve its use as an educational tool to promote sun protection. The highest UV levels occur daily between 10am and 2pm (11 to 3 during daylight saving time). When the UV level reaches 3 or higher a combination of five sun protection measures (sun protective clothing that covers your arms and legs as well as your body, broad-brimmed hat, wrap-around sunglasses, SPF30+ broad spectrum sunscreen and shade) may be required for personal protection.

UV Index values are related to the UVR exposure categories as follows:

Relationship between UV Index and UV exposure category

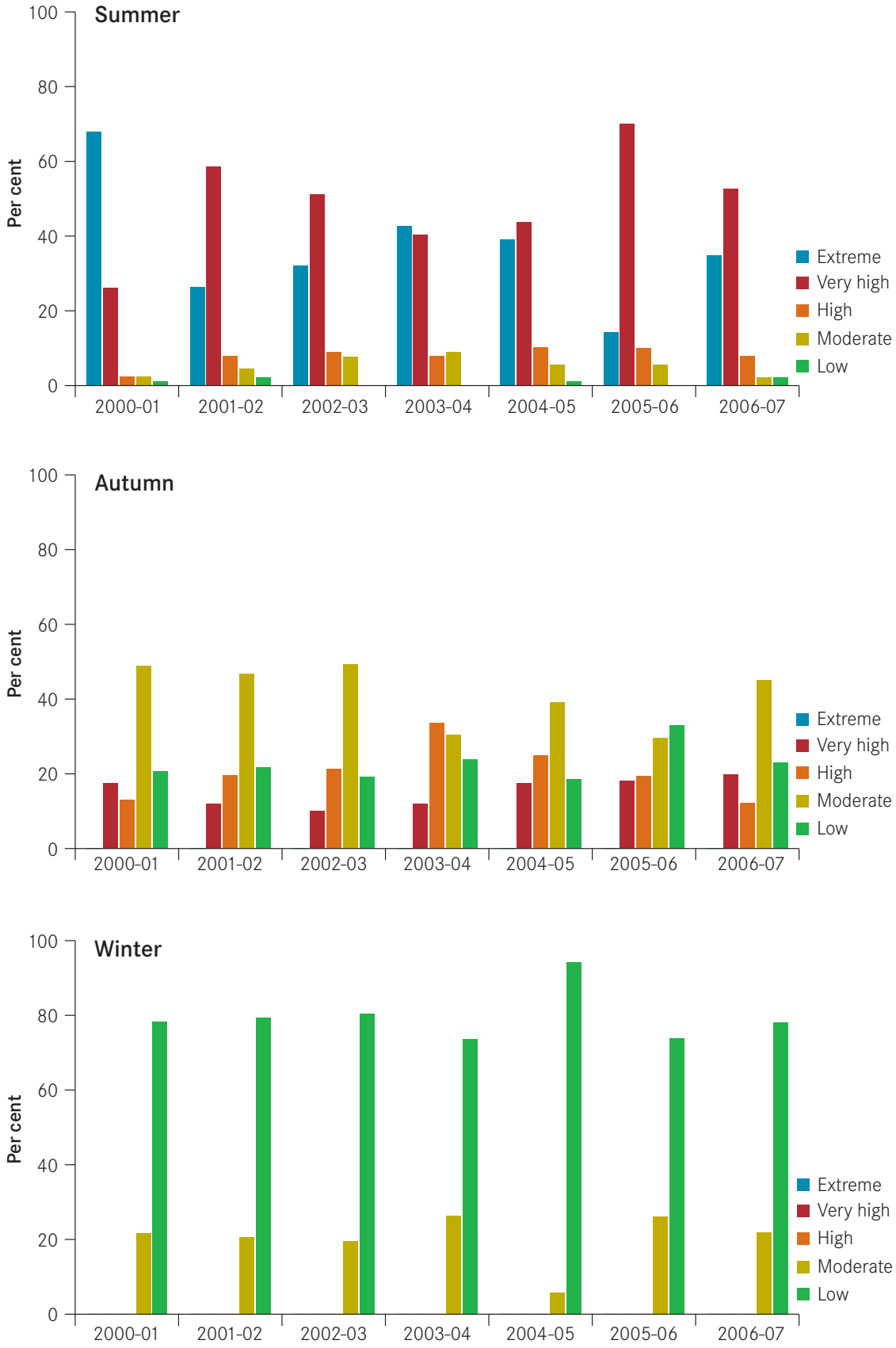
UV index	Exposure category	Interpretation
2 or below	Low	You can safely stay outdoors with minimal protection.
3 to 5	Moderate	Wear sun protective clothing, a hat, sunscreen, sunglasses and seek shady areas.
6 to 7	High	As above.
8 to 10	Very high	As above.
11+	Extreme	As above.

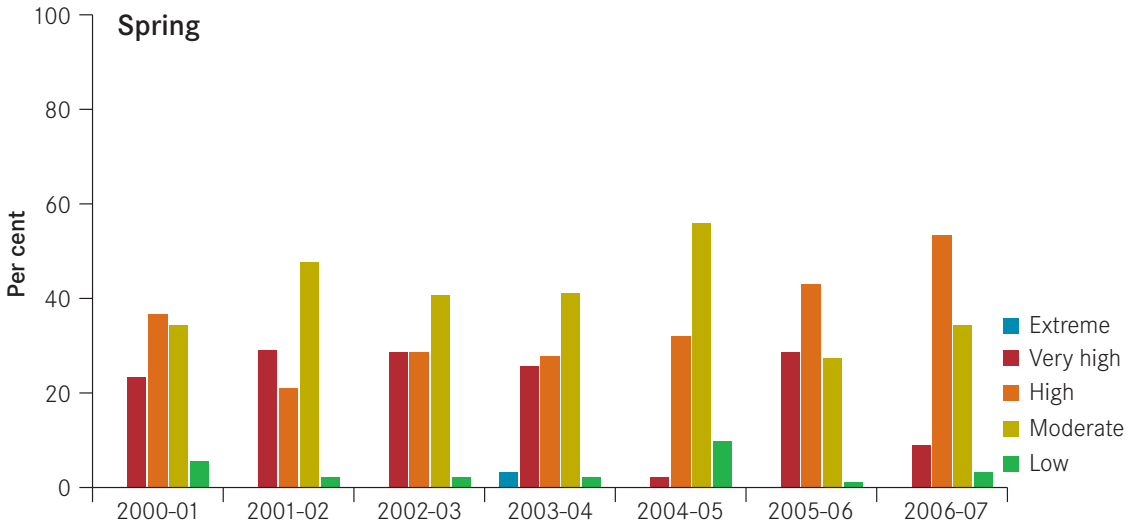
Note: The exposure categories are based on the response of fair-skinned people to UVR.

Source: World Health Organization, 2002, *Global Solar UV Index–A practical guide*; Geneva: WHO.

The distribution of UV index levels varies by location and by season. A UV Alert is issued by the Bureau of Meteorology when the UV Index is forecast to reach or exceed 3, a level that can damage your skin and lead to skin cancer. In 2007 in Melbourne there were 271 days when the reported value of the UV Index exceeded a UV level of 3 (moderate and above) and 89 days when the UV Index was below 3 – indicating that, under normal circumstances, no protective measures were needed. Historical data indicate that this threshold UV Index value is exceeded, on average, in Melbourne in all seasons except winter. Occasionally during winter on a sunny day the UV Index may exceed 3.

Distribution of reported UV Index days, by season, Melbourne, Victoria, 2000/01–2006/07





Source: Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), reported daily solar UV radiation level data for Melbourne, December 1 2000 to November 30 2007.

For more information

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) website provides realtime and historical UV Index data: www.arpansa.gov.au/uvindex

Lucas, R., McMichael, T., Smith, W., Armstrong, B. 2006, *Solar ultraviolet radiation: Global burden of disease from solar ultraviolet radiation*, Environmental Burden of Disease Series no 13, Geneva: Public Health and the Environment, World Health Organization.

Samanek, A.J., Croager, E.J., Gies, P., Milne, E., Prince, R., McMichael, A.J., Lucas, R.M., Slevin, T., 2006, 'Estimates of beneficial and harmful sun exposure times during the year for major Australian population centres', *Medical Journal of Australia*, Volume 184 No 7, pp. 338–341.

World Health Organization, 2002, *Global Solar UV Index–A practical guide*, A joint recommendation of the World Health Organization, World Meteorological Organization, United Nations Environment Programme, and the International Commission on Non-Ionizing Radiation Protection, Geneva: World Health Organization.

Contact

Environmental Health Unit
Public Health, Department of Human Services
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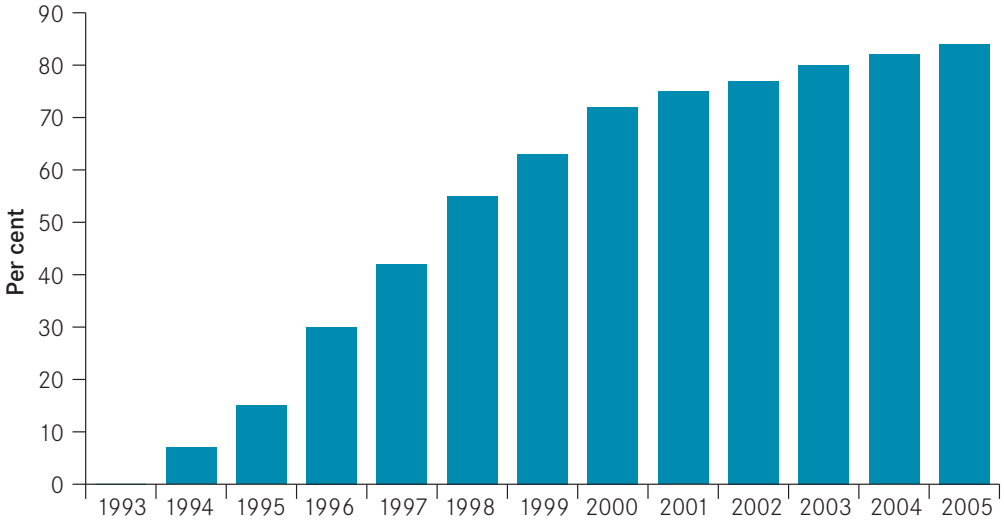
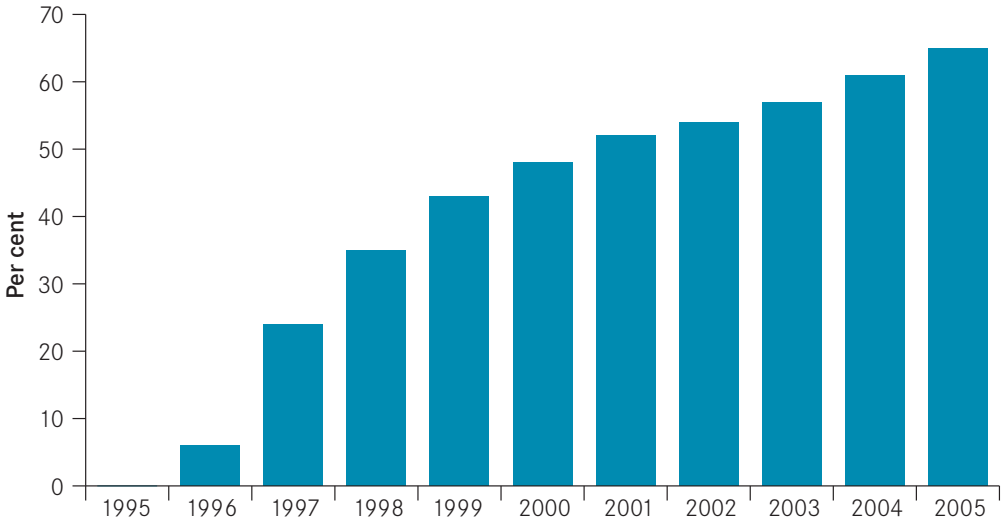
SunSmart programs

Primary schools registered as SunSmart in Victoria, 1993–2005



Early Childhood Services registered as SunSmart in Victoria, 1995–2005



Note: These graphs represent approximate numbers. The overall number of early childhood services is very fluid with some services closing and many more opening over the last 10 years. The number of primary schools has also fluctuated. The percentages are calculated based on the current total number of services.

In 1980, a strong message about sun protection was delivered to Victorians with the launch of the then Anti-Cancer Council of Victoria's Slip! Slop! Slap! campaign. A broader SunSmart Program began in 1988.

Research showed that over a decade after SunSmart was launched, awareness of the need to avoid exposure to ultraviolet radiation or engage in sun protection behaviour has increased. The proportion of Victorians who reported that they liked to get a suntan decreased markedly from 61 per cent in 1988 to 35 per cent in 1998. The percentage agreeing that 'friends think a suntan is a good idea' dropped from 69 per cent in 1988 to 36 per cent in 1998. Similarly, those agreeing that 'it is easier to enjoy summer once you get a tan' fell from 62 per cent to 29 per cent over the period and those agreeing that 'I feel more healthy with a suntan' fell from 51 per cent to 20 per cent.

Findings also showed a consistent increase from 1988 to 2001 in the proportion of people who reported seeking shade, using a hat and sunscreen, covering up and choosing not to go out in the sun between 11am and 3pm on summer weekends. There was a 50 per cent reduction in people getting sunburnt in the decade from 1988–99.

SunSmart Schools and Early Childhood Programs

The SunSmart Schools Program was launched in 1994. During that year 151 schools developed a comprehensive sun protection policy approved by The Cancer Council Victoria and joined the SunSmart Schools Program.

SunSmart criteria include:

- availability and use of shade
- following sun protection measures
- providing information for children, staff and families
- staff role modelling sun protective behaviours.

In 2005 there were 1,625 SunSmart schools in Victoria, representing 84 per cent of all Victorian primary schools.

The SunSmart Schools and Early Childhood Program started in 1996. There was a steady increase in the number of participating early childhood centres and preschools over the last decade. In 2003, SunSmart Family Day Care schemes commenced and then SunSmart Playgroups in 2005.

In 2005 there were 1,650 early childhood services participating (preschools, childcare centres, family day care and playgroups). This represents approximately 65 per cent of all early childhood services in Victoria (not including playgroups).

For more information

SunSmart website: www.sunsmart.com.au/

Contact

Environmental Health Unit
Public Health, Department of Human Services
Phone **1300 761 874**