



# Fly-in Fly-out/Drive-in Drive-out practices and health service delivery in rural areas of Australia

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## Acronyms

ABS	Australian Bureau of Statistics
BIBO	Bus-in, Bus-out
DEEDI	Department of Employment, Economic Development and Innovation
DEEWR	Department of Education, Employment and Workplace Relations
DDSWQ	Darling Downs, South West Queensland
DIDO	Drive-in, Drive-out
ED	Emergency Department
FIFO	Fly-in, Fly-out
GP	General Practitioner
ISM	Infrastructure and Services Model
LGA	Local Government Area
LNG	Liquefied Natural Gas
OESR	Office of Economic and Statistical Research
NSW	New South Wales
NPS	National Prescribing Service
NT	Northern Territory
Qld	Queensland
SA	South Australia
SLA	Statistical Local Area
STD	Sexually Transmitted Disease
WA	Western Australia

## Main messages

The aim of this research was to identify evidence that supported or challenged anecdotal accounts of the demands placed on Australian rural and remote health services by fly-in fly-out, drive-in drive-out, and bus-in bus-out workers and visitors, including seasonal workers and 'grey nomads' (from here on referred to collectively as FIFO/DIDO). Based on the literature search undertaken, we have made the following findings.

### FIFO/DIDO populations

- There are a number of data sources, of varying reliability, for quantifying the size of non-resident populations.
- Long-term estimates of mining FIFO/DIDO populations are unreliable and actual numbers are difficult to determine due to multiple fluctuations, including: shifts in mining phase, changing economic conditions, changes in resource demand, and availability of labour forces.
- Indications are that the number of non-resident seasonal workers and grey nomads is considerably greater than the mining non-resident population, but changes in mining FIFO/DIDO population size are likely to occur more rapidly.
- The greatest overlap in mining sector, seasonal worker and grey nomad FIFO/DIDO destinations occurs in the state of Queensland.
- Evidence of considerable intra-regional variation in the proportion of FIFO/DIDO populations suggests a need for local as well as regional level data.
- Resource towns in Alaska and Canada, which also have FIFO/DIDO populations, may face very similar challenges with respect to FIFO/DIDO demand on health services.

### Health services and impact of FIFO/DIDO

- Overall, there is very little published quantitative evidence to support or challenge claims that FIFO/DIDO places pressure on over-stretched rural/remote health services, although there has been more effort to generate such data within mining resource towns than in areas impacted by seasonal workers or grey nomads only.
- Where evidence has been collected (Bowen Basin, Qld), there is support for the claim that FIFO/DIDO demands on general health services are similar to those of local resident populations, with a greater demand being placed on emergency department (ED) services.
- Demands placed on local health services show seasonal variation for grey nomads and seasonal workers, whereas mining FIFO/DIDO worker demands are likely to fluctuate according to mining phase and international demand.
- Simple data collection based on patient postcode of usual residence can be used to reflect the extent of demand, but very few published records of this were identified. More detailed data collection and analysis is required to ascertain the reason for health service need and length of consultation, as well as FIFO/DIDO status (i.e. mining, grey nomad, or seasonal worker).
- Collection of data by pharmacies dispensing medications could be of value in quantifying the health care demands of grey nomads and FIFO/DIDO workers.
- Mining and seasonal FIFO/DIDO workers are more likely to present with musculoskeletal injuries, but an increase in age-related conditions is anticipated in the coming decade.
- Grey nomads are more likely to present with problems related to chronic diseases, in particular hypertension, dyslipidemia, heart disease and diabetes.
- In general, mining companies acknowledge the demand placed on health services by FIFO/DIDO workers, and support use of the Royalties for Regions program to aid government provision of this service in established communities.

## Executive summary

It is recognised that rural and remote health services in Australia are in many cases challenged by a combination of inadequate facilities and insufficient staff. According to anecdotal accounts, this is further exacerbated by the demands placed on these health services by fly-in fly-out, drive-in drive-out, and bus-in bus-out workers and visitors (from here on referred to collectively as FIFO/DIDO). The focus of the current investigation was FIFO/DIDO in rural Australia involving mine workers, seasonal agricultural workers, and grey nomads.

Based on published data and company input, there are likely to be at least 50 000 mining sector FIFO/DIDO (and possibly up to 100 000 depending on data source) currently on-shift in rural and remote regions of Australia. However, this is relatively minor compared to estimates of approximately 400 000 grey nomads during the winter months, and 2007–2008 estimates of 37 000 backpacker seasonal workers; and an agricultural industry need for 93 000 marginally attached workers in 2008 (Carter, 2002, Hay and Howes, 2012, Mikkelsen et al., 2013, National Farmers' Federation, 2008, Onyx and Leonard, 2007). However, it is likely that the wide dispersal of seasonal workers and grey nomads across Australia reduces their impact on local infrastructure compared to the more concentrated mining sector FIFO/DIDO. In contrast, mining-related FIFO/DIDO practice, whilst not new, has increased significantly and abruptly in Australia in the past decade.

Whilst popular and professional media sources abound with anecdotal accounts of the demands placed on rural and remote health services by FIFO/DIDO workers and visitors, in most cases there is very little published quantitative evidence either supporting or challenging these claims. One exception to this is the Bowen Basin coal mining region of Queensland, for which a number of very informative analyses have been conducted based on a series of one month 'snapshots' taken over a five year period; and application of a computer-based Infrastructure Service Model (ISM). The results of that study demonstrated FIFO/DIDO demand for general practitioner (GP) consultations and hospital services (Constantine and Battye, 2013). Comparison of observations in the Bowen Basin in 2011, with population statistics for the same year, revealed that FIFO/DIDO demand for health services was proportional to FIFO/DIDO representation within the total service population, with the exception of ED presentations in which case FIFO/DIDO demand was disproportionately high. The results of the Bowen Basin studies support anecdotal accounts of the increased demands placed upon health services by FIFO/DIDO, but do not provide information on the nature of this demand (i.e. disease or conditions treated, length of consultations etc.), nor does it distinguish between resource sector<sup>i</sup> and non-resource sector FIFO/DIDO (although according to Mikelsen (2013), approximately 75% of the Bowen Basin on-shift FIFO/DIDO workers in June 2011 were employed in mining or construction industries). In light of projected increases in mining FIFO/DIDO numbers to 2020, it seems prudent to plan current and future health service needs on the combined resident and non-resident population estimates such as those collected by the Queensland Office of Economic and Statistical Research (OESR). To this end, the Isaac Regional Council (including much of the Bowen Basin) contracted the consultancy firm KPMG to develop an ISM to project future needs in the region based on agreed benchmarks for services and a service population comprising resident and non-resident individuals (KPMG, 2011). Although only a summary account of the ISM is currently available in the public domain, this approach is consistent with long-held views by the Australian Bureau of Statistics (ABS) with respect to infrastructure funding models (Lee, 1999, KPMG, 2011).

However, extrapolation of results from the Bowen Basin to other regions is likely to be problematic for a number of reasons, including: differences in injury rates and health service needs dependent on type and phase of mining; variation in the proportion of FIFO/DIDO and in the size of resident



populations of affected communities (and hence in existing infrastructure); variation in source of FIFO/DIDO (proportion of mining, seasonal worker or grey nomad) and hence variation in needs. Community-specific analyses are required, and this might be achieved simply by including home address postcode for each patient together with diagnoses or reason for presentation.

No accounts of the impact of FIFO/DIDO on Aboriginal communities and access to health services were identified. With respect to rural communities in general, it is noted that mining operations in remote areas such as the Pilbara with limited access to local amenities, are likely to provide more extensive health services beyond on-site emergency first aid staff and facilities, whereas proximity to established communities may obviate this need. Nevertheless, in response to the inability of Moranbah health services to attend to all patients in a timely manner, at least one mining company reportedly established their own on-site clinics using FIFO/DIDO health care professionals. Provided that local health services document the case-loads in a way that identifies patient place of residence, then for communities where the FIFO/DIDO population is predominately mining workers, this information could be used in the future to flag a need for on-site clinics to ensure worker health and wellbeing, and community flexibility to cope with rapid changes in demand. Where the FIFO/DIDO population is of mixed origin, for example mining and seasonal worker/grey nomad, the increased need for capacity might be met by increased funding of local infrastructure.

Challenges were repeatedly identified across mining FIFO/DIDO, seasonal workers and grey nomads around defining and measuring these populations, and the need to include these variable populations in infrastructure and service planning. Nevertheless, the data available suggest that there are high numbers of these groups in regions throughout Australia. Similar health risks were identified for mining and seasonal workers, due predominantly to the physically-demanding nature of the work and the environmental conditions; whereas grey nomads often presented a different set of health challenges based on the average age of the cohort. These diverse FIFO/DIDO populations all demonstrate a need for improved health literacy, both in terms of the individual level health risks and in terms of local service appropriateness and availability. Limited evidence was available as to the specific impact of FIFO/DIDO and grey nomad populations on local communities' health services, though the data sourced suggested a negative impact. However, it must be acknowledged that in many cases the regions typically recording high numbers of FIFO/DIDO workers or visitors already experience health service problems related to availability of workforce and access, and the influx of these populations may simply exacerbate the problems already present.

## Context

The following Rapid Response aims to identify existing literature and data sources to determine the size and nature of fly-in, fly-out (FIFO), drive-in, drive-out (DIDO), and bus-in bus-out (BIBO) populations in rural and remote Australia; and to gather information on the communities affected and the extent to which provision of health services to resident populations is impacted by their presence. To this end, the FIFO/DIDO/BIBO populations related to mining and seasonal work activity have been included, as have the 'grey nomads' or people who are 55 years of age or older and travelling for extended periods of six weeks or more around Australia and for whom camping grounds (e.g. tent, caravan or similar) is the main form of accommodation. For the purposes of this report the term FIFO/DIDO is used irrespective of the mode of transport used and refers to both the situation where the place of work is sufficiently isolated from the workers' place of residence to make daily commute impractical; and for those travelling for an extended period where returning home on a weekly basis is not practical (Watts, 2004). In addition, an overview of the impact of mining-related FIFO/DIDO practice on health service provision to residents in Alaska, Canada and



Scotland was included for comparison based on industry and/or health care similarity with the Australian setting.

## Background

Australia is the most urbanised country in the world, with more than 85 per cent of the population living within 50km of the coastline (Walker et al., 2012). Beyond this populated coastal fringe lies remote Australia, comprising 85 per cent of the Australian landmass. It is home to far-flung rural communities that increasingly find themselves isolated in terms of infrastructure and opportunity, and often with limited access to health care and education. Remote Australia is also home to 60 per cent of operational mining platforms and, together with the new mine developments underway in various regions, this has placed substantial strain on local infrastructure as local communities experience sudden and rapid population growth (Walker et al., 2012).<sup>i</sup> However, whilst mining is a high profile contributor, it is not the only activity that periodically inflates population numbers in remote regions of Australia. A substantial number of seasonal workers and grey nomads also enter these regional communities for varying lengths of time and potentially burden the community infrastructure including the provision of health care.

## Aims and research questions

The aim of this Rapid Response is to identify available evidence either supporting or challenging the case that the transient, non-resident (FIFO/DIDO) mining and seasonal workforce, and grey nomad populations impact on the provision of health care services to permanent residents of rural communities. Specific questions to be addressed include:

- Which communities and geographic regions of Australia are affected?
- How large are these transient (non-resident) FIFO/DIDO populations?
- What are the prevalent and incident medical conditions for which these transient populations are likely to seek attention in the rural regional communities?
- What high risk behaviours are prevalent in these transient populations that may put additional pressure on local health care services? (e.g. accidents, injuries related to risky behaviours)
- What is the evidence for FIFO/DIDO impact on servicing local community health care needs?
- How are Indigenous communities affected?
- To what extent do the employers provide health care services independent of local community facilities (either on-site or provision of FIFO/DIDO health care services)?

## Methods

A thorough (though not systematic) review of Australian and international literature was undertaken to search academic and grey literature sources including, but not restricted to: PubMed, Trove, Google Scholar; and publicly accessible websites of relevant companies and organisations including the Minerals Council of Australia, Australian Bureau of Statistics, Rural and Regional Health Australia, and National Harvest Labour Information Service.

Keyword terms applied in the searches included the following terms: "rural health services"; "seasonal workforce"; "itinerant workforce"; "transient workforce"; "mobile workforce"; "mining"; "FIFO"; "DIDO"; "Fly-in Fly-out"; "Drive-in drive-out"; "grey nomad"; "gray nomad".

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<sup>i</sup> See also Department of Foreign Affairs and Trade, Trade at a Glance 2011 available at [www.dfat.gov.au/trade](http://www.dfat.gov.au/trade)

Searches were restricted to English language, the publication period 2008–2013, and the following settings: Australia and, where indicated, Canada, Alaska, and Scotland. In addition to the above filters, articles were reviewed for relevance to the questions listed above. References sourced from citations within primary references (snowballing) were included and, where availability of data was limited, pre-2008 publications were also included. See Appendix Figure 6, Figure 10 and Figure 17 for an overview of search outcomes.

In searching for evidence related to the mining FIFO/DIDO, a number of local community-based organisations were contacted in Pilbara, Kimberley, Darwin, Darling Downs South West Queensland, Mackay, and Isaac, in addition to a number of individual experts within the field. In this way, specific resources or additional information were identified to complement those already found based on the search strategy outlined above. However, as noted by the Pilbara Kimberley Medicare Local, whilst the topic of mining-related FIFO/DIDO and health service provision is regarded as a priority area, initial action centres on defining the population and it is hoped that in the near future data on actual service use will become available. With respect to the topic of grey nomads, despite approaching a range of relevant services, including Queensland Health, the Royal Flying Doctor Service (RFDS), ambulance services, the Pharmacy Guild, and the National Prescribing Service (NPS), the available information was very limited. This suggests that these organisations may not have systems in place to monitor the impact of grey nomads.

## Findings

### The impact of mining industry FIFO/DIDO work practices

#### *Australia*

For the past decade the Australian resources boom has enjoyed sustained growth in profits and productivity, but the need to increase workforce numbers to keep up with this demand has resulted in practices such as use of FIFO/DIDO workers. As much as 50 per cent of the mining operations in Western Australia and some regions of Queensland use FIFO/DIDO, and the tendency is upwards (Dixon, 2010, Morris, 2012). The reasons for increasing FIFO/DIDO in remote Australia relate to insufficient local population of working age to meet the needs and skill requirements, lack of family accommodation, and worker preference to live in areas with greater amenities as offered in cities (Dixon, 2010). As noted in the *remoteFOCUS* report by Walker et al. (2012), remote area workers also receive tax rebates irrespective of where they live. Therefore, the employee living in a well-serviced city centre is likely to be better off than if they were living in a remote community without hospital, medical or police services. In addition, changes in the Fringe Benefit Tax implemented by the Commonwealth government means that mining companies are liable for tax on company-owned housing occupied by staff.

While the actual size of the total mining industry workforce within the Australian setting has increased significantly in the past decade, it remains a very minor component of the total Australian workforce overall, accounting for approximately two per cent of all employees in Australia (Mikkelsen et al., 2013, Australian Bureau of Statistics, 2013, Molloy and Tan, 2008). However, these figures may underestimate the true number because individuals primarily employed in other sectors (e.g. the construction sector) might be contracted to the mining industry for short periods of time as required, but not appear in mining-related employment figures. As reported by Mikkelsen (2013), although the mining industry accounts for just two per cent of Australia's employment, it accounts for 21 per cent of the long-distance commuter or FIFO/DIDO workforce. However, it is important to note that workers from the mining resources sector are not the only, and in many cases not the largest group of workers involved in this practice even in a region with mining activity (Table 1).

**Table 1 Mining workers as a proportion of non-resident populations in selected mining regions of Australia in 2011**

<b>Region</b>	<b>Resident population</b>	<b>Non-resident worker population</b>	<b>Mining/construction workers as a proportion of non-resident worker population (%)</b>
Bowen Basin	68 588	16 544	62/13
Surat Basin	200 750	4 069	21/19
Pilbara	62 736	18 703	48/23
Hunter Valley	118 416	1 785	22/15
Central South Australia	8 735	3 100	63/11

Source: KPMG based on 2011 Census data (Mikkelsen et al., 2013).

## Communities and regions affected by FIFO/DIDO

Table 2 shows a selected list of Australian regions impacted by mining, and hence potentially by mining-related FIFO/DIDO practice. A more extensive representation of operational mines in Australia as at October 2013 is provided in the Appendices (Tables 6–9). The nine major Australian mining regions are Pilbara, Central West WA (known as Med West when extended to include Geraldton), Kalgoorlie-Boulder, Central South Australia, Hunter Valley, Surat Basin, Bowen Basin, Galilee Basin, and North-West Qld (Mikkelsen et al., 2013); see also Appendix Figure 7 and Figure 8. However, whilst these are the major centres, they are by no means the only communities influenced by mining activity. In the current report, the nine major regions form the focus of our investigations. Further, with changes in technology, ongoing new exploration, and decommissioning of older operations, while the major centres are relatively well-established, the number and location of impacted communities is likely to change continuously.

**Table 2 Location and type of mining for nine major mining regions of Australia**

Region	State	Major mining activity
Bowen Basin	Qld	Coal, Coal seam gas
Galilee Basin	Qld	Coal, Coal seam gas
Surat Basin	Qld	Coal, Coal seam gas
North West Qld	Qld	Coal, Copper, Zinc and other metals, Uranium
Pilbara	WA	Iron ore
Kalgoorlie-Boulder	WA	Gold, Iron ore
Central West	WA	Gold,
Hunter Valley	NSW	Coal, Coal seam gas
Central South Australia	SA	Iron ore, Copper, Zinc, Silver, Gold, Uranium

Based on information from GeoScience Australia. Accessed October 2013, and available at <http://www.australianminesatlas.gov.au/?site=atlas&tool=advsearch>

## Size of FIFO/DIDO population

For estimating demand on local services, it is important to consider the total population within a geographical area. Estimated resident population alone is insufficient and estimates of ‘service population’ comprising resident plus FIFO/DIDO are more likely to provide useful data on which to base projections (Lee, 1999). Therefore, to determine the likely impact of mining on local health services, it is important to obtain both estimates of service population and the proportion of service population that is mining FIFO/DIDO. The size of the FIFO/DIDO population as a proportion of total population in a given area potentially influences both demand on local services and resident acceptance of FIFO/DIDO practice.

The size of mining FIFO/DIDO populations is strongly influenced by the stage of mine development, with the typical mining operation cycling through: exploration, construction, operation and decommissioning; with construction being the most labour-intensive phase (Mikkelsen et al., 2013). For example, the Kimberley Browse LNG<sup>ii</sup> Precinct project was based on a construction workforce estimate of 6 000 versus an operational workforce of 400; and similarly, Sino Iron’s Pellet project workforces of 4 000 and 500 respectively (Dixon, 2010). The Fortescue Metals Group Ltd, Pilbara Iron-ore project was based on FIFO/DIDO workforces from Port Hedland and Newman, with a

<sup>ii</sup> Liquefied Natural Gas

workforce of 2 000 during construction over a 20-month period, and 600 during operation, of which 394 would be flying in to the mines (James, 2004).

A survey of perceptions about how mining projects impact on Queensland mining communities found that among 559 respondents, 61 per cent supported new mining projects where the non-resident workforce was 25 per cent or less, but 82 per cent of respondents opposed projects with 75 per cent or more non-resident populations (Carrington and Pereira, 2011). Although based on a small sub-cohort ( $n=22$ ) in that report, similar outcomes were reported for respondents who worked in mining.

### **Current FIFO/DIDO estimates**

Since release of the Standing Committee report on FIFO/DIDO work practices in regional Australia, a number of estimates for the size of the mining-related FIFO/DIDO population have become available from government, community and mining company sources, as summarized in the Appendix (Tables 6–9). However, when interpreting these estimates, a number of caveats need to be noted:

- Many estimates are based on Census data, but caution should be taken when interpreting these data because the Australian Census was not designed for this purpose.<sup>iii</sup> However, the ABS has proposed ways in which future Census collections could be structured to capture information relevant to the FIFO/DIDO population.<sup>iv</sup>
- As the size of FIFO/DIDO workforces varies depending on mining phase and region (construction workforce>operational phase>exploration), it is important to consider the time frame of estimates.
- Often estimates do not include construction workers as they are attributed to the building industry not mining, thus leading to underestimates of workers particularly during construction phases of mining activity.
- Census counts are static data; therefore only FIFO/DIDO workers on work cycles are counted in mining regions, whilst those on leave cycles would be counted at their place of usual residence (Carrington et al., 2011). This is likely to lead to significant underestimation of actual numbers, particularly where a service is provided on a continuous as opposed to ‘on-site’ basis only. For example, where two FIFO/DIDO workers replace each other in the work roster they physically represent one on-site worker and accommodation must be provided for only one person at any time. However, if both access local health facilities, they are two separate cases each requiring individual documentation and follow up so the workload is greater than for an individual patient even though they never engage with the service at the same time.
- Estimates from Mikelson (2013) for KPMG relate to FIFO/DIDO workers in nine major mining regions of Australia and are based on ABS 2011 Census data.
- Estimates from Waller (2010) are for the Pilbara region based on inputs from 10 mining companies and publicly available data sources.
- Estimates from Dixon (2010) are for WA based on data from the Department of Mines and Petroleum for direct employees and contractors, and on data from the report of Waller (2010).
- Estimates for FIFO/DIDO from the Qld OESR, are Qld-specific and are based on local accommodation surveys and other publicly available data (OESR, 2013a, OESR, 2013c, OESR, 2013b).

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<sup>iii</sup> [see statement 2.36 of HOUSE OF REPRESENTATIVES & STANDING COMMITTEE ON REGIONAL AUSTRALIA 2013. Cancer of the bush or salvation for our cities? Fly-in, fly-out and drive-in, drive-out workforce practices in regional Australia. Canberra: Commonwealth of Australia.]

<sup>iv</sup> [see submission item 223.1 at *ibid.*]

In summary, caveats notwithstanding, the data listed in the Appendix (Tables 6-9), highlight three important findings: in some, but not all regions, individual estimates of current FIFO/DIDO populations vary depending on data sources; mining and construction are not always the main source of FIFO/DIDO even in mining regions; and there is considerable variation in the absolute number and proportion of FIFO/DIDO within and between regions. Variation in FIFO/DIDO estimates are likely to reflect in part the limitations of current ABS and Census definitions as noted above, but also the dynamic nature of mining site demand for FIFO/DIDO such that surveys conducted during construction versus operational or expansion stages will yield very different results. An example of inter-regional variation is evident from an OESR survey (2012) conducted among accommodation providers in which it was reported that the active coal-mining region of Bowen Basin had a non-resident population of approximately 20 000 (20% of total population) compared to just 110 non-residents (3% of total population) for the Galilee Basin LGA of Barcaldine (main activity exploration). The potential for rapid change in non-resident populations is illustrated by the Surat Basin survey, where the non-resident population almost doubled in the year to June 2012 increasing by approximately 3 175 people to a total of 6 445 non-residents (Symons et al., 2013).

The timing of surveys strongly influences current estimates of FIFO/DIDO, and for this reason it is difficult to obtain accurate numbers. However, estimates contained in the KPMG report, based on Census data, indicate that approximately 45 000 mining sector and 28 400 construction FIFO/DIDO workers were on-shift in the nine major mining regions of Australia in 2011, with the largest FIFO/DIDO populations being located in the Pilbara and Bowen Basin (Mikkelsen et al., 2013). However, it should be noted that the authors of the KPMG report concede that whilst the ABS data are the most reliable and nationally consistent, this is likely to be an underestimate and 100 000 FIFO/DIDO workers could be a more realistic estimate based on accommodation surveys. Between-town variation in the proportion of non-resident individuals within a community is likely to reflect not only differences in local mining stage, but also in part the availability of local community services (and hence town attractiveness); and because of this variation, it is unlikely that regional or historical data will provide sufficient information to assess health service demands at the community level. In recognition of this, there has been a move towards enumeration of the 'service population'; for example, the 2011 Surat Basin Regional Planning Framework report includes both resident and 'planning' population listings (Lucas, 2011).

### **Future estimates**

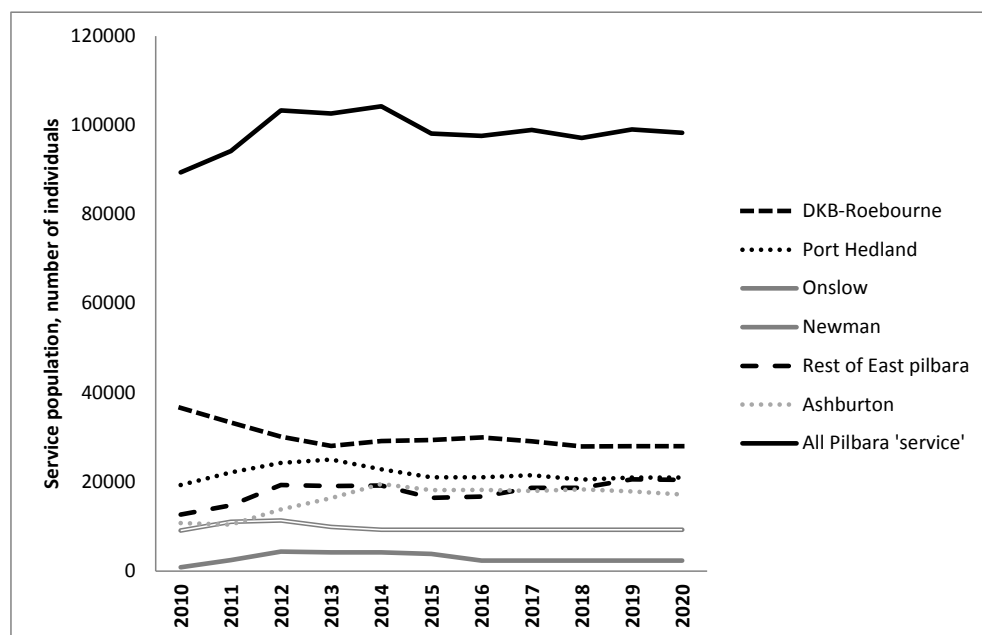
Whilst estimates of future FIFO/DIDO populations have been published, these are subject to fluctuations in marketplace demand for resources, economic position of mining companies, workforce availability, and even the increasing automation of mining, which is likely to affect the size of operational populations required to monitor the mines during production phases (KPMG, 2011, McNab et al., 2013, Waller, 2010). For example, forward-looking projections for the Pilbara region based on ABS statistics and industry information were prepared by Waller in 2008, but were then updated in 2010 in response to the global financial crisis of 2008/9 because of a better than expected outcome (Waller, 2010). While the projected employment of FIFO/DIDO to 2015 in the Pilbara was estimated at 12 864 in the 2008 report, this increased to 15 464 in the revised 2010 report, representing a 20 per cent increase over earlier estimates. Furthermore, a recently released report exploring the social dimensions of autonomous and remote operation mining in the Australian mining sector highlighted the potential impact of reduced funding of social services and infrastructure should mining populations decrease in response to increased automation (McNab et al., 2013). As noted in that report, "companies at the forefront of developing new technologies appear to have been reluctant to publicise the details about the profile, size and location of the future mining workforce under different automation scenarios" (p 27). Therefore, forward-looking

estimates should be applied with caution, particularly when applying them to fund community infrastructure such as health services.

The regions expected to experience the greatest increases in FIFO/DIDO workers over the decade to 2020 are Pilbara and Goldfields, but significant increases are also projected for other regions including the Bowen Basin. The Queensland Government OESR has prepared a very useful series of forward projections for non-resident populations based on local population reports and information provided by industry (OESR, 2013a, OESR, 2013c, OESR, 2013b).

Examples of projected increases in FIFO/DIDO population:

- In the Pilbara region, projected growth in total resource-related employment (excluding construction but including local resident jobs to support FIFO/DIDO) from 19 000 in 2008 to 47 000 in 2015, and reaching more than 53 000 by 2020 (Waller, 2010). The strongest employment growth is projected for FIFO/DIDO positions, increasing in the Pilbara from approximately 15 000 in 2010 to 33 000 in 2020. However, as a percentage of total service population in the Pilbara region, FIFO/DIDO will remain between 36-42 per cent due to decreases in some Local Government Authorities (LGAs) being balanced by increases in FIFO/DIDO numbers in others (Figure 1) (Waller, 2010). Projected FIFO/DIDO population changes for resident, miner-specific FIFO/DIDO and construction workers are shown in the Appendix (Table 10).

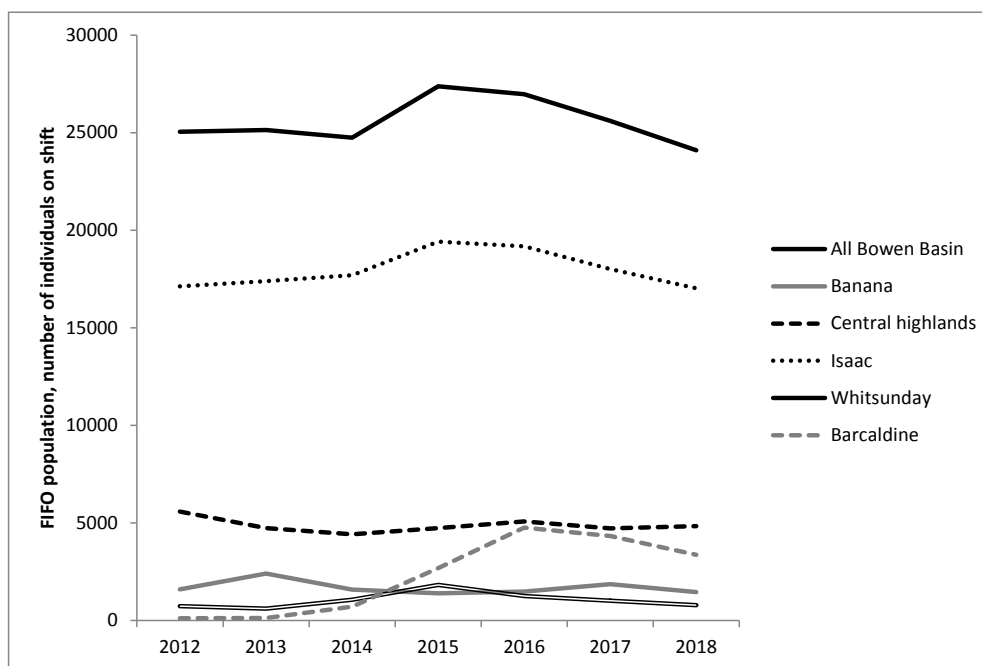


Source: (Waller, 2010, p 18).

**Figure 1** Projected changes in service population for Pilbara, Western Australia

- Projected increased demands for employees in 2014 and over the 2007 levels are 60 000 in the Mid-west, 3 000 in the Goldfields/Esperance region, and 14 000 in Pilbara (Dixon, 2010).
- In 2006 there were approximately 11 000 non-resident workers on shift in the Bowen Basin. Future projections based on Government series statistics and industry consultation conservatively estimate mining-related FIFO/DIDO for current and approved projects will increase from a baseline of 25 040 in 2012 to 26 970 in 2016, and decrease to 24 510 in 2019, representing a small decrease in FIFO/DIDO between 2012 and 2019 for the region (see Figure 2). In contrast, factoring in proposed projects results in a projected non-resident population of 34 250 in 2019, a 37 per cent increase over 2012 (OESR, 2013a).





Source: (OESR, 2013a) (Estimates based on current and approved projects only)

**Figure 2** Projected changes in number of non-resident mine workers on-shift in Bowen Basin, Queensland

### Prevalent and incident conditions, and high risk behaviours among FIFO/DIDO

According to Dixon (2010) for reasons of safety, the minerals industry tends to recruit mature-age employees, and mining industry demographics indicate that in the decade to 2020 there will be mass retirements due to ageing of the current workforce (Dickie and Dwyer, 2011). Therefore, it is likely that the incidence of age-related conditions such as cardiovascular disease and type 2 diabetes will increase among mining workers and with it the demand placed on local or on-site health services. Close monitoring of these developments will be necessary to adequately service the health needs of the FIFO/DIDO population.

The impact of FIFO/DIDO on local health facilities will also depend on the risk exposure of FIFO/DIDO workers. Risk-related health impacts for mining employees fall into two main categories: direct risks related to performing activities on site, or travelling to a worksite; and indirect impacts related to sleep, nutrition etc. (Kinnear et al., 2013). In view of the very physical nature of mining work, a greater incidence of injuries might be expected, and in line with this, compensation claims for serious injuries in 2010-11 were 12.7 per 1 000 mining employees compared to an average of 12.2 per 1 000 for all industries (Safe Work Australia, 2013). Nearly 50 per cent of claims were for *sprains and strains of joints and adjacent muscles*, and common causes of claims were *manual handling* (32%), *falls on the same level* (15%), followed by 12 per cent for *long term exposure to sounds*. Across the mining industry, the pattern of claims was similar, although coal mining sector employees were more likely to claim for *sprains and strains of joints and adjacent muscles*. However, whilst coal and metal ore mining account for two-thirds of workers in the mining industry they account for only 50 per cent of the claims made, with construction material mining recording the highest rate at 34.6 serious claims per 1 000 employees (see Appendix Figure 9). Therefore, the type of mining is likely to influence demand for health services.

The higher proportion of males among FIFO/DIDO populations could also potentially bias the incidence and prevalence of certain other health problems including: alcohol-related problems,

motor vehicle accidents and other accidental injury in resource developments (Carrington et al., 2011). Despite widespread acceptance of this, a recent review of the criminological impacts of mining development found very few Environmental Impact Statements that acknowledged this aspect (Carrington et al., 2011). Based on studies conducted in WA, NSW, and Qld, common features of rural communities were high rates of violence, debilitating injuries, motor vehicle accidents and suicide, and rapid population growth due to mining expansion (Carrington et al., 2010). Many of these increases are typical of rural communities, and it is anticipated that the presence of mining FIFO/DIDO may put additional demand on emergency and hospital services (Kinnear et al., 2013). However, the Queensland Centre for Accident Research and Road Safety reported in 2012 that the majority of rural crashes involve local residents (CARRS-Q, 2012).

With respect to the health status of FIFO/DIDO mining workers, an analysis of WA Health and Wellbeing Surveillance System continuous data collection system entries for 11 906 residents in 2008–2010 found that FIFO/DIDO workers represented 4.4 per cent of the adult, employed population in WA and reported a higher prevalence of some, but not all, conditions/behaviours surveyed compared to other workers (Table 3) (Joyce et al., 2013). However, Joyce et al. (2013) also found that miners tend to be healthier overall than the average population (it is likely that employment selection process favours such individuals) with slightly lower self-reported prevalence of diabetes, cancer and arthritis. The finding of a lower prevalence of mental health problems among FIFO/DIDO compared to other employment types was unexpected in view of anecdotal accounts and qualitative studies suggesting that FIFO/DIDO practice adversely affects mental health. For example, the recently released Lifeline WA study of mental health among 924 FIFO/DIDO workers in the Perth community found that overall levels of stress were low and job satisfaction medium, but collectively 30 per cent of this cohort were deemed as likely to have a psychological disorder (Henry et al., 2013). An important recommendation of the Lifeline WA study was to “develop ongoing post-employment supports that reduce stigma and address mental health literacy and coping skills” (p 11).

Anecdotal accounts including those contained within the Australian Medical Association submissions to the Parliamentary enquiry also suggest increases in the incidence and prevalence of sexually transmitted diseases; although these claims are challenged by Scott et al. (2012) who contend that the connection between FIFO/DIDO and HIV infections is based on a lack of evidence and in fact HIV infection prevalence is highest amongst Aboriginal groups, not miners. Similarly, whilst anecdotal accounts from remote region GPs indicate that many FIFO/DIDO workers are inadequately treated for chronic conditions such as diabetes, and often present to EDs for acute treatment, sources of quantitative data either supporting or challenging this observation were unable to be located (McEwan, 2011). There remains a clear lack of quantitative documentation with respect to the health status and needs of FIFO/DIDO workers from the mining sector.

**Table 3 Self-reported prevalence of health-related high risk behaviour and priority conditions among FIFO workers in Western Australia**

Demographic and health variables	FIFO (%)	Non-FIFO (excluding shift workers, %)
Approximate sample size <i>n</i>	524	10,501
Aged 25-44 years	60.6	46.3
Aged 45+ years	35.5	40.4
Male (%)	88.5	54.2
Area of residence metropolitan	80.4	77.4
Overweight or obese	79.3	68
Alcohol consumption more than four drinks per day	29.8	21.5
Current smoking	26.7	17.4
Insufficient physical activity	40.4	46.2
Heart disease	2.3	2.6
Current asthma	6.4	8.6
Arthritis	10.5	14.4
Cancer (excluding skin cancer)	1.0	3.1
Skin cancer	8.8	8.1
Injury in past 12 months	24.3	23.3
Current mental health problem	7.7	13.0
Diabetes	3.1	3.7

Source: (adapted from Joyce et al., 2013)

### Servicing health needs of resident populations

Rural regions of Australia are often challenged by under-resourced health systems, a situation resulting from a combination of factors including difficulties in attracting and retaining staff, poor access and poorer health status compared to Australians residing in major cities (Kinnear et al., 2013). Therefore in some regions, while FIFO/DIDO practices are unlikely to be the main cause of any deficiencies in health care service delivery, they may exacerbate existing pressures. It is conceivable that even low levels of FIFO/DIDO workers who are accustomed to having medical and dental needs seen to in an expedient manner in metropolitan settings, might serve to highlight the limitations of many rural services.

As concluded in the House of Representatives report (2013), while there are numerous anecdotal accounts, there is a paucity of evidential data regarding the demand placed on health care services by FIFO/DIDO mining workers. The difficulty with anecdotal 'evidence' is distinguishing between effects related to more general inadequacies in the provision of health care services to rural communities, and those specifically related to transient FIFO/DIDO populations. For example, the Goldfields-Midwest Medicare Local (GMML) Needs Assessment report (2013) noted that there were an estimated 770 000 overnight visitors to this region in 2012, with a significant impact on demand for health services. In the survey of the GMMLs' population of 127 448 persons, approximately 15 per cent of residents surveyed reported that they were unable to access at least one type of health service in the previous 12 months. However, in approximately 65 per cent of cases this was because no service was available, whilst approximately six per cent of males and ten per cent of females reported that waiting time prevented access. Similarly, a Needs Assessment Report for the Kimberley-Pilbara Medicare Local (Armitage, 2013) identified the impact of FIFO/DIDO work practices on workers and their families and host communities as a challenge. Together with the lower impact effect of transient sub-populations (grey nomads/backpackers), this places pressure on already

strained health services and staff shortages. However, no quantifiable data were provided in that report.

Mine location is also likely to influence the impact of mining FIFO/DIDO on local health services, as the lack of facilities in very remote locations is likely to be met by company-supported on-site health services; whilst proximity to established communities is likely to obviate the need to provide medical facilities on-site, but place increased demand on local communities (Williams and Giles, 2012). In view of this, health care service delivery funding models based on the 'usual' resident population for estimating town services and infrastructure needs such as health care, police, and airports will in some, but not all, regions fall short of actual needs (Australian Bureau of Statistics, 2012b). This is likely to underestimate the number of people these towns need to service. For example, in the township of Coppabella (LGA of Isaac) where non-residents accounted for 80 per cent of the 2012 population, community services are more likely to reflect the needs of the smaller population of 630 residents.

All of the mining region Medicare Locals contacted during compilation of the current report expressed acute interest in this topic with some indicating that determining the size of FIFO/DIDO populations was the immediate priority (personal communications). Therefore, robust data are likely to emerge in the near future from Medicare Locals, and studies commissioned by regional planners and mining companies; and it is likely that collection of relatively simple data such as postcode of residence for patients being treated could provide the information required to assess the demand represented by FIFO/DIDO resource workers (Wharton and Congdon, 2013, Kinnear et al., 2013). This approach was used to generate data for the Bowen Basin region of Queensland and are presented here as one of the few sources of quantitative evidence identified.

### **Impact of FIFO/DIDO mining on Indigenous communities**

No accounts of the impact of FIFO/DIDO on Aboriginal communities and access to health services were identified either in the literature, or through contacting expert sources. Only one publication was identified that dealt with the difficulty experienced in two regional centres of SA as a consequence of Indigenous mobility (Kainz et al., 2012). In that study, the inability to measure and forecast short-term mobility was one of the major difficulties; and inflexibility of current government funding models that focused on permanent resident populations was described as one of the reasons for the lack of appropriate services.

However, potential impacts can be implied from the literature. For example, 2010–11 hospitalisation rates were greater for Indigenous populations compared to non-Indigenous in all states of Australia, but in particular in the NT, SA, and WA where the rate ratios for Indigenous versus non-Indigenous were 7.9, 3.0 and 3.6 for those states, respectively (MacRae et al., 2012). Given that the most common reason for hospitalisation of Indigenous people was dialysis care (44% of separations), it is likely that any impact on hospital services resulting from FIFO/DIDO demand would potentially impact on service delivery to Indigenous populations. Further, diabetes type 2 is a serious problem for many Indigenous people, with a reported prevalence of 32.1 per cent for those aged 55 years and older, compared to 11.6 per cent among non-Indigenous people (2004–2005). Diabetes care is predominately delivered by primary health care and the rate of GP-managed events for Indigenous people with diabetes was more than double the rate for non-Indigenous people in 2009–10, and renal and eye-related complications were the most common cause of hospitalisation. Therefore, Indigenous populations may potentially be disadvantaged by any limitations on GP and hospital access. Future data collection aimed at quantifying the impact of FIFO/DIDO on health service delivery should, where possible, also differentiate between Indigenous and non-Indigenous

population needs and access. Tables 6-9 provide estimates of Indigenous populations in mining areas.

### **Evidence of FIFO/DIDO demand on health services – Bowen Basin**

The Bowen Basin contains the largest coal reserves in Australia. In 2011, the Bowen Basin service population comprised approximately 20 per cent FIFO/DIDO and of this, 75 per cent were employed in mining or construction industries (Appendix, Table 6). This represented a 69 per cent increase in FIFO/DIDO for the region compared to 2006 (Mikkelsen et al., 2013). For the rural mining region of Bowen Basin, an analysis of data for the month of June based on patient’s usual place of residence postcode was conducted for GP clinics at Moranbah, Clermont and Dysart; also for admissions and presentations to the Moranbah hospital over a 5–6 year period; and demonstrated the varied impact of FIFO/DIDO populations (Scholtz and Nieuwoudt, 2011, Constantine and Battye, 2013). In that study, non-resident patients seen at any of the three GP clinics in a one-month period comprised 18 per cent of all patients seen in 2007 and between 22–24 per cent of the total annual patient load between 2008 and 2011. In terms of actual patient numbers, this related to a non-resident patient cohort of 172 individuals in June 2007 and steadily increased to 516 in June 2011. Over the same time frame, presentation to ED or admission of non-residents to the Moranbah hospital increased to a greater extent, from 19.7 per cent to 31.3 per cent for ED and 23.1 per cent to 27 per cent for admission from 2008 until 2011, respectively, in the month of June. Results for 2010 and 2011 are summarised in Table 4. In addition, an estimated 25 per cent of patients accessing the Moranbah mental health service in 2011 were non-resident, and 50 per cent of x-ray and imaging services were provided for non-residents (Constantine and Battye, 2013). It is important to note that since non-resident patients were not identified in terms of employment, it is not possible to determine what proportion of these were mining sector FIFO/DIDO as opposed to tourist, grey nomad, seasonal worker, or other FIFO/DIDO.

**Table 4 Resident and non-resident patient visits to general practice and hospital services for the month of June 2010 and 2011 in the Bowen Basin region**

	Patients seen at Moranbah		ED presentations and admissions Moranbah			
	Medical, n (%)		Hospital, n (%)			
			Adm		ED	
	2010	2011	2010	2011	2010	2011
<b>Moranbah resident</b>	1 486 (72)	1 578 (70)	52 (84)	45 (72)	263 (74)	296 (68)
<b>Clermont resident</b>	65 (3)	135 (6)				
<b>Dysart resident</b>	34 (2)	39 (2)				
<b>Non-resident</b>	479 (23)	516 (23)	10 (16)	17 (27)	89 (25)	136 (31.3)
<b>Total</b>	2 064	2 268	62	62	352	432

Source: (data taken from Constantine and Battye, 2013, Scholtz and Nieuwoudt, 2011). Adm = Admitted to hospital; ED=emergency Department presentation.

Based on population numbers for 2011 obtained from the *Queensland Government OESR full-time equivalent populations report for 2011*, a total of 14 220 residents and 4 960 non-residents were living in Moranbah, Clermont and Dysart combined, and thus 25.9 per cent of the ‘service’ population were non-resident (OESR, 2011). Therefore, applying those estimates to the Bowen Basin study results means that approximately 26 per cent of the population accounted for 23 per cent of patients seen at Moranbah Medical and for 27 per cent of hospital admissions in the month of June (2011). This suggests similar or slightly less usage of these services by non-resident populations compared to residents. Access to ED was disproportionately high among Bowen Basin non-resident workers in 2011, with 26 per cent of the population accounting for 31.3 per cent of ED presentations.

However, reportedly almost 50 per cent of non-resident ED presentations and admissions to Moranbah hospital (2010) were non-urgent (triage stage 5), suggesting that they could have been dealt with in a primary care setting (Constantine and Battye, 2013). Study authors suggest that this indicates a need to improve health literacy among mine workers in terms of awareness of local service breadth and limitations. However, it might also suggest a need for after-hours GP clinics to service the needs of mining shift workers unable to access clinics during usual business hours. It should be noted that, in response to the health workforce shortages outlined above for the Bowen Basin, the mining companies set up health clinics within the FIFO/DIDO camps using FIFO/DIDO health services, although referral of FIFO/DIDO patients to non-existing services within the town illustrated the lack of communication between these health services (Constantine and Battye, 2013). The impact of these on-site clinics on local service demand has not been reported to date. Due to the dynamic nature of mining workforce numbers, it is important to utilise population estimates corresponding to the period of health service provision.

In summary, based on data collected in the month of June over a five-year period beginning in 2008, evidence from the Bowen Basin suggests that FIFO/DIDO use of health services is similar or slightly less compared to that of local residents in terms of frequency, with the exception of ED presentation. Whilst this quantifies use of health services by FIFO/DIDO, it does not indicate whether the reason for seeking medical attention differs between FIFO/DIDO and resident groups. However, comparison of health status may provide an insight into this topic. Based on the Bowen Basin study, establishment of an outpatient GP clinic at the hospital or within the FIFO/DIDO camps is likely to alleviate some of the impact of FIFO/DIDO workers on the ED. Given that FIFO/DIDO workers have a similar need for access to health services, it suggests that where mining companies do not provide GP services and some allied health services on-site, failure to base community funding models on the combined resident plus non-resident population is likely to exacerbate already strained services in rural regions leading to longer waiting times and bed-shortages in hospitals (see Staffing and facility needs below).

### **Staffing and facility needs**

Rural areas are generally under-resourced with respect to medical facilities and staff compared to metropolitan regions (Standing Council on Health, 2012). In a case study based on Bowen Basin, it was noted that there were 3.14 beds per 1 000 head of population in 2008 and that this was approximately 80 per cent of state and national averages (Kinnear et al., 2013). In a social impact management plan lodged in 2012 by Arrow Energy, the evidence from the Moranbah study was supported by the observation that the number of non-resident workers presenting at medical facilities across the Isaac Regional Council increased by approximately 200 per cent between 2007 and 2011 (Napier, 2012). However, in the accompanying Impact Mitigation and Management statement, the likelihood of increased demand on emergency services, local medical centres, and hospitals was rated as 'unlikely', whilst the risk for disease and illness outbreaks rated as 'possible' (Napier, 2012).

In a novel approach to assessment of current and future demand, on behalf of the Isaac regional council, KPMG (2011) developed the ISM to identify the services and infrastructure required by residents and non-residents. In 2011, the Isaac region had a resident population of 23 280 and a non-resident population of 19 808 workers. Therefore, the 'service population' at that time was already at the level that the resident population was forecast to reach in 2042 (KPMG, 2011). Based on input of data relating to current resident and non-resident populations, existing and proposed mining activity in the Isaac region, and benchmarks for infrastructure and services required, the ISM predicted that the health and emergency service provisions were significantly undersupplied and that there was a real need for a health centre staffed by permanent health professionals (KPMG,



2011). More specifically, it was reported that based on the service population estimates, Isaac had a doctor/patient ratio of 1:8 000 and required 185 more nurses, 38 more GPs, two more paramedics and three more pharmacists to achieve acceptable levels of health service. Further application of this model to other regions has not been reported. Similarly, based on consultation with industry and government sources, Waller's (2010) Pilbara region report estimated that 178 additional nurses would be needed by 2020 if the current ratio of 1:93 nurses to resident population is to be maintained; this does not account for meeting any potential demands of FIFO/DIDO.

As noted above, difficulties in meeting demands placed on health services in the Bowen Basin led the mining company to establish an on-site GP clinic using FIFO/DIDO health professionals (Constantine and Battye, 2013). In a review of potential models for health care delivery to FIFO/DIDO workforces, it was suggested that offering remote health monitoring options to workers as part of a health care cover benefit could alleviate demand on local services and benefit mining companies by improving conditions and encouraging workers to stay (Williams and Giles, 2012).

### **Other factors influencing the impact of FIFO/DIDO on servicing health needs**

When assessing the extent to which a community is affected or likely to be affected, a number of factors might be used to predict the potential impact and hence the needs to be met:

- Type of mining influences the nature and incidence of work related injuries
- Model of mining (Williams and Giles, 2012): new or existing towns and community based workforce (e.g. Bowen, Galilee, Surat Basins)
- Proximity to established community (e.g. Goldfields region Laverton, Leonora)
- Remote location (e.g. Pilbara)
- Remote region mine sites, without a sizeable local community, are more likely to invest in on-site medical facilities that extend beyond emergency response
- Resident population size, existing infrastructure, and the proportion of a community that is resident as opposed to non-resident (FIFO/DIDO) may influence impact. For example, in the Bowen Basin region of Qld, for the LGA of Banana non-residents accounted for 8.1 per cent of the community population in July 2011, but Statistical Local Area (SLA) communities within Banana were not equally impacted, with Biloela reporting 4.1 per cent non-resident compared to 29.7 per cent in Moura. Since Moura has a population of less than 2 000 residents, compared to almost 6 000 in Biloela, the service infrastructure in Moura is potentially inadequate with respect to any future increase in FIFO/DIDO numbers (see Appendix Table 6).

### **Positive impacts of FIFO/DIDO**

In addition to the economic benefits at individual, community and national levels, mining sector activity has contributed financial support for existing and expanded health services in resource regions. In WA, the financial contribution of mining companies to local services, infrastructure and community programs has been ensured via the *Royalties for Regions* program where 25 per cent of mining and on-shore petroleum royalties are reinvested into regional WA each year.<sup>v</sup> In 2011, a similar program was launched for NSW, although it was reported by the NSW Mineral Councils (2013) that less than \$10 million of the promised \$160 million royalties' proceeds had been allocated. Through the *Royalties for Regions* program and other initiatives, companies have contributed significant amounts for hospitals and healthcare including the following:

- \$15.8 million to redevelop Kalgoorlie health Campus hospital<sup>vi</sup>
- \$32.96 million to redevelop the Nickol Bay hospital in the Pilbara<sup>vii</sup>
- \$29.9 million for more aircraft, pilots, doctors and nurses to the RFDS<sup>vii</sup>

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<sup>v</sup> For more information see [www.drd.wa.gov.au/royalties/pages/default.aspx](http://www.drd.wa.gov.au/royalties/pages/default.aspx)

<sup>vi</sup> See [http://www.dmp.wa.gov.au/documents/132678\\_WA\\_Resources\\_Sector\\_Fact\\_Sheet.pdf](http://www.dmp.wa.gov.au/documents/132678_WA_Resources_Sector_Fact_Sheet.pdf)



- Surat Basin QGC, Santos and Australia Pacific provided funding of \$30 million to Aero Medical Evacuation (AME) retrieval service (2012). QGC provided Lifeline Darling Downs and South West Qld with \$970 000 for enhanced counselling services (2012)<sup>vii</sup>
- Gladstone Santos provided \$1 million in funding for Gladstone Hospital upgrade (2011)<sup>vii</sup>
- Australia Pacific contributed \$5 million to the Gladstone Foundation (2011)<sup>vii</sup>
- BHP Billiton donation of \$42.5 million for a new emergency department at Muswellbrook Hospital (Hunter valley)<sup>viii</sup>
- Patient Assisted Travel Scheme, subsidising more than 50 000 trips per year for permanent country residents requiring financial assistance when travelling more than 100kms to access health care.

### *Recommendations*

- Establishment of a routine collection of 'patient postcode of usual residence'
- Identification of service population (sometimes referred to as Full-time Equivalent population) as opposed to resident population on an annual basis (or more often) for purposes of infrastructure funding
- Review of the population growth rate upon which funding for infrastructure is based.

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<sup>vii</sup> See [http://www.ucareqld.com.au/index.php?option=com\\_docman&task=doc\\_download&qid=222](http://www.ucareqld.com.au/index.php?option=com_docman&task=doc_download&qid=222).

<sup>viii</sup> See <http://www.miningaustralia.com.au/news/bhpqives-2-5mtomuswellbrookhospital>

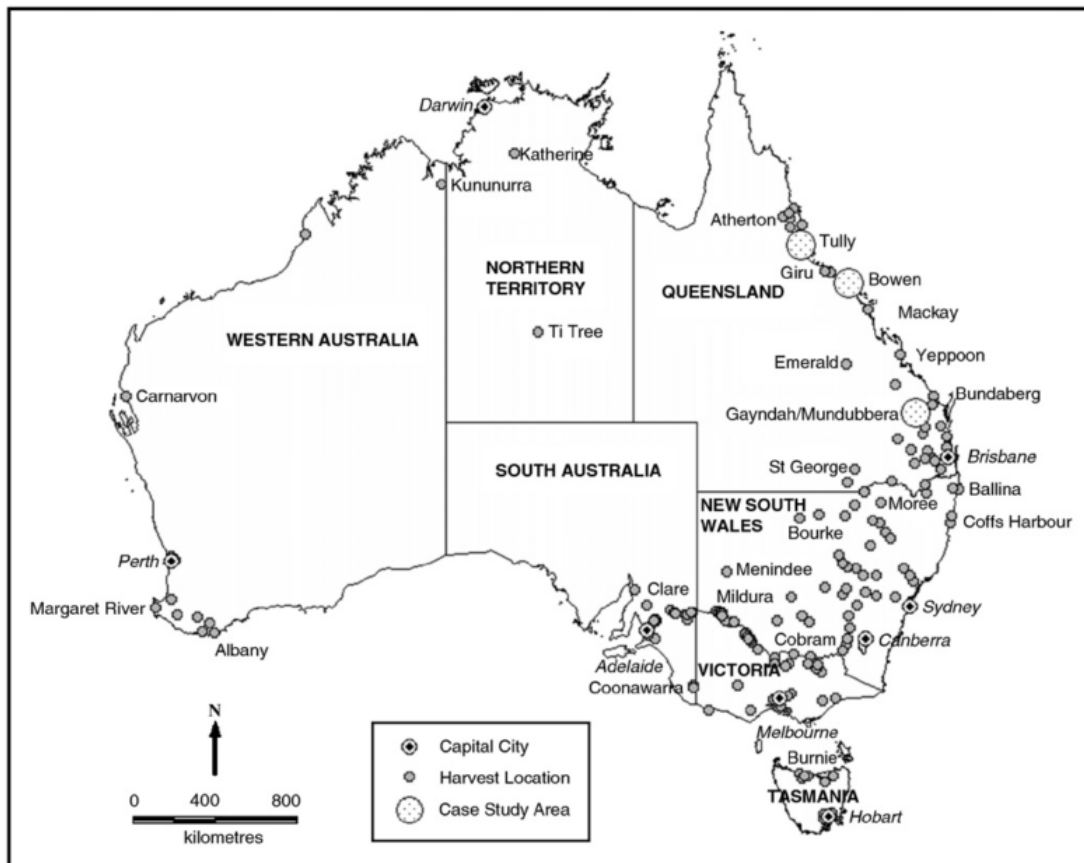
## The impact of seasonal worker FIFO/DIDO activity

### *Australia*

The term 'seasonal worker' has been used to describe individuals who work in a range of sectors including industries such as agriculture, horticulture, tourism, and construction. This itinerant workforce comes from both Australia and overseas, with some government programs in place to support international visitors, as described below. Much of the available literature on seasonal workers relates to their ability to fill labour shortages in rural regions, and the impact this workforce has on the ability to complete the harvest tasks. That is, there is very limited detail on the impact of this seasonal influx of workers on local communities and regions. The need to consider health services access and availability for these workers is often mentioned in passing, or anecdotally. Nevertheless, seasonal workers have been filling positions in Australia for decades, and it may be the case that the literature is limited as the communities in regions which experience seasonal variation have had systems in place to support them for many years based on a long history of the same patterns. The sections below describe the composition and estimates of the size of the seasonal worker population, regions affected by these groups, the kinds of health issues prevalent among seasonal workers, and services addressing their needs.

### **Communities and regions affected by FIFO/DIDO**

Based on information from Brebner's (2002) *Workabout Australia* guide and the *Job Network Harvest Trail* guide (2003), Hanson and Bell (2003) reported that the Australian growing regions requiring harvest labour from outside of the area are spread across the country (Appendix, Table 11). As seen in Figure 3, the locations are predominantly based in the Eastern states, with regions in the south-east of South Australia, east of Queensland, the south-west of Western Australia and spread throughout the Northern Territory. There are also regions spread throughout Victoria and New South Wales, with a concentration along the border; and coastal sites in north Queensland, Western Australia and Tasmania. Despite the high number of sites mentioned as part of the Harvest Trail, most workers visit only two or three regions each year (Hanson and Bell, 2003). Workers who are funding their travel around the country by fruit picking are likely to travel greater distances between sites (Hanson and Bell, 2003). Many seasonal workers stay for several months, working the whole harvest season at the one site, unless this is unsupported by the program they are involved with (e.g. the Working Holiday Maker Program has a three month restriction) (Hanson and Bell, 2003). Students tend to be more limited by the length of the holidays, and holiday makers have variable patterns (see Appendix Figure 11 and Figure 12). While there is some suggestion that workers repeatedly return to the same region, it greatly depends on the region. This is somewhat affected by preferences for working with specific crops, on specific tasks, or in specific locations (Hanson and Bell, 2003).



Source: (Hanson and Bell, 2007, p 105).

**Figure 3** Seasonal harvest regions of Australia, 2007

### Size of FIFO/DIDO seasonal worker population

As Charles-Edwards et al. (2008) noted, “in comparison with permanent migration, temporary population mobility remains poorly served by conventional statistical collections” (p 22); thus, it is a challenge to measure seasonal workers due to their itinerant nature. Often sources refer to the ABS Census data which indicate that a large number of people are away from their homes on census night. That is “almost one million Australians, one person in 20, were away from their place of usual residence on the night of the 2006 census” (Charles-Edwards et al., 2008, p 21), some of whom may have been away due to work; and Census data illustrate the number of people working in hired farm labour. However, it is difficult to extrapolate from these data the number of seasonal workers in Australia at any one time (Hanson and Bell, 2003). Estimates of the size of the seasonal worker population are complicated by the fact that the seasonal workforce is made up of a number of sources. As mentioned above, ‘seasonal workforce’ is often used to describe workers in a range of industries such as tourism, construction and agriculture/horticulture where the latter include sugarcane, cotton, fruit and vegetable picking, sheep shearing etc. Hay and Howes (2012) describe the horticultural sector as “fragmented and diverse” (p 16) with over 140 horticultural products available in Australia, and differing conditions and regulations in each state. Therefore, there are some data sources specific to different groups of seasonal workers (see example in Appendix Figure 13). For example, Mullins (2011), Chief Operating Officer of CANEGROWERS indicated that the seasonal workforce for the sugarcane harvest is estimated at 3 000 people; while Hay and Howes (2012) reported that there were 37 000 backpackers working on farms in 2007–08. In an attempt to quantify the seasonal workforce in terms of demand (i.e. the number of seasonal worker positions available), Hanson and Bell (2003) used data from the Department of Employment, Workplace Relations and Small Business, and estimates from Brebner’s guide to seasonal work *Workabout*

Australia (2002) to produce an (under)estimate of over 175 000 seasonal worker positions in harvest areas around the country.

Much of the seasonal workforce literature focuses on those employed in the agricultural/horticultural sector, with individuals working with fruits and vegetables considered to be on the ‘harvest trail’. Hanson and Bell (2007) suggest there are five main sources of seasonal workers involved on the Australian harvest trail, with details of each of these groups presented in Table 5 (Hanson and Bell, 2007). These include permanent itinerants (i.e. workers that live in the area full-time) who comprise 40–50 per cent of the labour force; retirees/grey nomads (15–25%); international working holiday makers or backpackers (20–30%); Australian working holiday makers or backpackers (5–10%); and students (5–10%). Additional groups include undocumented workers (i.e. unauthorised residents, Australians working while receiving government benefits or foreign travellers working without authorisation) (Growcom, 2006, Hay and Howes, 2012, Mares, 2005).

A key component of the seasonal workforce is migrant workers, supported by the government to work in Australia. These schemes enable workers to contribute to economic development in their countries through remittances and training; and help reduce labour shortages in horticultural areas in Australia (Reed et al., 2011). In 2008, the Pacific Seasonal Worker Pilot Scheme was introduced in Australia, offering support to residents of Kiribati, Papua New Guinea, Tonga, Vanuatu, Samoa and East Timor, to carry out seasonal work in Australia. The Pacific Seasonal Worker Pilot Scheme operated from 2008–2012 and during this time 1 623 seasonal workers arrived in Australia to work in 35 locations around the country (DEEWR, 2012, Department of Employment Economic Development and Innovation, 2013). With limited participation in the program, it ceased in June 2012.

**Table 5 Typology of the seasonal labour force**

	<b>Nature of employment</b>	<b>Characteristics</b>	<b>Spatial behaviour</b>
Permanent itinerants	Permanently engaged in the seasonal labour force	<ul style="list-style-type: none"> <li>• Greatest proportion of seasonal workforce in most areas</li> <li>• Decreasing numbers in recent years</li> <li>• More males</li> <li>• Involved in all tasks, especially picking, packing, thinning, pruning</li> <li>• Broad age range, mostly mid-20s to 40s</li> <li>• Some couples</li> <li>• Large proportion overseas-born</li> </ul>	<ul style="list-style-type: none"> <li>• Span all growing areas</li> <li>• Travel a variety of distances</li> <li>• Travel established circuits but may change locations</li> <li>• Generally stay entire season</li> <li>• Engaged in seasonal work for many years</li> </ul>
Retirees	Employed sporadically part/full time in seasonal labour force to supplement their income while travelling	<ul style="list-style-type: none"> <li>• Increasing proportion of total seasonal workforce in recent years</li> <li>• Males and females</li> <li>• Mostly picking and packing</li> <li>• Most aged 40s-50s, some 60s</li> <li>• Many couples and convoys</li> </ul>	<ul style="list-style-type: none"> <li>• Large variety of locations</li> <li>• Travel long distances</li> <li>• May return to a location</li> <li>• Often stay entire season</li> <li>• Engaged in seasonal work from a few months to a few years</li> </ul>
Working holiday makers from	Spend short periods engaged in seasonal	<ul style="list-style-type: none"> <li>• Increasing proportion of total seasonal workforce in recent</li> </ul>	<ul style="list-style-type: none"> <li>• Distinct pool of potential locations attractive to</li> </ul>

overseas	work to supplement income and enrich travel experience. (Supported through Working Holiday Maker Program)	years <ul style="list-style-type: none"> <li>• Males and females</li> <li>• Mostly picking and packing</li> <li>• Aged 18-20, most early 20s</li> <li>• Many small groups of friends or couples</li> <li>• From Canada, Germany, England, Ireland, Sweden, Norway, South Korea and Japan (UK most common)</li> </ul>	tourists (see appendix) <ul style="list-style-type: none"> <li>• Prepared to travel long distances</li> <li>• Spend most time on eastern seaboard (e.g. many visit Sydney and Cairns)</li> <li>• Mostly northbound circuits</li> <li>• Stay only 4-12 weeks (limits set by program)</li> </ul>
Working holiday makers from Australia	Employed sporadically part/full time in seasonal labour force to supplement their income while travelling	<ul style="list-style-type: none"> <li>• Small proportion of total labour force</li> <li>• Males and females</li> <li>• Mostly picking and packing</li> <li>• Aged 20s-30s</li> <li>• Some small groups or couples</li> </ul>	<ul style="list-style-type: none"> <li>• Large variety of locations</li> <li>• Travel long distances</li> <li>• Stay from few weeks to entire season</li> <li>• Engaged in seasonal work from a few months to a few years</li> </ul>
Students	Australian and overseas exchange students travel to harvest locations during vacation from tertiary studies.	<ul style="list-style-type: none"> <li>• Small proportion of total labour force</li> <li>• Males and females</li> <li>• Picking and packing</li> <li>• Most aged in 20s</li> <li>• Some small groups</li> </ul>	<ul style="list-style-type: none"> <li>• Variety of locations, generally within usual residence state</li> <li>• Visit single location</li> <li>• Stay for holiday period</li> <li>• Usually only 1 or 2 seasonal work stints</li> </ul>

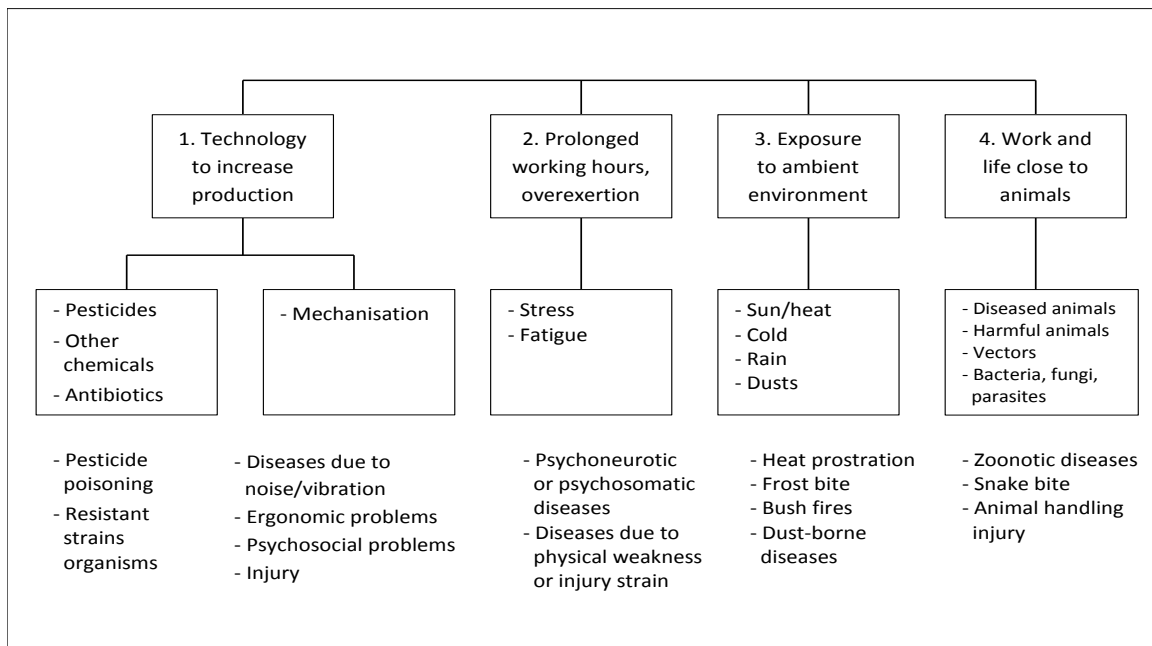
Source: (adapted from Hanson and Bell, 2003, p 6).

### Prevalent and incident conditions, and high risk behaviours among FIFO/DIDO

The National Harvest Labour Information Service's Harvest Guide (2013) emphasises some key health messages around the importance of eating well to sustain energy for physical work; keeping clean and healthy to maintain a job; and staying sun smart to ensure that workers "don't pay a high price in the future for the work you do now" (p 8). Common health concerns for seasonal workers relate to farm safety, physical labour and weather conditions. The evaluation of the Pacific Worker pilot described how workers from agriculture, forestry and fishing have a higher incidence of serious occupational health and safety-related injuries than other industries (Reed et al., 2011). Findings from an early World Health Organization document based on an 'occupational health and safety in agriculture' workshop formed a model of occupational health problems in agriculture (Fragar and Franklin, 2000), as illustrated in Figure 4 which reflects seasonal workers' potential vulnerability to a number of circumstances and risks.

According to the National Harvest Labour Information Service (2013), harvesting of fruit and vegetable crops is often physically demanding, repetitious and tiring. This means there is an increased risk of injury, with back pain commonly reported by workers (Ball and Reed, 2011), but it also means that many seasonal workers are physically fit and strong (Reed et al., 2011). In many cases, health conditions are specific to the workers' context. While musculoskeletal issues are of concern for those workers engaged in physical tasks such as harvesting bananas, respiratory conditions have been reported for workers in the grain and cotton industries. Climatic conditions are also a common problem as most harvesting tasks are conducted outside with no protection from the weather, and occur in regions with extreme temperatures (National Harvest Labour Information

Service, 2013, Ball and Reed, 2011). There have also been health problems related to hygiene and sanitation, affected by the workers' housing circumstances. That is, it is not uncommon for seasonal workers to reside in tents, caravans or hostels. Further, in a study on the mobile seasonal workforce in the Queensland fruit and vegetable industry, Hanson and Bell (2003) interviewed growers about their experiences with seasonal workers and found that many growers perceive alcohol and other drug problems to be major issues among permanent itinerants. This was demonstrated with a number of workers not attending work the day after they had received their weekly pay. There have also been some health issues specifically in relation to migrant workers. Some farmers have expressed concern about the risk of seasonal workers from the Pacific Islands bringing in diseases on their person to Australia (Growcom, 2006). Further, the National Harvest Labour Information Service (2013) emphasise caution to international visitors faced with different driving conditions and traffic laws, thus raising the questions as to whether these workers may be at increased risk of accidents.



Source: (adapted from Fragar and Franklin, 2000, p 17).

**Figure 4 Occupational health problems in agriculture**

There is a wealth of literature around farm safety, only some of which is likely to be relevant to seasonal workers. Reports consistently identify cancer, accidental injury, cardiovascular disease, suicide, hearing loss and exposure to pesticides or zoonotic conditions as highly prevalent among farming populations (Fragar and Franklin, 2000, Brumby et al., 2009). A 2000 overview of the health and safety of the population working in agriculture in Australia highlighted a number of key health concerns for farming cohorts (Fragar and Franklin, 2000). These included high age-standardised death rates for male farmers compared to non-farming Australian men, as a result of farm or traffic injuries, cardiovascular disease, cancers and suicide. An emerging area of concern is the rate of motorcycle injury with reports of 400–500 hospital admissions per year related to these issues. Some evidence suggests that non-intentional farm injury results in approximately 150 deaths and 6 500 hospital admissions per year (Fragar and Franklin, 2000). Child death and injury rates are also particularly high (e.g. drowning or vehicle accidents). According to a report on the Farm Injury Optimal dataset, tractor deaths due to rollover and run-over remain major causes of death on Australian farms.

While there are high rates of hospitalisations for injuries among farm workers, evidence suggests that typically health issues among farming populations are often underreported (Brumby et al., 2009). Farming populations generally have high rates of disease and morbidity but there is a reluctance to report health issues that might affect ability to work (Brumby et al., 2009). Whilst the above all represent risks to farm workers, the extent to which seasonal workers increase demand for health services locally is not known.

### **Servicing health needs of resident populations**

Based on evaluation of a Canadian Seasonal Workers program to inform similar programs in Australia, it has been suggested that the influx of seasonal workers have benefits for local communities in terms of spending money on local goods and services (e.g. food, entertainment, postal and banking services) (Bauder et al., 2003, Mares, 2005). However, there are consistent, albeit anecdotal, concerns as to what impact the seasonal workforce has on health services. In particular, issues around servicing the health needs of seasonal workers and resident populations relate to health cover and availability of services.

Despite limited available data on seasonal workers' use of local health services, there are consistent reports of seasonal variation in ED presentations from regions with high numbers of seasonal workers. For example, a study investigating ED presentations in a small rural hospital in Victoria found a peak over the warm months compared to the cooler months and described how this increase was likely to be the result of both an increase in tourists and an influx of fruit pickers working seasonally in local orchards (Chen and Tescher, 2010). Further studies of rural Victorian health services have examined semi-urgent ED presentations by non-residents per month (Victorian Government, 2011); see Appendix Figure 14, Figure 15, and Figure 16. Patterns showed seasonal variability in terms of demand. The Victorian Government (2011) report describes the importance of coordinated health services in dealing with this kind of pattern. The technical paper which supports this report (Department of Health, 2011) also describes the seasonal variability in relation to demand for services. Using data from the Victorian Emergency Minimum Dataset, this report highlights the proportion of 'non-resident' presentations to EDs. While these patterns can be attributed to increases in community populations based on seasonal variation, it must be noted that the non-resident population may include miners and other FIFO/DIDO cohorts. This document notes that "meeting the future service demand in rural areas will require careful service planning to ensure services align with projected population growth" (Department of Health, 2011, p 74).

Mares (2005) acknowledged the practical challenges of temporary workers in rural areas of Australia in relation to provision of health services. Similar to the experiences in communities with high numbers of FIFO/DIDO miners, these challenges reflect the potential difficulties that may already be faced by hospitals and GPs trying to support an influx of seasonal workers, particularly international workers from culturally and linguistically diverse (CALD) backgrounds. The Victorian Health Priorities Framework 2012–2022: Rural and Regional Health plan (Victorian Government, 2011) also acknowledged the impact of seasonal workers on local services, citing both challenges and opportunities. The report highlighted how, particularly in small towns, the influx of seasonal workers influences pharmacy, primary health care and ED attendances. They reinforced the need for health services to manage the potential increase in service demand when the rate of non-resident workers was high.

The impact of seasonal workers was also discussed in the *Strategy for Planning Country Health Services in SA* (2008), "large swings in population numbers are associated with ... variations in seasonal opportunities that place extra demands on rural health services in many towns. As a result,



country hospitals and health services must have the capacity to adapt swiftly and effectively to these unique challenges” (p 17). However, there are some challenges related to changing health infrastructure in rural communities. Besides the obvious issues of availability of funding and resources, Mares (2005) discusses the need for caution, suggesting that introducing new arrangements to address the seasonal workers’ needs may provoke resentment among community members who have campaigned for better health services in their areas for long periods. Many seasonal workers will bring their families along; hence there are increased issues with the inclusion of children and partners’ needs. For many regions, the emphasis is on efficiency and flexibility to deal with seasonal variation in population composition and addressing the needs of these populations.

One of the key recommendations for improving seasonal workers’ health relates to increasing health literacy, or the workers’ understanding of the health risks and availability of supports in their region. For those seasonal workers who are employed through the Pacific Worker Scheme, their employers must ensure they have access to health services and organise health insurance. All employers must also cover their workers for workplace injury (National Harvest Labour Information Service, 2013). Data from the Department of Education, Employment and Workplace Relations and worker financial diaries suggests that seasonal workers have an average of \$19.89 deducted from their pay per week for health cover, and spend an additional \$5.27 on health/prescriptions (Reed et al., 2011). However, some seasonal workers (e.g. those visiting under the Working Holiday Maker program or undocumented workers) are not eligible for government-provided benefits. Therefore their health services usage may be limited (and any data records may be incomplete for the seasonal workforce).

A report on the seasonal workforce in the Yarra Valley also describes how there may be language barriers with migrant workers in terms of translating instructions for work (Ball and Reed, 2011) and this also applies to health care needs; therefore, CALD issues need to be considered. Research also identifies a lack of connectedness in terms of migrant workers assimilating into the local community. In Australia, groups such as Rural Australians for Refugees offer support for refugees on temporary protection visas and initiatives to engage migrant workers in local communities have been proposed (Mares, 2005).

#### **Initiatives to address health needs of seasonal workforce and local population**

Seasonal workers are perceived to place little pressure on the social infrastructure despite a need for health care in some cases (Flynn, 2004). In the ski industry, “heavy seasonal demand on services and facilities such as schools, health and childcare services creates problems for the service providers in being able to meet the demand during the peak period, but still stay viable during the remainder of the year” (Flynn, 2004, p 40). The Snowy River Shire Council has conducted community consultations and meetings to address issues around the provision of health services within the shire. Particular concerns relate to prevalence of mental health conditions, access to services (e.g. after hours, emergency medical and dental, specialists), choice of services, availability of public health facilities, men’s health, and viability of practices. The Council has restructured their community nursing section to enable more nurse availability in outlying areas. These initiatives are not for the seasonal workers alone but relate generally to the seasonal variation of the whole community population. This council looked at ways to support vulnerable populations. In addition, the Victorian Sustainable Farm Families project involves health education and information workshops delivered to farm men and women aged 18 to 75 during a three- year intervention. Results from the project have suggested it is a beneficial model that engages communities in both learning and change (Brumby et al., 2009). Finally, a report from the National Centre for Vocational Education Research encouraged the development of new initiatives based on a need for new ways of delivering training and more formal training among seasonal workers to improve understanding of occupational health and safety (Kilpatrick and Bound, 2005).

### *Recommendations*

- Address health literacy (including understanding of workplace health and safety issues) among seasonal workers either by providing education sessions as part of the Government-funded programs (Working Holiday Maker Program and Pacific Seasonal Worker Scheme) or through brochures outlining health services in the regions, handed out by employers. These resources would also need to be made available in multiple languages to address the needs of CALD workers.
- Include options for itinerant workers to note such occupational status and their typical region of work in the collection of ABS Census data.
- Enable health services to take seasonal variation into account when establishing hours of operation (i.e. where available, offer additional after-hours services or roster additional staff on to work in health services during peak fruit picking months).
- While further research is required to obtain more accurate estimates of seasonal workers, more specific investigation into health services use is also required. Health providers in the affected regions could be asked to enquire about their patients' occupational status. It would be beneficial to collect these data from a range of health services including those in the acute and primary sectors and particularly allied health practitioners (i.e. it is possible that due to the physical nature of the work, health professionals such as physiotherapists may be in high demand).

## The impact of 'grey nomad' activity

### *Australia*

Health planners, regional health provider organisations and national health funding to Australian states should recognise the burden 'grey nomads' place on remote health infrastructure (Tate et al., 2006, pp 71-72)

'Grey nomads' is a term well established in the Australian vernacular (Holloway, 2009, p 17), generally connoting retired couples travelling long distances with caravans, particularly in (or heading towards) Queensland. Other terms include 'sunseekers', 'winter drifters', 'SADs' (people who 'See Australia and Die'), 'Loopies' (people who do a loop of Australia) (Holloway, 2009, pp 309-310), and 'older recreational vehicle travellers' (Brayley and Obst, 2010). Overall, however, there has been little research about Australian grey nomads (Hillman, 2013, Cridland, 2008, Higgs and Quirk, 2007, Onyx and Leonard, 2007), except from a tourism marketing perspective (Onyx and Leonard, 2007), often focusing on caravanners (of which grey nomads constitute a major market segment) (Prideaux and McClymont, 2006) rather than grey nomads per se.

Definitions of grey nomads vary (e.g. age 50+ or 55+ or 60+; minimum travel duration of one month or three months). Generally, the term refers to someone who is at least 50 years of age, retired/semi-retired and travelling (e.g. camping, caravan or similar) for an extended period of time. Table 12 (Appendix) lists a several definitions, which illustrate the importance of determining which definition is used when interpreting the literature.

For the purposes of this report, grey nomads are pragmatically defined as persons aged 55 years or older and travelling in Australia for a continuous period of one month or more, with the prime form of accommodation being a caravan or campervan or (less often) a motorhome, and the primary purpose being recreational.

To date, research on Australian grey nomads has consisted primarily of qualitative studies (e.g., Hillman, 2013, Holloway, 2009, Onyx and Leonard, 2005, Onyx and Leonard, 2007) with potentially limited generalisability. However, some of these studies are of high quality, and some consistent results have emerged. Quantitative data, including basic numerical and demographic data, are scarce. Typically, they arise from, and primarily relate to, tourism. There has been very little investigation of grey nomads' health and their need for healthcare services.

Noteworthy studies include: Tate et al.'s (2006) survey of people at a WA caravan park; Hillman's (2013) ethnographic study of grey nomads at a coastal Central Queensland location; Onyx and Leonard's (2007) ethnographic study of 418 grey nomads in WA, NT, and Queensland; Cridland's (2008) population geography analysis (PhD thesis) of grey nomad population characteristics and mobility; Holloway's (2009) ethnographic study (PhD thesis) of grey nomads, primarily in WA; and Koch and Mann's (2008) study of interviews with 26 grey nomads, mainly from NSW and SA.

According to Cridland (2008), most studies found that the majority of grey nomads are in their early to mid-sixties. In his own sample, the mean ages were 65.4 years for men ( $n=881$ ) and 62.6 years for females ( $n=879$ ). Other studies are consistent with this description (Mings, 1997, Tate et al., 2006).

Grey nomads are not entirely representative of their age cohort in the general Australian population. Most travel as heterosexual couples (Cridland, 2008, Onyx and Leonard, 2007), and several studies

have found that they are predominantly white Anglo-Australians (Onyx and Leonard, 2007, Mings, 1997).

### **Communities and regions affected by grey nomads**

Grey nomads primarily travel to and within northern Australia, moving northwards to spend time in warmer climates (Hillman, 2013), particularly in/for winter (Cridland, 2008). They most commonly go to Queensland (Hillman, 2013). WA also has significant grey nomad activity (Davies, 2011, Davies et al., 2009); and some people spend time in NT, often en route to WA or Queensland.

Tourist attractions, particularly natural ones such as national parks, are 'hot-spots' for grey nomads. Some towns and settlements attract high numbers of grey nomads for more practical reasons. Some are 'recreational vehicle (RV) friendly', providing good facilities and services for caravanners and similar travellers (Department of Employment Economic Development and Innovation, 2010). They may also provide the last ready access to health services for considerable distances. Some also serve as 'gateways', because it is geographically convenient or even necessary to travel through them to certain destinations. For example, Goondiwindi (west of Brisbane and near the NSW border) is:

a gateway to caravanners from southern states visiting Queensland as well as for Queenslanders travelling to southern destinations ... the number of motels, service stations selling fuel and food, caravan parks and restaurants are much higher than the numbers of these facilities required to service the local population (Prideaux and McClymont, 2006, pp 47-48).

In WA, Fitzroy Crossing is located on the only sealed road connecting East Kimberley and West Kimberley (Tate et al., 2006). Healthcare services are sparse in the Kimberley region. For example, prescriptions for travellers can be dispensed only in Broome (4 hours by road from Fitzroy Crossing), Derby (2 hours away), and Kununurra.

### **Size of grey nomad population**

As is the case with FIFO/DIDO populations, the grey nomad population is hard to quantify (Holloway, 2009). Drawing on ABS Census data and tourism sources (both government and industry), Cridland (2008, p 7) estimated that: "400 000 to 500 000 grey nomads could be wandering around Australia during the winter months each year, equating to approximately two per cent of Australia's population". However, Cridland (2008) prefaced this estimate by discussing multiple methodological difficulties in arriving at this estimate (pp 6-7). "While it is difficult to establish accurate numbers, the Bureau of Tourism Research estimates that in a single year Australian retirees undertake approximately 200 000 caravan trips of more than six weeks duration" (Carter, 2002 cited in Onyx and Leonard, 2007, p 384).

As noted earlier, Hanson and Bell (2007) estimated that retirees (including grey nomads) comprise 15–25 per cent of seasonal workers in the Australian fruit and vegetable industry. However, many of them are in their 40s and therefore do not fit common definitions of grey nomads. Retirees' significance in the industry has grown in recent years, as they have formed an increasing proportion of the labour force. They mainly engage in picking and packing tasks, and they travel more extensively, particularly into remote areas, than some groups of seasonal workers such as the working holiday-makers from overseas (Hanson and Bell, 2007).

### **Prevalent and incident conditions, and high risk behaviours among grey nomads**

There is little published information about the health of Australian grey nomads. A search of the *Australian Family Physician* website revealed only one mention of grey nomads (Tate et al., 2006).

To date, the most significant quantitative study of the health status of Australian grey nomads is Tate et al.'s (2006) survey of 260 people, conducted at the main caravan park at Fitzroy Crossing. According to the authors: "This is the first study to review the burden of disease and preparedness to travel of older travellers visiting remote Australia" (p 71). As Fitzroy Crossing is a geographically key transit node, the sample is likely to be representative of grey nomads in the Kimberley region, estimated at approximately 41 000 per year (Roach et al., 2007). Other useful sources of information are summarised below.

Australian grey nomads tend to view themselves as relatively healthy, but some incongruities have emerged in several studies. In Onyx and Leonard's (2007) sample, over 80 per cent self-reported good or excellent health (87% total; 85% men; 89% women). However, 32 per cent of men and 21 per cent of women reported a major 'health scare' in the past two years. Grey nomads are sometimes regarded as "'bad examples' of self care" (Holloway, 2009, p 148), and "badly prepared for outback travel both in terms of medical preparedness and safety issues". There is some quantitative evidence to support this: Tate et al.'s Fitzroy Crossing sample was "poorly prepared with regard to medication supplies and health summaries" (no data provided, p 72).

Like other Australians of their ages, grey nomads have high levels of chronic diseases (Tate et al., 2006). The most prevalent chronic disease in Tate et al.'s sample (median age 61.3 years) was hypertension (26.2%), followed by dislipidaemia (21.1%), heart disease (9.6%), and diabetes (6.5%). Cridland (2008) also found that chronic diseases were common. For example, 27.2 per cent reported having hypertension and eight per cent reported having diabetes, slightly more than the 26.2 per cent and 6.5 per cent, respectively reported in Tate et al.'s study (p 72, Table 1); but less than the 39 per cent and 14 per cent reported for people aged 65+ in the 2004/2005 National Health Survey (Australian Bureau of Statistics, 2006, p. 16, Table 1).

Most people (75%) in Tate et al.'s (2006) sample reported two or more ailments; 16 per cent more than three. Although osteoporosis and depression were more common in women, men tended to have more ailments. In Onyx and Leonard's (2007) study, women similarly reported slightly better health than men. Unfortunately, Tate et al. did not report men's and women's health separately.

Most people (61.9%) in Tate et al.'s sample were taking regular medications. Holloway (2009, p 318) reported encountering only one grey nomad couple who were not on long-term medication regimes. This is not surprising, given the high levels of medication use among older Australians. In Goldney and Fisher's (2005) South Australian community survey, 72.7 per cent of 55-64-year-olds, 83.6 per cent of 65-74-year-olds, and 91.6 per cent of those aged 75-plus reported taking at least one prescribed medication.

Like miners and seasonal workers, grey nomads have the potential to contract and spread infectious diseases. In their Fitzroy Crossing sample, Tate et al. (2006) found that 39.2 per cent of those aged 65 or more had not been adequately vaccinated according to National Health & Medical Research Council recommendations. They speculated that this might be the result of less frequent contact with the GPs they usually consulted at home.

### **Emergencies**

Several studies have reported on medical emergencies experienced while travelling. Obst et al. (2008) reported:

Five percent of the participants had experienced a medical emergency while travelling. Several of these involved minor falls, although three falls resulted in broken arms and one in a damaged knee. A further 14 per cent had experienced some kind of health scare while travelling. For example, severe chest pains,

back injuries, deep vein thrombosis, severe arthritis, cervical cancer diagnosis, pneumonia, and fainting fits. These health problems were treated at local regional hospitals or by local GP's [sic]. (p 8)

One of Koch and Mann's (2008) interviewees had had a heart attack; his wife, a trained nurse, had immediately recognised this and sought help. Some emergencies were also reported in Onyx and Leonard's (2007) study, but participants were able to resume their journeys:

Four of the 216 reported instances of medical emergency on the road. In all cases, the couple continued traveling after the emergency was resolved. (p 389).

Most of their sample reported being prepared – both practically and psychologically – for emergencies:

The majority of interviewees had thought through what they would do in a medical emergency. For example, of those interviewed, half (13) had some form of CB or UHF radio and knew how to get on the truckers' channel if necessary. Some made special arrangements when they went on risky adventures, informing local homesteads of their plans. But most accepted the risk as worth it.

## **Servicing health needs of resident populations**

### **Impact of grey nomads on delivery of service to residents**

According to (Tate et al., 2006): "Anecdote suggests 'grey nomads' place a poorly documented burden on limited remote health services" (p 70). It is clear that grey nomads impact significantly on health services in the regions in which they travel. However, most of the evidence is anecdotal. Grey nomads have been "reproached for depleting pharmacy supplies in rural and remote pharmacies, resulting in the local community going without key medications ... and overstressing emergency transport facilities such as the RFDS and local ambulance services" (Holloway, 2009, p 153). Inevitably, grey nomads sometimes have unexpected admissions to hospital as a result of injuries or health crises (Onyx and Leonard, 2007, Obst et al., 2008). Watson (2010) referred to grey nomads as one of the "three main categories of patients at Darwin Hospital"; the other categories were Aboriginal people from both Darwin and much further afield, and other local Darwinians. Patients from beyond Darwin were brought in by NT air ambulance and occasionally by the RFDS (which does not operate in the Top End of NT).

The National Prescribing Service (2013) advises grey nomads to attend to any health needs prior to travel and to take appropriate measures to ensure supply and quality of medications (see website for a comprehensive list).

Several of these recommendations echoed the conclusion of Tate et al. (2006) that:

Pre-travel health assessment, vaccination, medication supplies sufficient for the duration of the trip, and written health summaries might improve travellers' health care and reduce health service utilisation while travelling (p 72).

Tate et al. also surveyed local healthcare providers (doctors and nurses) at Fitzroy Crossing, and found that health summaries were highly valued. According to one of Koch and Mann's (2008) interviewees, the Australian Retired Persons Association recommends keeping a folder of medical information just inside the door of the caravan (p 266).

Grey nomads' regular GPs and other doctors (e.g. specialists) whom they consult when they are at home have varying attitudes towards their patients' travels. Hillman (2013) found that many grey



nomads "had supportive medical practitioners at home who provided a number of services to accommodate their patients while they travelled" (p 587). Onyx and Leonard (2007) reported:

at least one couple reported that their specialist had been very angry about his patient traveling. In most cases, however, the interviewees reported that they still had regular check-ups and that their doctor approved of their travel (p 389).

Some grey nomads take advantage of Regulation 24 prescriptions. This allows pharmacists to dispense all the repeats at once. The Pharmaceutical Benefits Scheme allows doctors and other prescribers to write 'Regulation 24' next to any item prescribed, provided certain conditions are met:

- the maximum PBS quantity is insufficient for the patient's treatment; AND
- the patient has a chronic illness or lives in a remote area where access to PBS supplies is limited; AND
- the patient would suffer great hardship trying to get the pharmaceutical benefit on separate occasions.<sup>ix</sup>

However, this can cost patients more, which makes this a less attractive option. This is likely to be a factor in Tate et al.'s (2006) finding that many people had insufficient supplies of medications. The RFDS Medical Chest Program caters for some travellers' unanticipated needs for medications for unexpected illnesses and emergencies (Margolis and Ypinazar, 2008), but this is not a satisfactory solution.

Some of the participants in Obst et al.'s (2008) sample reported having sought information on obtaining medications in rural areas (22%), preventing deep vein thrombosis (27%), and preventing driver fatigue (26%). Sources of information (not necessarily health information) included fellow travellers (61%) and the internet (38%).

### **Contribution of grey nomads to provision of health care services**

Onyx et al. (2009) discussed the potential for grey nomad volunteers to contribute in a range of domains, including health services. The Department of Employment, Economic Development and Innovation (2010) mentioned 'niche opportunities' for grey nomad health professionals to undertake part-time work (pp 12–13), and briefly discussed initiatives to facilitate their participation:

The Grey nomad population may include highly trained health professionals whose skills could be beneficial to the communities they visit. For example, Queensland Health is currently examining the feasibility of establishing an internal, state-wide nursing/midwifery locum management service that would provide support to Queensland Health's rural and remote facilities.

Other workforce models include the Allied Health Professional Enhancement Program (AHPEP) which is focused on providing professional development opportunities in the bush as well as locum programs for doctors. Persons who are travelling through Queensland with appropriate skills and registration may be able to participate in such programs and therefore become a viable workforce alternative (p 26).

Another example of a program designed to engage grey nomad health professionals is the *Caring Caravanners Program* run by *Nurse the Nation* (The Lamp, 2009). However, substantial information about this was not available.

Despite such initiatives, it seems unlikely that many grey nomads can be expected to participate, as several studies found that relatively few were health professionals prior to retirement. Cridland (2008) found that males had been predominantly tradesmen; and most women had been engaged in domestic household duties or clerical or manual labour positions. Only five per cent of the 306 men in Mings' (1997) sample had been professionals; and only five per cent of women and eight per cent

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<sup>ix</sup> See [http://www.pbs.gov.au/info/healthpro/explanatory-notes/section1/Section\\_1\\_2\\_Explanatory\\_Notes](http://www.pbs.gov.au/info/healthpro/explanatory-notes/section1/Section_1_2_Explanatory_Notes)



of men had university degrees. In contrast, 27 per cent of Obst et al.'s (2008) sample had a tertiary degree. However, as mentioned above, this sample was unrepresentative. In particular, it included people as young as 50, there were more than twice as many men as women, and one quarter were still employed full-time.

### **Initiatives to address health needs of grey nomads and local population**

Some health services have been developed to cater for grey nomads, among others. In the Northern Territory, the Alice Springs After Hours Practice was established (2003) to provide a "sustainable general practice after-hours service that will meet the needs of local communities" (Steenkamp and Rose, 2006, p 4). As of 2006, approximately 17 per cent of the patients were 'visitors'; a significant proportion of these were likely to be grey nomads. The age distribution of visitor patients was bimodal: there were "two very distinct peaks, i.e. one for the age group 20-29 years and another for the age groups 50-69 years ... for both males and females" (p 13). In NSW, the Bridges GP After Hours Service on the Central Coast also seems likely to have catered for grey nomads, among others, because ten per cent of patients resided outside of the region in 2006 (p 23).

Grey nomads often travel extensively during the day (Holloway, 2009), so it seems likely that after-hours services would suit them. Early morning services might also be convenient, given grey nomads' tendency to get up early (Holloway, 2009). The findings of Tate et al. (2006) suggest that there is a need for information provision and campaigns to encourage better preparation for trips. Given that many grey nomads use the internet, expansion of online information provided by organisations such as regional health services, the RFDS, and ambulance services could be helpful, as might participation in online forums.

There may also be potential for facilitation of knowledge exchange within face-to-face social networks. Because many grey nomads are repeat travellers, there may be value in developing on-the-road peer education programs with trained experienced travellers advising others.

Any programs that are developed need to be carefully targeted and, where appropriate, marketed. This includes recognition of identities and group memberships. Brayley and Obst (2010) found that some people were more likely to identify as recreational vehicle travellers than as grey nomads.

### ***Recommendations***

- Education of GPs to recognise their role in ensuring that grey nomads are appropriately prepared for travel
- Provision of outpatient clinics at non-peak times to suit grey nomads
- Education for grey nomads about better planning and preparation
- Targeted research focusing on the health needs of grey nomads, their impact on rural/remote health services, the effectiveness of existing and potential programs and services to reduce burden on rural/remote services
- Exploration of the potential for data linkage mechanisms to provide useful information (both current and future)
- To facilitate research, a consistent definition of grey nomads needs to be agreed upon and used by researchers and relevant agencies including the ABS and Medicare.

## International overview for the impact of mining-related FIFO/DIDO on health care provision in Alaska, Canada, and Scotland

### *Alaska*

Alaska has a comprehensive set of databases that provide accurate monitoring of resident employment details for the purposes of supporting resident hire preference legislation. As a consequence, the number of non-resident employees is also known with a high degree of accuracy, and this has been reported in the *Residency of Alaska Workers: 2011* report (Parnell and Blumer, 2013). Of relevance to the current report on FIFO/DIDO practice and health service needs, are the following facts:

- Non-resident population (2011) was 83 488 out of a total workforce of 414 569 workers, excluding self-employed, fishermen and other agricultural workers and private household workers
- Non-resident workers' main industry groups (2011) were seafood processing (21.4%,  $n=17\ 897$ ), leisure and hospitality (17.1%), followed by trade/transportation/utilities (16.8%). Oil and gas industry workers ranked seventh with 6.3 per cent of the non-resident workforce, and natural resources and mining were ranked tenth (3.2%)
- For oil and gas workers (17 049 workers), non-residents represented 31.1 per cent (2011)
- Metal mining industry (approx. 3 200 workers), 35.1 per cent were non-resident.

Unfortunately, despite the availability of detailed population numbers, no publications were identified for the search period 2008–2013 relating to the demands of Alaskan mining FIFO/DIDO on local health services. Based on the above, mining/oil/gas FIFO/DIDO in Alaska is likely to involve less than 8 000 employees. The relatively small size of the Alaskan FIFO/DIDO population taken together with the off-shore operational model for some of the FIFO activity (e.g. oil) may explain in part the lack of reports relating to any demand on local health services.

### *Canada*

Australia and Canada share many geographical and demographic parallels, including the challenge of meeting the needs of widely dispersed remote and rural communities, and the existence of significant mining resource operations serviced in part by a FIFO/DIDO workforce. Although some mining companies operating in Canada include a commitment to support the health needs of mine workers in the Environmental Impact Assessment (EIA) process, most do not (Shandro et al., 2011). Yet according to health care professionals, mining 'boom times' see increases in pregnancies, sexually transmitted infections, and mine-related injuries, the demands of which must be met by available services (Shandro et al., 2011).

A study of the impact of FIFO/DIDO workers in the Wood Buffalo region of Canada was based on a non-resident population of 24 311 workers (46% were DIDO, 30% FIFO, 23% BIBO) employed in the Oil Sands mining industry in 2006/2007, and therefore constituting 26 per cent of the regional population (Nichols Applied Management, 2007). In that report, specific investigation of the use of health services showed that FIFO/DIDO draw on hospital services, mostly by means of ED visits for temporary (59%), as compared to chronic, ailments (6%) and work-related injuries (30%). In addition, and similar to the Bowen Basin results described above, FIFO/DIDO accounted for 32 per cent of all visits to the ED of the Northern Lights Health Centre. It was also reported that:

- Use of ED was in part a response to lack of walk-in clinics, and 30 per cent of use was for a work-related injury

- 37 per cent of non-hospital health services were for physician services
- 33 per cent of non-hospital health services were for dental services.

With emerging evidence illustrating the impact of mining FIFO/DIDO on local services in Canada, it appears that responsibility for addressing this demand has been assigned to the Government. A shared responsibility for affected communities was not forthcoming in a joint briefing paper prepared by BHP Billiton EKATI, and Rio Tinto Diavik Diamond Mines, and De Beers for the North West Territories diamond mines, and tabled in 2013 (BHP Billiton EKATI et al., 2013). In the BHP report, the economic value of mining was presented in considerable detail, including workforce numbers (predicted workforce for three mines was 1 826, actual workforce was 3 028 of which approximately 50% were residents). However, whilst acknowledging the difficulties of dealing with Aboriginal social problems, many of which existed before commencement of mining operations, in terms of infrastructure problems they merely stated the following:

We support our employees in addressing their personal challenges, but it is the government's role to provide quality education, address community-based social issues like alcohol and drug dependency, and keep the costs of living in the North affordable. Through addressing these fundamentals, the Government will assist in attracting people to help industry grow the north and its economy (p 11).

A comprehensive report by Gosselin (2010) on the mineral sands industry in Canada depicts rural communities struggling with a shortage of health care staff and facilities, and higher than average rates of substance-related disorders, heavy drinking and smoking, sexually transmitted infections, obesity, prevalence of diabetes and mortality rates due to homicide and motor vehicle collisions. It was also found that availability of doctors is very low. For example, in Fort McMurray there were 71 GPs per 100 000 population compared to a Canadian average of 99 per 100 000 for 2007. An important Canadian government review of the oil sands mining operations in Alberta, the Radke et al. report (2006), originally initiated to scope the problems that had developed as a consequence of mining operations in Alberta, listed a number of recommendations surrounding health service provision in the region. Many of the findings of the *Responsible Actions: A plan for Alberta's Oil Sands* report bear a strong resemblance to reports from Australian mining communities. In summary, some of the health service-related recommendations for Fort McMurray were:

- Use salary and wage market modifiers to provide additional compensation due to difficulty in attracting and retaining health care workers
- Invest in hospital capability to deal with a large scale industrial accident or other event, or to control any outbreaks that might come with a widespread pandemic
- Allocate funding based on population projections and with particular reference to the rate of growth
- Reconcile health care registration numbers (actual patient number) with census data on an annual basis with an adjustment of funding in accordance with outcomes.

A 2011 progress report for the Alberta action plan merely noted that actions on health care improvement were ongoing and residents were being consulted about their health priorities (Alberta Government, 2011).

In summary, whilst there are strong similarities between mining-related FIFO/DIDO activity in Canada and Australia, based on the current literature search it appears that any demands placed on local health services are yet to be addressed in the Canadian setting.

### *Scotland*

No publications were identified for the impact of mining FIFO/DIDO on local community infrastructure and corresponding to the time period 2008 to 2013. This is likely to reflect in part the fact that much of the Scottish mining FIFO populations work on offshore oil platforms, and therefore all services must be provided by the employer.

## Challenges

The dynamic nature of mining activity with its cycle of exploration, construction, operation, and decommissioning creates an uncertain environment for infrastructure spending. However, there is emerging evidence of the demands placed on local health services, and preliminary evidence suggests that where mining is conducted in close proximity to established communities those demands are largely similar to those of the resident population in terms of service access. Assuming adequate funding can be secured, staff recruitment represents a major challenge due in part to regional isolation and hence reluctance of health workers to relocate, but also because of the increased cost of living in those areas in which mining salaries have contributed to increases in property prices and rent (Williams and Giles, 2012).

Challenges also arise in areas where there are high numbers of seasonal workers and/or grey nomads. For seasonal workers, the influx of international workers from CALD backgrounds may have implications on health services in terms of communication difficulties and cultural sensitivity (Mares, 2005), which may mean that access to translators and longer consultations are needed. For grey nomads, the challenges identified in the literature relate to their potential overuse of local pharmacies, which may deplete medication stocks (Holloway, 2009); and access to emergency care in areas where there are limited health workers to deal with multiple emergencies (Obst et al., 2008).

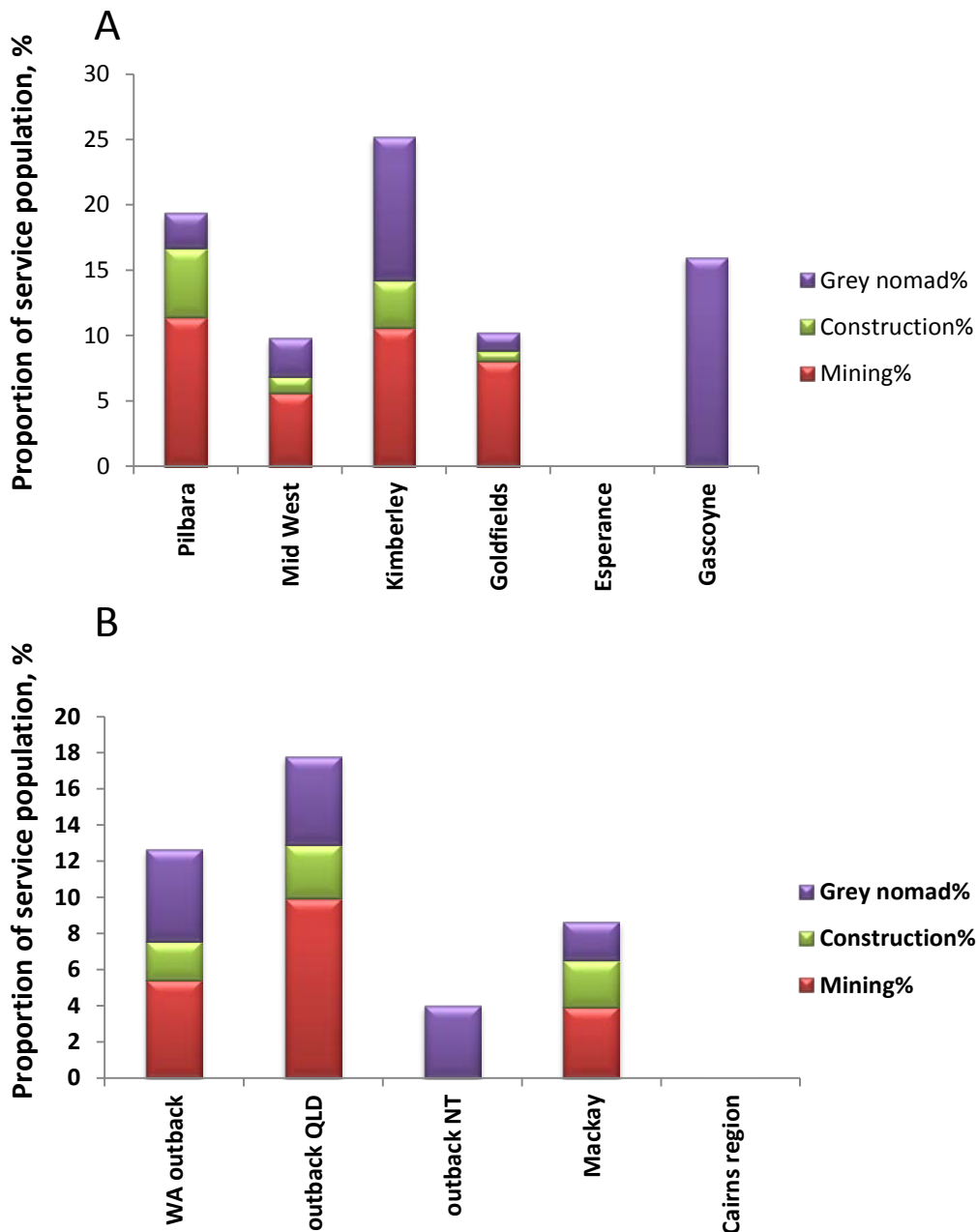
Defining and measuring these transient populations is a challenge in itself; yet it is important to understand the fluctuations and the different health challenges in these groups in order to adequately address their needs and limit the impact on the local resident population.

## Summary & conclusions

Rural and remote regions of Australia have struggled to provide adequate access to health care services and it seems likely that the added demands of FIFO/DIDO, in particular those related to the high profile mining industry, have served to increase awareness of this situation. Whilst in most cases the evidence is overwhelmingly anecdotal, there is growing interest in collecting the data required to measure the true impact and demand of FIFO/DIDO on regional health services. The few studies identified in this investigation that provided quantitative data suggest that the needs of FIFO/DIDO in terms of health services vary according to the reason for FIFO/DIDO (mining, seasonal workers or grey nomads) which loosely relates to age and nature of the work, if any, undertaken. However, extensive inter- and intra-regional variation with respect to the source of FIFO/DIDO, proportion of service population that is FIFO/DIDO, nature of mining activity or seasonal work, and level of remoteness necessitates collection of service use data at a local level.

Some, but not all, of the regions potentially impacted by mining, seasonal worker, and grey nomad FIFO/DIDO overlap. For example, the state of Queensland is a popular destination for grey nomads, and the communities of Emerald, Mackay, Bowen Basin, and Surat Basin are all centres of seasonal worker employment as well as centres of mining activity. Similarly, the Kimberley region of WA is a popular destination for grey nomads and a significant region for mining. Of particular use in understanding this is a set of ABS winter 2011 Census Night data analysing the resident and non-resident populations for WA regions and separately for selected rural and remote areas across Australia (Australian Bureau of Statistics, 2012b, Australian Bureau of Statistics, 2012c) (Figure 5). Although in each region the resident population constituted between 58 and 94 per cent of the service population, the remainder comprised varying proportions of construction and mining workers (together taken as representing resources industry workers), grey nomads, and others. Figure 5

shows that many areas included both mine workers and grey nomads; but in some, such as Gascoyne and Outback NT, only grey nomads were represented, whilst in Pilbara the miners and construction workers predominated. Winter was chosen for the 2011 Census because it is not the typical holiday season for most Australians. However, in the north of the country it is a popular travel period for grey nomad travellers and the usual time for harvest of agriculture (Appendix Table 11).



Source: (Australian Bureau of Statistics, 2012c, Australian Bureau of Statistics, 2012b).

**Figure 5** Geographical distribution of specific non-resident populations according to Census 2011 data

Although mining activity is known to be increasing in NT, the 2011 data suggest that grey nomads were the major source of FIFO/DIDO in that state in 2011. This is in line with the 2006 Alice Springs After Hours Clinic report (Steenkamp and Rose, 2006) in which 17 per cent of clinic presentations

were by visitors and a significant proportion of these were individuals between 60 and 70 years of age. It is essential to gain an accurate estimate of current FIFO/DIDO populations in those areas and an understanding of future trends so that the long-term benefit of any increased investment in infrastructure can be assessed. That is, whilst mining FIFO/DIDO is likely to peak and dip with the move from construction to operational phases, if medical facilities are also to be accessed by FIFO/DIDO seasonal and grey nomad populations then facility use is more likely to be sustained. Hence investment in permanent facilities may be of value in the longer term.

In summary, much of the data needed to inform decisions regarding demands placed on rural and remote health services in Australia by FIFO/DIDO are yet to be generated. Whilst a number of population estimates are available, there are limitations on their usefulness relating to the definition of FIFO/DIDO applied and the rapidly changing population dynamics. It is likely that routine collection of patients' usual place of residence postcode and employment/travel status might provide sufficient initial data to raise awareness and facilitate changes required to ensure that the infrastructure within a community is sufficient to meet the demands. Initiatives such as the Royalties for Regions might be used to finance any required changes. Although one of our aims was to include findings relevant to Indigenous community access to health care and related to the impact of FIFO/DIDO-related demand on local health services, this topic was not specifically addressed in any of the publications reviewed. It is likely that any impact of FIFO/DIDO on Indigenous health service delivery will need to be measured in targeted surveys. However, one publication was identified that dealt with the difficulty experienced in two regional centres of SA as a consequence of Indigenous mobility (Kainz et al., 2012). In that study, the inability to measure and forecast short-term mobility was one of the major difficulties; and inflexibility of current government funding models that focused on permanent resident populations was described as one of the reasons for the lack of appropriate services.

Similarities between the Canadian and Australian experiences with respect to mining FIFO/DIDO suggest that future developments in Canada are likely to be highly relevant to Australia. However, again the relevant data need to be generated before potential problems can be addressed.



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# Appendices

## Mining

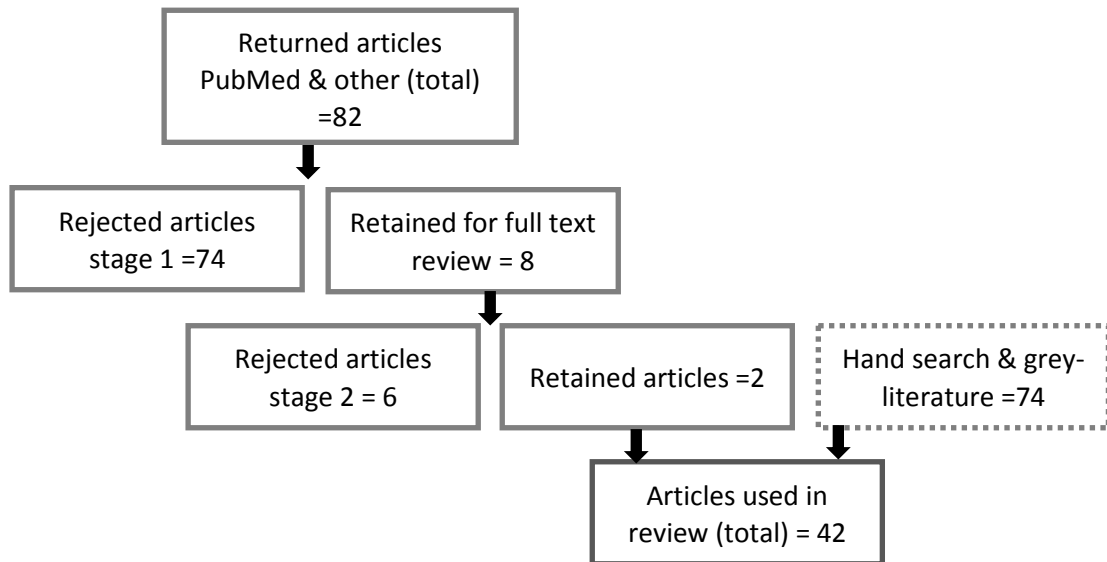
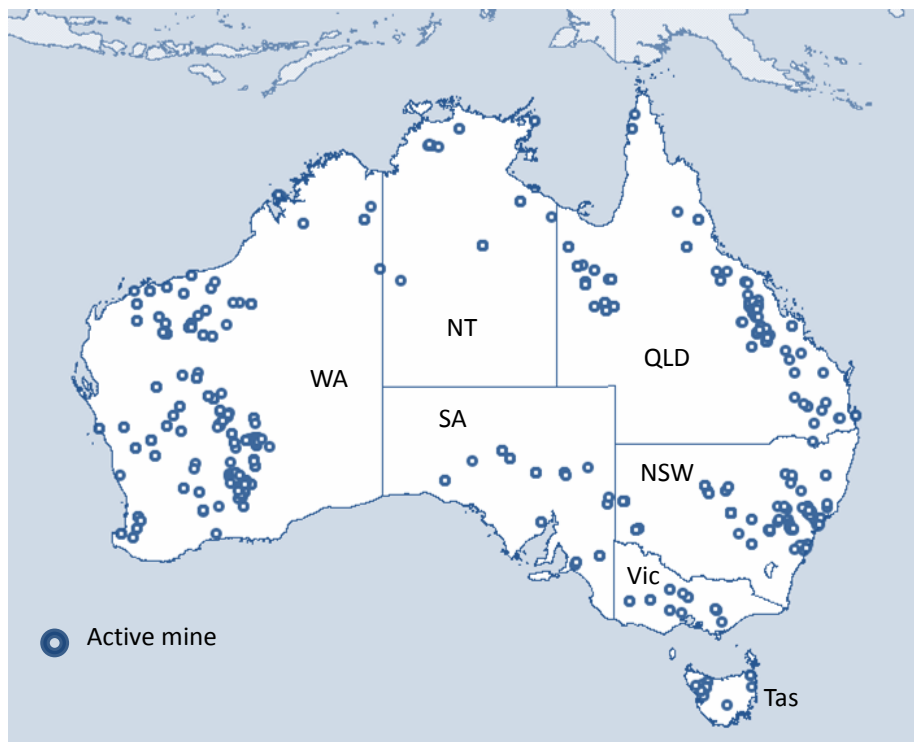


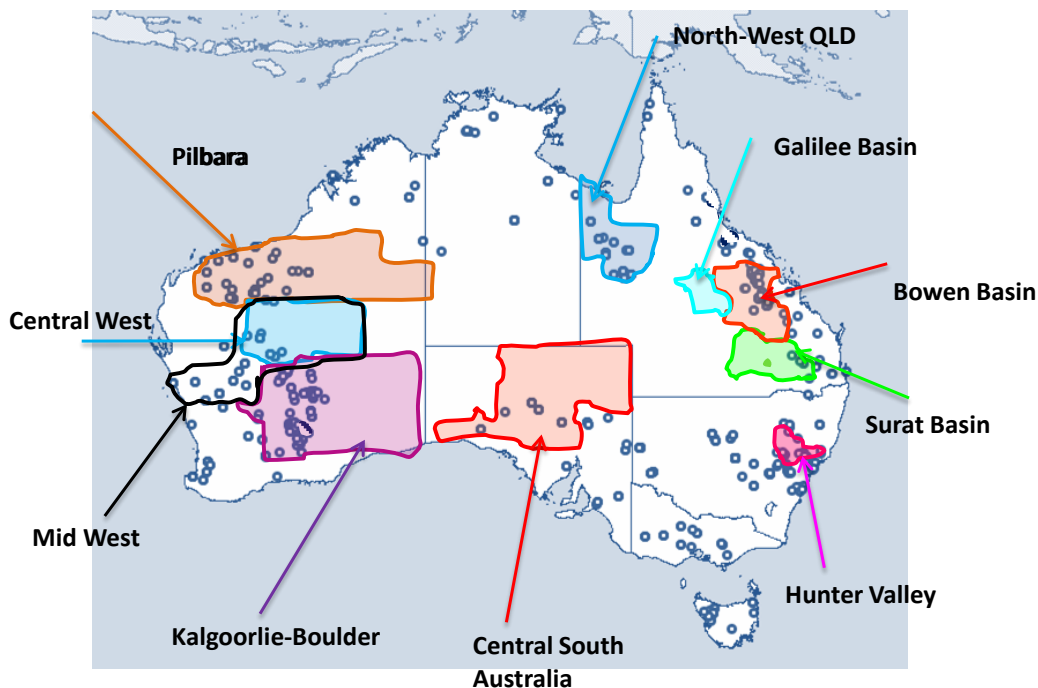
Figure 6 Literature search results for mining-related FIFO/DIDO



Source: Operational mines, obtained from GeoScience Australia mines atlas <http://www.australianminesatlas.gov.au/?site=atlas&tool=advsearch>

Figure 7 Location of operational mines in Australia at November 2013





Operational mines, from GeoScience Australia <http://www.australianminesatlas.gov.au/?site=atlas&tool=advsearch>

Source: Operational mines, obtained from GeoScience Australia mines atlas <http://www.australianminesatlas.gov.au/?site=atlas&tool=advsearch> and Mikkelsen et al. (2013)

**Figure 8** Location of selected major mining regions of Australia

### Population tables

The following series of Tables (6–9) provide estimates of FIFO/DIDO populations and resident populations in selected resource regions for 2011 (unless otherwise indicated) in selected mining regions and communities. Although the ABS changed to the Australian Statistical Geography Standard in July 2011, and Local Government Area (LGA) and Statistical Local Area (SLA) were approximately replaced with the newly defined SA2 and SA3 respectively, the geographical areas do not necessarily correspond. Therefore, since much of the documentation identified was based on LGA and SLA the data presented here are based on the older classification system.

Where data were available, Indigenous population estimates were included and varied according to region. In Queensland, apart from Weipa and Mt Isa (19% and 15%, respectively), most Indigenous populations in LGAs were estimated at less than ten per cent (approximately 3-6%); in the Hunter Valley (approximately 3-5%); and in WA, there were higher proportions overall – mostly greater than ten per cent (>50% in Ngaanyatjaraku and Marble Bar).

Table 6 Resident and non-resident population estimates for selected Queensland mining regions and towns

State	Region	LGA	SLA	Major FIFO worker route origin	ERP	Indigenous population	Non-resident population	FIFO as proportion of total population	Proportion of FIFO employed in mining / and construction
Qld	North-West Qld			Townsville (29%) <sup>a</sup> , Other-Qld (24%) <sup>a</sup>	28 724 <sup>a</sup>		3 973 <sup>a</sup>	13.8%	59/7% <sup>a</sup>
		Weipa			3 334 <sup>b</sup>	618 <sup>b</sup>			
		Mount Isa			21 237 <sup>b</sup>	3 205 <sup>b</sup>			
	Gladstone				59 400 <sup>c</sup> 57 891 <sup>b</sup>	2 048	1 210 <sup>c</sup>	2% (6%)	
							(increasing to 3 610 in 2012) <sup>c</sup>		
	Galilee Basin			Other Qld (28%) <sup>a</sup> , Bowen Basin (17%) <sup>a</sup> , Galilee Basin (17%) <sup>a</sup>	3 286 <sup>a</sup>		183 <sup>a</sup>	5.3%	10/13% <sup>a</sup>
		Barcaldine			3 420 <sup>d</sup> 1 580 <sup>b</sup>	129 <sup>b</sup>	110 <sup>d</sup>	3.1%	
	Bowen Basin			Other Qld (31%) <sup>a</sup> , Mackay (18%) <sup>a</sup> , (25%) <sup>d</sup> Brisbane (10%) <sup>a</sup>	68 588 <sup>a</sup> 80 825 <sup>d</sup>		16 554 <sup>a</sup> 20 520 <sup>d</sup>	19.4% 20.2%	62/13% <sup>a</sup>
		Banana			14 860 <sup>d</sup> 14 456 <sup>b</sup>	583 <sup>b</sup>	1 380 <sup>d</sup>	8.5%	
		Biloela			5 985 <sup>d</sup>		250 <sup>d</sup>	4.0%	

		5 808 <sup>b</sup>	238 <sup>b</sup>		
	Moura	1 745 <sup>d</sup>		495 <sup>d</sup>	22.1%
		1 899 <sup>b</sup>	116 <sup>b</sup>		
	Central Highlands	29 535 <sup>d</sup>		4 835 <sup>d</sup>	14%
		28 715 <sup>b</sup>			
	Emerald	13 245 <sup>d</sup>		870 <sup>d</sup>	6.1%
		16 666 <sup>b</sup>	516 <sup>b</sup>		
	Capella	940 <sup>d</sup>		275 <sup>d</sup>	22.6%
		926 <sup>b</sup>	28 <sup>b</sup>		
	Blackwater	5 050 <sup>d</sup>		1 650 <sup>d</sup>	24.6%
		5 100 <sup>b</sup>	247 <sup>b</sup>		
	Bluff	385 <sup>d</sup>		100 <sup>d</sup>	20.6%
		370 <sup>b</sup>	33 <sup>b</sup>		
	Springsure	850 <sup>d</sup>		50 <sup>d</sup>	5.5%
		839 <sup>b</sup>	29 <sup>b</sup>		
	Tieri	1 510 <sup>d</sup>		735 <sup>d</sup>	32.7%
		2 012 <sup>b</sup>	59 <sup>b</sup>		
	Isaac	23 210 <sup>d</sup>		13 590 <sup>d</sup>	36.9%
		22 588 <sup>b</sup>	602 <sup>b</sup>		
	Nebo	495 <sup>e</sup>		555 <sup>e</sup>	53.8%
		465 <sup>d</sup>		460 <sup>d</sup>	49.7%
		459 <sup>b</sup>	14 <sup>b</sup>		
	Moranbah	8 990 <sup>e</sup>		4 585 <sup>e</sup>	33.8%
		8 875 <sup>d</sup>		2 805 <sup>d</sup>	24%
		8 965 <sup>b</sup>	235 <sup>b</sup>		
	Coppabella	630 <sup>e</sup>		2 575 <sup>e</sup>	80%
		630 <sup>d</sup>		1 870 <sup>d</sup>	75%
		375 <sup>b</sup>	3 <sup>b</sup>		
	Clermont	2 260 <sup>e</sup>		130 <sup>e</sup>	5.4%
		2 235 <sup>d</sup>		75 <sup>d</sup>	3.2%
		2 177 <sup>b</sup>	71 <sup>b</sup>		

	Dysart		3 280 <sup>e</sup> 3 090 <sup>d</sup> 3 003 <sup>b</sup>	82 <sup>b</sup>	2 365 <sup>e</sup> 2 080 <sup>d</sup>	42% 40.2%	
	Middlemoun t		1 960 <sup>e</sup> 1 955 <sup>d</sup> 1 914 <sup>b</sup>	58 <sup>b</sup>	2 110 <sup>e</sup> 2 280 <sup>d</sup>	52% 53.8%	
	Glenden		1 340 <sup>e</sup> 1 340 <sup>d</sup> 1 308 <sup>b</sup>	31 <sup>b</sup>	535 <sup>e</sup> 440 <sup>d</sup>	28.5% 24.7%	
Surat Basin		Brisbane (27%), Surat Basin (21%), Other Qld (18%)	200 750 <sup>a</sup> 200 750 <sup>f</sup>		4 069 <sup>a</sup> 3 265 <sup>f</sup> 6 445 <sup>h</sup>	2% <sup>a</sup> 1.6% <sup>f</sup>	21/19% <sup>a</sup>
	Maranoa		13 465 <sup>f</sup> 13 369 <sup>g</sup> 13 076 <sup>b</sup>	958 <sup>b</sup>	1 155 <sup>f</sup> 2 075 <sup>h</sup>	8% <sup>f</sup>	
	Roma		7 160 <sup>f</sup> 6 524 <sup>g</sup> 6 906 <sup>b</sup>	602 <sup>b</sup>	275 <sup>f</sup>	3.7% <sup>f</sup>	
	Injune		405 <sup>f</sup> 374 <sup>g</sup> 398 <sup>b</sup>	28 <sup>b</sup>	50 <sup>f</sup>	3.8% <sup>h</sup> 11% <sup>f</sup>	
	Mitchell		935 <sup>f</sup> 1 027 <sup>g</sup> 911 <sup>b</sup>	163 <sup>b</sup>	30 <sup>f</sup>	30.5% <sup>h</sup> 3.1% <sup>f</sup>	
	Wallumbilla		265 <sup>f</sup> 262 <sup>b</sup>	15 <sup>b</sup>	30 <sup>f</sup>	10.1% <sup>f</sup>	
	Surat		462 <sup>g</sup> 426 <sup>b</sup>	45 <sup>b</sup>			

Toowoomba region	154 930 <sup>f</sup> 162 057 <sup>g</sup> 151 189 <sup>b</sup>	5 241 <sup>b</sup>	105 <sup>f</sup>	<1% <sup>f</sup>
Toowoomba city	99 305 <sup>f</sup> 106 743 <sup>g</sup> 96 567 <sup>b</sup>	3 696 <sup>b</sup>	40 <sup>f</sup>	<1% <sup>f</sup>
Oakey	4 385 <sup>f</sup> 3 964 <sup>g</sup> 4 284 <sup>b</sup>	350 <sup>b</sup>	50 <sup>f</sup>	1.1% <sup>f</sup>
Western Downs	32 355 <sup>f</sup> 32 071 <sup>g</sup> 31 590 <sup>b</sup>	1 417 <sup>b</sup>	2 005 <sup>f</sup>	5.8% <sup>f</sup>
Dalby	11 130 <sup>f</sup> 11 097 <sup>g</sup> 11 016 <sup>b</sup>	658 <sup>b</sup>	4 175 <sup>h</sup> 450 <sup>f</sup>	3.9% <sup>f</sup> 5.8% <sup>h</sup>
Tara	807 <sup>g</sup> 855 <sup>b</sup>	66 <sup>b</sup>		
Chinchilla	4 990 <sup>f</sup> 4 445 <sup>g</sup> 4 780 <sup>b</sup>	200 <sup>b</sup>	515 <sup>f</sup>	9.4% <sup>f</sup> 13.7% <sup>h</sup>
Miles	1 195 <sup>f</sup> 1 259 <sup>g</sup> 1 170 <sup>b</sup>	83 <sup>b</sup>	105 <sup>f</sup>	8.1% <sup>f</sup>
Wandoan	340 <sup>f</sup> 420 <sup>g</sup> 330 <sup>b</sup>	8 <sup>b</sup>	75 <sup>f</sup>	32.7% <sup>h</sup> 18% <sup>f</sup>
Jandowae	770 <sup>f</sup>		25 <sup>f</sup>	3% <sup>f</sup>

746 <sup>b</sup>	40 <sup>b</sup>
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<sup>a</sup> FIFO worker data for 2011 based on Census data for long-distance commuters (Mikkelsen et al., 2013) ; <sup>b</sup>ABS quick stats for 2011 available at [http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220); <sup>c</sup> mining FIFO based on local surveys (OESR, 2013b); <sup>d</sup>Queensland Treasury and Trade Bowen-galilee-basins full-time equivalent population report for 2011 and 2012 <http://www.oesr.qld.gov.au/subjects/demography/population-estimates/tables/bowen-basin-fte-pop-estimates-lga-ucl/index.php> ; <sup>e</sup> population in June 2012, Sarah Constantine based on OESR data (Constantine and Batty, 2013); <sup>f</sup> worker FIFO from Queensland treasury and trade Surat Basin full-time equivalent population report 2011-2012 <http://www.oesr.qld.gov.au/subjects/demography/population-estimates/tables/surat-basin-fte-pop-estimates-lga-ucl/index.php> ; <sup>g</sup> = 2010 resident population from Surat Basin planning framework 2011 <http://www.dsdip.qld.gov.au/resources/plan/surat-basin-regional/planning-framework.pdf> ; <sup>h</sup>2012 worker FIFO from Health Workforce Queensland Medicare Local 2013 Whole of region service and workforce Report <http://www.ddswqmedicarelocal.com.au/assets/HWQ-Final-Report-DDSWQML-June20131.pdf>

**Table 7 Resident and non-resident population estimates for the Hunter Valley mining region and towns**

State	Region	LGA	SLA	Major FIFO worker route origin	ERP	Indigenous population	Non-resident population	FIFO as proportion of total population	Proportion of FIFO employed in mining / and construction
NSW	Hunter Valley			Sydney (35%), Other-NSW (20%) Newcastle (16%)	118 416 <sup>a</sup>		1 785 <sup>a</sup>	14.9%	22/15% <sup>a</sup>
		Dungog			8 318 <sup>b</sup>	266 <sup>b</sup>			
		Great Lakes			34 430 <sup>b</sup>	1 325 <sup>b</sup>			
		Gunnedah			12 066 <sup>b</sup>	1 360 <sup>b</sup>			
		Liverpool Plains			7 480 <sup>b</sup>	816 <sup>b</sup>			
		Muswellbrook			15 791 <sup>b</sup>	847 <sup>b</sup>			
		Singleton			22 694 <sup>b</sup>	845 <sup>b</sup>			
		Upper Hunter Shire			13 754 <sup>b</sup>	537 <sup>b</sup>			

<sup>a</sup> FIFO worker data for 2011 based on Census data (Mikkelsen et al., 2013) ; <sup>b</sup> =ABS quick stats for 2011 available at

[http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220)



**Table 8 Resident and non-resident population estimates for selected South Australian mining regions and towns**

State	Region	LGA	SLA	Major FIFO worker route origin	ERP	Indigenous population	Non-resident population	FIFO as proportion of total population	Proportion of FIFO employed in mining / and construction
SA	Central South Australia			Adelaide (36%), Other SA (36%)	8 735 <sup>a</sup>		3 100 <sup>a</sup>	26%	63/11% <sup>a</sup>
		Coober Pedy			1 695 <sup>b</sup>	275 <sup>b</sup>	900 <sup>#</sup>		
		Roxby Downs			4 702 <sup>b</sup>	75 <sup>b</sup>			

<sup>a</sup> FIFO worker data for 2011 based on Census data for long-distance commuters (Mikkelsen et al., 2013) ; <sup>b</sup>=ABS quick stats for 2011 available at

[http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220) ; <sup>#</sup>= From Roxby Downs Council available at

<http://www.roxbydowns.com/Community/c-Facts-figures.html>

**Table 9 Resident and non-resident population estimates for selected Western Australian mining regions and towns**

State	Region	LGA	SLA	Major FIFO worker route origin	ERP	Indigenous population	Non-resident population	FIFO as proportion of total population	Proportion of FIFO employed in mining / and construction
WA Total									
WA	Goldfields- Esperance			Perth (52%), Kalgoorlie- Boulder (21%)	40 694 <sup>a</sup> 41 810 <sup>b</sup>		6 206 <sup>a</sup> 5 992 <sup>b</sup>	13.2%	65/6% <sup>a</sup>
		Coolgardie			3 999 <sup>b</sup>	389 <sup>b</sup>			
			Kalgoorlie- Boulder		30 841 <sup>b</sup>	2 086 <sup>b</sup>			
			Laverton		1 277 <sup>b</sup>	353 <sup>b</sup>			
			Leonora		779 <sup>b</sup>	190 <sup>b</sup>			

			532 <sup>d</sup>		880 <sup>d</sup>	2.1%	
	Menzies		384 <sup>b</sup>	256 <sup>b</sup>			
	Dundas		1 141 <sup>b</sup>	137 <sup>b</sup>			
	Ravensthorpe		2 126 <sup>b</sup>	29 <sup>b</sup>			
	Ngaanyat-jarraku		1 437 <sup>b</sup>	1 210 <sup>b</sup>			
<b>Central - West</b>		Perth (64%), Other WA (12%)	2 717 <sup>a</sup>		1 389 <sup>a</sup>	34%	64/6% <sup>a</sup>
	Meekatharra		1 377 <sup>b</sup>	451 <sup>b</sup>			
	Wiluna		1 159 <sup>b</sup>	292 <sup>b</sup>			
Mid-West			53 656 <sup>b</sup>		6 455 <sup>b</sup>		
	Central-west		2 717 <sup>a</sup>		1 389 <sup>a</sup>	34%	64/6% <sup>a</sup>
	Geraldton		19 132 <sup>b</sup>	2 187 <sup>b</sup>			
Gascoyne			9 288 <sup>b</sup>		6 821 <sup>b</sup>		
			9 291 <sup>c</sup>	1 368 <sup>c</sup>			
	Kalbarri		1 277 <sup>c</sup>	30 <sup>c</sup>			
	Carnarvon		5 787 <sup>c</sup>	1 110 <sup>c</sup>			
	Exmouth		2 393 <sup>c</sup>	44 <sup>c</sup>			
Pilbara		Perth (57%)	62 736 <sup>a</sup>		18 703 <sup>a</sup>	23%	48/23% <sup>a</sup>
			46 000 <sup>e</sup>		6 734 <sup>e</sup>	13%	
			(51 067) <sup>e</sup>		(15 464) <sup>e</sup>	23%	
			59 895 <sup>b</sup>		23 037 <sup>b</sup>		
	Ashburton		10 001 <sup>c</sup>	934 <sup>c</sup>			
	Paraburdoo		1 509 <sup>c</sup>	146 <sup>c</sup>			
	Tom Price		3 134 <sup>c</sup>	297 <sup>c</sup>			
	Onslow		667 <sup>c</sup>	180 <sup>c</sup>			
East Pilbara			11 950 <sup>c</sup>	2 028 <sup>c</sup>			
	Newman		5 478 <sup>c</sup>	548 <sup>c</sup>			

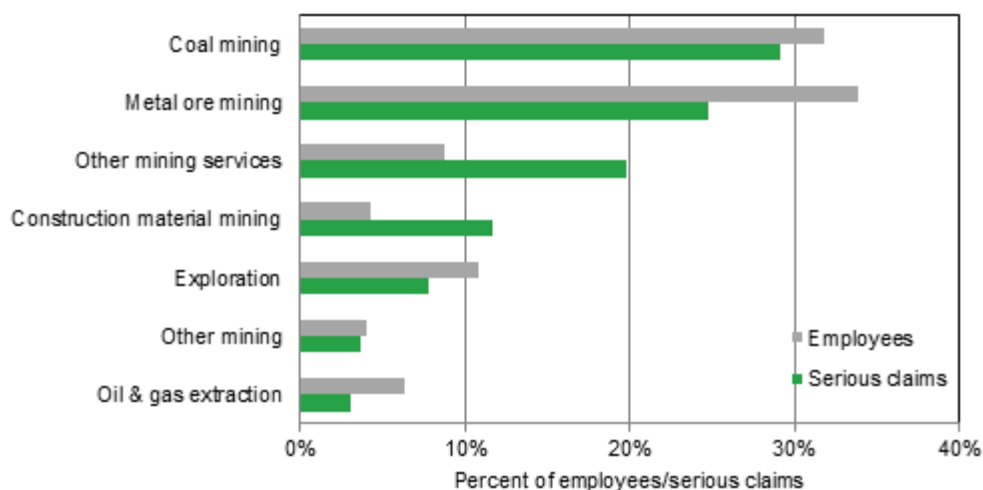
	Marble Bar	208 <sup>c</sup>	105 <sup>c</sup>
Port Hedland		15 044 <sup>c</sup>	2 223 <sup>c</sup>
	Port Hedland		
	South Hedland		
Roebourne/ Dampier/ Karratha		22 900 <sup>c</sup> (20 210) <sup>e</sup>	2 022 <sup>c</sup> (16 176) <sup>e</sup>
	Rest of East Pilbara		
Kimberley		34 793 <sup>b</sup> 34 794 <sup>c</sup>	15 076 <sup>b</sup> 13 921 <sup>c</sup>

<sup>a</sup> FIFO worker data for 2011 based on Census data for long-distance commuters to the Kalgoorlie-Boulder region (Mikkelsen et al., 2013) ; <sup>b</sup>= Results from Reflecting a nation based on 2011 ABS statistics available from <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2071.0main+features652012-2013> ; <sup>c</sup>ABS quick stats for 2011 available at [http://www.censusdata.abs.gov.au/census\\_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220](http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/SSC20035?opendocument&navpos=220) ; <sup>d</sup> Rola Rutzen estimates for 2006 [http://www.nintione.com.au/sites/default/files/resource/DKCRC-Working-paper-67-Profile-of-Leonora\\_A-sustainability-case-study.pdf](http://www.nintione.com.au/sites/default/files/resource/DKCRC-Working-paper-67-Profile-of-Leonora_A-sustainability-case-study.pdf) ; <sup>e</sup>2008 estimates from Waller 2010 (2010 projections in brackets); service population = 2010 projected resident + FIFO + Construction from Waller 2010.

**Table 10 Projected changes in resident, non-resident and construction populations in major communities of the Pilbara region**

	2010	2011	2012	2013	2014	2015	2020	Trend
<b>Dampier/Karatha region</b>								
<b>ERP</b>	20 210	20 359	20 830	21 792	22 627	23 424	25 002	↗
<b>FIFO</b>	1 076	1 235	1 299	1 361	1 511	1 591	1 691	↗
<b>Construction</b>	15 100	11 500	7 900	4 800	4 450	3 800	1 300	↓
<b>Port Hedland</b>								
<b>ERP</b>	15 826	17 007	17 945	18 705	19 012	19 012	19 870	↗
<b>FIFO</b>	1 040	1 156	1 261	1 307	1 050	1 050	1 110	↗↘
<b>Construction</b>	1 980	3 480	4 590	4 550	2 300	1 000	n/a	↗↘

Source: (Waller, 2010). ERP= Estimated Resident Population; FIFO= Fly-in Fly-out population identified as mining industry employee (not including construction workers)



Source: As presented in (Safe Work Australia, 2013).

**Figure 9 Mining: proportion of employees and serious claims by industry group, 2010-11**

## Seasonal workers

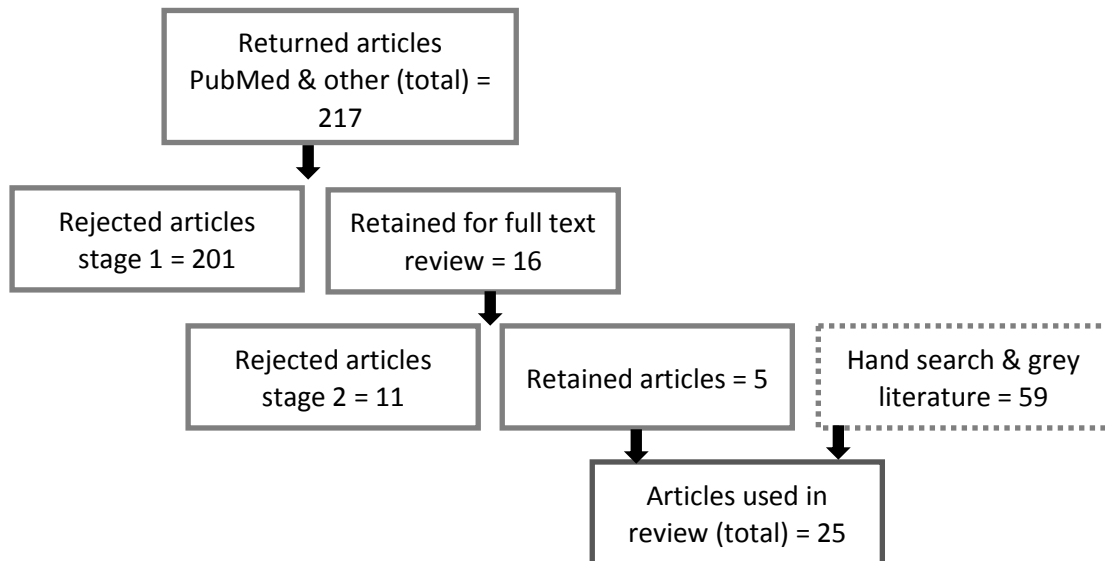
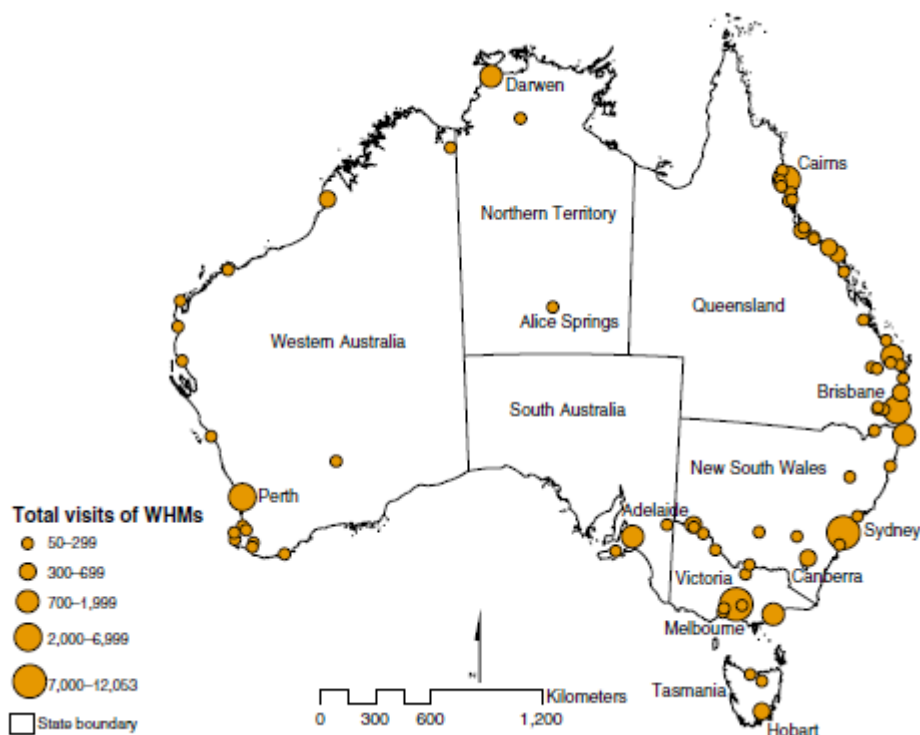
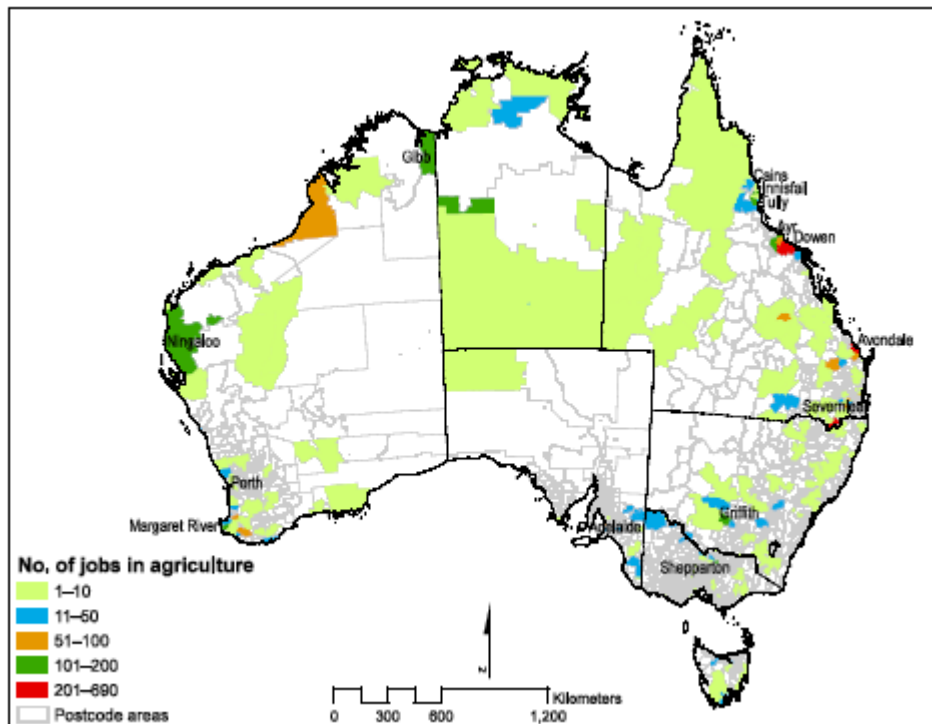


Figure 10 Literature search results for seasonal worker-related FIFO



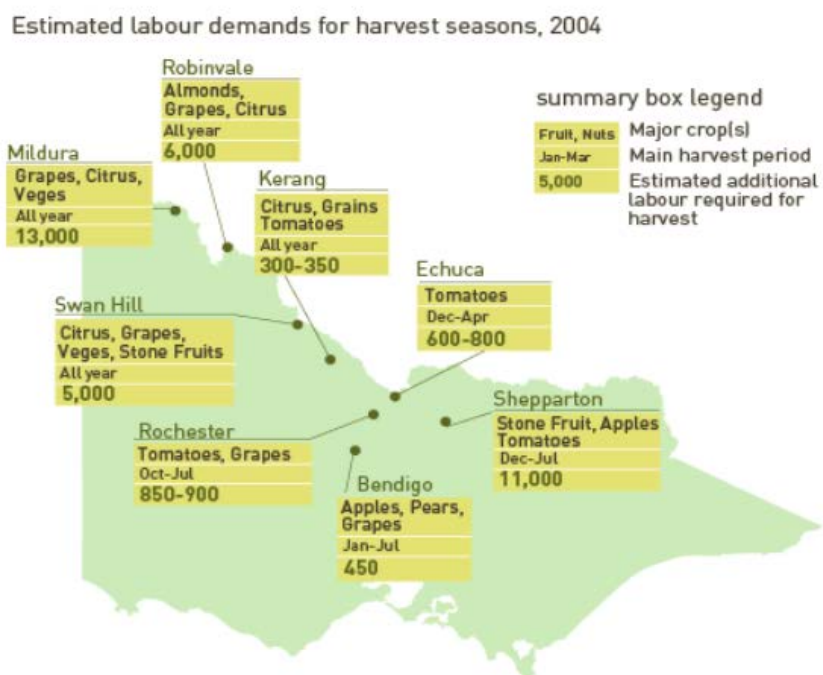
Source: (Tan and Lester, 2012, p 359).

Figure 11 Major locations visited by working holiday makers



Source: (Tan and Lester, 2012, p 374).

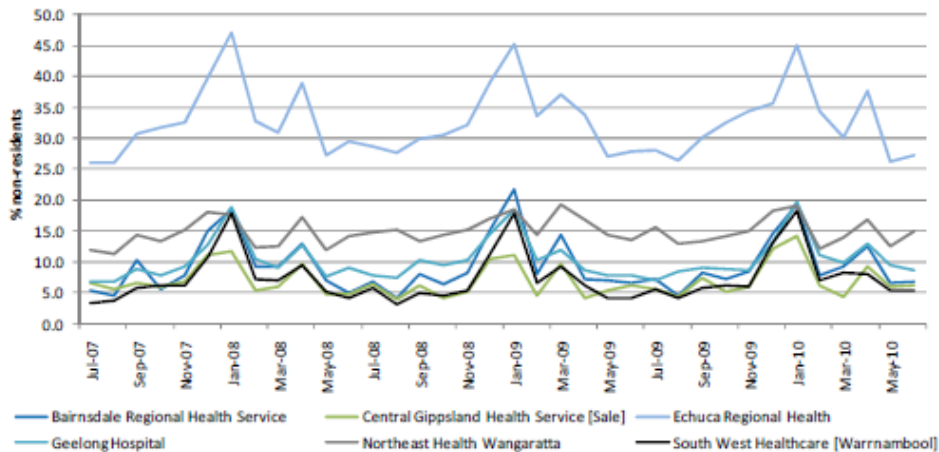
**Figure 12** Distribution of agricultural jobs in which working holiday makers worked



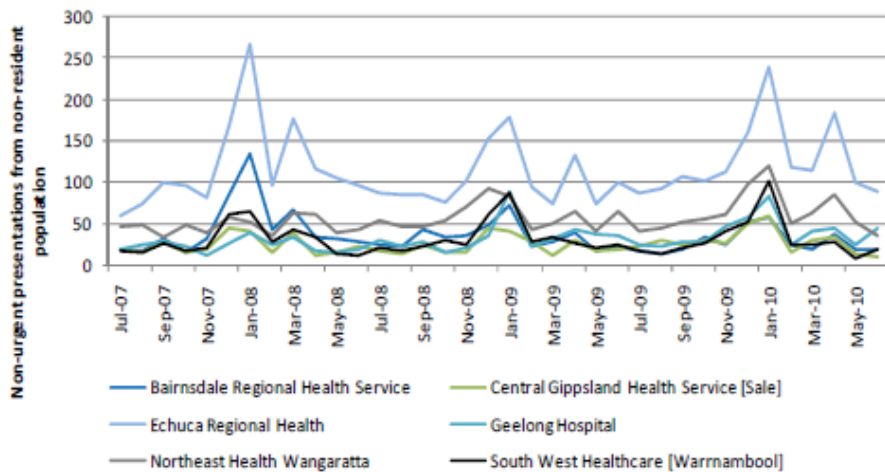
Source: Brebner 2004, Workabout Australia

Source: (Brebner 2004, cited in Victorian Government, 2008)

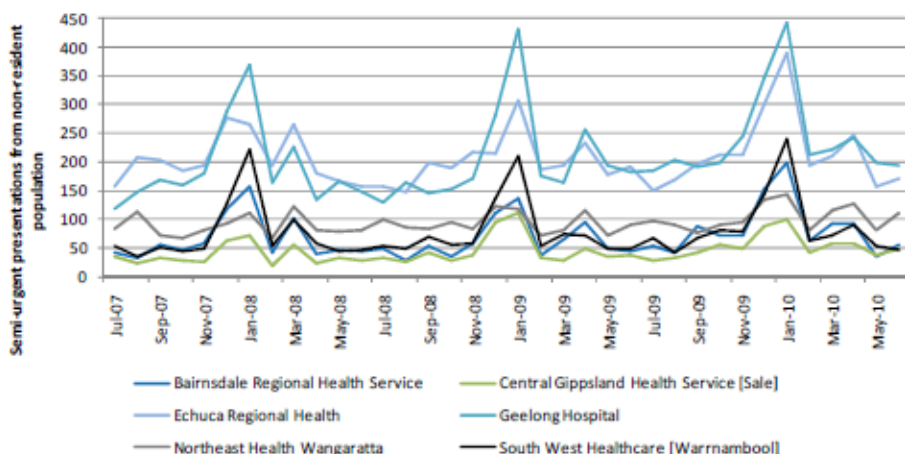
**Figure 13** Example of seasonal harvest demands in Murray-Goulburn Valley regions of Australia



**Figure 14 Presentations by non-residents to selected rural Victorian emergency departments by month (per cent)**



**Figure 15 Total non-urgent emergency department presentations to selected rural Victorian hospitals for non-resident population by month**



**Figure 16 Total semi-urgent emergency department presentations to selected rural Victorian hospitals for non-resident population by month**

Source for Figures 11–13: Department of Health (2011, pp 64-65).

**Table 11 Chasing the sun around Australia—Example of a 12 month harvest trail**



<b>February to April</b>		
South Australia	Limestone Coast; Riverland; Clare Valley; Adelaide Hills; Fleurieu Peninsula; Barossa Valley Adelaide Hills; Riverland; Limestone Coast	grapes; citrus  apples; pears
Tasmania	Burnie; Meander Valley; Devonport Tamar Valley; Huon Valley Huon Valley	vegetables; berries apples strawberries; berries
Victoria	Yarra Valley; Shepparton  Echuca; Shepparton Yarra Valley; Mildura; Robinvale; Swan Hill Mornington Peninsula	apples; stonefruit; pears tomatoes; vegetables grapes; citrus grapes; strawberries
New South Wales	Bathurst; Orange; Tumut Sydney Basin  Narromine; Wentworth; Leeton; Griffith Griffith; Mudgee; Hunter; Tooleybuc; Wentworth; Leeton Griffith; Swan Hill; Leeton	apples apples; stonefruit; vegetables citrus grapes  stonefruit
Southern Queensland	Boonah; Gatton; Laidley Caboolture Childers Chinchilla; St George Gayndah; Gin Gin Sunshine Coast St George	vegetables strawberry planting avocados; mangoes melons citrus ginger; pineapples grapes
Far Northern Queensland	Stanthorpe Atherton; Dimbulah; Mareeba Atherton; Innisfail; Mareeba; Tully Dimbulah; Mareeba Mareeba	apples; vegetables avocados bananas mangoes; paw paws citrus
<b>April to June</b>		
Northern New South Wales	Dubbo; Narromine; Narrabri; Moree; Mungindee; Wee Waa Ballina; Byron Bay; Coffs Harbour	cotton  avocados; macadamia nuts
Southern Queensland	Bundaberg; Gin Gin Bundaberg; Boonah; Gatton; Laidley Caboolture Childers Mundubbera; Gayndah Sunshine Coast Stanthorpe	avocados; citrus vegetables strawberries tomatoes citrus pineapples apples; vegetables
Northern Queensland	Ayr; Bowen	melons; vegetables
Far Northern Queensland	Atherton; Mareeba Atherton; Innisfail; Mareeba; Tully Atherton	avocados bananas custard apples

	Dimbulah; Mareeba Mareeba	paw paws citrus
<b>June to August</b>		
New South Wales	Sydney Basin  Ballina; Byron Bay; Coffs Harbour	nursery work; vegetables; turf production avocados; bananas; macadamia nuts
Southern Queensland	Bundaberg; Childers; Gin Gin Mundubbera; Gayndah; Gin Gin Bundaberg; Boonah; Gatton; Laidley Caboolture; Sunshine Coast Childers Stanthorpe	avocados citrus vegetables strawberries tomatoes apples; pears; vine pruning
Northern Queensland	Ayr; Bowen	vegetables
Far Northern Queensland	Atherton; Mareeba; Innisfail Dimbulah; Mareeba	bananas; custard apples paw paws; citrus
<b>September to November</b>		
New South Wales	Dubbo; Narromine; Narrabri; Moree; Mungindi; Warren	grain
Southern Queensland	Bundaberg; Childers; Gatton; Laidley Caboolture; Sunshine Coast  Childers Emerald Stanthorpe	vegetables strawberries; pineapples avocados melons stonefruit thinning; vegetables
Northern Queensland	Ayr; Bowen	melons; vegetables
Far Northern Queensland	Atherton; Mareeba; Innisfail; Tully; Dimbulah	bananas; paw paws
Northern Territory	Darwin; Katherine	mangoes
Northern Western Australia	Kununurra; Carnarvon	bananas; melons; vegetables
<b>December to January</b>		
Tasmania	Burnie; Meander Valley; Devonport Tamar Valley; Huon Valley	vegetables; berries cherries; berries
Southern Queensland	Bundaberg; Childers Bundaberg; Childers; Gatton; Laidley Childers; Gin Gin Chinchilla; St George St George Stanthorpe	mangoes vegetables avocados; citrus melons grapes stonefruit; vegetables
Northern Queensland	Ayr; Bowen	melons; vegetables
Far Northern	Atherton; Mareeba; Innisfail; Tully	bananas

Queensland	Dimbulah Dimbulah; Mareeba	mangoes; lychees paw paws; citrus; pineapples
Northern Western Australia	Carnarvon	bananas; melons; vegetables
Southern Western Australia	Albany; Mt Barker Perth Hills  Mt Barker Denmark; Manjimup	strawberries stonefruit; apples; pears cherries blueberries; vegetables
Northern New South Wales	Byron Bay; Coffs Harbour	blueberries; bananas

Source: (National Harvest Labour Information Service, 2013, p 6).

## Grey nomads

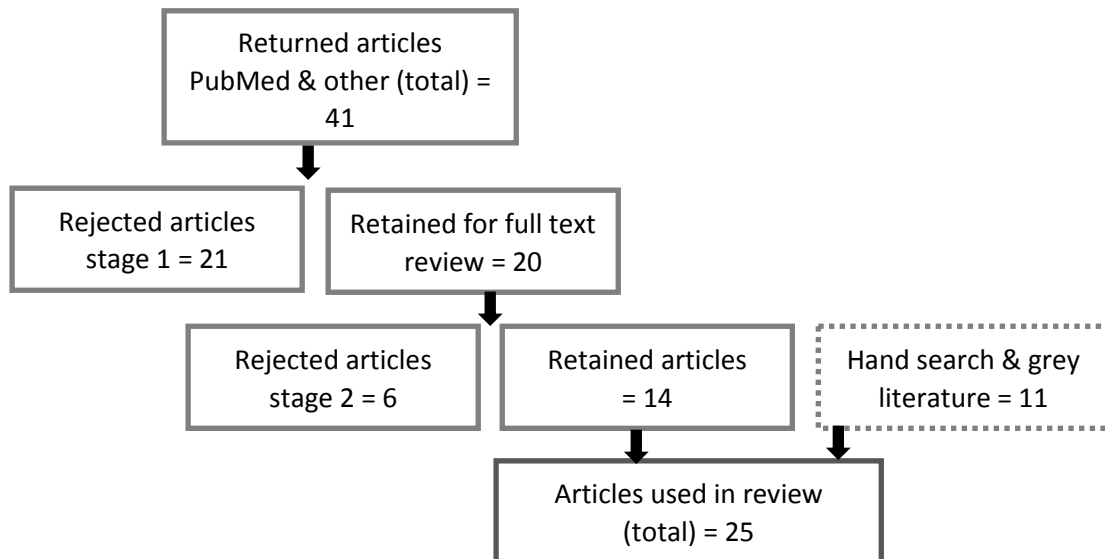


Figure 17 Literature search results for grey nomads

## Definitions of grey nomads

**Table 12** Definitions of grey nomads

'any retired person [staying at a camping location] over 50 years of age who were [sic] away from their place of usual residence for a period greater than one month' (Cridland, 2008, p 123)
'people aged over 50 years, who adopt an extended period of travel (at least 3 months) independently within their own country. They travel by caravan, motor-home, campervan, or converted bus for at least three months, but often up to several years, traveling for many thousands of kilometers through semi-arid country around Australia' (Onyx and Leonard, 2005, p 61)
'semi-retired, or retired people who travel for all, or part of the year, throughout Australia. They are generally seen as being aged 55 and over. These long-term travellers usually use a caravan or a motorhome as their base' (Obst et al., 2008, p 3)
'people aged over 55 years who travel for extended periods of time, have mixed budgets but are generally price conscious as the majority have low incomes' (Tourism Western Australia 2009, cited in Davies et al., 2009, p 40)
'a retired person who travels extensively within Australia, especially by campervan, caravan, or motor home (Oxford University Press, 2007)' (Holloway, 2009, p 17)
'older age group (55+yrs) [of caravan and camping tourists] on an extended trip, often including travel to other states in Australia' (Brighthouse and Starfish Business Solutions, 2012, p 60)
[a caravanning/camping retiree is] 'a traveller aged 50 or more who indicated their employment status as being retired or on a pension' (Carter, 2002, p 11)
'TQ [Tourism Queensland] defines a grey tourist as an individual aged 60 years or over, while Tourism Australia uses the definition of visitors aged 55 years or older' (Economic Development Committee, 2011, p 3)

The Australian Bureau of Statistics (ABS) defines grey nomads for Census data collection purposes as follows:

Grey nomads are a subset of visitor only household group reporting no usual address. They are defined as being in 'visitor only households' and reporting 'no usual address', where all people were aged 55 years or over, were not in the labour force and were staying in a caravan, cabin or houseboat on Census Night (Australian Bureau of Statistics, 2012a).

However, the inclusion of the 'no usual address' criterion in the definition appears to be unusual, with many descriptions in the published literature referring to people aged 55 or older, residing in a caravan or similar but with a usual address elsewhere in Australia. This latter definition equates to the ABS (2012a) definition of an 'older traveller': 'as for grey nomads but with the difference that the person reports having a usual address elsewhere for six months or more in the year of the Census'.

<sup>i</sup> Resource sector refers to those in the mining/oil/gas industry; non-resource sector therefore is taken to be anyone not employed within those industries. This report limited resource sector to mining only.