# Applied Point Pattern Analysis

Antonio Páez
School of Geography and Earth Sciences
McMaster University

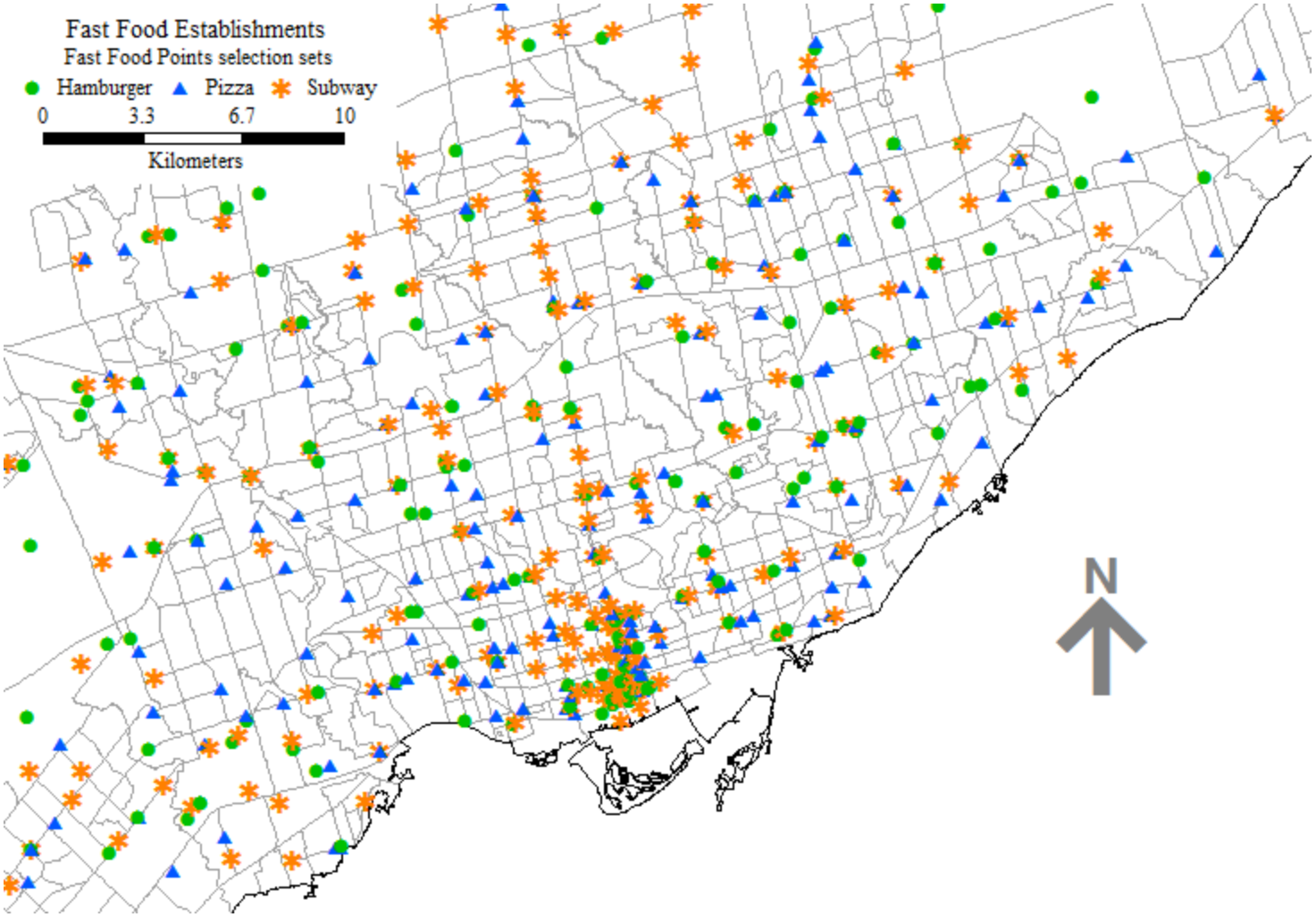
# Theory: Spatial pricing

- Market areas
- Type of pattern
- Developing testable hypotheses

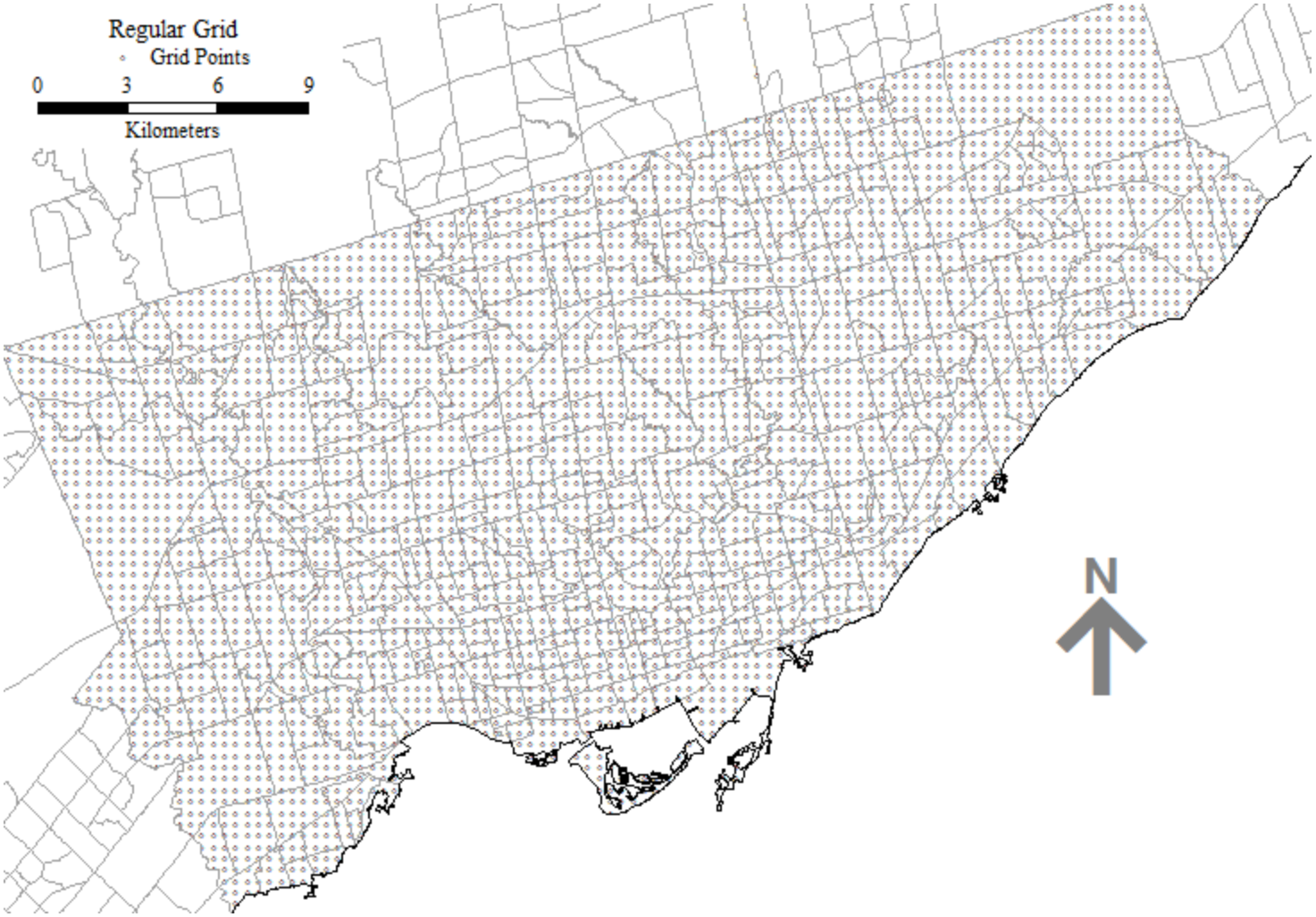
# Point pattern analysis

- Identifying patterns
- Nearest neighbor analysis
  - Exploratory technique
  - Point-event nearest neighbor (F-hat)
  - Event-event nearest neighbor (G-hat)
- Moving windows

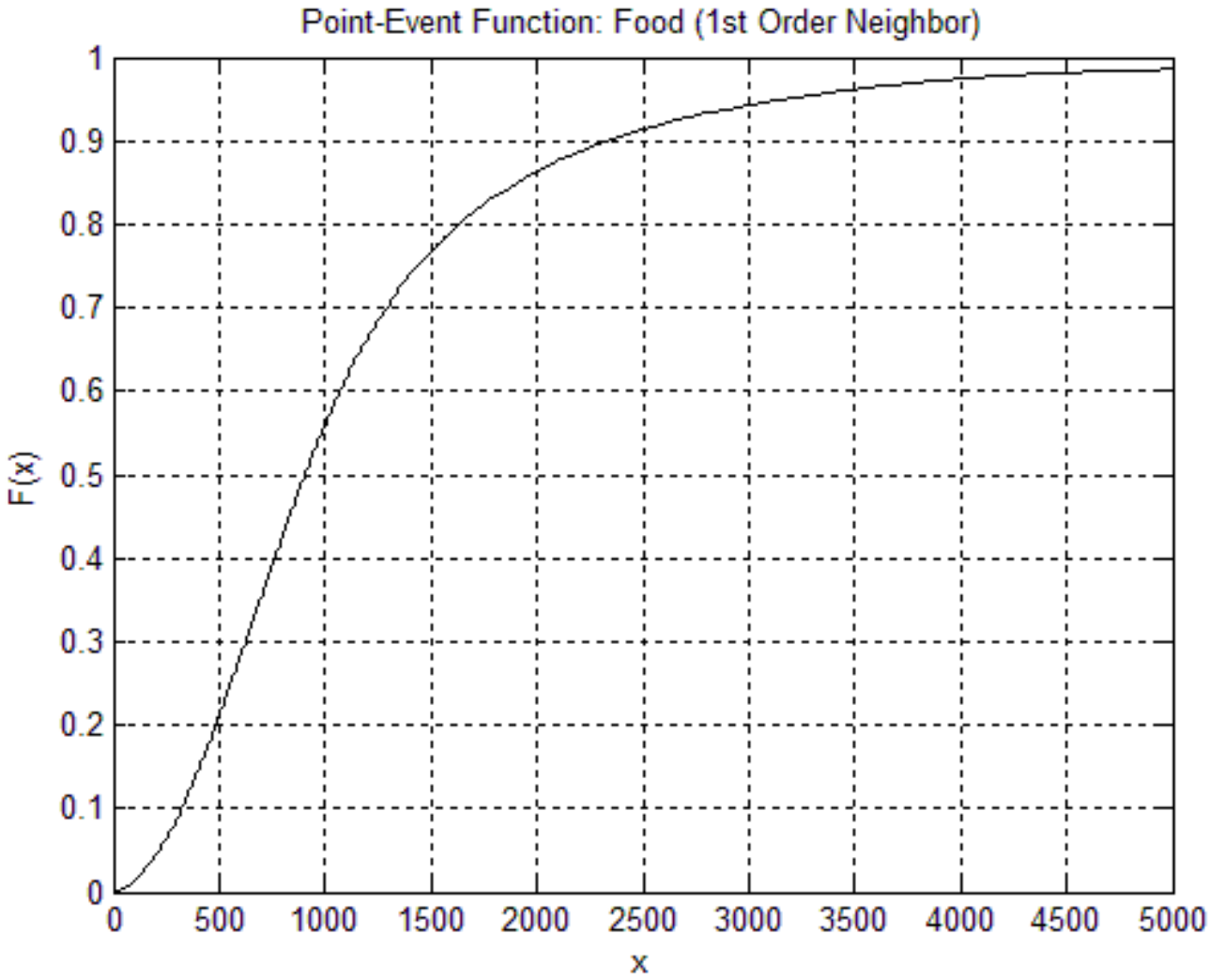
# Example: fast food in Toronto



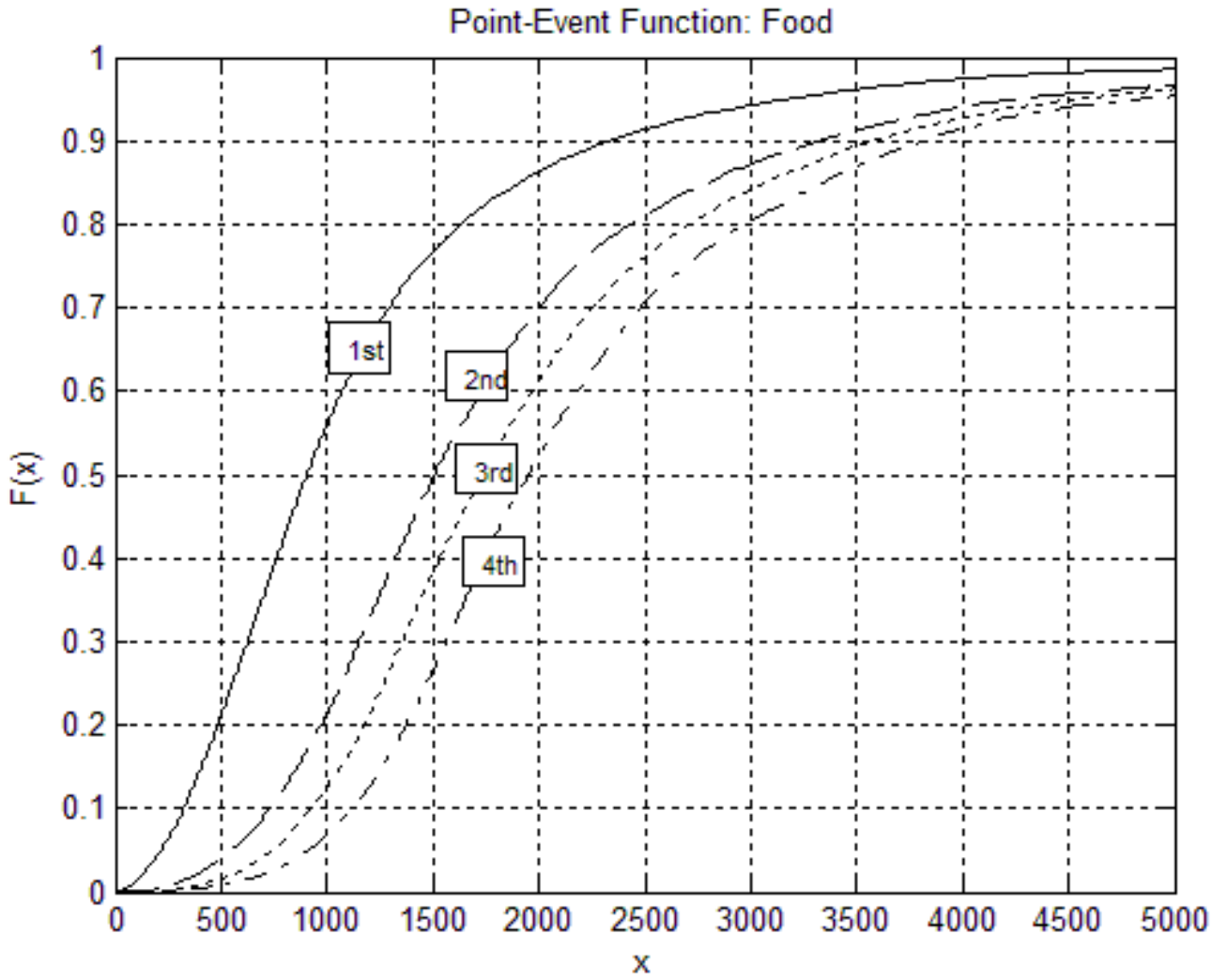
# Fast food in Toronto



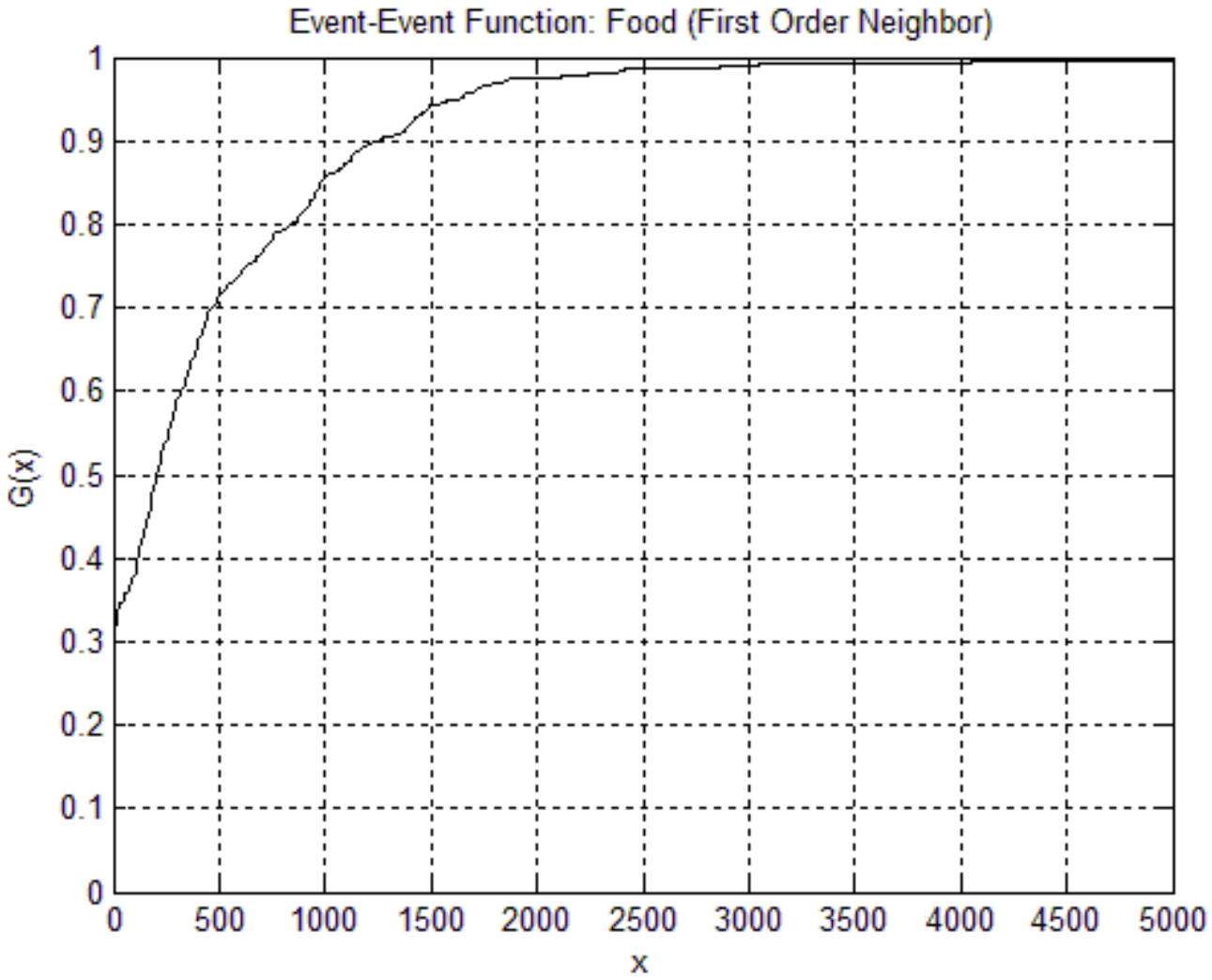
# Fast food in Toronto (F)



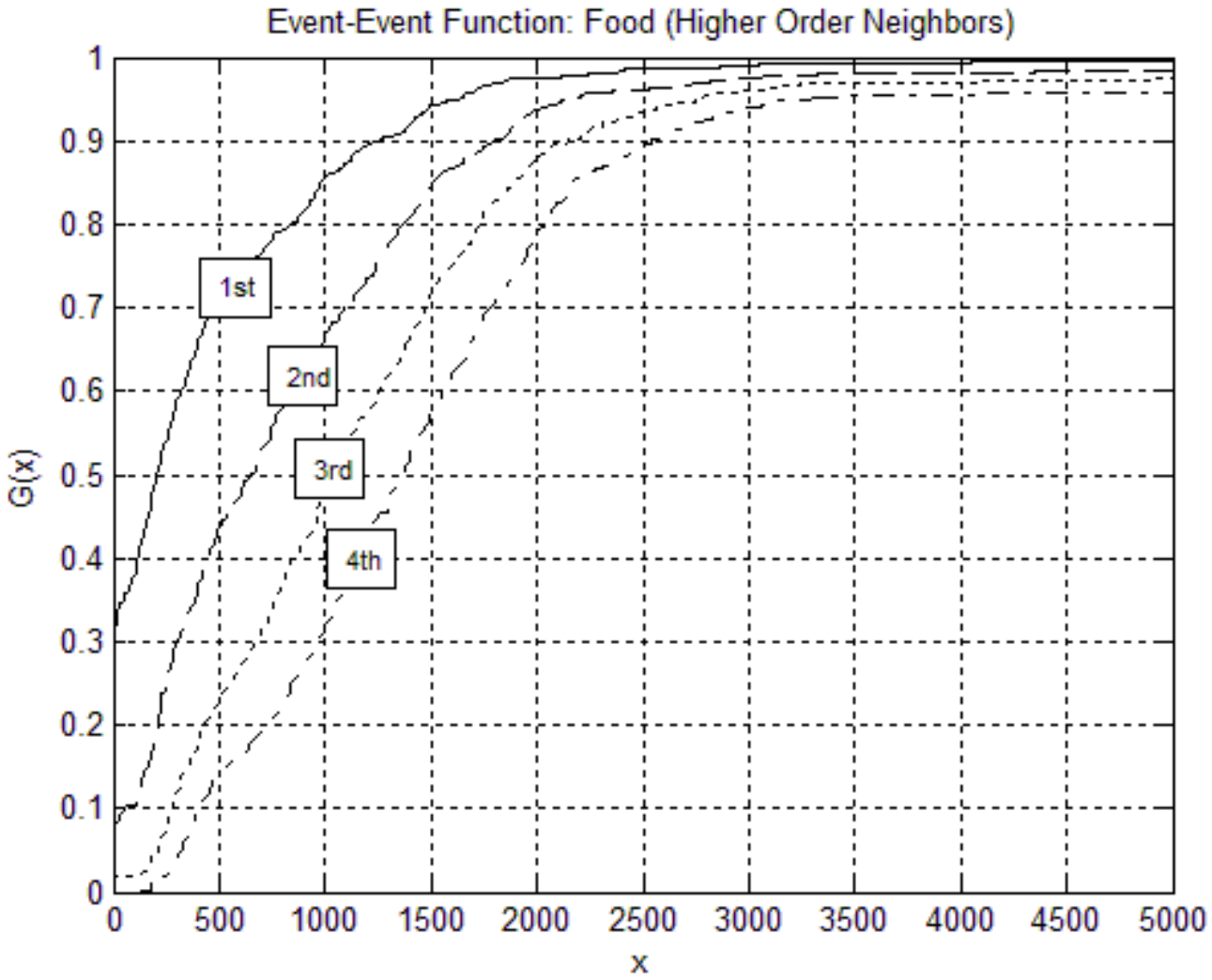
# Fast food in Toronto (F)



# Fast food in Toronto (G)



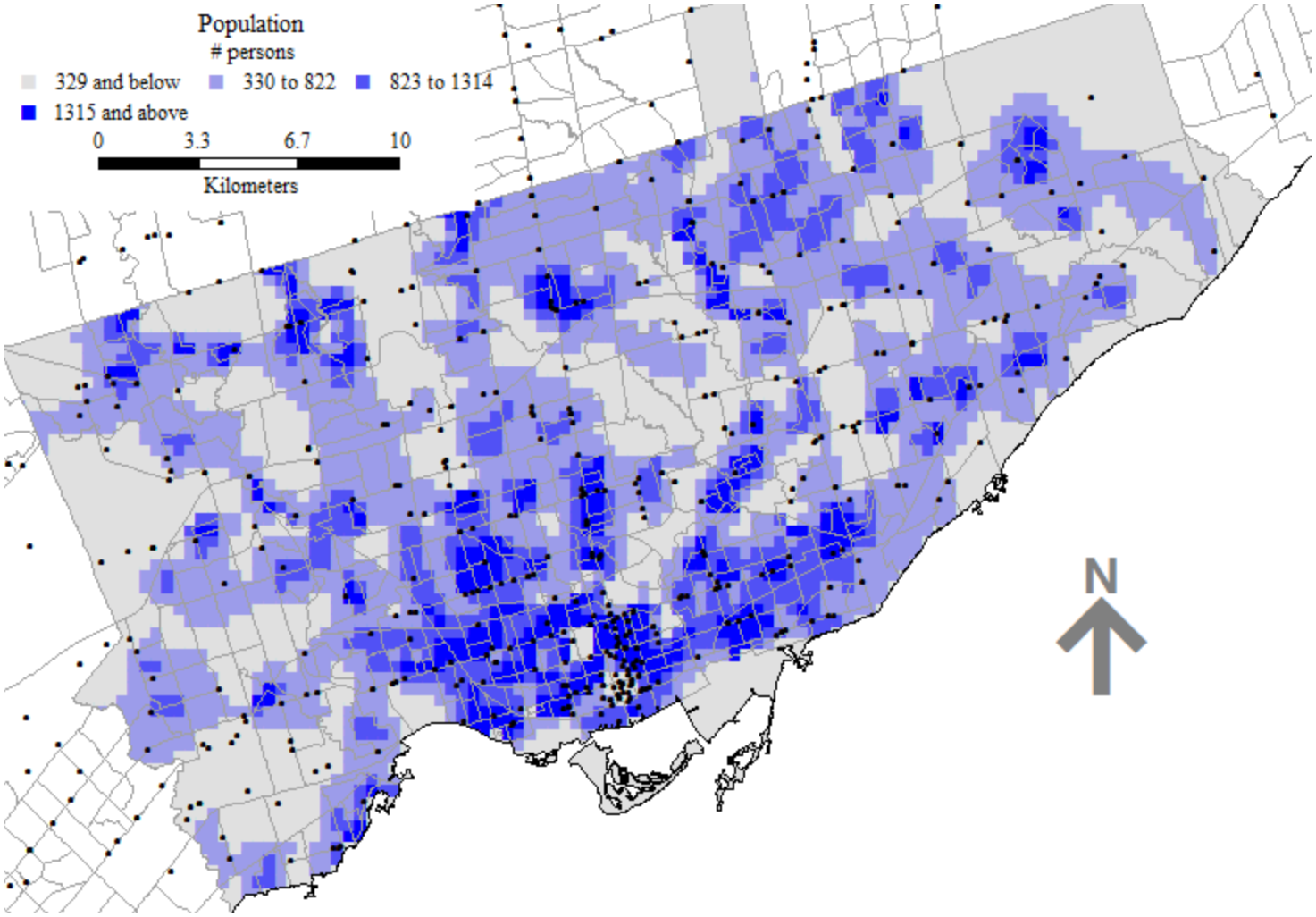
# Fast food in Toronto (G)



# Fast Food in Toronto

- Pattern?
- Relationship to theory?
- Discussion

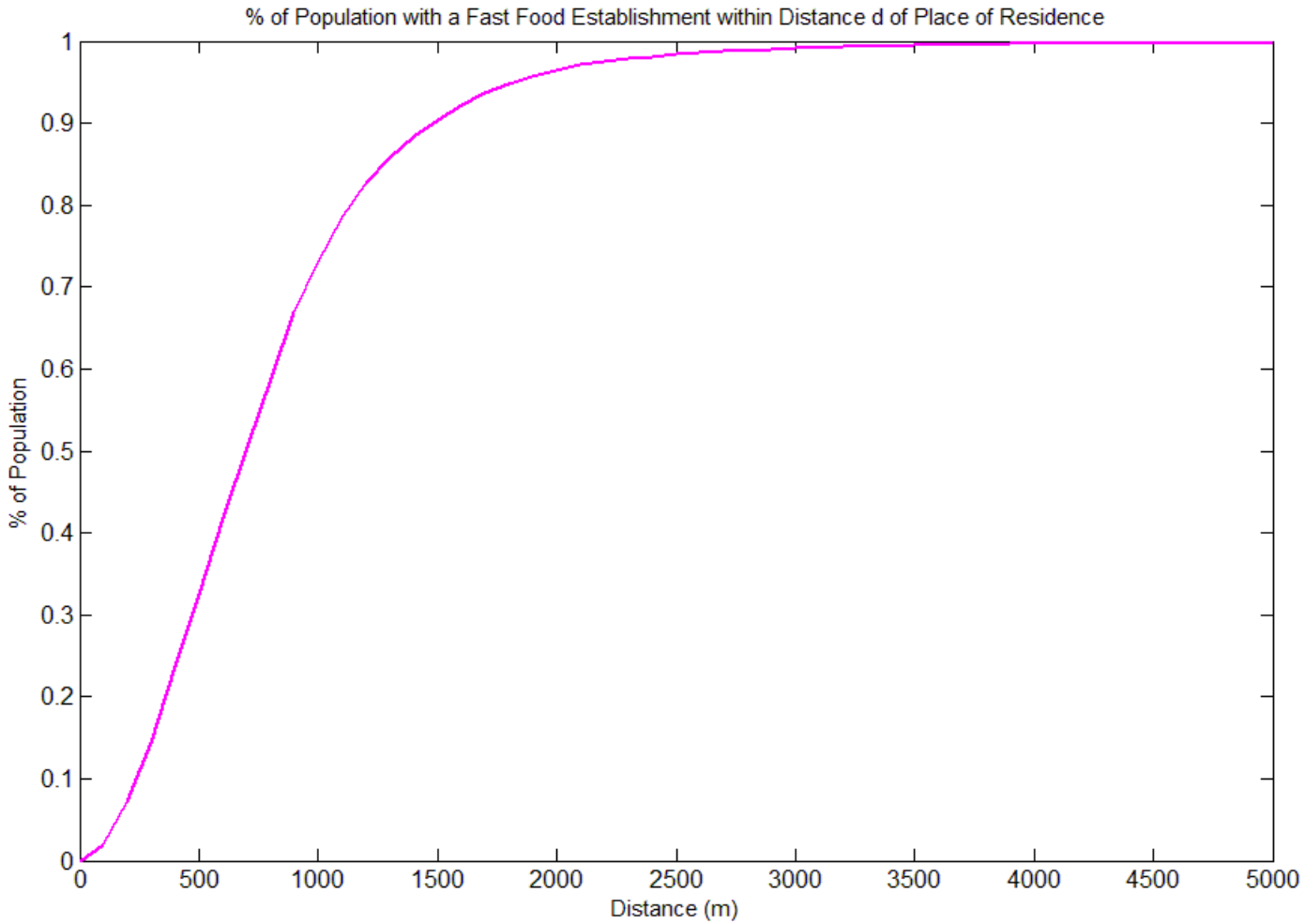
# Distribution of Population



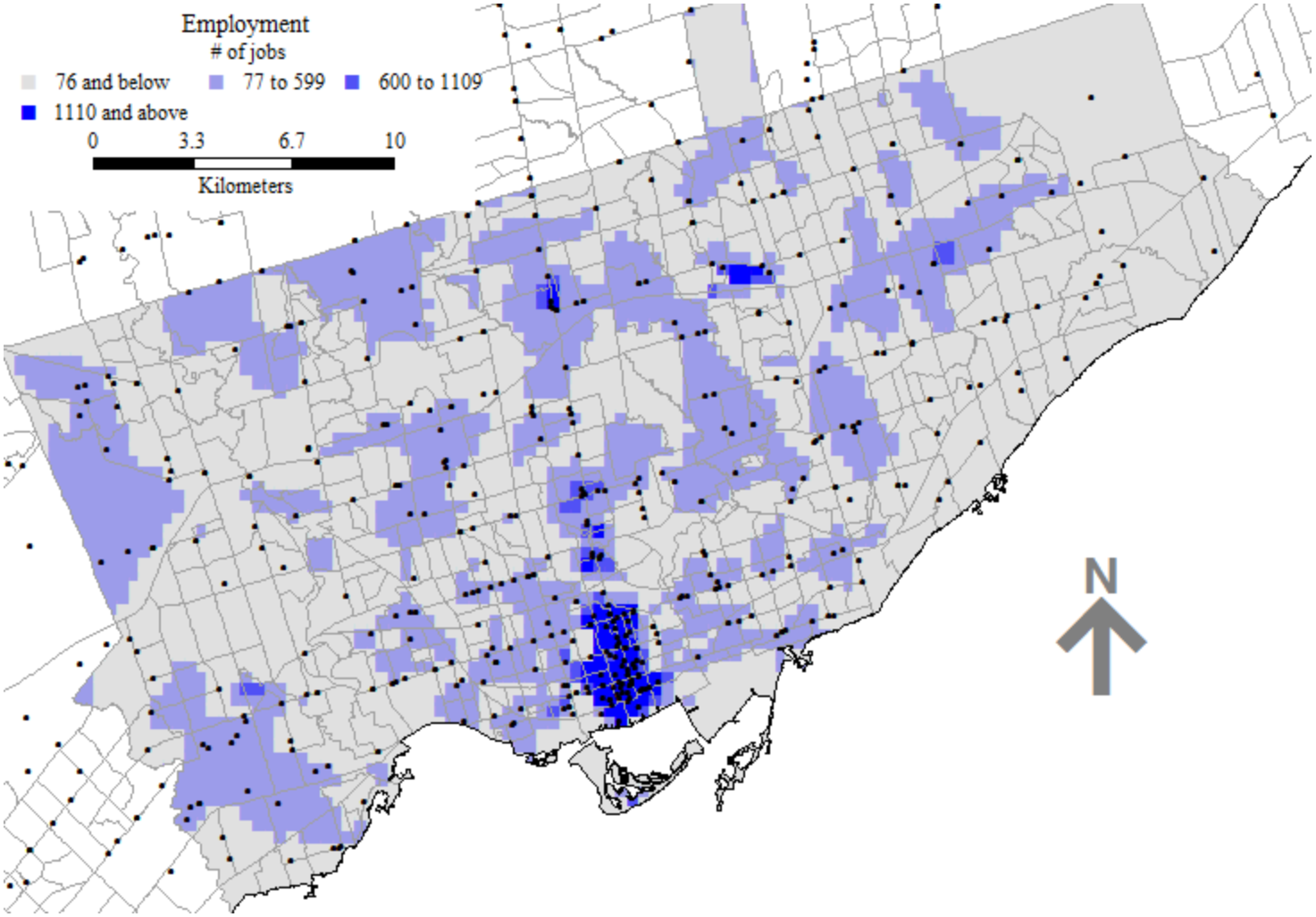
# Weighted F function

- “Points” now have an attribute of interest

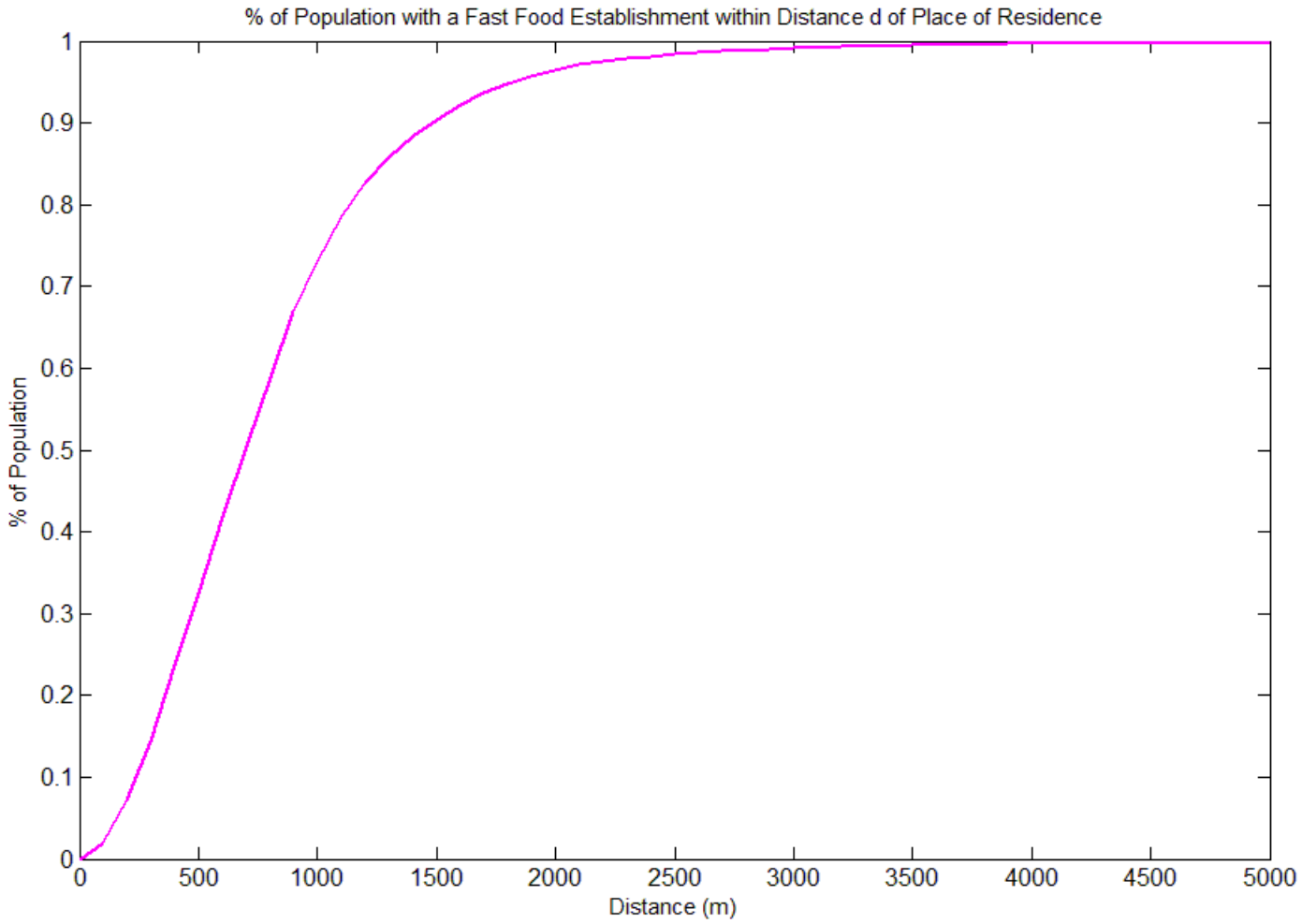
# Weighted F function (Population)



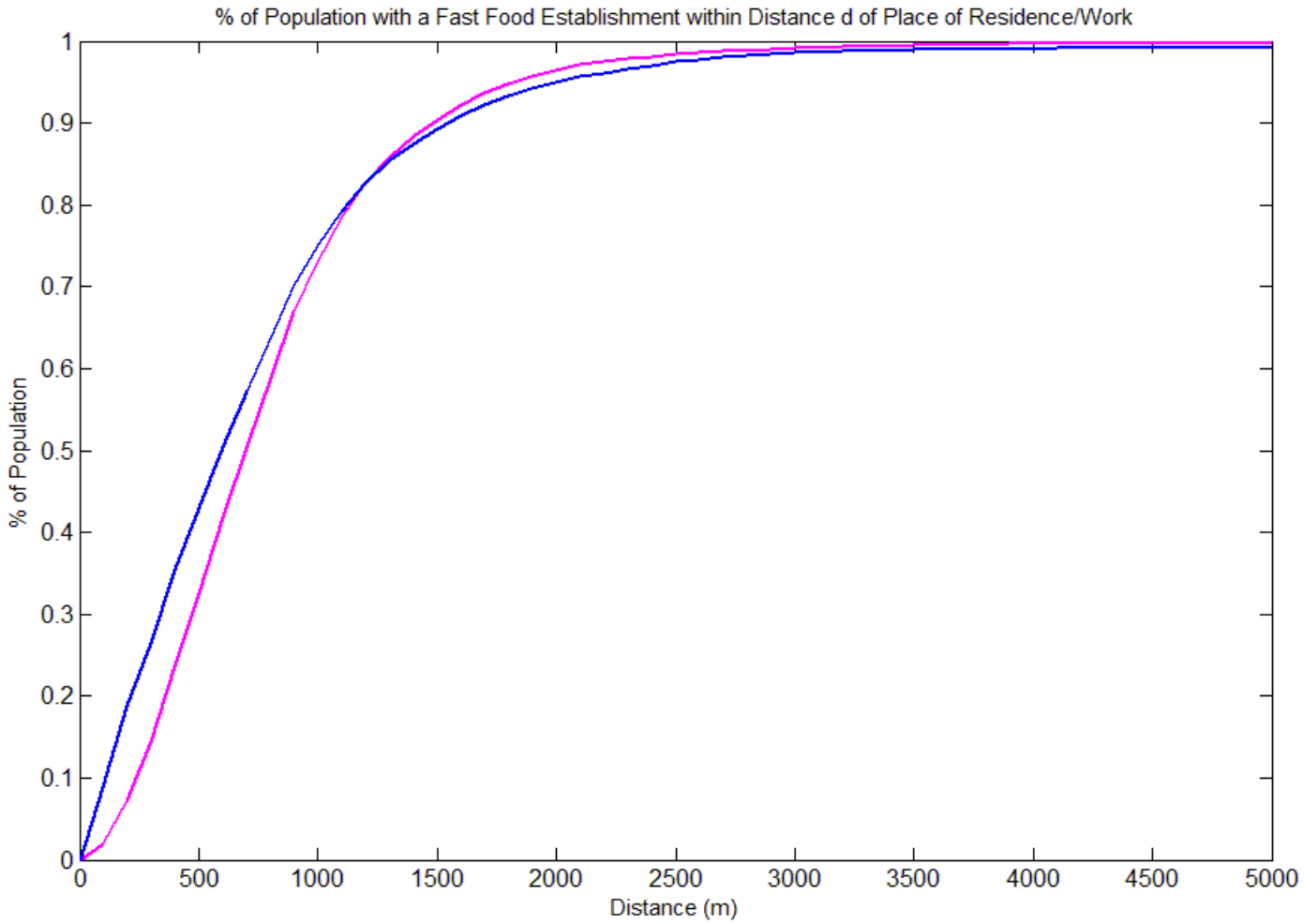
# Distribution of Employment



# Weighted F function (Employment)



# Weighted F function (Pop/Emp)



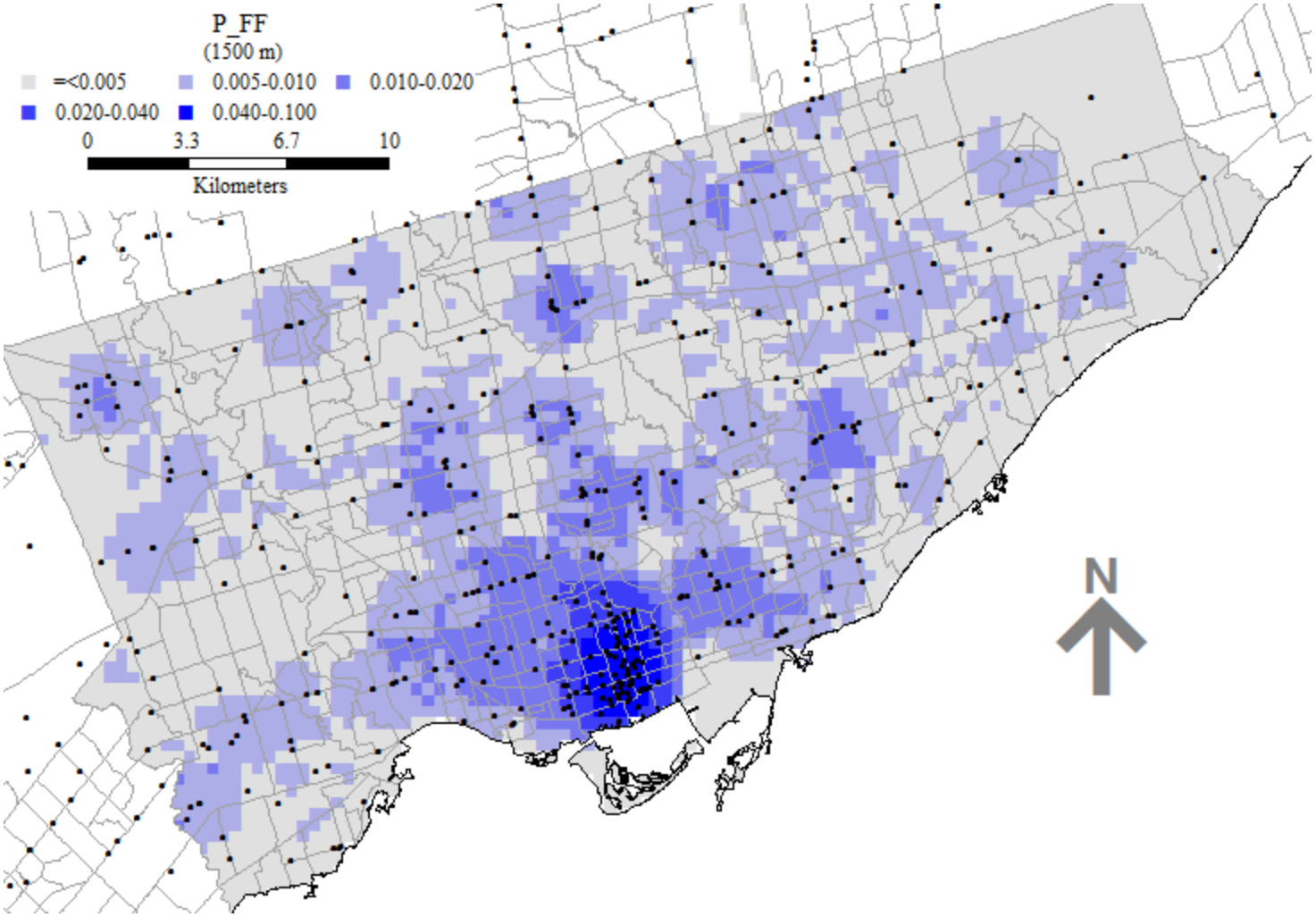

Kolmogorov-Smirnov 2-sample distribution test

$H_0$: X1 and X2 have same continuous distribution (reject)

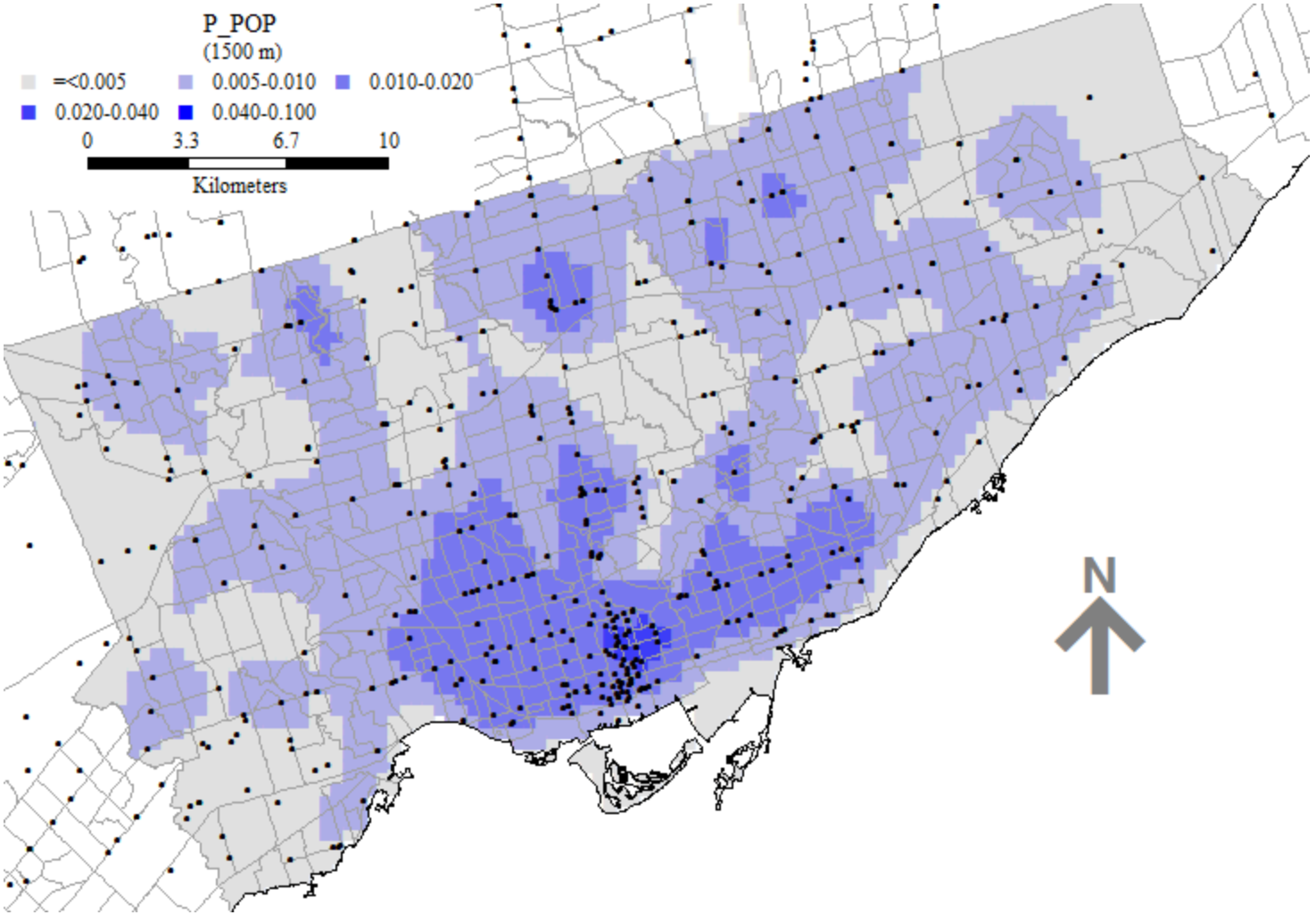
# Measuring Spatial Concentration

- Moving windows

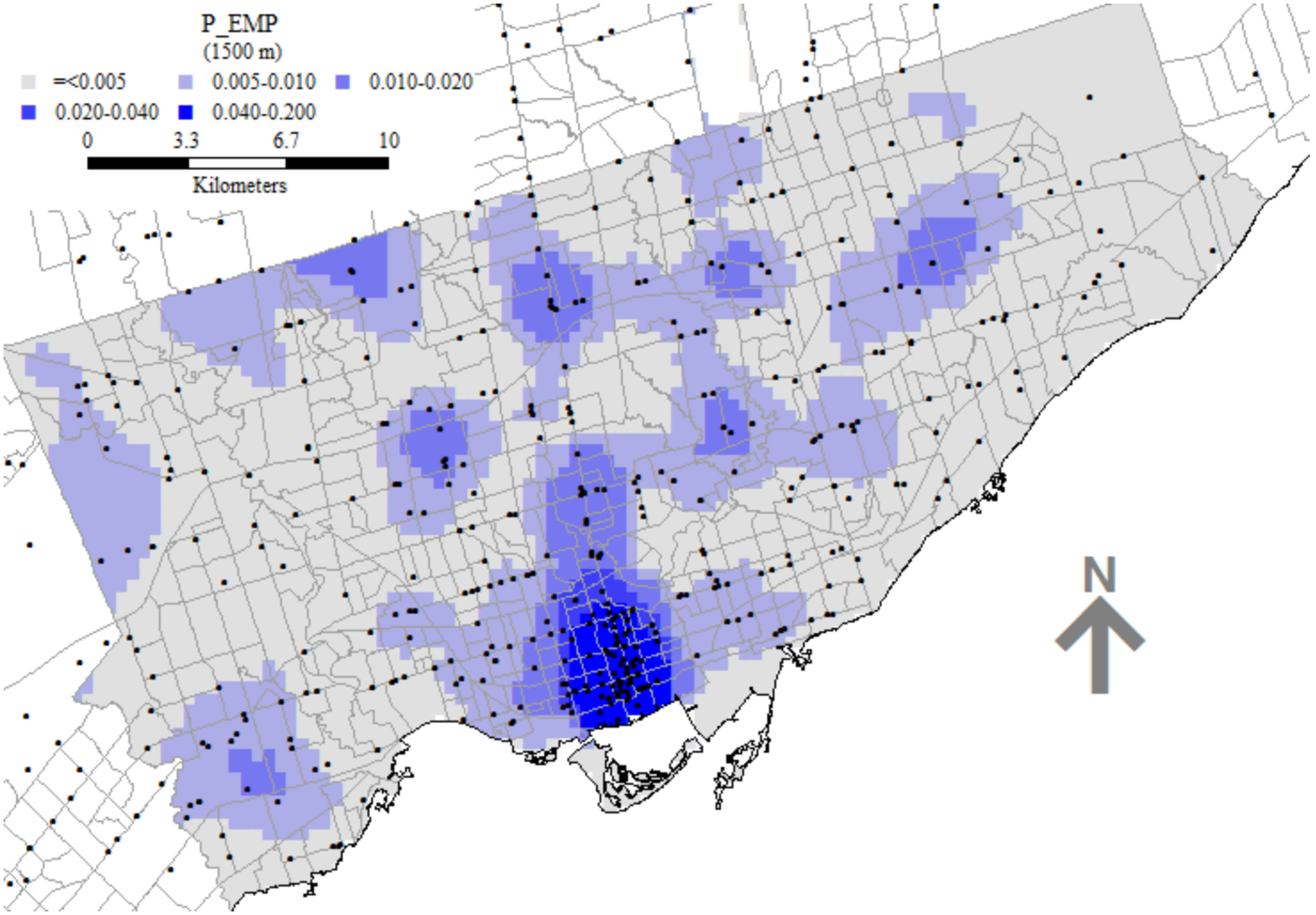
# Fast food – 1500 m concentration



# Population – 1500 m concentration



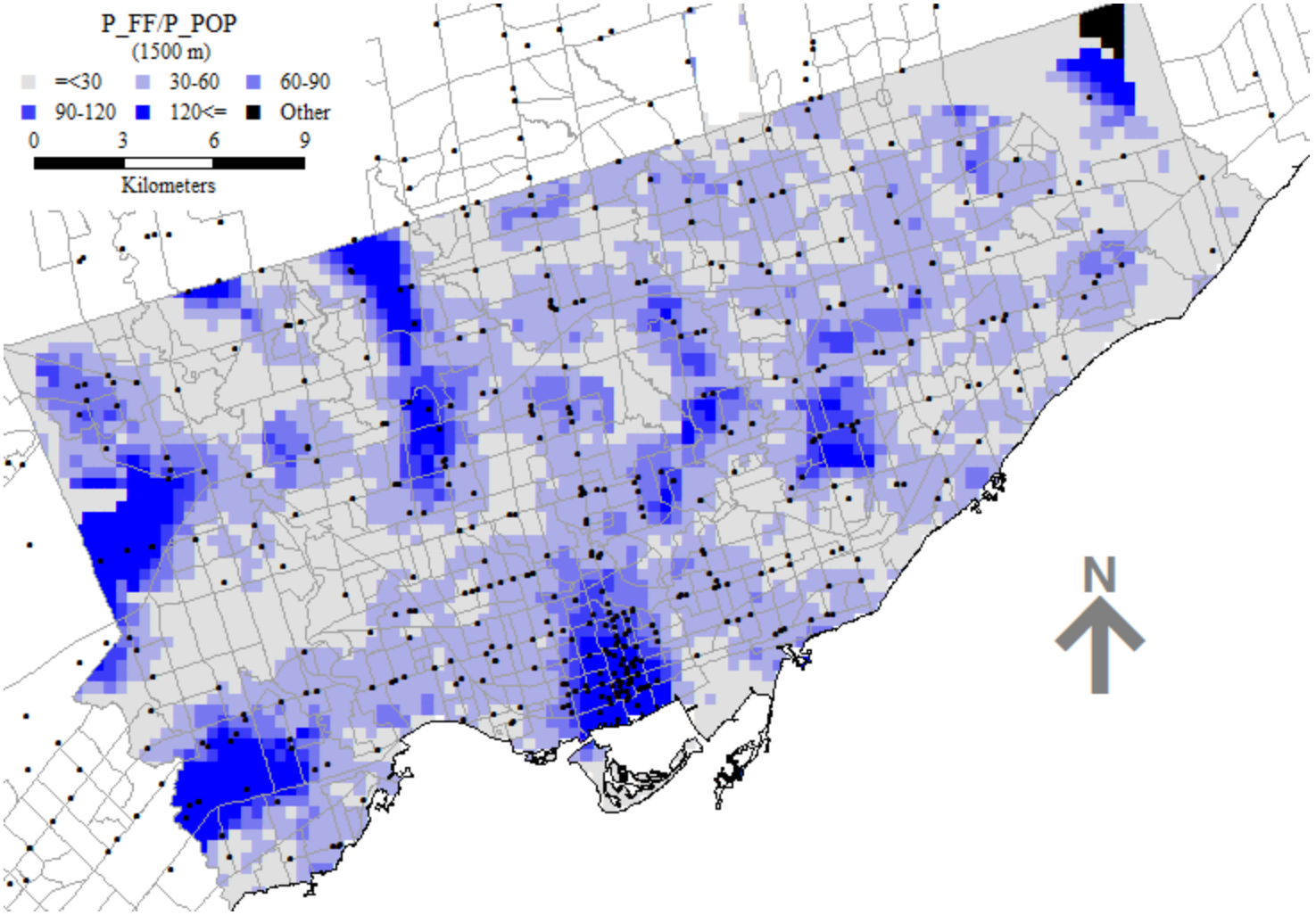
# Employment – 1500 m concentration



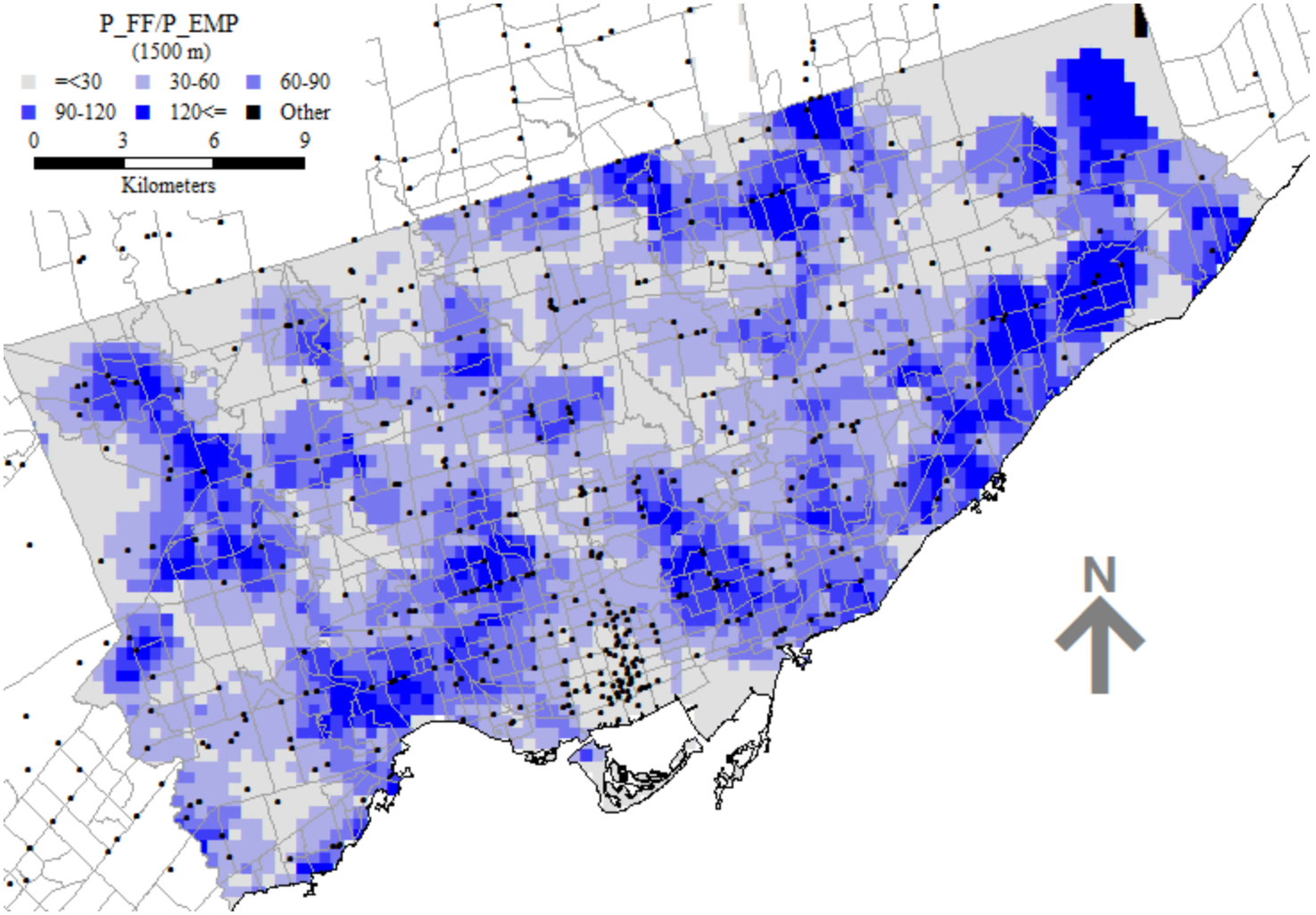
# Moving windows ratio of proportions

- Are two levels of concentration proportional?

# Ratio of proportions – Food/Pop



# Ratio of proportions – Food/Emp



# Summary + Discussion

- Spatial pricing theory: Market area patterns
- Testable hypotheses
- Point pattern analysis techniques
  - Nearest neighbor analysis
  - Moving windows
- What does the evidence indicate?
- What is the theory good for?