An examination of the accessibility implications of a pilot COVID-19 vaccination program in Hamilton, Ontario

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Abstract

The province of Ontario in Canada announced the pilot for a new vaccination program, with designated pharmacies across the province now able to offer COVID-19 vaccines. The accessibility of this program raises questions about the cost of travel and the distribution of the cost among the population. In our examination of the City of Hamilton we find that selected sites do not serve well the rural and urban population of Hamilton, and that the associated cost of travel is expected to be disproportionally borne by lower income populations. Modest additions to the list of pilot sites in the city can substantially alleviate this inequity.

Research Questions and Hypotheses

Along with the provision of health care facilities to treat severe cases of COVID-19 (Pereira et al., 2021), another front in the fight against the pandemic is the rolling out of vaccination programs. The Province of Ontario, in Canada, announced on April 1st 2021 the expansion of a pilot program to offer vaccines in pharmacies in the City of Hamilton[1]. This program is in addition to dedicated vaccination centers for people aged 70+. Twenty pharmacies in Hamilton were added to an earlier list of 325 locations in other cities across the province, and the program was extended to people aged 55 years old and over.

Critics were quick to point out that the list of pharmacies approved for Hamilton were mostly located in lower density parts of the city that are not well serviced by transit and are difficult to reach by foot[2]. Indeed, as seen in Figure 1, a vast majority of the pharmacies are in suburban Hamilton. The

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[1] https://www.cbc.ca/news/canada/hamilton/astrazeneca-vaccine-hamilton-1.5972704

[2] See inter alia: https://twitter.com/RyanMcGreal/status/1378027149790224386?s=20 and https://twitter.com/NrinderWard3/status/1378679195514060801?s=20.

issue is somewhat less clear cut when we consider that Hamilton's suburbs tend to be older (see Figure 2). The population aged 55 to 69 in Hamilton is approximately 59,095 suburban, 35,704 urban, and only 35,704 rural. Given the target demographic for the program, it is possible that suburban sites could be convenient for mature and older adults. Nevertheless, the selection of sites by the province raises some important questions[3]. As Yu et al. (2021) note, good geographical coverage is a key element for a successful vaccination campaign; at the same time, siting vaccinations sites in car-oriented locations may introduce inequities in access.

In this research, we investigate the accessibility implications of the sites selected for the pilot vaccination program. Concretely, we ask:

- What is the estimated cost of travel to reach the vaccination sites, assuming that every person requires a vaccine?
- What is the distribution of this cost across the population of the city?
- How does the cost and its distribution change with the addition of candidate sites in urban Hamilton?

We concentrate on the 55 to 69 years old population segment because the older 70+ group have access to other dedicated facilities besides those in the provincial pilot.

[3]The decision-making process to select these sites appears to have been opaque, and the normally inert Major of the city was caught flat footed by the announcement; see:https://twitter.com/FredEisenberger/status/1378350123114242053?s=20

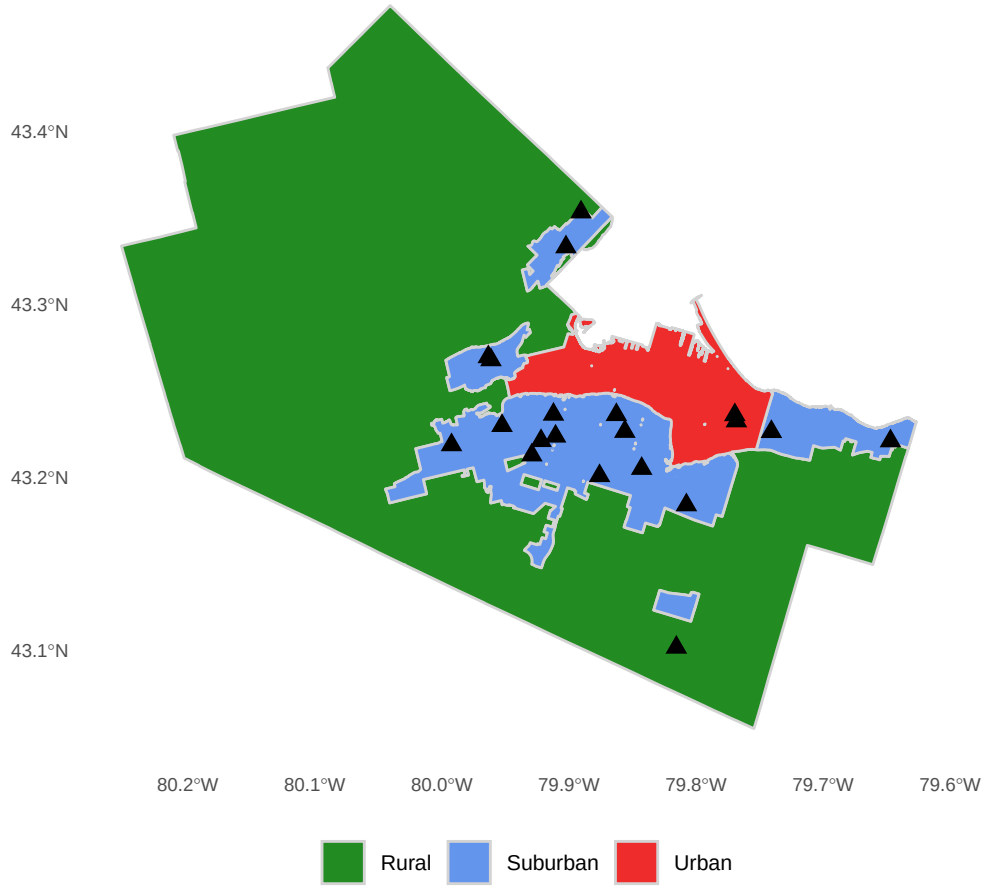

Figure 1: Location of pharmacies in pilot and regions with the City of Hamilton

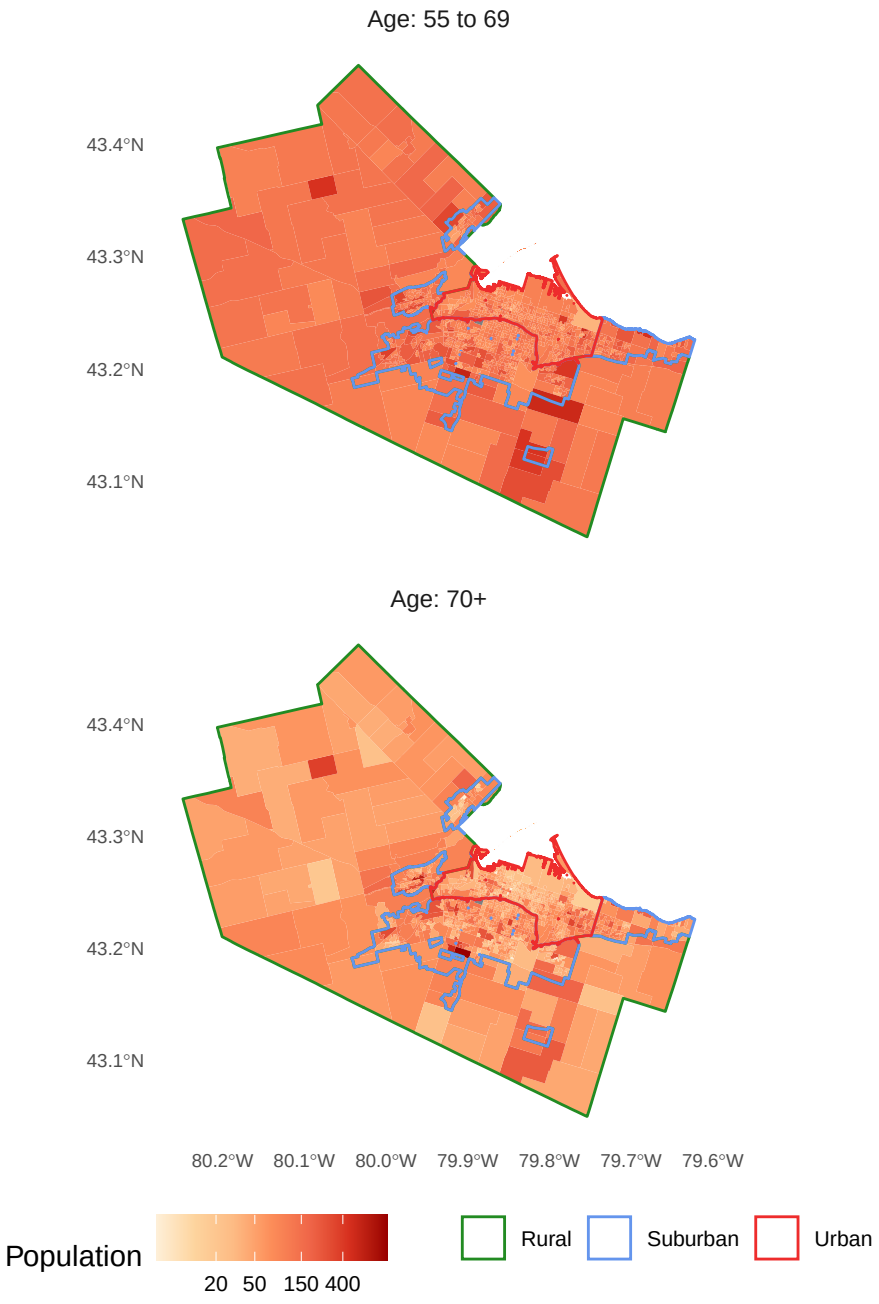

Figure 2: Distribution of population age 55+ in the City of Hamilton

Methods and Data

This paper is a reproducible research document (see Brunsdon and Comber, 2020) conducted using open source tools for transportation analysis (Lovelace, 2021). All code and data necessary to reproduce the tables and figures are available in a public repository[4].

Findings

Words.

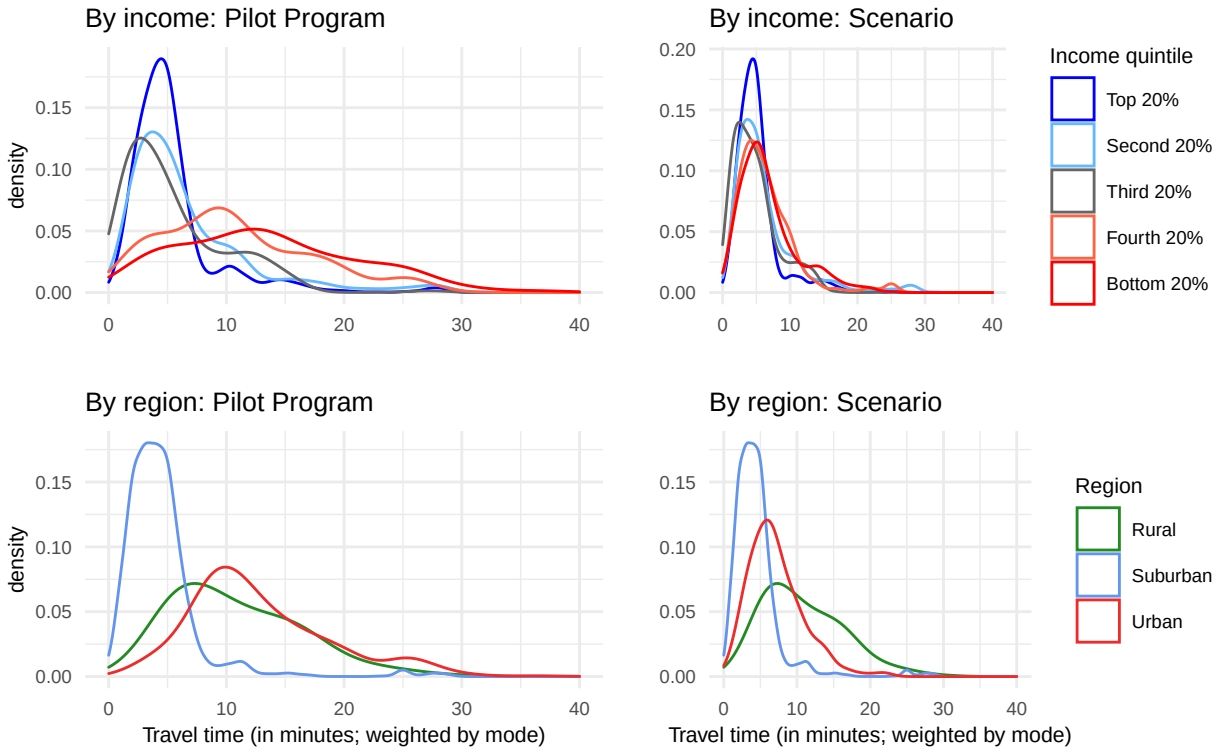

Figure 3: Distribution of travel time (weighted by mode) for different population groups

References

Brunsdon, C., Comber, A., 2020. Opening practice: Supporting reproducibility and critical spatial data science. Journal of Geographical Systems 1–20.

[4]https://github.com/paezha/Accessibility-Pharmacies-Hamilton-Vaccines

Table 1: Distribution of person hours travelled (PHT) by median total household income and region: pilot locations only, and scenario with three urban locations added

		Pilot Program		Scenario	
Group	Population	Total PHT	Hours per person	Total PHT	Hours per person
Income Quintile					
Top 20%	23297.315	2243.857	0.096	2146.558	0.092
Second 20%	22356.413	2471.952	0.111	2351.858	0.105
Third 20%	19570.061	1749.497	0.089	1563.978	0.080
Fourth 20%	17729.139	2928.959	0.165	1950.312	0.110
Bottom 20%	19629.952	4068.548	0.207	2388.422	0.122
Region					
Rural	8356.963	1730.268	0.207	1730.242	0.207
Suburban	58711.629	4138.482	0.070	4138.392	0.070
Urban	35491.942	7588.590	0.214	4527.021	0.128

Note:
The population totals differ due to small differences in the classification of the regions

Lovelace, R., 2021. Open source tools for geographic analysis in transport planning. Journal of Geographical Systems. doi:10.1007/s10109-020-00342-2

Pereira, R.H.M., Braga, C.K.V., Servo, L.M., Serra, B., Amaral, P., Gouveia, N., Paez, A., 2021. Geographic access to covid-19 healthcare in brazil using a balanced float catchment area approach. Social Science & Medicine 273, 113773. doi:https://doi.org/10.1016/j.socscimed.2021.113773

Yu, J.H., Jeong, H.J., Kim, S.J., Lee, J.Y., Choe, Y.J., Choi, E.H., Cho, E.H., 2021. Sustained vaccination coverage during the coronavirus disease 2019 epidemic in the republic of korea. Vaccines 9, 8. doi:10.3390/vaccines9010002