Does the Australian Bureau of Statistics Method of Travel to Work data accurately estimate commuter cycling in Australia?

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Abstract

The Australian Census of Population and Housing includes a responder's Method of Travel to Work for Persons (MTWP) on Census Day. With some exceptions, responders can select multiple modes of transport. In Australia and overseas, this data is used to estimate mode share and the proportion of Australians who utilize various active transport modes. This is especially true for cycling as there are scant data sources for Australian cycling exposure. In this study, we will discuss the often not advertised limitations of this data and provide examples of when it has been misused. When some of these issues are addressed, the MTWP data indicates an inconsistent trend in bicycle travel both by overall count and mode share.

Background

The Australian Bureau of Statistics (ABS) has collected data on the Method of Travel to Work for Persons (MTWP) since 1976 for a single day with observations occurring five years apart (ABS, 2017; Mees & Groenhart, 2012). The Census Day has varied from the end of June prior to the 1991 census and then to early August for all subsequent censuses (see Table 1).

Table 1. Australian Census Day (1976-2011)

Census Year	Census Day	Day of Week
1976	29 June	Tuesday
1981	29 June	Monday
1986	30 June	Monday
1991	6 August	Tuesday
1996	6 August	Tuesday
2001	7 August	Tuesday
2006	8 August	Tuesday
2011	9 August	Tuesday
2016	9 August	Tuesday

For the 2011 census, the question read "How did the person get to work on Tuesday, 9 August 2011." Responders can mark either train, bus, ferry, tram (including light rail), taxi, car – as driver, car – as passenger, truck, motorbike or motor scooter, bicycle, walked only, worked at home, other, or did not go to work. Multiple responses are allowed and recorded in the order written on the form. The responses "did not go to work", "worked at home", and "walked only" are not meant to be part of a multiple response. When this occurs, a single response is recorded with preference in the order they appear on the form. For example, someone responding with "did not go to work" and "walked only" is recorded as "did not go to work".

The MTWP data has been used to describe temporal patterns in Australian capital city commuter travel since 1976 (Mees, Sorupia & Stone, 2007; Mees & Groenhart, 2012). In these reports, cycling to work is considered negligible with the notable exception of Canberra.

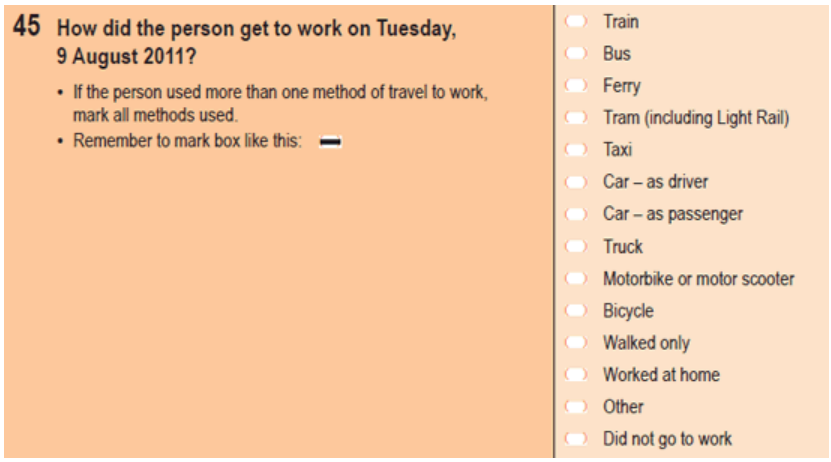
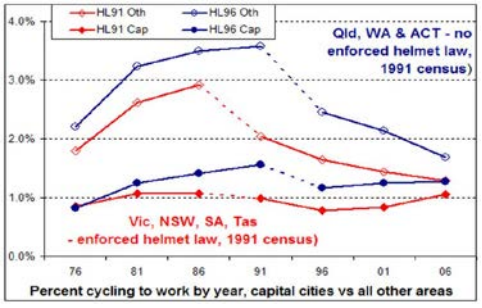
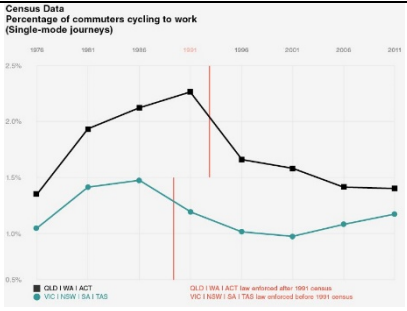


Figure 1. Question 45 from 2011 Census Household Form

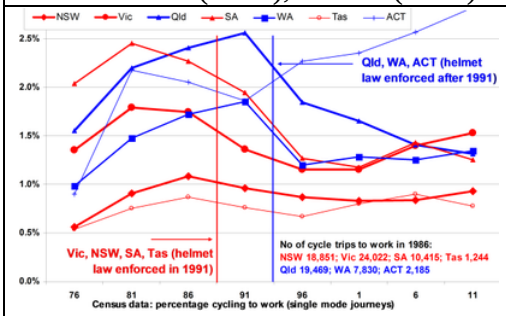
On several occasions, the MTWP bicycle data has been used to advocate for the repeal of bicycle helmet legislation (BHL). Figure 2 includes examples from Wikipedia (2019), online news outlets (Alter, 2014; Rachele, Badland & Rissel, 2017), anti-helmet advocacy websites (Freestyle Cyclists, 2014; Gillham, 2019), and submissions to government inquiries (Clarke, 2015). In each instance, the message conveyed is that bicycle helmet legislation has deterred cycling in Australia.



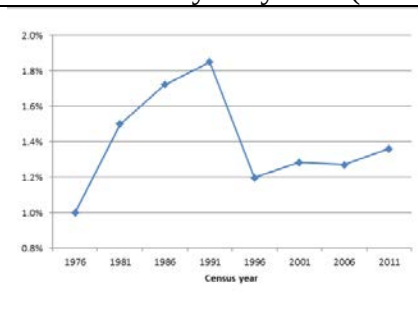
Source: Alter (2014), Clarke (2015)



Source: Freestyle Cyclists (2014)



Source: Wikipedia (2019)



Source: Rachele et al (2017)

Figure 2. Examples of using MTWP data to advocate for repeal of Australian bicycle helmet legislation

The aim of this study is to highlight the often unreported weaknesses in the MTWP data and to assess the validity the MTWP bicycle data supports the claims bicycle helmet legislation deters cycling.

Weaknesses of MTWP data

Although often presented as yearly aggregated data, the MTWP data is collected for single days with repeated observations 5 years later. That is, from 1976-2016, nine days of data were collected and not 40 years' worth. The Census Day has always occurred in Australian winter when the weather is not always conducive to cycling, especially in southern, populous regions. The change in Census Day

from late June to early August makes comparisons between the 1976-1986 and 1991-2016 censuses tenuous. The data collection (single days in winter) make it impossible to account for day of the week, monthly or seasonal variation. Further, the MTWP captures travel to work for adult Australians and, therefore, cannot be an accurate representation of all types of cycling.

Since MTWP allows for multiple response, it is not possible to identify a responder's "main mode" of travel (Olivier, Esmaeilikia & Grzebieta, 2018). For example, a person who rides their bicycle to a train station, travels on the train with their bicycle, and then cycles the remaining distance to work would always be recorded as "train, bicycle". This would be the same response for any trip where train and bicycle travel were combined irrespective of trip distance or time spent in either travel mode (e.g. ride from home to the train station and leave bicycle locked at the station). Some authors focus on those travelling by bicycle only (e.g., Gillham, 2019); however, this approach miscategorises those who combine cycling with other transport modes as non-cyclists.

The 1976 Census did not include a full enumeration or count (ABS, 2005a). Due to budgetary constraints, a full count was performed only on age, sex, marital status and birthplace (ABS, 2005b). For all other questions including MTWP, a 50% sample was processed, and a post-census assessment found undercounting was higher for the 1976 than previous ones. That is, it is unlikely the 1976 MTWP data is an accurate representation of those travelling to work on Census Day.

Travel modes using MTWP data is often represented as a proportion of those travelling to work on Census Day, often called modal share. Note the MTWP cannot be used as a measure of modal share in the strictest sense as not all trips are enumerated. Representing this data as a proportion can also hide temporal patterns. For example, the numbers of cyclists could increase from one Census Day to the next, but the mode share could decrease if increases were larger in other travel modes. In that case, a decline in mode share does not necessarily imply less cycling but could be interpreted as cycling mode share did not keep pace with other travel modes.

MTWP Data

MTWP data has been provided by the Australian Bureau of Statistics for years 1976-2001 while data for 2006 and 2011 was extracted from the ABS website. The 1976 data was excluded since only a 50% sample was counted.

As discussed, it is not possible to identify a responder's "main mode" of travel, while focusing on single mode travel miscategorises those involved in multimode travel. Since the purpose of this study is to assess changes in MTWP data relative to bicycle helmet legislation, transport modes were defined as using a bicycle for any leg of travel (Bicycle), walking only (Walking), the use of a bus, ferry, train or tram for any leg of travel except when a bicycle was used (Public Transport), and the use of a car or truck when neither a bicycle or public transport were used for any leg of travel (Vehicle). The total travellers exclude those who did not go to work, worked at home, or whose mode of travel was unknown.

Results

The MOTW data has been organised by state or territory since helmet laws were enacted at those levels (Esmaeilikia, Grzebieta & Olivier, 2018). The observed counts and mode share (% of total) are given in Figures 3 and 4.

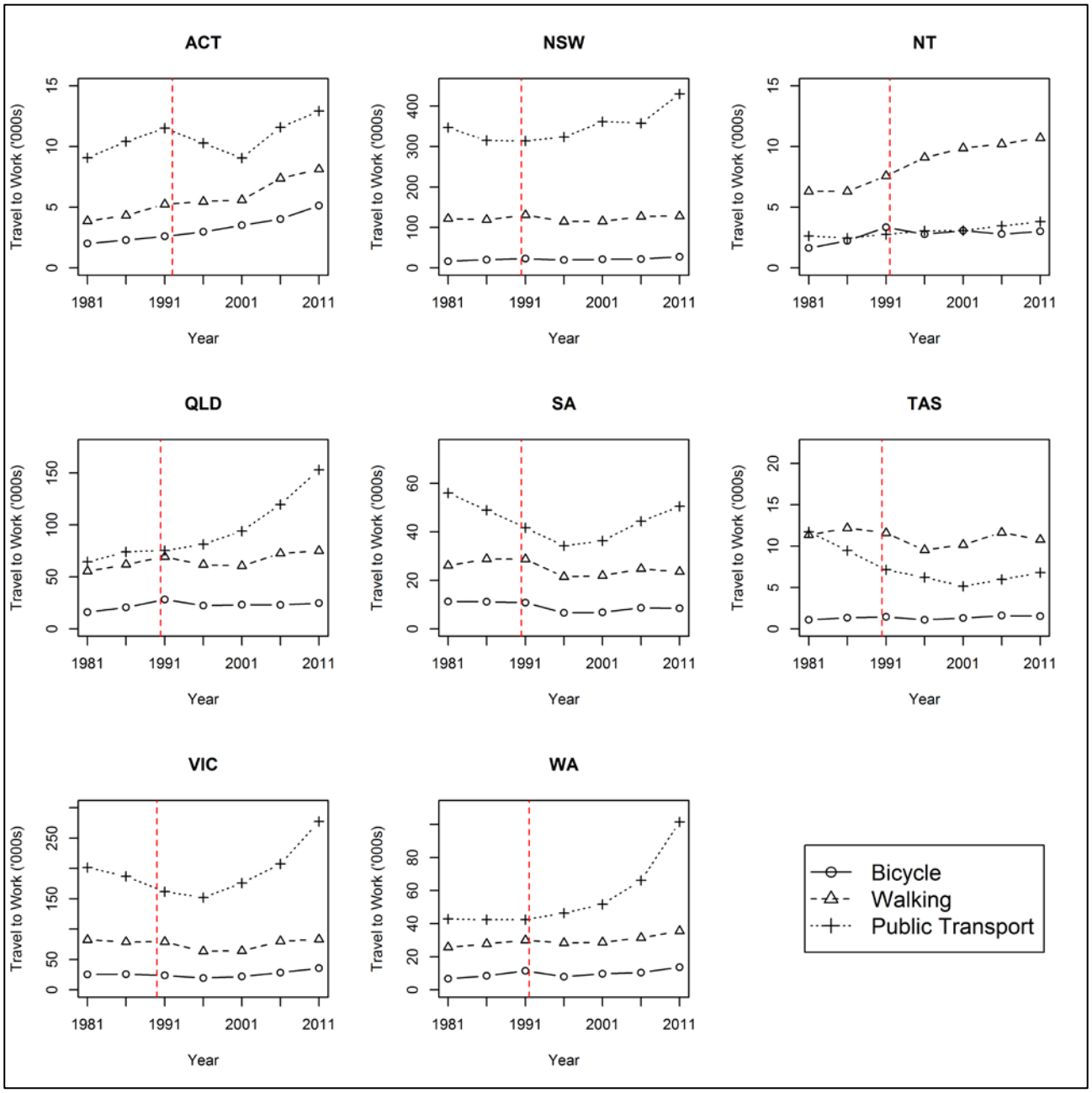


Figure 3. Number of responses to method of travel to work by active transport modes for Australian states and territories on Census Day (1981-2011)

There were increases in the numbers of responders cycling to work for the ACT, NSW, Queensland and Tasmania following BHL, while the counts were similar for South Australia and Victoria. There were observed reductions for the Northern Territory and Western Australia where each of these jurisdictions introduced BHL after the 1991 census date. This could be due to a general reduction in cycling across Australia as reductions were observed from the 1991 to 1996 censuses for all other jurisdictions except the ACT. Additionally, there were large increases in the use of public transportation since the 1996 census for many jurisdictions which could indicate a shifting among active transport modes.

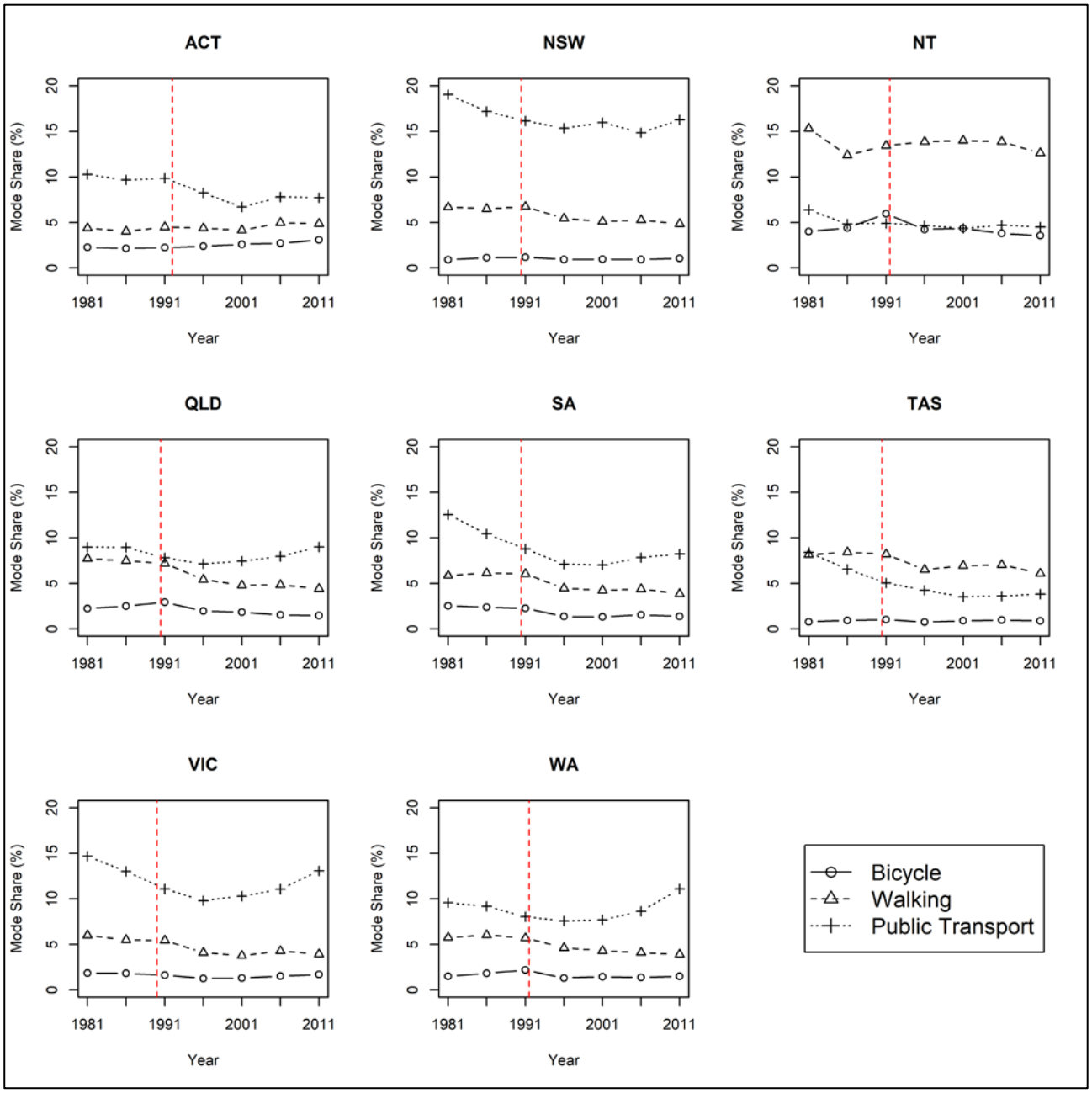


Figure 4. Mode share by active transport modes for Australian states and territories on Census Day (1981-2011)

The mode share for cycling to work shows a similar pattern following helmet legislation across Australia. Overall, the numbers who reported using a bicycle for travel to work prior to any helmet legislation was 92,517 in 1986 which increased to 104,470 in 1991 when most of Australia had helmet legislation. Cycling mode share increased slightly between these years as well from 1.74% to 1.84%.

Conclusions

The Australian Method of Travel to Work for Persons data is often used as an estimate of cycling mode share. The use of this data is problematic for several reasons including: (1) single day observations in winter five years apart, (2) month of data collection changed when bicycle helmet laws were introduced, (3) not possible to identify a primary travel mode, (4) the 1976 data was not a census, and (5) representing the data as a proportion can hide temporal patterns.

When some of these issues are addressed (elimination of 1976 data and all bicycle travel counted), the MTWP data indicates a mixture of increasing and decreasing bicycle travel on Census Days following the introduction of bicycle helmet laws. That is, there is no consistent pattern that is supportive of the claim bicycle helmet laws deter cycling in Australia.

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