

The socio-economic benefits of the cycling infrastructure in Wellington Street

City of Yarra
Melbourne



DECISIO

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DECISIO



This report was created with the technical support of Decisio.

Decisio is one of the main consulting firms operating in the sector of programming, planning and evaluation of territorial, environmental and transport policies.

Founded in 1998 in Amsterdam, The Netherlands, the city and country 'par excellence' for cycling, we started an Italian venture in Torino, Italy, where we built an office who now employs 8 people full-time who focus solely on cycling. The combined knowledge of our Amsterdam and Torino team gives us the perfect work base to implement the Dutch lessons in less developed cycling cities and regions.

In 25 years of activity, DECISIO has successfully conducted over 1400 projects in Europe, the United States, South America, Asia and Australia, focusing mainly on the topics of cycling, walking and active mobility.

We contributed to develop the concept of bikenomics and walkonomics by applying the economic tools in the field of cycling, walking and sustainable transport. In addition, we are more and more involved in cycling planning and designing at all scales, from the regional plan to the single intersection.

Decisio collaborates with clients in the public sector - from the European Commission to the small local authority - and in the private sector, with a team of about 30 consultants whose skills cover a broad sphere of disciplines:

- Social and behavioral scientists (economists, sociologists, political scientists, anthropologists ...).
- Urban planners, geographers, architects, engineers.
- Law and regulation experts.

The key areas of work of Decisio concern territorial analyses, economic studies (social costs-benefits, economic impact, business case) and multi-criteria analyses concerning the planning and design of cycling infrastructure but also the diffusion of cycling and walking best practices and soft measures, such as the deployment of incentivization schemes.

In the last years, Decisio has also developed a specialization on the topics of participatory projects, stakeholders' involvement and shared design of mobility infrastructure and public space.

This report was financed and sponsored by the City of Yarra, Melbourne.

Title

The socio-economic benefits of the cycling infrastructure in Wellington Street
City of Yarra - Melbourne

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Version

8.1 (final) - 19/12/2023

Client

City of Yarra, Melbourne (AU)

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The socio- economic context



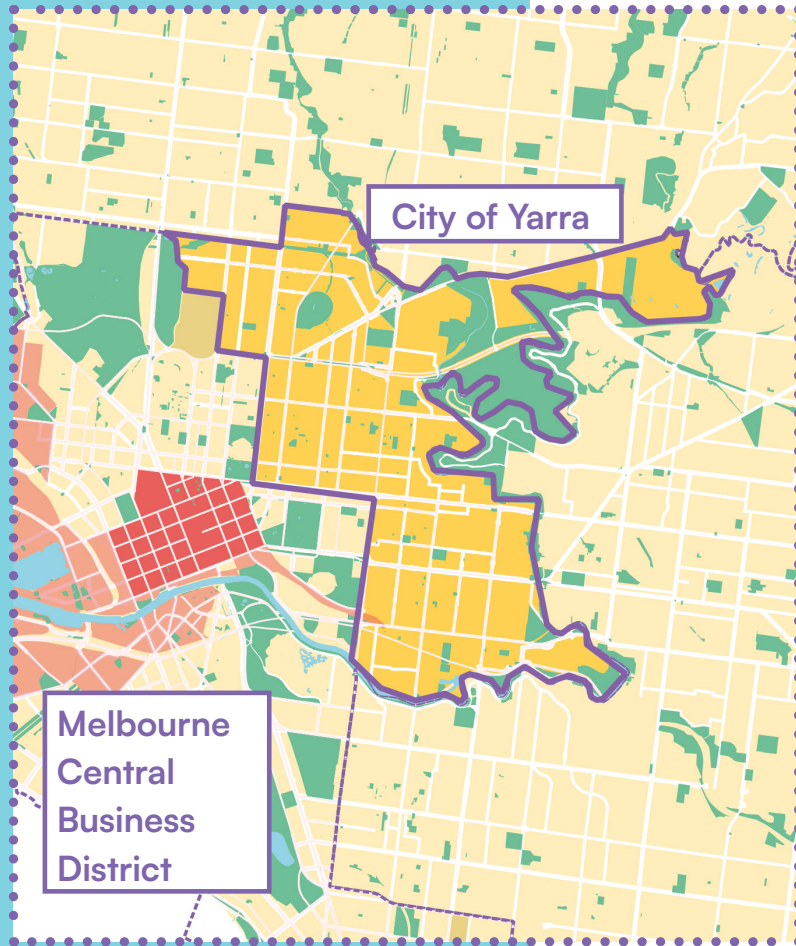
City of Yarra

Yarra, Melbourne, situated in Victoria, encompasses the inner eastern and northern suburbs; it has a population of approximately 93,000 residents, with a slight decline in recent years. From an age standpoint, the community skews younger than the Victorian average.

Remarkably, over 55% of the populace holds a bachelor's degree or higher, and more than 95% is employed. The majority, nearly 50%, works in the services sector, with 14% employed in healthcare and social assistance.

After Covid an increased inclination for travel was recorded, primarily by car, though walking, public transport, and cycling contribute significantly to the overall modal share. Notably, one-third of journeys are social/recreational, while another third is work-related.

Society and demography



2.061 ha
20 km²
Land area

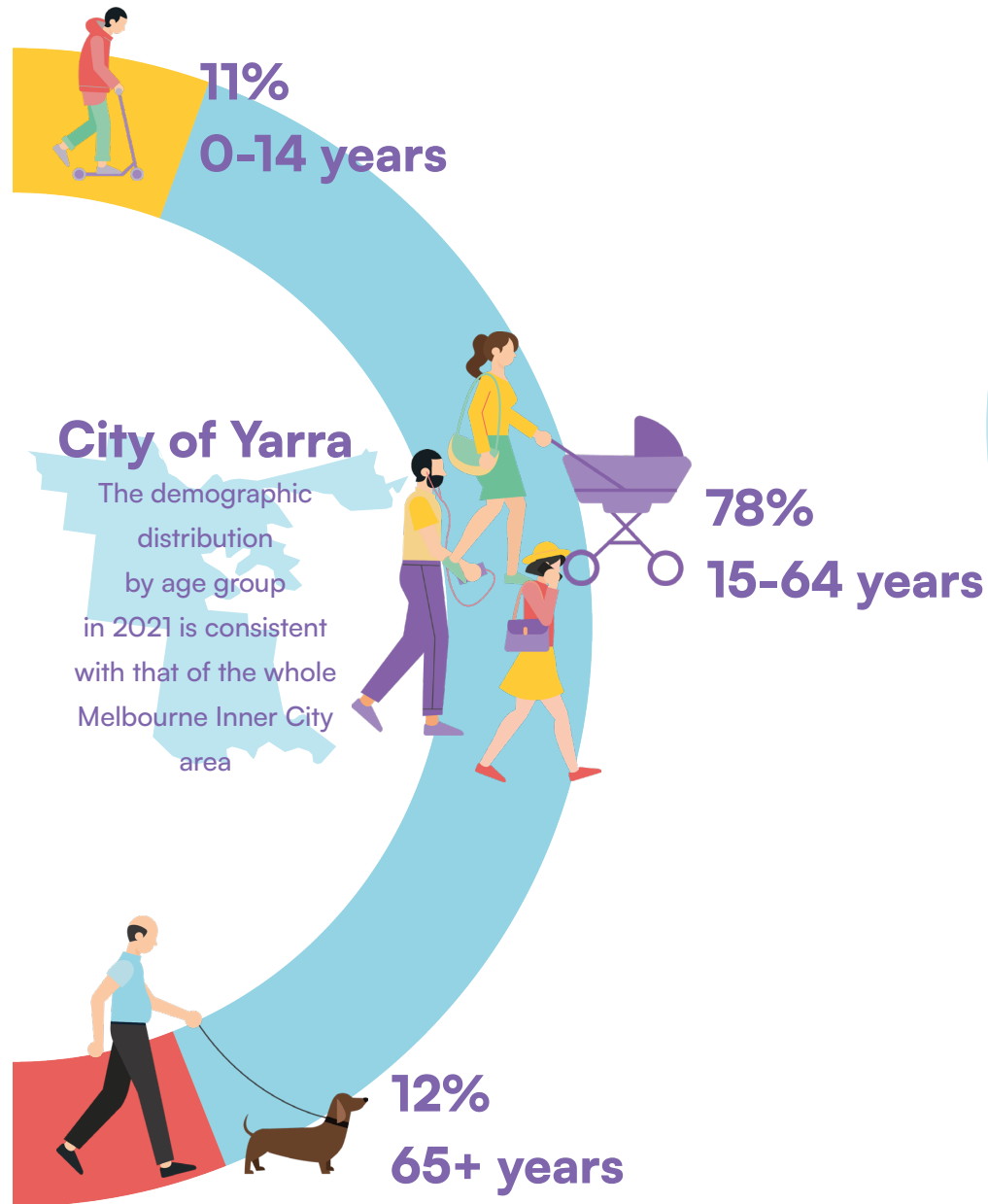
93.056
inhabitants
Estimated
resident
population

4.514
persons /km²
Population density



34 Years
Average age

Elaboration on data from ABS, 2021.



The population has decreased by 2% in the last five years, but **the younger age groups (up to 40 years) account for 61% of the total population.**

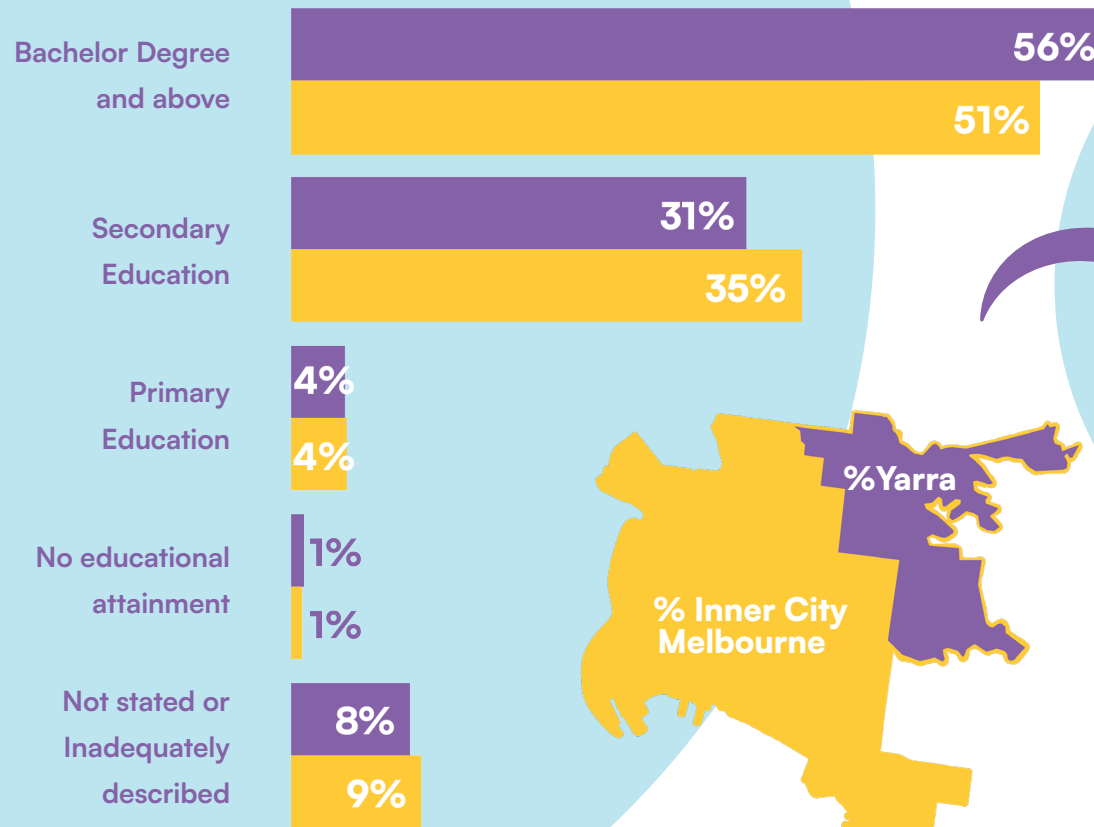
Avg. Population Growth Rate



Elaboration on data from ABS, 2021.

Education

Education level in residents aged 15 years and older



87% of the workforce in Yarra has a **professional qualification or degree.**

Elaboration on data from ABS, 2021.

Economy

Knowledge industry

Professional, scientific and technical services, financial and insurance services, information, media and telecommunications

Creative industry

Advertising and marketing, architecture, design and visual arts, film, television and radio, software and interactive content, music and performance arts, writing, publishing and print media, urban manufacturing (e.g. textiles)



Yarra's economy
diverse and dynamic economy, driven by four key areas

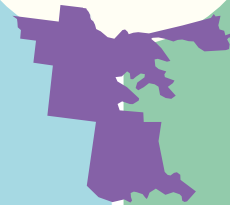
Health, education and public sector

Education and training, healthcare and social assistance, public administration and safety

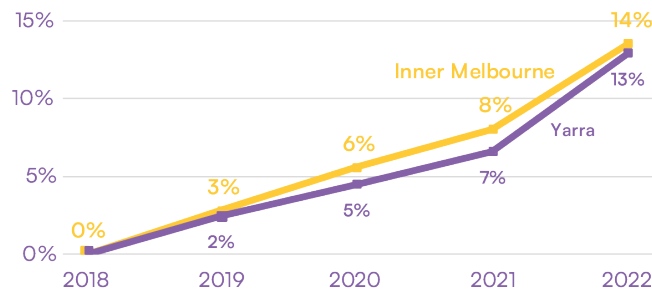


Services

Retail, hospitality, personal services, tourism, construction, transport



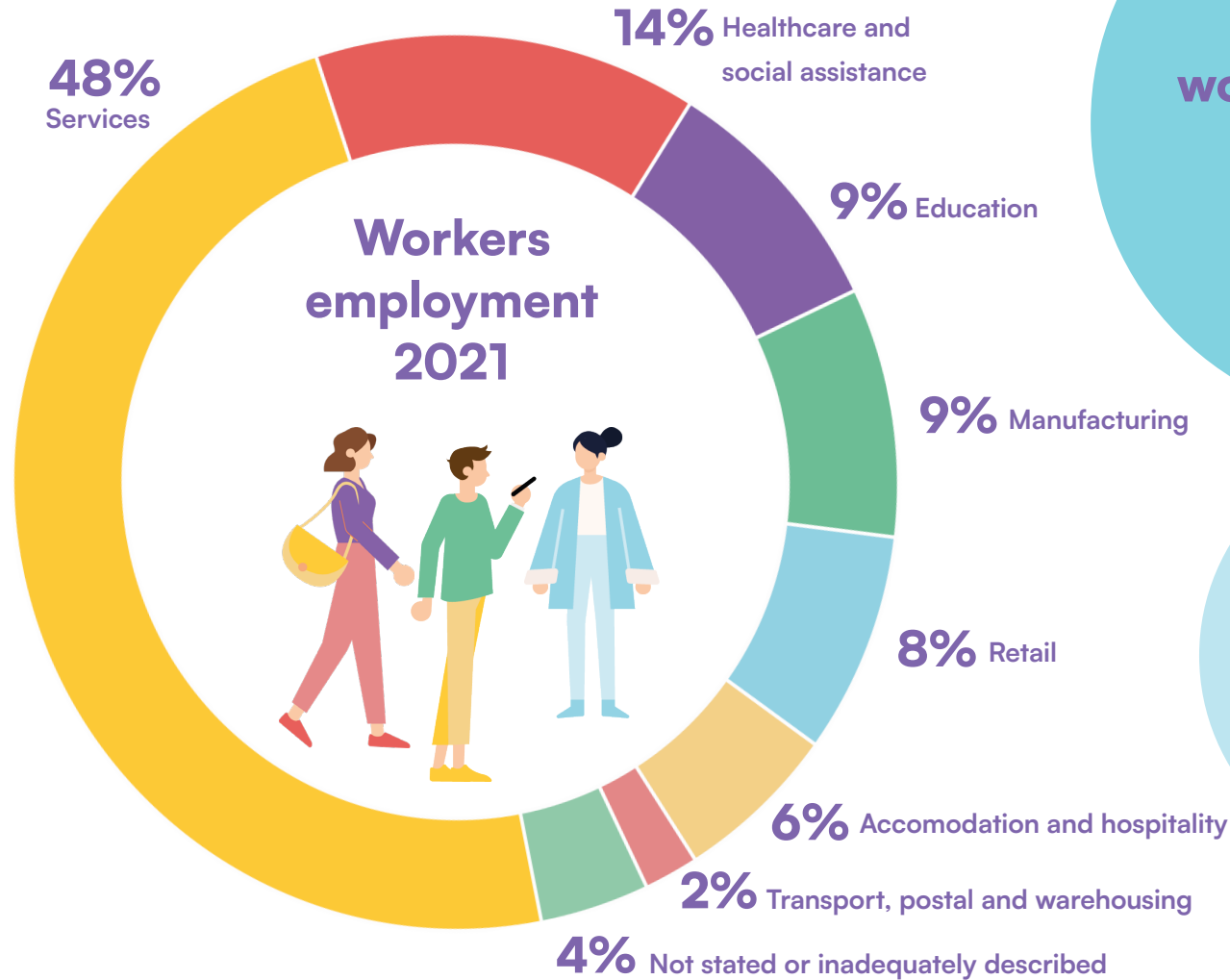
Annual growth in the number of companies compared to 2018



The number of companies in Yarra has increased by 14% over the last 5 years, in line with the trend in Inner Melbourne.

Elaboration on data from ABS, 2021.

Employment



In 2021, 47% of workers has worked from home.

An illustration of a person with dark hair, wearing a red shirt, sitting at a desk with a laptop and a coffee cup, representing remote work.

96% of workforce has a job in 2021.

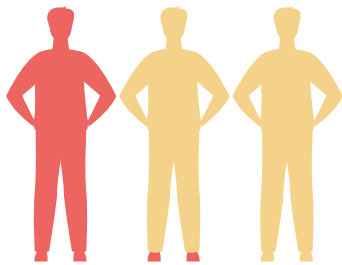
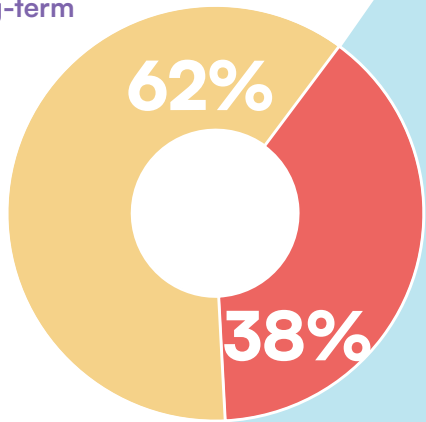
An illustration of two people standing together; one is a woman in a pink shirt and green pants holding a phone, and the other is a man in a blue shirt and pants.

Elaboration on data from ABS, 2021.

In 2023, 37% of Victoria's residents worked from home.

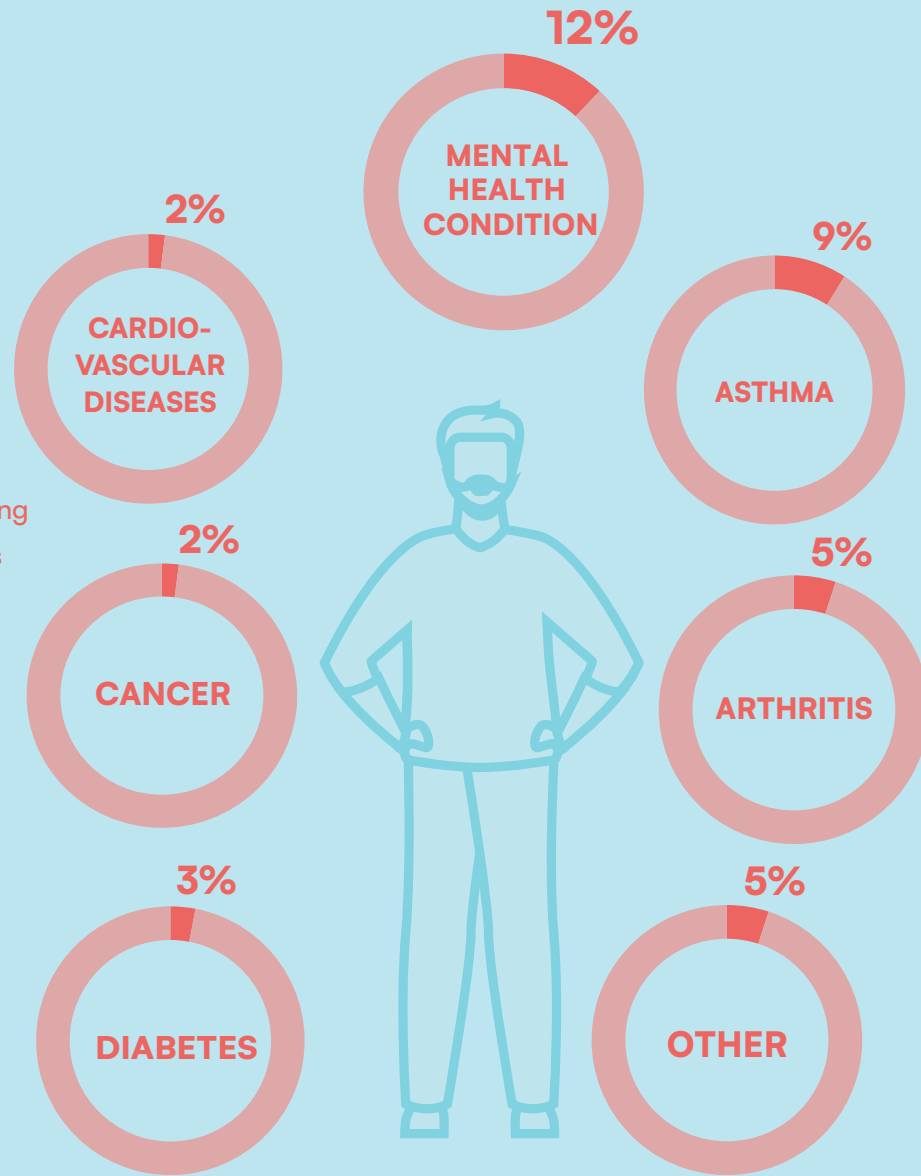
Health

No long-term illness



More than **one in three** have chronic diseases.

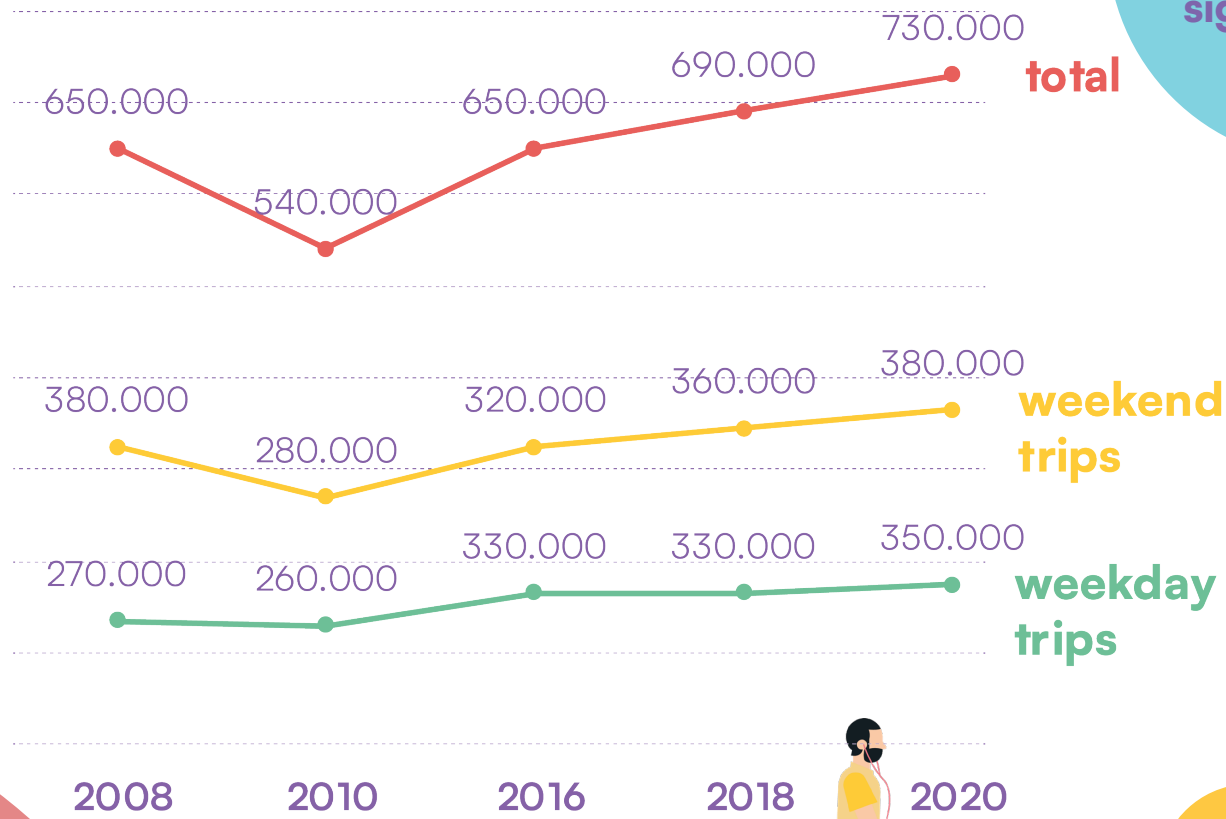
One or more long-term illnesses



Elaboration on data from ABS, 2021.

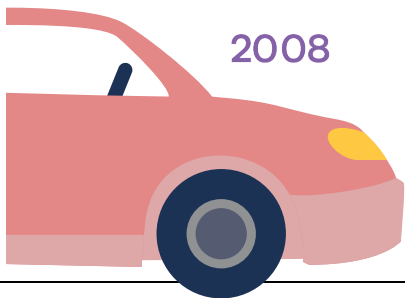
Transport demand

Evolution of trips from 2008 to 2020



The number of trips by car has increased significantly...

...but so has the number of households that do not own any motorised vehicle: **+23%** in 2021 compared to 2011



Elaboration on data from VISTA, 2021.

Active population
15-64 years



In 2018 people travelled for any purpose on average for **5 km**



In 2018, people commuted to work or school on average for **5.7 km**



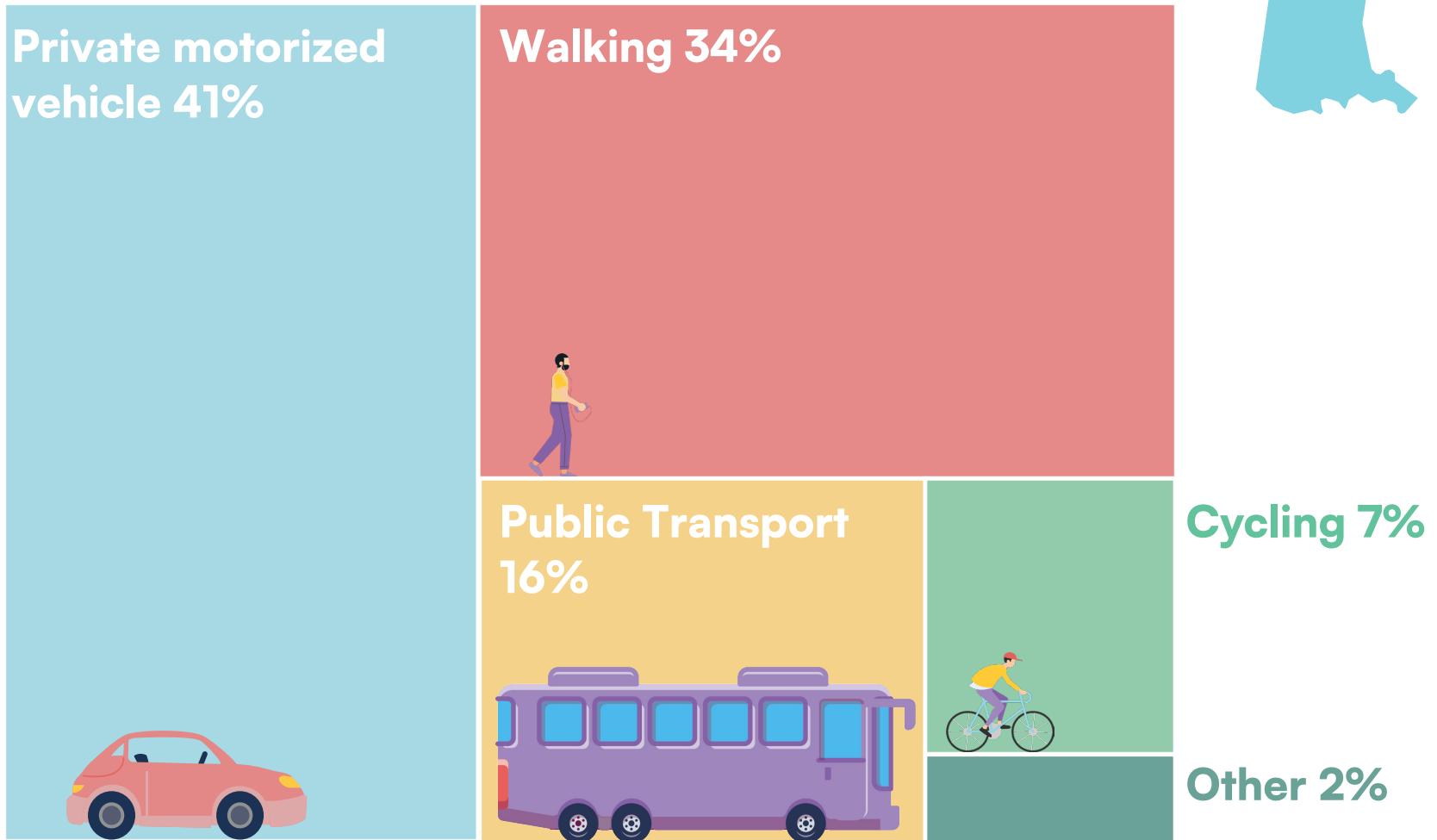
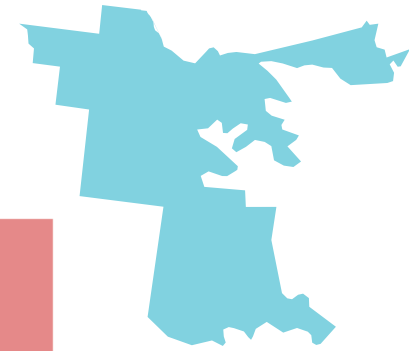
1 km by bike requires about **3-4 minutes** for the average person



5 km take about **20 minutes**

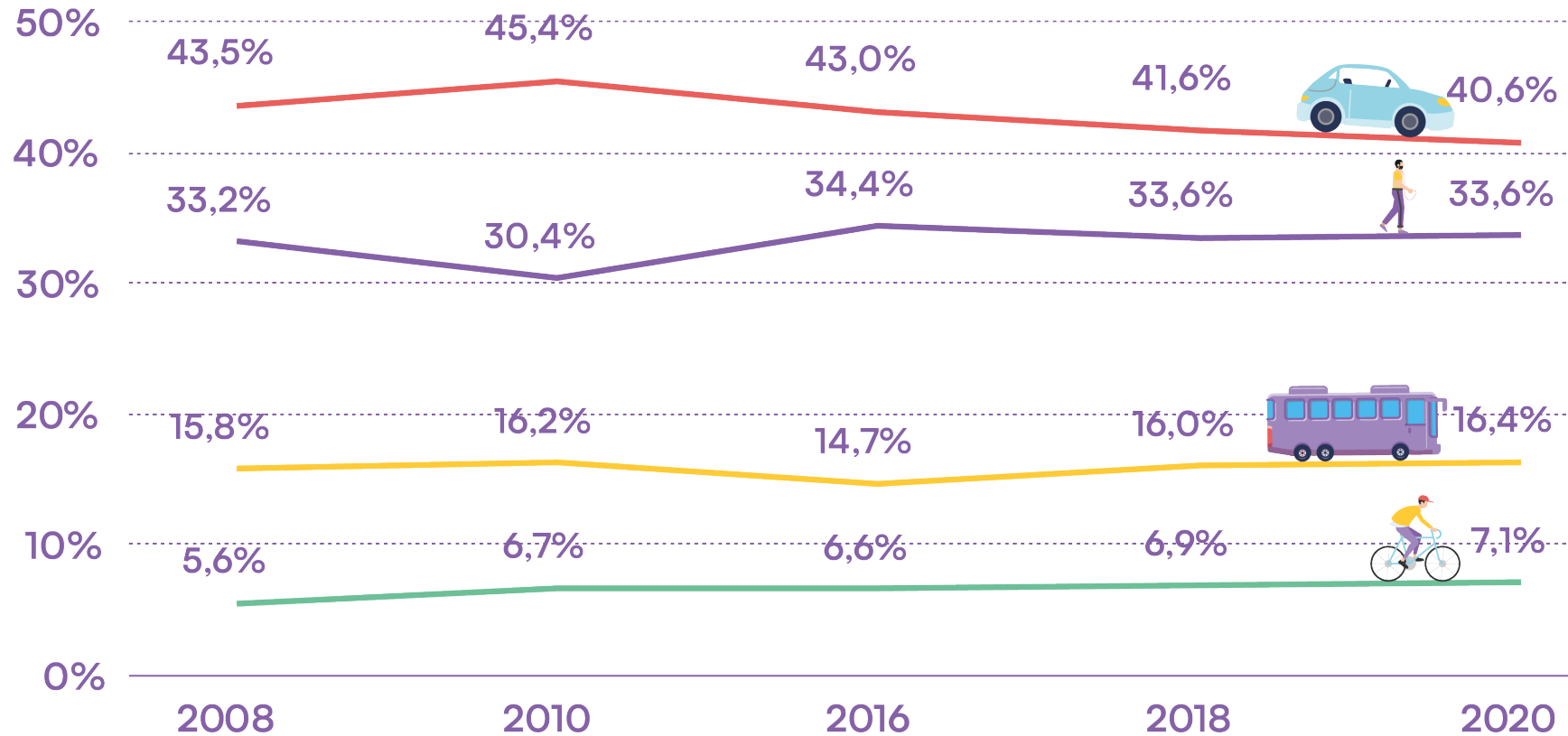


Modal share



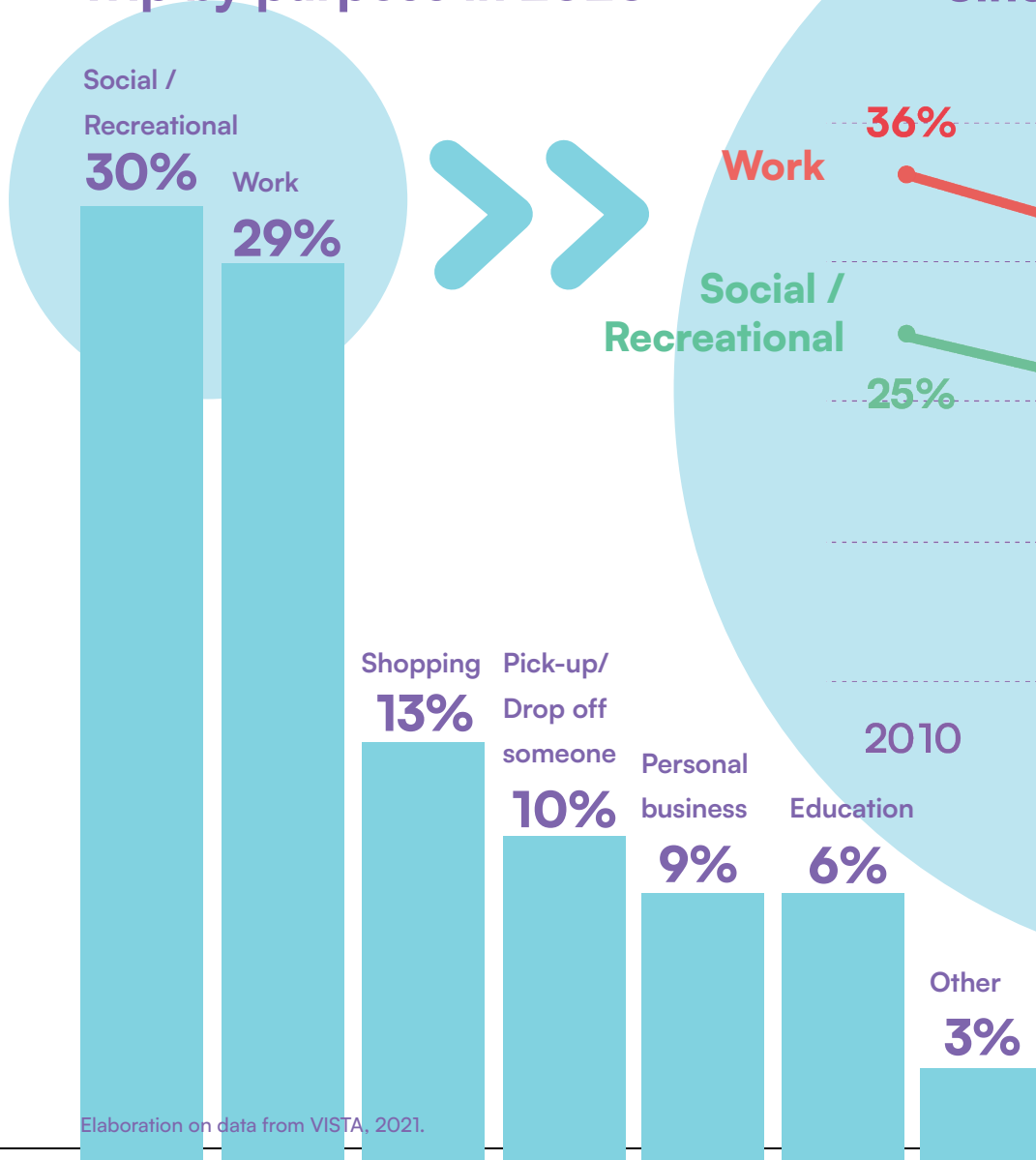
Elaboration on data from VISTA, 2021.

Modal shifts from 2008 to 2020



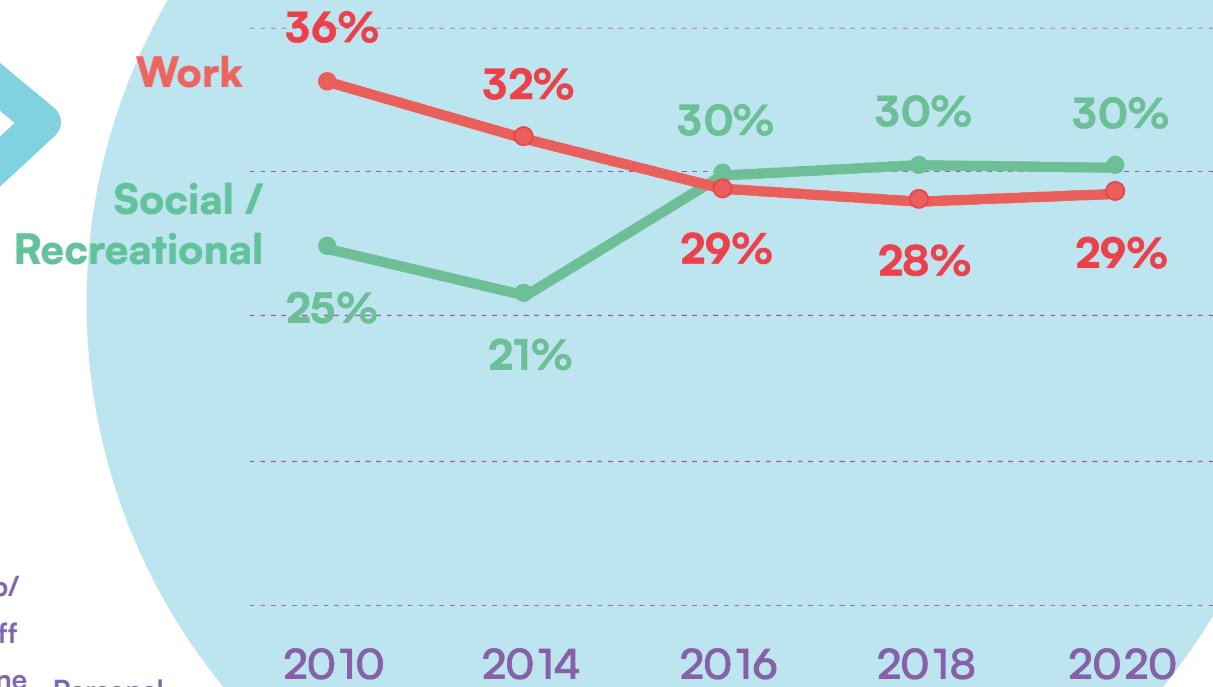
Elaboration on data from VISTA, 2021.

Trip by purpose in 2020

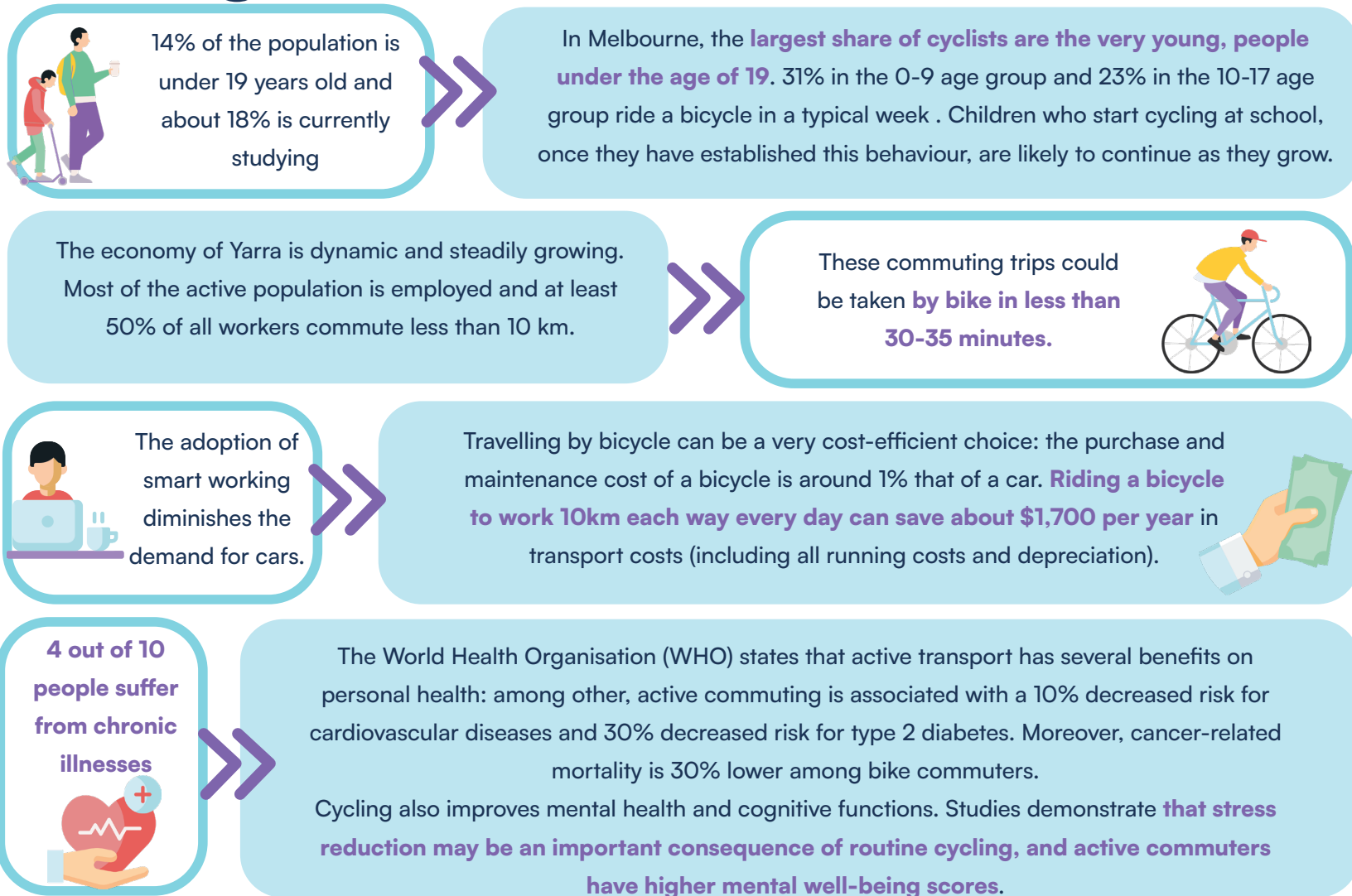


Elaboration on data from VISTA, 2021.

Since 2016 recreational trips exceed work trips



At a glance



Data from AUSTRROADS, 2019, DeWeese et al. 2022, WHO, 2022, Avila-Palencia et al., 2017.



The cycling infrastructure project



Elaboration by Decisio using the TravelTime plugin in QGIS

“Wellington Street is a key cycling route that connects Yarra’s North and East parts to the Melbourne Central Business District. This route is increasing in popularity, with cyclists growing by 20% every year since 2004.”

In 2023, 416 city-bound cyclists were recorded on Wellington Street in the morning rush hour compared with 101 in 2004, a 311% increase in less than 20 years.

The City of Yarra Bike Strategy identifies the street as a priority for improvement, because it would attract new cyclists, retain experienced ones, provide connections to other bicycle facilities and improve safety.

City of Yarra, 2021

Wellington Street: a strategic cycling corridor





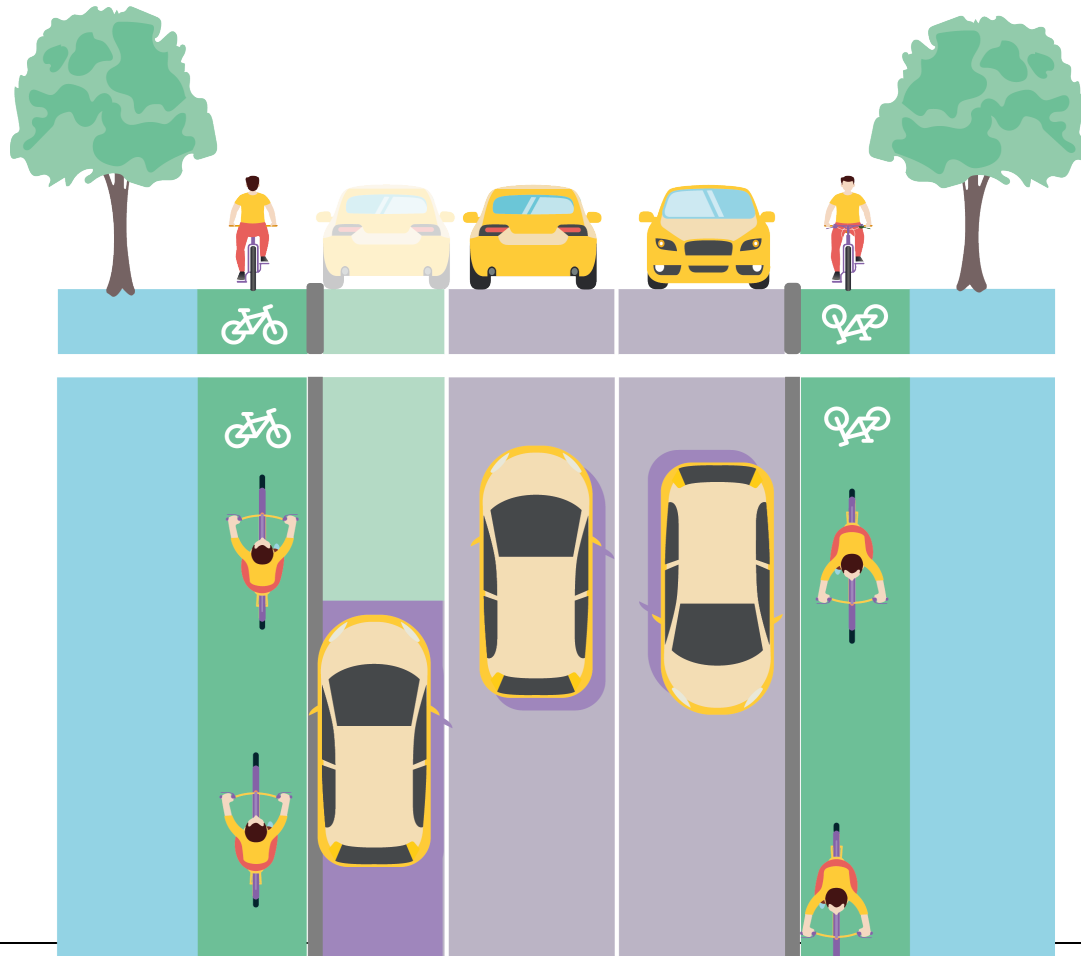
City of Yarra



City of Yarra

Wellington Street is an important part of Melbourne's wider bicycle network, providing key links to the Central Business District via Albert Street and to the North and East parts via Heidelberg Road.

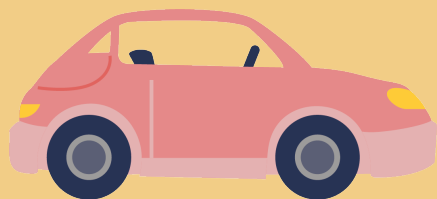
Wellington street new road section





The socio- economic benefits

Traffic



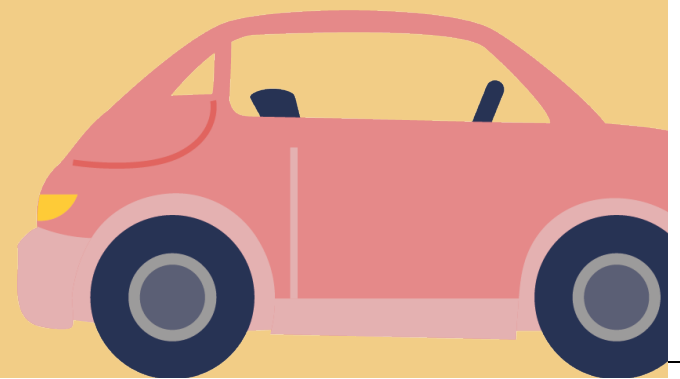
Health



Road Safety



Benefits on traffic



Congestion in Melbourne

In 2022, according to the Tom Tom Traffic Index (TOMTOM, 2022), Melbourne metropolitan area was the 59th most congested city in the world, the second in Australia after Sydney (43th).

The situation was critical during rush hours, when people spent 25 minutes to travel 10km and traffic meant +10 extra minutes.

59

World rank 2022

On average, how long did it take to drive 10Km in 2022?

20min 30s

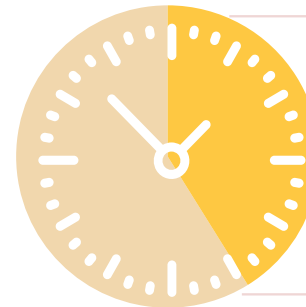
40s more than in 2021

Elaboration on data from TOMTOM, 2021.

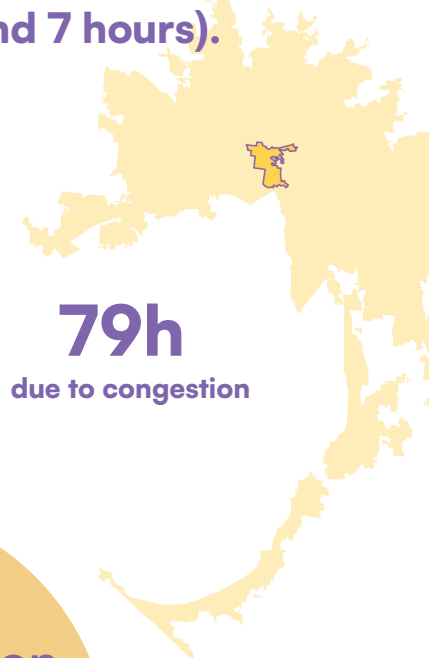
Every person in Melbourne spent on average 192 h for driving, and 79 h were due to congestion (3 days and 7 hours).

192h

Travel time (yearly)



79h
due to congestion



Road congestion in Melbourne costs **\$4.6 billion per year.**

Australian Government, data of 2015



24 km/h

14 min +10 min

24 min

Extra



17 - 24 km/h

25-35 min



19 - 25 km/h

24-32 min

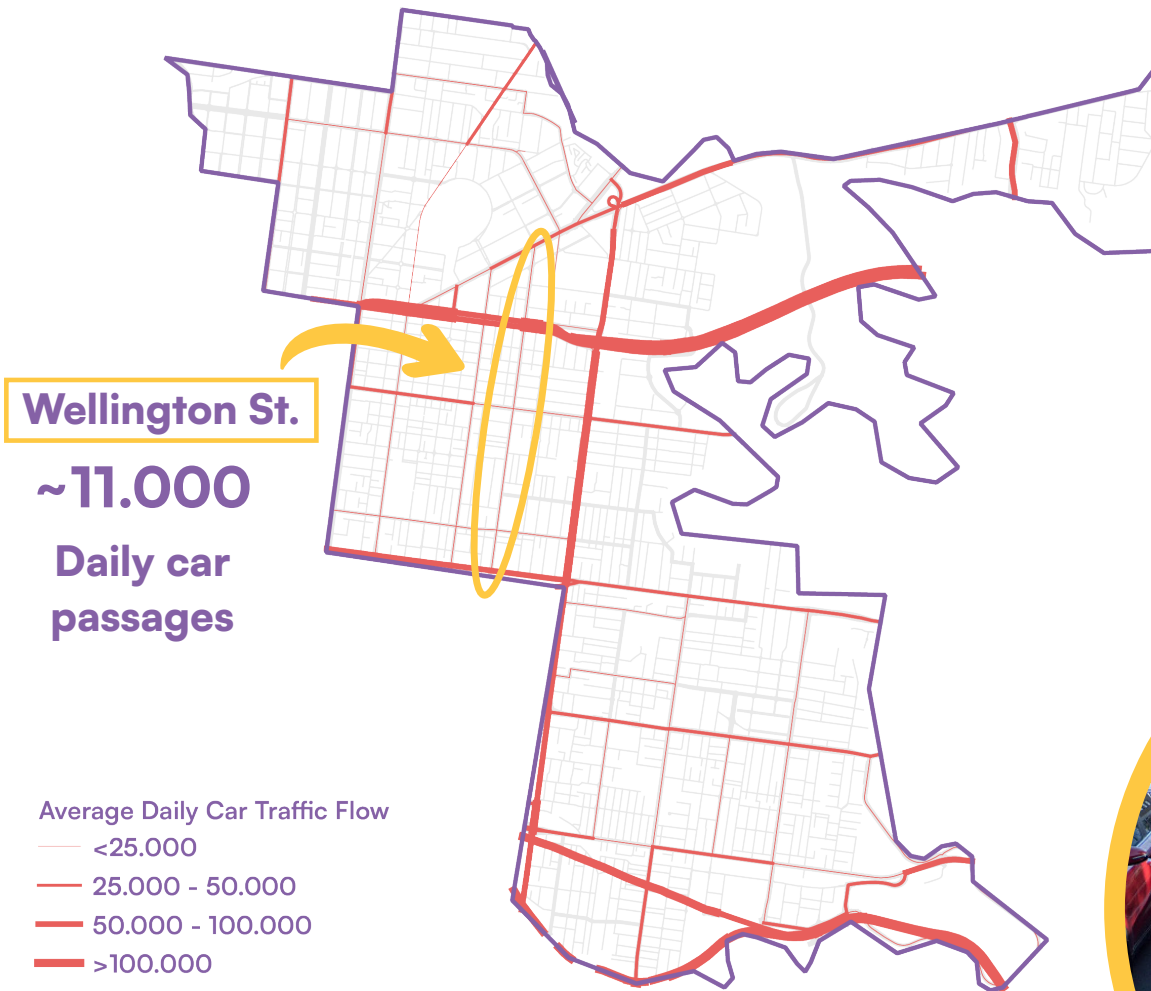


22 - 40 km/h

15-27 min

Elaboration on data from TOMTOM, 2021.

Congestion in Yarra



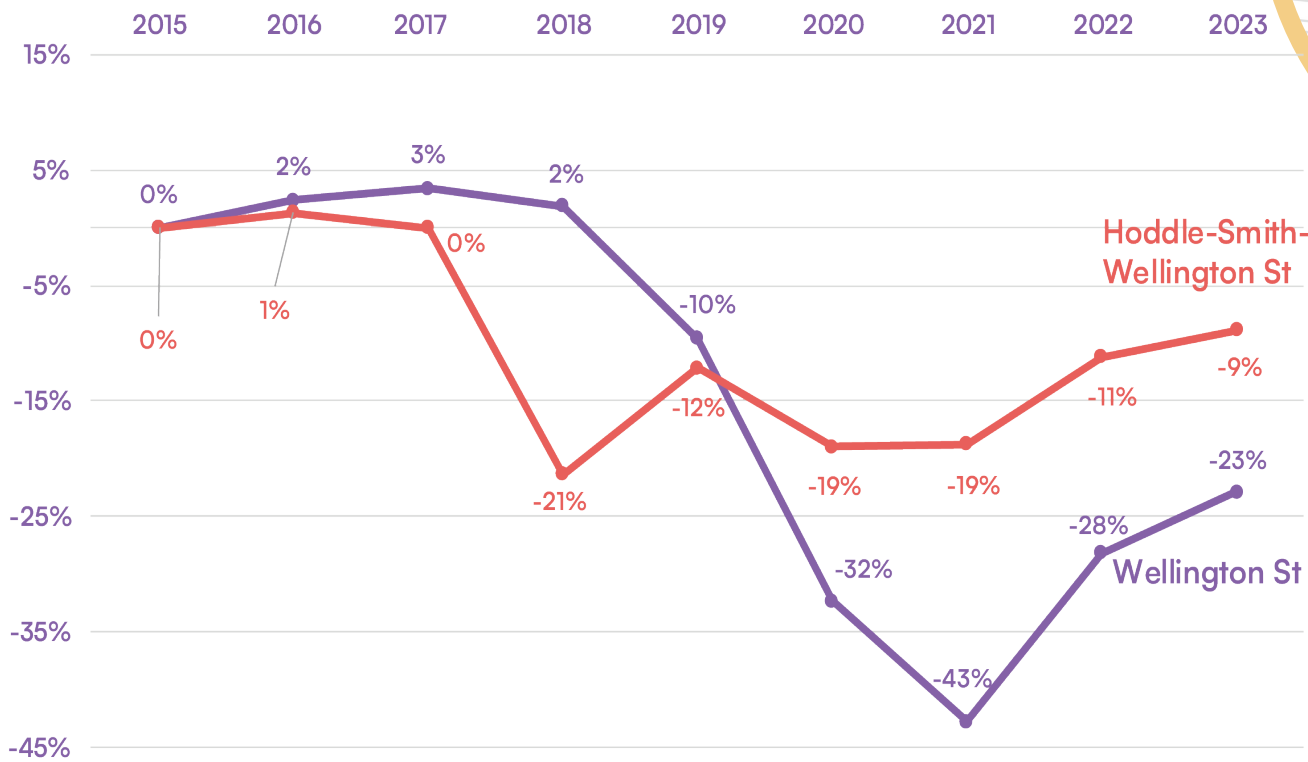
The two most congested roads in Yarra are Alexandra Parade and Hoddle St., with more than 100,000 daily passages of motorized vehicles. On top of this, the two freeway links record more than 200 thousands daily passages.

Although Wellington Street could not be considered as a main artery for car drivers, it still shows significant traffic flows, with an average of around 11,000 daily passages in 2023.



Traffic trends in the Wellington street area

Average daily traffic flow percentage change over 2015

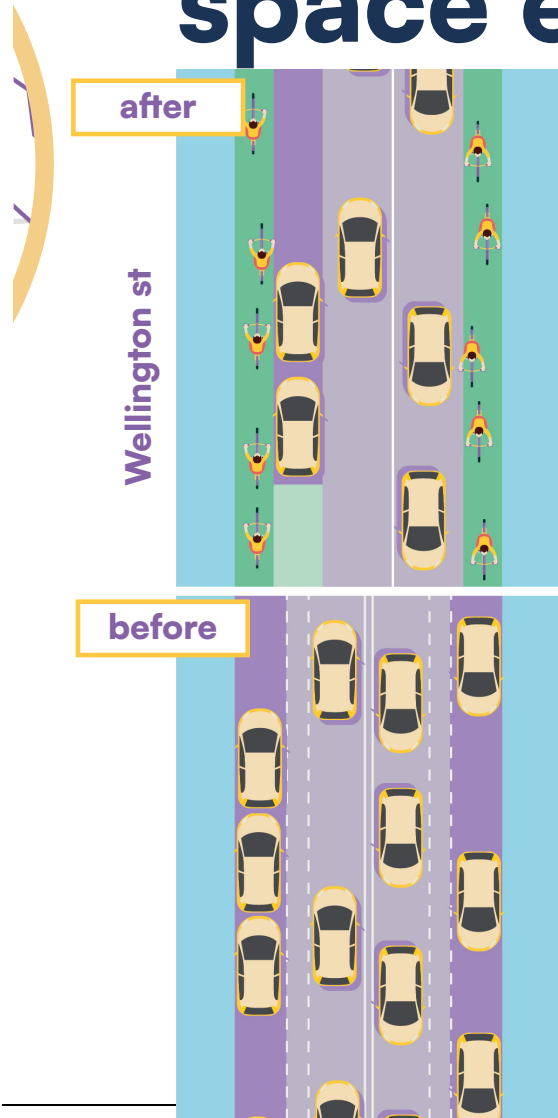


On Wellington street, average daily traffic flow in 2019 and 2022 over 2015, decrease of 19% and in the total area of -12%.

*The years 2020 and 2021 are not accounted because of the Covid-19 pandemic; the year 2023 has only partial data as this report is being written.

Elaboration on data from the City of Yarra.

Corridor capacity and road space efficiency



Transport infrastructure serves the purpose of enabling people to move efficiently from point A to point B. Streets and roads are perhaps the most fundamental of transport infrastructure, and their capacity is a crucial factor in ensuring smooth traffic flow.

Capacity is often measured in vehicles per hour and it is influenced by factors such as lane width, signal timing, and road geometry among others.

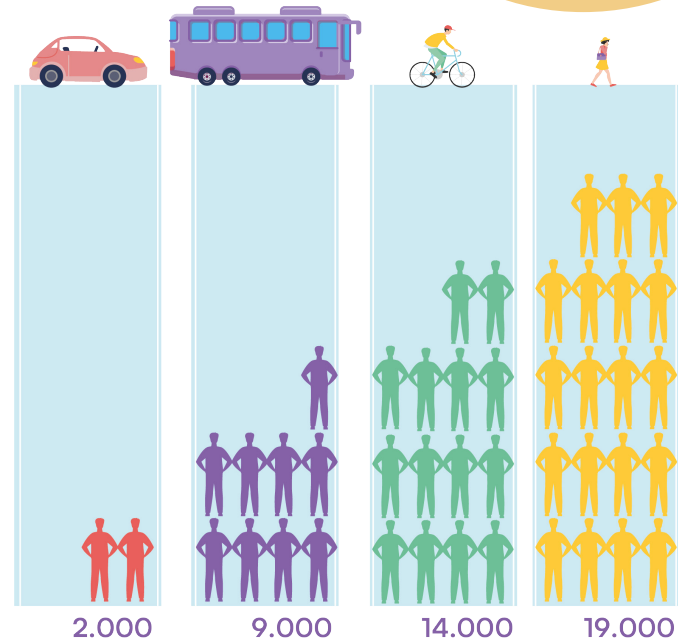
Efficient road design and management are essential to maximize capacity and minimize congestion. In short terms, the more people can move through a corridor in a given time, the more the occupied road space is used efficiently. Different modes of transportation contribute to road efficiency

in different ways: public transit can move many people efficiently, reducing congestion. Carpooling and ridesharing also optimize road usage by maximizing occupancy.

Finally, active modes such as walking and cycling also can contribute to a less congested road system.

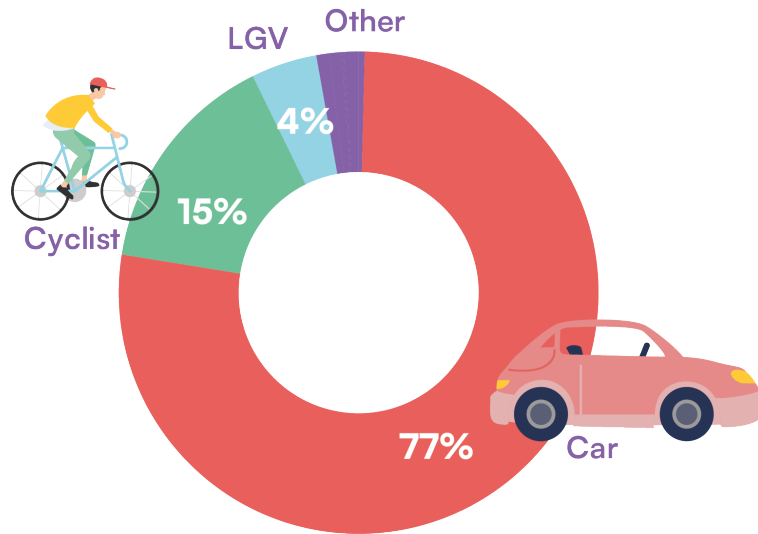
Walking and cycling infrastructure can actually reduce traffic congestion.

Corridor capacity people per hour on a 3.5 wide line in a city



Socio-economic benefits on traffic

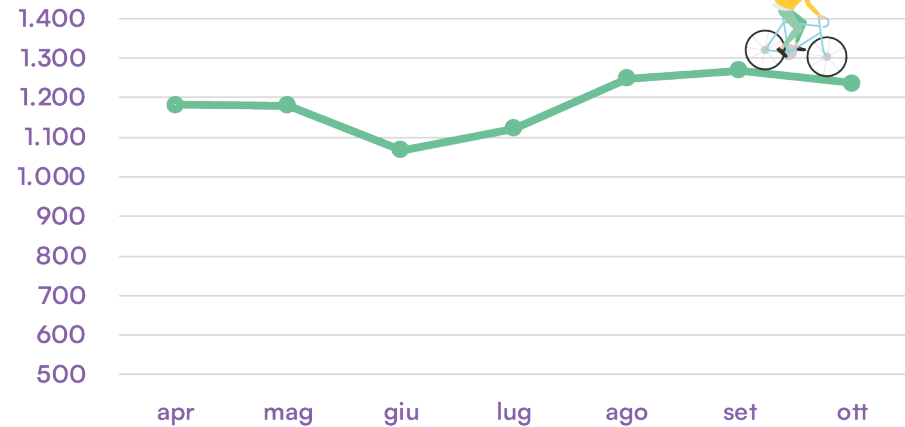
Wellington St. Modal share 2023



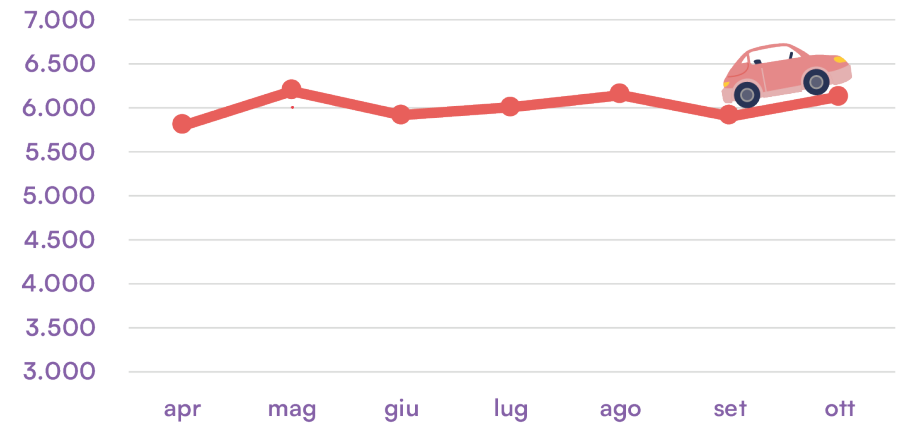
Who is moving through Wellington Street?

Most of the people (77%) move by car, 15% move by bike and 4% drive LGV. However, this pattern has been changing significantly over the last years.

Seasonal daily Bike flow 2023



Seasonal daily Car flow 2023



Elaboration on data from the City of Yarra.

What has been the effect of the cycling infrastructure addition in Wellington Street on traffic congestion?

After the construction of the first portion of the cycling infrastructure in Wellington Street, the average daily traffic decreased about -20% with respect to pre-pandemic levels, compared to a reduction of about -12% in other surrounding roads.

average
traffic
decreased
-20%

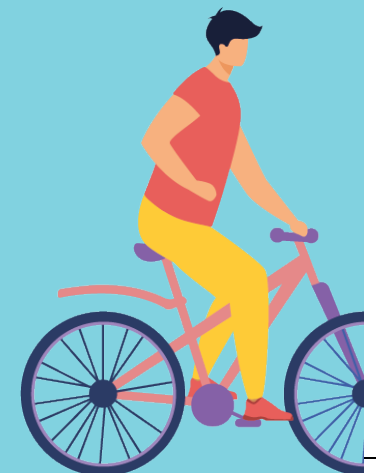
and on other
roads in the
surroundings?
-12%

The socio-economic benefits of the cycling infrastructure related to traffic can thus be conservatively estimated to be due to this -8% reduction in daily traffic compared to neighbouring streets, equivalent to about 2.635 vehicles per day.

Since the
construction of the
cycle path in 2015
the **social benefit**
on traffic congestion
has been
\$7.2 Million.



Benefits on health



Physical inactivity in Australia

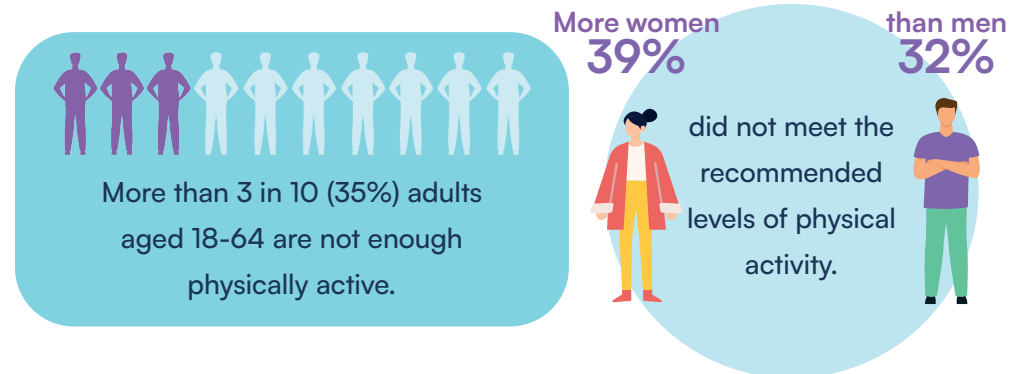
The Department of Health and Aged Care has the goal to make Australians understand the benefits of being physically active. In the Australian Physical Activity and Sedentary Behaviour Guidelines 'being physically active' is described as:

“Being active on most, preferably all days with at least 150 minutes of moderate to vigorous activity per week.”

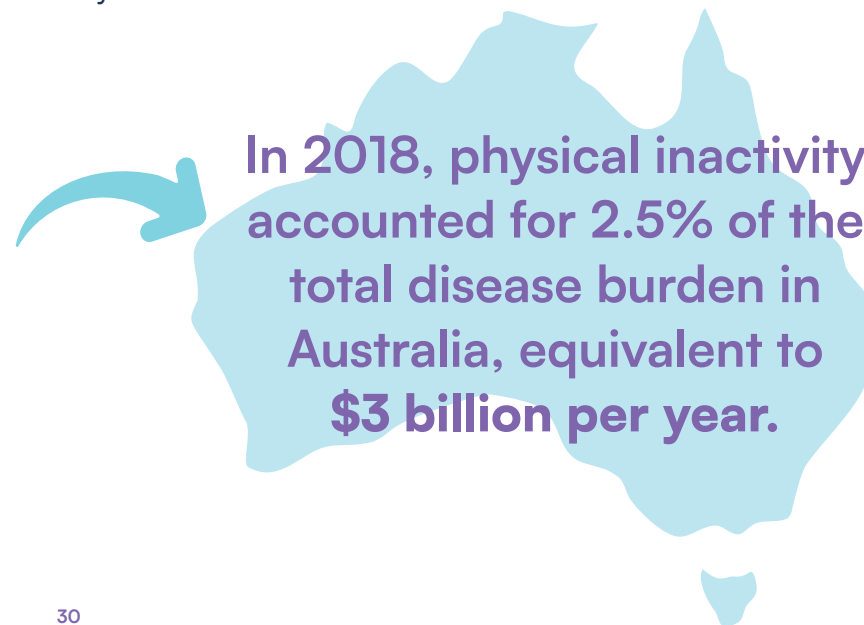
Physical inactivity contributes to:

- 20% of type 2 diabetes total disease burden.
- 16% of coronary heart disease burden.
- 16% of the uterine cancer burden.
- 12% of bowel cancer burden.
- 12% of dementia burden.
- 9.2% of stroke burden.
- 3.2% of breast cancer burden.

Physical inactivity also contributes to 8,253 deaths (5.2% of all deaths).



The proportion of people who are not enough physically active generally increases with age: 29% of adults aged 18-24 versus 50% of people who are 65+ years old.



The health benefits of cycling

Obesity and weight control

Cycling proves to be an effective means of weight management, given its capacity to elevate the metabolic rate, promote muscles development, and facilitate the reduction of body fat. Moreover, cycling offers a comfortable workout option with the flexibility to adapt the duration and intensity according to personal preferences, allowing for a gradual buildup and customization of the exercise routine.

Research advises achieving a caloric expenditure of approximately 2,000 calories per week through physical activity: a steady cycling session burns around 1,200 kilojoules (roughly 300 calories) per hour.

When you cycle twice a day, the burnt calories accumulate significantly: The Victorian Government reports that a daily half-hour bike ride can lead to the loss of nearly five kilograms of fat over the course of a year (VICGOV).



Health benefits of regular cycling include:

Physical benefits

- Increased cardiovascular fitness.
- Increased muscles strength and flexibility.
- Improvement in joint mobility.
- Improved posture and coordination.
- Strengthened bones.
- Reduction in body fat levels.
- Disease prevention or management.

Psychological benefits

- Reduction of anxiety and depression.
- Improved sleep-wake rhythm.
- Reduction in stress levels.

Elaboration from AIHW, 2022.

Cardiovascular diseases

Heart diseases and stroke are the two leading causes of death in Australia.

At least 150 minutes a week of moderate physical activity can reduce their impact, and the more the better.

Regular physical activity can also lower blood pressure and improve cholesterol levels.

150 minutes a week of moderate physical activity.



Several cancers

Being physically active reduces the risk of developing several common cancers. Adults who engage in more physical activity have a reduced risk of developing cancers of the:

Bladder
Breast
Colon (proximal and distal)
Endometrium
Esophagus (adenocarcinoma)
Kidney
Lung
Stomach (cardiac and non-cardiac adenocarcinoma)

An illustration of a person's body in a light blue color, with various organs labeled with text. The labels are positioned around the body: Bladder (top right), Breast (middle right), Colon (proximal and distal) (middle left), Endometrium (middle right), Esophagus (adenocarcinoma) (middle right), Kidney (lower middle right), Lung (lower middle right), and Stomach (cardiac and non-cardiac adenocarcinoma) (lower middle right).


Type 2 diabetes and metabolic syndrome

Regular physical activity can reduce the risk of developing type 2 diabetes and metabolic syndrome (a combination of too much fat around the waist) high blood pressure, low high-density lipoprotein (HDL) cholesterol, high triglycerides, or high blood sugar.

People begin to see the benefits of physical activity even before meeting the recommendations of 150 minutes per week of moderate physical activity. Additional amounts of physical activity appear to further reduce this risk.

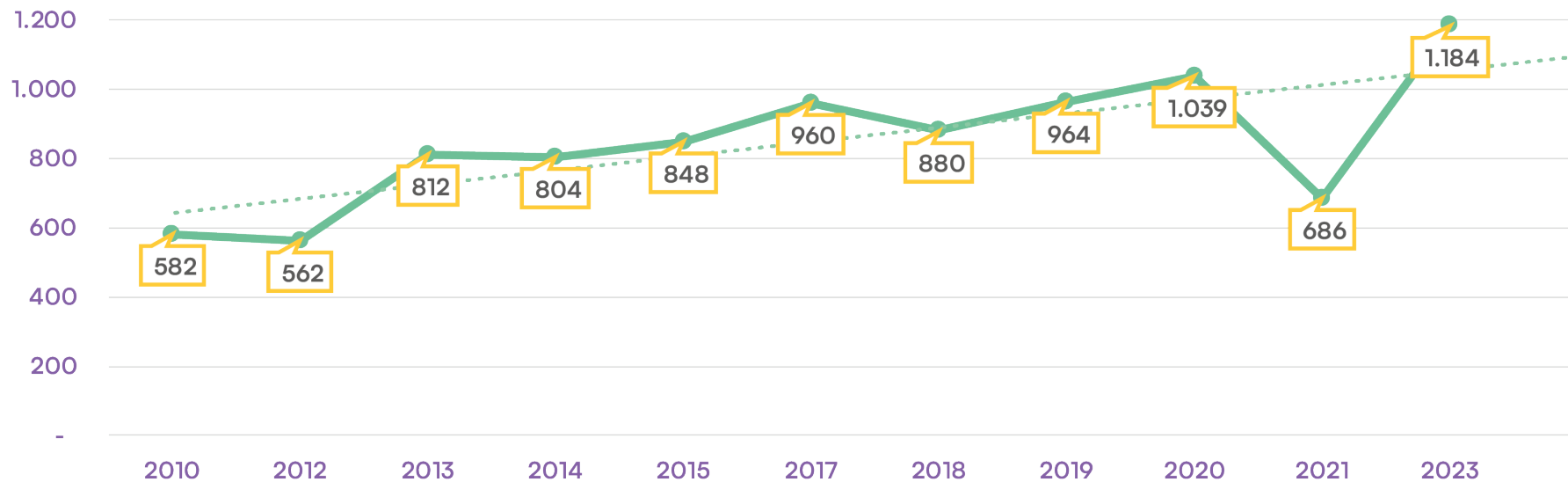
Bike traffic in Wellington Street

+250 daily bike passages in the last 8 years

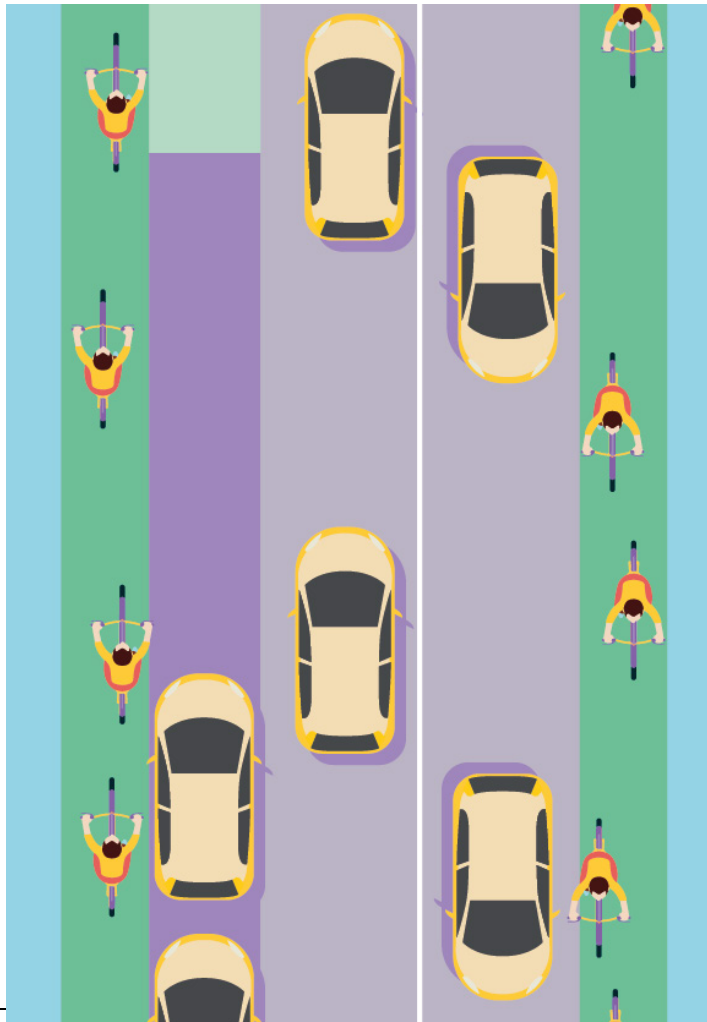


+35% daily bike passages in the last 8 years

Daily bicycle counts in Wellington St./Johnston St.



The health benefits of Wellington Street



The health-related impacts of the improvements on Wellington Street amounted to \$460,000 per year since 2015.

The **health-related social benefits** of adding the cycling infrastructure amounts to about **\$3.7 Million** in the 2015-2023 period.



Benefits on road safety

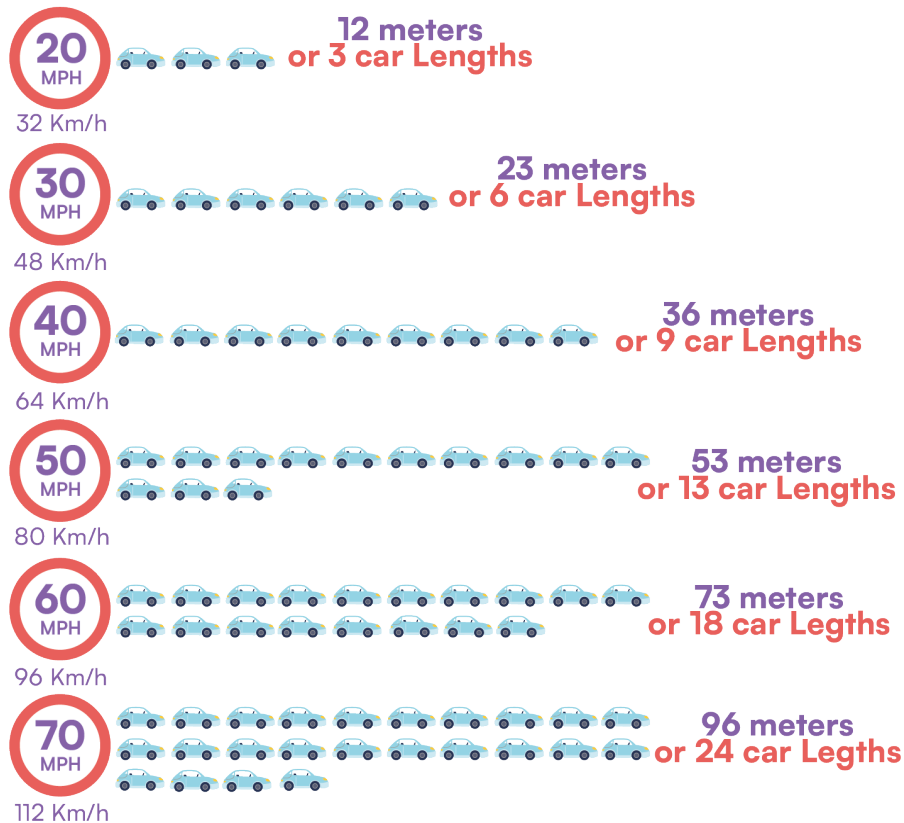


Speed and road safety

Speed increases the rates and the severity of road crashes

Typical stopping distances

At different speeds

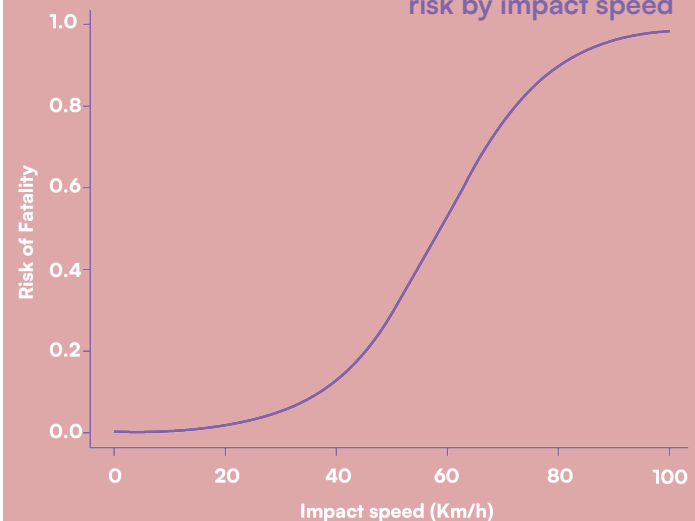


Elaboration from NACTO, 2020.

36

According to Hussain et al. (2019), a meta-analysis of fifty-five studies indicates that when the estimated impact speed increases by 1 km/h, the odds of a pedestrian fatality increase on average by 11%. The risk of a fatality reaches 5% at an estimated impact speed of 30 km/h, 10% at 37 km/h, 50% at 59 km/h, 75% at 69 km/h, and 90% at 80 km/h.

Plot for shaped curve for pedestrian fatality risk by impact speed

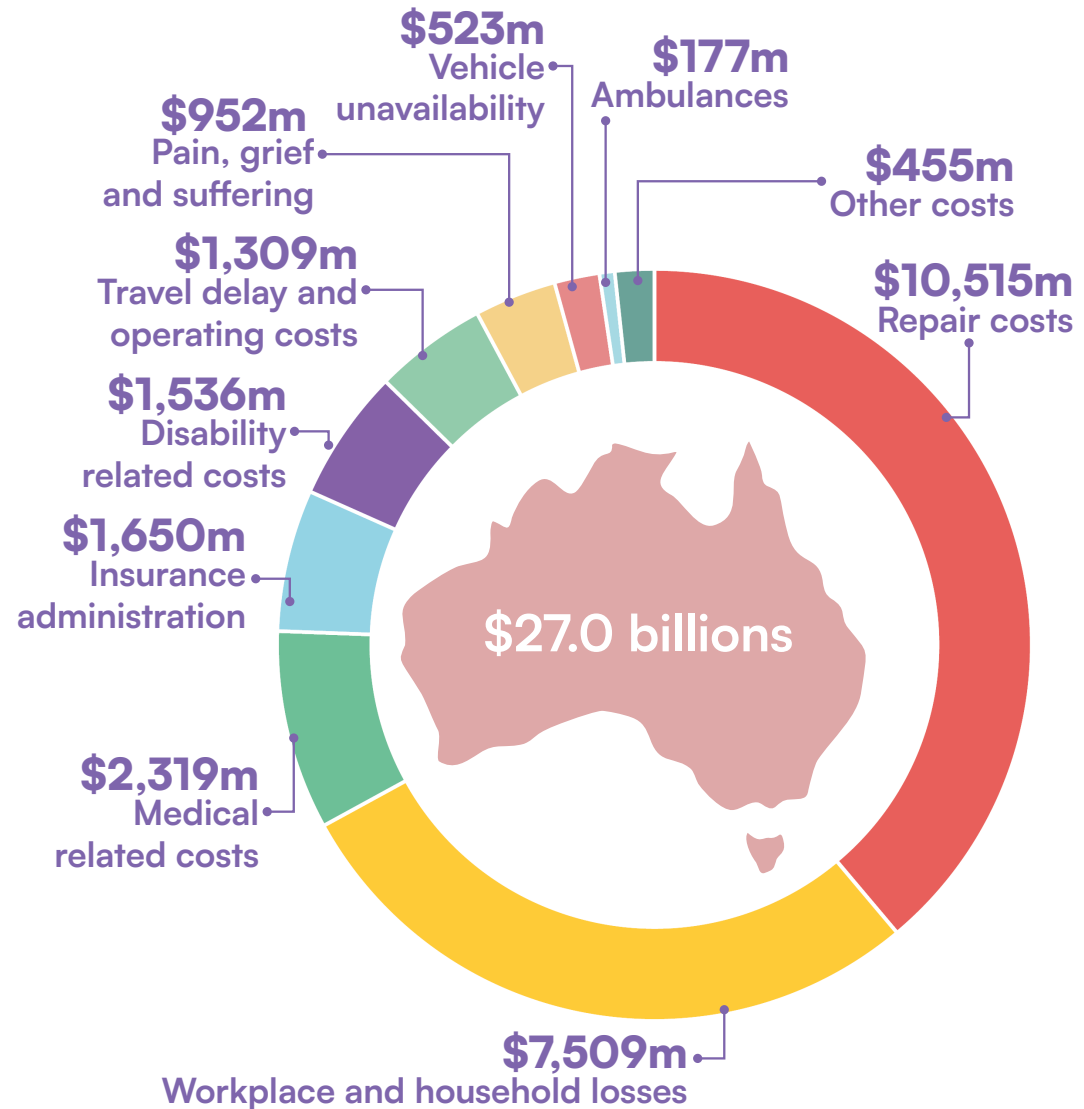


The social costs of crashes in AU

The economic toll of road crashes in Australia in 2020, calculated through the Hybrid Human Capital approach, was in the range of \$22.2 billion - \$30.3 billion, with a median reference value of about \$27 billion, equivalent to 1.4% of the national Gross Domestic Product (the range is due to the inherent uncertainties in the estimation process).

Within this total, fatal accidents accounted for an estimated \$3.5 billion (13%), injury-related accidents for \$11.8 billion (44%), and property damage-only for about \$11.7 billion (43%).

Remarkably, the sum of workplace and household losses and the social costs associated with pain, grief, and suffering amounted to 32% of the overall financial burden attributed to road crashes in Australia.



Elaboration on data from Steinhauser et al., 2022.

The social cost of crashes by severity

Between 2016 and 2020, there were approximately 966,000 road crashes each year in Australia, involving 1.7 million vehicles. In comparison, in 2006 (the reference year for the last Australian Costing Study published by the Bureau of Transport Economics) an estimated 654,000 crashes involved around 1.2 million vehicles.

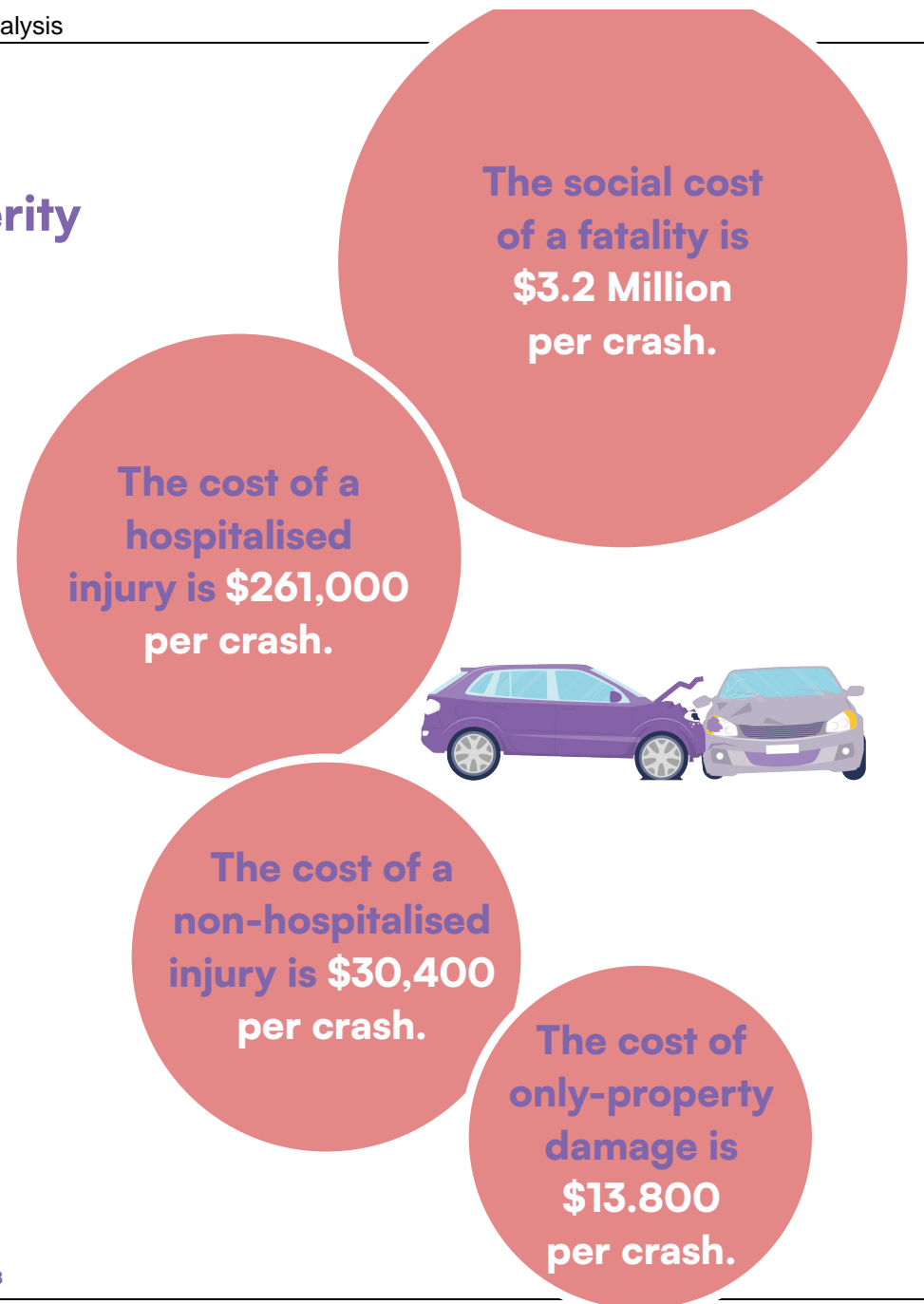
At the same time, over the 2016 to 2020 period, an average of 1,187 fatalities per year were due to road crashes, a 26% decrease with respect to the 1,602 fatalities recorded in 2006.

The amount of car crashes has thus increased in the past 15-20 years, but the likelihood of a fatality has decreased significantly.

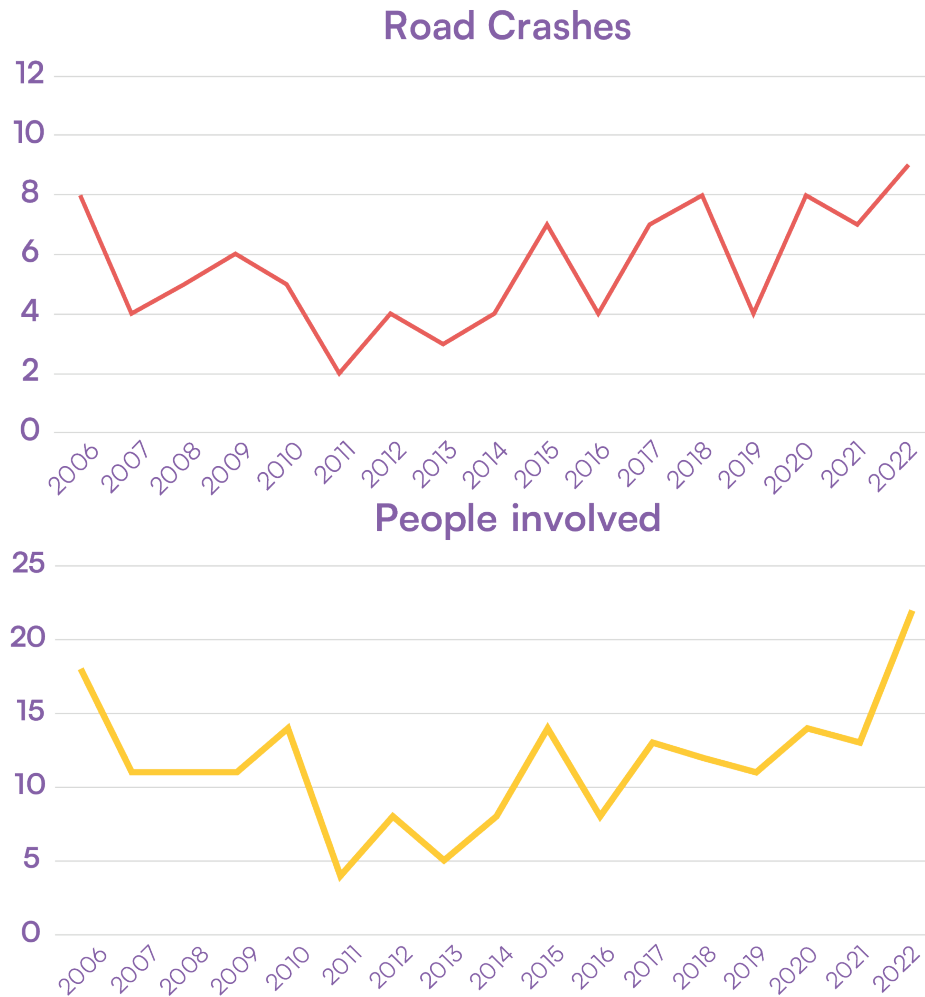
The estimated average social cost for a crash depends on its severity, and is estimated on average at:

- \$3.2 million if the crash caused one fatality.
- \$261,000 if the crash caused one hospitalized injury.
- \$30,400 if the crash caused one non-hospitalized injury.
- \$13,800 if the crash cause only property damage.

(Social Cost of Road Crashes Report for the Bureau of Infrastructure and Transport Research Economics Final report September 2022)



Crashes on Wellington Street



Since 2006, 96 road crashes occurred in Wellington Street, and over 205 people were involved. Data show great variability over the years: the number of both crashes and people involved decreased between 2010-2013 but increased again around 2018, a peak year.

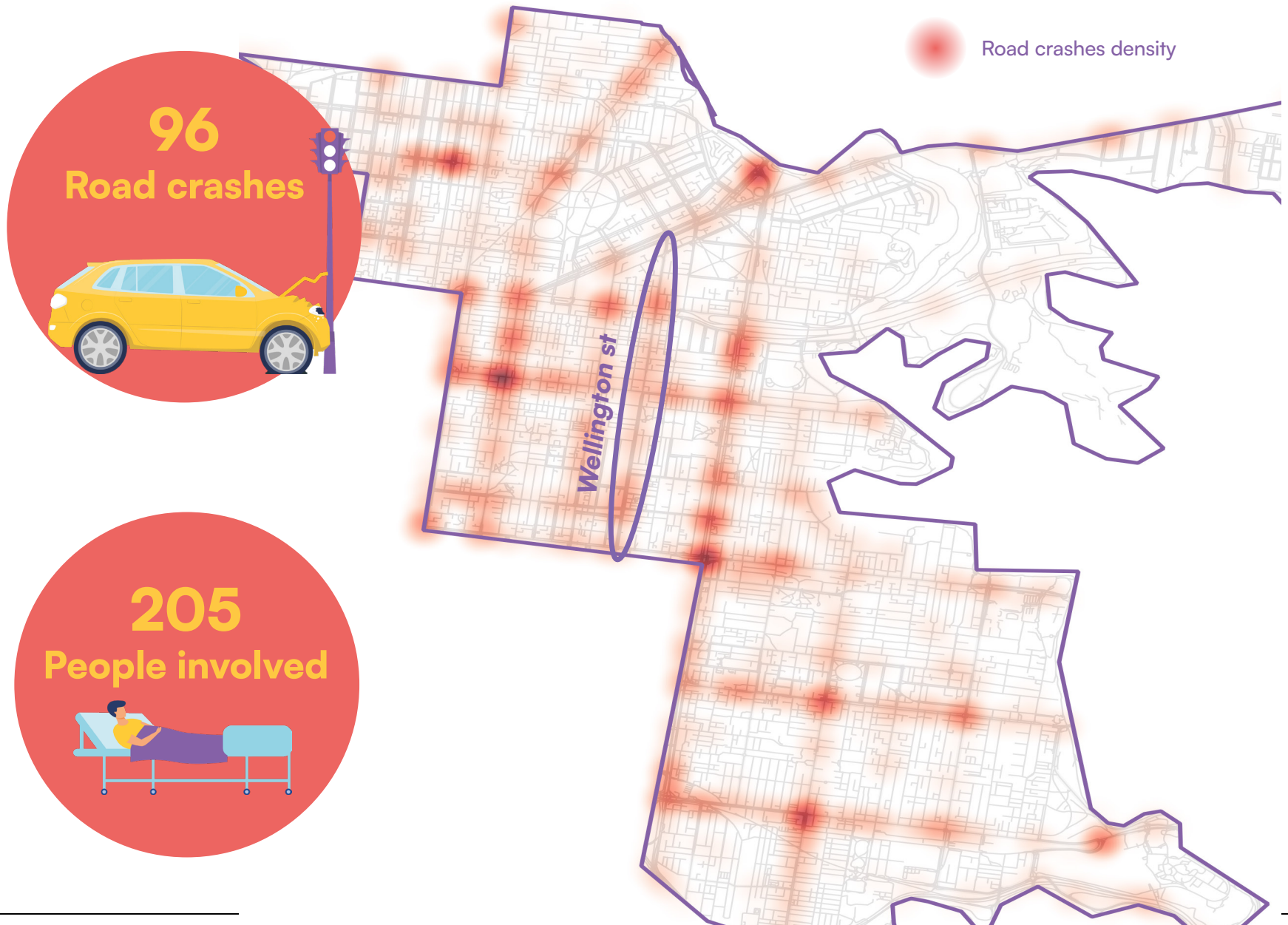
The impact of Covid had a positive effect on reducing accidents, but in recent years, the number of crashes has started to rise again.

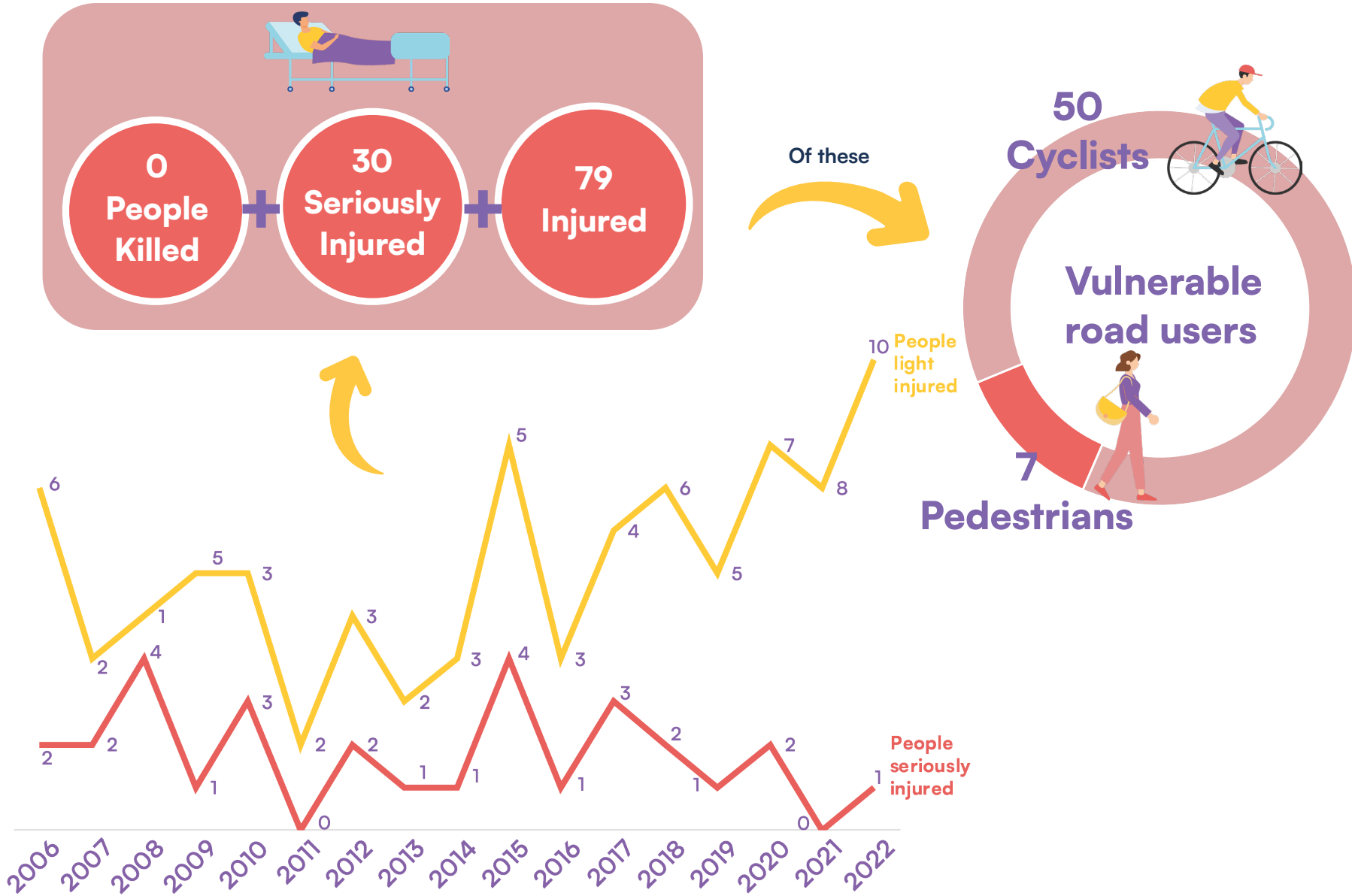
To identify potential improvements resulting from new policies or infrastructure, it is crucial to analyze trends in road crashes. Given the significant variation in crash rates over the years due to changing conditions, a thorough examination of data trends is essential.

This analysis allows for a more nuanced understanding of the effectiveness of interventions and highlights areas that may require targeted interventions or further enhancements in road safety measures.



Elaboration on data from the City of Yarra.

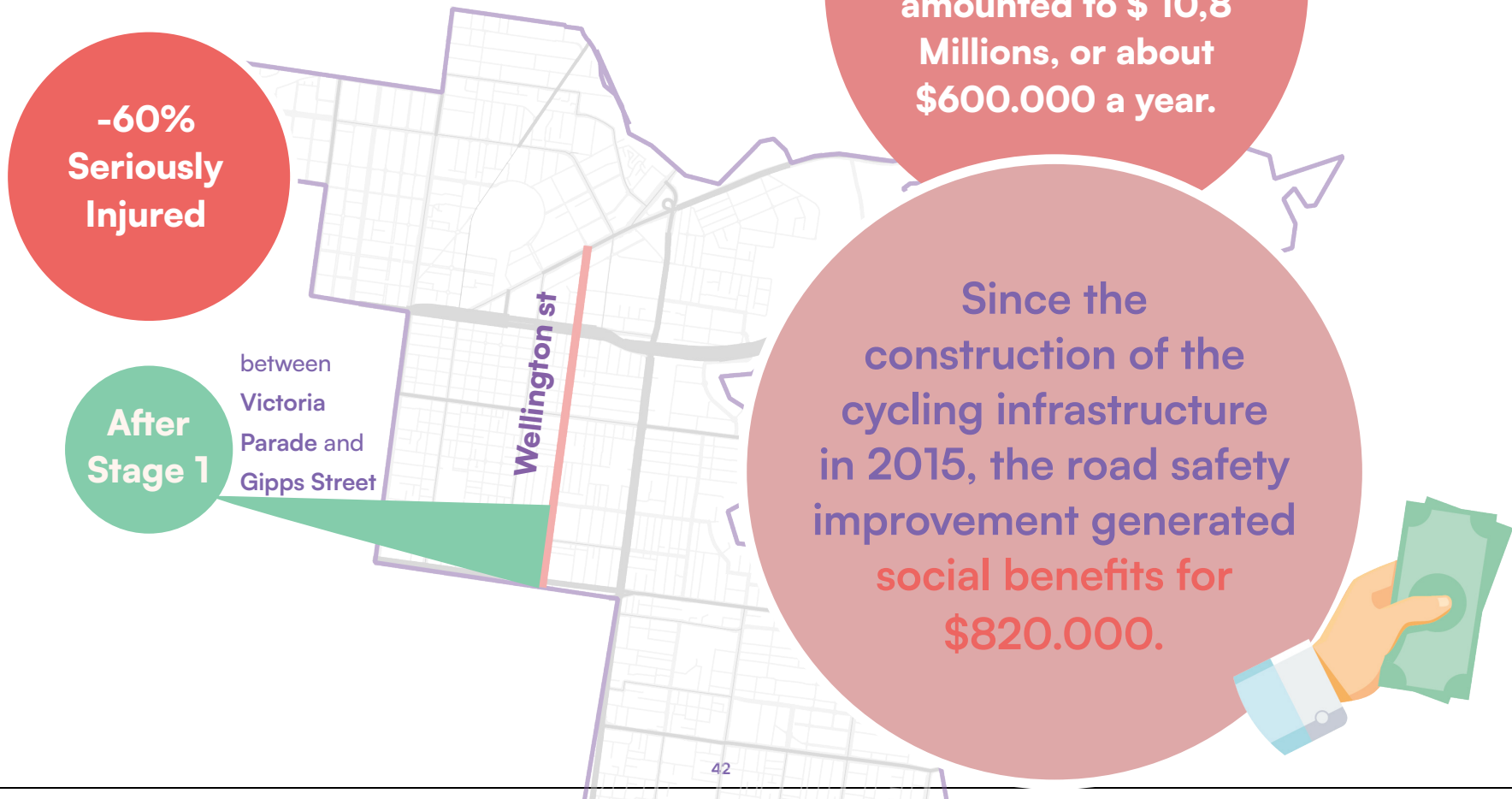




Elaboration on data from the City of Yarra.

The benefits on road safety

After the construction of the first stage of the cycling infrastructure in Wellington Street, the number of seriously injured people has decreased about 60%, even if the number of yearly crashes has remained basically stable.



Other socio-economic benefits

Energy Conservation

Motor vehicles production and use consume large amounts of natural resources and energy. This consumption imposes various external costs, including economic and national security impacts from dependence on imported fossil fuels, especially oil, as well as environmental and health damages from pollution.

Active transport can provide significant energy savings when it substitutes car use for short urban trips that have high emission rates per mile due to cold starts (engines are inefficient during the first few minutes of operation) and congestion. As a result, each 1% shift from automobile to active travel typically reduces fuel consumption 2-4%.

In addition, as previously described, active transport tends to have leverage effects, so comprehensive active mode improvements can provide additional energy conservation benefits.

Security / Reduced Crime Risk

Enhancing walking and cycling conditions not only directly increases security through measures like patrols and landscaping but also indirectly by fostering community engagement and economic opportunities, reducing crime risks. Studies show that compact, mixed, and walkable communities exhibit lower per capita crime rates.

Gilderbloom et al. (2015) linked Walk Score to decreased crime in Louisville. Twinam (2018) found crime diminishing with population density in Chicago, and Chang and Jacobson (2017) associated decreased crime rates in Los Angeles with enhanced walkability, emphasizing the importance of “eyes on the street.”

Parking Cost Savings

An urban parking space incurs annualized costs ranging from \$500 to \$3,000 covering land, construction, and operating expenses, with an average of two to six off-street spaces per vehicle (Litman, 2023). Conversely, accommodating pedestrians involves minimal costs for umbrella stands and coat racks, while the space needed for one car can house 10-20 bicycles. Although reduced car travel may initially lead to empty parking spaces, in the long term parking facilities incur opportunity costs as well. Diminished demand allows property owners to refrain from expanding parking, providing opportunities to rent, sell, or repurpose these facilities for other uses.

of cycling infrastructure

Barrier Effect

The barrier effect, also known as severance, describes the travel delay imposed on active modes by vehicle traffic, akin to congestion for non-motorized users (Litman, 2023). This curtails active mode accessibility, prompting shifts to motorized travel and escalating external costs like traffic and parking congestion.

Transport planning decisions influence this effect:

- highway expansion exacerbates it, while traffic calming and mobility management strategies alleviate it.
- Active mode enhancements, such as separated paths and improved crosswalks, can also mitigate the barrier effect.
- Land use changes that reduce the need for pedestrians and cyclists to cross major roadways contribute to minimizing barrier effects by integrating schools and shops within residential neighborhoods.

Social Equity Benefits

Equity in transportation involves the fair distribution of impacts and their perceived appropriatedness. In particular, horizontal equity advocates treating individuals with similar abilities in a similar way, suggesting comparable costs and access to public resources unless justified otherwise. Vertical equity, concerning income and transportation ability, aims to safeguard the interests of lower-income and mobility-impaired individuals, respectively. Enhancing conditions for active travel supports equity objectives by allocating resources fairly to non-drivers and providing essential mobility for those physically, economically, and socially disadvantaged. In many communities, 20-40% of the population faces barriers to driving due to disability, low income, or age, making improvements in walking and cycling infrastructure beneficial for both existing and new users.

Option Value

The term 'option value' refers to the worth individuals assign to having an available transport option, even if not presently utilized, as an alternative to the one they preferably use (Litman, 2023). Given the diverse roles of walking and cycling, serving as basic mobility, affordable transport, recreation, and exercise, their potential option value is substantial. The "Transport Diversity Value" chapter in Transportation Cost and Benefit Analysis (Litman, 2023) estimates a value of 0.07\$ per passenger-mile for improvements in affordable alternative modes. However, this valuation can significantly vary based on conditions and assumptions.



Conclusions

The present report investigated the socio-economic benefits derived from the cycling infrastructure that has been built in Wellington Street in Yarra, Melbourne, in the recent years. The objective of the report was to assess the impact of the bike lane on various aspects, including traffic, health, and road safety, in order to improve the understanding of the contribution cycling can give to the sustainable development of the society and economy in the City of Yarra.

In addition, the City is currently investigating the possibility of expanding the infrastructure up until the intersection between Wellington Street and Queens Parade. Therefore, the report has the additional aim to provide decision-makers with relevant and data-based information about the expansion of cycling infrastructure in the neighbourhood.

Following a thorough analysis of the socio-economic context of the area and a detailed description of the cycling infrastructure, the document proceeds with analysing several impacts of the bike lane on Wellington Street. First of all, an assessment of the reduction in traffic on Wellington St is provided by comparing the evolution of traffic in the Street and at different scales in the surrounding areas. The benefits on health were determined by calculating the increasing trend of cyclists along the road, considering the positive socio-economic effects of cycling on health. Finally, the impact on road safety was calculated by evaluating the reduction in road crashes in Wellington Street utilizing data on the social cost of incidentality in Australia.

Since 2015, the socio-economic effects of the Wellington Street bike lane amounted to \$7.2 million from traffic reduction, \$3.7 million from health benefits, and \$820,000 from the improvement in road safety.

In addition, cycling infrastructure yields various societal benefits, with some extending beyond the impacts evaluated in this report. The presence of bike lanes can contribute to a reduction in crime risk in the area where they are built, providing an additional layer of safety. Furthermore, cycling infrastructure can offer an option value for commuters, presenting an alternative and sustainable mode of transportation. Additionally, they also can play a role in enhancing social equity within society by promoting accessibility and inclusivity.

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