Part VII: Conclusions

New tools, like Google's Distance Matrix API web tool, are making it possible to measure accessibility more precisely than ever before. With down-to-the-second estimations of the time it takes to drive, take transit, walk, or bike between any origin or destination, it is possible to prognosticate whether the people of any given city, region, or country can reasonably and effectively reach of the places needed to go to carry out their daily lives. By knowing this information, we can understand where transportation systems are performing more efficiently and where they warrant improvement, a necessary task for planners, policy makers, and academics. Service inequities—where the provision of mobility services does not match the need or demand from citizens—can be discovered, especially when they affect marginalized groups like the poor. Mapping these phenomena makes it possible to ensure that everyone—regardless of where they live—has the mobility assets, whether public or private, required to access the array of economic, social, and cultural benefits associated with their cities, no matter where in the world.

This is especially true in Buenos Aires, Argentina, where there are substantial concerns that its urban poor, especially those living in the hundreds of precarious *asentamientos* scattered across its suburban periphery, are further marginalized by a transportation system that unfairly limits their access to key opportunity sites while, at the same time, promoting the mobility assets and accessibility conditions of their fellow citizens. Cornered onto isolated pieces of land in response to hostile government housing policies and spatially-uneven economic growth, the provision of public transportation (imperative for people too poor to afford traditional housing, let alone private cars) has been insufficient, especially as funding for transit has been slashed and operations privatized. A victim of rapid motorization, the transit system has struggled to recover the loss of passengers to private automobiles; services, for rail and bus, exhibit few improvements, old equipment, crowded vehicles, and unreliable services. As transit and its ability to enhance *accessibility* have deteriorated for all citizens, it is not unreasonable to expect those transport services provided to the *asentamientos*—nestled in Buenos Aires' periphery, with some of its most physically- and socioeconomically-disadvantage people—to be some of the conurbation's worst.

Using Google's data, this project attempted to evaluate **where** these inequalities exist within agglomerated Buenos Aires and, as seen earlier, many of them clearly do. After acquiring the required data, which involved querying the Distance Matrix API for estimations of the transit-based travel times between an assortment of origins and destinations (the former census geographies characterized by their spatial overlap with *asentamientos* and the latter a series of ten activity sites important to *asentados*), I performed a series of difference-of-means tests to surmise whether these times were longer for those geographies with *asentamientos* than those without. Tabulated for *asentamientos* sampled from three of AGBA's departments (each representing municipalities in different stages of urbanization), the statistics produced by the subsequent ANOVA and independent-means t-tests revealed that, while inequalities do exist within the study area, they vary by destination type and the urban morphology of each individual district.

Closer to agglomerated Buenos Aires' traditional core, where all of the departments are either fully urbanized (Quilmes) or mostly-urbanized (La Matanza), travel times are longer for

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asentamientos when travelling by transit to major commercial and employment centers (central business districts), public hospitals, and railway stations (which are part of the greater transportation system as well as local centers of commerce). On the other hand, activity sites like public schools and smaller-sized medical centers seem to be more equitably accessible, although some still had statistically-significant differences when the absolute differences in their times were not great.

When it comes to the departments on AGBA's periphery (like Pilar), trends were the opposite, with few significant differences between those neighborhoods inside and outside of the *asentamiento*; in fact, some of its activity sites are actually **more** *accessible* to *asentados*. These initially-surprising outliers, however, made more sense once the socio-territorial landscape of Pilar—with its gated communities and auto-oriented commercial offices—is understood. In fact, these results showcase a key takeaway of this project: accessibility and inequality can **only** be considered vis-à-vis transportation **and** *land use*. As a matter of fact, this theme underlies the paper's primary conclusion: Google's transit data show that—under particular socio-territorial configurations of its urban and suburban spaces—the *asentamientos* of agglomerated Buenos Aires do appear to enjoy worse transit-facilitated access to critical opportunity sites.

Before any larger application of these results can be made, this paper's assumptions must be addressed. For one, there is no way to verify the accuracy of these findings; there are no reliable alternative methods for calculating these travel times (the downside to tool's novelty) without being on the ground. Similarly, these results are also based solely on the theoretical route schedules supplied as GTFS; they cannot account for congestion, overcrowding, and other disruptions associated with transit that often cause delays. In turn, these times are likely underestimations of actual travel times. Relatedly, these results also reflect access at only a handful of times during the day, missing diurnal travel variations. Alternatively, they also only reflect modes and destinations that apply to *asentados*; opportunities or modes that might be preferred by the "control group" (driving cars or attending private schools, for example) are missed, implying that my comparisons reflect unrealistic traveler behaviors. Methodological improvements, like increasing the quantity of API requests or comparing travel times across modes or destinations, could ease these concerns.

In fact, there is one other methodological issue, also in reference to the API results, that muddles my findings. The API's output for transit-based travel time, as noted before, is merely a time value; it does **not** include the physical route of the trip nor any corresponding information on the number of legs on a trip, the mode of each leg, the number of transfers, the time of each leg, and whether any walking is required. Any travel time could reflect any combination of these elements; a thirty-minute trip could require twenty-five minutes of waiting or walking and five of riding the bus or vis-versa. There is no way to know. Such differences, like the amount of waiting or number of transfers, are not insignificant and probably have a substantial effect on accessibility, especially for vulnerable groups. Since most *asentamientos* have naturally longer travel times as a characteristic of their isolated locations (and, as said before, it could be that this characteristic alone explains the observed inequalities), knowing the amount of a trip that is made by walking or waiting would help to greatly improve the picture of accessibility that has been captured.

Given these considerations, I am hesitant to make any concrete policy recommendations based on these results alone. The economic and political conditions that surround the provision of transit in Buenos Aires, especially in those peripheral regions that lack the direction of a strong planning authority, are more complex than I yet understand. Simple fixes like adjusting transit routes or introducing new travel modes are likely more complicated than would seem (or might be with a planning agency in the Global North). Previous studies and historiographies have shown that the effective formulation and implementation of transportation policy in Argentina is an extraordinarily obscure, difficult process, complicated even further when applied across multiple jurisdictions; understanding the mechanisms that connect these policy disruptions with regional inequalities is first needed, especially through a spatial context. Nevertheless, the results of this project—itself a relatively a simplistic accessibility model—suggest that inequalities in transit-facilitated accessibility exist vis-à-vis Buenos Aires' particular socio-territorial contexts and that these problems must be addressed by the proper authorities.

Regardless of which actions are taken, however, consideration must be given to the variation in accessibility patterns within the region. That different patterns exist relative to certain socioeconomic groups, transportation modes, urban land use environments, and destination types suggests that any solution must incorporate these variations. A solution for automobile-centric Pilar will not necessarily work in fully-urbanized Quilmes. Furthermore, these findings also implicate a need to consider each component of access: t*ransportation **and** land use.* Relocating low-income housing to transit-accessible locations or constructing health centers or schools on well-situated parcels of land could be the ideal solution for improving accessibility in one municipality while fixing aspects of the transportation system (i.e. adding a new stop, increasing frequencies, or building bus shelters) the best for another. What is most important is that the implementation process incorporates thoroughly-considered accessibility measures and that the needs and demands of the *asentados,* no matter their unique locational or socio-economic circumstances, are fully contemplated.