

Measuring Urban Ecological Segregation by One Group Measures, Case Study: Takab City

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Extended Abstract

Introduction

Measures of segregation help us examine many urban issues. By studying the measure of segregation, we can identify the segregation patterns. The results will be useful to provide a framework for analyzing the outcomes in decisions making process and policy effectiveness.

The focus in this work is on the race. This study will use the most widely used and popular one group measures of residential segregation over the past decades for measuring ecological segregation in Takab city. The selected city in this research consists of two main groups, namely Turk and Kurd, as a suitable case study for research purposes.

Methodology

This study included several most commonly used segregation measures and spatial segregation measures for one group. These measures also consist of four dimensions proposed by Massey and Denton (1988). All of the structural measures can be processed by using an application called Segregation Analyzer created by Apparicio (2008). The calculation contains three steps:

1. Creation of a data table, which contains population of each group in urban area.
2. Application of the formula of indices.
3. Export the results to output files (e.g., text file)

Results and Discussion

The one group measures are the measurements that only capture the indices for one racial group only over the total population in the study area. This research uses indices including the four dimensions of measures mentioned by Massey and Denton (1988).

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Dimension of Evenness: Evenness refers to the distribution of one or more population groups across the spatial units of the metropolitan area (e.g., census tracts). **Segregation Index IS:** The famous and commonly used is the Index of Dissimilarity proposed by Duncan (1955). **Segregation Index with Boundary access IS (adj):** Morill in 1991 introduced IS (adj) to capture potential interaction between different groups across areal unit boundaries. **Segregation Index with Boundary Length IS (w):** Wong modified slightly the IS (adj) to incorporate a boundary length component. Then the index IS (w) was introduced where the shared boundary between areal units divided by the total length of the boundary for areal unit. **Segregation Index with Perimeter Ratio IS (s):** Wong further modified IS to capture the perimeter-area ratio divided by the maximum perimeter-area ratio among all of the area units in the study region. Therefore, Wong introduced IS (s) to incorporate the geometric characteristics of areal units into the segregation index. **Gini Index G:** The Gini Index is located in the area between the segregation curve and the diagonal. The Gini coefficient is for measuring segregation, proposed by Duncan (1955). **Entropy Index H:** This is also called the information index, originally proposed by Theil (1972) and Theil and Finezza (1971) as a measure for school segregation. It was later extended to racial evenness segregation measure for the city. **Atkinson Index ATK:** This was proposed by Atkinson (1970) which resembles the Gini coefficient. Unlike the Gini, this measure allows researchers decide how heavily to weight areal units at different points over the city wide minority proportion. The values of all above indexes are between 0 – 1 where 0 is evenly distributed and 1 means totally separated. The calculated values for the indexes in Takab city are shown in Table 1.

Table 1.

Ethnic group	IS segregation	IS(adj) evenness	IS(w) evenness	IS(s) evenness	H entropy	G Gini	A(0.1) Atkinson
Turk	0.8593	0.6656	0.8237	0.8162	0.7704	0.9647	0.7087
Kurd	0.8593	0.6656	0.8237	0.8162	0.7505	0.9647	0.7824

Dimension of Exposition: Exposure is the degree of potential contact between members of the same group (Massey and Denton, 1989). **Isolation Index xPx:** It measures the extent to which minority members are exposed to only their own group. **Correlation Ratio Eta2:** This measure is the interaction index with the asymmetric relation removed. It represents an independent dimension of segregation.

The values of both above indexes are between 0 – 1 where 0 is no exposure at all and 1 means highly exposed. The less the value, the more segregated the racial group. The calculated values for the indexes in Takab city are shown in Table 2.

Table 2.

Ethnic group	xPx exposure	Eta2 exposure
Turk	0.9126	0.7909
Kurd	0.8783	0.7909

Dimension of concentration: Concentration refers to the physical space occupied by a group. **Delta Index DEL:** It computes the proportion of X members residing in areal units with above average density of X members. **Absolute Concentration Index ACO:** It is by computing the total area inhabited by a group, and compared to the minimum and maximum possible areas that could be inhabited by that group in a given city. The values of both the indexes vary

between 0 to 1, where 0 means minimum concentration and 1 means maximum concentration. The calculated values for the indexes in Takab city are shown in Table 3.

Table 3.

Ethnic group	DEL concentration	ACO Absolute concentration
Turk	0.5611	0.7586
Kurd	0.5382	0.1516

Dimension of clustering: The more contiguous spatial units a group occupies—thereby forming an enclave within the city—the more clustered and therefore segregated it is, according to this dimension. **Absolute Clustering Index ACL:** This measure calculates the absolute clustering in urban space. **Mean Proximity between Members of Group X (Pxx):** It calculates by estimating the average proximity between members of the same group, and between members of different groups. **Distance decay Isolation Index DPxx:** This was proposed by Morgan (1983) and categorized as the clustering dimension index by Massey and Denton (1988). The values of above indexes vary between 0 to 1, where 0 means no isolation and 1 means maximum isolation. The calculated values for the indexes in Takab city are shown in Table 4.

Table 4.

Ethnic group	ACL clustering	Pxx clustering	DPxx isolation
Turk	0.7195	0.8902	0.7174
Kurd	0.5879	1.1232	0.4789

Conclusion

Tekab city with its ethnic demographics has provided an appropriate field for ecological segregation phenomenon. Thus, immigration and move of Kurd race from rural areas to the city during the past decades and its entrance mainly from the western side of the city, has caused a tissue with quite residential segregation in this city. The results show four stages of ecological invasion and succession taken place entirely in Tekab. The application of any of the mentioned indexes with their specific formula and calculations approved that ecological segregation occurs in highly in Tekab. This problem can be considered in urban planning.

Keywords: one group measures, segregation analyzer, Takab City, urban ecological segregation.