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# DEMOGRAPHIC PROFILING: VICTORIAN BUSHFIRES 2009 CASE STUDY

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## INTRODUCTION

### ABOUT THE PROJECT

The “Optimising post-disaster recovery interventions in Australia” project explores the impact of a number of Australian natural disasters on the disaster-hit individuals’ economic resilience. By analysing Australian 2006, 2011 and 2016 Census data, the project determines whether their income levels were able to recover post disaster, considering demographic factors and sectors of employment.

The project’s natural disaster case studies are:

- The Victorian Black Saturday Bushfires 2009
- The Queensland Floods 2010-11
- The Western Australian Bushfires 2011
- Cyclone Oswald 2013

### PURPOSE OF THIS REPORT

In this report, we provide some high-level demographic profiling and descriptive analysis of the Victorian Black Saturday bushfire affected areas to present a baseline of their overall socioeconomic characteristics, drilling in on particular attributes (e.g. home ownership) to provide further context to some of our more puzzling research findings. The profiling is area-based (either SA2 or LGA, depending on available information) and utilises the ABS Census as the primary data source, in line with project methodology.

This report is part of a series of demographic profiling reports which will be released for each of the project case studies.

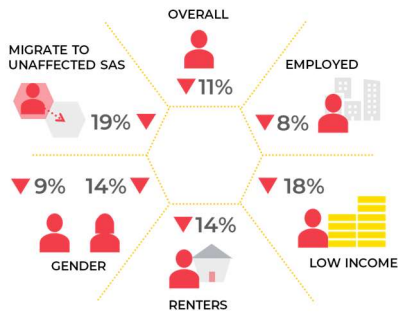
### RESULTS SO FAR (VICTORIAN BLACK SATURDAY BUSHFIRES)

So far, the project has examined the overall income effects of the Victorian Black Saturday Bushfires on individuals within bushfire affected SA2 areas within the immediate years following the fires (up to 2011).

Using the ABS Longitudinal Census data, our results show that Black Saturday Bushfires had a generally adverse effect on the incomes of individuals within these areas; some more so than others:



FIGURE 1



INDUSTRY OF EMPLOYMENT	2006 RANK	INCOME CHANGE
Agriculture, forestry and fishing	1	▼ 31%
Retail trade	3	▼ 13%
Health care and social assistance	4	▲ 8%
Accommodation and food services	8	▼ 12%
Transport, postal and warehousing	9	▼ 30%
Professional, scientific and technical services	12	▼ 19%

As often happens in research, these findings beg more questions. Why, for example, are some sectors and individual groups affected more than others? Why did those who migrated out of disaster-hit areas incur heavier losses than those who stayed? Is it due to the underlying socioeconomic characteristics of these areas, or specific characteristics within these groups that lead them to be more vulnerable than others?



## FIRE PROFILE

The 2009 Victorian Black Saturday Bushfires were the worst bushfire weather condition ever recorded globally; equivalent to 1500 Hiroshima style atom bombs going off (SMH, 2009). 173 people died; over 2,100 houses and 3,500 structures were destroyed, with thousands more suffering damage (Parliament of Victoria, 2010). The total area destroyed was around 400,000 hectares (CFA, 2009).

Based on the ABS 2007-08 estimated residential population, over 302,000 people, or 6% of Victoria's population would have been residing within the bushfire-hit areas at the time, with varied levels of exposure based on factors like the area's population density, bushfire severity and residence proximity to the fire's perimeter. On the latter, based on the available fire perimeter information, 38% of houses within fire perimeters were destroyed (min=13%, max=51%).

The Kilmore East-Murrindindi fires by far had the most devastating impacts, not only in sheer numbers of fatalities and houses destroyed, but also the number of SA2s that were exposed to these fires, which are known to have had adverse effects on the mental health of residents (Gibbs et al, 2016).

TABLE 1 BLACK SATURDAY BUSHFIRES COMMUNITY IMPACT AND EXPOSURE

<b>Fires (a)</b>	<b>Fatalities (a)</b>	<b>Casualties (a)</b>	<b>Houses destroyed (a)</b>	<b>No. houses within fire perimeter (b)</b>	<b>Burnt area sqkm (a)</b>	<b>Exposed SA2s (c)</b>	<b>Exposed SA2 population (d)</b>
Beechworth–Mudgegonga	2	12	38	–	388	5	32,386
Bendigo	1	41	58	172	39	4	36,611
Bunyip	–	2	31	240	244	4	40,642
Churchill	11	35	145	359	340	3	13,914
Coleraine	–	1	1	–	9	1	5,523
Delburn	–	–	44	–	178	2	15,734
Horsham	–	–	13	–	16	2	10,156
Kilmore East–Murrindindi	123	305	1790	4604	1364	12	113,684
Narre Warren– Upper Ferntree Gully	–	–	7	–	15	1	15,554
Pomborneit–Weerite	–	–	–	–	2	1	7,567
Redesdale	–	1	14	–	1030	3	14,976
<b>Total*</b>	<b>137</b>	<b>397</b>	<b>2141</b>	<b>5375</b>	<b>3626</b>	<b>37</b>	<b>302,340</b>

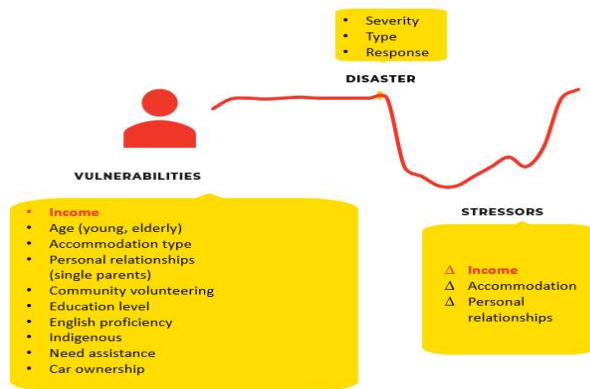
Sources: (a) Parliament of Victoria (2010). Note, this does not include damaged houses, which would increase the figure to over 4,600. (b) Chang-Richards et al (2013), (c) Author calculations, (d) totals reported will not match as some SA2s were exposed to multiple fires. Please refer to Appendix A, (e) 2008 ABS Estimated Resident Population.



## DEMOGRAPHIC PROFILE

Research studies have shown that some characteristics are associated with an individual's level of vulnerability before, during or after a disaster (DELWP, 2016).

FIGURE 2 INFLUENCERS ON THE RESILIENCE AND RECOVERY OF DISASTER-AFFECTED INDIVIDUALS AND POPULATIONS



Source: Vulnerabilities: DELWP, 2016; Stressors: Gibbs et al, 2016

Many of the indicators noted in the literature are highly correlated or interdependent, particularly with income, affirming our project's income focus. For example, the affordability of accommodation type and car ownership is often dependent on income, while educational level and income are interdependent. Additionally, Black Saturday Bushfire specific studies have also found that other stressors, not just the bushfire event itself, affected both resilience and recovery from these disasters. These include experiencing changes of income, changes in accommodation and changes in personal relationships (Gibbs et al, 2016).

The ABS SEIFA Indices capture many of the population vulnerabilities utilised in research for natural hazard risk analysis. These indices assign weights to these and other relevant indicators to rank LGAs according to their relative advantage and disadvantage compared to other LGAs within their state and Australia as a whole.

The SEIFA percentages in the table indicate the percentage of LGAs falling within the lowest scoring decile groups (1-4), thus more disadvantaged, in Victoria. As can be seen, the bushfires were not only widespread, but also impacted areas with varying levels of disadvantage. 38% of the affected LGAs scored low on the index of education and occupation, suggesting lower levels of educational attainment within these low scoring areas. The Churchill, Redesdale and Delburn fires affected LGAs had LGAs with low scores across all three indices.





TABLE 2 SUMMARY OF SELECTED SEIFA 2006 INDICES SCORING OF BUSHFIRE AFFECTED LGAS (A)

<b>Fires</b>	<b>Burnt area sqkm (b)</b>	<b>No. of affected LGAs</b>	<b>Index of Economic Resources</b>	<b>Index of Education and occupation</b>	<b>Index of Relative Socio-Economic Disadvantage</b>
Delburn	4.9%	1	100%	100%	100%
Kilmore East–Murrindindi	37.6%	6	0%	33%	17%
Bunyip	6.7%	2	0%	50%	0%
Horsham	0.4%	1	100%	0%	0%
Coleraine	0.3%	1	0%	0%	0%
Pomborneit–Weerite	0.05%	1	0%	0%	0%
Churchill	9.4%	3	67%	67%	67%
Redesdale	28.4%	3	67%	33%	33%
Narre Warren–Upper Ferntree Gully	0.4%	1	0%	100%	0%
Bendigo	1.1%	1	100%	100%	0%
Beechworth–Mudgegonga	10.7%	3	33%	33%	0%
<b>Total*</b>	<b>100%</b>	<b>21</b>	<b>28.6%</b>	<b>38.1%</b>	<b>19.0%</b>

(a) Figures show percentage of bushfire affected LGAs that have a score of 5 or less within the state of Victoria; Source: ABS SEIFA 2006. (b) Source: Calculations based on Victorian Bushfires Royal Commission final report figures (Parliament of Victoria, 2010). (c) Some LGAs were exposed to multiple fires. Please refer to Appendix A for list of LGAs.

What's happened since? Only broad comparisons can be made with the SEIFA 2011 results as the SEIFA indices are point-in-time estimates, with some changes to underlying index construction. The 2011 SEIFA Indices shows that the majority of LGAs either were in the same or a higher decile than in 2006, thus contributing to a lower percentage of LGAs falling within the 1-4 decile grouping for both the index of economic resources and education and occupation. Notably, there was an increase in LGAs falling within the 1-4 decile groups in the index of relative socioeconomic disadvantage, mainly located in areas affected by the Redesdale, Bendigo and Beechworth–Mudgegonga fires.

TABLE 3 SEIFA 2006 AND 2011 BUSHFIRE AFFECTED LGA DECILE COMPARISONS

<b>ABS SEIFA Index</b>	<b>% LGAs within 1-4 %LGAs who were in a decile group lower 2011 decile compared to 2006</b>		
	<b>2006</b>	<b>2011</b>	<b>(2006-2011)</b>
<b>Index of Economic Resources</b>	28.6%	19.0%	0.0%
<b>Index of Education and occupation</b>	38.1%	33.3%	14.3%
<b>Index of Relative Socio-Economic Disadvantage</b>	19.0%	23.8%	14.3%

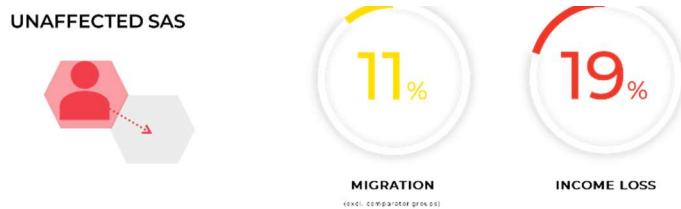
Source: ABS SEIFA 2006, 2011

Of course, many factors apart from the fires could have contributed to these figures. Additionally, as highlighted by our research findings, the outward movement of the most disaster-affected individuals, particularly in small SA2s, could positively alter the ranking of these LGAs, thus masking the true level of



disadvantage potentially felt subsequent to the bushfires and between Census periods.

FIGURE 3 INCOME EFFECTS ON BUSHFIRE AFFECTED INDIVIDUALS WHO MIGRATED TO UNAFFECTED AREAS



This is why it is important to apply a statistical approach such as our project's natural experimental design modelling to complement what this descriptive analysis is showing and confirm that the observed differences are statistically significant and attributable to the fires.

The use of the ACLD in particular enables researchers in a cost-effective and ethical way to track the movement of individuals and differentiate between those who stayed within their areas, and those who left, as we have done.



## ECONOMIC PROFILE

In 2006, the bushfire hit SA2 areas represented 28.6% of state's employed workforce. Notably, the bushfire affected areas contributed 4.6% of state employment in Agriculture, forestry and fishing, and 2% of state's employment in Electricity, gas and water services. The latter is explained by the presence of important infrastructural assets and water supply in bushfire affected areas, including:

- Morwell open-cut mine and power station and the main high-tension power line servicing Melbourne
- The O'Shannassy and Maroondah catchments in Melbourne's Yarra Ranges. Five of Melbourne's nine major dams had their forest catchments were affected by the bushfires, and 30 per cent of Melbourne Water's water catchments were burnt (Parliament of Victoria, 2016).

In the period between 2006 and 2011 Census, employees in 14 out of the 19 industry sectors experienced income declines. As not all of these sectoral declines are causally linked to the fires, only significant study results are reported in Table 4. Overall, there were 8% income losses across employment sectors. The bushfires particularly adversely affected the incomes of the largest employment sectors and tourism related industries (e.g. Accommodation and food services).

The Victorian Black Saturday Bushfires affected the overall economic composition of bushfire affected areas. In 2006, the top 5 industries across the bushfire affected areas were Agriculture, forestry and fishing; Manufacturing; Retail trade; Health care and social assistance; and Construction. In 2011, industries involved in individual assistance, recovery and rebuild efforts (e.g. Health care and social assistance; Construction) increased their percentage share of total employment, while the top three sectors (Agriculture, forestry and fishing; Manufacturing; Retail trade) declined.



TABLE 4 SUMMARY OF BUSHFIRE AFFECTED AREAS INDUSTRIES OF EMPLOYMENT (BY RANK, AVERAGE SA2 % OF EMPLOYMENT, AND % INCOME CHANGES ATTRIBUTABLE TO THE FIRES)

Industry of employment	Study results	2001		2006		2011	
		Rank	%	Rank	%	Rank	%
<b>Agriculture, forestry and fishing</b>	▼ 31%	1	13.9%	1	11.7%	3	10.3%
Manufacturing	– –	2	13.0%	2	11.5%	4	10.1%
<b>Retail trade</b>	▼ 13%	3	10.0%	3	10.5%	5	10.0%
<b>Health care and social assistance</b>	▲ 8%	4	9.6%	4	10.4%	1	11.7%
Construction	– –	5	7.8%	5	9.6%	2	10.8%
Education and training	– –	6	7.6%	6	7.6%	6	7.7%
<b>Accommodation and food services</b>	▼ 12%	7	5.6%	8	5.5%	8	5.8%
Public administration and safety	– –	8	4.6%	7	5.9%	7	6.2%
Wholesale trade	– –	9	4.5%	10	3.8%	12	3.7%
<b>Transport, postal and warehousing</b>	▼ 30%	10	3.9%	9	4.0%	9	4.3%
Other services	– –	11	3.8%	11	3.7%	11	3.8%
<b>Professional, scientific and technical services</b>	▼ 19%	12	3.8%	12	3.7%	10	3.8%
Administrative and support services	– –	13	2.5%	13	2.6%	13	2.5%
Financial and insurance services	– –	14	1.8%	14	1.7%	14	1.7%
Information media and telecommunications	– –	15	1.4%	17	1.2%	18	0.9%
Arts and recreation services	– –	16	1.3%	15	1.3%	16	1.3%
Electricity, gas, water and waste services	– –	17	1.2%	16	1.3%	15	1.4%
Rental, hiring and real estate services	– –	18	1.0%	18	1.0%	17	0.9%
Mining	– –	19	0.4%	19	0.6%	19	0.7%

Source: ABS Census 2001, 2006, 2011.

The significant income losses and employment share decline by the agricultural sector are well explained by the sector's prominence within bushfire hit areas and its more land-intensive nature, which is evident once overlayed by sector specific losses (Table 5), as well as other known losses including the burning of 3% of Yarra Valley's vineyard area and the loss of some 220 tonnes of trout (Parliament of Victoria, 2010).

TABLE 5 SUMMARY OF AGRICULTURAL ASSET TYPES DESTROYED OR DAMAGED IN THE BUSHFIRES

Asset type	Number lost
Fencing (kilometres)	8,618
Agricultural Buildings	1,411
Stock losses	11,800 <sup>a</sup>
Sheep	4,449
Cattle	3,673
Horses	200 <sup>a</sup>
Pasture (hectares)	65,065
Softwood plantation timber (hectares)	12,416

Sources: Unless otherwise indicated: DSE 2010. <sup>a</sup> Victorian Bushfires Royal Commission final report (Parliament of Victoria, 2010)



## HOUSING PROFILE

The Victorian Black Saturday bushfires destroyed 2,131 houses (Victorian Bushfire Commission, 2010), of which an estimated 74% were residential properties (Fire Recovery Unit, 2012).

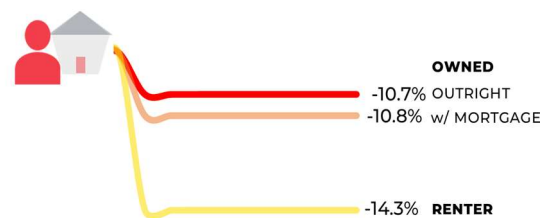
Compared to the state average, bushfire affected SA2s tended to have higher proportions of home owners with a mortgage (46%), and far lower number of renters (13%). Strikingly, the Black Saturday bushfires affected these groups differently. While home owners experienced income losses consistent with overall reported results (-11%), the bushfires most deeply affected incomes of renters (-14%).

FIGURE 4

(A) HOME OWNERSHIP COMPOSITION

Home ownership status (ABS Census 2006)	BSB Affected SA2s	Victoria
Owned outright (avg.)	34%	35%
Owned with mortgage (avg.)	46%	34%
Rented (avg.)	13%	24%

(B) VIC BSB INCOME EFFECTS, BY HOME OWNERSHIP STATUS



Source: ABS Census 2006; research results.

Since our research focus is income, these differences could be explained by any variations in disruptions to usual income sources, as well as other sources of income received during this period.

Based on our industry sector findings, differences in employment sectors between the home ownership status subgroups could account for their divergent outcomes. For example, if renters were disproportionately employed in part-time/seasonal work in the agricultural sector, then they were more likely to suffer immediate income losses than the other home ownership groups. It could also be, consistent with literature (DELWP, 2016), that other sociodemographic vulnerabilities highlighted earlier (e.g. low income earning) are observed in greater rates within the rental cohort, thus exacerbating these losses vis-à-vis other housing groups. This is being investigated further by the project team.

More crucially, we note that within the first 18 months following the bushfire (coinciding with our short-term study results), over \$200 million had been spent by VBAF on rehousing, house repair and recovery assistance for those whose principle place of residents was destroyed or damaged by the bushfires (Table 6). The majority of these payments were directed at home owners and/or landlords, with much smaller gifts made available to tenants directly. While this



likely explains the divergent outcomes, the research team can't confirm this without a full record of grant assistance data.

TABLE 6 VBAF HOUSING PROPERTY RELATED ASSISTANCE PAYMENTS (FEBRUARY 2009 - 31 AUGUST 2010)

Gift	Housing group	Gift amount	Distributed funds (\$m)	Number of payments
<b>Initial home dislocation</b>	<b>All</b>	<ul style="list-style-type: none"> <li>• \$5000 per household</li> <li>• \$2000 per person over 18</li> <li>• \$1500 per child under 18</li> </ul>	\$27.52	4,273
<b>Emergency household repairs</b>	<b>Home owners Landlords</b>	<ul style="list-style-type: none"> <li>• \$3000 lump sum</li> </ul>	\$2.78	931
<b>Rehousing and recovery (destroyed properties)</b>	<b>Home owners</b>	<ul style="list-style-type: none"> <li>• \$35,000 lump sum plus</li> <li>• \$15,000 contents payment</li> <li>• needs-based payment of up to \$50,000</li> </ul>		
<b>Rehousing and recovery (damaged properties)</b>	<b>Home owners</b>	<ul style="list-style-type: none"> <li>• \$15,000 lump sum, plus</li> <li>• a further, needs-based payment of up to \$20,000</li> </ul>	\$149.07	6,663
<b>Rehousing and recovery (tenant properties)</b>	<b>Tenants<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• \$15,000 lump sum</li> </ul>		
<b>Rehousing and recovery (construction)</b>	<b>Home owners</b>	<ul style="list-style-type: none"> <li>• Up to \$25,000 pre lock-up (during construction stage)</li> <li>• \$35,000 for post lock-up (certificate of occupancy; house ready to be moved into post construction)</li> </ul>		
<b>Essential services for temporary accommodation</b>	<b>All</b>	<ul style="list-style-type: none"> <li>• Case-by-case financial support</li> </ul>	\$3.91	22
<b>Transitional Support for Homeowners, Tenants and Boarders</b>	<b>Home owners Tenants</b>	<ul style="list-style-type: none"> <li>• Homeowners \$10,000 for singles and couples, \$15,000 per family of three or more</li> <li>• Tenants and boarders – \$5000 per home for up to two residents and \$7500 per home for three or more residents</li> </ul>	\$16.84	1,635
<b>Support for Boarders to Rehouse</b>	<b>Tenants / Renters</b>	<ul style="list-style-type: none"> <li>• \$5000 for less than two people</li> <li>• \$7,500 for three or more people</li> </ul>	\$0.43	89
<b>Total</b>	-	-	<b>\$200.55</b>	<b>13,613</b>

Source: VBAF 2010(a), VBAF 2010(b). <sup>a</sup>Based on available VBAF information, tenant properties rehousing and recovery program distributions account for an estimated 5% of total distributions within this program.

It is also likely that limited alternative accommodation options, coupled with the restrictive nature of private rental arrangements and tenancy laws in these circumstances may have affected the ability of tenants to return to their usual residence (thus causing further potential disruptions to income), and the speed at which affected renters were identified and funds distributed. For example, during the bushfires, the Residential Tenancies Bond Authority created special certification and procedures so 34 tenants could claim their bonds in cases where estate agencies were no longer operating and facilitated contact



between tenants and agents so urgent repairs could be done on the bushfire hit properties (Consumer Affairs Victoria, 2009).

Relevantly, there is evidence that those that were covered by insurance had 12 months of rent being paid for by their insurance, thus providing an additional source of income (Parliament of Victoria, 2010). It is noted that about 13 per cent of destroyed residential properties might have been without insurance cover (Parliament of Victoria, 2010).

While it is beyond our project scope, it is also known that apart from proximity to the fires, variations in housing standards contributed to some houses being burnt but not others (Chang-Richards et al, 2013). Thus, if there is a disproportionate number of renter households living in houses with a greater fire risk, they are more likely to have incurred income losses during this period.



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