

Examining Transportation Accessibility of Recent Immigrants

in Winnipeg, Manitoba

University of Manitoba

Gisele Sobhan-Sarbandi | Winter 2021

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INTRODUCTION

An urban transportation system is a crucial infrastructure the successful resettlement of recent immigrants (immigrated between 2011 and 2016). Research suggests recent immigration status as a social indicator to identify socioeconomically disadvantaged groups because

- many recent immigrants are more likely to work in lower-wage jobs (Foth et al., 2013)
- have higher rates of unemployment (Foth et al., 2013)

Many recent immigrants largely rely on public transit services to access key destinations (e.g., destinations for working, shopping,

health care, food shops, etc.) (Blumenberg & Smart, 2014). Recent immigrants who do not have access to adequate transportation services are at risk of "transport poverty". Transport poverty may occur when socioeconomic disadvantages (e.g., low-income, language barrier, disability) are combined with transport disadvantages (e.g., inadequate access to transit services or no access to a car) (Lucas, 2012). Transport poverty leads to inaccessibility to key destinations. It can potentially prevent recent immigrants from participating in social activities and programs and is linked to worsened emotional well-being (Farber et al., 2018).

In Winnipeg, Manitoba, recent immigrants are

nearly 7% of Winnipeg's total population and represent a significant group (Statistics Canada, 2017). However, there is limited research on the transportation experiences of recent immigrants in Winnipeg, Manitoba. This study seeks to fill this gap by analyzing the possible levels of transit accessibility of recent immigrants to employment (i.e., low-wage jobs) and compares it with their car accessibility.

METHODOLOGY

This study uses

- the geographic information system (GIS) to measure gravity-based accessibility by transit and private automobile to low-wage jobs (jobs paying \$16/hour or less) in the Winnipeg census subdivision
- the 2016 census dissemination areas (DA) and the 2006 census tracts (CT) as the geographical bases to model the home locations and low-wage

job locations, respectively (Statistics Canada, 2017; Statistics Canada, 2006)

The accessibility is measured as follows:

$$A_i = \sum_{j=1}^J O_j f(t_{ij})$$

A_i is the accessibility to the number of low-wage jobs for zone i , O_j is the number of low-wage job opportunities at zone j , and t_{ij} is the travel time from i to j . $f(t_{ij})$ is the inverse-power function that weights nearby low-wage job opportunities higher than those further away. The function is calculated as follows:

$$f(t_{ij}) = 140(70 + t_{ij})^{-1} - 1$$

This function returns a weight

of 0.5 for a 23-minute trip (i.e., the median travel time for commuting in Winnipeg) (Statistics Canada, 2017), ranging from a weight of 1 at $t_{ij}=0$, and a weight of 0 at $t_{ij}=70$

LIMITATIONS

The methodology of this study has limitations. For example:

- the job data acquired from the 2006 census which may not perfectly reflect the current geography of low-wage jobs in Winnipeg;
- the measured travel times would not accurately represent the travel time to the actual location of low-wage jobs; and
- the inherent temporal variations in transit schedules for public transit was not considered.

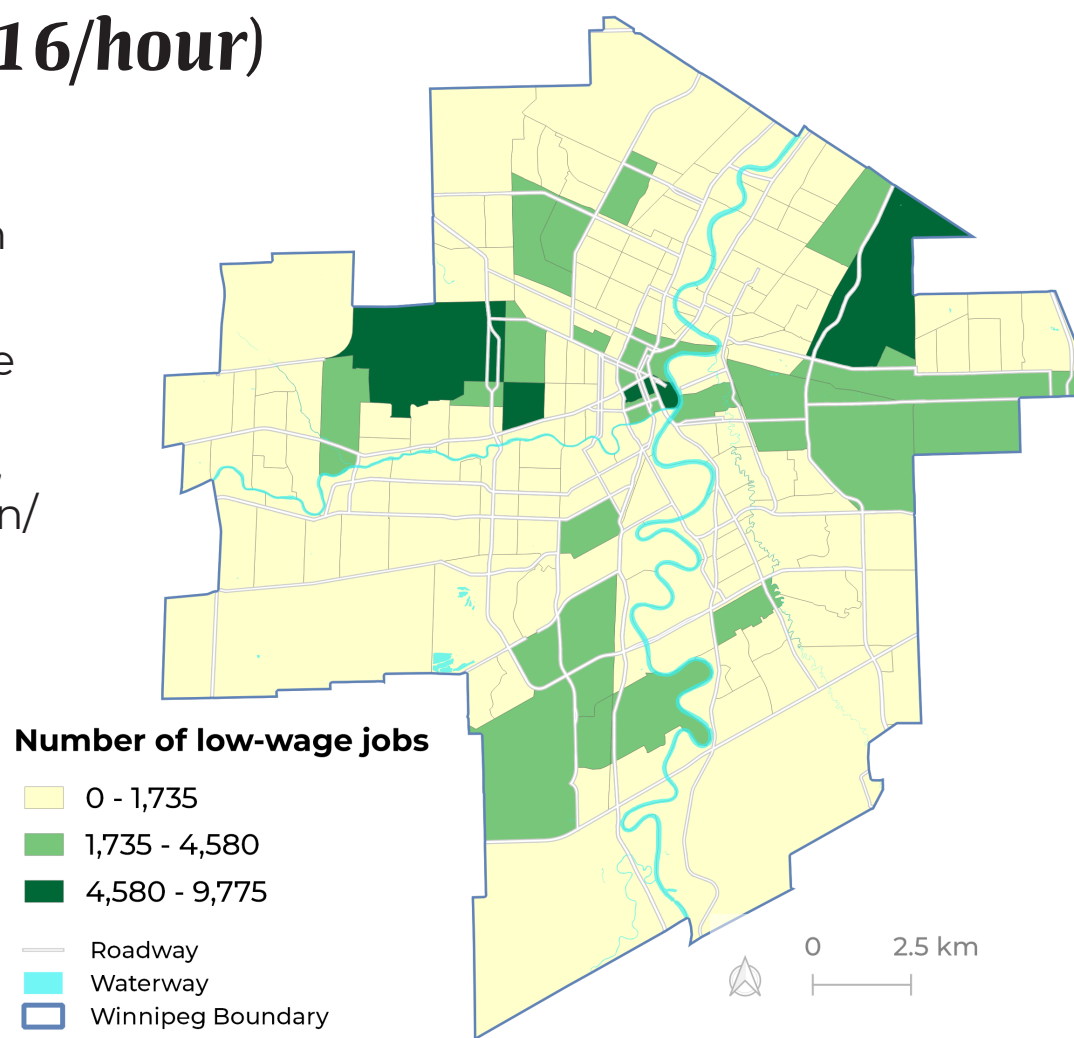
RESEARCH QUESTION

- What are the levels of access by transit compared to that by private automobiles, particularly for recent immigrants, in Winnipeg, Manitoba?
- What is the extent of "transport poverty" among recent immigrants in Winnipeg, Manitoba?

FINDINGS

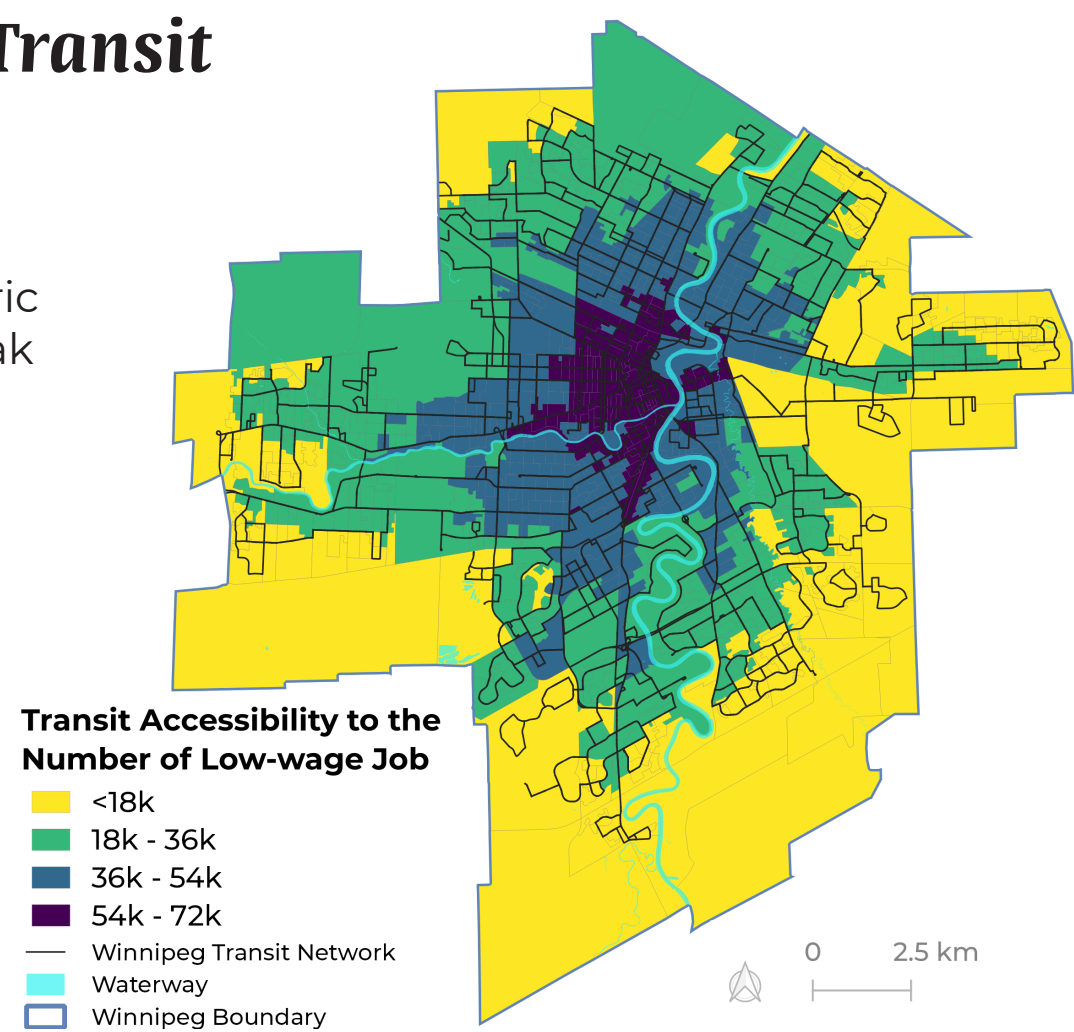
1. Distribution of Low-wage jobs (<\$16/hour)

- There are 162,000 "low-wage" jobs in Winnipeg.
- Low-wage jobs are more prevalent in Central Winnipeg, near the airport, in/around The Polo Park, in the East, and in/around the University of Manitoba.



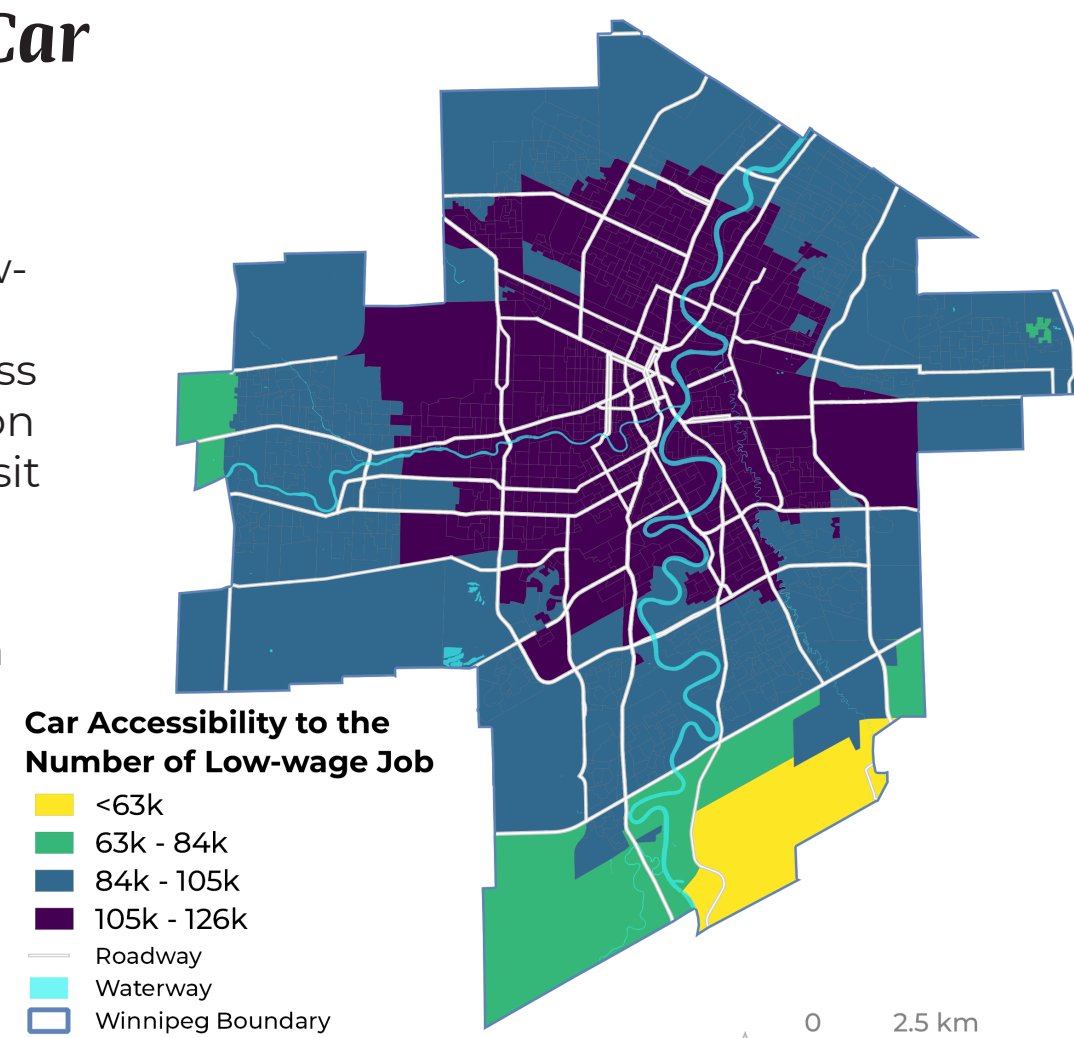
2. Accessibility to Low-wage Jobs by Transit

- Transit access to low-wage jobs follows a concentric pattern with a peak in the Winnipeg Downtown area.



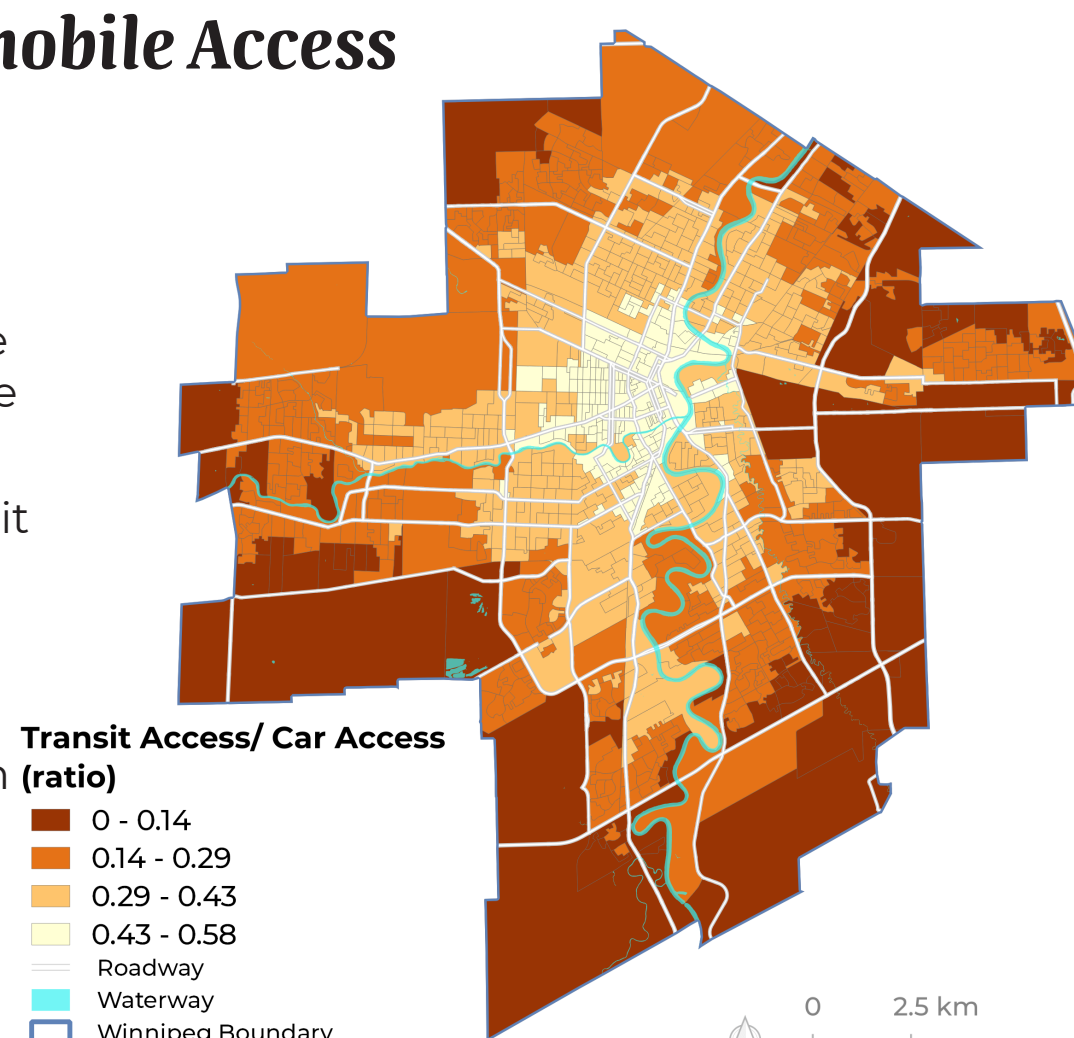
3. Accessibility to Low-wage jobs by Car

- Car-based accessibility to low-wage jobs seems to have a much less peaked distribution compared to transit accessibility.
- Overall, the entire City benefits from high levels of car accessibility.



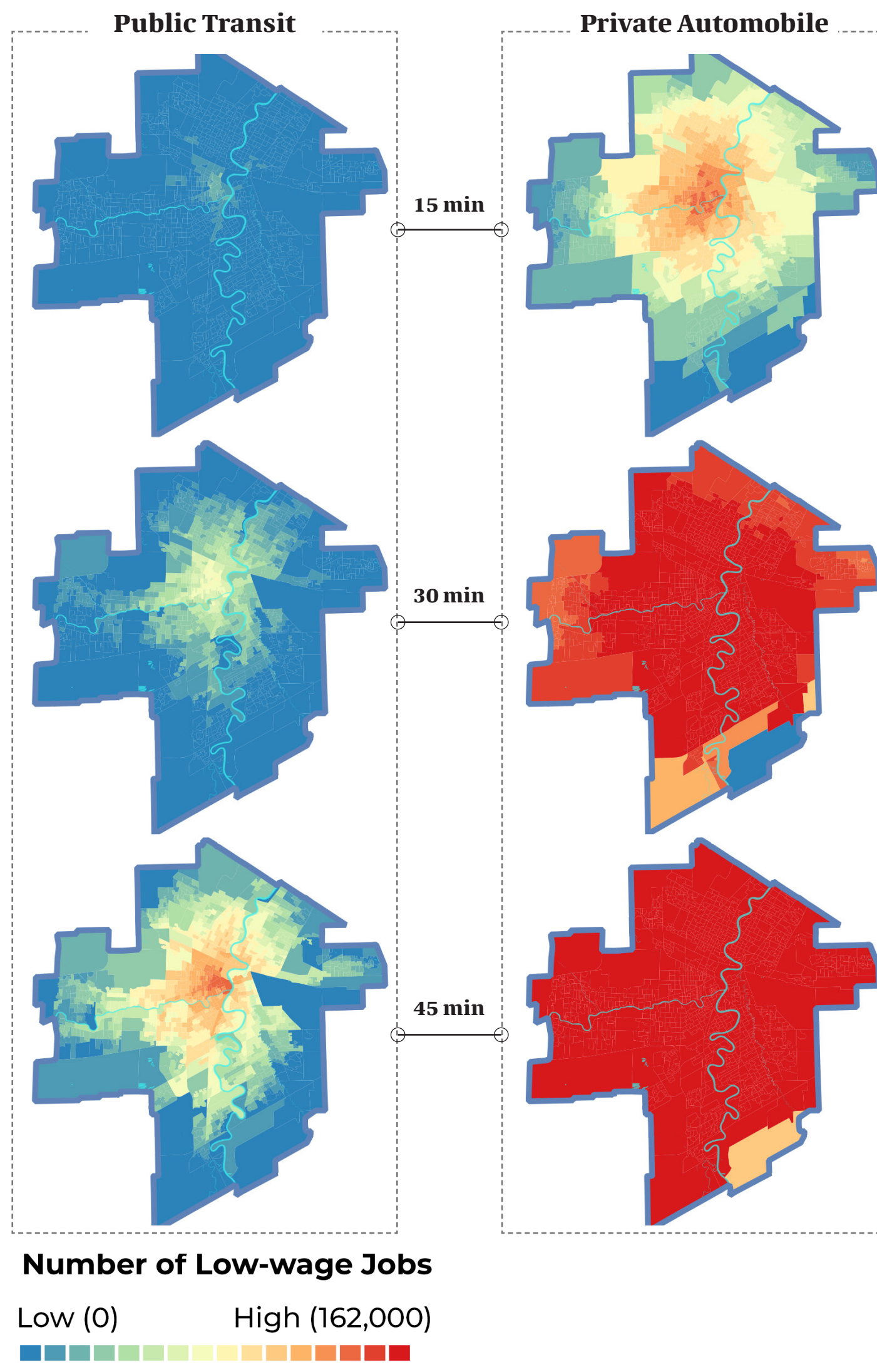
4. Ratio of Transit Access to Private Automobile Access

- 60% of the low-wage jobs accessible by car are also accessible by transit from the DAs in the Centre
- The relative benefit of transit users to drivers drops by moving away from the centre towards the urban periphery.



5. Number of Low-wage Jobs Accessible within 15, 30, 45-minute trips

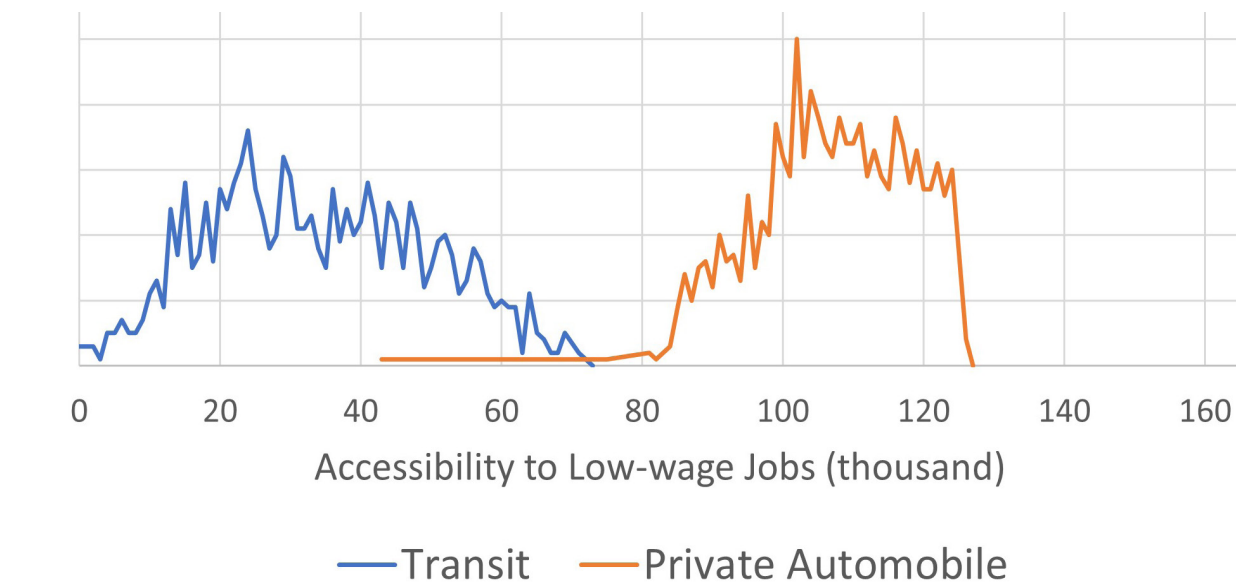
- The number of low-wage jobs accessible by transit within 30 minutes travel times is relatively low and is limited to Central Winnipeg
- This could explain why 70% of the population use car for commuting and only 14% use transit to get to work in Winnipeg (Statistics Canada, 2016).



6. Probability distribution of transit access compared to automobile access

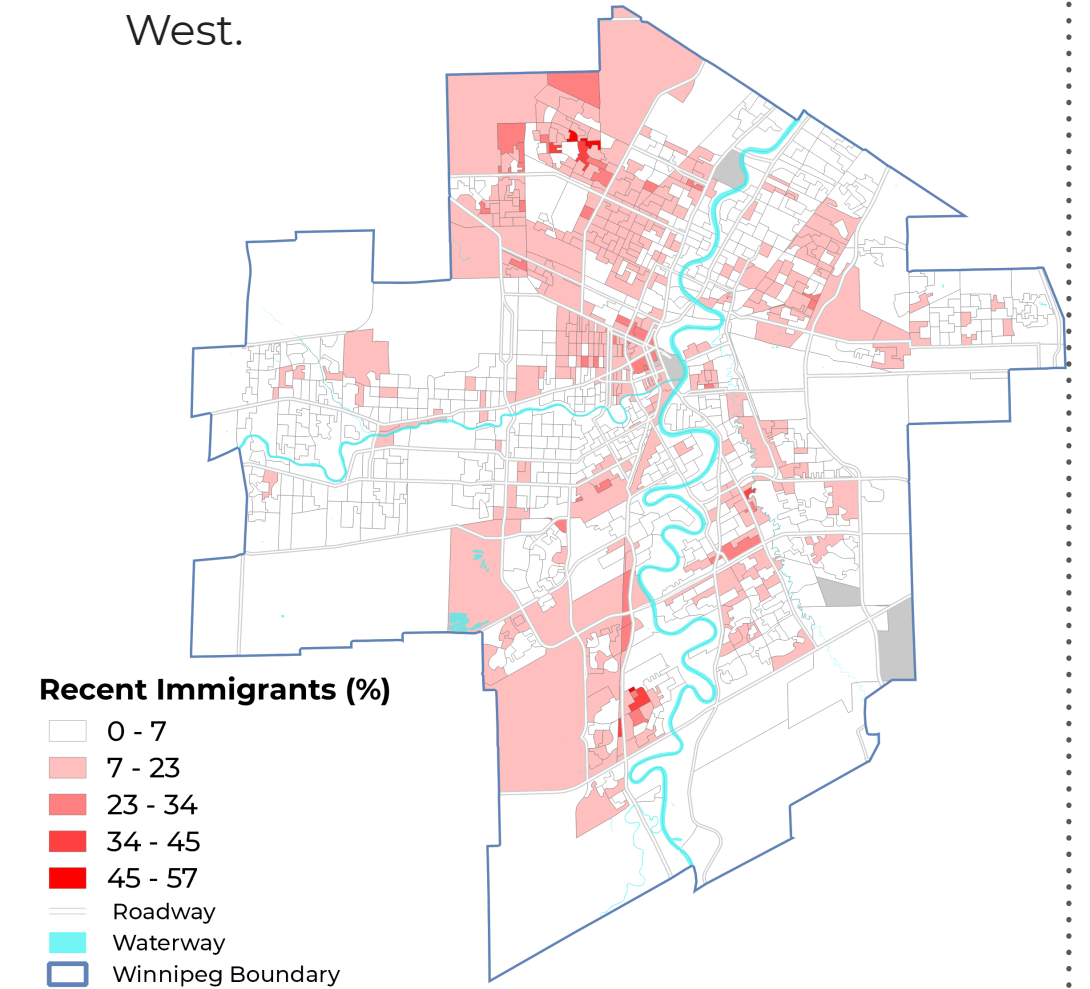
(the total area under each curve = 1)

- There are areas with no transit accessibility to low-wage jobs
- Private automobile is a way more effective travel mode in providing access to low-wage jobs compared to transit.



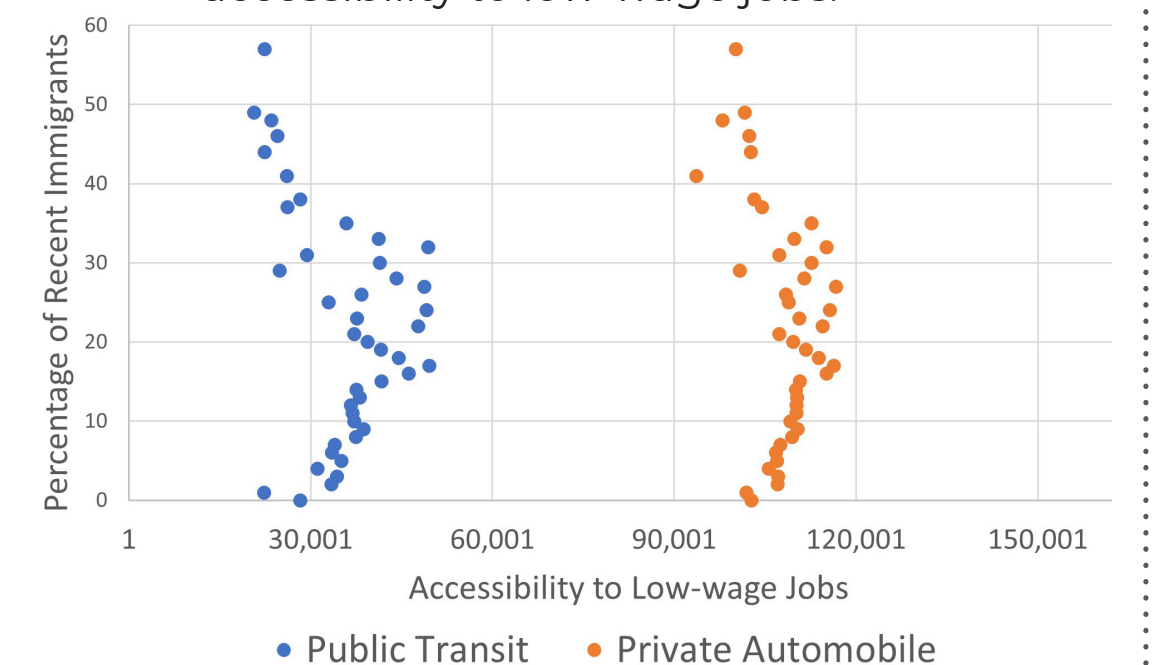
7. Distribution of Recent Immigrants (%)

- High percentages of recent immigrants have settled in the centre and the suburban areas in the North and South West.



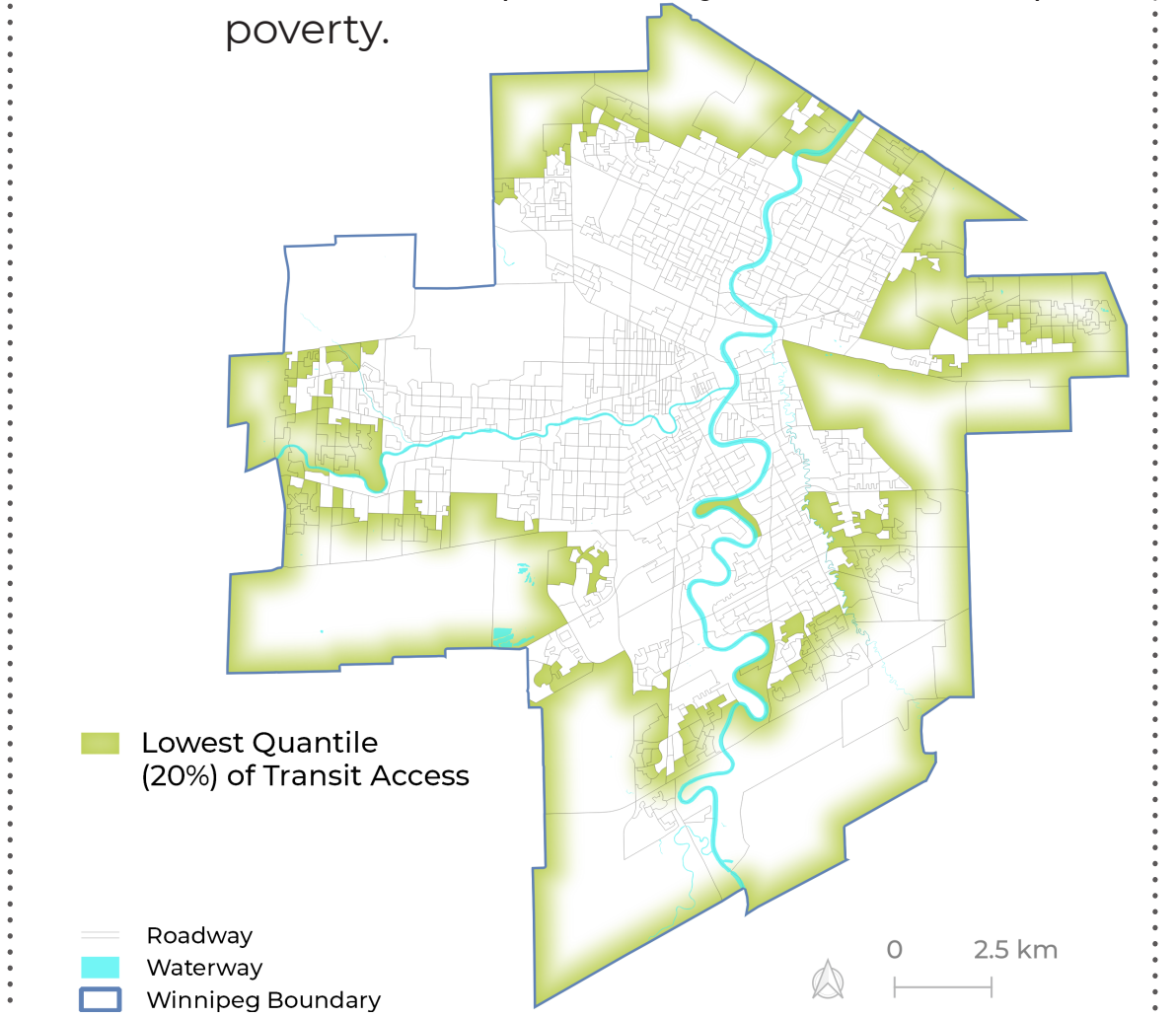
8. Probability distribution of accessibility with respect to recent immigrants

- Many dissemination areas with high percentages of recent immigrants (30% or above) have extremely low levels of transit accessibility to low-wage jobs.



9. Areas with lowest 20% (quantile) of transit access to low-wage jobs

- Nearly 10,000 recent immigrants are living in areas with lowest 20% of transit access and thus are potentially at risk of transport poverty.



CONCLUSION

This capstone project concludes that transport policies should be focused on improving transit services in poor-access areas, with particular focus towards those areas high on recent immigrants, low-income population, and other socioeconomically disadvantaged groups at risk of transport poverty (e.g., unemployed). Investment in public transit and improving accessibility not only help alleviate the risk of transport poverty, but also increase transit mode share (Allen, 2018). Planners and decision-makers should allocate the resources to projects that will be most cost-effective and have the substantial potential for alleviating transport poverty.

Maps Projection & Info

Identified lands are located on Treaty 1 Territory | Map Projection: NAD83/UTM Zone 14N (EPSG: 26914) | Sources: Statistics Canada, 2017, 2016 Census; Statistics Canada, 2006, Commute Table; Open Source Routing Machine (OSRM), n.d., Shortest Path; City of Winnipeg, 2020, Winnipeg Transit's Open Data Web Service; Province of Manitoba, 2020, Manitoba Municipal Boundaries; City of Winnipeg, 2020, Winnipeg Transit GTFS; Government of Canada, 2020, National Road Network; Province of Manitoba, 2020, Manitoba Road Network; City of Winnipeg, Road Network, 2021; Government of Canada, 2020, National Hydro Network

References

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