

TERRITORIAL EXCLUSION AS A LIMIT TO URBAN DEVELOPMENT: THE CASE OF QUITO, ECUADOR

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Abstract

Socio-spatial exclusion produces structural and chronic poverty and makes it difficult, if not impossible, for people to overcome that condition. Knowing about the main characteristics that cause social exclusion in geopolitical divisions at different levels can help governments design policies capable of improving their citizens' quality of life. Using the Multidimensional Poverty Index (MPI), this research aims to identify the parameters of spatial exclusion that explain poverty in the different parishes of Quito. The parameters considered herein are (a) distance to work as measured in travel time, (b) density of public transportation, and (c) healthcare and education infrastructure. Results show how these three variables do help explain poverty in Quito, except in the case of neighborhoods in the center.

Keywords: Quito. Poverty. Mobility. Accessibility. Exclusion. Spatial exclusion. Social exclusion. Socio-spatial exclusion.

1. INTRODUCTION

In recent years, exclusion has become an essential factor in studying and reducing urban poverty. Once the causes of exclusion are identified by econometric tools, ideologically different political forces can unite and increase available resources. In addition, working with exclusion focuses on the people that continue to live in poverty, generation after generation, and cannot break out of the poverty cycle.

Even though exclusion is a concept defined and more often used in high-income countries, in middle-income environments it can be useful in examining the limits of social mobility, one of these countries' greatest challenges.

Among the few studies that have tried to identify the constraints for leaving behind extreme poverty in middle-income countries in general, and in South America in particular, place of residence has been identified as key. These studies have concluded that their neighborhood determines people's options and the likelihood that they will continue to be poor.

This paper uses the concept of exclusion in Quito to identify the constraints on social mobility, and specifically on the possibility of breaking out of extreme poverty. The study compares the Mobility Index

(MI) with the Multidimensional Poverty Index (MPI) for each parish in Quito. The MI includes parameters related to access to employment, education and healthcare while the MPI is calculated using the same structure used to estimate national and provincial indexes.

Results show that the parishes that have the lowest MIs are the ones with the highest MPIs, which could lead to postulating a direct relationship between place of residence and poverty in Quito. However, this study found a second group of parishes with a relatively good MI and a higher MPI. These are the areas that had inherited poverty from colonial times, thus potentially representing a pattern for cities that were colonies and inviting them to join efforts to design a common political strategy to reduce exclusion that causes poverty.

2. QUANTITATIVE POVERTY, MULTIDIMENSIONAL POVERTY AND EXCLUSION

Even early studies of classical and neoclassical economists showed their concerns about poverty. They thought of poverty as insufficient income to pay for the goods and services required to cover basic necessities (Rauhut, 2005). Thus, the concept of the “poverty line,” understood as the minimum to cover basic necessities, became the core of related studies (Gillie, 1996). This concept was used to present the first data on people under the poverty line in London and York (Booth, 1899 and Rowntree, 1901). These early studies assumed that poverty was caused by poor people’s bad choices, which affected their productivity, and that no political action could help them. On the other hand, and especially for neoclassical economists, poverty was the result of market failures, which made it necessary to design policies to maximize or minimize externalities (Sanchez-Martinez and Davis, 2014).

Breaking with the general theories of classical and neoclassical economists, Marxist theories proposed a new view of poverty. They hypothesized that it was caused by the class division that meant that some people were unable to earn the minimum wage required to cover basic needs. The specific policies proposed by Marxism were anti-discrimination laws and labor market regulation (Blank, 2010).

Throughout the twentieth century the dramatic reduction of poverty in the countries today known as high-income countries contrasted with the situation that persisted in low-income countries, thus increasing the gap between these groups. Economists therefore focused their studies on the poorest countries and created a new branch of economics dedicated to improving their development process and appropriately known as “development economics.” They worked chiefly out of universities, economic research centers and some United Nations (UN) agencies, especially the World Bank. These economists continued to use amount of income available to cover necessities to define the poverty line but, because of their inherent Keynesian perspective, they related poverty to macroeconomic variables,

especially GDP. Some academics posited that impediments to growth could be explained by the underdeveloped countries' greater constraints than those of other countries. Thus, they believed it was necessary to accelerate the development of the low-income countries (Prebisch, 1950; Perroux, 1955; Meier and Baldwin, 1957). Other economists delved into greater depth on the impacts of low levels of saving and productive investment, and they proposed different ways to maximize the available capital (Rosenstein-Rodan, 1943; Nurkse, 1953).

Alongside the advances in development economics, some social sciences --such as philosophy, psychology and sociology-- re-examined the idea of human necessities and proposed that needs be understood as the result of the relationships between individuals and their environments, not designed from outside (Fromm, 1941). In addition, since the perception of needs could change, they had to be understood as a heterogeneous and dynamic issue (Stouffer, et al. 1949; Davis, 1959). Yet, needs could be ranked, valued and prioritized (Maslow, 1943) to design customizable policies (Marcuse, 1964).

As the concept of necessities changed, so did the concept of poverty. Thus, the poor were no longer those who could not earn enough money but rather those who could not cover their own changing basic needs. Accordingly, the relationship between poverty and macroeconomic data started to be questioned (Morawetz, 1977; Morawetz, 1979; Hicks and Streeten, 1979; Hicks, 1979; Streeten, et al., 1981). Nonetheless, some economists continued to develop the link between poverty, understood as low income, and macroeconomic indexes.

It therefore became necessary to rethink the way to measure poverty in order to have multidimensional data that accurately explained it (UN, 1954; Seers, 1969; McNamara, 1972). After the first effort of the UNRISD (United Nations Research Institute for Social Development) (Drewnowski and Scott, 1966), other indexes were designed. The Unsatisfied Basic Needs Index (UBN) was proposed by the Economic Commission for Latin America and the Caribbean (ECLAC) in 1989 and the Human Poverty Index (HPI) by the UN in 1997. The Multidimensional Poverty Index (MPI) was designed by Alkire and Foster (2007) and presented by the UN and the Oxford Poverty & Human Development Initiative (OPHDI) in 2010. In all these cases, except for the HPI, the indexes included income indicators, thus recognizing the value of quantitative poverty. This paper uses the MPI as a reference.

Because multidimensional aspects of poverty cannot be considered directly by macroeconomic indexes, it was necessary to understand its causes. Amartya Sen, influenced by his own background as a classical economist, philosopher and political scientist, was the flagship author in the area, although the work of Bauer (1957) and Streeten et al. (1981) can certainly not be ignored. Sen considered that

people have functions, which are the rights that they can exercise on goods and services. If people have the opportunity and freedom to access the functions that they want and can combine these as they want, they have the capabilities to achieve what they want for their lives. Hence, poor people are not free, which means they do not have access to opportunities (Sen 1981, 1982a, 1984, 1990, 1999).

To reinforce the idea of the lack of opportunities as a cause of poverty, it is necessary to address two other concepts that include that idea in their definition: exclusion and marginality. The definitions of these two concepts have in common the lack of access to ways in which needs can be met.

Even though the concept of marginality has been developed more than the concept of exclusion, this paper uses the latter because this research is focused on Quito and exclusion has traditionally been related to urban poverty. In addition, this paper aspires to be useful to policymakers, and governments have used exclusion more often than marginality in designing strategies to combat poverty (Saith, 2001).

The idea of exclusion gained relevance in Europe and the United States in the eighties. The “excluded” (Lenoir, 1989), “new poverty” (Harrington, 1984) or the “underclass” (Wilson, 1987) were the poor who could not improve their opportunities because of the structural and global changes resulting from the level of labor market flexibility and the weakness of the welfare state (Arriba, 2002).

Both the European Commission and the United States used the concept of exclusion to confront poverty and tried to expand the opportunities of the groups traditionally discriminated against because of gender, ethnicity, age, employment, disabilities and legal status. Policies centered on the three recognized dimensions of exclusion, which are economic, political, and sociocultural. The economic one refers to the lack of access to sources of employment and to the market for goods and services; political, to the lack of access to civil and political laws; and sociocultural, to ethnic, gender-related, generational, religious differences, etc.

In spite of the development of the concept of exclusion, it still faced substantial challenges. It could not overcome the difficulty that, in practice, it supposes that a process that takes place in different areas has different outcomes (Economic and Social Committee, 1992) and must deal with deprivations that are subjective and changeable (Silver, 1994). No consensus has been reached regarding the way to measure and quantify the condition of exclusion, and it is possible that no consensus will ever be reached. Neither is the theoretical concept of exclusion clear. In juxtaposition to quantitative poverty, it is paired with the idea of multidimensional poverty (Deleeck and Van den Bosch, 1992 and Tezanos, 1999), which calls into question its theoretical use and minimizes its practical importance. Even in a

comparative analysis, the measurement of exclusion relies on its own indicators of quantitative poverty (Arriba, 2002).

Despite the challenges, the concept of social exclusion continues to be promising. It can garner more support when addressing the reduction of poverty because it deals with the causes instead of the consequences and allows agreements on minimums among different ideologies (De Haan, 1999). In practice, the work concerning exclusion makes it possible to identify the reasons behind the lack of opportunities shared by the individuals who comprise the disadvantaged group (Kabeer, 2010). In addition, it makes it possible to include the especially vulnerable groups, which do not share the same lack of opportunities because they are more heterogeneous and tend not to collaborate with each other (Alesina, et al. 1999; Miguel and Gugerty 2005). Exclusion can also be the platform for more just and equitable development that equalizes people's opportunities. They can choose their own way, which makes them free-- and frees society, as well, of the responsibility for individuals' condition and future.

The possibilities offered by a focus on exclusion increase if its practical application in middle-income countries is considered. It can identify the constraints for social mobility opportunities; it makes it possible to identify the lack of access to a better life, i.e., the lack of freedom; and it can identify ways to tackle the inherited poverty that remains, generation after generation, in the pockets of poverty existing in the cities of middle-income countries. Notwithstanding the limitations for adapting a concept that originated in high-income countries as the result of a structural change, the concept of exclusion offers numerous opportunities to reduce poverty all around the world.

3. APPLYING SOCIAL EXCLUSION IN A MIDDLE-INCOME COUNTRY

To apply the concept of exclusion to a city in a middle-income country in general, and in South America in particular, it is necessary to identify the reasons for the lack of opportunities. As indicated above, in high-income countries those excluded did not have access to opportunities because of gender, ethnicity, age, employment status, disabilities and legal status (O'Brien, et al. 1997). In middle-income countries, what are the constraints for poor people? Is it possible to generalize or does every region or even every country have its own constraints?

The Inter-American Development Bank (IDB) presented an analysis that described the causes and the consequences of being excluded in Latin America. It identified place of residence, gender, ethnic origin and social status as the most frequent reasons for exclusion (Behrman, 2003).

This paper examines place of residence as a cause of exclusion because this factor determines access to work, which is the most direct means of reducing economic exclusion, overcoming income poverty,

and making it possible to acquire goods and services. It is thus the chief means of eradicating social exclusion (Saith, 2001). However, it is necessary to think not only about people's access to employment but also about their access to their workplace (Golledge and Stimson, 1997). This calls for considering accessibility, understood as the cost, time and reasonable ease involved in getting to their workplace. (Sen, 2008).

Once place of residence and accessibility to the workplace have been related, it is necessary to turn to the concept of mobility, understood as the ability to move easily within the parameters of space and time (May and Thrift, 2001). The study of mobility to employment as a factor of social exclusion could generate a new tool for evaluating ways to reduce poverty: socio-spatial exclusion assumes that poor mobility to employment because of place of residence leads to economic and social exclusion that in turn leads to poverty.

This paper aims to test the hypothesis that socio-spatial exclusion, as related to work, exists in Quito, which means that the capital city residents who have the worst mobility to their place of employment are also the poorest.

4. METHODOLOGY

Most studies have been conducted in high-income countries, but they estimate that less mobility in reaching the main sources of employment/income involves more poverty. This paper aims to assess whether such a relationship is indeed seen in the city of Quito, i.e., whether having less employment-access mobility (or employment-related transit mobility) or living in greater exclusion due to mobility issues increases the probability of being poor.

In order to perform the analysis, an econometric model will be applied to the entire population. The dependent variable is the poverty calculated for each of the urban parishes in the city of Quito, totaling almost 1.6 million people. The four independent variables are: the time, measured in minutes, that it takes to travel from the center of each parish to the center of the major employment-generating parish; the density of public transportation; the availability of education and healthcare centers in each parish; and the number of indigenous people. The model intends to test whether the location of the parish and the availability of transportation, healthcare and education increase the probability of being poor. In further research the cost of transportation could be considered. However, in the case of Quito, it is irrelevant because public transportation is integrated; this means that the fare is 25 cents regardless of the length of the route or the number of vehicles taken.

The methodology of the Multidimensional Poverty Index (MPI) based on Alkire and Foster's work (2007) and adopted by the National Institute of Statistics and Censuses (INEC, for its acronym in Spanish) was applied to calculate multidimensional poverty at the parish level in Quito. For the analysis of poverty in the parishes of Quito, however, a different INEC database was used: the 2014 National Employment, Unemployment and Underemployment Survey (ENEMDU, for its acronym in Spanish). This database does not allow for going lower than the canton level because it loses representativeness,¹ so it has also been necessary to recur to the latest (2010) Population and Housing Census (INEC, 2011)². Eight of the ten indicators can be calculated using the census, and using it is not detrimental because the data have been calculated in the same way and will be compared with each other. Appendix 1 shows the census indicators taken for this study from the census and the ENEMDU indicators used for the national analysis, as well as the weights for both.

The Multidimensional Poverty Index (MPI) is calculated by multiplying the multidimensional poverty rate (MPR) by the intensity of poverty (IP). The MPR is calculated as the percentage of the population that meets three of the eight poverty indicators; when a person meets half of the indicators, he or she would be considered extremely poor. The IP is calculated by weighting the indicators, giving more importance to some types of deprivation than to others.

The mobility variables included in the model as independent variables are based on the socio-spatial inclusion and exclusion model proposed by Shove (2002). In this case, when considering physical access to work, it is understood that a person has less access depending on (a) *distance*, that is, if it takes longer to get to work, and on (b) *lower density of public transportation*, that is, less infrastructure available. Independent variable (a) *distance* estimates the time taken to travel from the center of each parish to the center of the parish of Iñaquito.³ For this purpose, it is necessary to calculate (a.1) the time that it takes for the inhabitants of each parish to reach the center of their parish and (a.2) the time that public transportation from the center of each parish takes to the center of Iñaquito. To calculate (a.1) walking time to the center of the parish, the distance to the center of each parish is measured in kilometers and then multiplied by the walking speed of 4.66 km/h, provided by a study at the University of Wisconsin (Gates et al., 2006). To calculate (a.2) travel time from the center of each parish to the

¹ The loss of representativeness has prevented the use of the Basic Needs Index, which has data per parish but is based on both the census and the ENEMDU.

² The Census of Housing, Households, Emigration and Population databases have been unified in order not to duplicate records and to consider only the data corresponding to households and population.

³ The Iñaquito parish is the one that generates the most jobs in Quito, with 22.5% of the total. It was identified on the basis of the analysis of a sample of 347 companies of the almost 3,600 active in Quito in 2010. This information was provided by the Municipality of Quito.

center of Iñaquito,⁴ the most likely public transportation route is taken, considering one or more transportation lines, depending on each case, and then the distance is multiplied by the 40 km/h maximum speed for the public transportation of passengers in the urban sector. (Regulations for the Law on Overland Transportation, Traffic and Road Safety, 2012).

Independent variable (b) *density of public transportation* per parish is calculated by multiplying (b.1) number of transportation lines in the parish by (b.2) the passenger frequency and then dividing by the total parish population. This information was provided by the Ministry of Mobility for the Municipality of Quito. The number of available lines is calculated as all those in operation,⁵ while frequency excludes the number of articulated and bi-articulated buses used for the Ecovía and the Central Corridor Trolleybus. Item (b.2) frequency takes the number of units for the different modes of transportation considered available per hour in each parish and divides that number by the population of the parish.

Independent variable (c) *education and healthcare* results from the sum of public, public-private, municipal, private, private secular and religious schools and healthcare centers, hospitals and healthcare clinics of the Ministry of Public Health; hospitals, healthcare clinics and ambulatory care units of the Ecuadorian Social Security Institute (IESS, for its acronym in Spanish); the Solca cancer hospital; private clinics; private hospitals; hospitals and general offices of the Municipality of Quito; medical offices of the Ministry of Justice; and hospitals, clinics and healthcare centers of the armed forces. Education and healthcare centers are considered together because Ecuador is a middle-income country.

In addition, control variable (d) *indigenous* has been added to refer to the number of people who are self-defined as indigenous according to the latest Population and Housing Census. The simple regression model applies the following formula:

$$LMPI_i = \beta_0 + \beta_1 ldistance + \beta_2 ldensitypop_i + \beta_3 healtheducationpop_i + \beta_4 lindigenous_i + u$$

where (IMPI) is the logarithm of the Multidimensional Poverty Index, (ldistance) is the logarithm of the time required to travel to work, (ldensitypop) is the logarithm of the density of public transportation modes, (healtheducationpop) is the sum of education and healthcare centers divided by the population of each parish, (lindigenous) is the logarithm of the number of indigenous people by parishes and (i) is each of the parishes.

⁴ The modes of transportation considered are all those used in Quito: Ecovía, Central Corridor Trolleybus, North Central Corridor, Southeastern Corridor, Southwestern Trunk, Integrated System Routes, Extensions, Inter-parish and Intra-parish Routes and Conventional and Individual Routes.

⁵ Idem

5. RESULTS/FINDINGS

The results of the applied model, shown in Appendix 2, indicate that the variable *healtheducationpop* is not significant, i.e., the number of education and healthcare centers does not influence parish poverty levels.

As seen in Figure 1, a more detailed analysis of the Multidimensional Poverty Index (MPI) shows that the poorer parishes are divided into two groups: those that are the farthest away from the Ñaquito parish, and another group formed by the parishes of La Libertad, Itchimbía, Historic Center, San Juan and Belisario Quevedo.

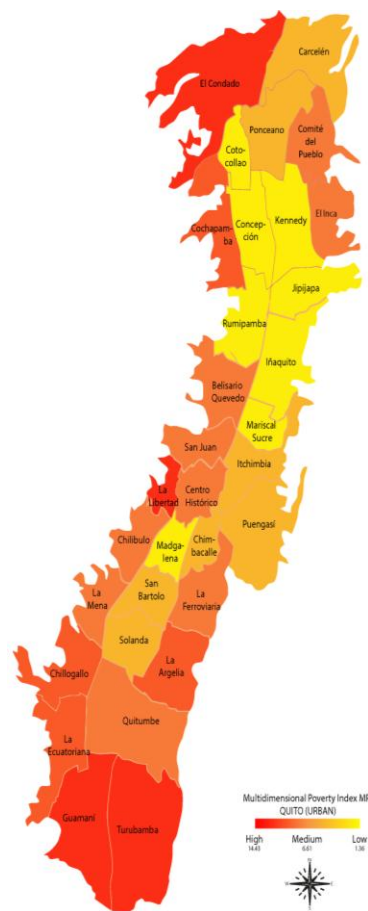


FIGURE 1 - INTENSITY OF THE MULTIDIMENSIONAL POVERTY INDEX (MPI) IN THE URBAN PARISHES OF THE CANTON OF QUITO

Source: Compiled by the author using the Population and Housing Census of 2010 and the database provided by the Municipality of Quito.

Applying the same model without the parishes La Libertad, Itchimbía, Historic Center, San Juan and Belisario Quevedo yields the following result:

TABLE 1 - MOBILITY EXCLUSION CORRELATION MODEL RESULTS WITHOUT CONSIDERING THE PARISHES OF THE CENTER

Source	SS	df	MS			
Model	9.67933393	4	2.41983348	Number of obs =	26	
Residual	1.07542716	21	.051210817	F(4, 21) =	47.25	
Total	10.7547611	25	.430190444	Prob > F =	0.0000	
				R-squared =	0.9000	
				Adj R-squared =	0.8810	
				Root MSE =	.2263	

lnMPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ldistance	.6251287	.1197419	5.22	0.000	.3761118	.8741455
lindigenous	.2020337	.0811009	2.49	0.021	.0333751	.3706923
lndensitypop	-.2530816	.0650429	-3.89	0.001	-.3883457	-.1178175
healtheducationpop	-109.6784	61.84606	-1.77	0.091	-238.2943	18.93752
_cons	-6.433681	.494362	-13.01	0.000	-7.461763	-5.405599

Source: Table generated by author.

TABLE 2 - ROBUSTNESS TEST RESULTS OF THE MOBILITY EXCLUSION CORRELATION MODEL WITHOUT CONSIDERING THE PARISHES OF THE CENTER

```
. swilk r
      Shapiro-Wilk W test for normal data
      Variable | Obs   W      V      z      Prob>z
      -----|-----
      r        |  26  0.96041  1.132  0.254  0.39962

. estat vif
      Variable |      VIF      1/VIF
      -----|-----
      lindigenous |  2.98  0.335563
      lndensitypop |  1.87  0.534888
      healtheduc~p |  1.65  0.604350
      ldistance    |  1.53  0.654234
      Mean VIF    |  2.01

. ovtest
Ramsey RESET test using powers of the fitted values of lnMPI
Ho: model has no omitted variables
      F(3, 18) = 0.29
      Prob > F = 0.8344

. hettest r
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: r
      chi2(1) = 0.09
      Prob > chi2 = 0.7682
```

The model indicates that, taken together, distance, density of public transportation, education and healthcare, and ethnicity explain 88.1% of the poverty in the 26 parishes studied. All the variables are significant at a confidence interval of 90%, and the signs of the coefficients are consistent. With more

density, there would be less poverty; with longer distances, there would be more poverty. Finally, the more education and healthcare centers there are, the less poverty there is, and among indigenous people, the likelihood of poverty increases.

A set of robustness tests was performed to confirm the validity of the model. In order to analyze the accuracy of the model specifications, the Ramsey RESET contrast was used, where the null hypothesis was the non-omission of variables, and this could not be rejected with a reasonable level of significance. It can thus be concluded that nonlinear combinations of the independent variables would not explain the dependent variable. In order to confirm that the variance of the disturbance terms was constant, the Breusch-Pagan test was used. It yielded a non-rejection of the null hypothesis that there was homoscedasticity with any reasonable level of significance. Then, to test the assumption that the explanatory variables should be linearly independent, the Variance Inflation Factor (VIF) test was used. Because it yielded a number less than 5, it can be concluded that there was no multicollinearity. Finally, to test the normal distribution of errors, the Shapiro-Wilk test was used; this test showed that the null hypothesis could not be rejected since the errors showed normal distribution.

6. CONCLUSIONS

An econometric analysis excluding parishes in the center shows how distance to the main source of employment/income, density of public transportation, education and healthcare centers and ethnicity influence the probability of being poor or not.

The greater the distance from the parish that generates the most jobs in the city, the higher the cost of traveling to work-- not in terms of money, but in terms of time available to take care of the family. Employers might even avoid hiring employees who live too far from the place of work in order to avoid delayed arrival because of travel contingencies.

A lower density of the modes of transportation to the economic center of the city, considering number and frequency, increases the likelihood of being poor. Just as in the case of distance, lower density increases travel time to work and discourages people from taking jobs in the economic center. They may need this time to take care of family, or they may be afraid of being assaulted if they have to travel home late at night. Again, since employers realize how difficult it can be to travel to work from some parishes and know that unforeseen situations may occur along the way, they try to hire people that live near the workplace.

There are two major ways to reduce the impact of distance and low density of public transportation on poverty. Travel time from the farthest parishes to the economic center of the city could be reduced, as in

the cases of the cities of Medellín, London or Madrid (Ibero-American Center for Urban Strategic Development, 2016), which opted to implement subway systems to improve connections between the periphery and the center, at least in terms of travel time.

On the other hand, it might be possible to revitalize the economy of the parishes farthest away from the center with cheaper strategies such as business incubators. This was the strategy used for cooperation from the North to reduce urban poverty in cities of the South, such as Buenos Aires and Lima (AECID, 2012; IDB, 2012), or directly and more or less successfully set in motion by a city council, as in Bogotá (Bogotá Mayor's Office, 2016).

The fewer the schools and healthcare centers in a parish, the more poor people there are. Primary, secondary and technical schools are related to jobs with better salaries, and the number of clinics has a positive influence on access to work, especially for women because healthcare facilities improve the early detection and treatment of diseases, thereby reducing absences from work and increasing worker efficiency and effectiveness. To improve the education and healthcare systems, the increased government spending seen in these areas in recent years must continue.

The analysis that included the parishes of the center sees less significance in the three variables. Even in the case of education and healthcare, its results are not significant enough to explain the poverty. This is because, in the parishes in Quito's center, poverty can be explained by the history of the city. The first Spanish conquerors that arrived in the city in the sixteenth century settled in what is now the historic center or "Old Town." Their employees resided on the periphery of that downtown area or in the surrounding parishes, and they were magnets for the migrants that came to the capital from the countryside. In the nineteenth century, the increase in the population residing in that area, the relations between social groups and the lack of planning and public maintenance led the bourgeoisie to seek new and more exclusive spaces to live. The upper classes moved to the Mariscal district, but their employees remained in the center and, above all, in the surrounding neighborhoods. They continued to be contacts for those who came from the countryside looking for better opportunities, especially during the 1940s and 1950s, thus increasing population density especially in the outlying neighborhoods of Quito's historic center. Proximity to the neighborhoods capable of generating more employment has not been able to improve the poverty indicators. Further research could examine the effect on poverty of improvements in mobility indicators, for example the number and frequency of units for the different modes of transportation and, above all, the impact of qualitative or quantitative "shock measures" to break the poverty cycle.

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APPENDIX 1. Variables for Calculating the Multidimensional Poverty Index (MPI) by Parishes in Quito and by Cantons at the National Level

Dimension	Deficiencies	Definition of Deficiency	INEC Weighting (National)	CENSUS Weighting (Parishes)	
Education	25%	Non-attendance at basic and high school education	Children between 5 and 14 years old who do not attend a basic education center and also young people between the ages of 15 and 17 who do not attend high school.	33%	50%
		No access to higher education for economic reasons	Young people between the ages of 18 and 29 who, having completed high school, cannot access a third-level higher education center due to lack of financial resources.	33%	-
		Incomplete educational achievement	Persons between the ages of 18 and 64 who have not completed basic education, i.e., who have less than 10 years of schooling and do not attend a formal school.	33%	50%
Work and social security	25%	Child and adolescent employment	Boys and girls between the ages of 5 and 14 who are employed during the school week are identified as deprived since child labor is prohibited. Adolescents between 15 and 17 years of age are considered deprived of the right to work if, though employed, during the school week they fulfill one of the following conditions: they received a remuneration lower than the Unified Basic Salary, they did not attend classes or they worked more than 30 hours.	33%	33%
		Unemployment or inadequate employment	People 18 years of age or older who in the reference period, were unemployed. In addition, employed persons with inadequate employment (underemployment) are considered deprived.	33%	33%
		Non-contribution to the pension system	Employed people aged 15 years or over who do not contribute to any kind of social security; excluding persons aged 65 and over who do not contribute but receive retirement pensions. People aged 65 or over who are unemployed or economically inactive, are considered deprived if they do not receive a retirement pension, the Human Development Stipend or the Joaquín Gallegos Lara Stipend.	33%	33%
Health, Water and Food	25%	No public water service	Households that obtain water through a medium other than the public grid.	50%	100%
		Extreme poverty based on income	People whose per capita household income is lower than the extreme poverty line.	50%	-
Habitat, housing, sanitation and environment	25%	Overcrowding	Households who have more than three people per bedroom.	25%	25%
		Housing deficit	People whose housing, due to the materials or condition of their walls, floors and ceilings, are deemed to have a qualitative or quantitative deficit.	25%	25%
		No sewage service	People in urban areas whose homes do not have toilet service connected to a sewer. In rural areas, deprived people are those whose dwellings do not have a sewer or a septic tank.	25%	25%
		No trash collection service	People living in homes that do not have access to the municipal waste collection service are classified as deprived in this indicator.	25%	25%

Source: Weighting at the national level was calculated by INEC (2016) using ENEMDU data while weighting at the parish level was calculated by the author.

APPENDIX 2. Mobility Exclusion Correlation Model Results for All Parishes Except Iñaquito

Source	SS	df	MS	
Model	9.68583376	4	2.42145844	Number of obs = 31
Residual	2.23787975	26	.086072298	F(4, 26) = 28.13
				Prob > F = 0.0000
				R-squared = 0.8123
				Adj R-squared = 0.7834
Total	11.9237135	30	.397457117	Root MSE = .29338

lnMPI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ldistance	.3457737	.1292915	2.67	0.013	.0800113	.6115361
lindigenous	.4131002	.0732372	5.64	0.000	.262559	.5636415
lndensitypop	-.1130605	.0657663	-1.72	0.097	-.248245	.022124
healtheeducationpop	-56.18045	71.64815	-0.78	0.440	-203.4553	91.09443
_cons	-6.946787	.554276	-12.53	0.000	-8.086118	-5.807457

Source: Table generated by author.