DemoGraphic

Visualising the impact of COVID-19 on Australian SA3 populations

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Introduction

The COVID-19 pandemic, and the related health measures implemented to control its spread resulted in significant changes in Australian international and internal migration. For example, net overseas migration was 192,700 in 2019-20, but decreased to -84,940 in 2020-21 (ABS 2022). It is difficult to understand how this population decrease was distributed at the smaller area level, particularly as there were also changes in historic internal migration trends, including an increase in migration to regional areas from capital cities (Stephens et al., 2022). The key aim of this data visualisation is to investigate how COVID-19 impacted populations at the SA3 level by comparing 2021 population estimates with possible populations if COVID-19 had not occurred.

Data and methods

Possible populations for a No-Covid Scenario were created for SA3 areas using Estimated Resident Populations (ERPs) from 2016 and 2019, which are found in 'Table 2. Estimated resident population, Statistical Areas Level 3 (ASGS 2021), Australia', of the 'Population estimates by SA2 and above (ASGS 2021), 2001 to 2021' Data cube (ABS 2021a). The No-Covid Scenario populations were created by applying the average growth rate from 2016 to 2019 to the 2019 data in order to project the SA3 populations to 2021.

To investigate the potential impact of COVID-19 on SA3 populations the absolute percentage differences between the 2021 SA3 populations of the No-Covid Scenario and the 2021 SA3 ERPs were calculated. These differences were then visualised on a mosaic cartogram of Australian SA3 areas. Mosaic cartograms are maps where each area is represented by a simple shape (Cano et al., 2015). The maps presented here represent each SA3 area as an equally sized element, regardless of its physical size or the number of persons resident. The mosaic cartograms are presented layered on top of a standard map of Australian states and territories; the State and Territories – 2021 GDA94 ASGS Edition 3 digital boundary files were used to produce this map (Australian Bureau of Statistics, 2021b).

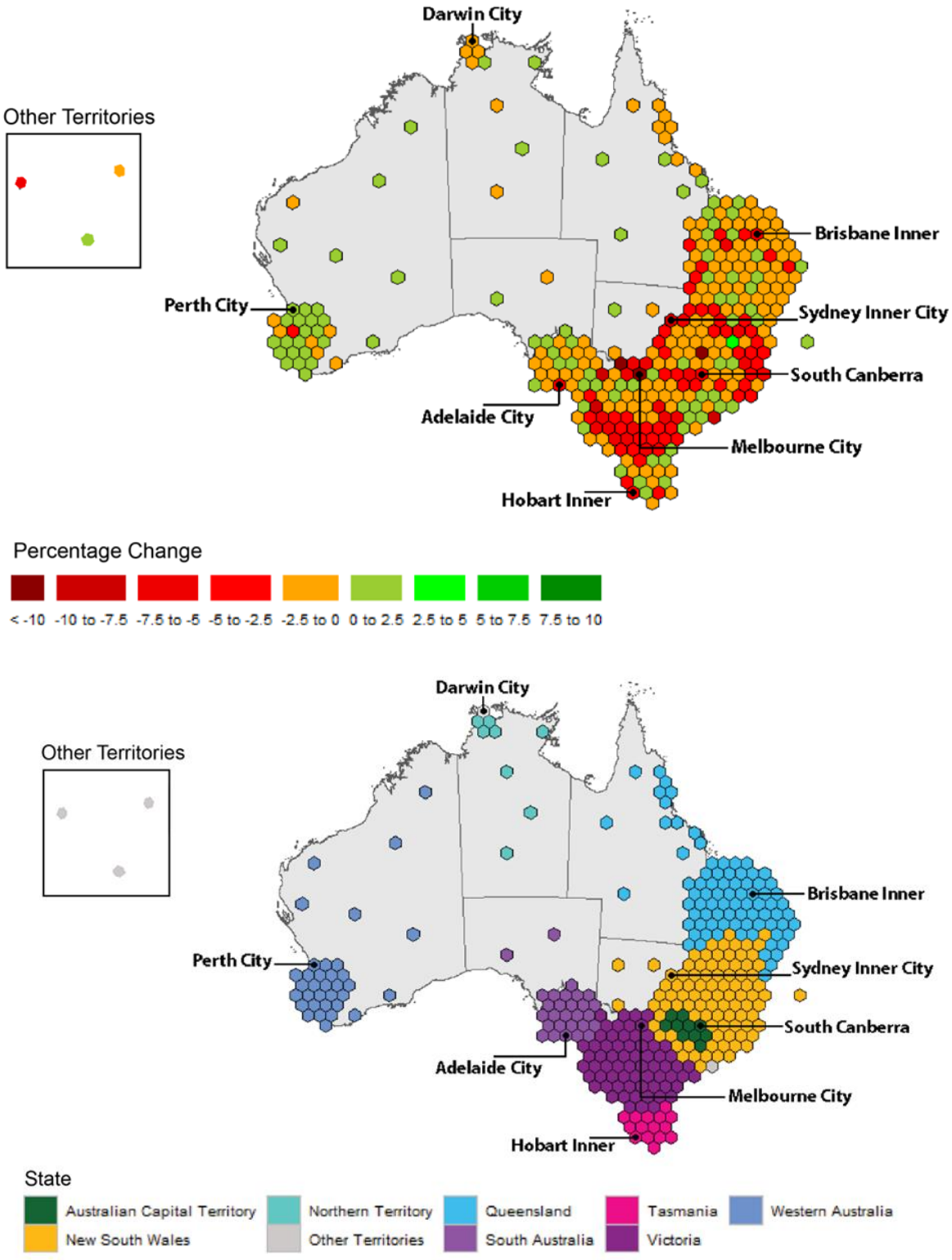

Figure 1: A mosaic cartogram visualising the impact of COVID-19 on 2021 Australian SA3 populations

Source: SA3 ERPs were sourced from ABS (2021a). Digital boundaries of SA3 areas and of states and territories were obtained from ABS (2021b). The maps were created using the ONS Hexmap Automation tool (Mitchell & Tzelepis, 2017).

Note: The percentage difference between the 2021 SA3 ERPs and the populations in the No-Covid Scenario is presented in the top map. For reference, the state or territory that each element belongs to is presented in the bottom map and selected SA3 areas in capital cities are labelled.

To create the mosaic cartograms the 2021 SA3 GDA94 ASGS Edition 3 digital boundary files were downloaded (ABS 2021b). The boundary files were transformed into a mosaic cartogram shapefile using the 'basic' variant of the ONS Hexmap Automation tool (Mitchell & Tzelepis, 2017). Minor edits were made to the shapefile such that SA3 areas from different states were clustered together. The 'ggplot' (Wickham, 2016) and 'sf' (Pebesma et al., 2018) R packages were used to create two maps. The minor edits were completed using Adobe Illustrator 2023 and Adobe Photoshop 2023. The first map (Figure 1, top map) visualises the absolute percentage change between the projected and estimated 2021 SA3 populations on a mosaic cartogram of Australian SA3 areas. The second map (Figure 1, bottom map) visualises which state or territory each element of the mosaic cartogram belongs to, and selected SA3 areas in capital cities are labelled.

Key features

The top map in Figure 1 visualises the 2021 changes in SA3 populations had COVID-19 not occurred and previous population trends continued. For reference, the bottom map of Figure 1 shows which states and territories each of the elements in the mosaic cartogram belongs to. The top map reveals that COVID-19 may have resulted in decreased populations in most SA3 areas. Nationally there was a 1.9% reduction when compared to 2021 ERPs and the populations in the No-Covid Scenario; this corresponded to a potential national decrease of 478,314 persons. However, the impact varied between states and territories. According to the No-Covid scenario, Western Australia's population was 10,074 persons, or 0.4%, greater than what could have been expected had pre-COVID-19 population trends continued. This was the only state or territory with an increased population in the No-Covid Scenario relative to the 2021 ERPs. All other states saw reduced populations, particularly Victoria and the Australian Capital Territory which both had decreases of 3.7%, corresponding to 243,144 and 16,622 persons less, respectively. 81.7% of SA3s in greater capital city regions had decreased populations, amounting to a reduction of 453,904 persons in the capital cities of Australia. Whilst regional populations were not as affected by COVID-19, they generally also saw population declines with 60.4% of SA3s outside of the capital city regions showing population decreases, resulting in a total of 24,410 fewer persons than what may have been expected in non-capital city regions in the absence of COVID-19.

It is important to note that whilst short term projections, such as the one used here to create the No-Covid Scenario, tend to be reasonably accurate, there are many factors that may impact SA3 populations other than COVID-19, such as housing developments and local job opportunities. It is important to emphasise that the No-Covid Scenario presented here is just one of many potential scenarios. Furthermore, it is important to consider that the process of creating our mosaic cartograms moved the relative positions of the SA3 areas. Therefore, the SA3 areas which are in the same SA4, or the same Greater Capital City Statistical Area, did not always cluster together. This should be considered when interpreting the maps.

Acknowledgements

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