

## Chapter 7

# Disasters and Demographic Change of ‘Single-Industry’ Towns—Decline and Resilience in Morwell, Australia



Deanne Bird and Andrew Taylor

**Abstract** In 2014, an open-cut coal mine fire burned for 45 days in the small single-industry town of Hazelwood in Victoria (Australia) spreading smoke and ash across the adjacent community of Morwell. This chapter examines the extent to which the mine fire acted as a catalyst for demographic and socio-economic change and considers how, if at all, it impacted Morwell’s resilience to disasters. We report on a range of secondary data analyses augmented with qualitative insights captured in government reports (namely, the Hazelwood Mine Fire Inquiry reports), as well as from related research papers and media articles. We suggest that a succession of structural and demographic changes meant that the town and its residents were accustomed and resilient to relatively large shocks. In this sense, the Morwell and broader Latrobe Valley population banded together around various community-led initiatives to fight for a better future for their community.

**Keywords** Disaster · Hazelwood · Mine fire · Resilience · Social capital · Demography

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## 7.1 Introduction

Throughout Australia's history, disasters have challenged the existence of rural and remote towns. At the extreme end, for example, the rural and remote towns of Gundagai in New South Wales and, Clermont and Grantham in Queensland were relocated following fatal floods in 1852, 1916 and 2011, respectively. For single-industry towns (see Text Box 7.1), disasters involving the pre-dominant industry present added threats since even temporary closures or wind-backs in economic production are likely to significantly erode the job base, cut money circulation in the town and lead to permanent out-migration of some residents. Through these processes, closures also thin-out the locally based pool of experienced workers, encouraging companies who own or run the (single) industry to 'import' temporary workers in the form of fly-in-fly-out (FIFO) or drive-in-drive-out (DIDO) workers. In turn, these factors tend to erode the social fabric and cohesiveness of communities, making them less resilient to shocks and stressors (Mitchell and O'Neill 2016). The shock and stressor considered in this chapter are from the Hazelwood mine fire disaster that impacted the adjacent, single-industry town of Morwell, Australia in 2014.

Before describing the case study location of Morwell, the Hazelwood power station, open-cut coal mine and mine fire disaster in Sect. 7.2, we first consider the terms *disaster* and *resilience*. There has been much debate around what constitutes a disaster (Quarantelli 1998; Perry and Quarantelli 2005). Based on that debate, Perry (2005) concluded that disasters are disruptive, social occasions that are related to social change and that disaster research generally focuses on 'some change in circumstances' (p. 316).

The definition of resilience in relation to disasters has also been the subject of much debate in academic discourse (e.g. Klein et al. 2003; Manyena 2006; Norris et al. 2008; Manyena et al. 2011; Alexander 2013; Cutter et al. 2014; Weichselgartner and Kelman 2015). For this chapter, we consider resilience as a '... measure of how well people and societies can adapt to a changed reality and capitalise on the new possibilities offered' (Paton 2006, p. 8).

In light of the above, the aims of this chapter are to examine the extent to which the Hazelwood mine fire acted as a catalyst for demographic and socio-economic change in the single-industry town of Morwell, and consider how, if at all, the Hazelwood mine fire impacted Morwell's resilience to disasters, shocks and stressors.

### **Text Box 7.1: Rural, Remote and Single-Industry Towns in Australia**

Rural and remote towns are hallmarked in the national psyche of many developed nations for their purported resilience in the face of adversity. Perhaps nowhere has this been more the case than in Australia. Although 68% of Australians live in major cities and with cities recently accounting for almost 80% of national population growth (ABS 2019), there remains an affinity for rural and remote towns. Despite the passing centuries, the exponential growth

of cities and a boon in overseas migration numbers to cities of late, Australian's affinity with 'the bush' remains. Rural and remote settlements are lauded for their historical and contemporary contributions to the nation and their economic and demographic resilience. This reflects, at least in part, remembrance of the significance of the livestock industry, and particularly wool, for transforming the economy from a colonially dependent backwater to a 'modern' thriving one with comparatively high living standards (ABS 2003). The nation is said to have 'ridden to success' on the sheep's back for more than a century from the mid-eighteenth century to mid-nineteenth century as a result of wool exports. Even today, agricultural or resource products round-out eight of the top ten Australian export commodities (Australian Government 2018).

Over time, the importance of inland Australia and its towns was re-enforced by other major historical developments like the Overland Telegraph Line, which ran through the 'middle dirt' of the landmass, and for some time was the only means of direct communication between Australia and elsewhere (notably Great Britain). Carrying Morse code signals, it stretched 3,200 km from Port Augusta in South Australia to Darwin in the north of the country. Likewise, the national airline Queensland and Northern Territory Aerial Services (QANTAS) was established in 1920 in the Queensland desert town of Winton. Some settlements were established and then either thrived or survived from the extraction of resources. In particular, gold and later a suite of resource-based settlements were established across the continent.

Many of Australia's rural and remote towns were therefore settled and established because of a single industry. The nation's economy has at various times been driven by agricultural and later resource-led economic growth. In many places, commodifiable resource(s) including gold, coal and iron ore were either the reason for rural town establishments or the reason for its continuation and growth after initial settlement. Often called 'single-industry' towns, these have been written about for their resilience in the face of volatile population change and susceptibility to 'boom and bust' economic times (for example, Carson and Carson 2014). While some have disappeared and become 'ghost towns', most have either continued to exist, have grown or transformed their economic basis despite declines in the main industry because of rationalisation, technological changes and market forces. Nevertheless, for some single-industry towns there remains a legacy and mythology whereby the perception of the town being single industry persists among outsiders. This is in part because of the past pre-eminence of the industry in question for jobs, business and maintaining population. Examples include Burnie in Tasmania whose industry profile was once dominated by a papermill and associated forestry activity (see The Advertiser 2013), as well as Nhulunbuy in the Northern Territory which was established specifically to house workers for the nearby bauxite mine and alumina smelter that closed in 2013 (see Carson and Carson 2014; Collin 2017).

7.2 Morwell and the Hazelwood Mine and Power Station

Morwell, centrally located in the State of Victoria's Latrobe Valley 150 km east of Melbourne (Fig. 7.1), is often recognised as a single-industry town. While the region is located in an important agricultural area, Morwell's history is intricately linked to the production of electricity produced from the extensive brown coal reserves in the

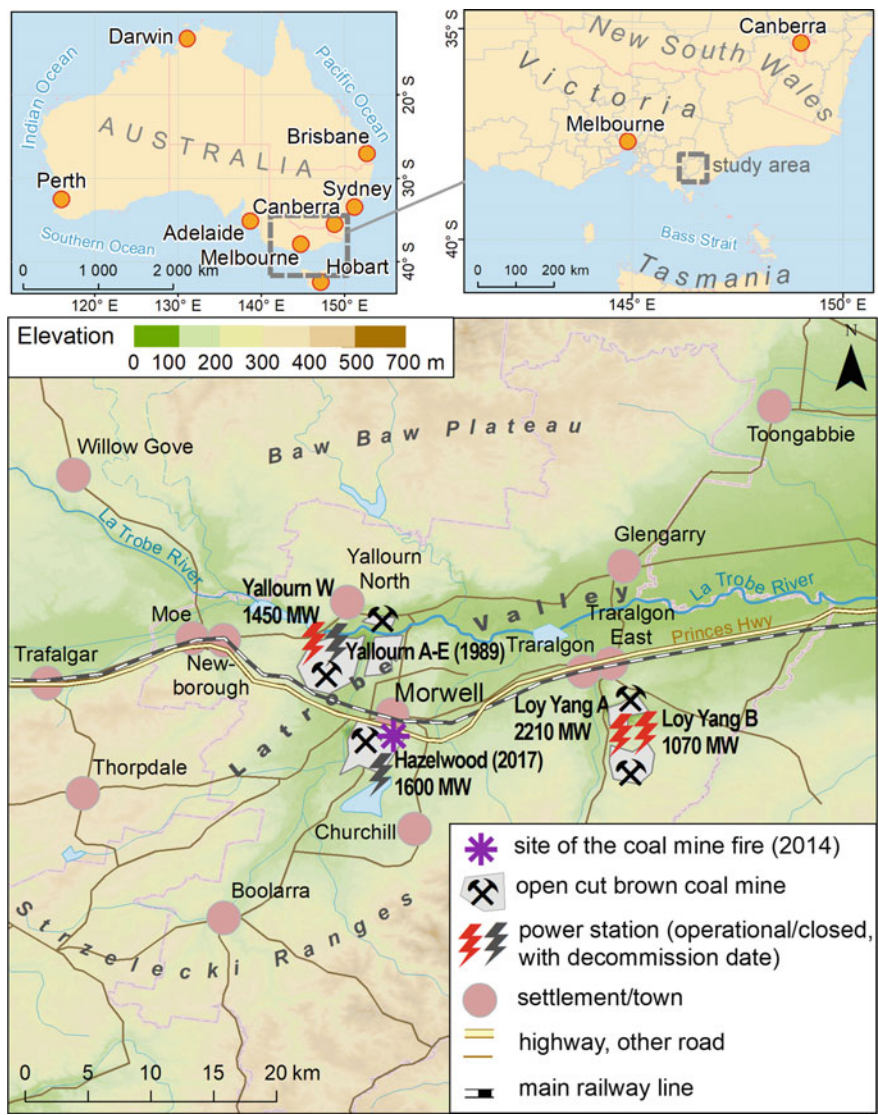


Fig. 7.1 Location of the town of Morwell (Authors: Bird, Taylor, cartography by Karácsonyi)

region. Teague and Catford (2016) report that around 95% of Victoria's base load electricity was produced from Latrobe Valley mines (Hazelwood, Yallourn and Loy Yang) and collectively they constituted the largest brown coal mining operation in the Southern Hemisphere (Davison 2015).

The Hazelwood mine and power station hailed from the 'Morwell project' which consisted of an open-cut coal mine and briquette works. It was initiated by the State Electricity Commission (SEC) of Victoria in the late 1940s (Morwell Advertiser 1949). A decade later, approval was given for the development of the Hazelwood Power Station to service Morwell's open-cut mine (later known as the Hazelwood open-cut mine). At its peak, the Hazelwood Power Station met 25% of the State and over 5% of the nation's electricity demands alone and its extensive dimensions reached a maximum depth of 120 m from ground level with an 18 km perimeter (Teague and Catford 2016).

From these beginnings, and given the coal mine pit begins its descent a few hundred metres from Morwell's residential area (Fig. 7.2), the town's identity had been interwoven with, up until recently, the Hazelwood Power Station and open-cut mine:

...the development and expansion of coal mining in the area over time has had a direct impact on the people of Morwell due to the town overlaying a significant coal deposit. In the context of the Hazelwood mine and power station being built to the south of Morwell, the town has expanded to the east and to the north. Despite such expansion away from the mine, the southern perimeter of Morwell is still remarkably close to the mine site. (Teague et al. 2014, p. 51)

At times, more than a third of jobs in the region were with the SEC alone, not taking into account associated industry and businesses associated directly with the coal mine and power station (Duffy and Whyte 2017). However, it was far from smooth sailing



**Fig. 7.2** Looking approximately northwards, this aerial photograph shows the proximity of Morwell (residential area outlined in green) to the Hazelwood Power Station (circled in red) and open-cut coal mine. (Teague et al. 2014, p. 410)

for Morwell residents and the plant. Most notably, the state government privatised the SEC in the mid-1990s and with it the Hazelwood Power Station and open-cut mine. More recently, Hazelwood's open-cut coal mine was at the centre of one of Australia's worst environmental and public health disasters (Doig 2015) when it burned for 45 days after embers from a nearby bushfire set the coal alight in February 2014. Three years later, the Hazelwood Power Station and coal mine were decommissioned.

In this chapter, we plot demographic change in Morwell through periods of coal mining development, expansion, decline and the mine fire disaster, right through to post-decommissioning. The mine fire in 2014 '... disrupted the community to a significant extent and was beyond the capacity of the community and support agencies to cope' (Walker et al. 2016, p. 16). However, using a range of data from the Australian Bureau of Statistics (ABS) alongside community consultations and research conducted after the 2014 Hazelwood Mine Fire, we examine population resilience through a long history of disaster familiarity (after previous major fires in 1977, 2006 and 2008). Our main contention is that, rather than accounting for a big change in population numbers and characteristics, the mine fire disaster added to pre-existing challenges faced by a community which itself had learned to adapt to and survive, in demographic and economic terms, to shocks, disasters and other challenges.

### 7.3 Mapping Resilience Through Demographic Change

In response to academic debate, Cutter (2016) critically examined methods for understanding and quantifying resilience in relation to disaster. In doing so, she identified the most commonly used attributes, assets (economic, social, environmental, infrastructure) and capacities (social capital, community functions, connectivity, and planning) for measuring community resilience. This chapter focuses on demographic and socio-economic indicators as measures of resilience. Our reason for doing so is based on the premise that much can be revealed about the resilience or otherwise of single-industry towns through the study of change among pre- and post-event demographic indicators, including socio-economic profiling. Such research and analysis are useful because they can:

- Provide a baseline for evaluating demographic and economic impacts from individual disasters (where suitable data is available);
- Plot interrelationships between economic and demographic transformations pre- and post-disaster;
- Be applied in a range of ways to ascertain likely demographic and economic futures given the post-disaster population structure and size; and
- Be studied for applied lessons which might help other towns increase their resilience and map out their futures.



Importantly, socio-economic profiling can also be validated, compared and contrasted to qualitative research 'on the ground' to enrich the research application.

In this chapter, we examine a range of publicly available demographic and socio-economic data for Morwell and compare to the wider Latrobe Valley region and the State of Victoria. We first augment our analysis with qualitative insights captured in government reports (namely, the Hazelwood Mine Fire Inquiry reports which provide detail on community consultations, health improvement forums and public submissions), as well as from related research papers and media articles. This latter analysis allows us to consider the social fabric and cohesiveness of Morwell with a focus on social capital and connectivity.

In a presentation given at a Municipal Association of Victoria forum on resilient cities and communities, Duckworth (2015, p. 6) highlighted 'resilience is not possible without the networks and links between individuals, communities, organisations, businesses and government'. Underlying these networks and links is social capital, which appears as a key feature in the broad range of tools, indices and scorecards that have been developed to measure community resilience (Cutter 2016). However, social capital is more than just connectivity through these networks and links. It is about cooperation among different groups of people and collective action to produce a mutual benefit, and it is reliant on trust (Bridger and Luloff 2001). Putnam et al. (1993) described the kind of trust required as social trust, which emanates from norms of reciprocity and networks of engagement.

In this chapter, three types of social capital are considered for the Morwell population, reflecting the networks of engagement and the situations where norms of reciprocity evolve.

1. *Bonding social capital* describes emotionally close, strong connections arising from family and friend networks.
2. *Bridging social capital* describes loose connections between acquaintances and individuals of diverse social groups, often stemming from membership or involvement in organisations, clubs and associations.
3. *Linking social capital* describes network connections between regular people (such as residents) and officials (such as government representatives) (Aldrich and Meyer 2015).

Before Morwell's pre- and post-fire demographic trajectories are examined, we first consider the Hazelwood mine fire alongside the health and economic impacts of that event and government response.

## 7.4 The 2014 Hazelwood Mine Fire Disaster

### 7.4.1 *The Mine Fire*

In February 2014, during a record-breaking hot and dry summer, a number of large bushfires burned across Victoria. Two of these were near Morwell and the adjoining Hazelwood coal mine. Embers from these fires set the northern, eastern and south-eastern batters and floor of the Hazelwood coal mine alight on 9 February 2014. The fires spread quickly and proved extremely difficult to extinguish due to the highly combustible nature of brown coal and the relatively thin layer of soil and clay covering the massive coal seams in the Latrobe Valley. Moreover, the mine operator was not prepared to manage such an event. In this instance, the mine's firefighting infrastructure was either not present or had not been maintained in the areas of the mine that were alight. Furthermore, once called in to assist, firefighting personnel experienced difficulties accessing and navigating the mine (Doig 2015; Teague et al. 2014).

More than 7,000 fire services personnel, a number equivalent to half the size of the town's population, from across Australia fought the fire for 45 days until finally, on 25 March 2014 the fire was officially declared extinguished (Teague et al. 2014). While it burnt out of control, the mine fire produced a significant amount of ash causing physical and mental health issues for nearby communities, especially the population of Morwell. For example, on 16 February 2014, the daily average of PM<sub>2.5</sub><sup>1</sup> reached approximately 28 times the advisory level (Teague et al. 2014). On the same day, carbon monoxide levels were almost four times the compliance standard (Teague et al. 2014). In relation to the particulate matter, an older respondent in the Walker et al. study commented:

It was like sand on a windy day. Sand on the beach on a windy day hitting your face, that's what it was like yet you couldn't see anything with the naked eye. (Walker et al. 2016, p. 42)

### 7.4.2 *Health Impacts and Government Responses*

Commonly reported short-term physical health impacts during the disaster included skin and eye irritations, blood noses and headaches. Despite the apparent adverse conditions in the early stages of the mine fire, the government was slow to issue public health alerts due to bureaucratic protocols around decision-making and over reliance on validated air quality data when indicative data would have sufficed (Teague et al. 2014).

It was the same old information we were getting day after day after day, "There's nothing wrong, nothing to worry about, nothing wrong, nothing to worry about, nothing wrong, nothing to worry about" and that's from people either in Traralgon or in Melbourne. They weren't in Morwell, trying to breathe this rubbish. (Walker et al. 2016, p. 56)

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<sup>1</sup>Particulate matter equivalent to or less than 2.5 microns and known to cause adverse health effects.



The general conversation was the same... they knew something wasn't right, and the smoke was different, and it was different, I've never smelt anything like it, or tasted anything like it. (Walker et al. 2016, p. 42)

On 25 February 2014, in recognition of the need for better protocols, the Environment Protection Authority and Department of Health<sup>2</sup> developed specific guidelines around health actions relating to PM<sub>2.5</sub> levels. On 28 February, when PM<sub>2.5</sub> levels had increased again, the Chief Health Officer advised temporary relocation for vulnerable groups, including preschool aged children, pregnant women, people with pre-existing cardiovascular and respiratory conditions and people over 65 years (Teague et al. 2014). However, this advice was deemed 'too late'. Furthermore, as the advice singled out particular demographic groups, the community found it to be illogical and divisive (Teague et al. 2014). Overall, the community did not feel that their views were being heard.

While distributing considerable amounts of information to the community, government departments and agencies did not engage to any significant extent in listening to, or partnering with local residents and community groups, which are identified as important strategies in best practice risk and crisis communication. (Teague et al. 2014, p. 400)

A few weeks into the mine fire disaster, and in response to community outcry, Monash University's School of Public Health and Preventative Medicine were commissioned to conduct a Rapid Health Risk Assessment. Based on the results of that assessment, the Board of Inquiry concluded that:

... the level of exposure to smoke and ash experienced by the community in Morwell would not be expected to cause any deaths if the level of exposure remained at that level for six weeks. However, the study was based on a standard Victorian population and was not adjusted for the poorer health status prevailing in Morwell. (Teague et al. 2014, p. 24)

The Board highlighted that several vulnerable groups characterised the population with an ageing population, higher incidence of cardiovascular and respiratory disease, a high percentage of low-income households and a higher percentage of residents with a disability (Teague et al. 2014). With this in mind, the Board reflected that the mine fire 'added further insult to an already vulnerable community' (Teague et al. 2014, p. 24). Nevertheless, Walker et al. (2016) report stoicism and resilience, particularly among older adults within the community. One service provider claimed their older clients were 'pretty resilient' relying on lived experience to deal with the situation at hand. Moreover, people relied on family and friends for essential assistance rather than the authorities, stating that they had it 'under control, we're at our families' and 'I've just gone to my friend in Traralgon' (Walker et al. 2016, p. 62).

While the short-term health impacts were of concern, the community were also gravely concerned about the potential for medium to long-term health impacts.

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<sup>2</sup>The Department of Health became the Department of Health and Human Services on 1 January 2015.

People are still waiting and people have moved on but I think the impact is longer lasting because the response post mine fire wasn't swift. [...] They denied that there was health issues, there was some cover-ups or perceived cover-ups, they could have done a lot more and they didn't. I think that affects the community pride, community connectedness and realizing that we're not as valued as somewhere else in the state. (Jones et al. 2018, p. 539)

The community petitioned the government to take further action, with over 21,000 signatures of support (Duffy and Whyte 2017). In response, the Department of Health and Human Services commissioned the Hazelwood Health Study, which commenced in November 2014. The study showed an increase in the occurrence of gestational diabetes among pregnant women exposed to mine fire-related air pollution than those who were not exposed during the disaster, with the greatest risk associated with exposure during the second trimester (Johnston et al. 2019). Furthermore, participants of the Health Study that were exposed to mine fire-related air pollution were more likely (compared to those not exposed) to report respiratory symptoms (wheeze, night-time and resting shortness of breath, chronic cough and phlegm, chest tightness and nasal symptoms) along with psychological distress in adults (Hazelwood Health Study 2019) and school children (Allen et al. 2019). Yell et al. (2019) also note that community wellbeing was greatly affected, with a distinct loss of trust in government authorities responsible for dealing with the disaster. The impact on community wellbeing is clearly articulated by the following comments captured in the Jones et al. study:

Bushfires were [...] only short lived with buildings and people losing properties and everything like that, whereas here the destruction was, I suppose, the Valley itself [...]. (Jones et al. 2018, p. 539)

I am very proud of my town [...] and my town was coping not a very good rap [...] It wasn't doing our town's image any good at all. We got known as a smoke town. Morwell has coped enough over the years without having to have that added to it. (Jones et al. 2018, p. 539)

I think that my experience here in the Valley's changed. So, up to the mine fire I think that life was a certain way, post that, it's almost like my attachment to the area is not as much. My feeling for the area, has waned – my commitment to the region – to where I live. My interest is no longer there. (Jones et al. 2018, p. 540)

### 7.4.3 *Economic Impacts*

On top of dealing with the long-term physical and mental health impacts of the mine fire, the community were faced with economic challenges including fears of falling house prices and local businesses struggling due to significantly reduced trading (Walker et al. 2016). The neighbourhood houses<sup>3</sup> were also feeling a pinch. Whyte

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<sup>3</sup>Neighbourhood Houses are described by Neighbourhood Houses Victoria as places that “bring people together to connect, learn and contribute in their local community through social, educational, recreational and support activities, using a unique community development approach” (<https://www.nhvic.org.au/neighbourhoodhouses/what-is-a-neighbourhood-house>).

(2017) provides an insight from a 2014 interview with the Morwell Neighbourhood House coordinator:

We've been impacted financially here because we've closed all our classes, people aren't engaged, that component of the community that were coming in to do courses have either left or have bunkered down because they've got their own social and emotional issues and they can't engage on that level. (Whyte 2017, p. 14)

Then, in November 2016, the owner at the time, Engie, announced the closure of the Hazelwood Power Station and open-cut coal mine. A submission from Latrobe City Council aptly noted:

While residents can learn to co-exist with [mining operations] the more that those operations intrude on the lives of those residents, the more resentful residents become. This in turn can lead to a diminishing of a community's ability to feel empowered and resilient. (Teague et al. 2016, p. 70)

The site was officially decommissioned in March 2017 at which time, 750 personnel were in direct employment at Hazelwood (Engie 2017). Later that same year, Carter Holt Harvey closed its Morwell sawmill on 28 September leading to the loss of another 160 jobs in the region.

What has emerged from [the Hazelwood Health Study interviews] (and ongoing conversations with community members) is that recovery is no longer only framed in relation to the mine fire event. It is talked about as also needing to address the ongoing impacts of the privatisation of the power industry in the late 1980s and early 1990s and the more recent closure of the Morwell open-cut mine and Hazelwood power station. (Hazelwood Health Study 2017, p. 49)

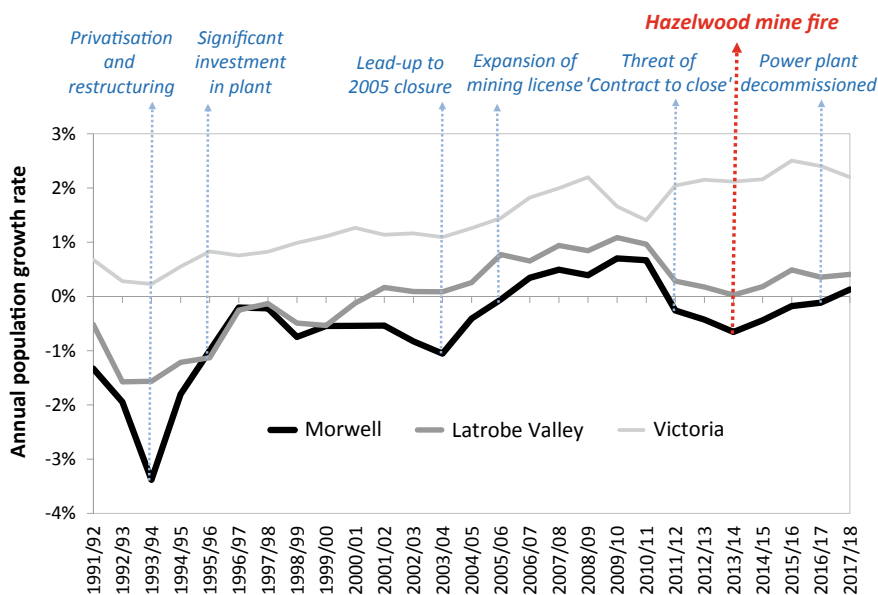
Having captured the essence of some of the impacts from the Morwell disaster on town residents and others, we now map out the transition of the population from pre-to post-disaster to evaluate the extent to which the fire may have altered the town's demographic and economic trajectories.

## 7.5 Morwell's Pre and Post-fire Demographic Trajectory

### 7.5.1 *Plotting Structural and Demographic Change*

Twenty-seven years of population data demonstrate the impacts of several structural upheavals on Morwell's resident population (Fig. 7.3). While population growth for Morwell and the Latrobe Valley has fluctuated quite widely, and at times been negative, State growth since 1991/92 was positive and comparatively consistent.

Demographic fluctuations for Morwell can be traced to a range of factors. During the 1990s, the town experienced population decline from restructuring and privatisation of the power industry by the State Electricity Commission of Victoria (SEC). This led to jobs and population losses in the region with Morwell most affected in proportional terms, particularly in 1993/94. Following privatisation in 1996, the then labelled 'Hazelwood Power Corporation' was sold to a consortium led by the



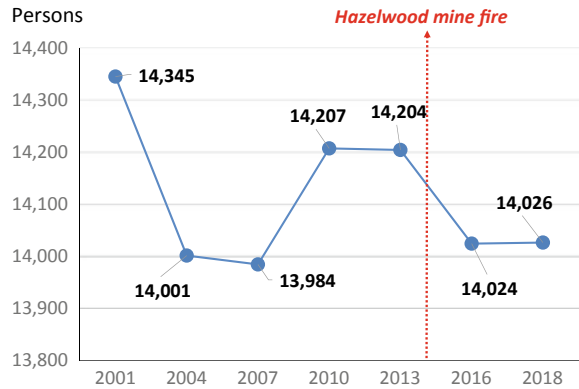
**Fig. 7.3** Annual population growth rates and major shocks, 1991/92 to 2017/18. (Calculation by Bird and Taylor using data from ABS.Stat)

British organisation National Power. However, population growth rates did not return to positive until the 2004 announcement of the proposed expansion of the mine to incorporate Phase 2 of the Hazelwood Mine West Field Development. Before this, the plant was due to be decommissioned in 2005 by the SEC, placing employment in the region under threat. This was evident in the negative population growth rates during the first half of 2000s.

In 2011/12, the Australian Government considered a Contract for Closure program as part of its Clean Energy Act, causing uncertainty in the region. However, that program was soon scrapped and no plants were closed. Nevertheless, as reported earlier, Engie closed Hazelwood at the end of March 2017 giving workers and local communities just five months' notice (ABC 2017). However, since closure of the plant in early 2017, there has been no evidence of a significant decline in growth rates for Morwell. Although growth rates were seemingly better than for most years since from the early 1990s onwards, from 2011/12 to 2016/17 rates were slightly negative.

The impacts of the events described above can be seen on the town's estimated resident population (Fig. 7.4) which fell by more than 300 during the lead up to the proposed 2005 closure (which did not take place). It recovered subsequently before falling again after the threat of the 'contract to close' became apparent in 2011/12.

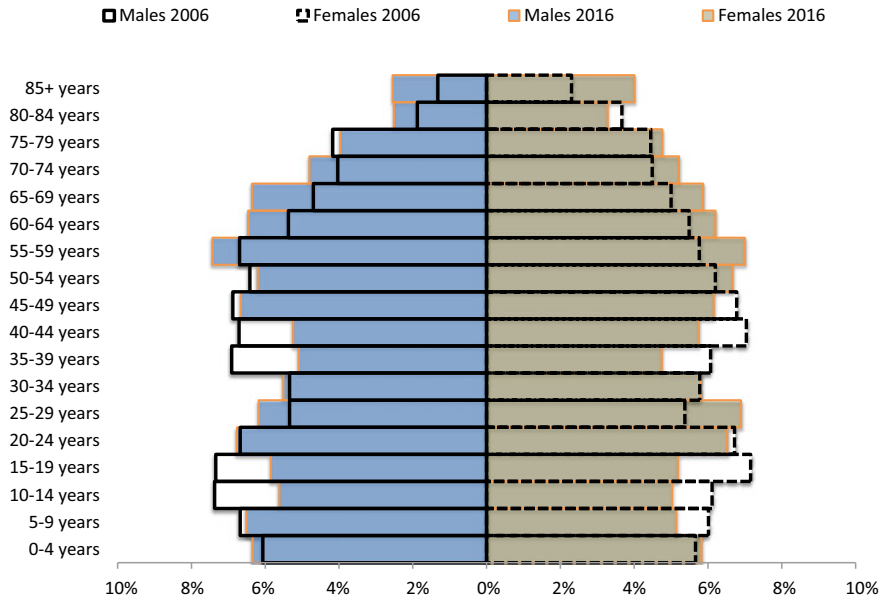
**Fig. 7.4** Morwell’s Estimated Resident Population, 2001–2018. (Calculation by Bird and Taylor using data from ABS.Stat)



Nevertheless, in 2018, the population was estimated at 14,026, just 2% lower than its peak of 14,345 during the past eighteen years.

**Changes in Morwell’s Age and Gender Composition**

While the population size has not fallen significantly since the mine closure, there have been progressive changes in the composition of the population. The population pyramid for the town (Fig. 7.5) for 2006 (black bars) and 2016 (for males blue with orange and females khaki with orange outline bars) shows there was a reduction in



**Fig. 7.5** Population by age and sex, 2006 and 2016. (Calculation by Bird and Taylor using ABS Census of Population and Housing data obtained from Table Builder)

the proportion of mid-career working-age residents (aged 30–44 years) and children aged 10–19 years. The latter is likely associated in part with the former as well as young people leaving for post-school education. In its place is a relatively prominent population ageing trend with an increase in the proportion of males and females aged 55 and above. Of note, the proportion of young children has remained stable, while those aged 25–29 years made up a greater part of the overall population in 2016 compared to 2001.

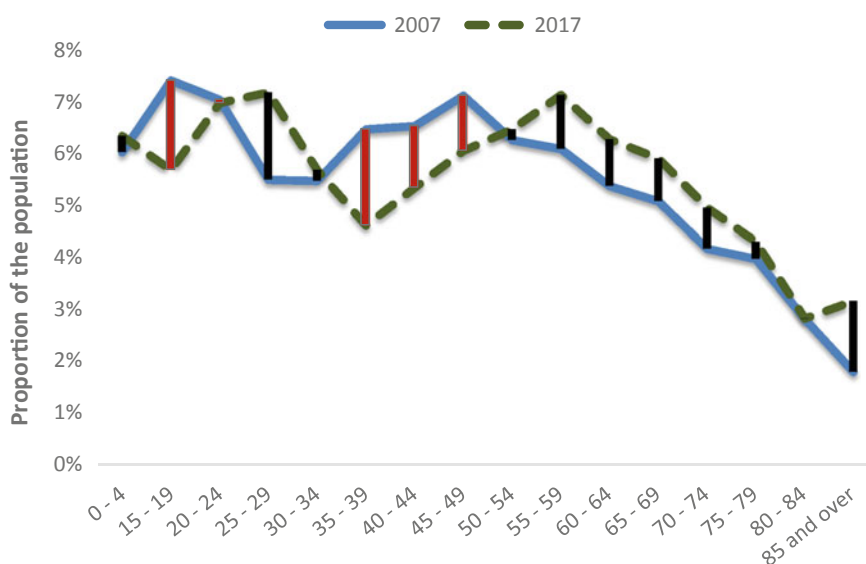
The changes described above are emphasised when comparing age-based estimates for the total population from 2007 to 2017 (Fig. 7.6). Changes in age composition for Morwell are shown by the red and black bars with the red indicating a reduced proportion of the population in 2017 at that age group and the black indicating an increased proportion. Hence, while the total population size has not altered significantly, its composition has.

### Migration

During 2011 to 2016 the town experienced a net loss of 149 males and 162 females (a total of 311) residents through migration. Analysis of this by life-stages (Fig. 7.7) shows net losses of early-career residents and children were substantial, while there were net gains in late-career males and retiree-aged males (those 65 years and over).

### Other Demographic Indicators

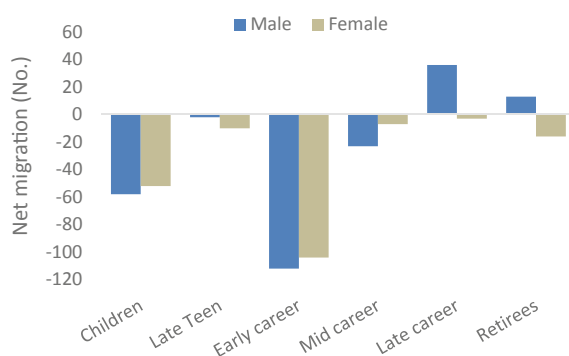
Comparing a range of other demographic indicators for Morwell to the region and to the State of Victoria highlights some significant differences and changes in the town



**Fig. 7.6** Changes in Morwell's population distribution by age, 2007 and 2017. (Calculation by Bird and Taylor using data from ABS.Stat)



**Fig. 7.7** Net migration by age for Morwell during 2011 to 2016. (Calculation by Bird and Taylor using ABS Table Builder data)



for the 15 years to 2016. With a median age of 43 in 2016, Morwell’s population in 2016 was older than for the region and Victoria by quite some margin, having risen considerably over the decade (Table 7.1). This indicates population ageing in the town through either resident’s ageing-in-place or the out-migration of younger people (or likely a combination of both). Morwell was relatively less ‘multicultural’ than Victoria by 2016 and its proportion born overseas had diminished, unlike for the State as a whole. Morwell, however, had a higher proportion of Indigenous residents (2.5%) compared to both the region (1.5%) and State (0.8%).

Also of note were lower median rents and house mortgage repayments in 2016 for Morwell when compared to the region and State. This is in part due to the higher proportion of householders who were renting from State housing organisations, at 6% in 2016 compared to 3% for Victoria (Table 7.2). In addition, a greater proportion rented from a real estate agent in 2016 (21%) than for Victoria (15%), having risen from 17% of households in 2006. These data indicate socio-economic status continues to be relatively lower in Morwell. However, there does not appear to be any collapse in these housing indicators subsequent to the fire and in the lead up to the closure of Hazelwood mine suggesting that the housing market may not have declined significantly in the post-disaster period; although certainly not increasing to the extent of mortgages and rents for the State as a whole.

### 7.5.2 *Employment, Income, Industry and Housing Profile Changes*

For towns such as Morwell, industrial composition and the distribution of jobs across industries are generally dominated by the main operation, usually a single large resourced-based extractive and/or processing industrial unit. Although the label might be appropriate as a descriptor, in reality, no town is truly ‘single industry’ with jobs in other sectors invariably prevalent and important including in retail, health and government administration and services; as well as a range of professions across various industries (such as medical or technical services). Economists point out there

**Table 7.1** Selected demographic indicators, 2006, 2011 and 2016

Indicator	Morwell			Latrobe valley			Victoria		
	2006	2011	2016	2006	2011	2016	2006	2011	2016
Estimated resident population	13,578	14,004	13,808	68,859	72,216	73,099	4,932,422	5,354,039	5,926,624
Median age	39	40	43	37	39	41	37	37	37
Proportion born overseas (%)	16	17	15	13	14	12	24	26	28
Per cent Indigenous (%)	2.2	2.8	2.5	1.3	1.5	1.6	0.6	0.7	0.8
Average household size	2.3	2.2	2.1	2.4	2.4	2.3	2.6	2.6	2.6
Median mortgage repayment (monthly)	737	975	953	867	1,200	1,200	1,252	1,700	1,728
Median rent (weekly)	115	150	180	120	160	200	185	277	325

Table constructed by Bird and Taylor using ABS, 2003.0 2016 Census of Population and Housing Time Series Profile (Morwell SA2, Latrobe Valley SA3 and Victoria State). Estimated Resident Population sourced from data extracted ABS.Stat

**Table 7.2** Tenure and landlord type for Morwell and Victoria, 2006, 2011 and 2016

	Morwell			Victoria		
	2006 (%)	2011 (%)	2016 (%)	2006 (%)	2011 (%)	2016 (%)
Owned or being purchased	68	66	64	74	72	73
Rented real estate	17	19	21	15	17	16
Rented state or territory housing	8	7	6	3	3	3
Other	7	8	9	9	9	9
Total	100	100	100	100	100	100

Table constructed by Bird and Taylor using ABS, 2003.0 2016 Census of Population and Housing Time Series Profile (Morwell SA2 and Victoria State)

are a range of benefits and challenges for towns like Morwell which were ‘specialised’ (also termed ‘agglomerated’ or ‘concentrated’) and for towns with employment diversified across industries (for a good discussion on these issues see ABS 2014). In this section, we profile employment and industry indicators for Morwell over time to examine the extent of industry concentration and identify whether and how the Hazelwood mine fire and power station closure may have altered the economic make-up of the town.

### Labour Market and Income Indicators

In 2011, the last Census before the closure of the power station, and at the end of a period of relatively high population growth from investment in Hazelwood, Morwell had a relatively high unemployment rate (12%) compared to its surrounding region (8%) and to the State of Victoria (5%). Participation rates in the workforce were also much lower (Table 7.3). In general, the range of indicators would suggest that the comparative socio-economic status of Morwell’s residents was low before the fire. Despite the scale of the fire and its impacts, the suite of indicators in Table 7.3 does not suggest a dramatic worsening of socio-economic conditions. Although the town did experience an increase in unemployment and decrease in participation rates during 2011 to 2016, these can reasonably be described as a continuation of pre-existing trends or as minor changes to date.

### Industry and Employment Profiles.

All else being equal, observed structural adjustments might be anticipated in the profile of jobs and industry compositions for small towns like Morwell after a disaster and when the major employer ceases to operate. Interestingly for Morwell, employment in the ‘Mining’ and ‘Electricity, Gas, Water and Waste Services’ industry sectors have never dominated overall employment patterns in the town. This is likely due to variable distributions of jobs in the mine and plant across a range of industry sectors including two which show in Census data to have been prominent: ‘Manufacturing’ and ‘Construction’ (Table 7.4). The former has significantly declined in Australia, and this is most evident for the State of Victoria where the sector has fallen

**Table 7.3** Comparative employment and income indicators, 2006, 2011 and 2016

Indicator	Morwell			Latrobe valley			Victoria		
	2006	2011	2016	2006	2011	2016	2006	2011	2016
Unemployment rate (%)	12	12	14	8	8	10	5	5	7
Participation rate (%)	49	48	46	56	56	54	60	61	61
Median personal income	\$326	\$391	\$470	\$376	\$468	\$544	\$456	\$561	\$644
Median family income (weekly)	\$809	\$930	\$1,092	\$1,053	\$1,236	\$1,414	\$1,189	\$1,460	\$1,715

Table constructed by Bird and Taylor using ABS, 2003.0 2016 Census of Population and Housing Time Series Profile (Morwell SA2, Latrobe Valley SA3 and Victoria State)

from being the largest employer in the State in 2011 to the sixth by 2016. Similarly, in Morwell, manufacturing no longer featured in the top four industries by 2016. Construction jobs in Morwell likely reflects stages of development in the plant and infrastructure associated with the mine and power station while the prominence of health care and social assistance by 2016 reflects a national population ageing trend and data in demographic analysis earlier in this chapter.

It is also pertinent, when considering possible local economic impacts from the disaster, to examine baseline industry concentrations and differential employment profiles for men and women, particularly considering the male-dominated profile of resource-based industrial operations. In terms of industry concentrations, the share of employment in the top four employing industries (known as the C4 Index) was the same in Morwell and the Latrobe Valley region in 2006 and 2011 (47% and 46%) but fell to 42% in 2016; the same as for the State of Victoria. Put another way, jobs in the town became more widely distributed across industries after the fire. Of concern, however, have been differential gendered outcomes for employment seen in the employment to population ratio. For males, there was a significant decline in the proportion of those 15 years and over who were employed, down from over half in 2006 to 43% in 2016. While this also declined in the Latrobe Valley and Victoria overall, the fall was larger in Morwell and is likely indicative of a range of long-term (for example, technology changes and population ageing) and event-related impacts including the mine fire and structural workforce adjustments in other industries. Meanwhile, the employment to population ratio for women was more stable for all three jurisdictions although much lower than for males (Table 7.5).

## 7.6 Discussion and Conclusion

The small Victorian town of Morwell, with a 2018 population of 14,000, has long been subject to shocks and stressors. In this chapter, we postulated that Morwell might previously have been considered a 'single-industry' town, given the historical importance of the coal mine and power station to employment and wealth generation. As a single-industry town, and in consideration of the apparent vulnerabilities that exist in relation to the poor health and wellbeing statistics of Morwell (see Teague et al. 2014), we anticipated that the 2014 mine fire, located adjacent to the town, might have led to substantial impacts on the economy and population. We know that health and wellbeing alongside socio-economic status impact the resilience of a population (100 Resilient Cities 2019; Latrobe City Council 2017; Wisner et al. 2004). However, our analysis of population and economic data over time suggests, aside from serious impacts during privatisation in the 1990s when growth rates were negative, the economy and population of the town have never substantively collapsed in the face of such shocks and stressors. Even subsequent to the fire and after the closure of the power station in 2017, the population size did not drop significantly when we might have anticipated otherwise.

**Table 7.4** Top four industries and trends in jobs for Morwell and beyond

Rank	2006		2011		2016	
	Industry	Employment	Industry	Employment	Industry	Employment
<i>Morwell</i>						
1	Retail trade	682	Retail trade	668	Health care and social assistance	630
2	Health care and social assistance	534	Health care and social assistance	612	Retail trade	626
3	Manufacturing	533	Manufacturing	487	Accommodation and food services	382
4	Construction	422	Construction	400	Construction	327
<i>Latrobe valley</i>						
1	Retail trade	3,923	Health care and social assistance	3,890	Health care and social assistance	4,279
2	Health care and social assistance	3,173	Retail trade	3,794	Retail trade	3,427
3	Manufacturing	3,082	Construction	2,972	Construction	2,670
4	Construction	2,800	Manufacturing	2,910	Public administration and safety	2,361
<i>Victoria</i>						
1	Manufacturing	287,108	Health care and social assistance	292,417	Health care and social assistance	341,999
2	Retail trade	263,447	Retail trade	273,715	Retail trade	279,636

(continued)



**Table 7.4** (continued)

Top 4 industries by employment size	Rank	2006		2011		2016	
		Industry	Employment	Industry	Employment	Industry	Employment
	3	Health care and social assistance	236,552	Manufacturing	271,051	Education and training	236,276
	4	Education and training	174,423	Construction	210,972	Construction	228,149

Table constructed by Bird and Taylor using ABS, 2003.0 2016 Census of Population and Housing Time Series Profile (Morwell SA2, Latrobe Valley SA3 and Victoria State)

**Table 7.5** Indicators for industry diversity and gendered employment outcomes

Indicator	2006 (%)	2011 (%)	2016 (%)
<i>Morwell</i>			
C4 index	47	46	42
Employment to population ratio—males	51	48	43
Employment to population ratio—females	36	37	36
<i>Latrobe valley</i>			
C4 index	47	46	45
Employment to population ratio—males	58	57	53
Employment to population ratio—females	45	48	46
<i>Victoria</i>			
C4 index	43	42	42
Employment to population ratio—males	63	64	61
Employment to population ratio—females	51	53	52

Table calculated by Bird and Taylor from ABS Table Builder data

Part of the explanation for lower than anticipated impacts on the economy and population after these shocks and stressors may lay in the historical diversity of industrial units comprising the mine and power station operations, as well as the employment profile it helped generate in the town through successive periods of renewal and growth (see Fig. 7.3). While we might have anticipated mining and power generation to be dominant industries in the town, particularly when the mine and power station expanded, the employment profile instead suggests retail and health or aged care to have been more prominent. Nevertheless, employment in manufacturing, likely the response option which many power plant employees selected in the Census, has suffered tremendously over time; but this is common across Australia and especially in the State of Victoria (see Table 7.3). However, declines in construction employment leading up to the closure may signify pending economic issues for the town in the form of downstream impacts on the whole economy and possibly on population size. Morwell is by no means alone in this respect with the construction industry historically subject to high variations across rural and remote Australia through boom and bust cycles.

The employment profile in Morwell may bring into question the voracity of the application of the label ‘single-industry town’, and this is further supported by industrial concentration measures derived for analysis in this chapter. Jobs in Morwell have never been significantly more concentrated in the top four industries than for the surrounding region and over time have become less concentrated with the C4 index (see Table 7.4) in 2016 the same as for the State of Victoria as a whole (42%). However, in spite of what appears to be stoicism in the face of major shocks, there is evidence that the fire and (what was then) the impending closure of the mine and power station worsening gendered employment outcomes with a lower proportion of working-age males employed in 2016 (see Table 7.4). This might also explain the

increased unemployment rate and reduced participation rate in the five years to 2016 when the State experienced the opposite with a buoyant economy and rapid population growth driven primarily by the city of Melbourne. Migration data supports this supposition with a noticeable net loss of population aged 35–54 years to other parts of Australia during 2007 to 2016 (see Fig. 7.6), and particularly for males (see Fig. 7.5).

Nevertheless, our demographic and socio-economic data suggests a certain stoicism and resilience inherent within the Morwell population. If we reconsider our working definition of resilience, it is pertinent to question how Morwell is adapting to the changed realities and capitalising on any new possibilities offered?

Walker et al. (2016) noted a certain level of stoicism and resilience in the community post-mine fire disaster with people relying on lived experience to deal with the situation at hand and their social connections for support. It has already been noted that Morwell has lived experience resulting from a long history of disaster familiarity (previous major fires in 1977, 2006 and 2008). In terms of social connections for support, however, we now consider the community's capacities in relation to the three different types of social capital—bonding social capital, bridging social capital and linking social capital.

If we look at the various community-led action groups established to secure a better future for Morwell and the Latrobe City area, it is evident that bonding and bridging social capital were prevalent. Most notably, strong and loose connections exist among the generations of families that have worked together in the mining industry and through attachment to place—i.e. people are connected because they are proud of the region where they live. Work place connections and attachment to place connections are clearly articulated by Doig (2019). Through these networks, within which a certain level of social trust evolves, the population collectively banded together around various community-led initiatives to produce a mutual benefit—a better future for their community. One such initiative was the formation of the community action group, Voices of the Valley in response to the Hazelwood Mine Fire. Voices of the Valley was established, through community fundraising, to ensure public concerns regarding health issues resulting from the mine fire were heard by government and the broader Victorian population. Another key network of collective action emanated from Morwell Neighbourhood House and together, they were instrumental in petitioning the government to take further action (Doig 2015, 2019). This action resulted in the establishment of the Hazelwood Health Study and reopening of the Hazelwood Mine Fire Inquiry. Regarding linking social capital, however, the Hazelwood Mine Fire Inquiry reports clearly articulate the fact that network connections and social trust between residents and the government was missing.

The Hazelwood Mine Fire Inquiry was originally completed in 2014 with 12 recommendations. In the second iteration, however, the Board of Inquiry made 246 recommendations for government, which included many bold initiatives aimed at re-establishing the lost social trust between residents and government officials, while at the same time, improving health and wellbeing across Latrobe City. Three of the key items included the designation of Latrobe City as a Health Innovation Zone, the establishment of the Latrobe Health Assembly and appointment of the Latrobe Health Advocate (Teague et al. 2016), which have been achieved.

The purpose of the Latrobe Health Innovation Zone, within which the Latrobe Health Assembly and Advocate sit, is to give voice to community aspirations in the planning and delivering of better health and wellbeing outcomes. With a membership of about 45 members, the majority of whom are Latrobe City residents, the Latrobe Health Assembly is a mechanism for increased community engagement leading to health improvement and integration of services. Based on community feedback and concerns, the Latrobe Health Advocate is providing independent and direct advice to the Minister for Health on system and policy issues affecting public health and wellbeing.

While it is too early to determine whether these initiatives are improving health and wellbeing and enhancing social trust between residents and the government (at the time of writing, they had been operating as a collective for 1 year), we are witnessing some positive demographic outcomes with Morwell's population growth rates tracking close to zero. We consider this a positive outcome in demographic terms in light of the closure of the main employer in the town. One key factor here is the ability of former Hazelwood employees to source work elsewhere in the region while remaining as residents in the town. Much of the transitioning of workers has been achieved by the Latrobe Valley Authority, which was established by the Victorian Government in November 2016 on the back of Engie's announcement to close the Hazelwood Power Station and open-cut coal mine.

The Latrobe Valley Authority is charged with the Worker Transition Service (providing upskilling, training and support to all ex-employees of Hazelwood including contractors, supply chain employees and their families) and the Back to Work Scheme (providing support to employers for hiring and training unemployed Latrobe Valley residents). This is part of the Victorian Government's 'Economic Growth Zone' which is injecting \$266 million into the Latrobe Valley for the creation of local jobs and businesses.

The town's relative proximity to Melbourne, a fast-growing and large city, may also position it as a future commuter town where affordable housing and lifestyle amenity secure its demand as a place to live and for businesses and the economy to continue to shift focus to servicing an emerging commuter population. Nevertheless, the memories of the fire disaster are likely to linger for remaining residents in perpetuity with the presence of the open-cut coal pit both a reminder of the town's past events, as well as potential ongoing environmental issues.

While the data and analysis conducted here provides consistent evidence of the resilience of the Morwell population, in reality, it may be too early to discern the full impacts from the fire and the de-coupling of the town from the power plant. A better understanding will come from repeating the sorts of analysis undertaken and reported on here with 2021 Census data and other data sources. This will provide a sturdier assessment on whether this seemingly resilient town was able to withstand the major shock of the power plant closure. Similarly, future studies should consider a more robust analysis of the strengths inherent within this community, particularly in relation to social capital and other social indicators of resilience highlighted by Cutter (2016). This will be critical to identify whether or not the various forms of social capital are negatively impacted by the possible diversification of the population

as new people move in in search of the new jobs and business opportunities being created.

It must also be noted, in relation to studying demographic indicators at these low levels of geography, there is some possibility that, for several reasons, they may not approximate actual 'on the ground' changes and trends in the community. Some of these issues are explained by Carson and colleagues in Chap. 5 and include data accuracy, changes in methods for data collection and ensuring changes are looked at using the most appropriate level or unit of geography (as far as possible).

In the face of the inevitable shift from fossil fuel to other sources, towns like Morwell were always going to experience a big shock at some point in time. Morwell, whose population and economy, although transitioning, has more than survived, may be a valuable case study for other towns undergoing such transitions from changing global resource consumption patterns. In reality, shock after shock may have helped 'prepare' the town to transition. The enforced transition with the closure of Hazelwood can be viewed as a litmus test for other rural and remote towns in Australia (and elsewhere) whose economic basis has been strongly tied to a main source (whether or not this is labelled 'single industry'). Climate change will no doubt lead to other towns facing similar challenges, testing their capacity to adapt and thrive.

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