Assessing spatial accessibility to mental health facilities in an urban environment

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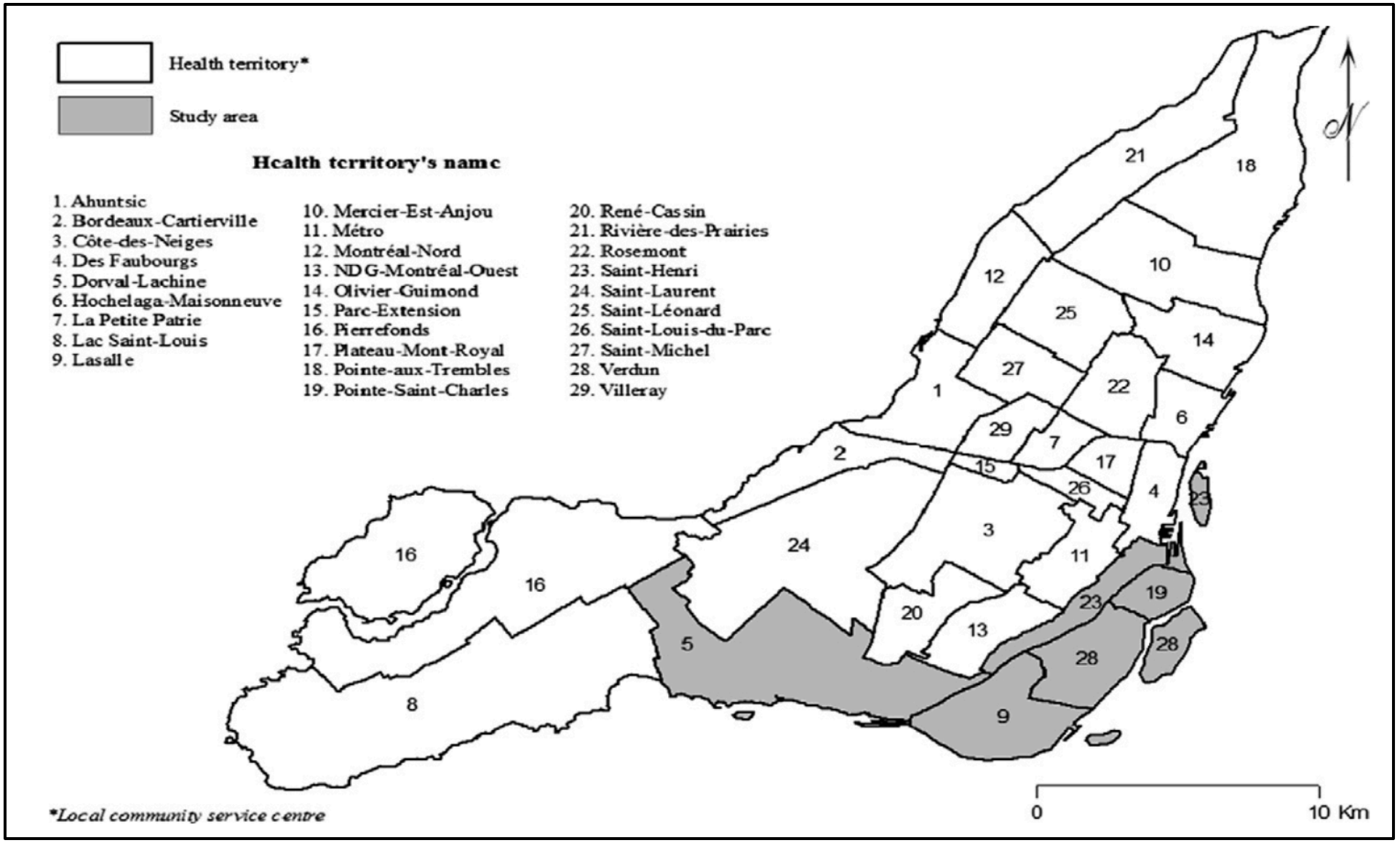
> Previous Canadian studies have reported that 4.5–10.9% of Canadians aged 15 and over experienced at least one mental health disorder annually but less than 40% of them consult a health care professional for their mental health problems.

Why?

Study Area


Health territory*
Study area
Health territory's name
1. Ahuntsic
2. Bordeaux-Cartierville
3. Côte-des-Neiges
4. Des Faubourgs
5. Dorval-Lachine
6. Hochelaga-Maisonneuve
7. La Petite Patrie
8. Lac Saint-Louis
9. Lasalle
10. Mercier-Est-Anjou
11. Métro
12. Montréal-Nord
13. NDG-Montréal-Ouest
14. Olivier-Guimond
15. Parc-Extension
16. Pierrefonds
17. Plateau-Mont-Royal
18. Pointe-aux-Trembles
19. Pointe-Saint-Charles
20. René-Cassin
21. Rivière-des-Prairies
22. Rosemont
23. Saint-Henri
24. Saint-Laurent
25. Saint-Léonard
26. Saint-Louis-du-Parc
27. Saint-Michel
28. Verdun
29. Villeray
*Local community service centre
0
10 Km

Research Question/Objectives

- What is the current spatial distribution of mental health care facilities in the southwest of Montreal?
- Which health territories of the southwest that do not possess enough mental health care facilities are appropriate candidate locations for new mental health services?

Data

- Dissemination Areas
- Montreal health services:
  - Agence de santé et des services sociaux of Montreal
  - Réseau alternatif et communautaire des organismes en santé mentale de l'île de Montréal (RACORSM)
  - Centre de reference du grand Montreal
- CanMap street files from DMTI

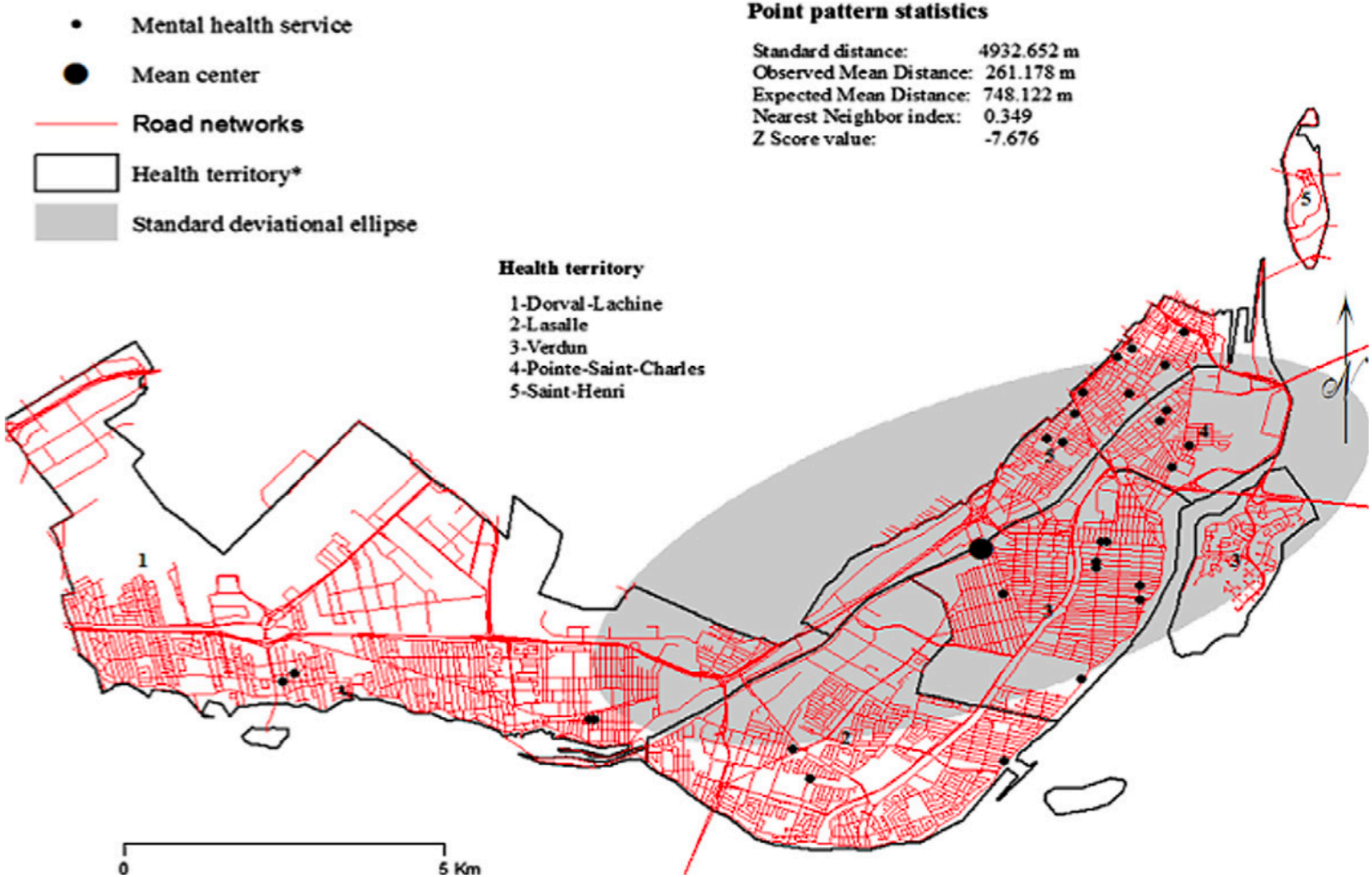
Methods

- Two-step Floating Catchment Area (2SFCA)
  - Step 1: calculate initial ratio for each service area

$$R_j = \left(\frac{S_j}{\sum_{k \in \{d_{kj} \leqslant d_0\}} D_k} \right) \times 10,000$$

  - Step 2: sum initial ratios in overlapped service areas to measure accessibility for demand locations

$$A_i^F = \sum_{j \in \{d_{ij} \leqslant d_0\}} R_j = \sum_{j \in \{d_{ij} \leqslant d_0\}} \left(\frac{S_j}{\sum_{k \in \{d_{kj} \leqslant d_0\}} D_k} \right)$$

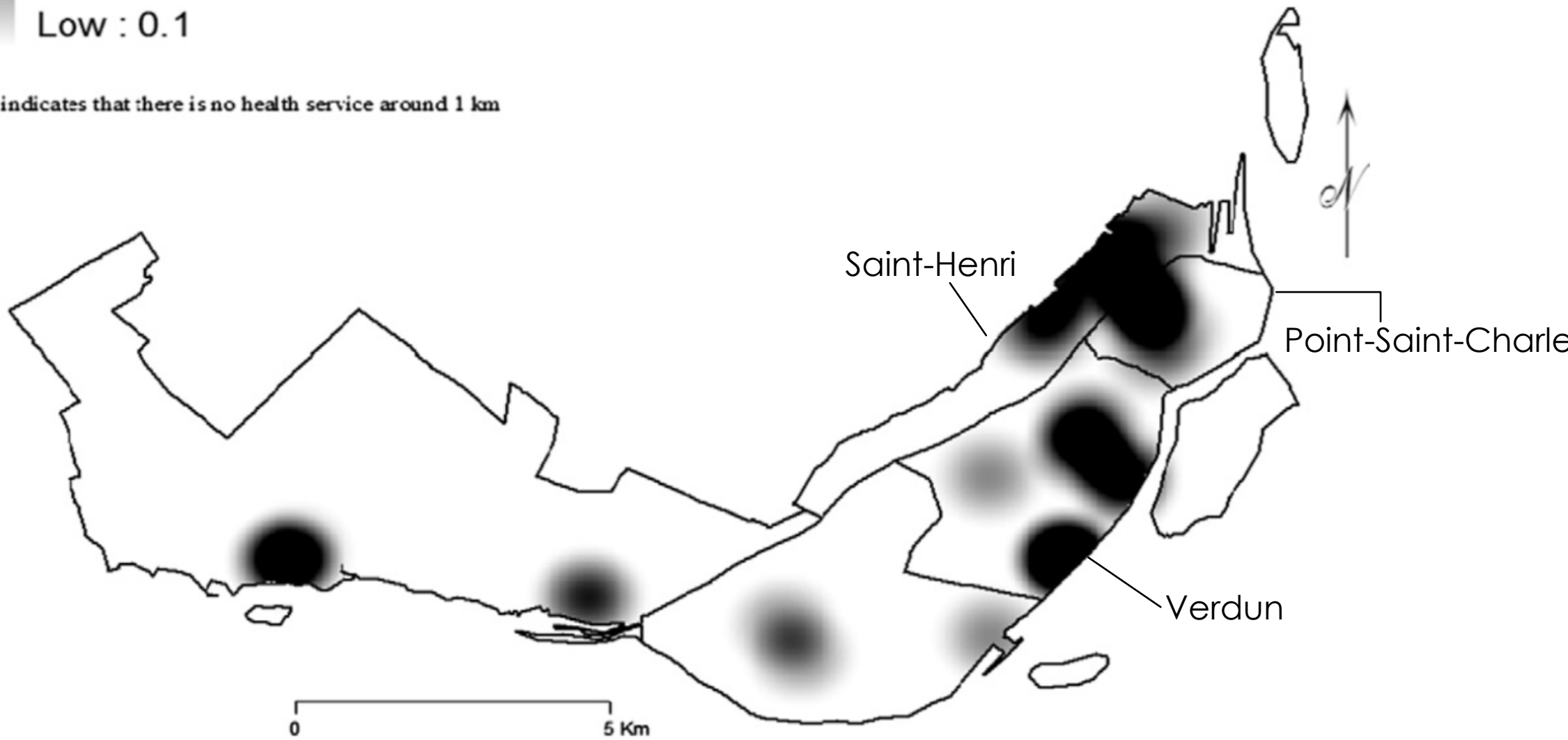

Mental health service
Mean center
Road networks
Health territory*
Standard deviational ellipse
Point pattern statistics
Standard distance: 4932.652 m
Observed Mean Distance: 261.178 m
Expected Mean Distance: 748.122 m
Nearest Neighbor index: 0.349
Z Score value: -7.676
Health territory
1-Dorval-Lachine
2-Lasalle
3-Verdun
4-Pointe-Saint-Charles
5-Saint-Henri
1
2
3
4
5
0
5 Km

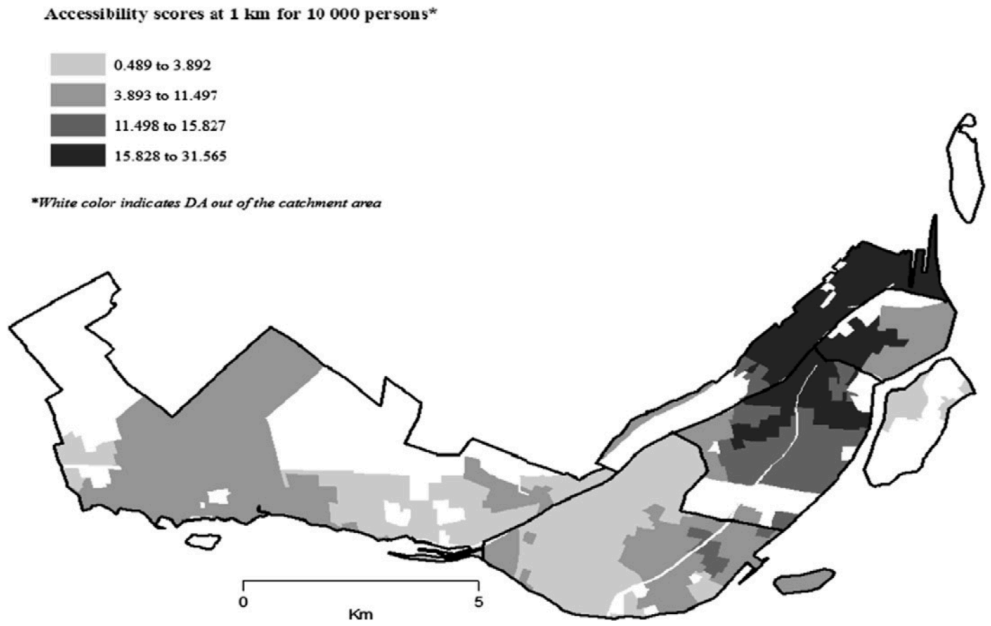
High : 4.77

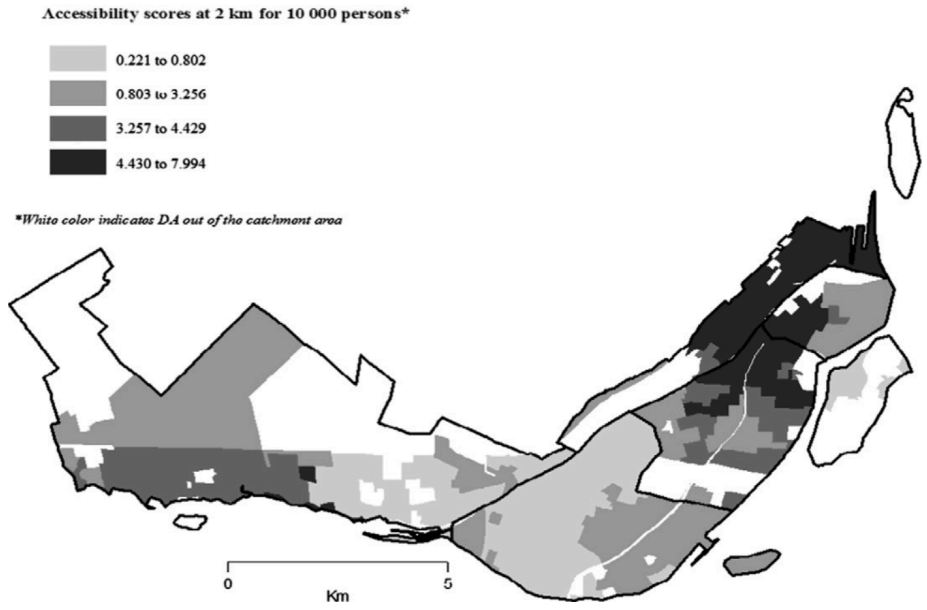
Low : 0.1

Mental health services per square kilometer
with a search radius of 1000 meters*

*White color indicates that there is no health service around 1 km







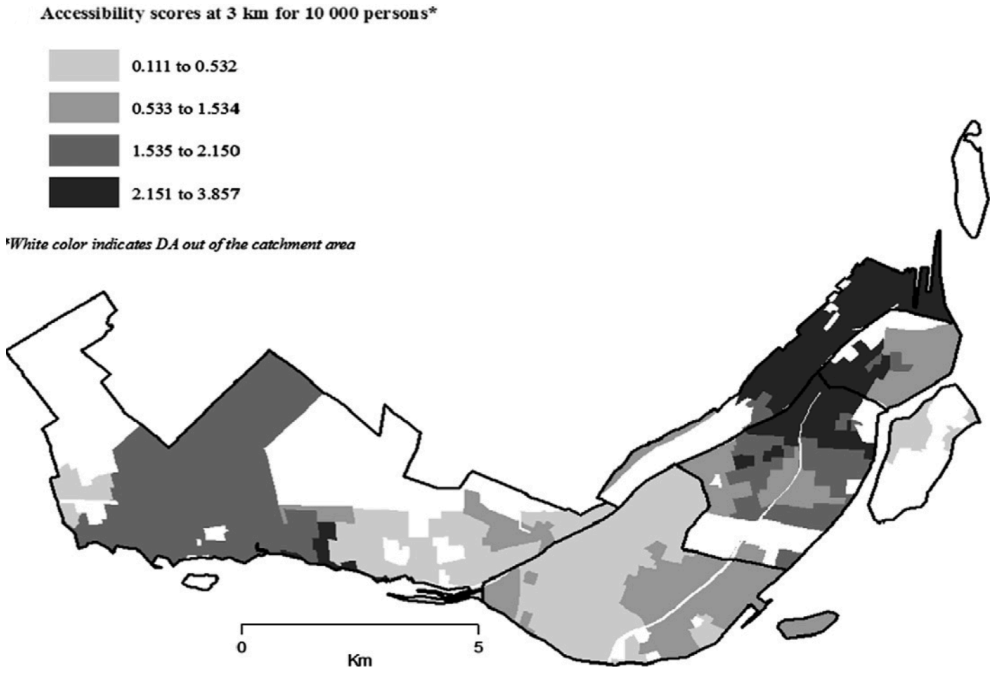
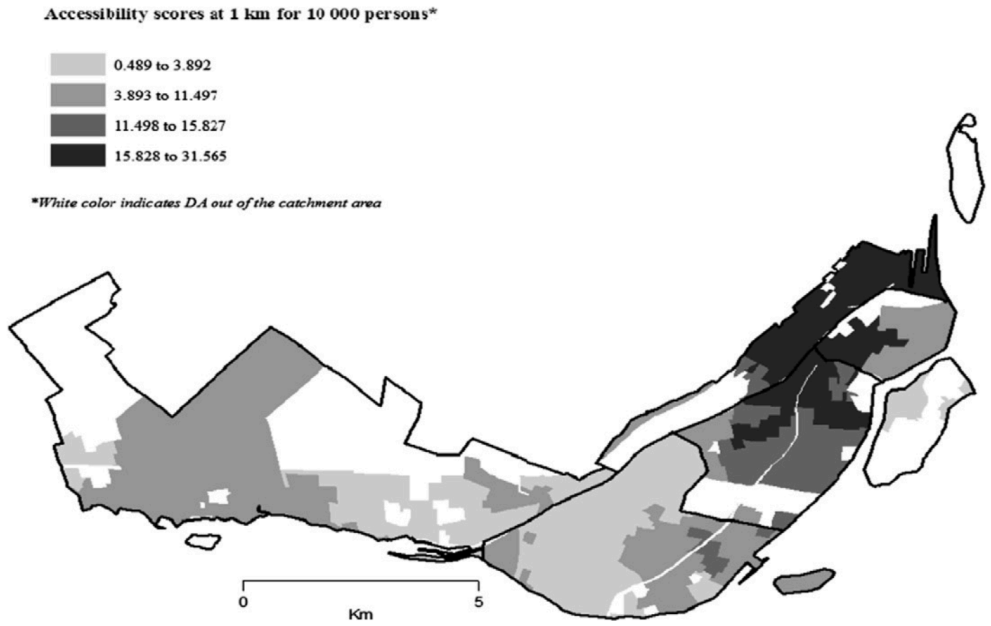
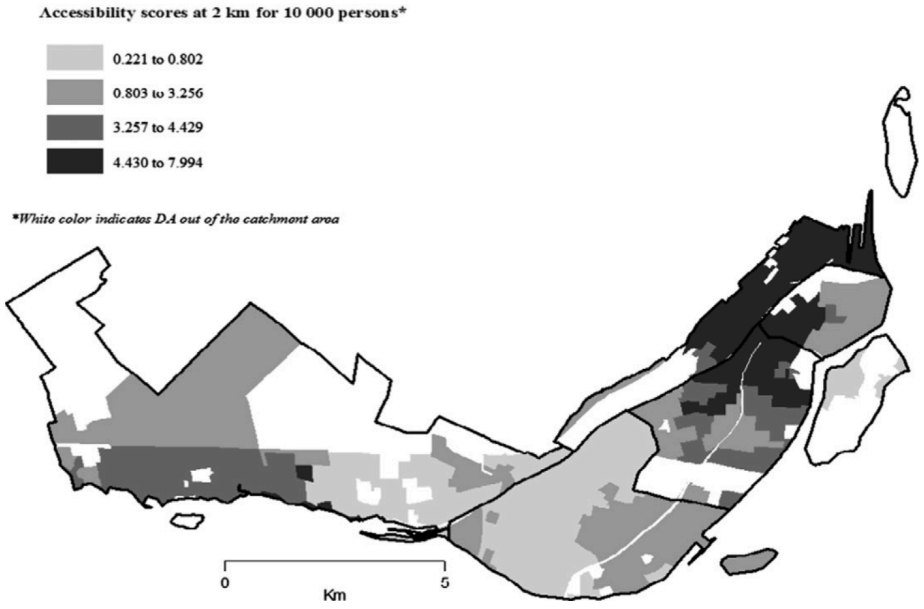


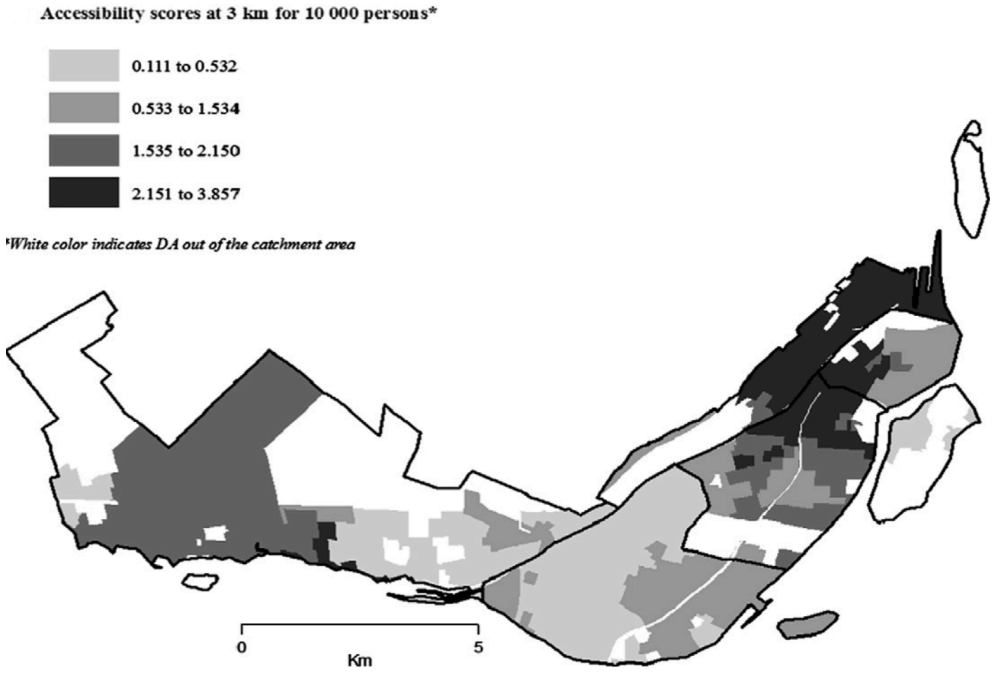
Table 1
Descriptive statistics on accessibility.

	1 km	2 km	3 km
N[a]	457	457	457
Mean	10.953	2.858	1.372
Std. Deviation	7.390	1.977	0.911
Skewness	0.538	0.354	0.342
Kurtosis	−0.845	−1.078	−1.140
Minimum	0.489	0.221	0.111
Maximum	31.565	7.994	3.857
Range	31.076	7.774	3.746
Percentiles (%)			
5	2.929	0.682	0.332
25	3.892	0.802	0.532
50	11.009	3.256	1.534
75	15.501	4.077	2.150
95	24.579	6.206	2.863

[a] Number of dissemination areas.







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Descriptive statistics on accessibility.

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Future Study Areas

- Variation in accessibility corresponding to socioeconomic characteristics of the population
- Implications of access to a personal vehicle versus reliance on public transportation
- Comparisons of service accessibility over time

Conclusion

- **Pros**
  - Paper accomplishes goal in a clear, concise, and easily understood manner
  - Limitations clearly explained
  - Similar studies could easily be done in other provinces/cities
  - Lots of maps to visualize results
- Cons
  - Differences in access between people with personal vehicle vs transit-users left out

- **Paper rating: 8.5/10**