# Zoning of Health Districts: Segmentation of New York City Neighborhood per Restaurant and Sport Institutions.

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# INTRODUCTION

Obesity is a main issue in the United States. The prevalence of obesity was 42.4% in 2017/2018. Moreover, obesity-related conditions are composed of heart disease, stroke, type 2 diabetes, and certain types of cancer.
Obesity concerned physical condition but also medical cost. Indeed, the estimated annual medical cost of obesity in the United States was $147 billion in 2008 and people with obesity cost $1,429 more than people of normal weight [(1)]. In New York City, the percentage of adults who have overweight or are obese increased from 42% in 1997 to 62.7% in 2018 [(2)].

Many analyses study the relationship between obesity and race, income, gender, level of education, or age [(3)]. However, the impact of the environment on obesity is still incomplete [(7)]: obesity is mainly related to food and lack of sport. Thus, the number of restaurants and the number of sports institutions in a city could directly influence the obesity trend. High availability of restaurants compared to low availability of sports facilities has a psychological impact on food consumption. Indeed, predominant exposure to restaurants in the environment could increase body weight.

The goal of this study is to present a clustering analysis of the neighborhoods in New York City (NY) based on the number of restaurants and sports institutions in each district. The clustering analysis is the first approach to identify a "healthy index" of each neighborhood. To do so, we will first calculate a restaurant index and a sport index related to the number of restaurants or sports institutions in each neighborhood. Then, these indexes will be used to perform a clustering analysis to define different types of districts.

Lastly, we will correlate the restaurant index and the sport index with the income and the density population of each borough in NY.

This analysis could help governmental institutions to regulate the distribution of restaurants and sports facilities in order to act on body weight of NY residents. Further analyses as the correlation of the number of restaurants with the obesity rate could bring additional elements to understand the impact of the environment on obesity trend.

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