Rule of Law and Access to Justice: Construction of an Accessibility Index of Primary Justice Fora in Paraguay

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Abstract

Access to primary justice fora is a fundamental pillar of the Rule of Law. One of the most significant components of this is geographic accessibility as the most basic indicator of fairness in the nationwide distribution of justice institution facilities. Primary justice fora are the very first instances citizens seek in the face of civil or criminal problems, thus their geographic location is a factor of prime importance in the assessment of equal access to justice. In Paraguay, these fora are the Justice of the Peace Courts (*Juzgados de Paz)*, found in most cities and towns, police stations (*Comisarías*), and Offices of the Attorney of the State (*Fiscalías*). To date, studies on spatial accessibility to justice institution facilities in Paraguay have been limited. The proposed research aims at filling that gap by conducting an in-depth analysis of spatial accessibility to primary justice fora in Paraguay using Geographic Information Systems (GIS) tools, which offer innovative methods to identify policy challenges using spatial data. The main objective of the study is to create an index that measures the population's spatial accessibility to primary justice fora in Paraguay – at the national level –, identifying areas that need additional resources to improve such access. The data used for the analysis include all households registered in the 2012 census in Paraguay, with their corresponding geographic coordinates, as well as all available geodata for Justice of the Peace Courts, police stations, and State Attorney Offices within the same studied area. The methodology proposed is the application of a minimum distance analysis, together with a point proximity buffer analysis, upon which results are used to estimate a comprehensive spatial accessibility index of districts to primary justice fora. Results show that districts located in the Central department of Paraguay have the highest accessibility index in the country, while those located in the Chaco area have the lowest. Population size seems to be a relevant factor that play into the supply side of justice fora. The results of the study will be a useful tool for visualizing access to justice in Paraguay, and could serve as the basis for the design and promotion of enhanced justice-related policies.

Keywords: spatial accessibility, justice fora, police stations, justice of the peace courts, offices of the attorney of the state, spatial analysis, GIS, Paraguay

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Allies:

This program is also associated to **The Institute of Politics at Harvard University**

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Contents

Introduction

Access to justice is considered a basic principle of the Rule of Law. Historically, justice services have been deemed as a means for people to make their voices heard, fight discrimination, and exercise their rights (UN)[15]. Access to justice is, however, a multidimensional concept that can be studied and analyzed from multiple angles and perspectives. For instance, it can be assessed from the point of view of legal empowerment, where special focus is given to legal literacy and right awareness; it can certainly also encompass the availability of justice services, the overall approachability of the justice system, the costs that it entails, or the spatial/geographic accessibility to justice services. This last dimension of access, perhaps one of the most basic ones, is often mentioned as a fundamental feature of access, yet in-depth academic research on it has been scarce, let alone in Paraguay.

If little has been said of the physical access to justice services, the attention given to accessibility to *primary justice fora* has been even smaller. In this paper, "primary justice fora" (or primary justice services/facilities, used indistinctly) is defined as the physical locations where a person usually goes first to file a civil or criminal complaint. In the case of Paraguay, police services (police stations, sub-police stations and police posts) and the Offices of the Attorney of the State (*Fiscalías*) emerge as the first instances where a person can file a criminal complaint, and the Courts of Peace or Offices of Justices of the Peace (*Juzgados de Paz*), for minor civil complaints. The general assumption here is that these are services where, to different extents, an individual can, by their own means, go to and (a) directly receive a justice-related service, or (b) receive guidance on any better approach to satisfy their legal needs.

The question this study seeks to answer is: *to what extent does Paraguay's population have access to primary justice fora?*. It is a well-known fact that geographic accessibility of legal services is a frequent barrier for those living in remote areas, where often people are more vulnerable to legal problems (OECD)[12]. With that in mind, this research intends to apply Geographic Information Systems (GIS) tools to measure and assess spatial accessibility to primary justice services in Paraguay – at the national level –, identifying areas that need additional resources to improve such access. The expected final outcome is a comprehensive index of spatial accessibility to primary justice fora that combine two common GIS approaches applied to each type of service: *minimum distance analysis*, and *point proximity buffer analysis*. In the analysis process, special attention is given to the influence of territorial delimitations (jurisdictions) for each type of service.

This research intends to explore – and consequently insert itself into – two lines of

research literature: (a) literature focused on Rule of Law and access to justice, and (b) GIS literature focused on spatial accessibility to public services. The first one will explore existing notions and concepts on the relationship between geography and access to justice. The second one will draw on the methodological GIS tools mentioned above to estimate spatial accessibility to justice fora. At the end, the results obtained through the analysis are expected to support conclusions that lie at the intersection of both: on the one hand, it should shed light on which regions/areas/populations are left behind in the distribution of primary justice services in Paraguay, and on the other hand it will offer an interesting methodological approach to creating an index of services that belong to a determined policy spectrum.

Additionally, this study seeks to exert a positive impact over the existing efforts to enhance the Rule of Law in Paraguay, through new insights and perspectives on accessibility to primary justice services. Reliable measures of accessibility can help identify underserved areas in need of resources to improve such access, and motivate effective planning and decision-making for the design and implementation of better judiciary public policies in Paraguay.

Access and Accessibility

The concept of "access" to public services is broad. The term is widely used to describe the relationship that exists between people and the services. Defining this relationship, however, is a complex task because it involves multiple facets that are often difficult to measure. In that context, Penchansky and Thomas (1981)[14] propose a taxonomic definition of "access" as regards that population–public service relationship, composed of a set of five specific dimensions: *availability, acceptability, affordability, accommodation,* and *accessibility. Availability* explains whether the volume of the service is adequate enough for the size of the population; *acceptability* focuses on the attitude of the population towards the services and vice versa; *affordability* refers to the ability of the population to pay for services; *accommodation* describes how well prepared the services are to accept clients; and *accessibility* is the relationship between the geographic location of the supply and the location of the demand, measured by distance, the means of transportation used, or travel time.

It is this last dimension, accessibility, that this research intends to explore in depth with primary justice fora at the center of the analysis. Assessments of "access" to justice tend to focus more on other dimensions, such as availability, evaluating a generalized supply-demand relationship between the population and legal services. For instance, it is not uncommon

to see data on the number of police agents per inhabitant, or the number of lawyers per person. However, any problems that arise within the sphere of the other dimensions of access, mentioned above, can certainly be exacerbated by the geographic accessibility obstacles caused by the trouble people experience in low-access areas when attempting to visit offices or buildings that offer legal services (Birgin & Gherardi, 2012)[3]. This speaks of the importance of geographic distribution of justice fora, as an essential element of access to justice.

Spatial Accessibility and the Rule of Law

Access to justice is a fundamental component of the Rule of Law. It essentially means that people know what resources they have available to obtain help with their legal needs (Open Government Partnership, 2019)[13]. In that context, accessibility (as one dimension of "Access"), becomes a relevant concept. Enhancing the geographic presence of justice institutions with the objective of providing the population with opportunities to use their services are important challenges on what traditional Rule of Law and justice reforms have historically focused (G. Fraser, 2013)[6]. The technological progress, especially amid the COVID-19 pandemic, have unquestionably challenged the need for in-person activities, including pursuing public services. However, how much of an impact that will ultimately have over the justice system is a topic to be analyzed separately, and perhaps within a few years.

There are many factors that can be considered an obstacle to the accessibility to justice services. Distance to facilities, travel time, means of transportation, among others are factors that affect the population when it comes to accessibility. However, the degree to which these aspects impact people vary depending on demographics: migrants, women, indigenous people, rural population, and the poor are at a larger disadvantage than the rest (Birghin, Kohen, 2006)[2]. In fact, specialized services that deal with specific issues (family, women, etc.) are often located in urban areas or larger cities (Marchiori, 2015)[10]. This is certainly the case with many services in Paraguay as well, with most Courts of Peace located in urban areas, and offices of the State Attorney concentrated in the capitals of the country's departments or larger cities.

Primary Justice Fora in Paraguay

The primary justice fora considered in this study are police services, the Offices of the Attorney of State (*fiscalías*), and the Offices of Justices of the Peace or Courts of Peace. They are services that attend immediate justice-related needs of the population. Any person

can technically visit the facilities of a police service or a State Attorney office to file a criminal complaint, such as domestic abuse, assault, theft, battery, among other criminal offences. For civil complaints, such as non-physical domestic disagreements, debts, evictions, among others, people can visit the office of a Justice of the Peace.

In the case of *police services*, they include police stations, sub-police stations, and police posts. Regional police headquarters and the National Police Headquarter Office are also included in the study, given that they are in the capacity of taking complaints as well. Each police station has its own geographic area of operation. In the past, this meant that citizens could only file complaints about cases that occurred within that jurisdiction. That changed with Police Resolution 657 from 2010, through which citizens can "file a complaint in any police station" regardless of their area of operation (Centro de Estudios Judiciales, 2010)[4].

The distribution and operation of *Offices of the Attorney of State* follow the national judiciary circumscription system, established by the Supreme Court of Justice of Paraguay. That is, they operate within the 18 judiciary circumscriptions. Technically, a citizen can go to any office, irrespective of their jurisdiction, to file a complaint (Ministerio Público)[11]. In practice, this involves additional administrative steps for the services, which may act as a deterrent for them to take the complaint, and for people to visit State Attorney offices outside of their jurisdiction.

Justices of the Peace are government official in charge of taking care of the needs of the community where they are based. They are expected to offer assistance with civil cases. Additionally, they offer services such as provision of residence certificates, legal authorization for minors to travel abroad by their parents, authentication of documents, etc.

Data

Study area

This study focuses on the whole territory of Paraguay. Country-wide georeferenced household data from the 2012 census was obtained from the National Institute of Statistics (INE)[9], which is the latest available data of its kind. In order to minimize aggregation error (Hewko, 2002)[7], the accessibility measures were first estimated at the household level. Then, in order to obtain the final accessibility index, the population-weighted average was calculated for each district, using the number of household members as weights.

The total number of studied households, after data cleaning, reaches 1,156,425, which in

turn account for 4,696,681 people (50.3 percent men, 49.7 percent women). A total of 440,932 observations were excluded because they had missing population number. Additionally, a cap of 15 inhabitants per gender per household was imposed on the data on those that had more than that number. Although not with certainty, it could be inferred that observations with a large number of household members might be from communities of some sort. This cap, which was put on a total of 232 observations, prevents the effects these outliers might have on the population distribution and the analysis.

Primary justice fora data

Primary justice fora were defined as the justice services that a citizen would choose to resort to as a first instance for either civil or criminal complaints. In the case of Paraguay, data was secured for police stations, offices of the State Attorney, and local offices of Justices of the Peace. One major limitation was the lack of existing georeferenced data for both State Attorney offices and Justices of the Peace offices. Georeferenced data on police station was obtained from the National Institute of Statistics (INE)[9], and it contains 1055 facilities distributed all over the country. As for offices of the State Attorney, a total of 89 facilities are accounted for, and data was extracted from the State Attorney's website on September, 2021. Finally, 141 offices of Justices of the Peace were found (out of 196 listed in other sources) (Centro de Estudios Judiciales)[4] and data was attained through Google maps with some information available on the Supreme Court's website. In this regard, a word of caution worth pointing out is that besides the actual absence of Courts of Peace in certain towns, some of them have missing geospatial data, which if incorporated could potentially change their final accessibility index and their rank with respect to other districts. This fact notwithstanding, two important goals are being attained through this research: (1) the creation of an novel spatial accessibility index to primary justice fora in Paraguay, and (2) the implementation of an innovative methodology that could potentially be applied to areas different than justice in the generation of geographic accessibility indices.

Departments and Districts

Given that data was secured from multiple sources, variables concerning Paraguay's political division (departments and districts) were all updated relying on a single reference geospatial dataset, also obtained from INE, for consistency. The updated cartography includes, besides the capital city Asuncion, 17 departments and 260 districts.

Methods and data analysis

This research proposes the creation of a spatial accessibility index to evaluate access to justice fora for Paraguay through a combination of two GIS methods: minimum distance estimation, and point proximity buffer analysis for each type of justice forum, taking into consideration the inherent characteristics of each service.

Minimum distance analysis

Understanding the notion of minimum distance is simple: it refers to the estimation of the distance of a household to the nearest justice-related facility. This method was called an "equity" model by Hodgart (1978)[8], because it seeks to minimize inequality through access to facilities that reduces the distance, and therefore cost, of any origin to a minimum. In the case of justice fora, the significance of this method lies on the general assumption that the shorter the distance to a facility, the greater accessibility the population has to such services. Minimum distance will be estimated independently for police stations, Peace Courts, and State Attorney's Offices. This measure accounts for accessibility to single facility in each case: the nearest one to a household.

In this study, distance is measured in Euclidean distance (in meters), which can be explained as a straight line that connects two points, in this case a household and a justice service. Mathematically the minimum distance follows the equation:

$$Z_h^A = min\,|d_{hf}|, \hspace{2cm} \text{(Equation 1)}$$

Where:

Z_h^A= minimum distance between a household h and the nearest justice facility

d_{hf}= distance between a household h and justice facilities f

This estimation yields unrestricted minimum distance results, under the assumption that a household can have full access to the nearest service, irrespective of the jurisdictions of the service facilities. Legally, with the exception of Justices of the Peace, which operate under specific territorial delimitations, a citizen can file a complaint in any police station or office of the State Attorney. In practice, however, this does not occur frequently. Because it is highly likely that a person will be redirected to the facilities of their own jurisdictions, they often avoid going to a service that, while being the closest to their home, would make them incur in even additional travelling costs. This happens mainly due to the extra administrative steps that would require filing a complaint from an area over which the police station or State

Attorney's office does not have competence.

In order to take into consideration both the distance to the nearest service (to account for the option that a person has to visit it regardless of its jurisdiction) and the distance to the closest service *within* its jurisdiction (to reflect the trip a person might actually need to take to file a complaint), minimum distance was also estimated with a restriction of being calculated only inside the boundaries of a geographic unit. Given the lack of geospatial data for police jurisdictions, the chosen geographic unit for police stations was the district (city/town), as a proxy of specific circumscriptions. The exception was Asuncion, which has 22 jurisdictions that are accounted for in the analysis. In the case of the State Attorney's office, the geographic unit used was the *department*, given that these offices are regionally distributed by judiciary circumscriptions, which in turn are equivalent to the number of departments (17), plus the capital city. As mentioned, offices of the Justices of the Peace are limited by their geographic location, which in this case are districts. Mathematically:

$$Z_h^B = min\,|d_{hf}| \qquad \forall t, \qquad \text{(Equation 2)}$$

Where:

$t=$ a specified geographic unit (department or district), applied as proxy of circumscriptions

In the case of Peace Courts, it is relevant to mention that because of the restriction imposed on Equation 2, many districts will have missing minimum distance values. That is, many districts do not have an office of the Justice of the Peace in their districts. They are treated as missing values and given a score of zero in the final service-specific index. It is important to highlight that for this specific justice service there are a few missing geospatial data, which if incorporated may affect the outcome for some of the districts.

Finally, both measures (Equation 1 and Equation 2) are combined into one single value per household, for police stations and offices of the State Attorney, by finding the arithmetic average of the two values. The idea behind this operation is that the minimum distance for households located within the same jurisdiction as the nearest justice facility will remain the same, but for households located in a different circumscription this will serve as a "penalization", representing the difficulty of accessing the service closest to their home, as the newly estimated distance will always be higher. Thus:

$$Z_h = \frac{Z_h^A + Z_h^B}{2}, \qquad\qquad \text{(Equation 3)}$$

Where:

Z_h= final minimum distance measure

Point proximity buffer analysis

This approach helps estimate the number of facilities that lie within a specified radius from a household location. Sometimes also called the container approach (Talen & Anselin, 1998)[5], this measure speaks of the options of justice facilities the population has at hand. As such, it only applies to police stations and offices of the State Attorney, because offices of Justices of the Peace are, in the own right, the only option of its kind for households within the same jurisdiction. Formally, the point proximity buffer analysis may be expressed as this:

$$Q_h = \sum_f^n C_r, \qquad \forall r \in \{d_{hf} \leq d_0\}, \qquad \text{(Equation 4)}$$

Where:

Q_h= the number of justice facilities a household has access to within a specified radius

C_h= each individual facility located within a specified radius

r= the radius determined for the analysis

d_{hf}= the distance between a household and a facility

d_0= the radius' farthest possible distance

The value of the radius may vary depending on the goals of the research and the types of services analyzed. In this study, a 5km buffer was used for police stations, and a 15km radius was used for offices of the State Attorney. The election of these values was arbitrary, but they are expected to help illustrate the strong assumption that, in case of a non-urgent need, a person will be reasonably willing to travel those distances to access other options.

Standardization of variables

It is important to consider that because minimum distance runs in the opposite direction of the count of facilities when it comes to accessibility interpretation (the smaller the value of distance the greater the access, but in turn the smaller the count of facilities, the lower the access), it is fundamental that this be corrected accordingly. In this study, minimum distance is simply multiplied by negative 1, which besides representing a change in sign does not really affect rank other than reversing it and making it run in the same direction as

the count of facilities. From this point on, it could be helpful to start considering minimum distance as a 'score', for which higher values mean higher accessibility. Thus:

$$Z_h' = -1 \times Z_h \,, \qquad \text{(Equation 5)}$$

Given that both the minimum distance and the number of facilities that are located within a buffer are relevant for the construction of the accessibility index, and that they are both in different measurement scales (one is distance, the other is a count), they are subject to a standardization procedure that makes them comparable and allows for aggregation of the two variables. The process is simple and it involves demeaning each observation and then dividing it by the sample standard deviation:

$$X' = \frac{(x_h - \bar{x})}{sd(X)} \,, \qquad \text{(Equation 6)}$$

Where:

X'= the standardized variable (both minimum distance and count of facilities)

x_h= each observation of the variable

$\bar{x}$= the mean of the variable, weighted by population (number of household members)

$\overline{sd(X)}$= the sample standard deviation of the variable, weighted by population

As seen in Equation 6, at this point the number of people living in the households begin to being considered as weights. Up to this point, all estimations (minimum distance, buffer analysis) derived average values for each household but, for a better reflection of reality and to avoid bias as much as possible, an assessment of accessibility to justice fora at the individual-level will become highly relevant when aggregating at the district level. In addition, correct standardization heavily depends on the variable distribution and some of its parameters, which highlights the importance of weights being introduced in this step. The weighted mean and weighted standard deviation are estimated as follows:

$$\bar{x} = \frac{\sum_{h=1}^{n} (x_h \cdot w_h)}{\sum_{h=1}^{n} w_h}, \qquad \text{(Equation 7)}$$

$$\overline{sd(X)} = \sqrt{\frac{\sum_{h=1}^{n} (x_h \cdot w_h)^2}{\frac{(M-1)}{M} \sum_{h=1}^{n} w_h}}, \qquad \text{(Equation 8)}$$

Where:

w_h= weights (population by household)

M= the number of non-zero weights

Final steps of the 'Primary Justice Fora Accessibility Index' construction

The final steps of the index construction involve aggregating variables by services where applicable. That is, for both police stations and offices of the State Attorney, a sum of the standardized adjusted minimum distance plus the standardized count of justice facilities within a buffer is conducted. Justices of the Peace only have minimum distance, which is left as is, post standardization. After this step, there will be one variable per service (three in total), which indicate the accessibility of the population to each of them.

Standardized scores can be difficult to interpret, because there are negative values that may be confusing. A more amicable form of displaying an index is the man-mix normalization, which yields values ranging from 0 to 1. For each service, normalization is conducted following the next equation:

$$X'' = \frac{x_h - min\left(X'\right)}{max\left(X'\right) - min\left(X'\right)}, \hspace{2cm} \text{(Equation 9)}$$

Where:

X'' = the normalized variable for each type of service

The aggregation at the district level takes, once again, consideration of population weights. For each service, the weighted mean of household normalized scores is estimated. Mathematically:

$$S_t = \frac{\sum_{h=1}^{n}(x_h \cdot w_h)}{\sum_{h=1}^{n} w_h}, \hspace{1.5cm} \forall t, \hspace{1.5cm} \text{(Equation 10)}$$

Where:

t = each district

S_t = the accessibility index for a specific justice forum/service by district

Finally, in order to find the total accessibility index to justice fora for each district, the geometric mean of all three indices is calculated. The geometric mean allows for a smooth weighting of all three variables, so that none of them has a stronger dominance than the other. The justice fora studied in this research are different in nature and in functions, which is better reproduced with the use of the geometric mean. That is, a high score in one of the services will not impact the final index as much as it would have with the implementation of an arithmetic mean instead.

One limitation that the geometric mean operation has is its inability to incorporate

zeros in the calculations. Given that in the measure of accessibility for Justices of the Peace there are zeros, the approach taken to solve this problem was adding a constant of 1 to each observation of all three variables before finding the mean and then subtracting 1 from the final result, as follows:

$$A_t = \left(\sqrt[3]{(S_t^1 + 1) \cdot \ (S_t^2 + 1) \cdot \ (S_t^3 + 1)} \right) - 1, \qquad \text{(Equation 11)}$$

Where:

A_t= the final index accessibility by district

S_t= the index of each individual service by district

Results

Minimum distance

TABLE 1. National Averages of Minimum Distances and Counts of Facilities Within a Radius

| Tye of service	Minimum Distance (meters)			Number of facilities (count)		
	Total	Men	Women	Total	Men	Women
Police*	2,358	2,450	2,290	7.10	7.31	7.52
State Attorney*	10,656	11,030	10,277	7.24	6.99	7.47
Court of Peace	4,430	4,577	4,284	n.a	n.a	n.a

SOURCE: Author's own elaboration with results from the applied GIS methods
* Number of facilities are counted within a radius of 5km for police stations and 15km for State Attorney's offices

At the national level the average minimum distance (adjusted for location within/outside jurisdiction) of police services is 2,358 meters, which makes of them the most accessible primary justice out of the ones studied in this research. Disaggregated by gender, women live 160 meters closer to police stations on average, compared to men. As for offices of the State Attorney, the average distance to the nearest facility is 10,656 meters, with women living almost 754 meters closer to these services than men. In the case of Courts of Peace, the average minimum distance is 4,430 meters, with men living 294 meters farther than women, on average, from these offices. For this last estimation, results are the average (weighted by population) only for districts that have an office of Justices of the Peace, excluding those with missing values or with no offices.

The top five districts with the lowest average minimum distances for police stations are are Guarambare (834 m), Pilar (885 m), Asuncion (896 m), Nanawa (906 m), San Lorenzo (907 m). At the other end of the distribution, the districts with the highest average minimum distances are Bahia Negra (55,232 m), General Bruguez (19,771 m), Teniente Irala Fernandez (18,946 m), Teniente Esteban Martinez (17,913 m), and Puerto Pinasco (16,323 m). These districts at the bottom are all from the Chaco area.

FIGURE 1. Maps of Minimum Distances by Type of Service, By District
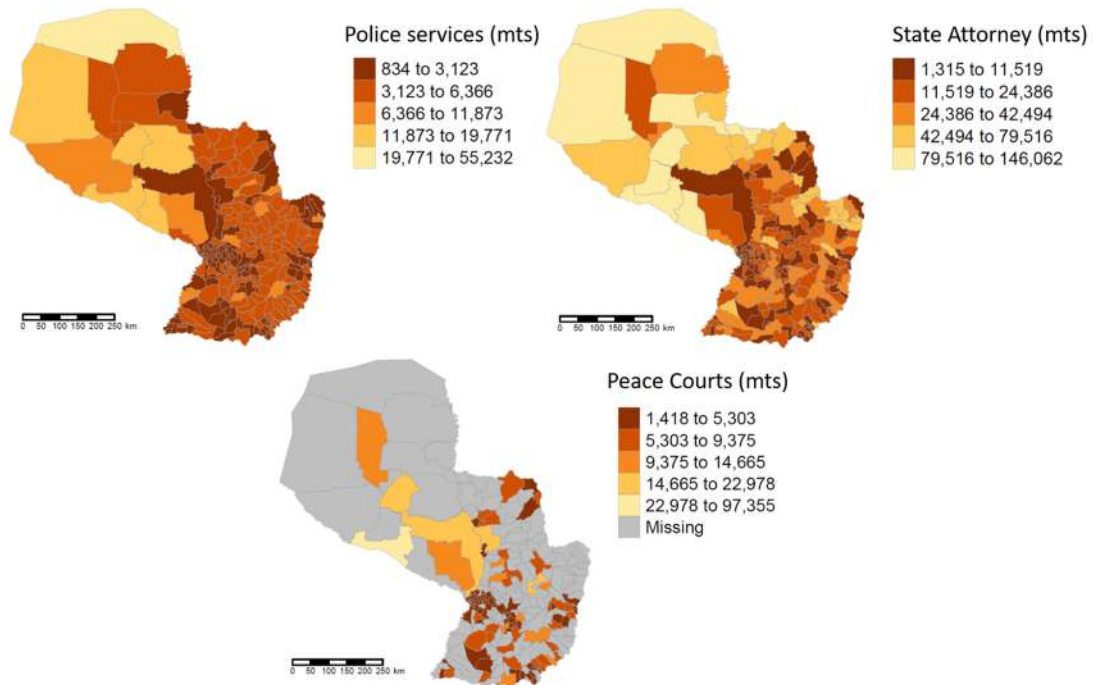
Source: Author's own elaboration with results from the applied GIS methods

As for offices of the State Attorney, Asuncion leads the table with 1,315 m of average minimum distance, followed by the districts of Alberdi (1,387 m), San Antonio (1,795 m), Mariano Roque Alonso (1,627 m), and Villa Elisa (1,214 m). The district with the highest minimum distance for this service is, again, Bahia Negra (146,062 m), followed by Puerto Casado (136,335 m), San Lazaro (135,447 m), Teniente Esteban Martinez (119,468 m), and General Bruguez (117,402 m). Out of this group, only San Lazaro is not in the Chaco region.

Out of the districts that have an office of a Justice of the Peace, Guarambare is at the top with an average distance of 1,417 m to its facility. Following Guarambare is San Antonio (1,765.3 m), Yataity (1,837 m), Antequera (1,858 m), and Loma Grande (1,885 m). The districts with the highest minimum distances are Teniente Esteban Martinez (119,468 m), Teniente Irala Fernandez (22,977 m), Yhu (21,098 m), Villa Hayes (21,043 m), San Pedro

del Ycuamandyju (18,454 m).

Count of facilities within a determined radius

The average number of police services within 5 km of a household is 7, a number that is shared for both women and men. Coincidently, the average number of offices of the State Attorney within a radius of 15 km is also 7.

The top five of districts with the highest count of police stations within a radius of 5 km is composed of Fernando de la Mora with 21 facilities on average, followed by Lambare (20), San Lorenzo (19), Asuncion (18), and Villa Elisa (15). With only 1 facility each (and fewer than that when weighted by population), the bottom group are Teniente Irala Fernandez, Maracana, General Bruguez, Juan de Mena, and Puerto Adela. However, 84 percent of the districts (220 city/towns) have on average fewer than 2 police facilities within a 5 km buffer area.

As for offices of the State Attorney, Fernando de la Mora leads the top, again, with an average of 26 facilities in a radius of 15 km. Following are Villa Elisa with 24 facilities, Asuncion also with 24, Lambare with 23, and San Lorenzo with 21 facilities on average. Same as with police stations, almost 90 percent of districts (234 in total) have fewer than 2 offices within a radius of 15 km. 75 districts do not have access to an office within that distance.
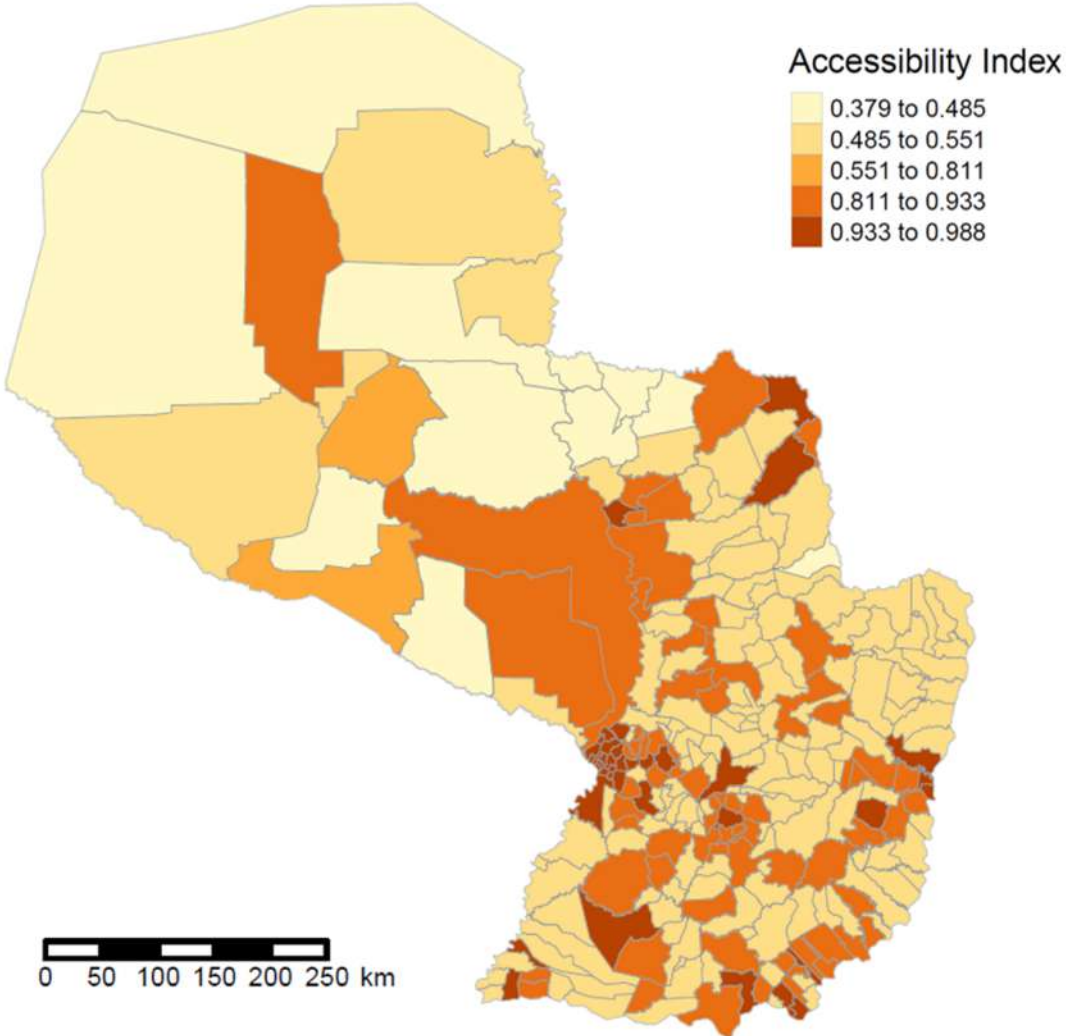
Accessibility Index to Justice Fora

The final accessibility index combines accessibility indicators for all three services studied in this research: police stations, State Attorney offices, and Courts of Peace. The index is easy to interpret, as it ranges from 0 (complete absence of justice services), to 1 (highest access relative to peer districts). The district with the highest accessibility index is Fernando de la Mora with a score of 0.988, followed by Asuncion (0.985), Lambare (0.983), Villa Elisa (0.983), and San Lorenzo (0.979). Overall, districts at the top are, for the most part, cities with big populations surrounding the capital, Asuncion.

At the bottom of the distribution, mostly remote districts from the Chaco appear, but also some town from the area of Concepcion and San Pedro in the northern area. Bahia Negra recorded the lowest at 0.379, followed by General Bruguez (0.437), Puerto Casado

(0.438), San Lazaro (0.441), and Mariscal Estigarribia (0.451).

FIGURE 2. Map of Paraguay's Spatial Accessibility Index to Primary Justice Fora, by District

In general, it can be seen that high accessibility to primary justice fora in Paraguay is highly concentrated in larger the Central department. Cities like Ciudad del Este in the Alto Parana Department, Encarnacion in Itapua, and Pedro Juan Caballero in Alto Paraguay also exhibit a high accessibility index. The Chaco region, especially the most remote districts (with respect to the capital Asuncion) are the ones with the lowest accessibility index. While not assessed in this paper, it can be inferred that there is spatial correlation between population size and accessibility to primary justice fora. In other words, a higher percentage

of the population have high accessibility to these services. However, the large majority of towns/cities still fall in the lower end of the index distribution.

TABLE 2. Spatial Accessibility Index to Justice Fora in Paraguay

Top 20: Highest Accessibility		Bottom 20: Lowest Acccessibility	
District	Accessibility Index	District	Accessibility Index
Fernando de la Mora	0.988	Bahía Negra	0.379
Asunción	0.985	General Bruguez	0.437
Lambaré	0.983	Puerto Casado	0.438
Villa Elisa	0.983	San Lázaro	0.441
San Lorenzo	0.979	Mariscal Estigarribia	0.451
Ñemby	0.972	San Carlos del Apa	0.457
Luque	0.097	Campo Aceval	0.458
Mariano Roque Alonso	0.970	San Alfredo	0.482
San Antonio	0.964	Sargento J. Félix López	0.483
Capiatá	0.957	Puerto Pinasco	0.484
J. Augusto Saldívar	0.955	Itarana	0.485
Limpio	0.953	Ypejhu	0.494
Ypané	0.952	Boquerón	0.494
Presidente Franco	0.949	Corpus Christi	0.494
Guarambaré	0.948	Ybyrarobana	0.496
Areguá	0.948	Karapai	0.498
Ciudad del Este	0.947	Nueva Esperanza	0.499
Villarrica	0.945	Laurel	0.500
Pedro Juan Caballero	0.945	Maracana	0.500
Itauguá	0.945	Puerto Adela	0.500

SOURCE: Author's own elaboration with results from the applied GIS methods

Conclusion

Accessibility to primary justice fora is a fundamental component of overall access to justice and therefore of the Rule of Law. In Paraguay, primary justice services include police stations, Offices of the Attorney of the State, and Offices of Justices of the Peace. These are considered places where people attend first when needing a legal service, both in the criminal as in the civil spectrum. Little has been studied about geographic accessibility to justice services, and the Geographic Information Systems (GIS) studies offer tools for innovative analyses of the spatial relationship between the population and public services.

With that into consideration, this study sought to fill the literature gap by conducting a spatial analysis of primary justice services in Paraguay. Relying on two methods, (a) minimum distance analysis, and (b) point proximity buffer, as well as on georeferenced data from justice services and households (from the Census 2012), this paper combined these accessibility indicators to construct a comprehensive index that could show, at the district level, the current situation of primary justice fora in Paraguay.

The results show that there is an apparent spatial correlation between the population count and the spatial accessibility index to primary justice services. This however, comes most likely as a response of the demand forces than through an active public initiative aiming at increasing access. Most of the country's districts still show a medium to lower accessibility index, which could be a relevant fact in the process of promoting better judiciary policies.

The methods applied to construct the index can certainly be applied to other areas, and the results here obtained are an invitation to further navigate along the different components of a topic that, as a component of the Rule of Law, is certainly an area worth exploring.

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