health

# Hazelwood coal mine fire February–March 2014

## Assessment of short term health impacts in Morwell and the Latrobe Valley

Interim report May 2014

Department of Health

State Government Victoria

# Hazelwood coal mine fire February–March 2014

## Assessment of short term health impacts in Morwell and the Latrobe Valley

## Interim report May 2014

If you would like to receive this publication in an accessible format, please phone insert phone number using the National Relay Service 13 36 77 if required, or email: insert email address@health.vic.gov.au

This document is available as a PDF on the internet at: www.health.vic.gov.au/insert web address



Authorised and published by the Victorian Government, 1 Treasury Place, Melbourne

(If using images, insert) Except where otherwise indicated, the images in this publication show models and illustrative settings only, and do not necessarily depict actual services, facilities or recipients of services.

(If professionally printing, complete the following line – otherwise delete)
Printed by insert printing company name, suburb. Printed on sustainable paper.

Insert month and year (insert job number in brackets, if applicable)

# Contents

# 1. Hazelwood coal mine fire

On 9 February 2014 a grass fire, believed to have been deliberately lit, spread to disused areas of the coal mine at the Hazelwood power station complex near Morwell in the Latrobe Valley. The fire was unusual in two important respects:

- The substrate for the fire was brown coal, rather than vegetation
- the fire burned, and hence emitted smoke, at the same location, adjacent to the town of Morwell, for over four weeks.

The fire was declared controlled on 10 March 2014 and considered extinguished on 25 March, 45 days after it started.

During the time of the fire the Latrobe Valley region experienced high levels of smoke which impacted on local air quality, with periods of low visibility due to high particle concentrations in the air. The EPA closely monitored air quality throughout the period of the Hazelwood coal mine fire. Air samples were collected using both fixed monitoring stations and specifically located canisters during high smoke days. Samples were tested for a large number of substances, including carbon monoxide, volatile organic compounds (VOC) and particulate matter ($PM_{10}$ and $PM_{2.5}$), that may be found in the smoke. The EPA provided these results to the Department of Health to interpret and provide advice the potential health impacts associated with the smoke, its components and the ash distributed into the local area.

The Hazelwood open cut mine fire was a brown coal fire. Coal is made up of carbon compounds, metals and other elements. When coal burns it emits various compounds that are formed while it burns – the main ones being carbon dioxide (CO2) and carbon monoxide (CO). In most Australian towns and cities, levels of carbon monoxide already exist in the air as a result of emissions from the wide scale use of fossil fuels. Carbon monoxide can be found in exhaust fumes from cars, petrol and gas engines, gas ovens and cooktops, generators, lanterns, BBQs and gas and wood heaters[1]. Table 3 in Section 3 of this report provides further detail of measurement of blood levels of CO (as COHb) and associated clinical features. Smoke from coal burning also contains a range of other chemical compounds and elements[2] that are either present in the coal, or form while the coal burns.

Particulate matter (PM) is a term that refers to any particle that can be found in the air. Particles are measured as $PM_{2.5}$ (2.5 micrometres or less in diameter) or $PM_{10}$ (10 micrometres or less in diameter). This particulate matter is so small it can be inhaled into the lungs and can result in a variety of health effects.

Ash particles are too big to be breathed into the lungs, however ash may irritate the eyes, nose or throat and also be mildly irritating to the skin. Ash was present during the fire period and may also be of concern during clean-up activities, which have the potential to stir up residual ash material.

The effect that smoke has on an individual depends on their age, pre-existing medical conditions such as asthma or heart disease, and the length of time they are exposed to the smoke. Signs of smoke irritation include itchy eyes, sore throat, runny nose and coughing. Healthy adults usually find that after a short exposure to smoke these symptoms clear up once they are away from the smoke.

Children, the elderly, pregnant women, smokers and people with pre-existing illnesses such as heart or lung conditions (including asthma) are more sensitive to the effects of breathing in fine particles. Symptoms may worsen and include wheezing, chest tightness and difficulty breathing.

[1] http://www.epa.vic.gov.au/air-quality-latrobe-valley-mine-fire/air-quality-testing
[2] http://www.epa.vic.gov.au/air-quality-latrobe-valley-mine-fire/whats-in-the-brown-coal

## Affected communities

The southern area of Morwell is most closely located to the Hazelwood  coal mine. The greater Latrobe Valley region including Moe, Churchill, Traralgon and surrounds were also considered to experience changes to air quality as a result of the fire. The boundary definitions used in this report vary depending on the data sources used (see Methods: Figure 9 on page 21, Figure 10 on page 22 and Statistical Geography on page 24).

## Short term health impact assessment

### Community Health Assessment Centre

The Community Health Assessment Centre (CHAC) was established by the Department of Health and Ambulance Victoria in Morwell to provide basic health assessments to residents. It operated from 21 February until 30 March 2014. Over 2,000 people visited this Centre. A limited number were referred to their General Practitioner, or the emergency department of Latrobe Regional Hospital, for further assessment. Details of presentations to the CHAC are presented in Section 3.

### Monitoring heath service activity

Health service activity was monitored during the incident period through the evaluation of:

- calls to NURSE-ON-CALL
- Ambulance Victoria call outs
- qualitative assessment of appointment demand and common themes of consultations at 23 general practice clinics in the Latrobe Valley; and
- numbers of presentations to the Latrobe Regional Hospital (LRH) emergency department.

# Purpose of this report

This interim report primarily summarises the data collected and used for situational monitoring at the time of the Hazelwood  coal mine fire. Health service activity is reported for the period 9 February–10 March and, where possible, comparisons are made with the same period in previous years. CHAC information is presented for its entire operating period. GP clinic activity is reported for the period 28 February–4 April 2014. Preliminary data is presented, and where further data or additional analysis is required, this has been noted for inclusion in an expanded report to be presented later in 2014.

# 2. Health service activity

## Key points

- Between 9 February and 10 March 2014, 46 calls were made to NURSE-ON-CALL for respiratory-related reasons, compared with 15 calls for the same period in 2013 and 18 calls for the same period in 2012. These calls were mostly made from localities within Morwell and Traralgon postcode areas.
- Almost two-thirds of calls (61 per cent) were queries relating to the health of an adult. Calls were mainly about breathing difficulties (39 per cent), asthma (24 per cent) and cough (24 per cent).
- Ambulance Victoria respiratory-related priority dispatches (as a proportion of total dispatches) for the Gippsland region or Morwell area (encompassing localities falling within a 50km radius of the Hazelwood coal mine) for the period 9 February–10 March 2014 did not significantly differ from the same period in 2013.
- During the period of the Hazelwood coal mine fire, GP practices in Morwell, Moe, Churchill and Traralgon reported they observed increases in consultations which related to respiratory conditions (breathing difficulties or asthma, chronic obstructive pulmonary disease (COPD) exacerbation, coughing or throat irritations), anxiety associated with increased smoke and ash, and requests for carbon monoxide testing.
- Although there was increased demand, GP practices were still able to schedule urgent appointments and see patients in a timely manner throughout this period.

## NURSE-ON-CALL respiratory-related telephone calls

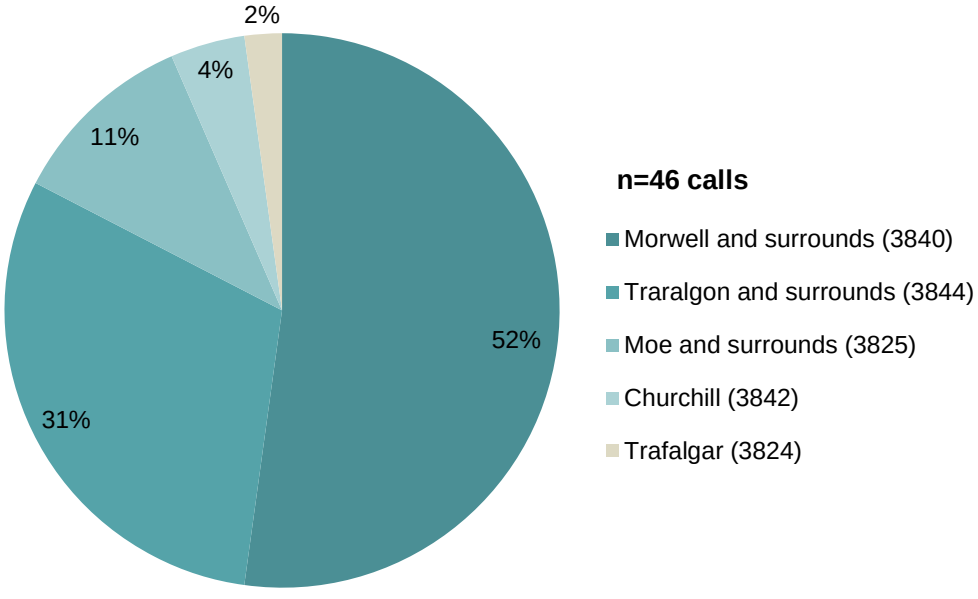
The NURSE-ON-CALL telephone service is operated by Medibank Health Solutions, which provides immediate, expert health advice from a registered nurse, 24-hours a day, seven days a week. Residents who were worried about their health were encouraged to use the NURSE-ON-CALL service.

De-identified data was provided to the department for calls to NURSE-ON-CALL originating from Latrobe City area[3] that, based on the caller's presenting symptoms, related to a subset of triage guidelines reflecting air quality and/or respiratory symptoms. These included allergies or hayfever symptoms in children (0–14 years) or adults (15–120 years), asthma attack in children or adults, wheezing other than asthma in children, breathing difficulties in children or adults and cough in children or adults.

[3] Data requested from Medibank Health Solutions was for NURSE-ON-CALL calls originating from the Latrobe Valley postcode area only (3824, 3825, 3840, 3842, 3844, 3854, 3856, 3857, 3869, 3870, 3871, 3971 - see Figure 9, page19).

Between 9 February and 10 March 2014, there were 46 calls were made to the NURSE-ON-CALL service from the Latrobe City area about respiratory-related concerns. This compares to 15 calls for the same period in 2013 and 18 calls for the same period in 2012 (preliminary comparisons – refer to *Data considerations*). Just over half (52 per cent) of calls came from Morwell and locations within the postcode 3840; 30 per cent of calls came from Traralgon and locations within the postcode 3844, with the remaining calls from Moe and surrounds (within the postcode 3825), Churchill or Trafalgar (Figure 1). A map showing the location of these areas in relation to the Hazelwood power station is provided in Methods (Figure 9, page 21).

**Figure 1: Distribution of calls made to NURSE-ON-CALL (as a proportion of total NURSE-ON-CALL respiratory-related calls) from locations across Latrobe City.**



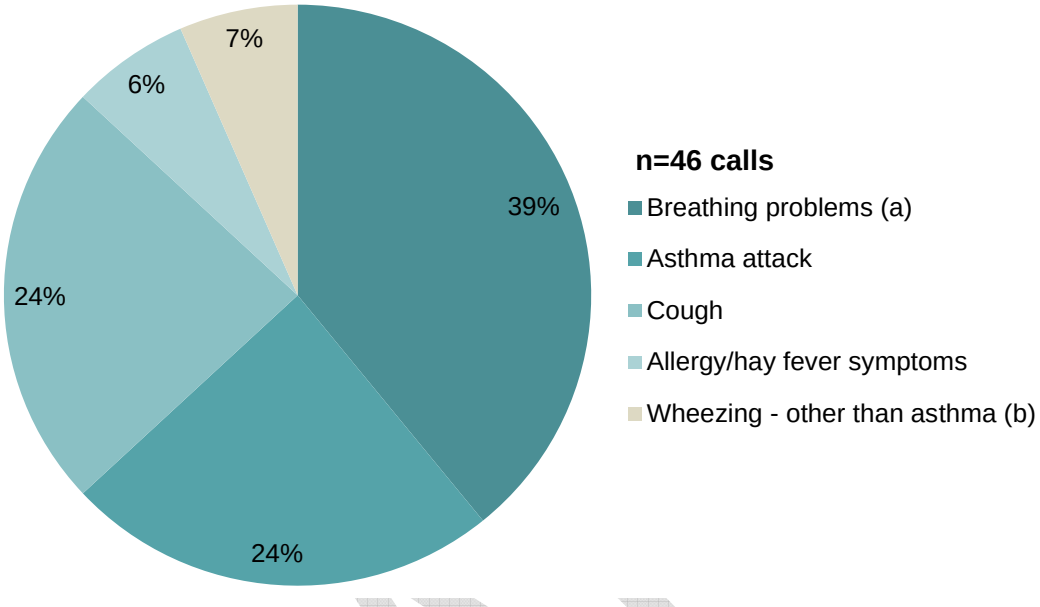

Source: Medibank Health Solutions.

Postcodes correspond to the following locations: 3840 = Hazelwood North, Jeeralang Junction, Morwell, 3844 = Traralgon, Traralgon East, Tyers, 3825 = Moe, Tanjil South, Newborough, Yallourn, Rawson, Yallourn North, 3842 = Churchill, 3824 = Trafalgar

Callers to the service were predominantly female (91 per cent). Half (54 per cent) were aged 15–39 years, one-third (35 per cent) of callers were aged 40–64 years and 11 per cent were aged 65 years or over. Almost two-thirds (61 per cent) of calls were about the health of an adult, with the remaining calls (39 per cent) relating to the health of a child under 15 years of age.

Figure 2 shows that, of the respiratory-related calls (n=46 calls) to the service between 9 February–10 March 2014, 39 per cent were about breathing problems, 24 per cent of calls were about each of asthma attack and cough, while fewer calls related to allergy or hay fever symptoms (7 per cent) or non-asthma wheezing in children (7 per cent).

**Figure 2: Telephone calls to NURSE-ON-CALL service, by respiratory-related topic (as a percentage of all respiratory-related calls), 9 February–10 March 2014**




(a) including severe breathing difficulties - paediatric

(b) paediatric only

**Data considerations**

In order to eliminate the possibility that the increase in calls observed between 2013 and 2014 is due to an increase in total calls to the service, further data needs to be sought for the total calls made during the period of interest. Additional analysis will be required to evaluate differences in activity of respiratory-related calls as a proportion of total calls made to NURSE-ON-CALL. Furthermore, comparisons between 2014 call rates and previous years will need to be made using an average call rate determined from pooled data from multiple previous years to account for year to year variability.

## Ambulance Victoria respiratory-related priority dispatches

Ambulance Victoria provides medical care and transport for Victorians in both emergency and non-emergency situations. The service is provided across the state, however the information presented in this section is about emergency ambulance call outs, or priority dispatches, for the Gippsland region and for the Morwell area (defined as localities falling within a 50km radius of the Hazelwood coal mine – see Methods, Figure 10, page 22). Priority dispatches where cases were regarded as respiratory-related are also presented. Comparisons are made to the same period in 2013.

In Gippsland, between 9 February and 10 March 2014, there were 3,228 priority ambulance dispatches, 302 of which were respiratory-related (Table 1). Of these dispatches, 1,758 priority ambulance dispatches (54 per cent) were specifically to the Morwell area, 184 of which were respiratory-related (representing 61 per cent of respiratory-related dispatches for the Gippsland region). Between 2013 and 2014, the absolute number of respiratory-related dispatches increased by 5 per cent, in both the Gippsland region and the Morwell areas. These comparisons do not account for population growth.

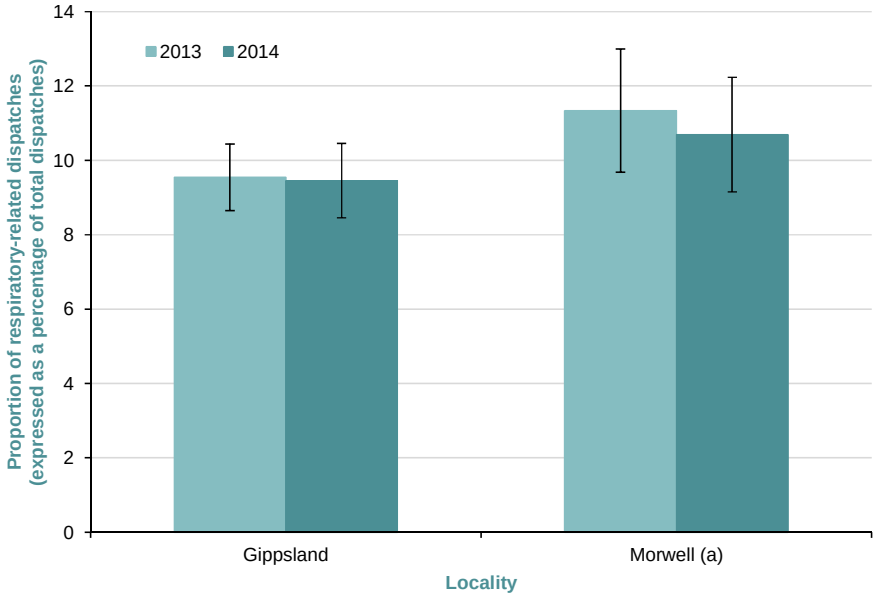
**Table 1: Total Ambulance Victoria priority dispatches and respiratory-related priority dispatches for Gippsland and Morwell, 9 February–10 March, 2013 and 2014**

| Year | Gippsland | Morwell[(a)] |
|---|---|---|
| **Priority dispatches** | | |
| 2013 | 3,005 | 1,561 |
| 2014 | 3,228 | 1,758 |
| Increase 2013 to 2014 | 7% | 13% |
| **Respiratory-related priority dispatches** | | |
| 2013 | 288 | 175 |
| 2014 | 302 | 184 |
| Increase 2013 to 2014 | 5% | 5% |

(a) Morwell and localities falling within a 50km radius of the Hazelwood coal mine fire

Figure 3 shows respiratory-related priority dispatches, expressed as a proportion of total priority dispatches, for the period of the Hazelwood coal mine fire (9 February–10 March 2014), compared with the same period for the previous year. There were no significant differences (assessed by 95% confidence intervals) in the proportion of respiratory-related priority dispatches for Gippsland or Morwell between 2013 and 2014.

**Figure 3: Ambulance Victoria respiratory-related priority dispatches (as a percentage of total priority dispatches) for Gippsland and Morwell[(a)], 9 February–10 March, 2013 and 2014**




(a) Morwell and localities falling within a 50km radius of the Hazelwood coal mine fire
Error bars represent 95 per cent confidence interval.

**Data considerations**

Comparisons made between years in this section have not accounted for any impact that changes in population size and/or characteristics may have on the number of priority dispatches.

While ideally, comparisons between 2014 dispatches and previous years will need to be made to an average determined from pooled data from multiple previous years to account for year to year variability, only one year of previous data with the same collection parameters was available at this time from Ambulance Victoria.

## General practice clinic activity

The Department of Health first contacted general practice clinics directly on 19 February and collected qualitative information on any increases in attendances and any impact on service capacity. Thereafter, the Gippsland Medicare Local (GML) collected information from 23 general practice clinics in Morwell, Moe, Traralgon and Churchill between 20 February and 4 April 2014. The department sought updates on clinic activity from GML approximately every three to five days during this period. Practice managers and GPs gave information to GML staff on:

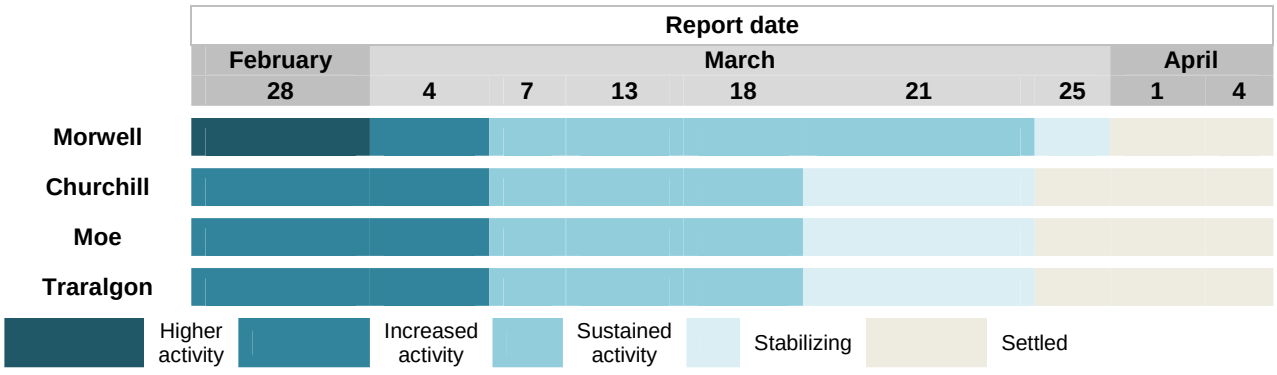
- whether their practice was seeing any increase in consultations for conditions or concerns potentially related to smoke exposure or air quality
- the types of presentations which were being seen
- whether there were any particular concerns they may have about specific groups (including the elderly, pregnant women and children)
- if, in the last 24–48 hours, the practice had been unable to schedule urgent appointments or been unable to see patients due to increased demand.

This section presents a qualitative assessment of reported patterns in general practice clinic activity over the data collection period.

## Consultation activity

Apparent patterns in consultation activity at 23 GP clinics in Morwell, Moe, Traralgon and Churchill reported between 28 February and 4 April 2014, based on narrative information provided by practice staff, are summarised in Figure 4.

**Figure 4: Summary of apparent patterns in consultation activity at 23 GP clinics in Morwell, Moe, Traralgon and Churchill between 28 February and 4 April 2014**




At 28 February 2014, the larger practices in Morwell were reporting pronounced increases in consultations above what they usually observed; however practices had not needed to extend opening hours. At this time, practices in Churchill, Traralgon and Moe were also reporting moderate to considerable increases in consultation demand, although appointments were still available. The conditions reported to be associated with the perceived increases in consultation demand are summarised in Box 1; practices mostly commonly reported these were related to respiratory conditions and anxiety.

**Box 1: Summary of conditions reported to be associated with increased consultation demand at clinics in Morwell, Moe, Churchill and Traralgon, at 28 February 2014**

Practices indicated that increases were observed in patients presenting with:

- **respiratory conditions**
  - breathing difficulties or asthma, including non-seasonal asthma
  - chronic obstructive pulmonary disease (COPD) exacerbation
  - coughing or throat irritation
- **anxiety** related to smoke and ash or post-traumatic stress disorder exacerbation
- **other conditions**
  - headaches
  - nausea or vomiting
  - eye irritation or blurred vision
- **requests for carbon monoxide testing**

At 4 March 2014, practices in Churchill and Morwell still considered they were working at full capacity. Practices in Morwell, Churchill, Traralgon and Moe continued to report experiencing increases in respiratory cases and other consultations relating to the health conditions described above. Interestingly, some practices in Morwell indicated they felt that there was a decrease in patient demand compared to previous weeks, which they attributed to people not wishing to expose themselves to the smoke/ash to attend clinics.

Practices in Morwell continued to report being busy between 7 March and 21 March, and indicated they were still seeing more consultations than usual for respiratory concerns. Some practices reported that they felt there was a slight settling of activity which they attributed to an improvement in air quality. Overall, practices in Morwell started to report an abatement of the previous increase in consultation demand by 25 March, and that demand was settling considerably by 1 April 2014.

Practices in Churchill, Traralgon and Moe continued to see an increase in respiratory presentations between 7 March and 18 March. In Moe, some practices also reported presentations for anxiety related to health effects and relocation. By 21 March 2014 practices in Churchill, Traralgon and Moe reported that the increases in activity observed had begun to stabilize, and that it appeared to have settled between 25 March and 4 April 2014.

**Data considerations**

Qualitative data, such as that presented here, is advantageous for providing an experiential view of a situation. However, as it is often of a subjective nature, systematic comparisons of trends are limited.

# 3. Community Health Assessment Centre

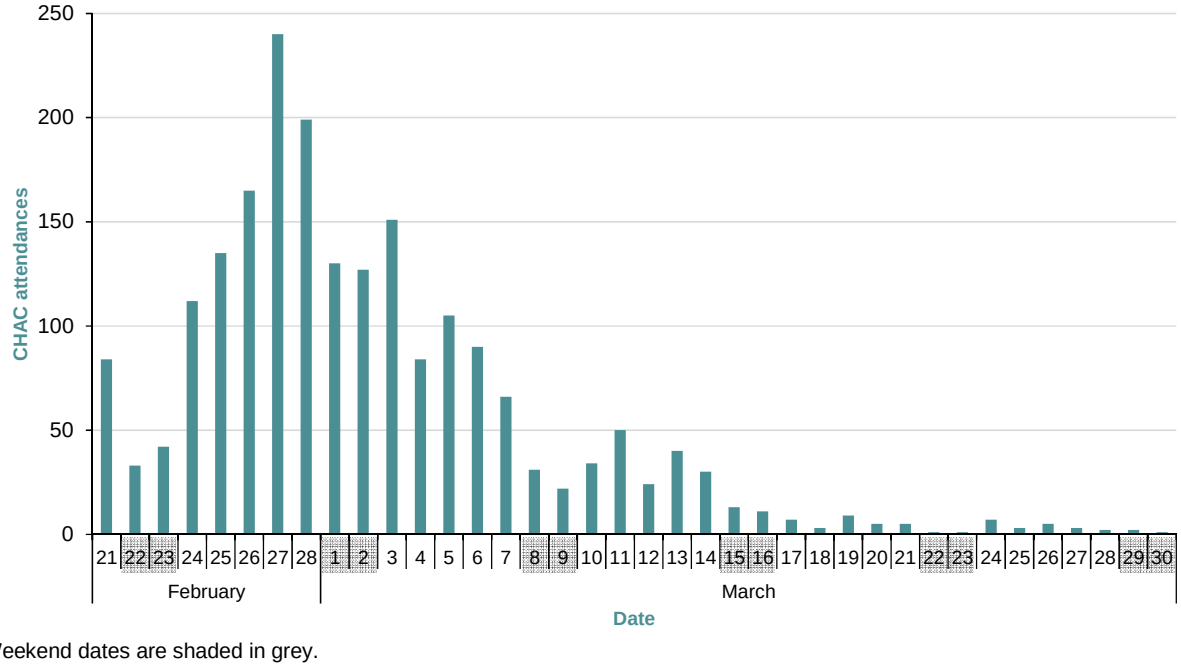
## Key points

- There were a total of 2,072 attendances at the Community Health Assessment Centre (CHAC) between 21 February and 30 March 2014.
- More women (59 per cent) than men attended the CHAC. The majority (66 per cent) of attendees were aged 15–64 years. Pregnant women comprised less than 2 per cent of attendances and 18 per cent of attendances were children aged less than 15 years.
- The majority of attendances (59 per cent) were because the person had concerns about their own or another's health. People also attended the CHAC for reassurance (31 per cent) or to obtain more information (6 per cent).
- Two per cent of CHAC attendances were referred to the Latrobe Regional Hospital (LRH) emergency department (ED). Just under half (43 per cent) of these were referred for follow up of suspected elevated COHb levels, as measured at the CHAC.
- Following assessment by the LRH ED medical staff, sustained elevated COHb levels (≥10%) were detected in only two individuals and attributed to the smoking status of these individuals in both cases.

## CHAC usage patterns and patient demographics

The Community Health Assessment Centre (CHAC) was established by the Department of Health and Ambulance Victoria in Morwell to provide basic health assessments to residents. There were a total of 2,072 attendances at the CHAC between 21 February and 30 March 2014, representing a total of 1,895 individuals (Figure 5). Over two-thirds (68 per cent) of the total attendances occurred between 21 February and 3 March. There were fewer attendances on weekends.

**Figure 5: Daily attendance at Community Health Assessment Centre (CHAC), 21 February – 30 March 2014**




Weekend dates are shaded in grey.

The age and gender distribution of those who attended the CHAC are presented in Table 2. More women (59 per cent) than men attended the CHAC and less than 2 per cent (n=34) of attendees were pregnant women (data not shown). The majority of attendees were aged between 15–64 years (66 per cent), 18 per cent were children aged less than 15 years and 15 per cent were aged 65 years and over.

**Table 2: Age and gender distribution of attendees to CHAC (as a proportion of total number of attendances), 21 February – 30 March 2014**

| Age group (years) | Female (%) | Male (%) | Total (%) |
|---|---|---|---|
| Children less than 15 | 9 | 9 | **18** |
| 15–39 | 18 | 10 | **29** |
| 40–64 | 23 | 14 | **37** |
| 65+ | 8 | 7 | **15** |
| **Total** | **59** | **41** | |

Date of birth information was not available for 27/2,072 attendances. Gender information was not available for 5/2,072 attendances. Subgroup percentages may not add up totals due to missing values.

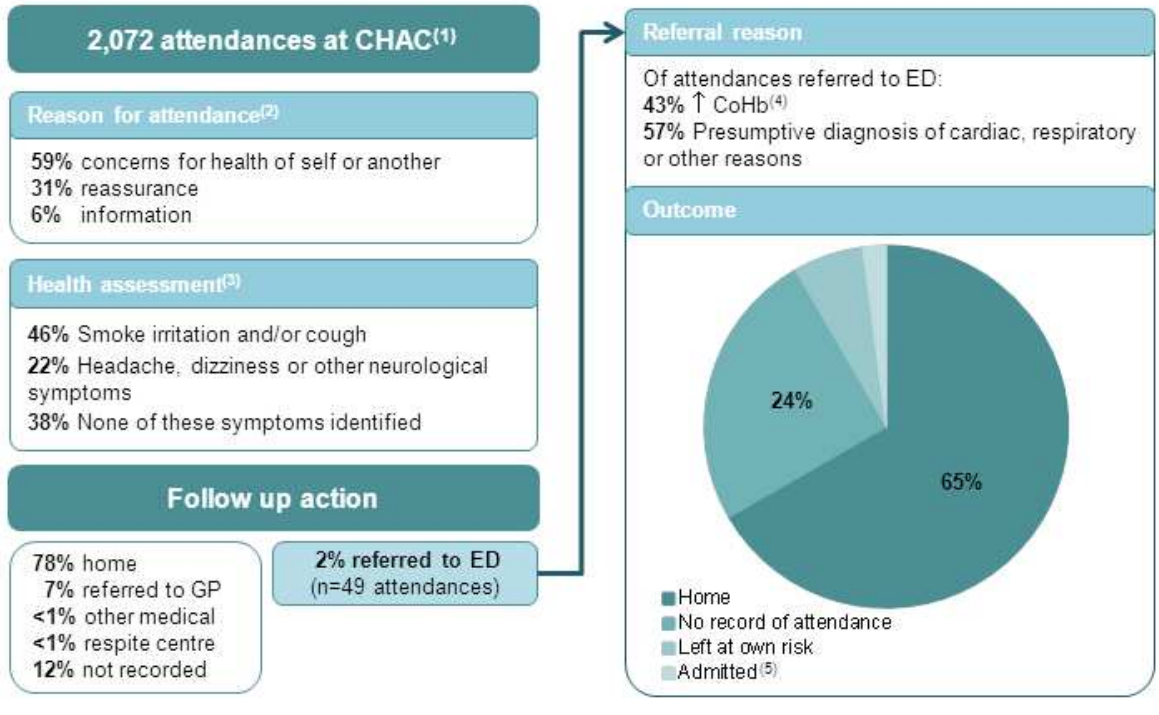
Attendees were also asked their primary reason for attending the CHAC. The majority (59 per cent) of attendances were because the person had concerns about their own or another person's health. People also attended the CHAC for reassurance (31 per cent) or to obtain more information (6 per cent).

A summary of the outcomes of CHAC attendances, health assessment outcomes, the follow up action and outcomes of referrals to the Latrobe Regional Hospital (LRH) emergency department is provided in Figure 6.

A health assessment identified one or more of the following symptoms in CHAC attendees: smoke irritation and/or cough (46 per cent), and headache, dizziness or other neurological symptoms (22 per cent). None of these symptoms were identified in 38 per cent of attendees. A respiratory presumptive diagnosis of asthma and chronic obstructive pulmonary disease (COPD) was made for 4 per cent and 0.7 per cent, respectively, of attendees (data not shown).

Two per cent of CHAC attendances were referred to the LRH emergency department. Just under half (43 per cent) of these were for follow up of suspected elevated COHb levels, as measured at the CHAC. The remainder were for a presumptive diagnosis of cardiac, respiratory or other reasons.

**Figure 6: Summary of CHAC attendances, health assessment outcomes, follow up actions and outcomes of referrals to LRH emergency department**




(1) Includes repeat attendances and represents a total of 1,895 individuals.
(2) Primary reason for attendance was not available for 99/2,072 presentations.
(3) Medical assessment as indicated by CHAC health assessor. Percentages may add to greater than 100, as attendees may have had more than one symptom identified. Medical assessment information was not available for 174/2,072 attendees.
(4) COHb measured by pulse carboximeter. Patients referred to ED if COHb≥5% in a non-smoker or COHb≥10% in a smoker. Seven of these referrals include an additional presumptive diagnosis (cardiac, respiratory or other symptoms).
(5) Admissions due to aetiology unrelated to COHb blood saturation level.

## Carbon monoxide testing

The effects of carbon monoxide (CO) exposure on a community population from environmental exposures such as fires is not well documented, compared to a sound level of evidence regarding exposures in confined spaces and exposure in emergency service responders. CO binds reversibly to haemoglobin (Hb) with a high affinity resulting in a temporary, relative anaemia (hypoxia) and can be measured by a carboxy-haemoglobin (COHb) level. The correlation of COHb levels and clinical features is variable; Table 3 below is a guide for levels taken soon after exposure.

**Table 3: Estimated correlation of clinical features and COHb levels**

| COHb level (Blood saturation %) | Clinical features |
|---|---|
| <5% | Normal level |
| <10% | Background level in smokers<br>Level proportional to smoking history |
| <10% | Asymptomatic or mild headache |
| <20% | Dizziness, headache, nausea or vomiting, Shortness of breath, impaired judgement |
| 30% (moderate toxicity) | Ataxia, visual disturbances |
| 40% | Confusion, coma, seizure, syncope |
| >50% | Cardiovascular and respiratory complications, death |

Reference: http://www.atsdr.cdc.gov/ToxProfiles/tp201-c6.pdf
Note: While children are more susceptible to COHb poisoning due to a higher resting respiratory rate leading to a faster accumulation of COHb, the normal reference range remains unchanged.

An initial approximation of an attendee's COHb level was obtained using a portable pulse carboximeter and values reported as percentage blood saturation (%). Based on this measure, selected individuals were referred to the Latrobe Regional Health (LRH) emergency department for medical assessment. These included:

- non-smokers and children with COHb ≥5%
- smokers with COHb ≥10%
- pregnant or potentially pregnant females with COHb ≥3%
- persons with medical co-morbidities, including significant cardiovascular or respiratory disease (asthma or COPD), especially if age over 55 years with COHb ≥5% (not reported here).

COHb pulse carboximetry was conducted on 1,879 (91 per cent) of the 2,072 CHAC attendances.

The distribution of COHb blood saturation levels for tested CHAC attendances and for selected subgroups is shown in Table 4. Of those for whom a COHb blood saturation level was obtained, 91 per cent had a COHb blood saturation level below 3%. COHb blood saturation levels above the referral threshold value were observed for five pregnant women, seven children aged less than 15 years, 32 non-smokers and nine smokers.

Smoking is known to increase COHb levels. Table 4 also shows that the proportion of current smokers within each COHb blood saturation range appeared to increase with increasing COHb blood saturation. Of note, all pregnant women who had an elevated COHb (greater than 3% blood saturation) identified that they were current smokers.

**Table 4: Distribution of COHb blood saturation levels (%) for tested CHAC attendances, including selected subgroups**

| ATTENDANCES TESTED FOR COHb | | | |
|---|---|---|---|
| **COHb level (%)** | **Number** | **Proportion of tested (per cent)** | **Current smokers(1) (per cent)** |
| 0 to <3 | 1,713 | 91 | 17 |
| 3 to <5 | 93 | 5 | 54 |
| 5 to <10 | 60 | 3 | 53 |
| ≥10 | 13 | 1 | 69 |
| **Total** | **1,879** | **100** | **20** |

| SELECTED SUBGROUPS | | | |
|---|---|---|---|
| **Subgroup and COHb threshold (% blood saturation)** | **Number above threshold** | **Maximum CoHb level observed (% blood saturation)** | **Current smokers(1) (per cent)** |
| ≥3 pregnant women (n=33 tested) | 5 | 6 | 100 |
| ≥5 in children (<15 years) (n=304 tested) | 7 | 9 | 0 |
| ≥5 in non-smokers(2) (n=1,493 tested) | 32 | 16 | N/A |
| ≥10 in current smokers(3) (n=382 tested) | 9 | 27 | N/A |

(1) Individuals were classified as current smokers if identified as such during their health assessment. Where health assessment information did not include smoking status, attendees who self-reported as current smokers were also grouped as such. Smoking status was not available for 8/2,072 attendees.
(2) Non-smokers also includes passive smokers
(3) Includes pregnant women

## LRH emergency department presentations

Of those presenting at LRH emergency department with elevated COHb who underwent further testing during an assessment by medical staff, two current smokers had COHb levels greater or equal to 10% which was attributed to tobacco smoking.

**Data considerations**

Although a standardised form was used to collect information for each CHAC attendance, some variables were incomplete.

# 4. Presentations to Latrobe Regional Hospital emergency department

## Key points

- Overall average daily presentations to the Latrobe Regional Hospital emergency department were significantly higher in 2014 compared to previous years (2012/2013 pooled); however average daily presentations were significantly lower for residents of Morwell in 2014 compared to average presentations in the same period in 2012/2013.

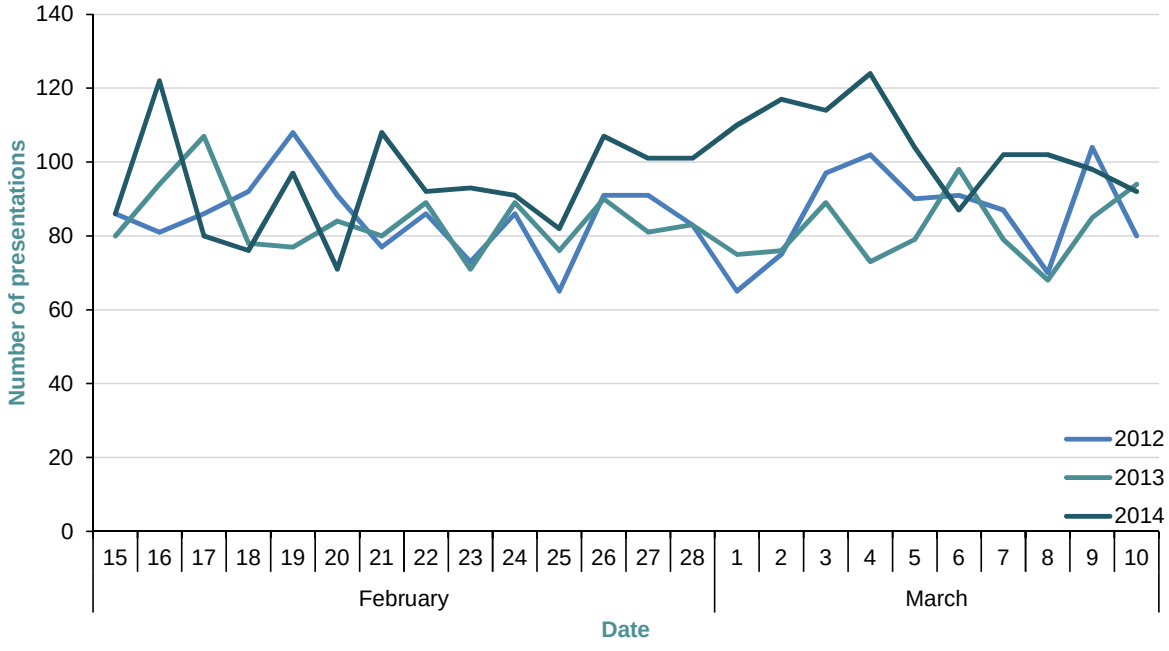
## Total emergency department presentations

The Department of Health requested that the Latrobe Regional Hospital (LRH) provided data on emergency department presentations for the period 15 February–10 March 2014. For this interim report, comparisons were made using data for the same period from 2012 and 2013 extracted from the administrative dataset, the Victorian Emergency Minimum Dataset (VEMD) (see Methods, page 23).

Figure 7 illustrates that daily total presentations to the LRH emergency department fluctuate over the period 15 February and 10 March for 2012, 2013 and 2014. A similar variability is observed for presentations to the LRH emergency department by residents of the Morwell area (Figure 8).

Table 5 compares the average daily presentations to the LRH emergency department for 15 February–10 March 2014 with the same period in 2012 and 2013, by area of residence. While overall the average daily presentations to LRH emergency department, irrespective of area of residence were significantly higher in 2014, compared to the previous years (2012/2013 pooled), the average daily presentations were significantly lower for residents of Morwell SLA in 2014 compared to the average presentations across the same period in 2012/2013 (based on 95% confidence intervals – preliminary comparisons, refer to *Data considerations*). While data for each year are collected using similar methodology, 2014 data may be incomplete and uses different definitions for Morwell residency. In addition, these estimates do not account for population changes in the area between years, or include residents of Morwell who may have presented to other hospital emergency departments.

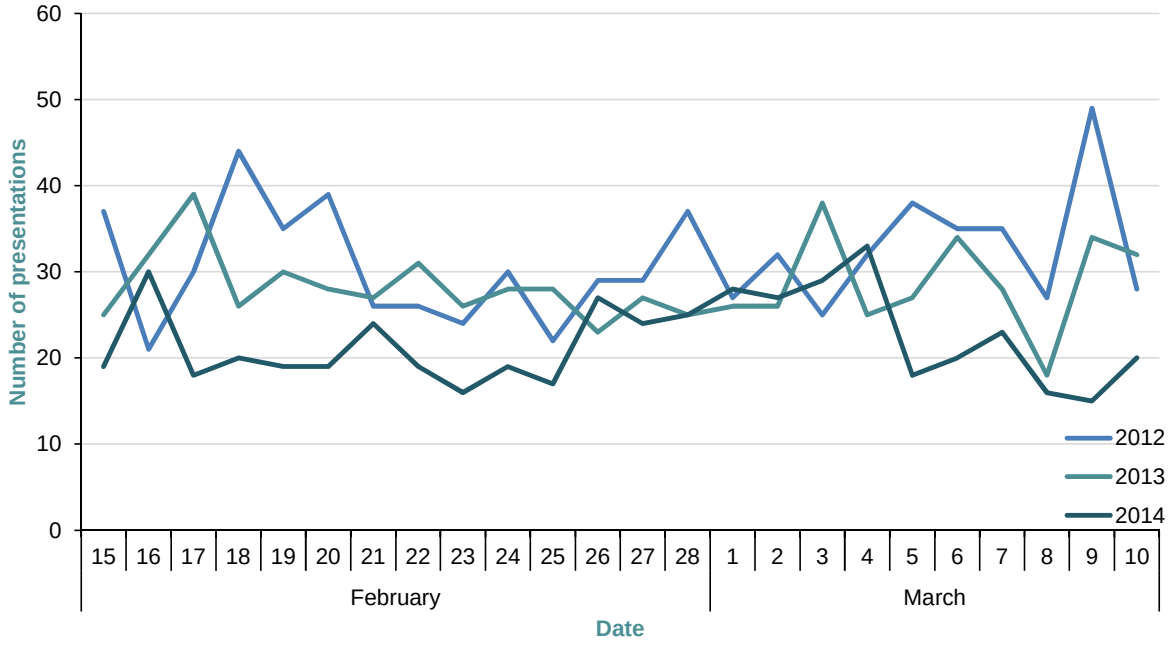
**Figure 7: Number of presentations to LRH emergency department, 15 February to 10 March, 2012, 2013 and 2014**




Values presented have not been adjusted to account for population size and/or the influence of the age composition of the population.

Note: Given 2012 was a leap year, the data point for 28 February represents the average of emergency department presentations for 28 and 29 February 2012.

**Figure 8: Number of presentations to LRH emergency department by residents of Morwell[(a)], 15 February to 10 March, 2012, 2013 and 2014**




(a) Different definitions for Morwell residency are applied to data for 2012 and 2013 (address within boundary of Latrobe (C) – Morwell SLA (code 23814)[4] and 2014 (based on Morwell as address of residence).

Values presented have not been adjusted to account for population size and/or the influence of the age composition of the population.

Note: Given 2012 was a leap year, the data point for 28 February represents the average of emergency department presentations for 28 and 29 February 2012.

**Table 5: Mean daily presentations to LRH emergency department, by area of residence[(a)], 15 February–10 March, 2012, 2013 and 2014**

| Year | Mean (95% CI) |
|---|---|
| All areas | |
| **2014** | 98.2 (92.5–103.9) |
| **2013** | 83.1 (79.3–86.9) |
| **2012** | 85.5 (81.2–90.3) |
| **2012/2013[(b)]** | 84.4 (81.5–87.3) |
| Morwell[(a)] | |
| **2014** | 21.9 (19.8–23.9) |
| **2013** | 28.5 (26.5–30.4) |
| **2012** | 31.5 (28.8–34.3) |
| **2012/2013[(b)]** | 30.0 (28.3–31.7) |

(a) Different definitions for Morwell residency are applied to data for 2012 and 2013 (address within boundary of Latrobe (C) – Morwell SLA (code 23814)[5] and 2014 (based on Morwell as address of residence).

(b) Average of daily data for the period 9 February to 10 March pooled from 2012 and 2013.

Values presented have not been adjusted to account for population size and/or the influence of the age composition of the population.

95% CI = 95 per cent confidence interval.

[4] Statistical Local Areas (SLA) are defined by the Australian Standard Geographical Classification (ASGC), Jul 2008 (cat. no. 1216.0): http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/CE86F275F2B130F8CA2576320019D85B?opendocument

[5] Statistical Local Areas (SLA) are defined by the Australian Standard Geographical Classification (ASGC), Jul 2008 (cat. no. 1216.0): http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/CE86F275F2B130F8CA2576320019D85B?opendocument

**Data considerations**

It should be noted that while data for each year are collected using similar methodology, 2014 data was obtained directly from the LRH and may be not be finalised. Furthermore, different definitions for Morwell residency are applied to data for 2012 and 2013 (address within boundary of Morwell SLA) and 2014 (based on Morwell as address of residence). As such any comparisons should be regarded as preliminary.

The data in this interim report are restricted to presentations only to the LRH emergency department, and thus excludes information about residents of the Morwell who may have presented to other hospital emergency departments. Values presented have not been adjusted to account for population size and/or the influence of the age composition of the population.

Further analyses will include an examination of emergency department presentations and hospital admissions using the Victorian Emergency Minimum Dataset (VEMD) and Victorian Admitted Episodes Dataset (VAED), and will be included in a more detailed report to be published later in 2014.

This will allow for:

- a more complete analysis of total, cardiac and respiratory presentations
- possible analysis by triage category and age (paediatric/older) although these sub-analyses may be limited due to small numbers
- inclusion of presentations by residents of Morwell SLA/affected area to any Victorian hospital emergency department
- comparison of presentations during the Hazelwood coal mine fire with the same time period in previous years (using pooled data from multiple previous years to account for year to year variability)
- further exploration of disposition code for presentations (eg type of hospital admission, length of stay).

# 5. Discussion

These health surveillance data demonstrated an increase in telephone calls to NURSE-ON-CALL for respiratory-related concerns and GP presentations for breathing difficulties and anxiety. Increases in telephone calls to NURSE-ON-CALL were not unexpected given that this facility was actively promoted to residents to gain information about health concerns. As well, both this increase and the increases in presentations at general practices were not unexpected given the known effects of exposure to particulate matter in smoke, which include the exacerbation of existing respiratory and cardiovascular disease. Reassuringly, there is no evidence from Ambulance Victoria priority dispatches or Latrobe Regional Hospital emergency department presentations of acute severe effects.

Data from the CHAC also reflected respiratory health issues, as well as anxiety around the health consequences of the event. A range of other primary care issues were detected, particularly where the attendee had not seen a general practitioner for some time. Levels of carboxy-haemoglobin tested validated air quality monitoring that carbon monoxide levels were not a concern in the community.

In conclusion, a range of moderate health effects, mainly relating respiratory disease, anxiety and/or seeking reassurance, were seen in primary care-type settings in this event. No indications of more serious morbidity were evident.

# Methods

## Data sources

### Time periods covered by data sources

Telephone calls to NURSE-ON-CALL and Ambulance Victoria priority dispatches are presented for the period 9 February–10 March 2014. Latrobe Regional Hospital emergency department presentations are presented for the period 15 February–10 March 2014. Comparisons are made to the same period in 2013, where data was available. Data from the Community Health Assessment Centre is presented for the entire period of the centre's operation (21 February to 30 March). GP clinic activity was collected between 19 February–4 April 2014, and is reported for the period 28 February–4 April 2014.

### NURSE-ON-CALL telephone calls

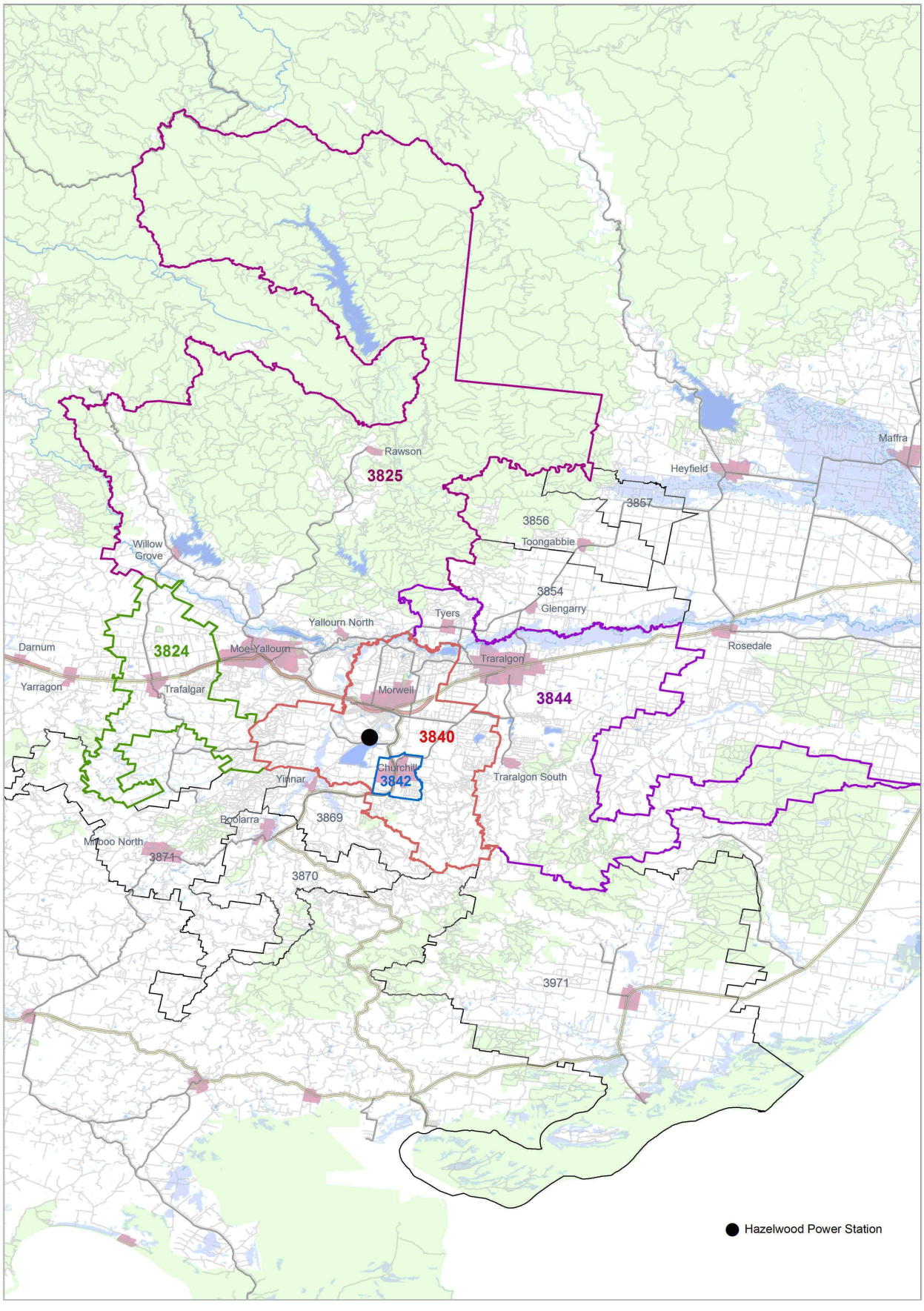
The NURSE-ON-CALL telephone service is operated by Medibank Health Solutions, which provides immediate, expert health advice from a registered nurse, 24-hours a day, seven days a week.

De-identified call data was provided to the department for telephone calls to NURSE-ON-CALL originating from the Latrobe City area (Table 6 and Figure 9) that, based on the caller's presenting indications, related to a subset of triage guidelines reflecting air quality and/or respiratory symptoms. Details of phone calls to the service were collected, including the postcode of residence of the caller. Data was analysed for the period 9 February 2014 to 10 March 2014. This report includes an analysis of phone call records at the time of the incident, and compares total call number at the time of the incident with the same time period in 2013. As total call numbers originating from Latrobe City area had not been sought at the time of preparation of this interim report, the rate of respiratory-related calls as a proportion of total calls was not calculated and compared between years.

**Table 6: Postcodes areas selected to define calls to the NURSE-ON-CALL service which originated from the Latrobe City area**

| Postcode | Locality | | |
|---|---|---|---|
| 3824 | Trafalgar | | |
| 3825 | Moe | Newborough | Rawson |
| | Tanjil South | Yallourn | Yallourn North |
| 3840 | Hazelwood North | Jeeralang Junction | Morwell |
| 3842 | Churchill | | |
| 3844 | Traralgon | Traralgon East | Tyers |
| 3854 | Glengarry | Glengarry North | Glengarry West |
| 3856 | Toongabbie | | |
| 3857 | Cowwarr | | |
| 3869 | Jumbuk | Yinnar | Yinnar South |
| 3870 | Boolarra | | |
| 3871 | Mirboo | Mirboo North | |
| 3971 | Alberton | Alberton West | Balook |
| | Calrossie | Devon North | Gelliondale |
| | Hiawatha | Hunterston | Jack River |
| | Langsborough | Macks Creek | Madalya |
| | Manns Beach | Port Albert | Robertsons Beach |
| | Snake Island | Staceys Bridge | Tarra Valley |
| | Tarraville | Won Wron | Yarram |

**Figure 9: Map showing distribution of postcode areas in relation to the Hazelwood power station**

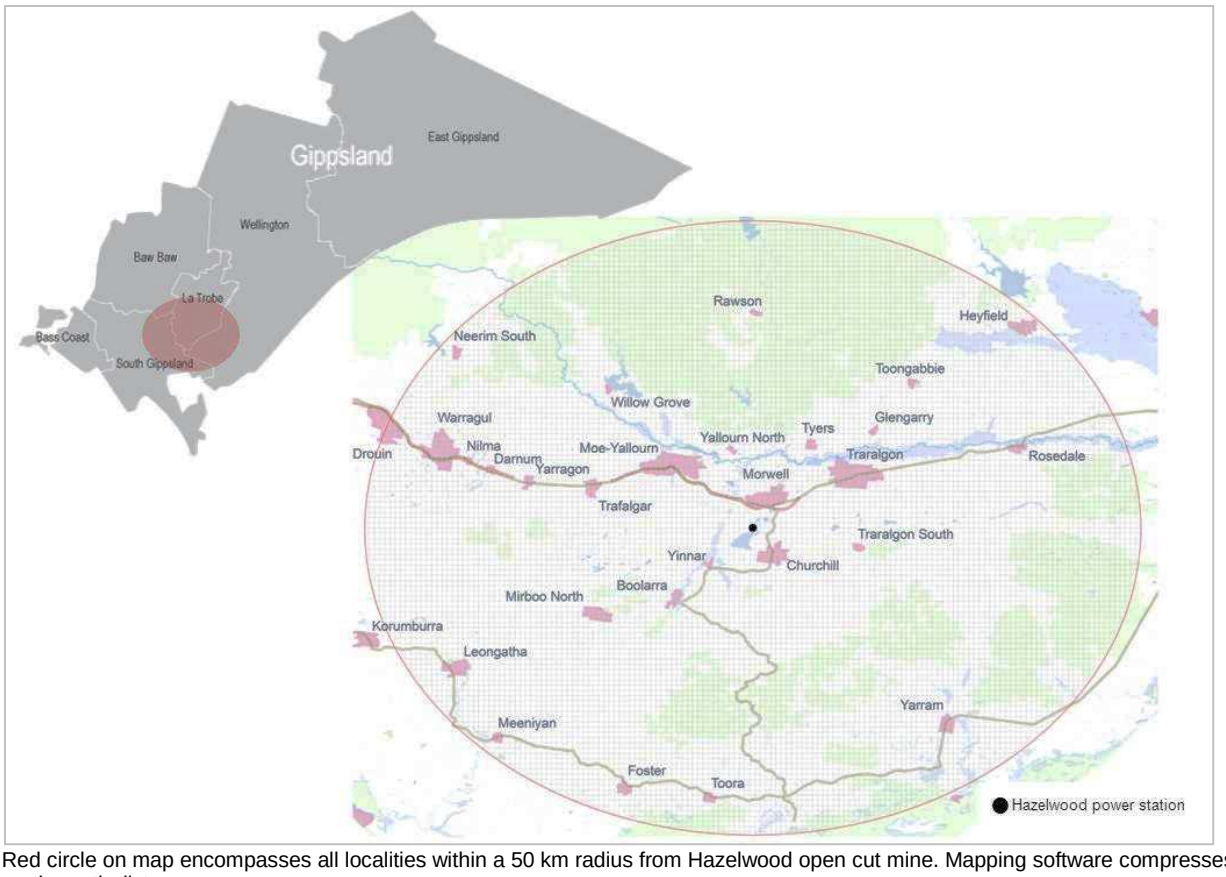



Data requested from Medibank Health Solutions was for NURSE-ON-CALL calls originating from the Latrobe Valley postcode area (3824, 3825, 3840, 3842, 3844, 3854, 3856, 3857, 3869, 3870, 3871, 3971). Coloured postcode areas (3824, 3840, 3844, 3824 and 3825) indicate those from which telephone calls were received.

## Ambulance Victoria priority dispatches

Ambulance Victoria provides medical care and transport for Victorians in both emergency and non-emergency situations. De-identified data was provided by Ambulance Victoria for emergency ambulance call outs, or priority dispatches, and priority dispatches where cases were carded as respiratory-related (Card 6). The service is provided across the state however the data presented in this report is for the Gippsland region[6] and for the Morwell area (defined as localities falling within a 50km radius of the Hazelwood coal mine fire) (Figure 10). Comparisons are made to the same period in 2013.

**Figure 10: Map showing distribution of localities falling within a 50km radius of the Hazelwood coal mine**




Red circle on map encompasses all localities within a 50 km radius from Hazelwood open cut mine. Mapping software compresses north-south distances.
Note: Location of 50km marker on Gippsland region map insert is an approximation.

## General Practice clinic activity

The Department of Health first contacted general practice clinics directly on 19 February and collected qualitative information on any increases in attendances and any impact on service capacity. Thereafter, information was collected from 23 general practice clinics and medical centres in Morwell, Moe, Traralgon and Churchill, by both visits to the practices in person by a representative of the Gippsland Medicare Local (GML) as well as by phone calls. Practice managers and GPs were interviewed to ascertain whether:

- the practice was seeing any increase in consultations for conditions or concerns potentially related to smoke exposure and air quality, and the types of presentations which were being seen
- there were any particular concerns they may have about specific groups (including the elderly, pregnant women and children)
- in the last 24–48hrs the practice had been unable to schedule urgent appointments or been unable to see patients due to increased demand.

[6] (http://www.health.vic.gov.au/regions/gippsland/)

Data collection by GML commenced on 20 February 2014, and continued until 3 April 2014. Updates on practice activity were provided to the department every three to five days.

Data was summarised based a qualitative assessment of patterns in General Practice clinic activity, along with the types of presentations which were being seen, over the data collection period.

### Community Health Assessment Centre (CHAC)

A standardised form was used to collect self-reported information by attendees and information about the attendee's health assessment conducted by CHAC health practitioners. Data was entered into the Department of Health's electronic Public Health Event Surveillance System (PHESS) and manually cross-checked with hard copy records.

An initial approximation of COHb was obtained using a portable pulse carboximeter and values reported as percentage blood saturation (%). Selected individuals were referred to the Latrobe Regional Health emergency department for medical assessment based on either their health assessment information or COHb blood saturation level.

### Latrobe Regional Hospital emergency department presentations

The Department of Health requested that the LRH provided data on emergency department presentations for the period 15 February–10 March 2014. The data was defined by the information entered in the hospital's Emergency Department Information System. Address information was used to determine Morwell as the place of residence (as city stated in address).

For this interim report, comparisons were made using data for the same period from 2013 extracted from the Victorian Emergency Minimum Dataset (VEMD). The VEMD is a data collection containing de-identified clinical information on presentations to public hospital emergency departments. Data was specifically extracted for Latrobe Regional Hospital (campus ID 2440), and place of residence was defined as Morwell if it fell within the Latrobe (C) - Morwell Statistical Local Area (code 23814 – see Statistical Geography, page 24).

## Data analysis

All analyses were conducted using Stata statistical software version 12.1 (StataCorp, College Station, Texas, USA).

### Data disclaimer

The results presented in this report should be regarded as preliminary and are subject to amendment following data finalisation. Any changes to existing data are expected to be minor and are not expected to impact on patterns and trends. Where limitations exist for the data used in preparing this report or additional data is required to facilitate comparisons with previous years, this has been noted within the relevant sections as *Data considerations*.

Finalised datasets for hospital presentations (Victorian Emergency Minimum Dataset - VEMD) and admissions (Victorian Admitted Episodes Dataset -VAED) and mortality information (Coroners Court of Victoria and Victorian Registry of Births Deaths and Marriages) is unavailable for inclusion in the current report, and will be examined in future, expanded iterations. Note that the finalisation of some datasets can take some time.

### Confidence intervals

The 95 per cent confidence interval (95% CI) indicates a 95 per cent probability that the true value of a number is contained within the interval. So, the confidence interval is the likely range of true value for a number.

## Statistical significance

The term ‘significance’ is used in this report to denote statistical significance. It is not used to describe clinical significance, the relative importance of a particular finding, or the actual magnitude of difference between two values.

Where possible, the significance of differences between values was determined by comparing 95 per cent confidence intervals. The values in this report were deemed statistically significant if the 95 per cent confidence intervals of the respective values did not overlap. If there was no statistically significant difference between two values (that is, the 95 per cent confidence intervals overlapped), they were either not mentioned in the text, or they have been described as being ‘similar’.

## Statistical geography

The Australian Standard Geographic Classification (ASGC) is used by the Australian Bureau of Statistics (ABS) for the collection and dissemination of geographically classified statistics. It is an essential reference for understanding and interpreting the geographic context of statistics published, not only by the ABS but also by other organisations, and its use enables comparability across datasets. Statistical Local Areas (SLA) are defined by the Australian Standard Geographical Classification (ASGC), Jul 2008[7] (cat. no. 1216.0), and are a subset of local government areas (LGA).

Within Latrobe (City) LGA, four SLA boundaries exist: Latrobe (C) – Morwell (SLA code 23814), Latrobe (C) – Moe (23811), Latrobe (C) – Traralgon (23815), Latrobe (C) Bal (23818)[8].

[7] http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/CE86F275F2B130F8CA2576320019D85B?opendocument

[8] http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/F3B01F25604D3581CA2574CF0013D325/$File/12160_vic_maps_jul%202008.pdf