Feeding the poor? Spatial Patterns and neighborhood demographics in Metropolitan Santiago Informal Food System *

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Abstract

Food systems are closely linked to urbanization patterns. Recent research in Latin America has shown how the globalization is affecting the population distribution by SES within main cities, and the capacity of these cities to connect with the local agricultural production. Still, there is little research documenting how segregation is affecting urban food systems. This paper intends to contribute to this field of research by analyzing the informal food systems in Santiago de Chile, composed mainly by street markets. Using census data from 2002 census and the complete records of street markets locations, a spatial analysis is performed in order to identify the demographics of the potential consumers of informal urban food systems. I test whether or not the socioeconomic segregation pattern is also manifested in a spatially segmented consumer market.

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Problem Description & Theoretical focus

Capital cities in developing countries concentrate a greater share of the national population which constitutes a commercial opportunity for several food retailers. Nevertheless, the increasing inequality experienced by population living in those cities has also increased the diversity of food retailers and their reach. In a context in which informal retailers are controlled by municipalities' regulation, I argue that their reach can be demonstrated spatially in the way how the locations of urban informal food retailers testify a segmented consumer market.

As most Latin American cities, Santiago de Chile shows a high primacy. . Santiago concentrates 35.8% of the total population, and it 3.1 times the sum of the next three main cities population. However, similar to the current Latin American trends (Cerruti & Betoncello, 2003), both demographic growth and internal migration have declined as well in Santiago. Comparing to 1997-2000 period to 1970-1982 intercensal period, demographic growth rate has decreased by 2.4 points, and internal migration diminished by 5.4 points (Sabatini 2003). These tendencies suggest a process of land saturation and suburbanization inside Santiago, in which the peripheral poor neighborhoods are growing while the center is being deserted (Sabatini, 2003:23). In consequence, the negative outcomes of inequality are nowadays more testified spatially. High and middle class neighborhoods are moving to be gated communities, while, low-income neighborhoods are moving forward a 'ghetto' model (Sabatini et al. 2003).

Although large-scale residential segregation in Santiago de Chile has been a typical characteristic in the last two decades, recent evidence has shown that residential segregation has decreased, especially among the groups in the extremes of the social

scale(Sabatini, 2005). However, the decrease of residential segregation has not lessened the malignancy of its effects. Sabatini (2005) has demonstrated that residential segregation is much stronger spatially auto correlated with social problems such as unemployment, youth inactivity and adolescent pregnancy in 2002 than they were in 1992.

Concerning commercial features, Santiago's food system has historically developed a traditional commercial structure that is composed of numerous street markets, which not only provide basic goods to the surrounding population, but also constitutes an important labor market for survival strategies. Along with the immigration, the phenomenon of street vending has evolved substantially from markets of direct producers to those employing merchants who purchase goods via wholesale intermediaries. In this sense, government responses have varied overtime, ranging from efforts to eradicate street markets in 19th century, to state support and certification of street vending during the popular front government in an effort to lower food prices as part of a populist political strategy (Salazar 2001). In the last three decades, in a context of economic liberalization, the modernization of commercial services has implied a proliferation of supermarkets whose location, have been increasingly approaching low-income population.

While the presence of supermarkets is increasing, municipalities have regulated street vending to limit their growth within suitable commercial areas. In Santiago de Chile, 67 % of the total 177 supermarkets working today were open to the public during the nineties while 32 % were open from 2000 to 2003. The current competition of these two urban systems, traditional and modern forms of agricultural commerce, may also

reflect a pattern of segregation based along socioeconomic lines. In Santiago, municipalities did not have the policy to construct building for communal markets. Rather the municipalities in Santiago give licenses to street vendors and identify the area in which they can operate. Street markets operate daily but not necessarily in the same area of the city. Municipalities' regulation permits them to work from Tuesday to Sunday and allocates them in specific streets to sell.

Many researchers have demonstrated that informal food suppliers, which are more likely connected to agricultural small trade, are a more affordable food source to low-income population in developing countries (Drakakis-Rondinelli, 1987; Smith, 1991; Kaynak, 1981; Smith, 1998; Goldman, 1974). Therefore, in Santiago the closeness or apartness for these food retailers is an important matter in terms of food security. While the supermarkets increase might represent a change in the patterns of food consumption, it is an open question whether or not the distribution of informal retailers is also fostering those changes. In the Santiago context, Stillerman (2004) studied consumer habits about working class families. Analyzing purchase decisions of durable goods, he showed that although low income population is exposed greatly to new retailers, they still negotiate and maintain cautious in their spending and credit practices. Food requires more frequent shopping practices, particularly within population that can not plan their expenses. In this sense, street markets can be more beneficial to low income population. Nevertheless, greater consumer market segmentation may represent also a threat in their capacity to articulate agricultural products and job creation associated with small-trade commodity chain in this urban food system.

The environmental factor regarding a potential market could be explored using residential segregation measures as social exposure and dissimilarity indexes. Assuming that shoppers tend to buy in the nearest place, social interaction between different social groups could be beneficial in order to access a suitable population demand. The main hypothesis that I seek to test is if the segregation indexes are spatially auto correlated with street markets location. In this sense, it is expected to find an increasing low income population among the surroundings of street markets' influence area as the literature for developing countries suggest and that visually seems to prevail in Santiago. As shown below, street markets have been located in a large scale in non upper class neighborhoods (Map 1); and in a small scale within the poorer areas of mixed neighborhoods (Map 2). The effect of segregation may vary by different areas and city across different days of the week.

Map 1 about here

Map 2 about here

My aim is to asses how important is this system to reach poor urban population. Therefore I pose the following questions: What are the population's characteristics related to this informal food system? How does segregation affect the likelihood to be served by this informal system? What is the potential reach of street markets according to their spatial distribution?

II. Data & Research Methods

2.1 Data

This paper uses the digital cartographic map of Santiago de Chile at the census tract level (880 polygons), street markets locations (341 points) and supermarkets (177).

All maps are projected in UTM_PSAD 1956_S19 and map units are meters. Using the 2002 Chilean census, a data set is composed with meaningful variables. This analysis is aggregated at the census tract level, as an approximate to a neighborhood unit.

2.2 Methods

In order to begin with this analysis, it is necessary to identify the pattern of the distribution of street markets and test for spatial autocorrelation. For analytical purposes, this pattern will be compared recurrently with supermarkets distribution to explore in which extent there a spatial segmentation of the consumer market. In order to describe the distribution of street markets/supermarkets, I use joint count statistics, a technique that measures the degree of clustering or dispersion among a set of spatially adjacent polygons. Joint count statistics is applicable to nominal or binary data. In this case, the presence of street markets/supermarkets at a census tract will be equal to 1. This technique calculates the difference in the number of 1:1 (AA), 0:0 (BB), and 1:0 or 0:1 (AB) joints tested against normal or evenly distributed pattern.

To identify census tract' population characteristics related to the location of street markets/supermarkets, spatial autocorrelation will be tested by a point pattern analysis using Moran and Geary. Moran's I and Geary ratios are indices for spatial autocorrelation applicable to interval attribute data. Both measure spatial autocorrelation in terms of proximity of locations and similarity of the characteristics of these locations. Both are similar in format but Geary's calculate the difference in attribute values directly while Moran's I calculates it through their mean. I complement my analysis using both indices. The variables were selected in order to identify potential commercial motives associated with street vending such as population density, % low SES population, % high SES

population, % car ownership and % housewives. It is necessary to point out that one of the limitations of this technique does not tell us about the direction of the association. In other words, it solely confirms whether or not the pattern is associated in terms of similar characteristics.

In order to identify main factors in determining street markets and supermarkets allocation, I use geographic weighted regression (GWR). GWR is technique that extends traditional regression method to allow for local rather than global estimates. Since most of our observations suggest a greater variability in space, this method permits to model nonlinearly the local coefficient estimates and also provides adjusted measures for the global pattern, using a fixed Kernell with Cartesian coordinates, as an estimator for distance decay function and providing a local significance test, indicating the range of the parameters' variability. The following variables are used for this analysis in a two stage modeling:

Table 1 about here

For the segregation measures, I used the socioeconomic status definition that is used by default in the Chilean Census. This definition categorizes population in five strata: ABC1 (upper class), C2 (middle class), C3 (middle low class), D and E (working classes).

Finally, in order to identify the reach of street markets population, the area of influence for a street market will be calculated from the estimated travel time that a customer takes on average to go to a street market. To avoid overlapping, the analysis

will be performed by day of the week[1]. and the unit of analysis will be the center of the polygon formed around one or more street markets influence area.

Table 2 about here

III. Results

3.1 Describing the Spatial Pattern of Street Markets

In terms of allocation, joint counts statistics test for randomness in terms of allocation to a specific administrative unit, describing as well the direction of the spatial pattern for street markets. As Table 3 under normality sampling shows, AA joints for supermarkets tend to be larger than expected, showing a strong clustered pattern, being significant at 0.5 level. In the case of street markets any day of the week, AA joints are larger than expected joints, showing a slightly and significant clustered pattern at 0.5 level. Also, for street markets at any day of the week, AB joints are smaller than AB expected joints, showing a negatively significant pattern.

Surprisingly, excepting from Friday and Tuesday, street markets' distribution on weekends and weekdays show neither a consistent nor a significant pattern. Both Friday and Tuesday show a significant slightly clustered pattern. We can conclude that unlike supermarkets which show a significant positive spatial autocorrelation with a clustered pattern, street markets do not show a consistent pattern along different days of the week. Using a random sampling method, it can be stated that supermarkets and street markets' general distribution is not random, particularly in terms of dissimilar joints. This also is supported by using normality sampling. In terms of street markets general distribution,

[1] This information comes from the Street Markets' Consumer Survey performed by the author for this thesis.

there is a consistent pattern among similar and dissimilar census tracts in terms of presence and absence of street markets. Therefore, we can conclude that street markets distribution in terms of allocation is not random; however, we failed to reject randomness by each day of the week. Furthermore, these results suggest that allocation could be spatially auto correlated with some characteristics at the local level.

Table 3 about here

3.2 Neighborhood characteristics and street markets distribution

Spatial autocorrelation asserts whether or not street markets distribution is associated with a specific characteristic of the census tract assigned. The variables selected account for the potential attraction of a neighborhood setting in commercial terms and consumer characteristics in terms of socioeconomic status. The former set of variables is composed by density, car ownership and housewives. It implies that the higher the density, the lower car ownership and the higher the proportion of housewives living in the census tract, the greater the attractiveness for a street market allocation. The latter set of variables consist of the proportion of low and high SES population living in the census tract and segregation indexes related to the overall spatial distribution of population by socioeconomic status.

As shown in Table 4, in contrast to supermarkets distribution, street markets do not appear to be spatially auto correlated in terms of similar consumer characteristics. For supermarkets, Moran'I and Geary show a significant clustered spatial autocorrelation in terms of similar interaction, isolation and dissimilarity indexes, as well as, proportion of high SES population, low SES population, car ownership and housewives. In terms of interaction and isolation and dissimilarity supermarkets distribution show a clustered

pattern. For street markets, just Tuesday and Wednesday distribution is associated with a specific set of variables. On Tuesday and Wednesday, which are the lowest sales days for street markets, the distribution demonstrates a slightly clustered pattern in terms of similar interaction and isolation indexes as well as in terms of proportion of car ownership, high SES and low SES population. While on Tuesdays, density shows a significant clustered pattern, on Wednesday, the clustered pattern is more likely associated to proportion of housewives at the census tract level. Again, street markets distribution do not show a consistent pattern along days of the week. Therefore, from Thursday to Sunday, we can not conclude that there is a significant spatial autocorrelation in terms of commercial variables.

Table 4 about here

Furthermore, these results suggest that street markets spatial pattern is more likely to be attributed to socioeconomic segregation than to other consumer or commercial-driven determinants. In this sense, segregation indexes could be used as predictors to determine street markets allocation, as an unintended result of the regulation policy.

3.3 Effects of Segregation on Street Markets Allocation

Table 5 presents the results from the global geographic weighted regression. While the probability of allocation of a supermarket in a census tract is 15%, the probability for street market any day of the week is greater. However, from Tuesday to Sunday, the probability is very close to that observed for supermarkets. Looking at significant parameters, interaction demonstrates a significant negative association to allocation of street markets. This pattern is consistent in all days of the week and shows a strong relationship. Conversely, supermarkets are strongly negatively associated with the

degree of isolation of minority population in the census tract. Compared to street markets, isolation appears less strong and it is significant for the allocation of street markets on any day of the week, Saturdays, Fridays and Tuesdays. While the presence of a supermarket does not show any effect in street markets allocation at the census tract level, the increase of High SES population from 1992 is slightly negatively associated to the allocation of supermarkets, street markets on any day of the week, Saturdays and Tuesdays.

Table 5 about here

In the local models, Akaike Information Criterion (AIC) has not decrease substantially but it provides more effective estimates than the global model in all cases. For supermarkets, local parameters show that in 100% of the spatial distribution isolation is negatively associated with its association while being 75% negatively and weakly associated with the increase of high SES population. For street markets allocation any day of the week 100%, 75%, and 75% of the local variability is negatively associated with interaction, isolation and the increase of high SES population. Street markets allocation on Sundays, Fridays, Thursdays and Wednesday show consistently a 100% negative association with interaction. On Saturdays and Tuesday, isolation and the increase of high SES population is a 100% negatively associated with allocation.

Table 6 about here

Visualizing the t-values of the local coefficients for the allocation of street markets any day of the week, it could be identified that the zone more affected by segregation is the southeast. Allocation of street markets is far negative associated to isolation in this zone. While the presence of supermarkets is not significant to determine

allocation, the increase of high SES has a wider effect ranging from the center up to the northwest and south east Santiago. Furthermore, interaction has a negative spatial relationship in most of the city, particularly from up downtown to the south.

Map sequence 3 about here

Looking at the general and conditional predicted values in the model (Map 4), segregation effects appear with higher predictability in areas moving away from downtown Santiago. When the observed value; that is the allocation of a street market, is equal 0 (green circles), few areas demonstrate a large predicted value, which means large errors. By contrast, red circles representing the presence of a street market, show a high predicted value in the northwest and southeast Santiago, indicating small errors in that zones. Therefore, segregation effects on the allocation of street markets at the census tract level are more evident in northwest and southeast Santiago.

Map 4 about here

3.4 Potential Consumer Market

Although, the dispersion over space contributes to a greater reach of street markets, their potential market is segmented according to the socioeconomic status of the households located closer to their influence area. Potentially, street markets in Santiago serve 40% of the city households on Tuesdays reducing its reach over the remaining weekdays and increasing it during the weekends. On Sundays, street markets potentially reach fifty percent of Santiago's households. Overall, most of the households, regardless their SES, follow the same time pattern.

Relative to the total households in Santiago according to their SES, street markets area of influence demonstrate a variable market target toward the total low income

population. In both, among working class and poorest households in Santiago (D and E), street markets reach consistently almost 50 to 60 percent of the total households in that category each day. Meanwhile, street markets covers almost one third of low-middle class households during the weekdays and a half on the weekends. Middle classes (C2) accounts for one third of their reach, representing at the most 40% of their potential reach. In contrast, upper class households are served at the most a quarter share of their total representation in the city.

Figure 1 about here

Figure 1 about here

It could be argued that this potential market distribution does not necessary implies a real reach. However, it could be also stated that the potential reach can be more realistic when moving downward of the SES scale in which population usually prefers walking to shop. Nevertheless, taking just the street markets' are of influence households, the composition of their potential market appear more stable. Figure 2 shows that street markets potential consumers are composed by two thirds of low SES or low-middle class households, while just concentrating less than a quarter of upper SES households.

Figure 2 about here

IV. Discussion & Conclusions

It is commonly stated that street markets are affected by the presence of supermarkets and urban renewals associated with housing projects for upper classes. However, although segregation could be related to those factors, there is no statistical evidence that street markets are affected by the increase of high SES population or a supermarket allocation. Conversely, these results suggest that street markets do not show

a consistent pattern in terms of commercial spatial distribution since it is not clearly associated with environmental variables, excepting in some degree from segregation in terms of population interaction.

Since locations of street markets are determined by municipalities' regulation, it could be implied that this regulation is fostering a consumer segmentation of this informal food system. As a result, street markets are serving areas in which low SES population resides in less heterogeneous but not isolated neighborhoods. As part of the urban food system, it could be suggested that street markets as a main actor in the informal food system is reaching in much extent poor population. Since supermarkets and street markets are also negatively associated to isolation, poor neighborhoods may be more potentially excluded from both sources of food distribution. Further research is necessary to evaluate how this consumer spatial segmentation is affecting the quality of the provision in terms of products availability and price competition.

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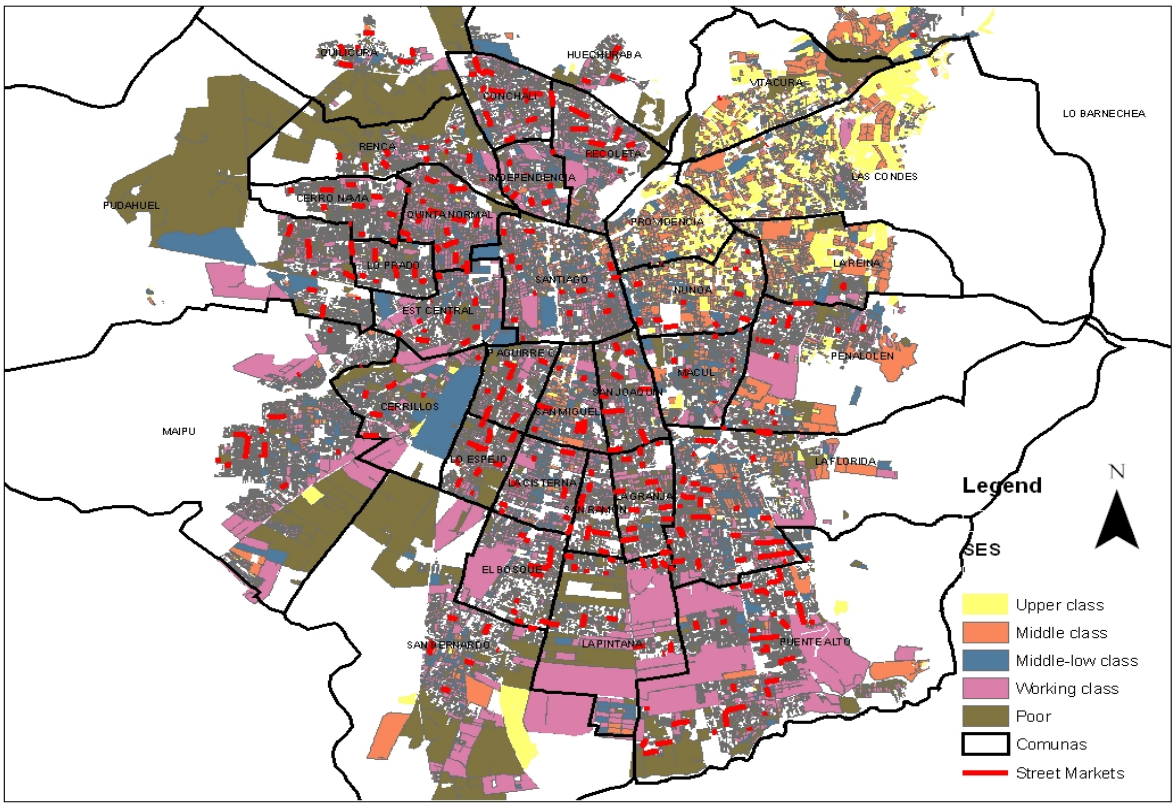
Tables, Maps & Figures

MAP 1: Street Markets location and SES distribution in Santiago de Chile



MAP 2: Snapshot at street markets location in a typical neighborhood setting

Table 1 estimated street markets area of influence by day of the week

Day of the week	Mean (minutes)	Estimated area* (meters)
Tuesday	9.47	859.11
Wednesday	7.94	720.28
Thursday	8.32	754.44
Friday	7.38	668.98
Saturday	9.66	876.53
Sunday	10.63	964.00

* Assuming e=(v*t), a person would walk in average 1.51 m/sec[2]

Table 2: Variables and measures

Dependent Variable
Street Markets allocation (Likelihood that a census contain a street market)
Independent Variables
Index of interaction* $_xP*_y = \sum_{i=1}^{n} [x_i / X] \times [y_i / t_i]$
Index of isolation** $_xP*x = \sum_{i=1}^{n} [x_i / X] \times [x_i / t_i]$
Index of Dissimilarity *** $D = \frac{1}{2} \sum_{i=1}^{n} \left\| \frac{N_i}{N} - \frac{W_i}{W} \right\|$
Increase of High SES households from 1992 (%)
Presence of Supermarket (0=no 1=yes)

Notes

* It measures the extent to which members of minority X are exposed to members of majority Y

** It measures the extent to which minority members are exposed only to one other, rather than to majority members.
In both, interaction and isolation: where x_i, y_i, and t_i are the numbers of X members, Y members, and the total population of unit i, respectively, and X represents the number of X members within the entire study area

*** It is the proportion of one group or the other that would have to be redistributed in order for the two groups to have identical distributions it is the proportion of one group or the other that would have to be redistributed in order for the two groups to have identical distributions. It varies from 0 to 1, in which one represents an even distribution.

[2] Source: Richard L. Knoblauch, Martin T. Pietrucha, & Marsha Nitzburg. 1996. "Field Studies of Pedestrian Walking Speed and Start-Up Time" *Transportation Research Record No. 1538.* Accessed at Road Engineering Journal, http://www.usroads.com/journals/p/rej/9710/re971001.htm.

Table 3: Joint counts statistics
(Using normality sampling)

	Supermarkets	**Street Markets (any day of the week)**	**Sunday**	**Saturday**	**Friday**	**Thursday**	**Wednesday**	**Tuesday**
AA Joints	100	642	1977	1952	92	2050	2024	94
BB Joints	1898	874	83	89	1991	79	69	1987
AB Joints	764	1246	702	721	679	633	669	681
Expected AA Joints	68.08	552.12	1978.75	1962.83	61.35	2026.92	2048.51	62.29
Expected BB Joints	1962.83	844.34	65.15	68.08	2000.09	56.75	53.21	1994.74
Expected AB Joints	731.09	1365.54	718.10	731.09	700.57	678.33	660.29	704.97
Variance of AA Joints	169.50	2003.46	3504.46	3540.42	149.01	3387.46	3330.96	151.84
Variance of BB Joints	3540.42	2974.52	160.52	169.50	3454.17	135.33	124.95	3467.00
Variance of AB Joints	3774.67	2833.82	3752.99	3774.67	3721.14	3676.44	3636.63	3729.42
z-value for AA Joints	**2.45**	**2.01**	-0.03	-0.18	**2.51**	0.40	-0.42	**2.57**
z-value for BB Joints	-1.09	0.54	1.41	1.61	-0.15	1.91	1.41	-0.13
z-value for AB Joints	0.54	**-2.25**	-0.26	-0.16	-0.35	-0.75	0.14	-0.39

Significant at .05 level highlighted

(Using random sampling)

	Supermarkets	**Street Markets (any day of the week)**	**Sunday**	**Saturday**	**Friday**	**Thursday**	**Wednesday**	**Tuesday**
AA Joints	100	642	1977	1952	92	2050	2024	94
BB Joints	1898	874	83	89	1991	79	69	1987
AB Joints	764	1246	702	721	679	633	669	681
Expected AA Joints	67.66	551.34	1978.35	1962.41	60.95	2026.53	2048.13	61.89
Expected BB Joints	1962.41	843.56	64.74	67.66	1999.69	56.37	52.83	1994.34
Expected AB Joints	731.93	1367.10	718.91	731.93	701.36	679.10	661.04	705.77
Variance of AA Joints	13757.10	903663.00	11679600.00	11492000.00	11204.00	12256200.00	12519200.00	11544.50
Variance of BB Joints	11492000.00	2118380.00	12613.80	13757.10	11933300.00	9614.65	8472.51	11869500.00
Variance of AB Joints	342.74	677.83	336.24	342.74	327.50	316.45	307.51	329.69
z-value for AA Joints	0.28	0.10	0.00	0.00	0.29	0.01	-0.01	0.30
z-value for BB Joints	-0.02	0.02	0.16	0.18	0.00	0.23	0.18	0.00
z-value for AB Joints	**1.73**	**-4.65**	-0.92	-0.59	-1.24	**-2.59**	0.45	-1.36

Significant at .05 level highlighted

Table 4: Moran's I and Geary Ratio test for spatial autocorrelation for selected variables

	Interaction		**Isolation**		**Dissimilarity**		**Density**		**% High SES**		**% Low SES**		**% Car ownership**		**% housewives**	
	Moran's I	Geary	Moran's I	Geary	Moran's I	Geary	Moran's I	Geary	Moran's I	Geary	Moran's I	Geary	Moran's I	Geary	Moran's I	Geary
Supermarkets	**0.56***	**0.16***	**0.53***	**0.19***	**0.30***	**0.30**	0.32	**0.32**	**0.51**	**0.14**	**0.57**	**0.14**	**0.68**	**0.11**	**0.93**	**0.15**
Street Markets (anytime of the week)	0.51	0.00	0.64	0.00	0.08	0.00	1.21	0.00	0.44	0.00	0.98	0.00	0.73	0.00	0.15	0.00
Sunday	-0.81	3.63	-0.56	2.03	0.12	0.44	-0.36	**0.94**	-0.61	3.25	-0.58	2.71	-0.70	2.39	**0.03**	2.04
Saturday	**-0.07**	0.41	0.25	0.18	0.36	0.10	0.32	0.21	0.12	**0.16**	0.09	0.36	**0.03**	0.35	0.10	0.06
Friday	-0.38	1.10	**1.85**	0.57	0.59	0.18	0.13	0.20	0.09	0.14	1.05	0.19	0.91	0.16	0.05	0.14
Thursday	0.26	0.13	0.52	0.10	0.02	0.66	0.31	0.17	0.21	0.10	0.42	0.12	0.46	0.10	0.79	0.13
Wednesday	**0.33**	**0.45**	**0.34**	**0.59**	0.32	0.60	**0.42**	0.77	**0.29**	**0.31**	**0.24**	**0.47**	**0.24**	**0.44**	**0.31**	**0.42**
Tuesday	**0.24**	**0.67**	**0.12**	**0.72**	0.09	0.76	**0.30**	**0.89**	**0.16**	**0.66**	**0.21**	**0.73**	**0.12**	**0.77**	0.09	0.91

p-value <0.05 is highlighted

Table 5: Global model diagnostics and coefficients from geographic weigthed logistic regression for explaining street markets allocation

	Supermarkets	Street Markets	Sunday	Saturday	Friday	Thursday	Wednesday	Tuesday
Probability	15.60%	44.76%	15.36%	15.70%	14.90%	14.33%	13.88%	15.02%
Bandwith	7767.30	7767.30	29089.82	29089.82	29089.82	8156.16	29089.82	29089.82
AIC	683.35	1123.50	727.26	736.42	720.81	685.62	684.97	708.50
Constant	1.38	1.88**	-0.24	0.94	0.25	0.72	0.07	0.95
(Std. Deviation)	(0.699)	(0.738)	(0.701)	(0.707)	(0.716)	(0.717)	(0.702)	(0.718)
Interaction	-0.05	-2.68***	-3.22***	-2.47***	-2.50**	-3.27***	-2.78***	-2.76**
(Std. Deviation)	(0.843)	(0.807)	(0.916)	(0.891)	(0.927)	(0.961)	(0.923)	(0.934)
Isolation	-5.16***	-1.68**	-0.93	-2.52**	-1.63*	-1.82	-1.79	-2.05**
(Std. Deviation)	(0.844)	(0.813)	(0.818)	(0.820)	(0.833)	(0.837)	(0.827)	(0.833)
Dissimilarity	1.83	0.03	-0.34	-0.12	-0.26	-1.11	0.48	-1.34
(Std. Deviation)	(1.752)	(0.758)	(1.023)	(1.044)	(0.048)	(1.122)	(1.050)	(1.117)
% Increase High SES	-0.04***	-0.04**	-0.01	-0.05**	-0.03	-0.04	-0.04	-0.05**
(Std. Deviation)	(0.014)	(0.014)	(0.021)	(0.022)	(0.022)	(0.027)	(0.023)	(0.025)
Presence Supermarkets		0.02	0.42	0.16	-0.43	-0.21	0.40	-0.25
(Std. Deviation)		(0.218)	(0.284)	(0.286)	(0.335)	(0.336)	(0.291)	(0.327)

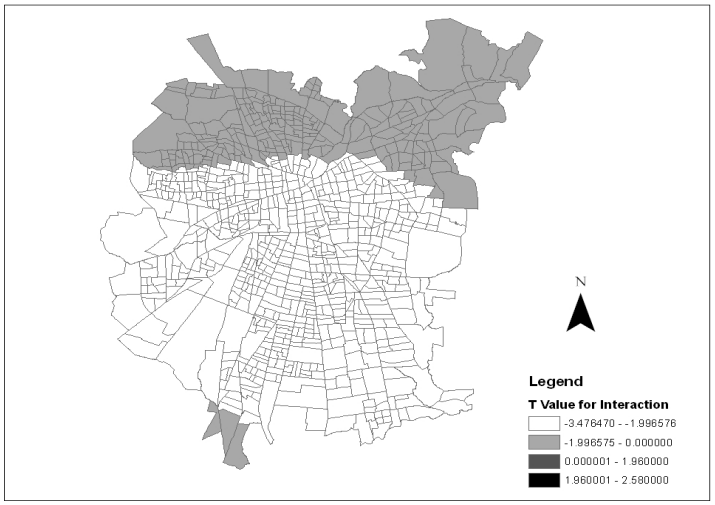
*** p- value <0.001, ** p-value <0.05, * p-value<0.10

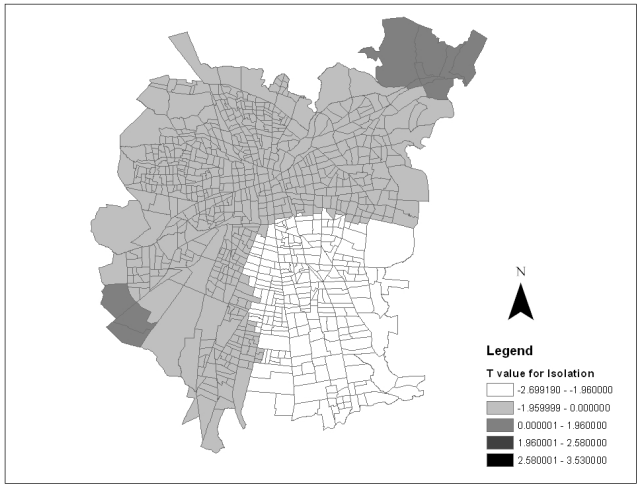
Table 6: Local coefficients from Geographic weigthed logistic regression for explaining street markets allocation

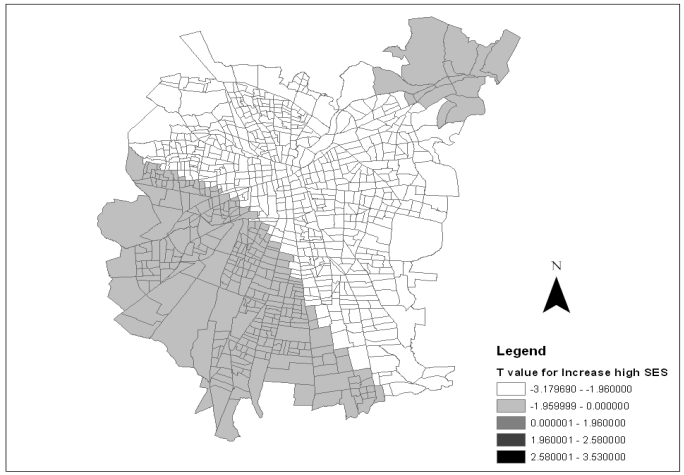
Supermarkets				***Effective 12.37***	***AIC 677.32***
Variables	Min	Lower Quartile	Median	Upper Quartile	Max
Constant	0.39	0.71	1.13	1.44	6.53
Interaction	-8.13	0.52	1.11	1.42	1.93
Isolation	-9.95	-5.64	-4.99	-4.12	-3.61
Dissimilarity	-0.86	0.29	1.31	2.18	4.69
Increase High SES	-0.07	-0.06	-0.05	-0.04	0.01
Sunday				***6.63***	***727.65***
Constant	-0.29	-0.25	-0.24	-0.23	-0.19
Interaction	-3.36	-3.23	-3.20	-3.17	-3.10
Isolation	-1.00	-0.96	-0.94	-0.92	-0.86
Dissimilarity	-0.35	-0.29	-0.27	-0.26	-0.24
Increase High SES	-0.01	-0.01	-0.01	-0.01	-0.01
Presence Supermarkets	0.33	0.37	0.40	0.42	0.48
Friday				***6.62***	***721.75***
Constant	0.20	0.22	0.23	0.24	0.27
Interaction	-2.52	-2.50	-2.49	-2.48	-2.42
Isolation	-1.67	-1.64	-1.62	-1.61	-1.57
Dissimilarity	-0.27	-0.20	-0.19	-0.18	-0.16
Increase High SES	-0.03	-0.03	-0.03	-0.03	-0.02
Presence Supermarkets	-0.49	-0.46	-0.45	-0.44	-0.41
Wednesday				***6.62***	***684.97***
Constant	-0.03	0.05	0.07	0.08	0.12
Interaction	-2.92	-2.83	-2.78	-2.73	-2.61
Isolation	-1.83	-1.81	-1.80	-1.79	-1.78
Dissimilarity	0.37	0.50	0.55	0.59	0.79
Increase High SES	-0.04	-0.04	-0.04	-0.04	-0.03
Presence Supermarkets	0.35	0.37	0.38	0.38	0.40

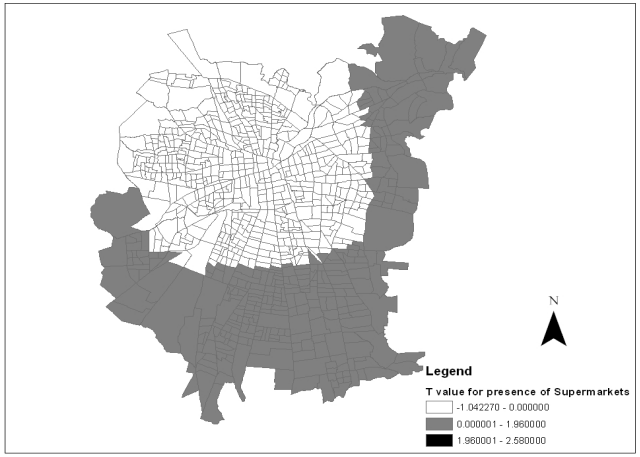
Street Markets (any day of the week)				***Effective: 15.51***	***AIC 1118.46***
	Min	Lower Quartile	Median	Upper Quartile	Max
	-0.79	1.24	1.48	2.33	4.62
	-4.05	-3.29	-2.74	-2.12	-1.19
	-4.41	-2.20	-1.38	-1.07	1.00
	-1.38	0.15	0.62	0.99	1.32
	-0.07	-0.04	-0.04	-0.03	0.00
	-0.32	-0.18	-0.07	0.03	0.71
Saturday				***6.61***	***736.77***
	0.75	0.84	0.89	0.95	1.10
	-2.56	-2.49	-2.46	-2.42	-2.30
	-2.70	-2.54	-2.48	-2.43	-2.33
	-0.19	-0.09	-0.06	-0.02	0.11
	-0.06	-0.05	-0.05	-0.05	-0.05
	0.11	0.14	0.15	0.16	0.19
Thursday				***14.32***	***684.93***
	-0.48	0.11	0.24	0.48	2.49
	-4.87	-4.01	-3.52	-2.93	-1.10
	-3.54	-1.52	-1.27	-1.14	-0.48
	-3.86	-1.19	-0.86	-0.66	-0.42
	-0.11	-0.03	-0.02	-0.02	-0.01
	-1.49	-0.68	-0.25	0.14	0.47
Tuesday				***6.61***	***709.04***
	0.86	0.90	0.93	0.96	1.04
	-2.91	-2.79	-2.73	-2.69	-2.62
	-2.14	-2.07	-2.05	-2.04	-1.99
	-1.55	-1.33	-1.26	-1.18	-1.07
	-0.06	-0.05	-0.05	-0.05	-0.04
	-0.28	-0.26	-0.26	-0.25	-0.24

Map 3 Sequence showing T values from GWR coefficients for street markets allocation any day of the week









Map 4: General and Conditional Predicted Values for Modeling Segregation Effects

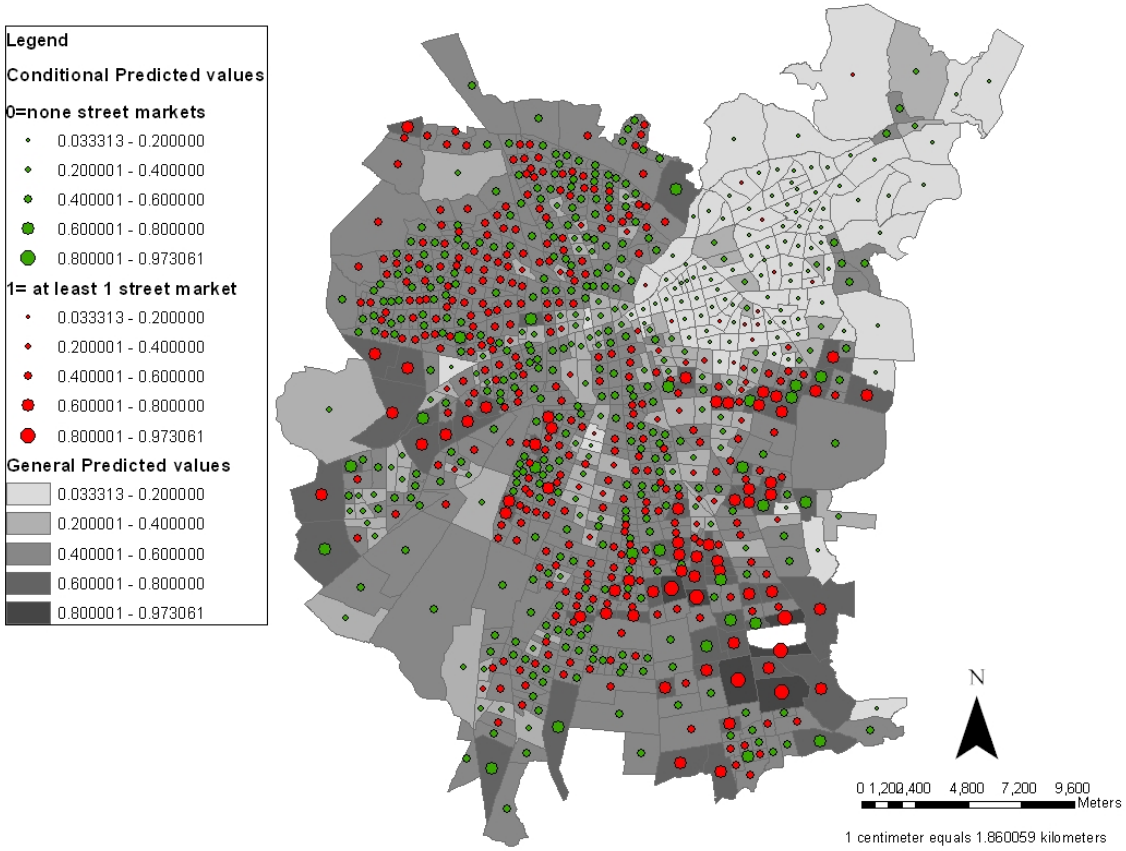


Figure 1: Share of Santiago Households by SES served daily by Street Markets

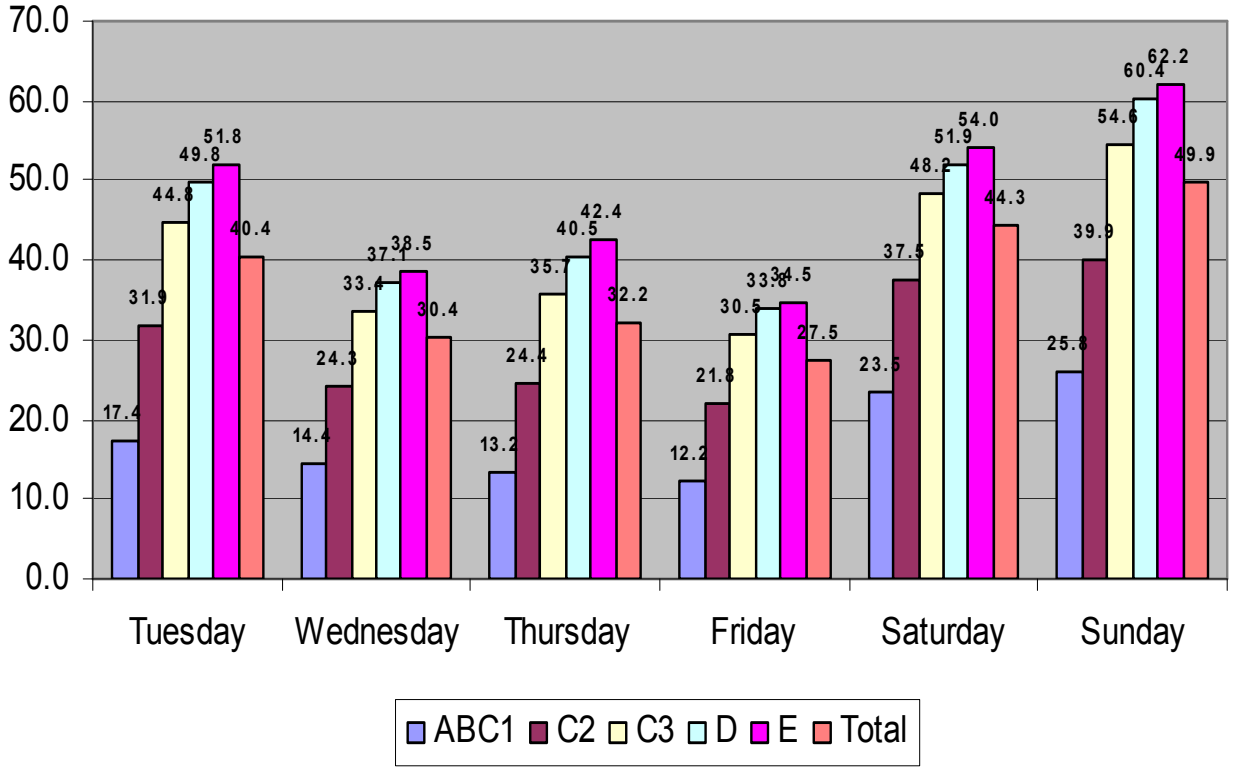


Figure 2: SES Composition of Street Markets Potential Households Market by day of the week