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

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August 30, 2022

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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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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 Public Prosecutor's Offices (*Fiscalías*) emerge as the first instances where a person can file a criminal complaint, and the Justice of the Peace Courts – or simply Peace Courts, here used interchangeably – (*Juzgados de Paz*), for minor civil complaints. The general assumption here is that these are services where 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 combines two common GIS approaches: *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 public 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 judicial public policies in Paraguay.

The first sections of this paper introduce the concept of "access" and "accessibility", as well as the relationship between spatial or geographic accessibility to justice and the rule of law. Then, a brief description of the studied primary justice fora in Paraguay gives way to the details on the data and the applied methods for the analysis. Results are then presented, followed by the conclusion.

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 capita. 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 are available for them 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.

There are many factors that can be considered obstacles to the accessibility to justice services. Distance to facilities, travel time, means of transportation, among others are variables 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]. For instance, specialized services that deal with specific issues (family, women, etc.) are often located in urban areas or larger cities (Marchiori, 2015)[10], exerting a negative impact on the accessibility that rural populations have to these services. This is certainly the case with many services in Paraguay as well, with most Peace Courts located in urban areas, and Public Prosecutor's Offices concentrated in the capitals of the country's departments (political division units in Paraguay) or larger cities.

Primary Justice Fora in Paraguay

The primary justice fora considered in this study are police services, the Public Prosecutor's Offices, and the Justice of the Peace Courts. 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 Public Prosecutor's 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 Court 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 or, more informally, "jurisdiction." In the past, this meant that citizens could only file complaints on cases that occurred within the jurisdiction of the police station they visited. 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]. In practice, it is not unheard of that the previous regulations on geographic exclusivity still shape some of the crime reporting/recording behavior of both the population and the police.

The distribution and operation of *Public Prosecutor's Offices* 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 Prosecutor's Offices from a different jurisdiction.

Justices of the Peace are government officials 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.

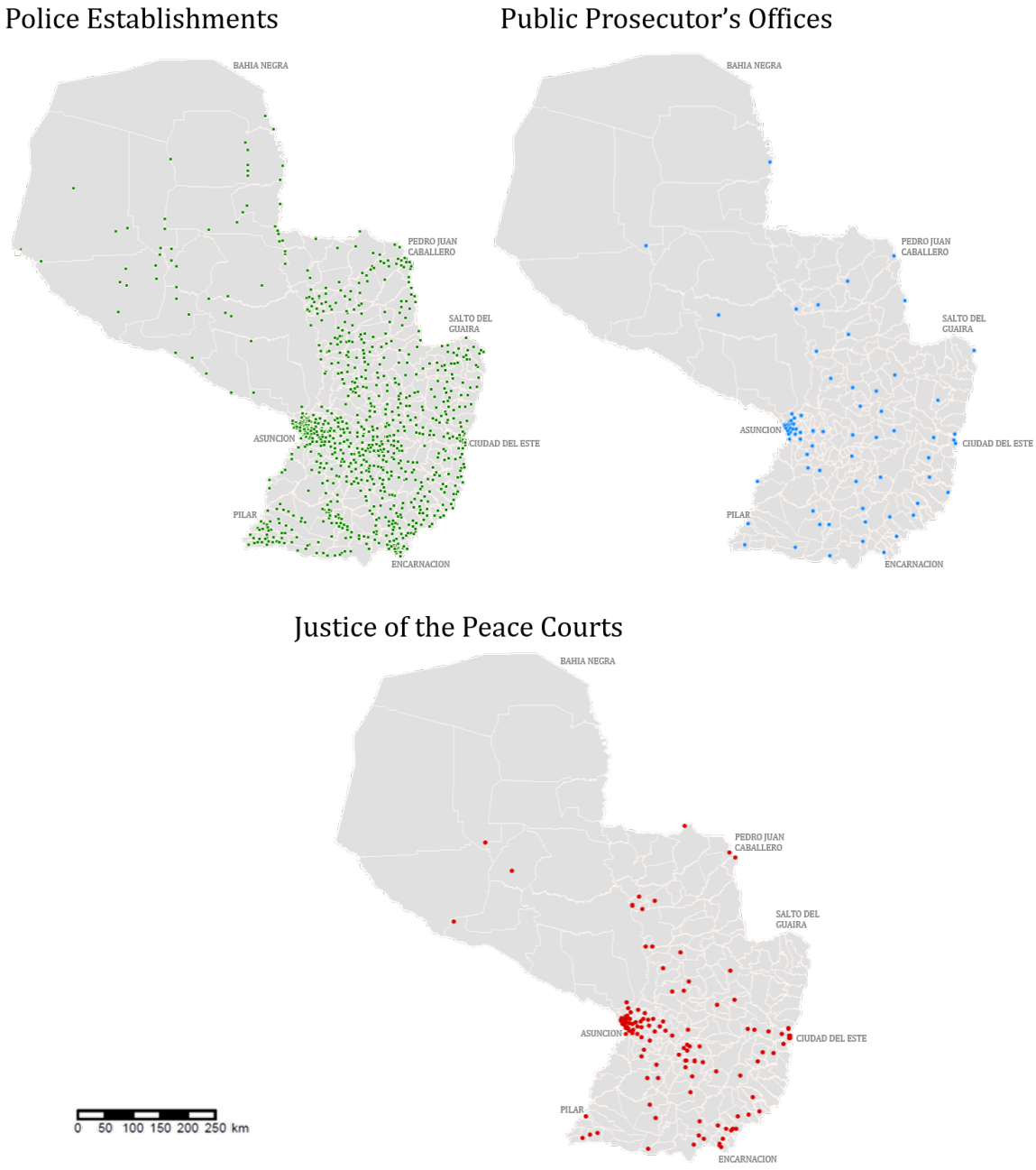
The total number of studied households, after data cleaning, reaches 1,156,425, which in turn account for 4,696,681 people (50.3 percent men, 49.7 percent women), about 73% of the total population of Paraguay in 2012. A total of 440,932 observations were excluded because they had missing population number. Additionally, a cap of 15 inhabitants per gender per household was imposed on observations that showed a higher number than that. Although not with certainty, it could be inferred that observations with a large number of household members might be from communities of some sort (e.g. indigenous communities). 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, Public Prosecutor's Offices, and local Justice of the Peace Courts. One major limitation was the lack of existing georeferenced data for both Prosecutor's Offices and Peace Courts. 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 Public Prosecutor's Offices, a total of 89 facilities are accounted for, and data was extracted from the Prosecutor General's website on September, 2021. Finally, 141 Justice of the Peace Courts were found (out of 196 listed in other sources) (Centro de Estudios Judiciales)[4] and data was attained through Google maps relying on information of their physical addresses available on the Supreme Court's website. In this regard, a word of caution worth pointing out is that any future expansion of the geospatial data for Peace Courts and subsequent incorporation into the analysis could potentially change the final accessibility index of those districts for which data is currently missing, as well as 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.

FIGURE 1. Maps of Distribution of Primary Justice Services in Paraguay



SOURCE: Author's own elaboration with georeferenced data of primary justice fora

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 (2021), for consistency. The updated cartography includes, besides the capital city Asuncion, 17 departments and 261 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 Public Prosecutor's Offices. This measure accounts for accessibility to a single facility in each case: the nearest one to a household.

Unrestricted Minimum Distance

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:

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

Where:

Z_h^A= unrestricted minimum distance (A) 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. *Equation 1* applies to police stations and Public Prosecutor's Offices, as it models the fact that a citizen can file a complaint in any facility, and the assumption that the nearest service would very likely be their first choice. This is not the case for Peace Courts, which operate legally under specific territorial delimitations.

Restricted Minimum Distance

In practice, there is a probability that a person filing a complaint at a police station or Prosecutor's Office located in a jurisdiction/circumscription outside of their place of residence will be redirected to the facilities in charge of their jurisdiction. Because of this, it could occur that while the closest facilities to a person's house is one that covers a different jurisdiction (for example, if living at the border of two towns), they would still choose to visit the facilities of their own jurisdiction as their first option, lest they need to incur in additional travel costs if they are turned down. This happens mainly due to the extra administrative steps that would require filing a complaint on a case occurred in a geographic area over which the police station or Prosecutor's Office does not have competence.

Therefore besides taking into consideration the unrestricted distance to the nearest police service or Prosecutor's Office (to account for the nearest option a person can resort to in order to file complaints), minimum distance was also estimated with the restriction of being calculated only inside the boundaries of a geographic unit. This measure works for police services, Prosecutor's Offices, and Peace Courts, and it intends to model the Euclidean distance that a person might actually need to travel to file a complaint.

Given the lack of geospatial data for police jurisdictions outside of Asuncion, the chosen geographic boundary unit for police stations was the district (city/town), as a proxy of specific circumscriptions. The exception was Asuncion, which has 22 police jurisdictions that are accounted for in the analysis. In the case of the Prosecutor's Office, the geographic unit used was the *department*, given that these offices are regionally distributed by legal judiciary circumscriptions, which in turn are equivalent to the number of departments (17), plus Asuncion, the capital city. As mentioned, Justice of the Peace Courts are limited by the geographic location they serve, which in this case are districts. Mathematically:

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

Where:

Z_h^B= restricted minimum distance (B) between a household h and the nearest justice facility within a jurisdiction/circumscription

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

Unrestricted and Restricted Minimum Distance Combined

Finally, where avaiable, both measures (*Equation 1* and *Equation 2*) are combined into one single value per household by finding the simple arithmetic average of the two values. The idea behind this operation is that the restricted and unrestricted minimum distance for households located within the same jurisdiction as the nearest justice facility will be the same; thus, the final (combined) minimum distance measure will not change. But, on the other hand, for households located in a different circumscription than the nearest justice facility, the restricted minimum distance will be higher than the unrestricted measure. Here, the restricted estimation will serve as a "penalization," representing the difficulty of accessing the service closest to their home, as in cases like this the newly estimated distance will always be higher. Thus:

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

Where:

Z_h= final minimum distance measure for household h

n_v= the number of available minimum distance measures v. It equals 2 if both Z_h^A and Z_h^B are available, and 1 if one of them is missing.

Equation 3 works for all three primary justice fora analyzed in this paper, because it yields a simple average of the combined restricted and unrestricted minimum distance when both can be estimated, but is equal to either when only one of them is available.

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 number of options of justice facilities the population has at hand. As such, it only applies to police stations and Public Prosecutor's Offices, because each Justice of the Peace Court is, in its own right, the only option of their kind for households within the jurisdiction it oversees. Formally, the point proximity buffer analysis

may be expressed as this:

$$Q_h = \sum {}_f^n C_f, \qquad \forall f \qquad \in r, \qquad \text{(Equation 4)}$$

Where:

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

C_f= each individual facility f located within a specified radius from a household

r= the radius determined for the analysis, measured from a household

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 Public Prosecutor's Offices. 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 up to 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 before combining them. 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:

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

Where:

Y_v= the standardized variable (where v is either minimum distance Z'_h or count of facilities Q_h)

x_h= each observation of the variable

$\overline{x}$= 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 each household can be considered as a weight. Up to here, 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 considering population weights 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:

$$\overline{x} = \frac{\sum_{h=1}^{n}(x_h \cdot w_h)}{\sum_{h=1}^{n} w_h}, \qquad \text{(Equation 6.1)}$$

$$\overline{sd\,(X)} = \sqrt{\frac{\sum_{h=1}^{n}(x_h \cdot w_h)^2}{\frac{(M-1)}{M}\sum_{h=1}^{n} w_h}}, \qquad \text{(Equation 6.2)}$$

Where:

w_h= weights (population by household)

M= the number of non-zero weights

Within-Service Aggregation of Variables

The next step of the index construction involves aggregating variables Y_v by services where applicable. That is, for both police stations and Public Prosecutor's Offices, a sum of the standardized adjusted minimum distance plus the standardized count of justice facilities within a buffer is conducted. Justice of the Peace Courts only have a restricted minimum distance measure, which is left as is, post standardization. After this step, there will be one

variable per service (three in total), showing the accessibility of the population to each of them. Mathematically:

$$X' = Y_Z + Y_Q, \qquad \text{(Equation 7)}$$

Where:

Y_Z= standardized adjusted minimum distance (Z)

Y_Q= standardized count of justice facilities within a buffer (Q)

Normalization of Variables

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:

$$X'' = \frac{x_h - min\left(X'\right)}{max\left(X'\right) - min\left(X'\right)}, \qquad \text{(Equation 8)}$$

Where:

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

Aggregation at the District Level

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:

$$S_t = \frac{\sum_{h=1}^{n}(x_h \cdot w_h)}{\sum_{h=1}^{n} w_h}, \qquad \forall t, \qquad \text{(Equation 9)}$$

Where:

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

Final Step: Accessibility Index by Distict

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 Peace Courts 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:

$$A_t = \left(\sqrt[n]{\prod_{j=1}^{n} \left(S_t^j + 1 \right)} \right) - 1, \qquad \text{(Equation 10)}$$

Where:

A_t= the final index accessibility by district

S_t^j= the available index j of each individual service, by district t

Limitations

The accessibility index to primary justice fora estimated in this paper is an innovative tool that measures one important dimension of access to justice in Paraguay. It can certainly shed light over the nation-wide presence of the State, and in particular of institutions in charge of promoting and upholding justice and the rule of law. However, greatly induced by data availability at the time of the implementation, it is important to mention some limitations to the estimated index.

First, the minimum distance approach relies on the Euclidean distance. This means that it calculates which services are closest to a household drawing a straight line that connects them both. It is clearly an oversimplified model of how things work in real life. In actuality, people move using different means of transportation, throug multiple networks of roads, which in turn differ from each other in the materials they are made of, their quality, the traffic, among other factors that impact travel cost. Accounting for all of this would require data that, unfortunately, is not readily available for Paraguay as of today. Future iterations of the accessibility index could certainly include at least some of the above-mentioned characteristics for a more precise reflection of infrastructure and the population's behavior.

Second, this index does not measure the *quality* of the primary justice fora. It is true that while some people live closer to justice services, a good service is not always guaranteed. As mentioned at the beginning, there are multiple dimensions to access, and accessibility is

just one of them. Future improvements of the index could include, for instance, variables such as workforce size for each facility to account for how much service is actually available to the population.

Finally, this index that goes from 0 to 1 (1 being highest accessibility) is a within-country comparison of accessibility to justice fora. That is, a final index assigned to a district is relative to the performance of other districts. However, the components of the index (minimum distance and count of facilities) can certainly be used for a more regional or global compairson of accessibility levels.

Results

Minimum distance

TABLE 1. National Averages of Minimum Distance by Justice Fora

	Minimum Distance (meters)		
Justice Service	Total	Men	Women
Police*	2,358	2,451	2,264
Prosecutor's Office*	10,656	11,030	10,277
Court of Peace	4,430	4,577	4,284

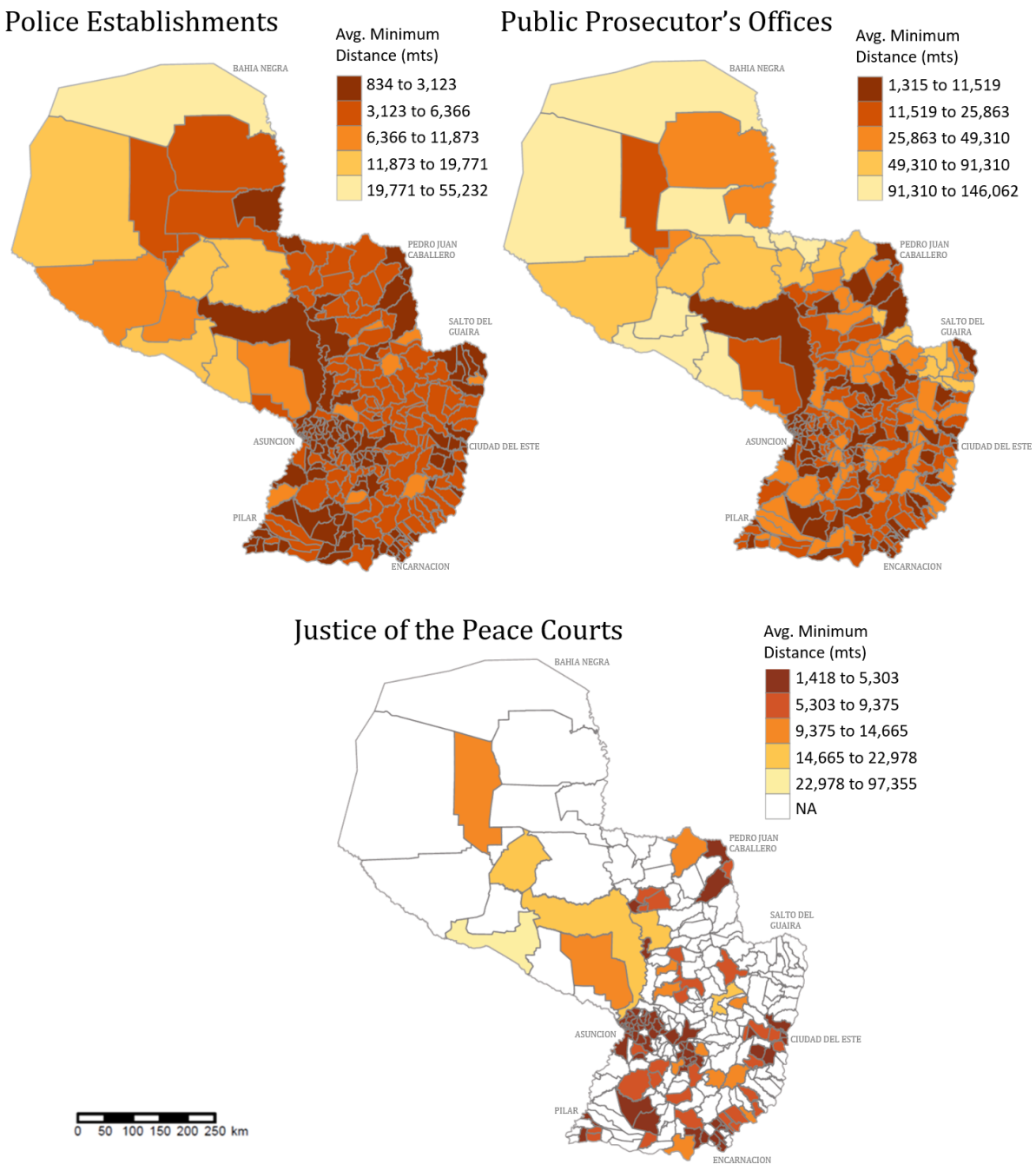
SOURCE: Author's own elaboration with results from the applied GIS methods

At the national level, the average minimum distance (adjusted for location within/outside jurisdictions) to police services is 2,538 meters, which makes of them the most accessible primary justice fora if looking only at this measure. Disaggregated by gender, women live on average 187 meters closer to police stations, compared to men. As for Public Prosecutor's Offices, the average distance to the nearest facility is 10,656 meters, with women living 753 meters closer to these services than men. In the case of Peace Courts, the average national minimum distance is 4,430 meters, with men living 293 meters farther than women, on average, from these offices. For this last estimation, results are the average (weighted by population) only for districts with available geodata of their Peace Courts.

The top five districts with the lowest average minimum distances for police stations are Guarambare (834 m), Pilar (885 m), Asuncion (896 m), Nanawa (907 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 2. Maps of Minimum Distances by Type of Service, By District



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

As for Public Prosecutor's Offices, 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 (1,866 m), and Villa Elisa (1,885 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 geodata for their Justice of the Peace Courts, Guarambare is at the top with an average distance of 1,418 m to its facility. Following Guarambare is San Antonio (1,765 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 (97,335 m), Teniente Irala Fernandez (22,978 m), Yhu (21,098 m), Villa Hayes (21,043 m), as well as San Pedro del Ycuamandyju (18,454 m).

Count of facilities within a determined radius

TABLE 2. National Average Counts of Facilities Within a Determined Radius

	Number of facilities (count)		
Justice Service	Total	Men	Women
Police*	7.31	7.10	7.52
Prosecutor's Office*	7.24	7.00	7.48
Court of Peace	n.a	n.a	n.a

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

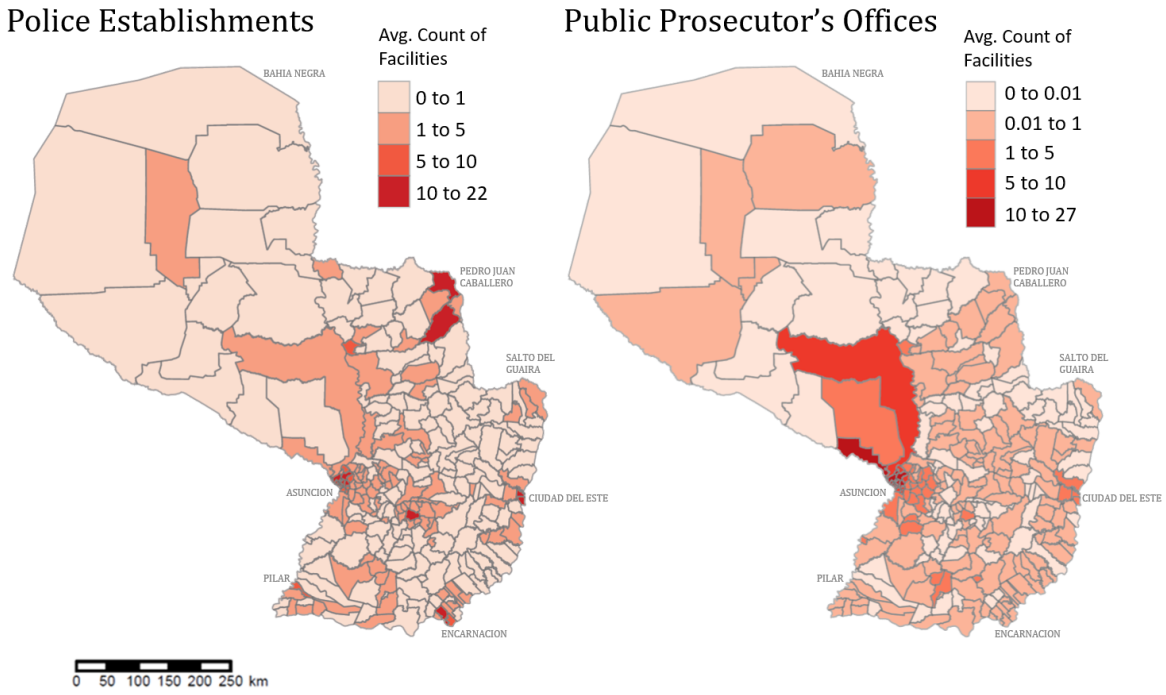
* Number of facilities are counted within a radius of 5km for police stations and 15km for Public Prosecutor's Offices

The country average rounded number of police services within 5 km of a household is 7. For women, this value is closer to 8, compared to men. Coincidently, the average number of Public Prosecutor's Offices within a radius of 15 km is also 7.

The top five districts with the highest count of police stations within a radius of 5 km include Fernando de la Mora, with 21 facilities on average, followed by Lambare (20), San Lorenzo (19), Asuncion (18), and Villa Elisa (15). With fewer than 1 facility each on average (when weighted by population), the bottom group include Teniente Irala Fernandez, Maracana, General Bruguez, Juan de Mena, and Puerto Adela. However, 86 percent of the districts (225 city/towns) have on average fewer than 2 police facilities within a 5 km buffer area. As can be expected, the bulk of the remaining 14 percent is composed of larger cities

and towns with bigger population size.

FIGURE 3. Maps of Average Count of Facilities Within a Determined Radius, By District

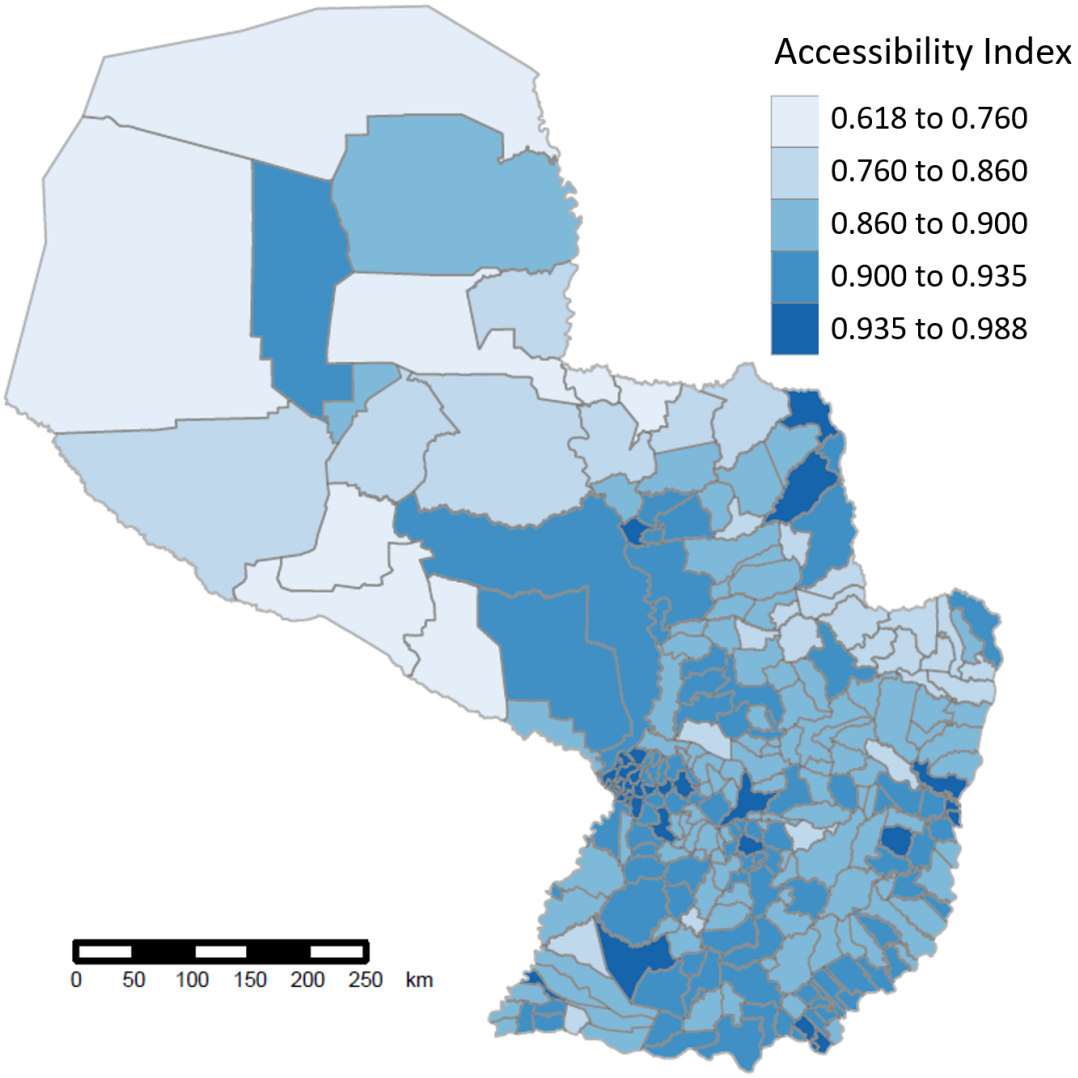


SOURCE: Author's own elaboration with results from the applied GIS methods

As for Public Prosecutor's Offices, 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. Similar to police stations, almost 87 percent of districts (226 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

FIGURE 4. Map of Paraguay's Spatial Accessibility Index to Primary Justice Fora, by District



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

The final accessibility index combines accessibility indicators for all three services studied in this research: police stations, Prosecutor's Offices, and Peace Courts. 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 overall index for Paraguay reached 0.933. Women

recorded a slightly higher index (0.934) than men (0.932).

TABLE 3. National Average Accessibility Index to Primary Justice Fora

Index	Value
Total	0.933
Men	0.932
Women	0.934

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

TABLE 4. 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	Bahia Negra	0.618
Asuncion	0.985	Teniente Martinez	0.698
Lambare	0.983	General Bruguez	0.721
Villa Elisa	0.983	Puerto Casado	0.724
San Lorenzo	0.979	San Lazaro	0.729
Ñemby	0.972	Mariscal Estigarribia	0.747
Luque	0.971	San Carlos del Apa	0.758
Mariano Roque Alonso	0.970	Campo Aceval	0.760
San Antonio	0.964	San Alfredo	0.803
Capiatá	0.957	Sargento J. Félix López	0.806
J. Augusto Saldívar	0.955	Puerto Pinasco	0.807
Limpio	0.953	Itarana	0.810
Ypane	0.952	Teniente Iala Fernandez	0.811
Presidente Franco	0.949	Boquerón	0.825
Guarambare	0.948	Ypejhu	0.825
Aregua	0.948	Corpus Christi	0.827
Ciudad del Este	0.947	Ybyrarobana	0.829
Villarrica	0.945	Karapai	0.834
Pedro Juan Caballero	0.945	Nueva Esperanza	0.836
Itaugua	0.945	Laurel	0.836

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

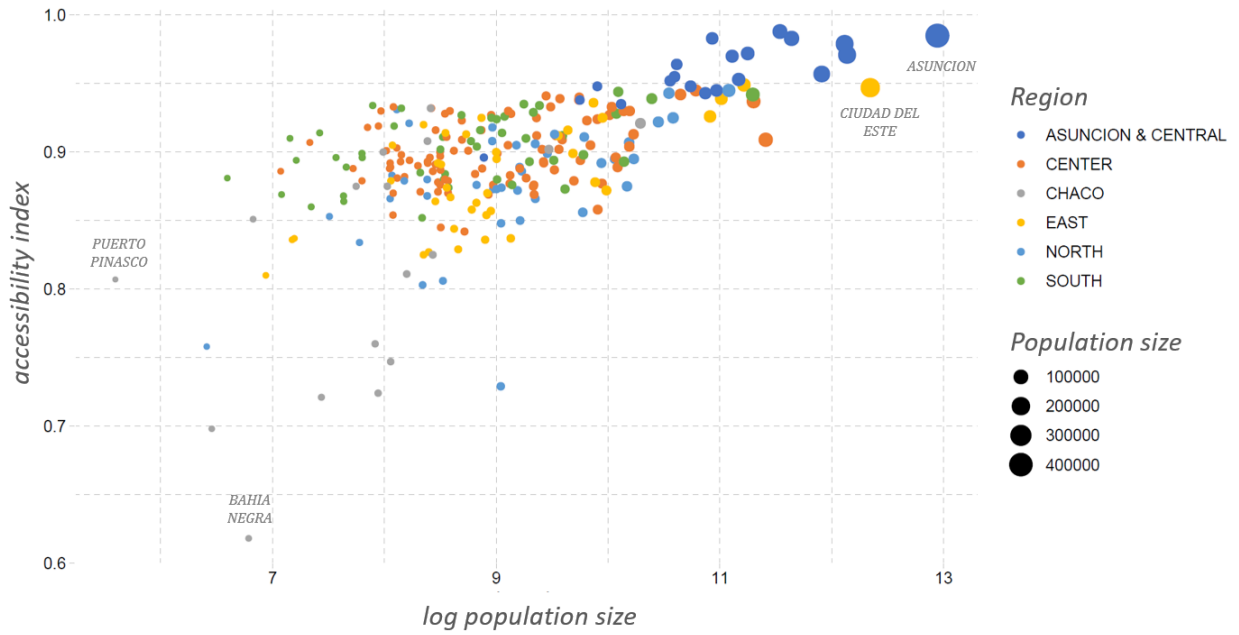
The district with the highest accessibility index is Fernando de la Mora, with a score of 0.988, followed by Asuncion (0.985), Lambare (0.983), Villa Elisa (0.983), and San Lorenzo

(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 tows from the departments of Concepcion and San Pedro in the northern area. The district of Bahia Negra recorded the lowest index at 0.618, followed by Teniente Esteban Martinez (0.698), General Bruguez (0.721), Puerto Casado (0.724), and San Lazaro (0.729).

As shown in Figure 5 below, the index reveals two interesting patterns: one, there is a positive spatial correlation between population size and accessibility to primary justice fora; and two, besides Asuncion, the highest levels of accessibility are all observed in districts of the Central department.

FIGURE 5. Correlation Between Population Size and the Accessibility Index to Primary Justice Fora



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

* CENTER Region: includes the departments of Caaguazu, Caazapa, Cordillera, Guaira, Misiones, Paraguari. CHACO Region: includes the departments of Alto Paraguay, Boqueron, Presidente Hayes. EAST Region: includes the departments of Alto Parana and Canindeyu. NORTH Region: includes the departments of Amambay, Concepcion, and San Pedro. SOUTH Region: includes the departments of Itapua and Ñeembucu.

Accessibility clearly improves as the population size increases. This could be due to the market forces acting where there is supply in response to demand. The Chaco region poses a

particular case, because districts tend to be large in territory (compared to districts in other areas of the country), but small in population density, which may impact their accessibility index.

As for districts in the Central department, the bulk of them exhibit the highest levels of accessibility, even ahead of highly populated cities like Ciudad del Este, Encarnacion, and Pedro Juan Caballero. Their proximity to the capital city (some of them are satellite cities) has given these districts a historical advantage in terms of access to public services, which could be a potential reason for their high levels of geographic accessibility to primary justice fora.

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, Public Prosecutor's Offices, and Justice of the Peace Courts. 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.

One interesting finding of this research is that, when looking at the individual components of the accessibility index to primary justice fora, women tend to do slightly better than men. For instance, the results show that, on average, women live closer than men to all three studied justice services. This trend is consistent upon evaluating the national average of count of facilities within a determined radius. This result is certainly at odds with some of the literature stating that, along with other vulnerable groups, women are often at disadvantage when it comes to accessibility to justice services. However, it is yet to be seen how more disaggregated demographics would perform in terms of accessibility (e.g. rural vs. urban population, minorities, etc.), and this paper may serve as the basis for such deeper

exploration.

Additionally, the results show that the spatial accessibility to primary justice fora improves as the population size increases. This comes most likely as the effect of the market forces of demand and supply. However, there is also a "gravity" effect with the capital Asuncion at the center, by virtue of which districts that are closest to it (in the Central department) all make up the group with the highest accessibility index, while those farthest from it (in the Chaco region), experience the opposite. This may be consequence of a historically highly centralized country, along with the Chaco being the largest area of the Paraguay yet the least inhabited.

The methods applied to construct the index can certainly be applied to other policy spectrums, 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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Annex

Table A1. Accessibility Index of Primary Justice Fora in Paraguay, by District

NO.	DEPARTMENT	DISTRICT	POLICE STATIONS	PROSECUTOR'S OFFICE	PEACE COURTS	OVERALL ACCESSIBILITY INDEX
1	CENTRAL	FERNANDO DE LA MORA	0.982	0.991	0.992	**0.988**
2	ASUNCIÓN	ASUNCIÓN	0.978	0.984	0.993	**0.985**
3	CENTRAL	LAMBARÉ	0.981	0.979	0.990	**0.983**
4	CENTRAL	VILLA ELISA	0.972	0.983	0.993	**0.983**
5	CENTRAL	SAN LORENZO	0.980	0.968	0.989	**0.979**
6	CENTRAL	ÑEMBY	0.965	0.957	0.993	**0.972**
7	CENTRAL	LUQUE	0.969	0.955	0.988	**0.971**
8	CENTRAL	MARIANO ROQUE ALONSO	0.952	0.966	0.993	**0.970**
9	CENTRAL	SAN ANTONIO	0.956	0.943	0.994	**0.964**
10	CENTRAL	CAPIATÁ	0.963	0.922	0.985	**0.957**
11	CENTRAL	J. AUGUSTO SALDIVAR	0.958	0.915	0.992	**0.955**
12	CENTRAL	LIMPIO	0.956	0.916	0.989	**0.953**
13	CENTRAL	YPANÉ	0.960	0.905	0.992	**0.952**
14	ALTO PARANÁ	PRESIDENTE FRANCO	0.970	0.888	0.992	**0.949**
15	CENTRAL	GUARAMBARÉ	0.956	0.895	0.995	**0.948**
16	CENTRAL	AREGUÁ	0.953	0.902	0.988	**0.948**
17	ALTO PARANÁ	CIUDAD DEL ESTE	0.971	0.889	0.984	**0.947**
18	GUAIRÁ	VILLARRICA	0.964	0.884	0.990	**0.945**
19	AMAMBAY	PEDRO JUAN CABALLERO	0.964	0.883	0.989	**0.945**
20	CENTRAL	ITAUGUÁ	0.950	0.897	0.989	**0.945**
21	ÑEEMBUCÚ	PILAR	0.957	0.885	0.991	**0.944**
22	CONCEPCIÓN	CONCEPCIÓN	0.960	0.885	0.986	**0.943**
23	CENTRAL	ITÁ	0.950	0.891	0.989	**0.943**
24	ITAPÚA	ENCARNACIÓN	0.964	0.879	0.986	**0.942**
25	CORDILLERA	CAACUPÉ	0.950	0.889	0.989	**0.942**
26	CORDILLERA	EMBOSCADA	0.945	0.888	0.992	**0.941**
27	PARAGUARÍ	PARAGUARÍ	0.948	0.884	0.990	**0.940**
28	ALTO PARANÁ	HERNANDARIAS	0.952	0.883	0.984	**0.939**
29	MISIONES	SAN JUAN BAUTISTA DE LAS MISIONES	0.950	0.881	0.986	**0.939**
30	ITAPÚA	CAMBYRETÁ	0.958	0.875	0.985	**0.939**
31	CENTRAL	YPACARAÍ	0.948	0.879	0.991	**0.938**
32	CORDILLERA	EUSEBIO AYALA	0.944	0.884	0.988	**0.938**
33	CAAGUAZÚ	CORONEL OVIEDO	0.951	0.878	0.983	**0.937**
34	ALTO PARANÁ	SANTA RITA	0.941	0.881	0.987	**0.936**
35	ITAPÚA	HOHENAU	0.945	0.879	0.983	**0.935**
36	CENTRAL	VILLETA	0.937	0.889	0.981	**0.935**
37	ITAPÚA	CORONEL BOGADO	0.943	0.878	0.984	**0.934**
38	ÑEEMBUCÚ	GRAL. JOSÉ EDUVIGIS DÍAZ	0.944	0.878	0.982	**0.934**
39	MISIONES	SAN IGNACIO	0.941	0.878	0.982	**0.933**
40	GUAIRÁ	YATAITY	0.945	0.864	0.994	**0.933**
41	CORDILLERA	ATYRÁ	0.944	0.871	0.986	**0.933**
42	ITAPÚA	JESÚS	0.944	0.862	0.993	**0.932**
43	PRESIDENTE HAYES	NANAWA	0.953	0.912	n.a.	**0.932**
44	GUAIRÁ	FÉLIX PÉREZ CARDOZO	0.945	0.864	0.988	**0.932**
45	SAN PEDRO	ANTEQUERA	0.945	0.856	0.993	**0.931**
46	GUAIRÁ	MBOCAYATY	0.945	0.863	0.984	**0.930**
47	PARAGUARÍ	CARAPEGUÁ	0.936	0.876	0.980	**0.930**
48	PARAGUARÍ	ROQUE GONZALEZ DE SANTA CRUZ	0.939	0.868	0.985	**0.930**
49	PARAGUARÍ	YAGUARÓN	0.941	0.863	0.987	**0.930**
50	CORDILLERA	PIRIBEBUY	0.944	0.864	0.984	**0.930**
51	CORDILLERA	LOMA GRANDE	0.944	0.854	0.993	**0.930**
52	ITAPÚA	OBLIGADO	0.939	0.876	0.974	**0.929**
53	CORDILLERA	ISLA PUCÚ	0.942	0.858	0.988	**0.928**
54	ITAPÚA	TOMÁS ROMERO PEREIRA	0.934	0.874	0.978	**0.928**
55	CORDILLERA	SAN BERNARDINO	0.941	0.858	0.986	**0.928**
56	CORDILLERA	ITACURUBÍ DE LA CORDILLERA	0.941	0.854	0.990	**0.927**
57	ITAPÚA	CARMEN DEL PARANÁ	0.940	0.856	0.989	**0.927**
58	CORDILLERA	TOBATÍ	0.941	0.856	0.986	**0.927**
59	ALTO PARANÁ	MINGA GUAZÚ	0.944	0.857	0.980	**0.926**
60	ITAPÚA	BELLA VISTA	0.940	0.861	0.978	**0.926**
61	ALTO PARANÁ	YGUAZÚ	0.939	0.868	0.971	**0.925**
62	SAN PEDRO	SAN ESTANISLAO	0.939	0.869	0.969	**0.925**
63	CANINDEYÚ	VILLA CURUGUATY	0.931	0.871	0.975	**0.925**
64	CORDILLERA	ALTOS	0.940	0.848	0.988	**0.925**
65	ITAPÚA	CAPITÁN MIRANDA	0.942	0.850	0.984	**0.925**
66	ITAPÚA	GENERAL ARTIGAS	0.938	0.856	0.980	**0.924**

67	CAAZAPÁ	CAAZAPÁ	0.940	0.866	0.967	**0.924**
68	PARAGUARÍ	YBYCUÍ	0.935	0.868	0.969	**0.923**
69	GUAIRÁ	ITAPÉ	0.943	0.848	0.982	**0.923**
70	CONCEPCIÓN	HORQUETA	0.934	0.866	0.967	**0.922**
71	AMAMBAY	ZANJA PYTÃ	0.946	0.846	0.973	**0.921**
72	PRESIDENTE HAYES	VILLA HAYES	0.946	0.897	0.926	**0.921**
73	ALTO PARANÁ	SANTA ROSA DEL MONDAY	0.939	0.842	0.982	**0.920**
74	ÑEEMBUCÚ	MAYOR JOSÉ DEJESÚS MARTÍNEZ	0.945	0.840	0.974	**0.919**
75	GUAIRÁ	ÑUMÍ	0.939	0.833	0.988	**0.919**
76	GUAIRÁ	SAN SALVADOR	0.936	0.836	0.985	**0.918**
77	CONCEPCIÓN	BELÉN	0.937	0.847	0.972	**0.918**
78	ÑEEMBUCÚ	ALBERDI	0.946	0.887	n.a.	**0.916**
79	CANINDEYÚ	SALTO DEL GUAIRÁ	0.952	0.881	n.a.	**0.916**
80	CAAZAPÁ	YEGROS	0.937	0.835	0.979	**0.916**
81	GUAIRÁ	ITURBE	0.943	0.822	0.986	**0.916**
82	ALTO PARANÁ	NARANJAL	0.930	0.840	0.976	**0.914**
83	ITAPÚA	CAPITÁN MEZA	0.936	0.848	0.960	**0.914**
84	ITAPÚA	LA PAZ	0.940	0.820	0.986	**0.914**
85	ALTO PARANÁ	LOS CEDRALES	0.933	0.834	0.977	**0.913**
86	SAN PEDRO	UNIÓN	0.928	0.837	0.978	**0.913**
87	CAAZAPÁ	SAN JUAN NEPOMUCENO	0.929	0.856	0.955	**0.913**
88	CONCEPCIÓN	LORETO	0.939	0.830	0.971	**0.913**
89	ALTO PARANÁ	DR. JUAN LEÓN MALLORQUÍN	0.937	0.817	0.987	**0.912**
90	MISIONES	AYOLAS	0.946	0.879	n.a.	**0.912**
91	ITAPÚA	NATALIO	0.933	0.831	0.976	**0.912**
92	MISIONES	SANTA ROSA	0.945	0.879	n.a.	**0.912**
93	SAN PEDRO	GENERAL ELIZARDO AQUINO	0.937	0.845	0.954	**0.911**
94	ITAPÚA	PIRAPÓ	0.937	0.828	0.971	**0.911**
95	PARAGUARÍ	QUIINDY	0.942	0.880	n.a.	**0.911**
96	PARAGUARÍ	QUYQUYHÓ	0.936	0.820	0.980	**0.911**
97	ÑEEMBUCÚ	DESMOCHADOS	0.939	0.815	0.980	**0.910**
98	ITAPÚA	MAYOR JULIO DIONISIO OTAÑO	0.939	0.880	n.a.	**0.910**
99	GUAIRÁ	GRAL. EUGENIO A. GARAY	0.939	0.811	0.982	**0.909**
100	CAAGUAZÚ	CAAGUAZÚ	0.945	0.874	n.a.	**0.909**
101	CAAGUAZÚ	SAN JOSÉ DE LOS ARROYOS	0.940	0.811	0.982	**0.909**
102	BOQUERÓN	FILADELFIA	0.928	0.852	0.949	**0.908**
103	SAN PEDRO	25 DE DICIEMBRE	0.941	0.824	0.962	**0.908**
104	ITAPÚA	SAN COSME Y DAMIÁN	0.936	0.832	0.957	**0.908**
105	SAN PEDRO	SAN PEDRO DEL YCUAMANDYYÚ	0.941	0.847	0.935	**0.907**
106	MISIONES	YABEBYRY	0.943	0.804	0.978	**0.907**
107	AMAMBAY	CAPITÁN BADO	0.941	0.872	n.a.	**0.906**
108	CAAGUAZÚ	SANTA ROSA DEL MBUTUY	0.938	0.873	n.a.	**0.905**
109	SAN PEDRO	ITACURUBÍ DEL ROSARIO	0.937	0.874	n.a.	**0.905**
110	GUAIRÁ	INDEPENDENCIA	0.942	0.814	0.963	**0.905**
111	ALTO PARANÁ	IRUÑA	0.937	0.873	n.a.	**0.905**
112	CAAGUAZÚ	DR. J. EULOGIO ESTIGARRIBIA	0.936	0.872	n.a.	**0.904**
113	ITAPÚA	SAN JUAN DEL PARANÁ	0.946	0.862	n.a.	**0.904**
114	CORDILLERA	NUEVA COLOMBIA	0.940	0.866	n.a.	**0.903**
115	PRESIDENTE HAYES	BENJAMÍN ACEVAL	0.924	0.838	0.948	**0.902**
116	ITAPÚA	TRINIDAD	0.939	0.866	n.a.	**0.902**
117	CAAZAPÁ	YUTY	0.932	0.872	n.a.	**0.902**
118	PARAGUARÍ	PIRAYÚ	0.948	0.857	n.a.	**0.902**
119	MISIONES	SAN PATRICIO	0.942	0.861	n.a.	**0.901**
120	PARAGUARÍ	CAAPUCÚ	0.933	0.807	0.967	**0.901**
121	MISIONES	SANTA MARÍA	0.945	0.858	n.a.	**0.901**
122	PRESIDENTE HAYES	JOSÉ FALCÓN	0.941	0.862	n.a.	**0.900**
123	ALTO PARANÁ	MINGA PORÁ	0.937	0.864	n.a.	**0.900**
124	CAAGUAZÚ	SIMÓN BOLIVAR	0.935	0.866	n.a.	**0.900**
125	CONCEPCIÓN	YBY YAÚ	0.936	0.863	n.a.	**0.899**
126	GUAIRÁ	BORJA	0.938	0.811	0.953	**0.899**
127	ITAPÚA	JOSÉ LEANDRO OVIEDO	0.932	0.867	n.a.	**0.899**
128	ALTO PARANÁ	JUAN E. O'LEARY	0.930	0.794	0.979	**0.899**
129	ITAPÚA	EDELIRA	0.937	0.861	n.a.	**0.898**
130	CAAGUAZÚ	NUEVA LONDRES	0.939	0.858	n.a.	**0.898**
131	CAAGUAZÚ	DR. CECILIO BÁEZ	0.940	0.856	n.a.	**0.897**
132	PARAGUARÍ	ESCOBAR	0.939	0.855	n.a.	**0.896**
133	ÑEEMBUCÚ	LAURELES	0.938	0.856	n.a.	**0.896**
134	CAAGUAZÚ	YHÚ	0.928	0.837	0.926	**0.896**
135	CENTRAL	NUEVA ITALIA	0.944	0.849	n.a.	**0.896**
136	ÑEEMBUCÚ	ISLA UMBÚ	0.945	0.848	n.a.	**0.896**
137	SAN PEDRO	CAPIIBARY	0.928	0.863	n.a.	**0.895**
138	ALTO PARANÁ	SAN ALBERTO	0.938	0.853	n.a.	**0.895**
139	SAN PEDRO	CHORÉ	0.930	0.790	0.969	**0.895**
140	CORDILLERA	SANTA ELENA	0.946	0.844	n.a.	**0.894**
141	CAAGUAZÚ	DR. JUAN MANUEL FRUTOS	0.932	0.857	n.a.	**0.894**
142	ÑEEMBUCÚ	PASO DE PATRIA	0.946	0.843	n.a.	**0.894**
143	ITAPÚA	CARLOS ANTONIO LÓPEZ	0.937	0.852	n.a.	**0.894**
144	ITAPÚA	ALTO VERÁ	0.931	0.856	n.a.	**0.893**
145	CAAGUAZÚ	SAN JOAQUÍN	0.937	0.850	n.a.	**0.893**
146	MISIONES	SAN MIGUEL	0.947	0.840	n.a.	**0.893**

147	CAAZAPÁ	MACIEL	0.940	0.847	n.a.	**0.893**
148	ITAPÚA	SAN PEDRO DEL PARANÁ	0.934	0.852	n.a.	**0.893**
149	SAN PEDRO	SANTA ROSA DEL AGUARAY	0.936	0.850	n.a.	**0.892**
150	CAAGUAZÚ	NUEVA TOLEDO	0.932	0.785	0.964	**0.892**
151	PARAGUARÍ	ACAHAY	0.929	0.855	n.a.	**0.892**
152	ALTO PARANÁ	DR. RAÚL PEÑA	0.942	0.843	n.a.	**0.892**
153	GUAIRÁ	CORONEL MARTÍNEZ	0.943	0.842	n.a.	**0.892**
154	CAAZAPÁ	GRAL. HIGINIO MORINIGO	0.937	0.846	n.a.	**0.891**
155	ALTO PARANÁ	TAVAPY	0.941	0.841	n.a.	**0.891**
156	CAAZAPÁ	BUENA VISTA	0.943	0.838	n.a.	**0.890**
157	SAN PEDRO	LIMA	0.932	0.848	n.a.	**0.889**
158	GUAIRÁ	NATALICIO TALAVERA	0.946	0.835	n.a.	**0.889**
159	ÑEEMBUCÚ	HUMAITÁ	0.940	0.840	n.a.	**0.889**
160	CAAGUAZÚ	REPATRIACIÓN	0.936	0.843	n.a.	**0.889**
161	GUAIRÁ	TEBICUARY	0.945	0.833	n.a.	**0.888**
162	CAAGUAZÚ	3 DE FEBRERO	0.934	0.843	n.a.	**0.888**
163	CORDILLERA	CARAGUATAY	0.940	0.837	n.a.	**0.888**
164	CORDILLERA	SAN JOSÉ OBRERO	0.945	0.832	n.a.	**0.888**
165	CAAZAPÁ	TAVAÍ	0.925	0.786	0.956	**0.887**
166	PARAGUARÍ	SAPUCÁI	0.941	0.834	n.a.	**0.887**
167	GUAIRÁ	DOCTOR BOTTRELL	0.944	0.830	n.a.	**0.886**
168	PARAGUARÍ	LA COLMENA	0.947	0.827	n.a.	**0.886**
169	SAN PEDRO	YATAITY DEL NORTE	0.929	0.843	n.a.	**0.886**
170	ÑEEMBUCÚ	CERRITO	0.933	0.839	n.a.	**0.885**
171	ITAPÚA	NUEVA ALBORADA	0.934	0.835	n.a.	**0.884**
172	CAAGUAZÚ	R.I. 3 CORRALES	0.934	0.835	n.a.	**0.884**
173	CAAGUAZÚ	VAQUERÍA	0.936	0.831	n.a.	**0.883**
174	SAN PEDRO	SAN PABLO	0.936	0.831	n.a.	**0.883**
175	CAAGUAZÚ	LA PASTORA	0.935	0.831	n.a.	**0.882**
176	CAAGUAZÚ	RAÚL ARSENIO OVIEDO	0.934	0.830	n.a.	**0.881**
177	CORDILLERA	MBOCAYATY DEL YHAGUY	0.944	0.821	n.a.	**0.881**
178	ÑEEMBUCÚ	VILLA FRANCA	0.922	0.840	n.a.	**0.881**
179	ITAPÚA	FRAM	0.937	0.826	n.a.	**0.880**
180	ITAPÚA	ITAPÚA POTY	0.933	0.829	n.a.	**0.880**
181	MISIONES	SANTIAGO	0.944	0.819	n.a.	**0.880**
182	SAN PEDRO	NUEVA GERMANIA	0.918	0.842	n.a.	**0.880**
183	CORDILLERA	ARROYOS Y ESTEROS	0.937	0.824	n.a.	**0.879**
184	ALTO PARANÁ	SANTA FE DEL PARANÁ	0.936	0.824	n.a.	**0.879**
185	CORDILLERA	VALENZUELA	0.935	0.825	n.a.	**0.879**
186	SAN PEDRO	SAN JOSÉ DEL ROSARIO	0.929	0.830	n.a.	**0.879**
187	MISIONES	VILLA FLORIDA	0.947	0.813	n.a.	**0.879**
188	CORDILLERA	PRIMERO DE MARZO	0.944	0.814	n.a.	**0.878**
189	CANINDEYÚ	YASY CAÑY	0.927	0.830	n.a.	**0.878**
190	CAAZAPÁ	ABAÍ	0.929	0.827	n.a.	**0.877**
191	GUAIRÁ	CAPITÁN MAURICIO JOSÉ TROCHE	0.939	0.816	n.a.	**0.877**
192	ITAPÚA	YATYTAY	0.937	0.818	n.a.	**0.876**
193	CAAGUAZÚ	CARAYAÓ	0.929	0.824	n.a.	**0.876**
194	CONCEPCIÓN	PASO HORQUETA	0.934	0.820	n.a.	**0.876**
195	PARAGUARÍ	CABALLERO	0.936	0.817	n.a.	**0.876**
196	CAAGUAZÚ	JOSÉ DOMINGO OCAMPOS	0.937	0.816	n.a.	**0.876**
197	CAAZAPÁ	3 DE MAYO	0.937	0.816	n.a.	**0.875**
198	ALTO PARAGUAY	FUERTE OLIMPO	0.931	0.821	n.a.	**0.875**
199	BOQUERÓN	LOMA PLATA	0.932	0.819	n.a.	**0.875**
200	SAN PEDRO	GUAJAYVI	0.932	0.820	n.a.	**0.875**
201	SAN PEDRO	GENERAL FRANCISCO ISIDORO RESQUÍN	0.941	0.810	n.a.	**0.874**
202	ITAPÚA	GENERAL DELGADO	0.939	0.812	n.a.	**0.874**
203	CANINDEYÚ	LA PALOMA DEL ESPÍRITU SANTO	0.946	0.804	n.a.	**0.874**
204	ITAPÚA	SAN RAFAEL DEL PARANÁ	0.935	0.813	n.a.	**0.873**
205	SAN PEDRO	VILLA DEL ROSARIO	0.942	0.807	n.a.	**0.873**
206	CONCEPCIÓN	ARROYITO	0.936	0.811	n.a.	**0.873**
207	ALTO PARANÁ	ITAKYRY	0.931	0.815	n.a.	**0.872**
208	SAN PEDRO	YRYBUCUA	0.930	0.816	n.a.	**0.872**
209	GUAIRÁ	JOSÉ FASSARDI	0.942	0.803	n.a.	**0.871**
210	CAAZAPÁ	DR. MOISÉS S. BERTONI	0.921	0.821	n.a.	**0.871**
211	ALTO PARANÁ	ÑACUNDAY	0.937	0.806	n.a.	**0.870**
212	PARAGUARÍ	YBYTYMÍ	0.934	0.809	n.a.	**0.870**
213	PARAGUARÍ	TEBICUARY-MÍ	0.938	0.804	n.a.	**0.870**
214	PARAGUARÍ	MBUYAPEY	0.935	0.805	n.a.	**0.869**
215	CAAGUAZÚ	TEMBIAPORÁ	0.933	0.807	n.a.	**0.869**
216	ÑEEMBUCÚ	GUAZÚ-CUÁ	0.934	0.806	n.a.	**0.869**
217	ÑEEMBUCÚ	TACUARAS	0.935	0.804	n.a.	**0.868**
218	AMAMBAY	CERRO CORÁ	0.937	0.801	n.a.	**0.868**
219	ALTO PARANÁ	MBARACAYÚ	0.932	0.803	n.a.	**0.867**
220	SAN PEDRO	TACUATÍ	0.930	0.804	n.a.	**0.866**
221	CONCEPCIÓN	PASO BARRETO	0.938	0.796	n.a.	**0.866**
222	ÑEEMBUCÚ	VILLA OLIVA	0.939	0.792	n.a.	**0.864**
223	ALTO PARANÁ	DOMINGO MARTÍNEZ DE IRALA	0.941	0.790	n.a.	**0.864**
224	ALTO PARANÁ	SAN CRISTÓBAL	0.932	0.797	n.a.	**0.863**
225	ÑEEMBUCÚ	VILLALBÍN	0.944	0.779	n.a.	**0.860**
226	CANINDEYÚ	FRANCISCO CABALLERO ALVAREZ	0.941	0.778	n.a.	**0.858**

227	GUAIRÁ	PASO YOBAI	0.938	0.781	n.a.	**0.858**
228	CANINDEYÚ	YBY PYTÁ	0.932	0.784	n.a.	**0.857**
229	SAN PEDRO	LIBERACIÓN	0.936	0.780	n.a.	**0.856**
230	CANINDEYÚ	VILLA YGATIMÍ	0.932	0.780	n.a.	**0.854**
231	PARAGUARÍ	MARÍA ANTONIA	0.934	0.777	n.a.	**0.854**
232	CONCEPCIÓN	AZOTE'Y	0.928	0.781	n.a.	**0.853**
233	ÑEEMBUCÚ	SAN JUAN BAUTISTA DE ÑEEMBUCÚ	0.941	0.768	n.a.	**0.852**
234	ALTO PARAGUAY	CARMELO PERALTA	0.940	0.767	n.a.	**0.851**
235	SAN PEDRO	SAN VICENTE PANCHOLO	0.931	0.772	n.a.	**0.850**
236	AMAMBAY	BELLA VISTA NORTE	0.936	0.662	0.962	**0.848**
237	CAAGUAZÚ	MARISCAL FRANCISCO SOLANO LÓPEZ	0.928	0.767	n.a.	**0.845**
238	CANINDEYÚ	KATUETÉ	0.944	0.750	n.a.	**0.844**
239	CORDILLERA	JUAN DE MENA	0.916	0.770	n.a.	**0.842**
240	CANINDEYÚ	PUERTO ADELA	0.918	0.760	n.a.	**0.837**
241	CANINDEYÚ	MARACANÁ	0.918	0.759	n.a.	**0.837**
242	CANINDEYÚ	LAUREL	0.935	0.742	n.a.	**0.836**
243	CANINDEYÚ	NUEVA ESPERANZA	0.942	0.736	n.a.	**0.836**
244	AMAMBAY	KARAPAÍ	0.937	0.737	n.a.	**0.834**
245	CANINDEYÚ	YBYRAROBANÁ	0.932	0.732	n.a.	**0.829**
246	CANINDEYÚ	CORPUS CHRISTI	0.941	0.720	n.a.	**0.827**
247	CANINDEYÚ	YPEJHÚ	0.935	0.722	n.a.	**0.825**
248	BOQUERÓN	BOQUERÓN	0.907	0.748	n.a.	**0.825**
249	PRESIDENTE HAYES	TTE. 1° MANUEL IRALA FERNÁNDEZ	0.876	0.651	0.919	**0.811**
250	CANINDEYÚ	ITANARÁ	0.915	0.710	n.a.	**0.810**
251	PRESIDENTE HAYES	PUERTO PINASCO	0.887	0.730	n.a.	**0.807**
252	CONCEPCIÓN	SARGENTO JOSÉ FÉLIX LÓPEZ	0.930	0.690	n.a.	**0.806**
253	CONCEPCIÓN	SAN ALFREDO	0.935	0.681	n.a.	**0.803**
254	PRESIDENTE HAYES	CAMPO ACEVAL	0.904	0.626	n.a.	**0.760**
255	CONCEPCIÓN	SAN CARLOS DEL APA	0.934	0.598	n.a.	**0.758**
256	BOQUERÓN	MARISCAL JOSÉ FÉLIX ESTIGARRIBIA	0.893	0.614	n.a.	**0.747**
257	CONCEPCIÓN	SAN LÁZARO	0.947	0.537	n.a.	**0.729**
258	ALTO PARAGUAY	PUERTO CASADO	0.937	0.534	n.a.	**0.724**
259	PRESIDENTE HAYES	GENERAL JOSÉ MARÍA BRUGUEZ	0.873	0.583	n.a.	**0.721**
260	PRESIDENTE HAYES	TENIENTE ESTEBAN MARTÍNEZ	0.881	0.578	0.657	**0.698**
261	ALTO PARAGUAY	BAHÍA NEGRA	0.736	0.509	n.a.	**0.618**

SOURCE: Results from the applied GIS methods

Table A2. Accessibility Index of Primary Justice Fora in Paraguay, by Department

NO.	DPTO_DESC	POLICE STATIONS	PROSECUTOR'S OFFICE	PEACE COURTS	OVERALL ACCESSIBILITY INDEX
1	ASUNCIÓN	0.978	0.984	0.993	**0.985**
2	CENTRAL	0.966	0.944	0.990	**0.966**
3	ALTO PARANÁ	0.957	0.870	0.984	**0.932**
4	AMAMBAY	0.956	0.853	0.986	**0.925**
5	CORDILLERA	0.943	0.859	0.987	**0.920**
6	MISIONES	0.945	0.868	0.983	**0.917**
7	ITAPÚA	0.944	0.860	0.981	**0.917**
8	ÑEEMBUCÚ	0.947	0.855	0.988	**0.913**
9	PARAGUARÍ	0.939	0.855	0.981	**0.912**
10	GUAIRÁ	0.948	0.839	0.981	**0.911**
11	CAAGUAZÚ	0.940	0.856	0.971	**0.905**
12	CAAZAPÁ	0.933	0.840	0.961	**0.898**
13	CONCEPCIÓN	0.942	0.827	0.976	**0.898**
14	PRESIDENTE HAYES	0.932	0.842	0.928	**0.893**
15	SAN PEDRO	0.934	0.833	0.960	**0.893**
16	CANINDEYÚ	0.935	0.804	0.975	**0.872**
17	BOQUERÓN	0.915	0.764	0.949	**0.843**
18	ALTO PARAGUAY	0.910	0.658	n.a.	**0.778**

SOURCE: Results from the applied GIS methods

Table A3. Minimum Distance to Primary Justice Fora and Count of Facilities, by District

NO.	DEPARTMENT	DISTRICT	MINIMUM DISTANCE (METERS)			COUNT OF SERVICES	
			POLICE STATIONS	PROSECUTOR'S OFFICES	PEACE COURTS	POLICE STATIONS	PROSECUTOR'S OFFICES
1	SAN PEDRO	25 DE DICIEMBRE	2,765.1	24,218.8	10704.95	1.2	0.1
2	CAAGUAZÚ	3 DE FEBRERO	4,331.7	17,122.1	n.a.	0.6	0.2
3	CAAZAPÁ	3 DE MAYO	3,762.7	27,182.3	n.a.	0.9	0.0
4	CAAZAPÁ	ABAÍ	5,499.1	23,667.9	n.a.	0.6	0.3
5	PARAGUARÍ	ACAHAY	5,413.1	13,576.3	n.a.	0.5	0.9
6	ÑEEMBUCÚ	ALBERDI	1,349.3	1,386.8	n.a.	0.9	1.0
7	ITAPÚA	ALTO VERÁ	5,011.7	13,018.8	n.a.	0.8	0.7
8	CORDILLERA	ALTOS	2,881.0	15,605.4	3307.72	1.1	0.4
9	SAN PEDRO	ANTEQUERA	1,618.0	13,207.0	1858.32	0.9	0.9
10	CENTRAL	AREGUÁ	1,384.1	6,248.7	3297.16	5.2	7.5
11	CONCEPCIÓN	ARROYITO	3,731.2	29,176.2	n.a.	0.7	0.1
12	CORDILLERA	ARROYOS Y ESTEROS	3,612.1	24,385.9	n.a.	0.7	0.0
13	ASUNCIÓN	ASUNCIÓN	896.1	1,314.7	1895.85	17.9	23.9
14	CORDILLERA	ATYRÁ	2,159.2	9,100.0	4066.29	1.4	1.9
15	MISIONES	AYOLAS	1,615.1	4,596.3	n.a.	1.8	0.9
16	CONCEPCIÓN	AZOTE'Y	5,945.6	40,695.7	n.a.	1.0	0.0
17	ALTO PARAGUAY	BAHÍA NEGRA	55,231.8	146,061.8	n.a.	0.6	0.0
18	CONCEPCIÓN	BELÉN	3,600.2	16,270.7	7975.24	0.7	0.5
19	ITAPÚA	BELLA VISTA	3,072.1	11,024.9	6379.63	1.2	0.8
20	AMAMBAY	BELLA VISTA NORTE	3,776.6	87,014.1	10758.70	0.8	0.0
21	PRESIDENTE HAYES	BENJAMÍN ACEVAL	7,003.1	21,067.0	14664.70	0.9	1.4
22	BOQUERÓN	BOQUERÓN	11,281.3	53,920.8	n.a.	0.6	0.2
23	GUAIRÁ	BORJA	3,471.9	29,323.5	13467.86	0.8	0.0
24	CAAZAPÁ	BUENA VISTA	2,201.9	18,912.6	n.a.	1.0	0.1
25	CORDILLERA	CAACUPÉ	1,759.3	2,634.6	3177.89	4.2	2.1
26	CAAGUAZÚ	CAAGUAZÚ	2,303.3	6,164.3	n.a.	2.4	0.9
27	PARAGUARÍ	CAAPUCÚ	4,589.4	30,943.4	9288.25	0.7	0.0
28	CAAZAPÁ	CAAZAPÁ	2,788.0	9,083.4	9374.90	0.9	0.7
29	PARAGUARÍ	CABALLERO	3,833.5	26,955.2	n.a.	0.7	0.0
30	ITAPÚA	CAMBYRETÁ	1,355.2	6,069.6	4348.63	7.7	1.0
31	PRESIDENTE HAYES	CAMPO ACEVAL	11,872.8	100,735.5	n.a.	0.4	0.0
32	CENTRAL	CAPIATÁ	1,316.2	3,095.7	4187.00	10.7	10.4
33	SAN PEDRO	CAPIIBARY	5,894.3	10,254.7	n.a.	0.5	0.7
34	AMAMBAY	CAPITÁN BADO	2,593.1	7,238.4	n.a.	0.8	0.9
35	GUAIRÁ	CAPITÁN MAURICIO JOSÉ TROCHE	3,197.7	27,209.4	n.a.	1.2	0.0
36	ITAPÚA	CAPITÁN MEZA	3,911.5	15,805.9	11275.35	0.8	0.6
37	ITAPÚA	CAPITÁN MIRANDA	2,568.3	15,016.0	4504.46	1.2	0.6
38	CORDILLERA	CARAGUATAY	3,112.5	19,370.2	n.a.	1.6	0.1
39	PARAGUARÍ	CARAPEGUÁ	3,874.6	5,711.7	5727.53	0.9	0.9
40	CAAGUAZÚ	CARAYAÓ	5,461.9	24,189.6	n.a.	0.5	0.0
41	ITAPÚA	CARLOS ANTONIO LÓPEZ	3,607.3	14,542.8	n.a.	0.9	0.6
42	ALTO PARAGUAY	CARMELO PERALTA	2,742.2	46,454.4	n.a.	0.9	0.0
43	ITAPÚA	CARMEN DEL PARANÁ	2,888.5	13,071.8	3262.46	0.8	0.8
44	ÑEEMBUCÚ	CERRITO	4,499.2	18,998.6	n.a.	0.6	0.2
45	AMAMBAY	CERRO CORÁ	3,776.6	33,105.2	n.a.	1.0	0.0
46	SAN PEDRO	CHORÉ	5,367.3	37,559.1	8739.18	0.5	0.0
47	ALTO PARANÁ	CIUDAD DEL ESTE	927.3	3,901.5	4658.87	14.3	2.9
48	CONCEPCIÓN	CONCEPCIÓN	1,751.3	3,719.3	3997.06	9.5	1.9
49	ITAPÚA	CORONEL BOGADO	2,134.0	4,670.0	4675.95	0.9	0.9
50	GUAIRÁ	CORONEL MARTÍNEZ	2,413.9	17,538.0	n.a.	1.5	0.1
51	CAAGUAZÚ	CORONEL OVIEDO	1,778.6	4,732.4	4738.28	4.6	0.9
52	CANINDEYÚ	CORPUS CHRISTI	2,669.5	64,486.2	n.a.	0.8	0.0
53	ÑEEMBUCÚ	DESMOCHADOS	3,275.4	27,633.4	5758.94	0.9	0.0
54	GUAIRÁ	DOCTOR BOTTRELL	2,026.3	21,888.8	n.a.	1.4	0.0
55	ALTO PARANÁ	DOMINGO MARTÍNEZ DE IRALA	2,612.2	37,434.0	n.a.	1.0	0.0
56	CAAGUAZÚ	DR. CECILIO BÁEZ	2,890.2	13,248.2	n.a.	0.9	0.8
57	CAAGUAZÚ	DR. J. EULOGIO ESTIGARRIBIA	3,814.8	6,843.4	n.a.	0.9	0.8
58	ALTO PARANÁ	DR. JUAN LEÓN MALLORQUÍN	3,580.2	26,797.8	3830.93	0.8	0.0
59	CAAGUAZÚ	DR. JUAN MANUEL FRUTOS	4,811.6	12,588.6	n.a.	0.6	0.7
60	CAAZAPÁ	DR. MOISÉS S. BERTONI	7,490.7	25,226.1	n.a.	0.5	0.0
61	ALTO PARANÁ	DR. RAÚL PEÑA	2,501.2	17,279.3	n.a.	1.0	0.3
62	ITAPÚA	EDELIRA	3,707.7	11,519.5	n.a.	0.8	0.9
63	CORDILLERA	EMBOSCADA	1,940.6	2,386.9	2354.16	1.9	1.8
64	ITAPÚA	ENCARNACIÓN	930.9	4,548.3	3869.18	10.0	1.0
65	PARAGUARÍ	ESCOBAR	3,212.6	13,373.2	n.a.	0.9	0.7
66	CORDILLERA	EUSEBIO AYALA	2,174.9	3,516.8	3533.90	1.7	1.5
67	GUAIRÁ	FÉLIX PÉREZ CARDOZO	2,304.0	10,039.4	3469.36	2.6	0.9
68	CENTRAL	FERNANDO DE LA MORA	1,260.4	2,299.8	2253.91	21.1	26.3
69	BOQUERÓN	FILADELFIA	6,366.1	14,855.0	14570.96	1.5	0.8
70	ITAPÚA	FRAM	3,641.0	23,513.3	n.a.	0.7	0.0
71	CANINDEYÚ	FRANCISCO CABALLERO ALVAREZ	2,544.7	42,123.0	n.a.	0.9	0.0
72	ALTO PARAGUAY	FUERTE OLIMPO	5,138.8	26,347.6	n.a.	0.9	0.7

73	ITAPÚA	GENERAL ARTIGAS	3,365.2	13,014.4	5561.36	0.9	0.7
74	ITAPÚA	GENERAL DELGADO	3,122.7	28,960.4	n.a.	0.8	0.0
75	SAN PEDRO	GENERAL ELIZARDO AQUINO	3,631.0	16,801.8	13006.82	0.7	0.5
76	SAN PEDRO	GENERAL FRANCISCO ISIDORO RESQUÍN	2,627.7	29,740.4	n.a.	1.0	0.0
77	PRESIDENTE HAYES	GENERAL JOSÉ MARÍA BRUGUEZ	19,771.1	117,402.1	n.a.	0.3	0.0
78	GUAIRÁ	GRAL. EUGENIO A. GARAY	3,266.2	29,277.4	5021.08	1.1	0.0
79	CAAZAPÁ	GRAL. HIGINIO MORINIGO	3,887.4	16,290.5	n.a.	1.3	0.4
80	ÑEEMBUCÚ	GRAL. JOSÉ EDUVIGIS DÍAZ	1,813.8	5,042.6	4984.59	1.1	1.0
81	SAN PEDRO	GUAJAYVI	4,857.2	26,190.0	n.a.	0.6	0.2
82	CENTRAL	GUARAMBARÉ	833.7	6,605.4	1417.60	5.5	6.0
83	ÑEEMBUCÚ	GUAZÚ-CUÁ	4,414.2	31,295.8	n.a.	0.6	0.0
84	ALTO PARANÁ	HERNANDARIAS	1,255.6	4,631.5	4421.10	4.4	1.9
85	ITAPÚA	HOHENAU	1,867.9	4,333.0	4701.29	1.6	0.9
86	CONCEPCIÓN	HORQUETA	4,234.2	9,280.6	9265.99	0.7	0.8
87	ÑEEMBUCÚ	HUMAITÁ	2,755.3	18,428.0	n.a.	0.8	0.2
88	GUAIRÁ	INDEPENDENCIA	2,577.9	28,245.9	10442.85	1.6	0.0
89	ALTO PARANÁ	IRUÑA	3,685.0	6,989.4	n.a.	1.1	1.0
90	CORDILLERA	ISLA PUCÚ	2,517.2	12,536.9	3478.01	1.3	0.8
91	ÑEEMBUCÚ	ISLA UMBÚ	1,904.3	15,732.6	n.a.	1.3	0.5
92	CENTRAL	ITÁ	1,621.0	3,259.4	3248.59	3.7	3.0
93	CORDILLERA	ITACURUBÍ DE LA CORDILLERA	2,613.5	13,869.5	2880.99	0.9	0.7
94	SAN PEDRO	ITACURUBÍ DEL ROSARIO	3,462.3	6,420.0	n.a.	0.7	0.9
95	ALTO PARANÁ	ITAKYRY	5,056.3	27,877.3	n.a.	0.6	0.0
96	CANINDEYÚ	ITANARÁ	9,221.0	68,164.2	n.a.	0.5	0.0
97	GUAIRÁ	ITAPÉ	2,455.0	15,532.8	5237.74	1.5	0.4
98	ITAPÚA	ITAPÚA POTY	4,553.9	22,471.9	n.a.	0.6	0.2
99	CENTRAL	ITAUGUÁ	1,616.7	3,037.9	3079.33	3.8	4.3
100	GUAIRÁ	ITURBE	2,066.6	25,166.0	3903.29	0.9	0.1
101	CENTRAL	J. AUGUSTO SALDIVAR	1,554.5	2,118.7	2219.92	8.2	8.1
102	ITAPÚA	JESÚS	1,858.1	11,016.8	2005.01	0.9	0.9
103	CAAGUAZÚ	JOSÉ DOMINGO OCAMPOS	3,779.5	27,497.6	n.a.	1.4	0.0
104	PRESIDENTE HAYES	JOSÉ FALCÓN	3,182.1	28,885.7	n.a.	2.0	11.8
105	GUAIRÁ	JOSÉ FASSARDI	2,782.0	32,257.4	n.a.	1.6	0.0
106	ITAPÚA	JOSÉ LEANDRO OVIEDO	4,893.3	10,020.9	n.a.	0.5	1.5
107	CORDILLERA	JUAN DE MENA	8,806.2	45,064.8	n.a.	0.3	0.0
108	ALTO PARANÁ	JUAN E. O'LEARY	5,340.5	35,939.2	6092.57	0.6	0.0
109	AMAMBAY	KARAPAÍ	3,503.1	58,044.5	n.a.	0.8	0.0
110	CANINDEYÚ	KATUETÉ	1,935.1	52,804.3	n.a.	1.0	0.0
111	PARAGUARÍ	LA COLMENA	1,520.4	23,173.7	n.a.	2.1	0.0
112	CANINDEYÚ	LA PALOMA DEL ESPÍRITU SANTO	1,347.2	32,118.3	n.a.	1.0	0.0
113	CAAGUAZÚ	LA PASTORA	4,132.0	21,768.6	n.a.	0.8	0.1
114	ITAPÚA	LA PAZ	2,979.0	25,733.6	4039.07	1.3	0.0
115	CENTRAL	LAMBARÉ	924.6	2,147.1	2836.97	19.9	23.3
116	CANINDEYÚ	LAUREL	4,045.0	55,769.2	n.a.	0.7	0.0
117	ÑEEMBUCÚ	LAURELES	3,599.8	12,842.5	n.a.	1.1	0.6
118	SAN PEDRO	LIBERACIÓN	4,014.1	41,277.3	n.a.	0.9	0.0
119	SAN PEDRO	LIMA	4,730.9	15,749.6	n.a.	0.6	0.4
120	CENTRAL	LIMPIO	1,392.7	2,860.1	3042.09	6.9	8.6
121	CORDILLERA	LOMA GRANDE	1,859.4	13,961.8	1884.50	1.0	0.8
122	BOQUERÓN	LOMA PLATA	4,833.5	26,167.6	n.a.	0.7	0.1
123	CONCEPCIÓN	LORETO	3,108.7	21,935.1	8140.71	1.0	0.0
124	ALTO PARANÁ	LOS CEDRALES	4,681.0	20,624.4	6520.69	0.6	0.1
125	CENTRAL	LUQUE	1,210.2	3,109.4	3307.34	13.9	18.2
126	CAAZAPÁ	MACIEL	2,843.2	16,199.1	n.a.	0.9	0.5
127	CANINDEYÚ	MARACANÁ	8,272.3	49,309.8	n.a.	0.2	0.0
128	PARAGUARÍ	MARÍA ANTONIA	4,286.3	42,493.8	n.a.	0.6	0.0
129	CENTRAL	MARIANO ROQUE ALONSO	1,627.1	1,865.8	2005.93	4.9	20.0
130	CAAGUAZÚ	MARISCAL FRANCISCO SOLANO LÓPEZ	5,958.2	46,636.0	n.a.	0.7	0.1
131	BOQUERÓN	MARISCAL JOSÉ FÉLIX ESTIGARRIBIA	14,950.6	105,528.0	n.a.	0.6	0.0
132	ÑEEMBUCÚ	MAYOR JOSÉ DEJESÚS MARTÍNEZ	1,775.4	18,301.8	7426.31	1.5	0.3
133	ITAPÚA	MAYOR JULIO DIONISIO OTAÑO	3,062.0	4,010.3	n.a.	0.8	1.0
134	ALTO PARANÁ	MBARACAYÚ	4,772.8	32,346.7	n.a.	0.7	0.0
135	GUAIRÁ	MBOCAYATY	1,708.8	10,536.4	4479.36	1.4	0.9
136	CORDILLERA	MBOCAYATY DEL YHAGUY	2,036.0	25,520.3	n.a.	1.1	0.0
137	PARAGUARÍ	MBUYAPEY	3,985.2	31,446.4	n.a.	0.6	0.0
138	ALTO PARANÁ	MINGA GUAZÚ	2,694.1	13,453.6	5799.19	2.5	1.1
139	ALTO PARANÁ	MINGA PORÁ	3,563.8	9,811.1	n.a.	0.8	0.7
140	ALTO PARANÁ	ÑACUNDAY	3,718.7	31,153.6	n.a.	1.0	0.0
141	PRESIDENTE HAYES	NANAWA	906.6	16,449.3	n.a.	3.7	16.0
142	ALTO PARANÁ	NARANJAL	5,310.3	18,520.9	6744.75	0.6	0.2
143	GUAIRÁ	NATALICIO TALAVERA	1,701.5	20,168.6	n.a.	1.6	0.0
144	ITAPÚA	NATALIO	4,671.4	21,816.6	6823.88	0.6	0.1
145	CENTRAL	ÑEMBY	1,492.6	2,240.5	1909.12	12.0	18.2
146	ITAPÚA	NUEVA ALBORADA	4,255.0	19,916.7	n.a.	0.8	0.0
147	CORDILLERA	NUEVA COLOMBIA	2,972.6	9,455.0	n.a.	1.1	1.0
148	CANINDEYÚ	NUEVA ESPERANZA	2,285.3	58,293.2	n.a.	0.8	0.0
149	SAN PEDRO	NUEVA GERMANIA	8,339.7	17,695.6	n.a.	0.5	0.3
150	CENTRAL	NUEVA ITALIA	2,045.2	15,420.0	n.a.	1.6	0.4
151	CAAGUAZÚ	NUEVA LONDRES	3,039.4	12,490.2	n.a.	0.9	0.8
152	CAAGUAZÚ	NUEVA TOLEDO	4,824.9	39,223.3	10275.45	0.6	0.0

153	GUAIRÁ	ÑUMÍ	3,231.6	20,889.6	3406.31	1.2	0.0
154	ITAPÚA	OBLIGADO	3,331.3	5,587.0	7496.46	1.5	0.9
155	PARAGUARÍ	PARAGUARÍ	1,379.7	2,720.5	2813.46	2.0	1.0
156	CONCEPCIÓN	PASO BARRETO	3,494.5	34,921.8	n.a.	0.8	0.0
157	ÑEEMBUCÚ	PASO DE PATRIA	1,257.5	16,984.5	n.a.	0.9	0.1
158	CONCEPCIÓN	PASO HORQUETA	4,526.0	25,843.4	n.a.	0.8	0.0
159	GUAIRÁ	PASO YOBAI	3,529.6	40,843.0	n.a.	1.0	0.0
160	AMAMBAY	PEDRO JUAN CABALLERO	1,159.5	2,872.0	3007.99	10.9	1.0
161	ÑEEMBUCÚ	PILAR	885.1	2,162.1	2474.30	6.3	1.0
162	ITAPÚA	PIRAPÓ	3,673.4	22,662.5	8132.25	0.8	0.0
163	PARAGUARÍ	PIRAYÚ	1,361.2	14,813.4	n.a.	2.2	2.0
164	CORDILLERA	PIRIBEBUY	2,017.7	12,366.7	4667.35	1.2	2.1
165	ALTO PARANÁ	PRESIDENTE FRANCO	1,238.1	3,001.0	2391.17	14.1	2.1
166	CORDILLERA	PRIMERO DE MARZO	2,395.2	27,933.5	n.a.	1.9	0.0
167	CANINDEYÚ	PUERTO ADELA	8,397.2	48,848.6	n.a.	0.4	0.0
168	ALTO PARAGUAY	PUERTO CASADO	3,659.3	136,335.3	n.a.	0.9	0.0
169	PRESIDENTE HAYES	PUERTO PINASCO	16,323.3	60,667.3	n.a.	0.7	0.0
170	PARAGUARÍ	QUIINDY	2,381.3	4,406.2	n.a.	1.0	1.1
171	PARAGUARÍ	QUYQUYHÓ	3,820.2	25,862.5	5699.91	0.7	0.0
172	CAAGUAZÚ	R.I. 3 CORRALES	4,277.3	20,130.7	n.a.	0.7	0.1
173	CAAGUAZÚ	RAÚL ARSENIO OVIEDO	4,301.2	21,997.1	n.a.	0.6	0.1
174	CAAGUAZÚ	REPATRIACIÓN	3,807.5	17,465.8	n.a.	0.9	0.4
175	PARAGUARÍ	ROQUE GONZALEZ DE SANTA CRUZ	3,047.7	9,828.3	4170.63	0.8	1.5
176	CANINDEYÚ	SALTO DEL GUAIRÁ	1,242.8	3,768.0	n.a.	4.0	0.9
177	ALTO PARANÁ	SAN ALBERTO	3,351.7	14,294.0	n.a.	0.8	0.8
178	CONCEPCIÓN	SAN ALFREDO	4,082.1	79,515.5	n.a.	0.9	0.0
179	CENTRAL	SAN ANTONIO	1,513.8	1,795.1	1765.31	7.0	14.6
180	CORDILLERA	SAN BERNARDINO	2,845.1	13,534.7	3887.20	1.2	1.6
181	CONCEPCIÓN	SAN CARLOS DEL APA	4,317.7	111,581.1	n.a.	0.8	0.0
182	ITAPÚA	SAN COSME Y DAMIÁN	3,699.4	21,275.2	12255.81	0.7	0.2
183	ALTO PARANÁ	SAN CRISTÓBAL	4,870.0	34,523.8	n.a.	0.7	0.0
184	SAN PEDRO	SAN ESTANISLAO	3,278.6	7,953.5	8874.47	1.0	0.8
185	MISIONES	SAN IGNACIO	2,522.7	5,101.2	5084.86	0.9	1.0
186	CAAGUAZÚ	SAN JOAQUÍN	3,537.1	15,122.4	n.a.	0.7	0.5
187	CAAGUAZÚ	SAN JOSÉ DE LOS ARROYOS	2,941.4	29,414.5	5166.58	0.8	0.0
188	SAN PEDRO	SAN JOSÉ DEL ROSARIO	5,424.4	22,101.7	n.a.	0.5	0.0
189	CORDILLERA	SAN JOSÉ OBRERO	2,360.6	21,177.1	n.a.	2.5	0.0
190	MISIONES	SAN JUAN BAUTISTA DE LAS MISIONES	1,409.5	3,660.4	3923.76	3.4	1.0
191	ÑEEMBUCÚ	SAN JUAN BAUTISTA DE ÑEEMBUCÚ	2,598.9	45,963.4	n.a.	0.9	0.0
192	ITAPÚA	SAN JUAN DEL PARANÁ	2,224.5	10,846.4	n.a.	2.8	0.9
193	CAAZAPÁ	SAN JUAN NEPOMUCENO	5,585.1	12,678.1	12629.63	0.6	0.6
194	CONCEPCIÓN	SAN LÁZARO	1,338.7	135,446.9	n.a.	1.2	0.0
195	CENTRAL	SAN LORENZO	907.4	2,685.6	3227.87	19.2	21.1
196	MISIONES	SAN MIGUEL	1,267.6	18,492.8	n.a.	1.4	0.3
197	SAN PEDRO	SAN PABLO	3,826.0	21,688.3	n.a.	0.7	0.0
198	MISIONES	SAN PATRICIO	2,290.4	11,455.8	n.a.	0.9	0.9
199	ITAPÚA	SAN PEDRO DEL PARANÁ	4,295.0	14,045.0	n.a.	0.7	0.4
200	SAN PEDRO	SAN PEDRO DEL YCUAMANDYYÚ	2,870.3	16,066.7	18454.04	1.3	0.5
201	ITAPÚA	SAN RAFAEL DEL PARANÁ	3,987.5	28,321.1	n.a.	0.7	0.0
202	GUAIRÁ	SAN SALVADOR	3,946.9	19,552.0	4155.18	1.0	0.1
203	SAN PEDRO	SAN VICENTE PANCHOLO	5,031.8	44,524.3	n.a.	0.6	0.0
204	CORDILLERA	SANTA ELENA	1,526.7	16,736.7	n.a.	1.4	0.1
205	ALTO PARANÁ	SANTA FE DEL PARANÁ	3,723.3	24,358.9	n.a.	0.7	0.0
206	MISIONES	SANTA MARÍA	1,978.3	12,908.2	n.a.	1.6	1.1
207	ALTO PARANÁ	SANTA RITA	2,684.5	3,738.8	3702.70	0.9	1.0
208	MISIONES	SANTA ROSA	1,850.8	4,808.7	n.a.	1.7	1.1
209	SAN PEDRO	SANTA ROSA DEL AGUARAY	3,971.5	15,284.4	n.a.	1.1	0.6
210	CAAGUAZÚ	SANTA ROSA DEL MBUTUY	3,802.1	6,615.5	n.a.	1.8	0.9
211	ALTO PARANÁ	SANTA ROSA DEL MONDAY	3,003.3	17,854.3	5025.86	0.8	0.2
212	MISIONES	SANTIAGO	1,868.1	26,333.4	n.a.	1.0	0.0
213	PARAGUARÍ	SAPUCÁI	2,683.3	20,406.9	n.a.	1.1	0.0
214	CONCEPCIÓN	SARGENTO JOSÉ FÉLIX LÓPEZ	5,267.1	76,162.1	n.a.	0.6	0.0
215	CAAGUAZÚ	SIMÓN BOLIVAR	4,193.2	9,485.2	n.a.	1.0	0.9
216	ÑEEMBUCÚ	TACUARAS	4,165.9	31,934.4	n.a.	0.8	0.0
217	SAN PEDRO	TACUATÍ	5,243.3	32,150.6	n.a.	0.7	0.1
218	CAAZAPÁ	TAVAÍ	6,553.3	38,997.9	12503.87	0.5	0.0
219	ALTO PARANÁ	TAVAPY	2,959.0	17,721.5	n.a.	1.7	0.1
220	GUAIRÁ	TEBICUARY	1,931.8	20,875.4	n.a.	1.8	0.0
221	PARAGUARÍ	TEBICUARY-MÍ	3,413.7	31,933.3	n.a.	0.9	0.0
222	CAAGUAZÚ	TEMBIAPORÁ	4,566.6	30,821.0	n.a.	0.6	0.0
223	PRESIDENTE HAYES	TENIENTE ESTEBAN MARTÍNEZ	17,913.2	119,468.5	97355.44	0.4	0.0
224	CORDILLERA	TOBATÍ	2,636.8	14,388.6	3952.88	0.9	1.5
225	ITAPÚA	TOMÁS ROMERO PEREIRA	4,247.4	6,361.2	6223.44	0.6	0.9
226	ITAPÚA	TRINIDAD	3,184.6	9,436.5	n.a.	1.0	0.9
227	PRESIDENTE HAYES	TTE. 1° MANUEL IRALA FERNÁNDEZ	18,946.3	91,310.3	22977.59	0.1	0.0
228	SAN PEDRO	UNIÓN	5,852.5	19,342.8	6202.77	0.5	0.1
229	CORDILLERA	VALENZUELA	4,042.4	23,994.3	n.a.	0.8	0.0
230	CAAGUAZÚ	VAQUERÍA	3,840.7	22,334.2	n.a.	0.8	0.4
231	CANINDEYÚ	VILLA CURUGUATY	5,093.8	7,373.6	7163.44	0.6	0.8
232	SAN PEDRO	VILLA DEL ROSARIO	2,648.3	30,907.6	n.a.	1.5	0.0

233	CENTRAL	VILLA ELISA	1,214.8	1,884.8	1921.72	15.3	24.2
234	MISIONES	VILLA FLORIDA	1,109.1	28,624.9	n.a.	1.0	0.0
235	ÑEEMBUCÚ	VILLA FRANCA	7,359.4	18,978.8	n.a.	0.5	0.6
236	PRESIDENTE HAYES	VILLA HAYES	2,632.1	8,186.1	21043.30	3.8	7.5
237	ÑEEMBUCÚ	VILLA OLIVA	2,993.9	36,544.9	n.a.	0.8	0.0
238	CANINDEYÚ	VILLA YGATIMÍ	4,879.1	41,238.0	n.a.	0.6	0.0
239	ÑEEMBUCÚ	VILLALBÍN	2,105.1	41,698.0	n.a.	1.4	0.0
240	GUAIRÁ	VILLARRICA	1,122.2	2,612.7	2815.05	10.5	1.0
241	CENTRAL	VILLETA	3,853.2	5,067.7	5302.76	1.2	3.6
242	MISIONES	YABEBYRY	2,091.0	31,926.1	6208.40	0.9	0.0
243	PARAGUARÍ	YAGUARÓN	2,725.1	11,312.6	3696.55	1.2	1.3
244	CANINDEYÚ	YASY CAÑY	5,982.5	22,143.6	n.a.	0.4	0.1
245	GUAIRÁ	YATAITY	1,799.2	10,401.8	1836.64	1.1	0.9
246	SAN PEDRO	YATAITY DEL NORTE	5,589.8	17,489.0	n.a.	0.6	0.5
247	ITAPÚA	YATYTAY	3,582.3	26,716.5	n.a.	0.7	0.0
248	CANINDEYÚ	YBY PYTÃ	4,714.4	39,649.6	n.a.	0.6	0.0
249	CONCEPCIÓN	YBY YAÚ	3,726.3	10,308.3	n.a.	0.7	0.7
250	PARAGUARÍ	YBYCUÍ	4,033.3	8,600.6	8908.60	0.7	0.8
251	CANINDEYÚ	YBYRAROBANÁ	4,797.3	60,016.4	n.a.	0.6	0.0
252	PARAGUARÍ	YBYTYMÍ	4,505.8	30,170.7	n.a.	0.8	0.0
253	CAAZAPÁ	YEGROS	3,596.3	20,318.1	5942.07	0.8	0.1
254	ALTO PARANÁ	YGUAZÚ	3,103.7	8,373.6	8254.74	0.8	0.7
255	CAAGUAZÚ	YHÚ	5,894.4	19,989.3	21098.35	0.5	0.4
256	CENTRAL	YPACARAÍ	1,377.0	7,784.6	2603.05	1.9	2.9
257	CENTRAL	YPANÉ	1,156.6	5,634.6	2258.92	8.5	7.8
258	CANINDEYÚ	YPEJHÚ	4,002.6	63,876.0	n.a.	0.8	0.0
259	SAN PEDRO	YRYBUCUA	5,393.0	27,520.1	n.a.	0.5	0.0
260	CAAZAPÁ	YUTY	4,736.5	6,967.5	n.a.	0.6	0.9
261	AMAMBAY	ZANJA PYTÃ	1,576.7	16,534.2	7555.75	1.7	0.6

SOURCE: Results from the applied GIS methods