Spatial variation in bicycling: a retrospective review of travel survey data from Greater Melbourne, Australia

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ABSTRACT

Understanding spatial variation in bicycling within cities is necessary to identify and address inequities. We aimed to explore spatial variation in bicycling and explore how bicycling rates vary across population sub-groups. We conducted a retrospective analysis of household travel survey data in Greater Melbourne, Australia. We present a descriptive analysis of bicycling behaviour across local government areas (LGAs; n=31), with a focus on quantifying spatial variation in the number and proportion of trips made by bike, and by age, sex and trip distance. Associations between the proportion of infrastructure that had provision for biking and the proportion of all trips made by bike were analysed using linear regression. Overall, 1.7% of all trips were made by bike. While more than half (53.2%) of all trips were less than 5km, only 2% of these trips were by bike. Across LGAs, there was considerable variation in the proportion of trips made by bike (range: 0.1% to 5.7%). Mode share by females was 35.0%, and this varied across LGAs from 0% to 49%. Tor each percentage increase in the proportion of infrastructure that had provision for biking, there was an associated 0.2% increase in the proportion of trips made by bike (coefficient = 0.20; SE = 0.05; adjusted R^2 = 0.38). While we observed a low bicycle mode share, more than half of all trips were less than 5 km, demonstrating substantial opportunity to increase the number of trips taken by bike.

INTRODUCTION

Reflecting the myriad of health, environmental, social and economic benefits of bike riding, [1-3] cities across the world are promoting bicycling as an active and sustainable mode of transport.[4-7] With increasing investment in bicycling infrastructure,[6, 8] there is a need to ensure that robust measurements of bicycling are captured to enable evidence-driven decisions on where to implement infrastructure for the greatest gains in participation and safety. Understanding where bicycling does and does not occur, and in which population groups, is also necessary to address inequities in access to safe and connected bicycling infrastructure for all ages and abilities.

Prior studies of bicycling behaviour have compared rates across cities, jurisdictions and countries,[9-13] and between population groups.[14-16] These studies have been important for benchmarking across regions and identifying inequities in participation and access to safe infrastructure. However, there are few studies that have explored spatial variation in bicycling behaviour within cities. Such information is critical in understanding small area-level variations in bicycling behaviour that are masked when relying on data across larger areas such as cities or countries. Collecting such data would enable more targeted implementation of bicycling infrastructure to address differences in bicycling and broader social and demographic inequities that exist within cities.

Using population-weighted travel survey data, this study aimed to explore spatial variation in bicycling across Greater Melbourne, Australia, and explore how bicycling rates vary across population sub-groups.

METHODS

Study design

We conducted a retrospective analysis of household travel survey data in the Greater Melbourne region (Australia), using data from 2012 to 2018. Drawing from values-based messaging for health promotion, we used the terms “bike riding”, “bicycling” and “biking” in this study rather than “cycling” (and their equivalents) to ensure inclusivity and avoid association with competitive cycling.[17]

Setting

The State of Victoria, Australia, has a population of 6.7 million people of which 67% reside in the Greater Melbourne area.[18] The State is further divided into 79 smaller, geographically defined Local Government Areas (LGA’s). Local governments play a key role in the planning of bicycling infrastructure as 85% of the road network in Victoria is maintained by local governments.[19] As a result, we selected LGAs as the geographical area for analysis. Analyses were restricted to 31 LGAs within Greater Melbourne (Figure 1) comprising a population of 4.89 million people in 2018.

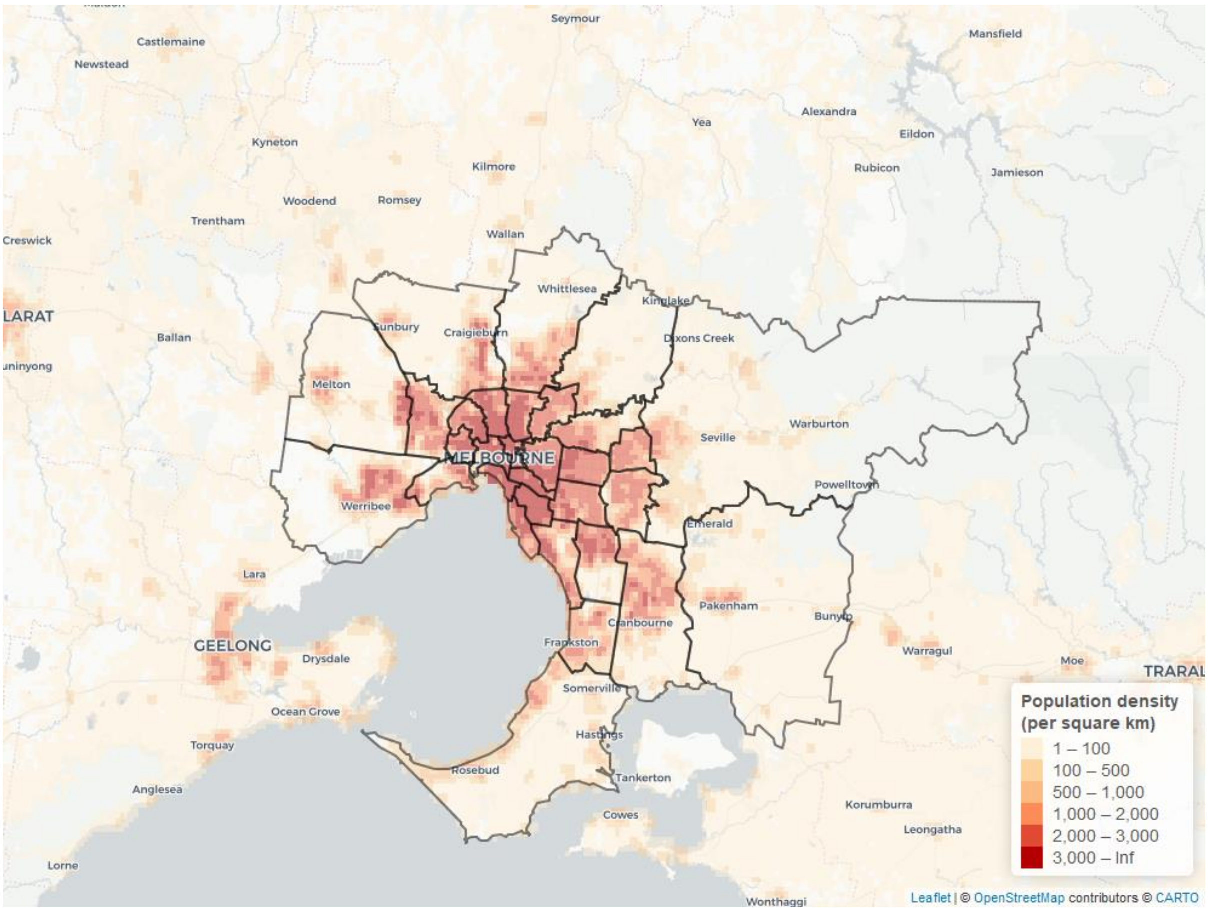


Figure 1: Map of included local government areas within Greater Melbourne and population density.

Travel survey data

We used data from three waves (2012-14, 2014-16, 2016-18) of the Victorian Integrated Survey of Travel & Activity (VISTA). VISTA is a survey of day-to-day travel coordinated by the Victorian Department of Transport and conducted in the Greater Melbourne area and in a single regional centre in Victoria. Since 2012, 16,000 households and 66,000 people have contributed to the VISTA survey. VISTA randomly selects households to complete the VISTA travel diary for a single specified day. This included all persons within the household (excluding those aged 0-4 years). The travel survey requires individuals to detail all travel they undertook on a specific day. VISTA employs a stratified, clustered sampling methodology, with stratification based on LGAs. Clusters were based upon the smallest unit within the Australian Statistical Geographical Standard; the Mesh Block. The survey and resulting data are then weighted to generate population-representative data at the LGA level. In this study, we employed a set of combined weights that use the full data set from 2012-2018 to produce statistics weighted to the 2017-18 population. In the setting of low bicycle mode share, and given the focus of this study was to explore small-area level spatial variation and variation population sub-groups, collapsing the data across the full study period was necessary to ensure robust estimates. Therefore, we were unable to explore temporal trends. Weights were applied to the LGA in which the trip originated, and therefore, data reflect where trips commenced and not trip routes or destinations. Unless otherwise specified, data reflect trips made within Greater Melbourne on an average day across the study period.

Eligibility for inclusion in this study were participants aged 18 years and older, and trips that had trip origins and destinations within the Greater Melbourne region.

Biking infrastructure data

In the absence of government data sets of biking infrastructure in Victoria, we used Open Street Map (OSM) data to characterise biking infrastructure in the study region. We captured infrastructure at a single time-point, which was the final year of the study period (2018). 2018 OSM data was downloaded for the Greater Melbourne region from Geofrabrik.[20] Biking infrastructure was coded by OSM contributors according to the OSM Wiki[21] and stratified into: on-road bike lanes, protected on-road bike lanes, and off-road paths (off-road dedicated bike path, off-road shared path (shared with pedestrians), and footways where bicycling is legal). This was achieved using the ‘highway’, ‘cycleway’, ‘bicycle’, ‘segregated’ and ‘foot’ tags in OSM. Motorways, motorway links and raceways were excluded from analyses. Riding a bike on a footpath is illegal in Victoria with the exception of adults accompanying children under 13 years of age and, therefore, we excluded footpaths from analyses (with the exception of footways where bicycling is legal). In this study, we use the term ‘infrastructure’ to be all streets and all paths where biking is permitted.

Analyses

For trips with multiple stages and multiple modes, we assigned ‘main modes’ (the primary mode of transport for the trip), consistent with how VISTA data are reported by the Victorian Department of Transport. Trip distance was defined as the total distance of all stages of a trip. Biking distance was defined as the sum of all stages within a trip that were made by bicycle. Trip purpose was classified as ‘work’, ‘recreation’, ‘education’, ‘socialisation’, ‘shopping’, ‘personal business’, or ‘other’. Participant age was classified as 18-34 years, 35-54 years, 55-74 years and 75 years and older.

We report multiple metrics of biking: counts of the number of trips, the proportion of all trips that were made by bike, and the average trip distance by bike. Data are reported overall, by age, by sex, by month of year, and by trip distance. Data are reported as the point estimate with a standard error (SE) and reflect an average day across the study period. Spatial variation across LGAs is depicted using choropleth maps.

For OSM data, we calculated the proportion of all streets and paths that had provision for biking (whether as a protected bike lane, painted on-road bike lane, or off-road shared path). Using univariate linear regression, we report the association between the proportion of infrastructure that had provision for biking and the proportion of all trips that were made by bike across LGAs.

All analyses were conducted using the statistical software package R v4.0.3 (R Core Team, 2021) and the integrated development environment RStudio (RStudio 2020, Boston, MA, USA), using the 'srvyr' and 'leaflet' libraries.

Ethical approval

Ethical approval for this study was provided by the Monash University Human Research Ethics Committee (Project ID: 29210).

RESULTS

Overall

On an average day in Greater Melbourne, there were 10,527,767 trips (SE = 19,680) of which 177,821 trips (SE = 4,443) were made by bike, reflecting 1.7% (SE = 0.04%) of all trips. The average travel distance by bike per day was 929,612 km (SE = 31,679 km). Bike trips were made for work-related (33.8%), recreational (25.6%), education (4.0%), social (14.6%), shopping (11.4%), personal business (3.1%) and other (7.6%) purposes (Table 1).

Table 1: Summary of the number and proportion of trips made by bike (SE = standard error).

Characteristics	Number of trips by bike	Proportion of trips by bike
Age group		
18-34 years	71,302 (SE = 3,181)	40.1% (SE = 1.3%)
35-54 years	75,437 (SE = 2,680)	42.4% (SE = 1.2%)
55-74 years	29,128 (SE = 1,616)	16.4% (SE = 0.9%)
75 years and older	1,953 (SE = 354)	2.0% (SE = 0.2%)
Sex		
Female	62,210 (SE = 2,677)	35.0% (SE = 1.2%)
Male	115,611 (SE = 3,580)	65.0% (SE = 1.2%)
Trip purpose		
Work-related	60,075 (SE = 2,603)	33.8% (SE = 1.2%)
Recreation	45,484 (SE = 2,259)	25.6% (SE = 1.1%)
Education	7,157 (SE = 925)	4.0% (SE = 0.5%)
Social	25,887 (SE = 1,788)	14.6% (SE = 0.9%)
Shopping	20,264 (SE = 1,460)	11.4% (SE = 0.8%)
Personal business	5,435 (SE = 852)	3.1% (SE = 0.5%)
Other	13,520 (SE = 1,156)	7.6% (SE = 0.6%)

Overall, 35.0% (SE = 1.2%) of bike trips were made by females and 26.7% (SE = 1.4%) of kilometres travelled by bike were ridden by females. Across all age groups, the proportion of trips made by bike was higher in males than females (Figure 2). The number and proportion of trips made by bike for females and males, stratified by month of year, is shown in Supplementary Material.

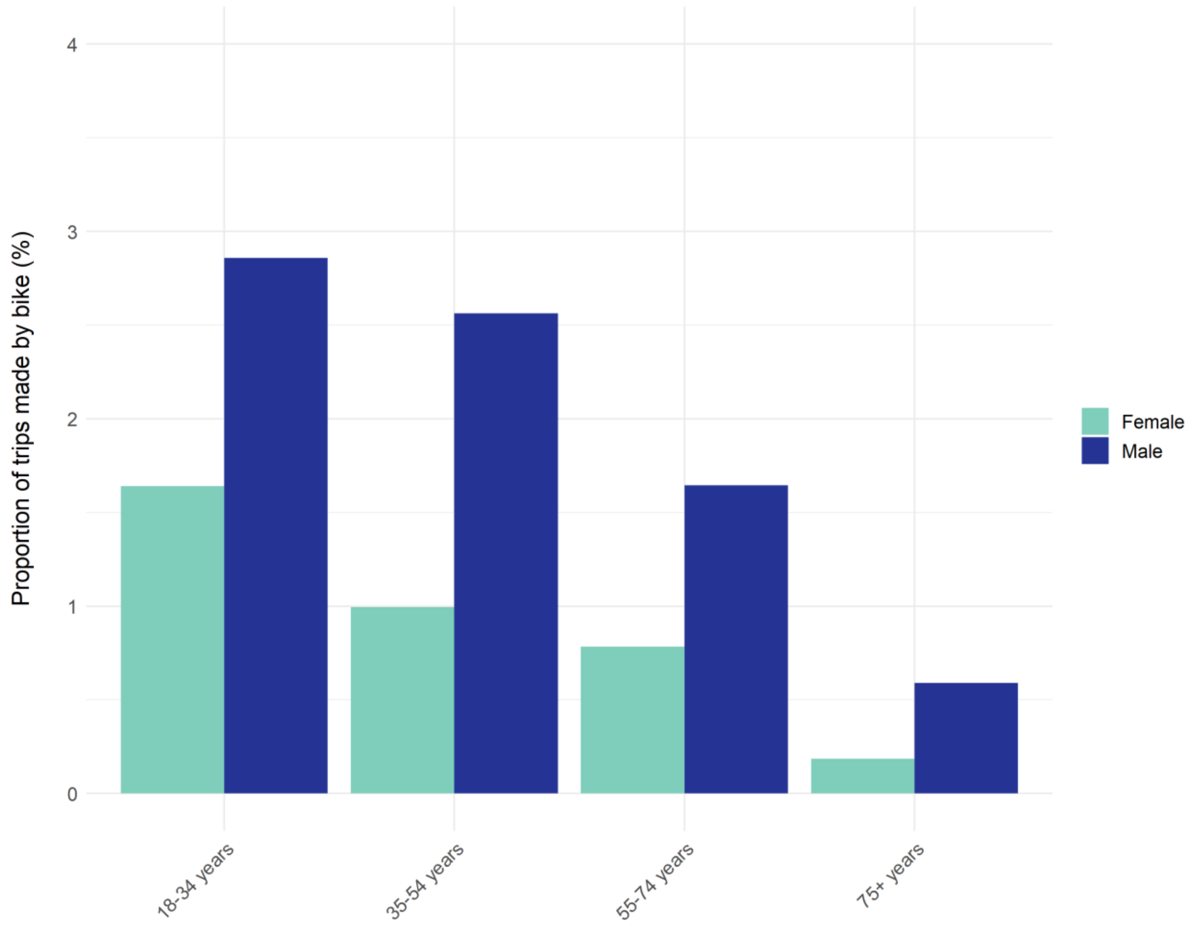


Figure 2: Proportion of trips made by bike, stratified by age group and sex. Note: proportion of trips reflects the total number of trips within each age group and sex category (ie. the numerator is the number of trips made by bike within an age group and sex category, and the denominator is the total number of trips made by that same age group and sex category).

Across all modes, 53.2% (SE = 0.2%) of trips were less than 5 km, and 70.8% (SE = 0.1%) of trips were less than 9 km. Across distance bands, the proportion of trips made by bike was highest between 2and 9 km for both females and males (Figure 3): still, 2% (SE = 0.06%) of trips between 0 and 5 km were by bike, and 2.1% (SE = 0.06%) of trips between 0 and 9 km were by bike.

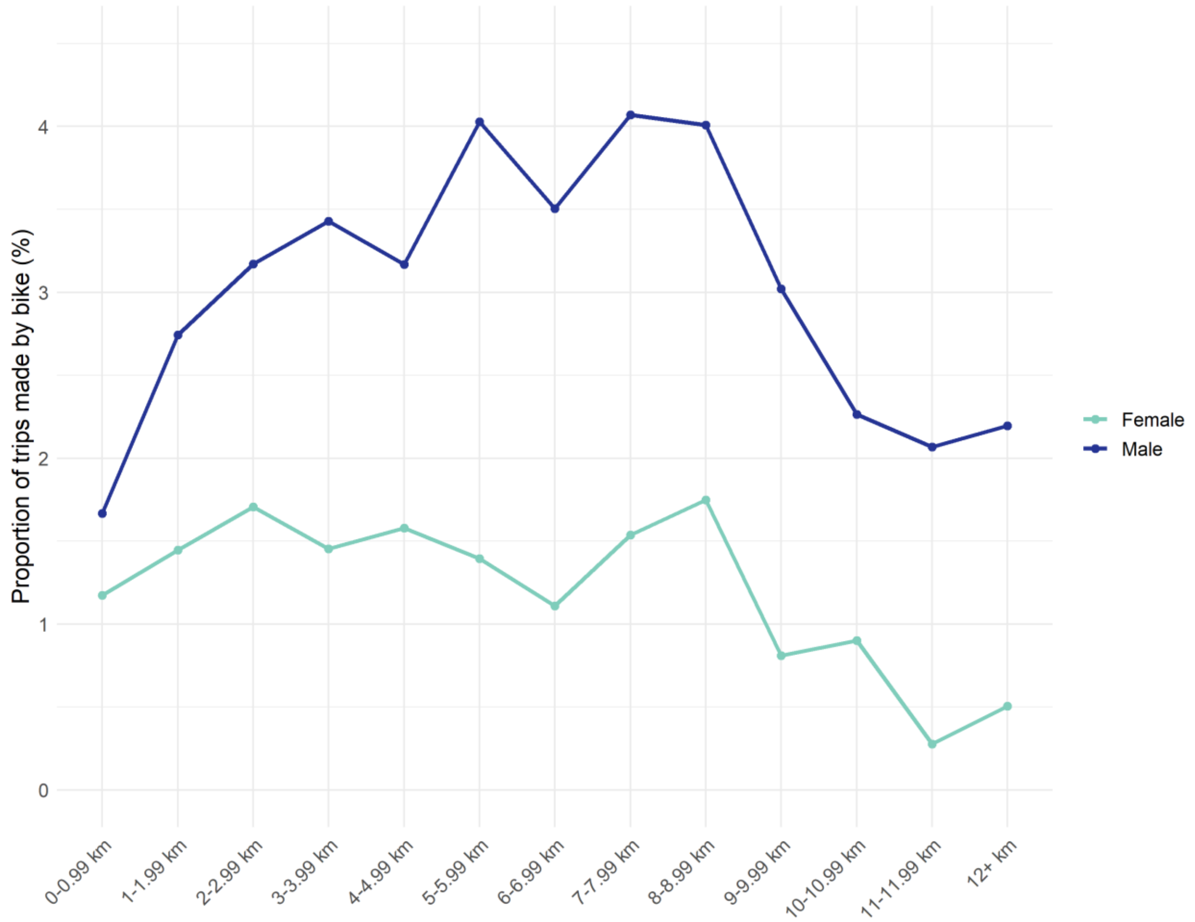
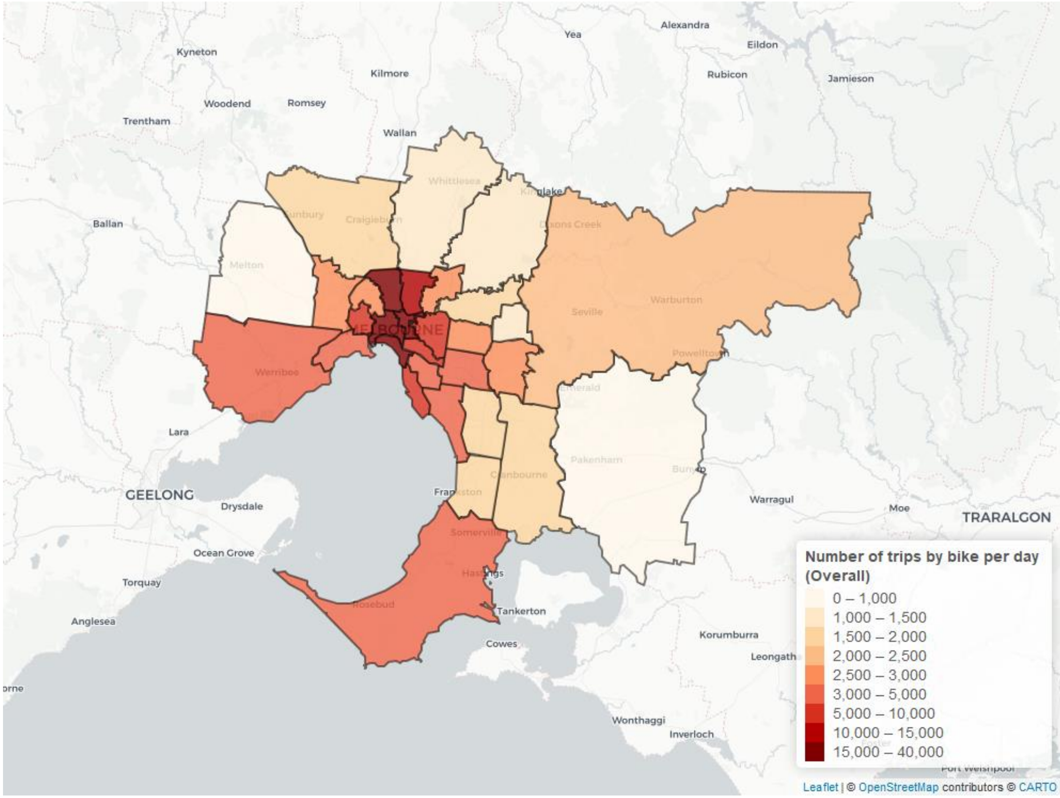


Figure 3: Proportion of trips made by bike by trip distance, stratified by sex.

Spatial variation

Across LGAs in Greater Melbourne, there was considerable variation in the number and proportion of trips by bike (Figure 4 and Table 2). The number and proportion of trips by bike were substantially higher in LGAs in the inner part of Greater Melbourne compared to LGAs in the outer areas. The LGA with the greatest number of trips by bike was the City of Melbourne (n=34,244 per day; located in the inner-city region), while the LGA with the lowest number of trips by bike was Melton (n=307 per day; located in the outer north-west region). The LGA with the highest proportion of trips made by bike was Moreland (5.7%; located in the inner north region), while the LGA with the lowest proportion of trips made by bike was also Melton (0.1%).

A



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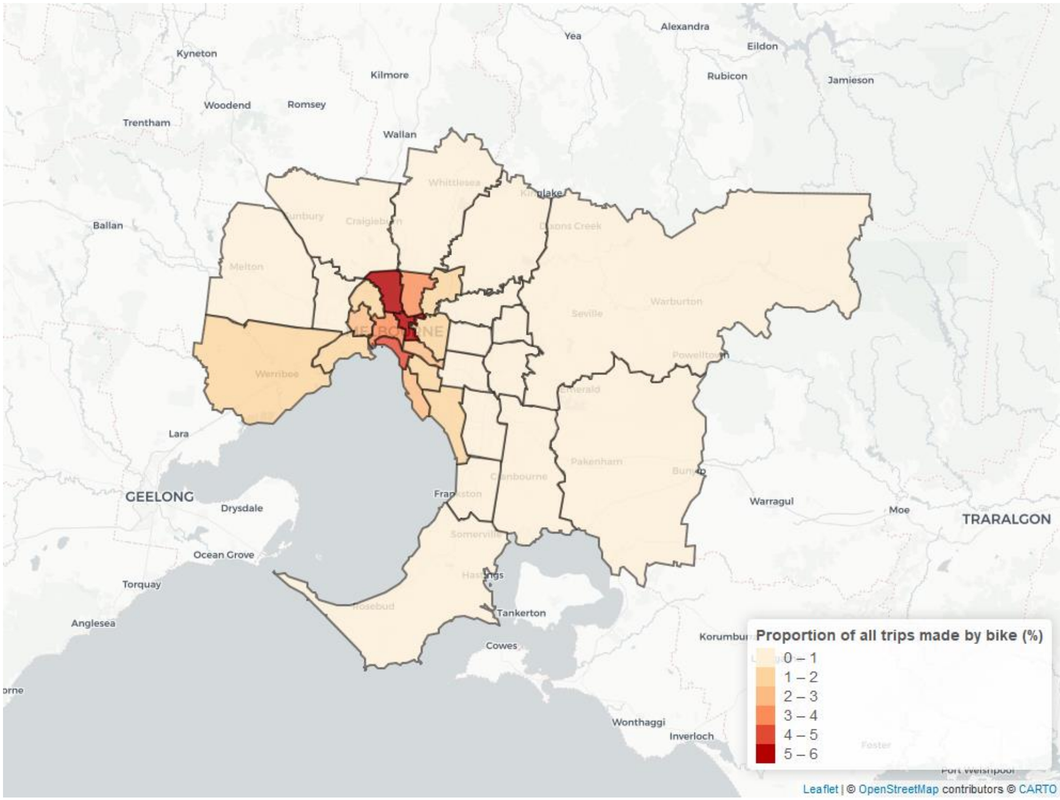

Figure 4: Number (A) and proportion (B) of trips by bike per day across LGAs.

Table 2: Summary data for each local government area (SE = standard error).

Local Government Area	Distance by bike per day (km)	Number of bike trips per day	Proportion of trips made by bike	Proportion of bike trips made by females
Banyule (C)	19008 (SE = 4227)	2812 (SE = 521)	1.1% (SE = 0.2%)	13% (SE = 5%)
Bayside (C)	40657 (SE = 6555)	6078 (SE = 825)	2.5% (SE = 0.3%)	37% (SE = 7%)
Boroondara (C)	30632 (SE = 5237)	5074 (SE = 633)	1.1% (SE = 0.1%)	38% (SE = 6%)
Brimbank (C)	13670 (SE = 5093)	2509 (SE = 506)	0.7% (SE = 0.2%)	40% (SE = 10%)
Cardinia (S)	5062 (SE = 2317)	839 (SE = 283)	0.5% (SE = 0.2%)	20% (SE = 11%)
Casey (C)	8769 (SE = 2613)	1969 (SE = 430)	0.4% (SE = 0.1%)	48% (SE = 11%)
Darebin (C)	48461 (SE = 6327)	11109 (SE = 1127)	3.4% (SE = 0.3%)	33% (SE = 4%)
Frankston (C)	22880 (SE = 8303)	1934 (SE = 405)	0.7% (SE = 0.1%)	24% (SE = 8%)
Glen Eira (C)	25413 (SE = 6535)	4445 (SE = 668)	1.4% (SE = 0.2%)	19% (SE = 5%)
Greater Dandenong (C)	5198 (SE = 1577)	1553 (SE = 400)	0.5% (SE = 0.1%)	40% (SE = 13%)
Hobsons Bay (C)	19719 (SE = 4009)	3439 (SE = 537)	1.8% (SE = 0.3%)	21% (SE = 6%)
Hume (C)	13006 (SE = 3900)	1528 (SE = 386)	0.4% (SE = 0.1%)	49% (SE = 13%)
Kingston (C)	27056 (SE = 6092)	3705 (SE = 503)	1.0% (SE = 0.1%)	24% (SE = 6%)
Knox (C)	15412 (SE = 3006)	2936 (SE = 471)	0.8% (SE = 0.1%)	22% (SE = 7%)
Manningham (C)	8620 (SE = 2203)	1576 (SE = 321)	0.6% (SE = 0.1%)	37% (SE = 10%)
Maribyrnong (C)	20051 (SE = 3847)	5335 (SE = 727)	2.5% (SE = 0.3%)	37% (SE = 6%)
Maroondah (C)	10052 (SE = 2758)	1393 (SE = 292)	0.5% (SE = 0.1%)	27% (SE = 9%)
Melbourne (C)	182458 (SE = 12966)	34244 (SE = 2125)	3.4% (SE = 0.2%)	35% (SE = 3%)
Melton (S)	5495 (SE = 4602)	307 (SE = 221)	0.1% (SE = 0.1%)	0% (SE = 0%)
Monash (C)	18618 (SE = 3539)	3307 (SE = 481)	0.7% (SE = 0.1%)	15% (SE = 5%)
Moonee Valley (C)	20793 (SE = 4791)	2811 (SE = 446)	1.0% (SE = 0.2%)	14% (SE = 5%)
Moreland (C)	94377 (SE = 9222)	20086 (SE = 1515)	5.7% (SE = 0.4%)	41% (SE = 4%)
Mornington Peninsula (S)	19339 (SE = 4114)	3898 (SE = 533)	1.0% (SE = 0.1%)	34% (SE = 6%)
Nillumbik (S)	8818 (SE = 3355)	1012 (SE = 255)	0.8% (SE = 0.2%)	18% (SE = 9%)
Port Phillip (C)	71317 (SE = 8538)	16356 (SE = 1445)	4.5% (SE = 0.4%)	47% (SE = 5%)
Stonnington (C)	49286 (SE = 10082)	8106 (SE = 1032)	2.4% (SE = 0.3%)	25% (SE = 5%)
Whitehorse (C)	23311 (SE = 5015)	2863 (SE = 414)	0.7% (SE = 0.1%)	25% (SE = 6%)
Whittlesea (C)	9360 (SE = 2733)	1499 (SE = 340)	0.5% (SE = 0.1%)	5% (SE = 4%)
Wyndham (C)	12641 (SE = 2529)	3895 (SE = 580)	1.0% (SE = 0.2%)	36% (SE = 7%)
Yarra (C)	68187 (SE = 7424)	19189 (SE = 1615)	5.7% (SE = 0.5%)	48% (SE = 4%)
Yarra Ranges (S)	11944 (SE = 3406)	2011 (SE = 420)	0.6% (SE = 0.1%)	16% (SE = 9%)

Spatial variation was observed in the proportion of bike trips made by females (Figure 5 and Table 2). This ranged from 0% in Melton (outer north-west region) and 5% in Whittlesea (outer north region), but approached near gender balance in others, such as 48% in Yarra (inner north region) and 49% in Hume (outer north-west region).

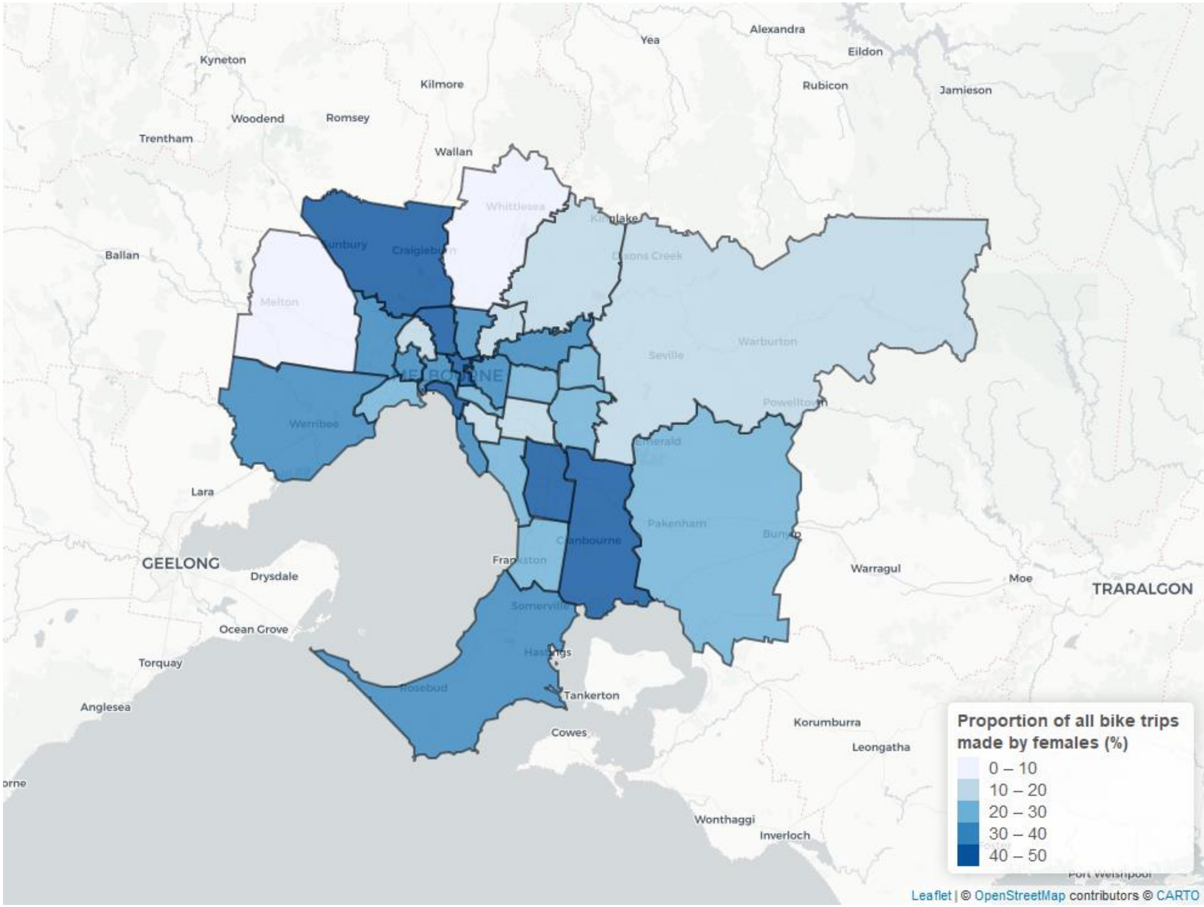

Figure 5: Proportion of bike trips that were made by females by LGA.

Spatial variation in the proportion of trips made by bike for each age group are shown in Supplementary Material. The proportion of trips made by bike ranged from 0% (Cardinia and Hume) to 9.7% (Moreland) for people aged 18-34 years, 0% (Melton) to 5.1% (Moreland) for people aged 35-54 years, 0% (Melton) to 3.3% (Yarra) for people aged 55-74 years, 0% (20 LGAs) to 2.8% (Port Phillip) for people aged 75 years and older.

There was minimal spatial variation across LGAs in the proportion of all trips that were less than 5 km and less than 9 km (Supplementary Material). The proportion of trips less than 5 km and less than 9 km are shown in Supplementary Material.

Relationship to biking infrastructure

In 2018, of the 40,564 km of total street/path infrastructure, 1,165 km (2.9%) were classified as on-road bike lanes, 2,647 km (6.5%) were classified as off-road paths, and 8 km (0.02%) were classified as protected bike lanes. There was variation in the proportion of infrastructure that had provision for biking across LGAs (Figure 6). This ranged from 1.9% in Cardinia (outer south-east region) to 22.9% in Yarra (inner north region).

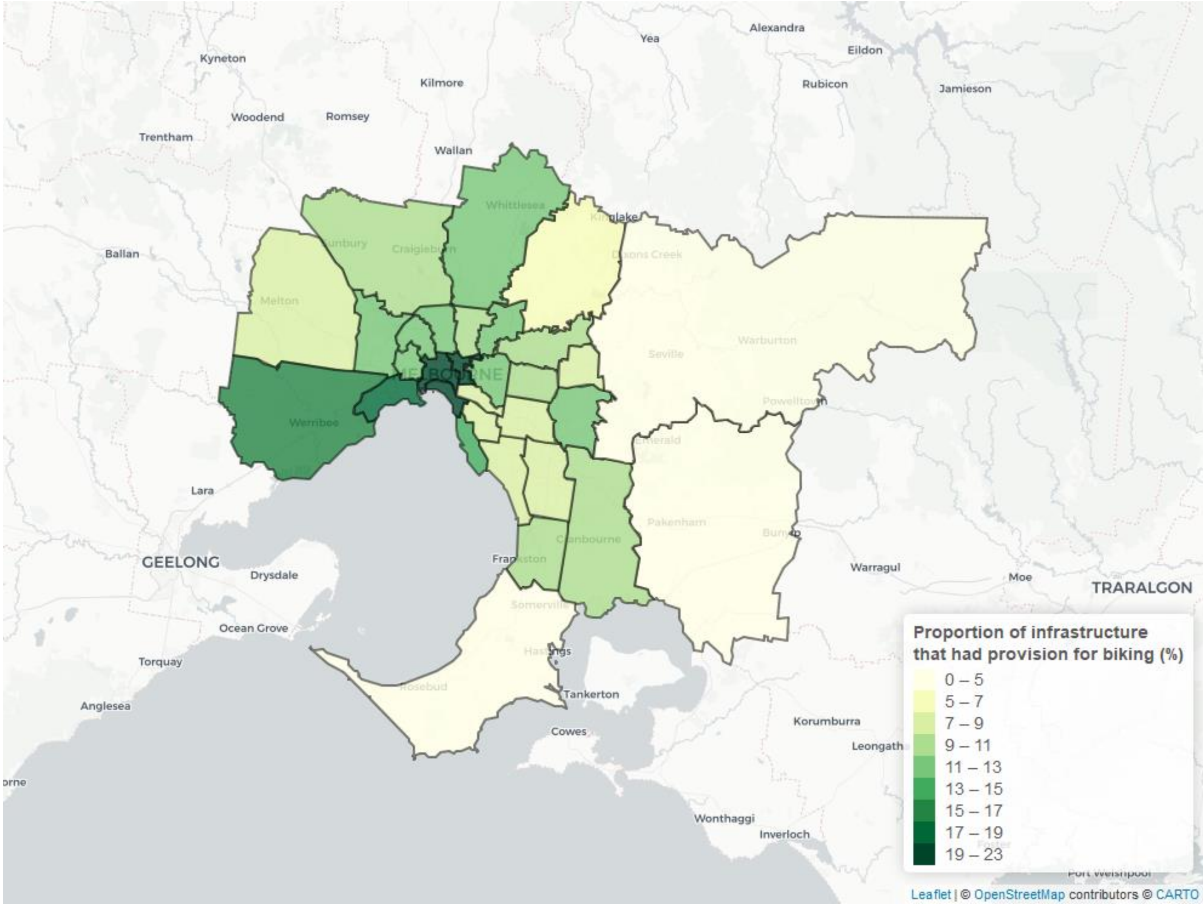

Figure 6: Proportion of infrastructure that had provision for biking across LGAs.

The proportion of infrastructure that had provision for biking was positively associated with the proportion of trips by bike (Figure 7). For each percentage increase in the proportion of infrastructure that had provision for biking, there was an associated 0.2% increase in the proportion of trips made by bike (coefficient = 0.20; SE = 0.05; adjusted R^2 = 0.38).

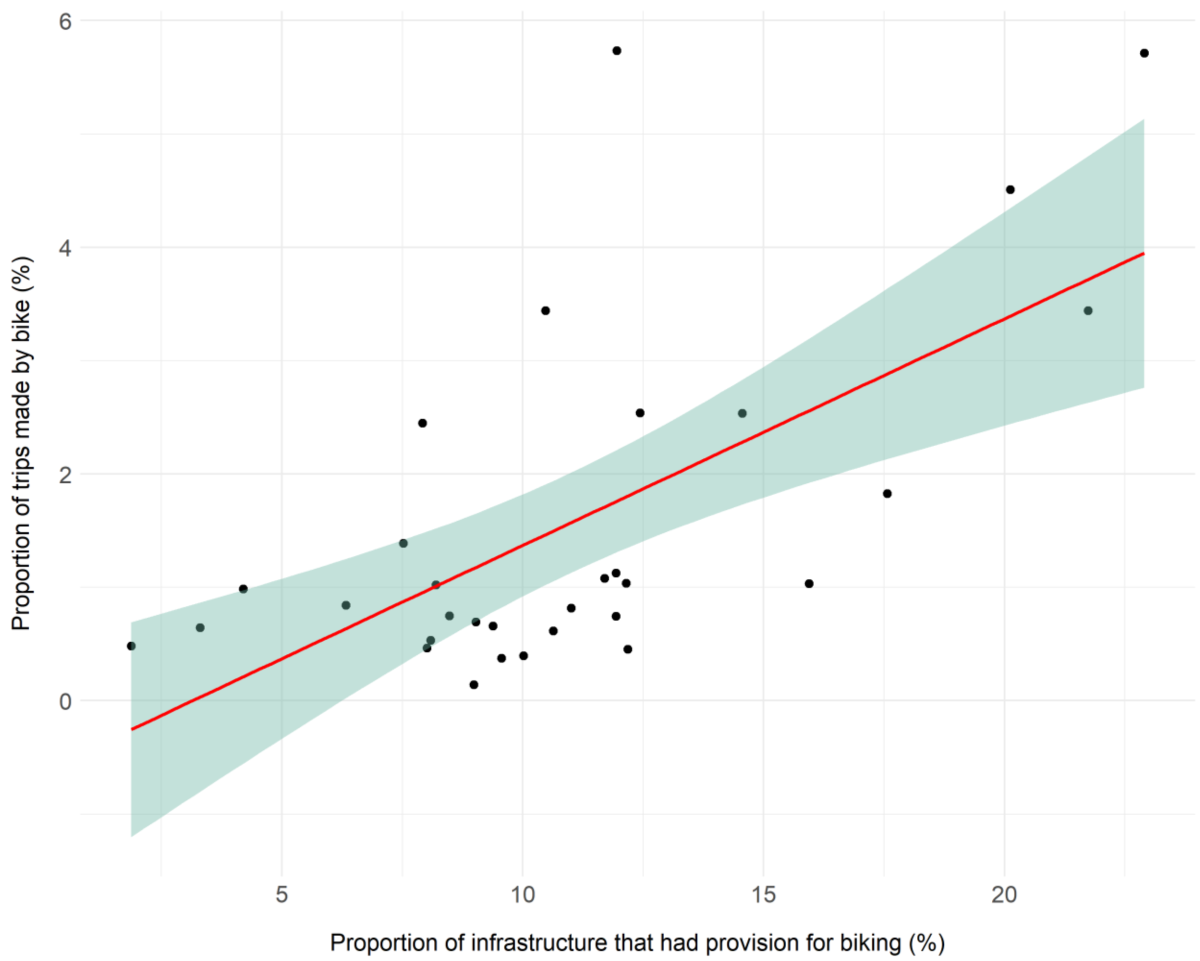

Figure 7: Scatterplot of the relationship between the proportion of infrastructure (streets and paths) that had provision for biking and the proportion of trips made by bike, by LGA. A linear regression line of best fit is presented with the coloured band representing the standard error.

DISCUSSION

In this population-based study of bicycling, we demonstrated low bicycle mode share (1.7% of all trips) and substantial spatial variation in the proportion of trips made by bike. While more than half of all trips were less than 5 km, only 2% of these trips were by bike, demonstrating substantial opportunity for increases in bike riding. We observed spatial variation in the provision of bicycling infrastructure, and an association between the provision of bicycling infrastructure and the proportion of trips made by bike. These data are important in understanding where bike riding occurs and by whom, and identifies opportunities to reduce inequities in bicycling.

Our finding of bicycle mode share of 1.7% of all trips in Greater Melbourne, Australia, is consistent with other low bicycling regions such as the USA (1.1%) and England (2.1%), but is in contrast to high bicycling regions, such as the Netherlands (26.8% mode share).[12] While overall bicycling mode share was low, we demonstrated variation across the study region, ranging from 0.1% to 5.7%. As expected, the proportion of bike trips was highest in inner-city areas, and rapidly declined as distance from the inner-city area increased. Our previous research has demonstrated that interest in bike riding is high across LGAs in Greater Melbourne. In this prior study, 78% of people were classified as 'Interested but Concerned',[22] reflecting those who are comfortable riding only in protected lanes or off-road paths. This high proportion of 'Interested but Concerned' people was consistent across LGAs, even in peri-urban areas. This demonstrates the potential to address spatial and socioeconomic inequities in bike riding by focusing on these peri-urban areas, understanding what is needed for modal shift to occur in areas outside of the inner city and developing policies to support bike riding in these areas.

It is well known that in jurisdictions with low bicycling prevalence, there is a disproportionately low number of women cycling.[23, 24] In a study of 11 countries and 35 cities, Goel *et al.* noted that when bicycling mode share was above 7%, females were as likely as males to bike.[12] Given current bicycling mode share is far lower than this 7% threshold, and the low proportion of trips made by women (35%), significant efforts are required to achieve gender equity in bike riding. It has been suggested that safe and connected cycling infrastructure, and systems that normalise women's cycling, with policies to support these, are key to increasing the number of women cycling.[25]

In Australia, bike riders are typically viewed as recreational riders and there is a dominance of representation of MAMILs (middled-aged men in lycra) in policy documents.[26] In contrast to this, our results showed that almost three-quarters of trips were utility trips (including 37% of trips that were for purposes other than travelling to work or education). This is an important finding as it demonstrates a need to focus on the diversity of utility trips that occur in our region and how we can support local biking trips (e.g., for shopping, accessing services and entertainment), rather than focussing solely on strategic cycling corridors that primarily target commuter trips.

Critical to increasing bike riding and addressing inequities in bike riding is the equitable provision of safe and connected networks of infrastructure. There is a growing body of evidence demonstrating increases in biking resulting from the implementation of high-quality infrastructure.[27-29] Consistent with this, our findings demonstrate a positive association between the proportion of infrastructure that had provision for biking and the proportion of trips by bike. However, this is simply an association and these results do not imply causation. Further, they reflect a crude measure of infrastructure, and do not reflect more detailed measures of comfort and connection, such as bikeability indices.[30, 31] Regardless, it is clear that there are inequities in the provision of infrastructure across our region of Greater Melbourne, and it can be suggested that the lack of comfortable and connected infrastructure in many areas may be contributing to the very low mode share of biking.

As part of Victoria's Climate Change Strategy, the Victorian Government have recently set an objective to make 25% of trips to be by foot or bicycle by 2030. Currently, 16% of trips are made on foot[32] and our results demonstrate that 1.7% of trips are made by bike. To achieve the 25% goal by 2030, it is evident that significant investment in safe and connected active transport infrastructure is urgently required.

The strengths of this study include the use of population-weighted travel survey data that enables robust evaluation of bike riding across LGAs in Greater Melbourne. However, there are a number of limitations to note. Firstly, these data pre-date the COVID-19 pandemic which has created dramatic shifts in the way we move about our cities globally. Further, due to a low bicycling mode share, it was necessary to collapse data across multiple years to enable sub-group analyses. As a result, exploration of temporal patterns of bike riding was not possible. Additionally, survey weights were applied to the LGA in which the trip originated, and the data presented do not reflect trips that occurred across multiple LGAs. In the absence of government data sets of biking infrastructure in Victoria, we were reliant on Open Street Map (OSM) data to characterise biking infrastructure. There is variability in the accuracy of OSM data in international settings,[33] and the accuracy of OSM data is unknown in our region. Further, exploring associations between specific types of infrastructure (e.g. protected on-road bicycle lanes) and the proportion of trips made by bike was not possible due to the low proportion of some individual infrastructure types. Finally, the focus of this study was on LGAs, which typically encompass a large number of streets and paths. This study was unable to explore bicycling volumes on individual streets. While such approaches have been employed using crowd-sourced data, such as Strava,[34, 35] there are known biases of these data.[34]

CONCLUSION

Robust data are essential to monitoring, planning and evaluating bike riding. Using population-weighted travel survey data, our analysis identified population sub-groups and local government areas that are under-represented in cycling. These data can assist government agencies to target active transport policies and future investment in cycling infrastructure. While we observed a low bicycle mode share, more than half of all trips were less than 5 km, demonstrating substantial opportunity to increase the number of trips taken by bike. Greater focus must be placed on these underserved populations and regions, to ensure that inequities in bike riding are addressed.

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DISCLOSURE STATEMENT

There are no conflicts of interest to declare.

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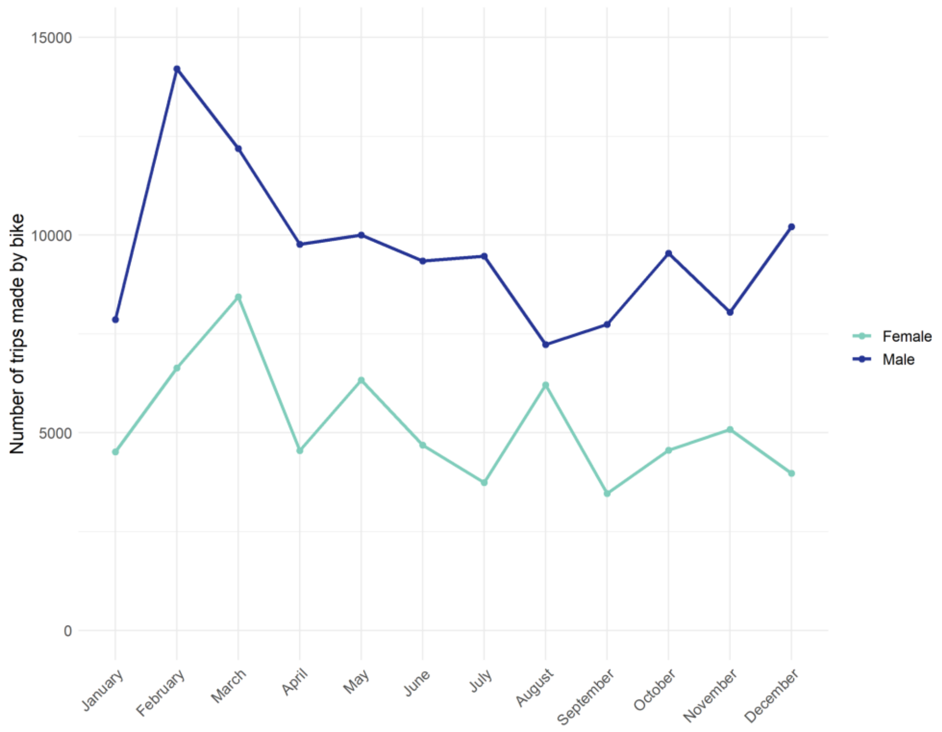
SUPPLEMENTARY MATERIAL

A



B

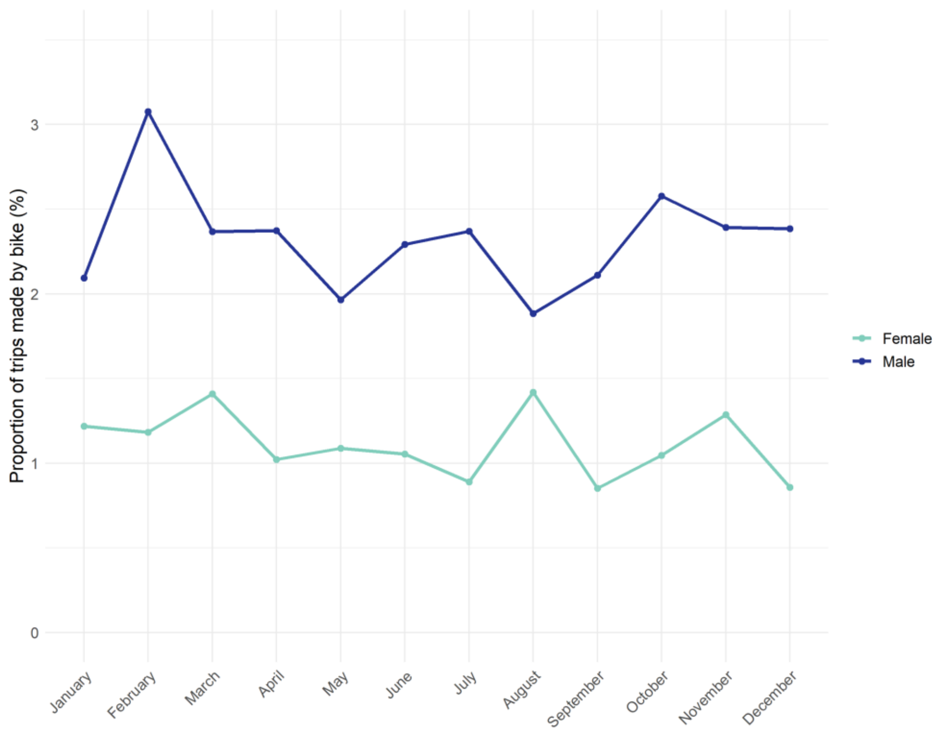


Figure 8: Number (A) and proportion (B) of trips made by bike, stratified by month of year and sex.

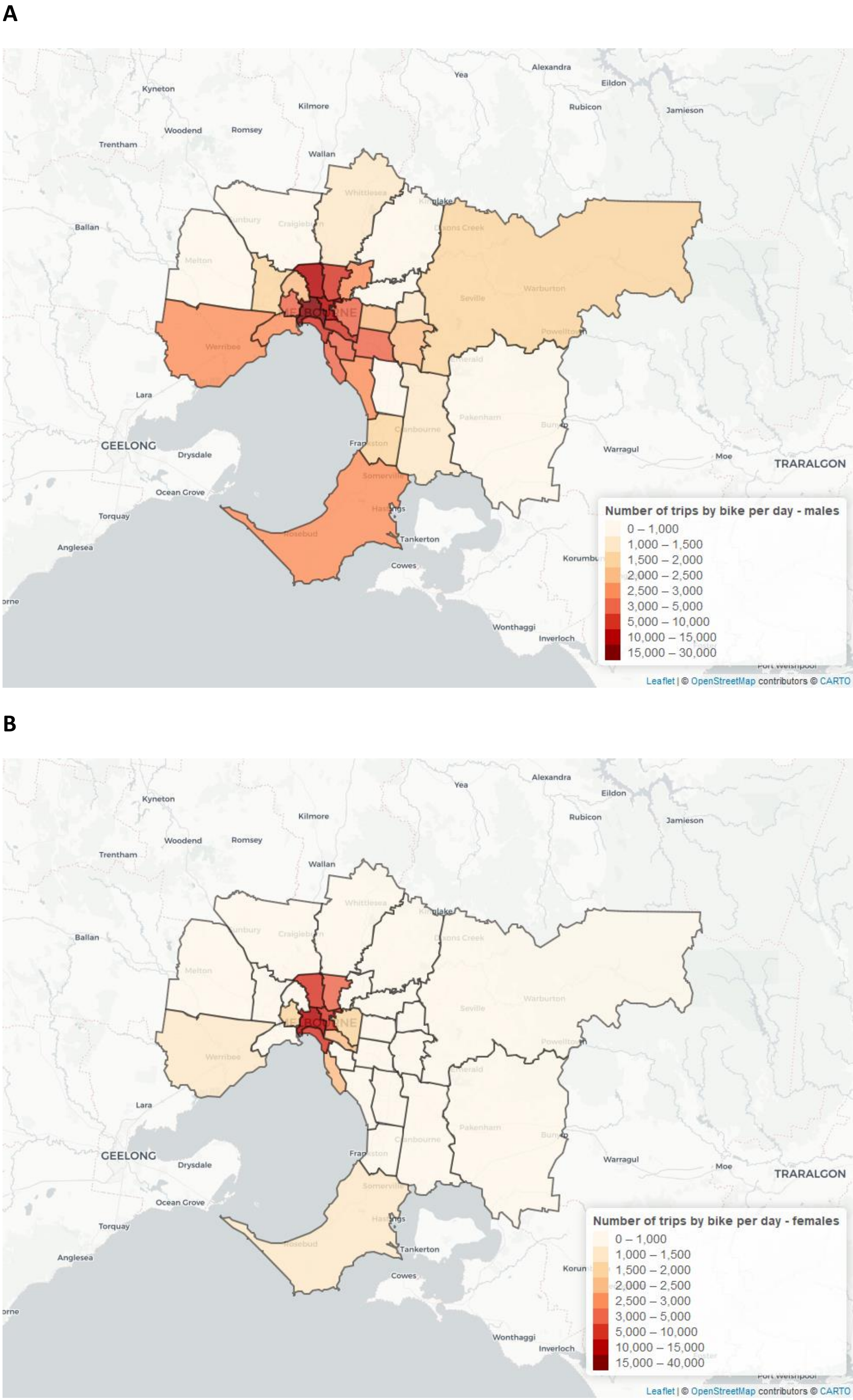
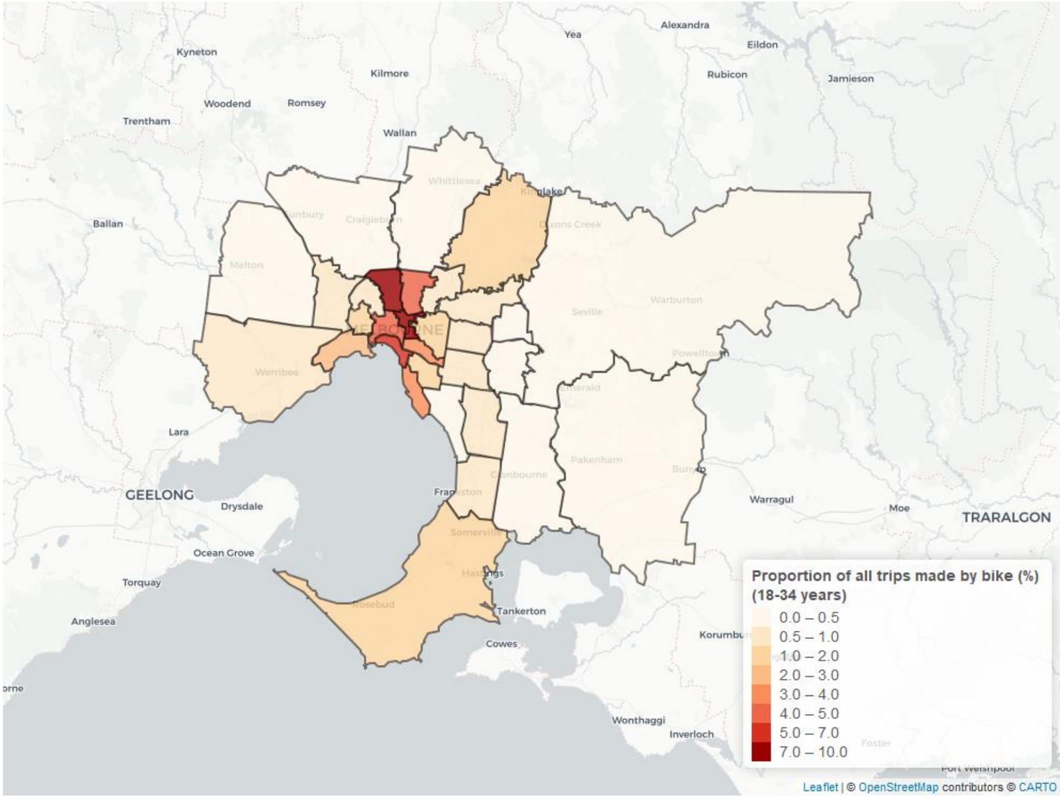
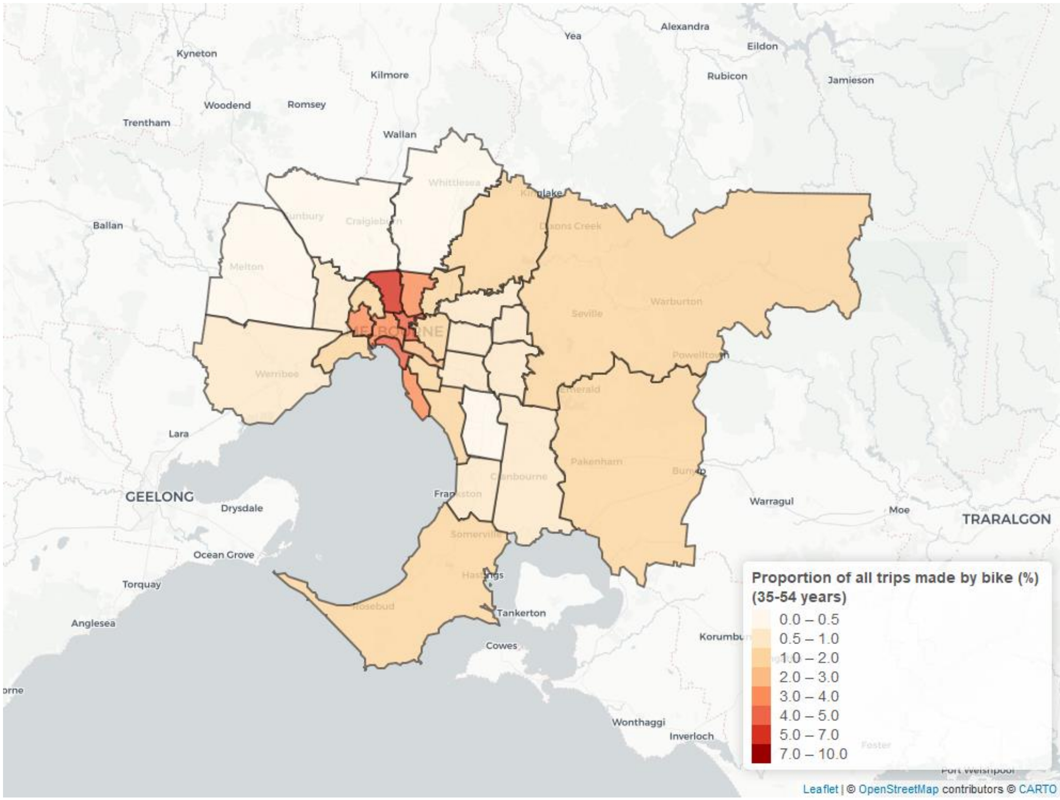


Figure 9: Number of trips by bike per day (A: males; B: females) across LGAs.

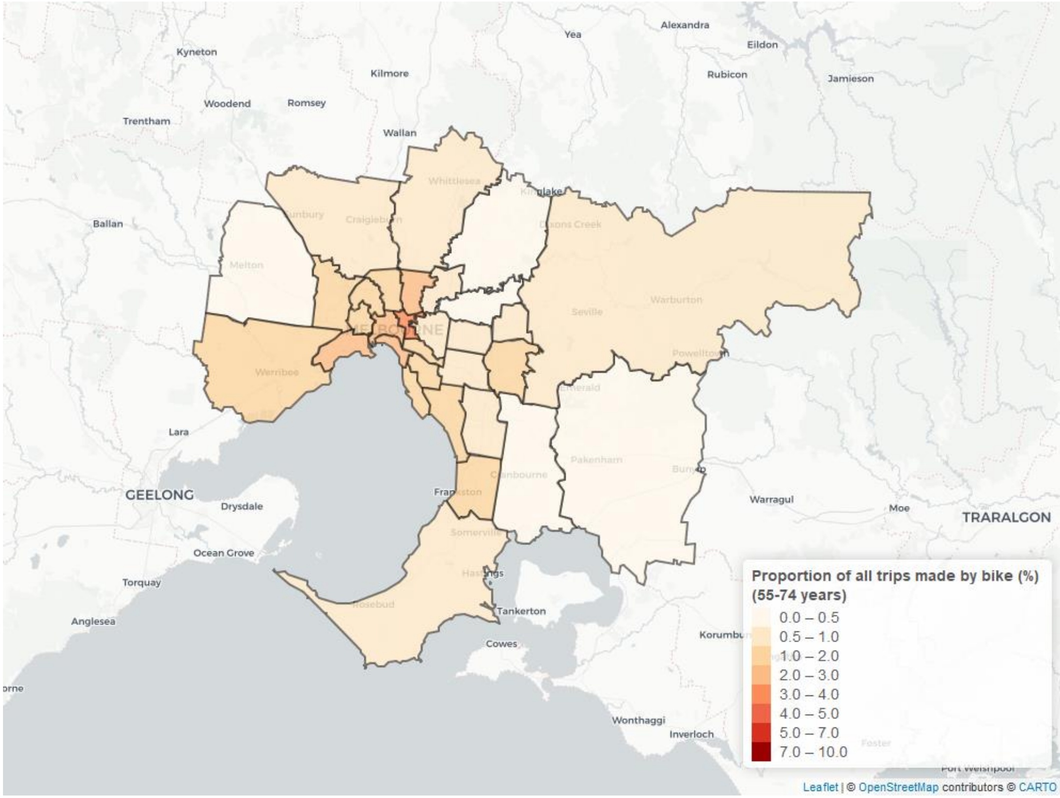
A


Proportion of all trips made by bike (%)
(18-34 years)
0.0 – 0.5
0.5 – 1.0
1.0 – 2.0
2.0 – 3.0
3.0 – 4.0
4.0 – 5.0
5.0 – 7.0
7.0 – 10.0
Kyneton
Kilmore
Yea
Alexandra
Eildon
Rubicon
Jamieson
Woodend
Romsey
Trentham
Wallan
Ballan
Lara
GEELONG
Drysdale
Ocean Grove
Torquay
Anglesea
Tankerton
Cowes
Warragul
Moe
TRARALGON
Wonthaggi
Inverloch
Leaflet | © OpenStreetMap contributors © CARTO

B


Proportion of all trips made by bike (%)
(35-54 years)
0.0 – 0.5
0.5 – 1.0
1.0 – 2.0
2.0 – 3.0
3.0 – 4.0
4.0 – 5.0
5.0 – 7.0
7.0 – 10.0
Kyneton
Kilmore
Yea
Alexandra
Eildon
Rubicon
Jamieson
Woodend
Romsey
Trentham
Wallan
Ballan
Lara
GEELONG
Drysdale
Ocean Grove
Torquay
Anglesea
Tankerton
Cowes
Warragul
Moe
TRARALGON
Wonthaggi
Inverloch
Leaflet | © OpenStreetMap contributors © CARTO

C



D

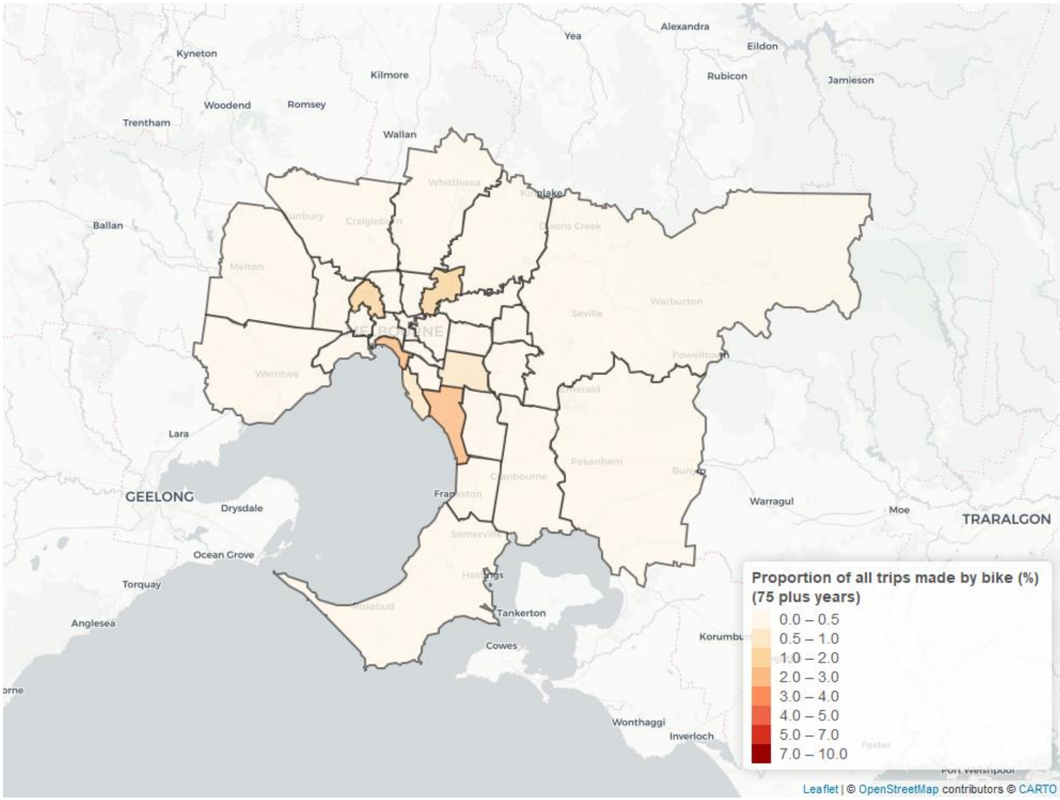


Figure 10: Proportion of all trips that were made by bike for people aged 18-34 years (A), 35-54 years (B), 55-74 years (C), and 75 years and older (D).

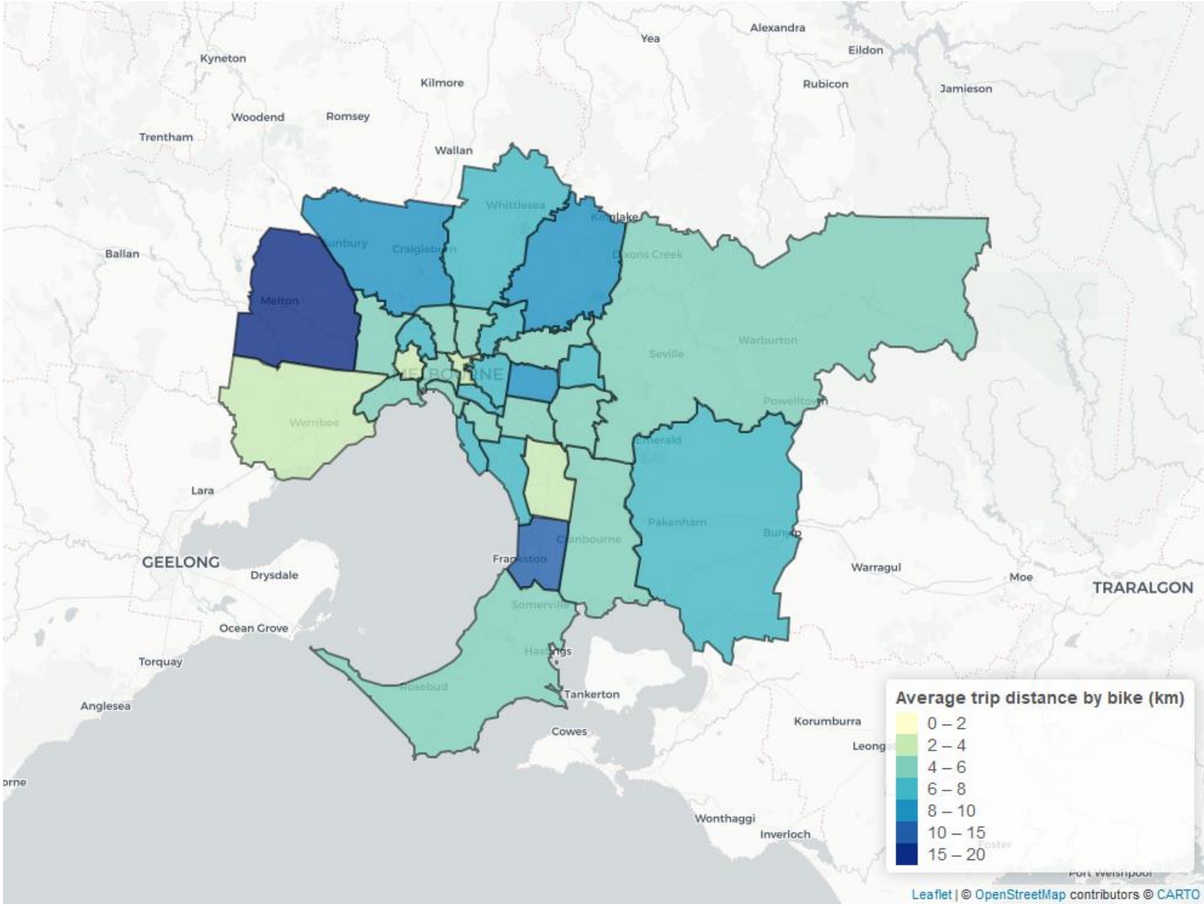
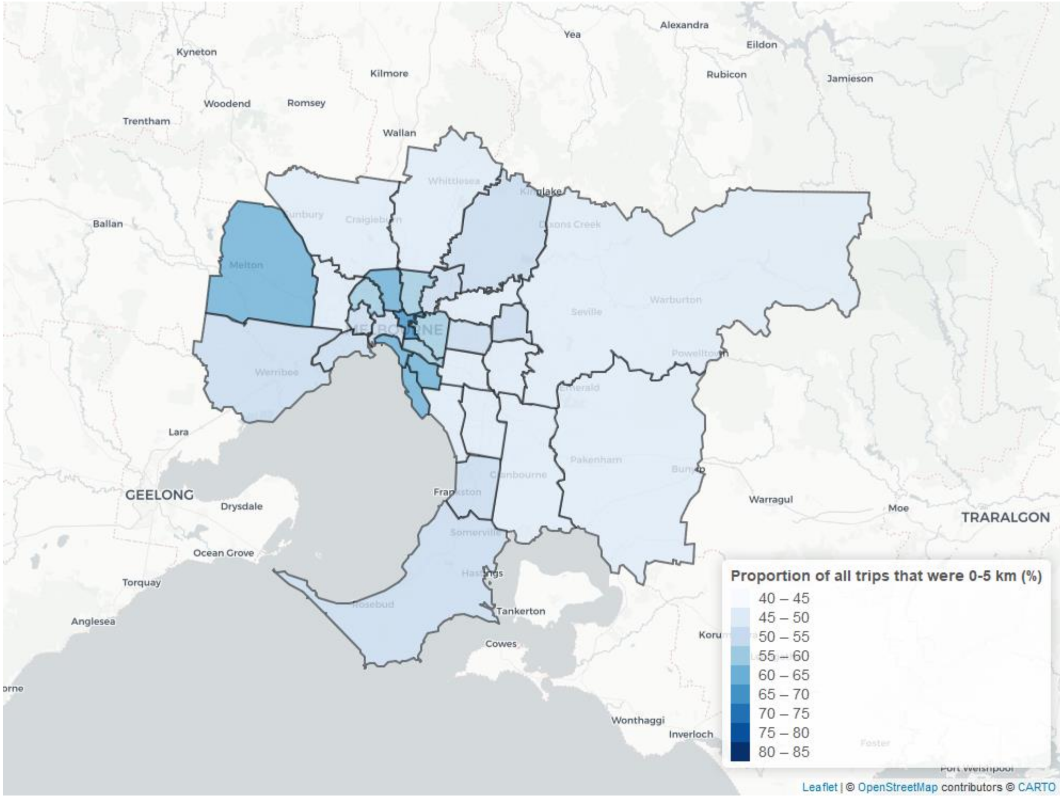


Figure 11: Average trip distance by bike.

A



B

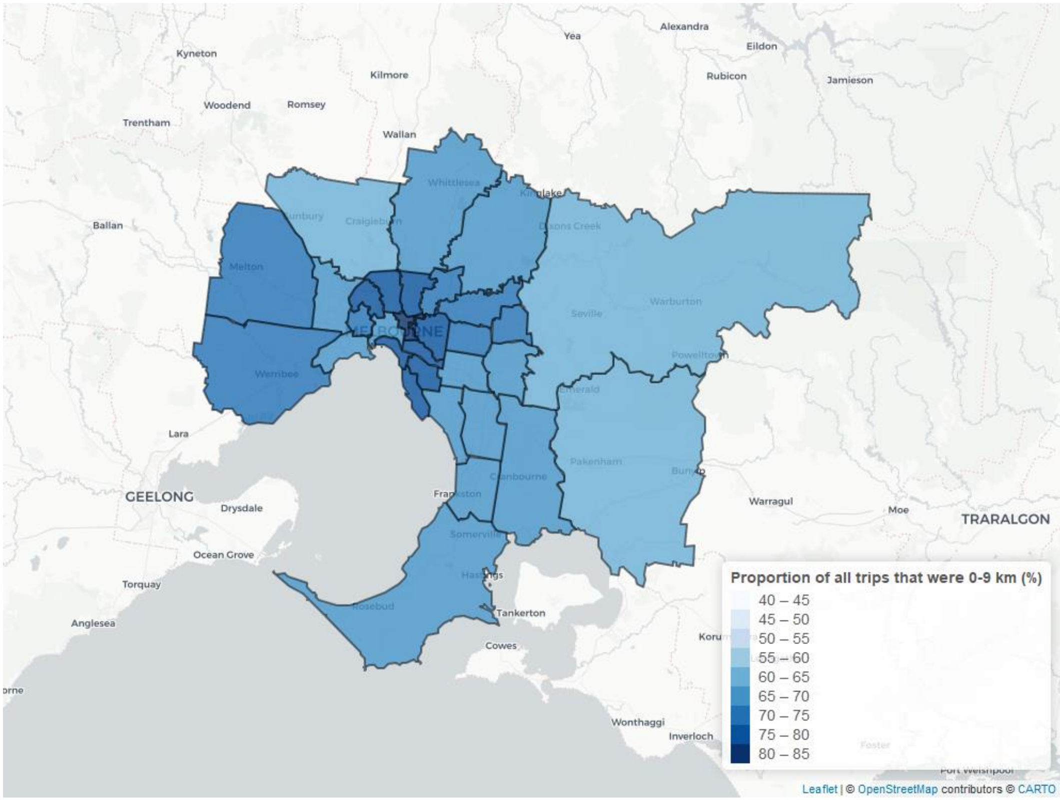
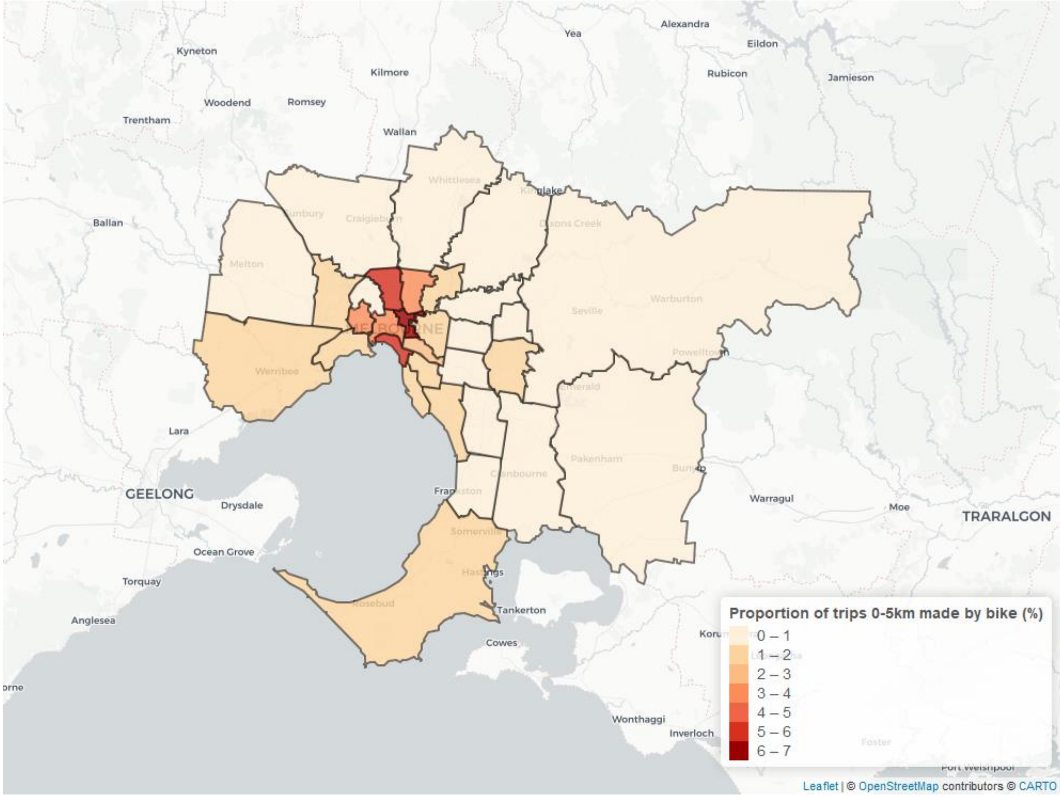


Figure 12: The proportion of all trips (all modes) that were less than 5 km (A) and less than 9 km (B).

A



B

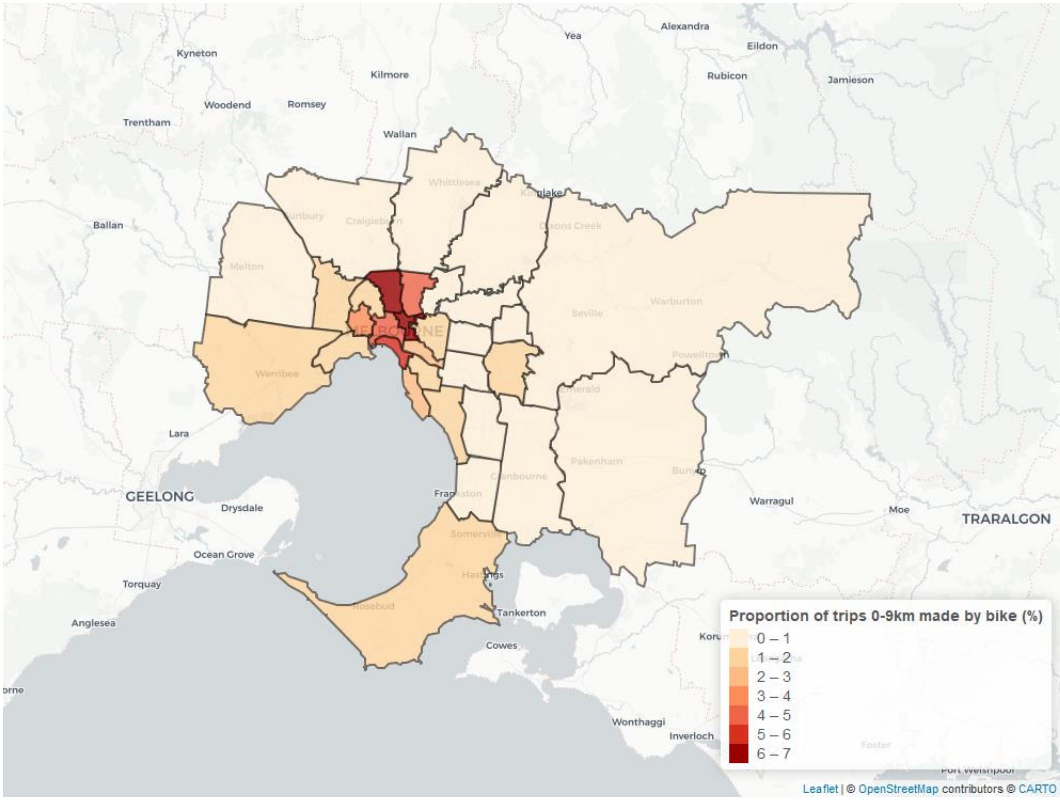


Figure 13: Proportion of trips made by bike across trips with a distance of 0-5 km (A) and trips with a distance of 0-9km (B).