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FRANCISCO VERGARA-PERUCICH
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WHERE DO THE LITTLE ONES STUDY? SPATIAL INEQUALITY IN PRESCHOOL EDUCATION PROVISION IN THE METROPOLITAN AREA OF SANTIAGO, CHILE[1]

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Este estudio examina la distribución de la oferta de educación preescolar en el Área Metropolitana de Santiago, evidenciando desigualdades en la relación entre la demanda infantil y la infraestructura educativa. Se utilizaron datos censales del año 2017 y registros del 2023, se aplicó un modelo de Regresión Geográficamente Ponderada (GWR) para analizar variaciones locales. Las covariantes incluyen matrículas disponibles, valor del suelo y proporción de mujeres, reflejándose dinámicas urbanas y socioeconómicas. Los resultados muestran una correlación positiva entre matrículas y presencia de infantes, y una relación negativa con el valor del suelo, lo que indica menor acceso en áreas de alto costo. El análisis espacial detectó clústeres de sobreestimación y subestimación de la oferta educativa, en que destaca la necesidad de políticas focalizadas. El estudio propone ajustar la planificación urbana para garantizar un acceso equitativo a la educación preescolar, subrayándose la relevancia de enfoques espaciales en la evaluación de servicios públicos.

Palabras clave: desigualdad, Santiago, patrones, infancia

This study examines the distribution of preschool education provided in the Metropolitan Area of Santiago, evidencing inequalities in the relationship between the demand and educational infrastructure. Census data from 2017 and records from 2023 were used, applying a Geographically Weighted Regression (GWR) model to analyze local variations. Covariates include available slots, land value, and proportion of females, reflecting urban and socioeconomic dynamics. The results show a positive correlation between enrollment and the presence of infants, and a negative relationship with land value, indicating less access in high-cost areas. The spatial analysis detected clusters of overestimating and underestimating educational availability, highlighting the need for targeted policies. The study proposes adjusting urban planning to ensure equitable access to preschool education, highlighting the relevance of spatial approaches in evaluating public services.

Keywords: inequality, Santiago, patterns, childhood

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I. INTRODUCTION

Preschool education plays a crucial role in shaping individual and collective well-being. It is widely recognized as one of the most effective social investments to reduce structural inequalities from the earliest stages of development (Findlay, Findlay, & Stewart, 2009; Romanillos & García-Palomares, 2018). In Chile, the preschool education system provides services to children aged 0 to 5. Although its coverage has increased in the last two decades, important gaps in access and quality persist, especially in the peripheral urban sectors (Alaníz Hernández, 2021; Muñoz-Oyarce, 2021; Rivera Flores & Orozco-Martínez, 2022). Despite the state's drive to expand the options through public and subsidized modalities, the infrastructure for early childhood education continues to reproduce historical patterns of territorial segregation, particularly in the Metropolitan Area of Santiago, a city marked by a deeply unequal urban morphology (Catalan Catalan, 2024; Ramond, 2025).

This study examines the spatial distribution of the preschool education infrastructure in Santiago, investigating how its location responds—or does not—to the real demand of urban communities. A Geographically Weighted Regression (GWR) model was used, which allowed capturing the local variability in the relationship between the child population (0 to 5 years old) and the availability of spots in kindergartens and daycares. Variables such as land value, an indicator of real estate dynamics, and the proportion of women, as a proxy for family care responsibilities and structures, are incorporated to highlight structural factors that affect equity of access. The findings of this research approach contribute to the empirical evidence applied based on GWR from similar studies in Latin America (Alonso-Pastor, Olaya Acosta & Calmet, 2024; Sassera, 2022).

From a theoretical perspective, this work is anchored in socio-spatial approaches that understand education as a right and that articulate the theory of spatial justice with territorial accessibility models (Cabannes & Lipietz, 2018; Kofman & Lebas, 1996; Marcuse et al., 2009). The central hypothesis suggests that urban planning perpetuates conditions of inequality that affect skill development from an early age by not comprehensively integrating educational services for children. Thus, it advocates for a territorial configuration that places children at the heart of urban planning decisions.

II. THEORETICAL FRAMEWORK

Early childhood has been central to care policies in Chile, where various public policies have tried to ensure access to quality preschool education. Different challenges in this area, on which urban studies can provide convergent views towards empirical and relevant solutions, are still pending. One of the leading causes of concern is school absenteeism, with children missing 14% of school days on average (Arbour et al., 2023). This situation is often explained by urban-type difficulties, especially mobility and proximity. Socioeconomic status is relevant to achieving educational outcomes, which affects low-income children the most (Espinoza et al., 2020; Gelber et al., 2021; Moraga-Aros et al., 2022; Otero, Carranza & Contreras, 2017). This not only impacts school performance, but also health. For example, care in educational centers has been associated with a lower body mass index in early childhood (Allel, Narea & Undurraga, 2020), where accessibility is also a relevant factor from an urbanistic perspective (Perez-Silva et al., 2023). The distance to preschool facilities affects attendance, albeit less than the child's age (Dussaillant, 2016). This is supported in the international literature. Access to quality early education is associated with better academic performance and behavioral outcomes in kindergarten and daycares (Fantuzzo et al., 2005; Jimenez et al., 2016). Urban planning should consider the proximity to these establishments, as this impacts creating more affordable cities, significantly affecting housing prices and parents' decisions (Bergantino et al., 2022; Bucaite-Vilke, 2021; Vergara-Perucich, Aguirre-Nuñez & Marmolejo-Duarte, 2023). The optimal distribution of these facilities can significantly reduce travel costs and improve accessibility (Ullauri-Ugalde et al., 2024; Xu et al., 2020). Urban environments with libraries and child care centers positively influence early development, particularly in the socio-emotional and literacy domains (Prado-Galbarro et al., 2021). Designing cities that reduce disparities requires clearly identifying where they occur or gaps in territories (Kim & Wang, 2019; Zurayk, Tawil & Gangarosa., 1982).

This is a multifactorial problem that requires integrating factors that go beyond mere localization and that also focus on other variables to understand their complexity. Socioeconomic factors significantly influence the access and quality of early childhood education, with children from low-income families being less likely to enroll in high-quality programs (Cloney et al., 2016; Crosnoe et al., 2016). This disparity contributes to achievement gaps in language, literacy, and socio-emotional development (Bassok et al., 2016; Hartas, 2011; Tran, Luchters, & Fisher, 2017). Theoretical models that explain these disparities include the accommodation or ubiquity model (Crosnoe et al., 2016) and concerted cultivation (Cheadle, 2008). Parents' educational investments mediate socioeconomic and racial/ethnic disparities in children's academic achievement. To address these issues, strategies such as promoting children's participation in decision-making related to their initial education, which affects their social mobility in the future, are generated (Correia et al., 2023, p. 202; Wu, Li & Miao, 2024). In this regard, Chile has a knowledge gap regarding the spatial distribution patterns of preschool educational spaces, which should be a structural part of the models for new neighborhoods and even integrated as critical infrastructures.

The theoretical framework is a reference point for the article, which is located at the intersection between socio-spatial theory and applied territorial analysis. It articulates the spatial justice approach with geographic modeling tools to assess inequalities in access to initial education. It is assumed that the location of preschool services in Santiago reproduces socio-spatial segregation dynamics, which disproportionately affects vulnerable groups. The hypothesis suggests a structural misalignment between child demand and institutional supply, influenced by urban factors such as land value and gender structure as a proxy for care. The geographically weighted regression allows testing this hypothesis, which reveals local patterns of educational inequality.

Case Study

The Metropolitan Area of Santiago (AMS, in Spanish) is a paradigmatic case of urbanization under the neoliberal paradigm. It is characterized by market-oriented planning, institutional fragmentation, and marked socio-spatial segregation. After the structural reforms promoted during the Pinochet dictatorship, a subsidiary state model was consolidated, in which city production was largely in the hands of the private sector, without a metropolitan authority that integrally coordinated urban planning (Garreton, 2017). This situation has resulted in a functionally polycentric, but territorially and socially segmented city, where access to public goods such as education, housing, and transport varies drastically depending on the income level and location of the inhabitants (Truffello & Hidalgo, 2015). Despite important public investments, such as the expansion of the Metro, urban benefits tend to be captured in the areas with the highest real estate valuation, exacerbating the territorial exclusion of working-class sectors (Vergara-Perucich & Aguirre-Nuñez, 2020). Peripheral growth, driven by demand subsidy policies, encourages urban dispersion, aggravating the housing deficit and infrastructural disconnection (Correa-Parra et al., 2023). In this context, studying the localization and accessibility of preschool educational infrastructures is key to understanding how the city reproduces inequalities from the earliest ages.

III. METHODOLOGY

Geographically weighted regression (GWR) is an effective tool for analyzing spatial relationships, especially in studies on accessibility and educational inequality. It captures local variations better than the ordinary least squares regression (OLS). Its application has demonstrated significant improvements in modeling access to public hospitals (Martinez Bascunan & Rojas Quezada, 2016), public beaches (Kim & Nicholls, 2016), and recreational resources (Kim & Graefe, 2020). In addition, GWR has been instrumental in examining spatial relationships between environmental, socioeconomic, and health indicators (Saib et al., 2014), investigating long-term limiting diseases and deprivation at the territorial level (Duarte-Cunha et al., 2016; Morrissey, 2015), as well as modeling spatial variations in housing prices (Lu et al., 2017). These diverse applications highlight GWR's strength in addressing spatial heterogeneity and dependence.

This study uses census data from 2017 and educational records from 2023 to analyze the spatial distribution of preschool education supply and demand in the Metropolitan Area of Santiago. The timeframe was chosen considering that a 0-year-old infant in 2017 would have completed the kindergarten cycle in 2023, providing a complete window of analysis. Although this criterion limits itself to possible demographic changes, the method can be replicated with future public data, facilitating long-term comparisons. The data used come from the 2017 Census (National Institute of Statistics [INE], 2017), while validated methodologies by Correa-Parra, Vergara-Perucich & Aguirre-Nuñez (2020); Correa Parra, Vergara Perucich & Aguirre Núñez (2022); Encinas et al. (2022); Ulloa-León et al. (2023), and from the open data portal of the Ministry of Education of Chile (MINEDUC, 2025), were followed. This method combines key variables to analyze spatial inequalities in preschool education using GWR, which captures local effects in each census area. The data sample includes enrollment and educational establishments of all types of dependency: municipal (26,547 enrollments), private (24,671 enrollments), subsidized private (126,378 enrollments), and local education services (4,148 enrollments). In this case, only establishments located in urban areas and in an active state of operation were used as of 2023, the cut-off date of the Preschool Education Registry 2011-2023 of the Studies Center of the Ministry of Education (MINEDUC, 2025).

As a dependent variable, GWR modeling uses the number of children aged 0 to 5 per census area, interpreted as the potential demand for preschool education. This variable was calculated from census data disaggregated by block and added to census tracts, with a minimum variation

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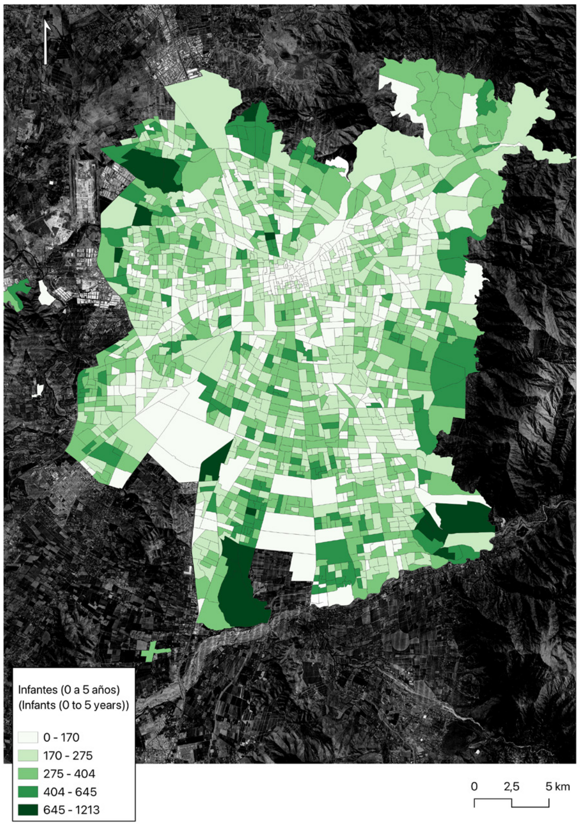

Figure 1. Children between 0 and 5 years of age by census areas in the Metropolitan Area of Santiago. Source: Preparation by the authors with data from the 2017 CENSUS (INE, 2017).

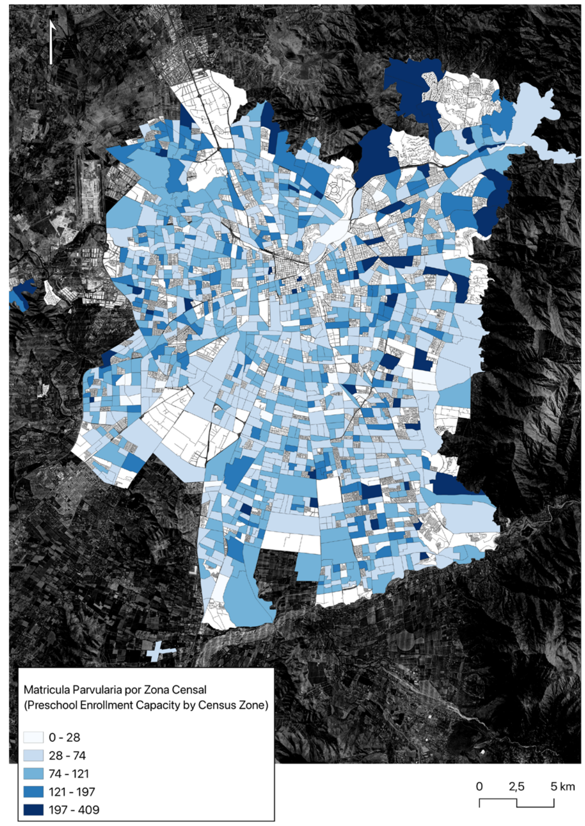

Figure 2. Preschool enrollments according to establishments by census areas. Source: Preparation by the authors with data from MINEDUC. (2025).

of 0.256%, validating the conversion. The covariates include available enrollments (educational offer), average land value (urban dynamics), and percentage of women (gender structure). A limitation of this study is that the estimation of the initial education available by census area is based on the geographical location of the establishments and does not consider the real routes of the families. This introduces a spatial bias associated with the ***Modifiable Areal Unit Problem*** [MAUP], particularly in bordering areas. The offer was treated as a structural proxy of the available facilities, without incorporating patterns of parental choice or daily commutes, which restricts the interpretative scope regarding the effective accessibility to these educational services.

One limitation of using census data is that it assumes that children should attend establishments close to their homes. However, including numerous establishments with part-time working hours reinforces the reasonableness of the residential approach.

Based on the model's residuals, a local spatial association analysis [LISA] identifies clusters of equity or inequity by categorizing the zones into High-High, Low-High, High-Low, and Low-Low patterns and offering a detailed view of spatial inequalities. The LISA analysis applied seeks to evaluate the presence of spatial autocorrelation in the model's errors. In other words, it makes it possible to detect whether the overestimations or underestimations are spatially concentrated, revealing a non-random structure of the residuals.

IV. RESULTS

The modeling is applied with four core variables: Child demand (dependent variable) measured in the number of children aged 0 to 5 by census area (INE, 2017); educational offer measured in effective enrollments in active kindergartens as of 2023, geo-referenced and added to the census area where each establishment is located; urban

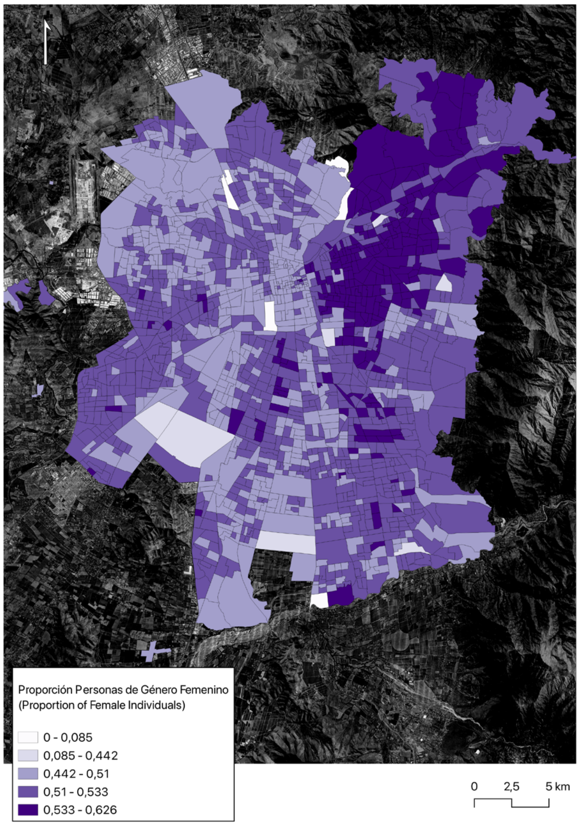

Figure 3. Distribution by census areas of people of the female gender. Source: Preparation by the authors with data from the 2017 CENSUS (INE, 2017).

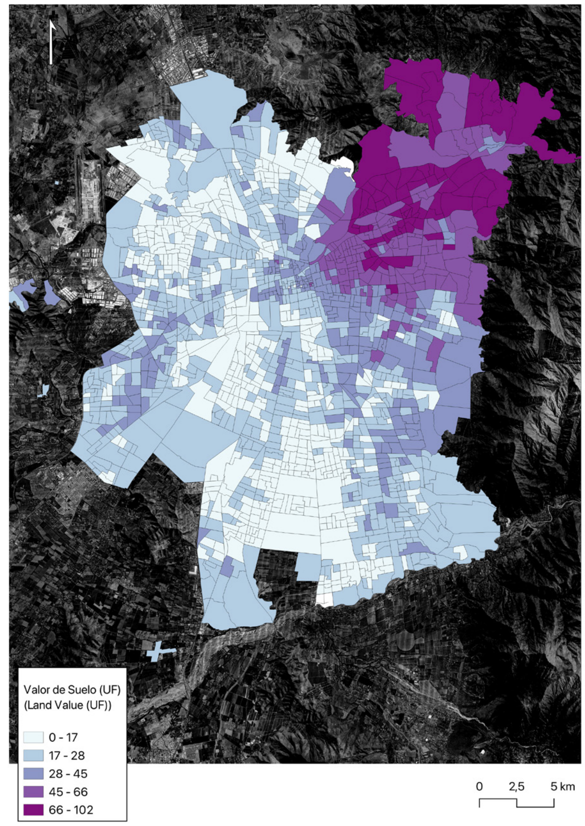

Figure 4. Average land value in UF by census tract. Source: Prepared by the authors with INE data (2025).

Residual sum of squares	1106.782
Log of verisimilitude	-1610.653
Akaike's Information Criterion	3229.306
Corrected Akaike Information Criterion	3231.359
R2	0.038
Adjusted R2	0.036

Table 1. Diagnostics of global regression fit. Source: Preparation by the authors.

Variable	Coefficient	SE	t(Est/SE)	p-value
Interception	0	0.029	0	1
Kindergarten and daycare enrollment by census area	0.109	0.029	3.711	0
Land Value in UF	-0.19	0.031	-6.077	0
Proportion of women by census area	0.026	0.031	0.853	0.394

Table 2. Global regression results. Source: Preparation by the authors.

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Residual sum of squares	601.968
Effective number of parameters (tract(S))	225.399
Degrees of freedom	925.601
Estimation of sigma	0.806
Log of verisimilitude	-1260.169
Degree of dependence	0.428
Akaike's Information Criterion	2973.136
Corrected Akaike Information Criterion	3084.619
Bayesian Information Criterion (BIC)	4116.083
R2	0.477
Adjusted R2	0.35
Adjusted Alpha (95%)	0.001
Adjusted critical t-value (95%)	3.333

Table 3. Diagnostics of the fit of the geographically weighted regression (GWR).Source: Preparation by the authors.

Variable	Mean Coefficient	STD	Min	Median	Max
Interception	-0.011	0.495	-1.353	-0.114	2.645
Kindergarten enrollment by census area	0,068	0.24	-0.554	0.06	2.101
Land value by census area in UF	-0,099	0.544	-1.811	-0.094	1.981
Proportion of women by census area	-0.077	0.518	-1.978	-0.054	2.423

Table 4. Synthetic results of the geographically weighted regression. Source: Preparation by the authors

condition, measured according to the average land value (UF/m^2) declared in fiscal cadasters; it is used as a proxy for real estate pressures and residential access barriers; and gender dimension measured by the proportion of women over the total population; it operates as a proxy for care structures and possible residence patterns of families with children. Figures 1 and 2 show clear north-south gradients: child demand is concentrated in south-west peripheral communes, while the educational offer appears denser in the intermediate ring. Figures 3 and 4 confirm the well-known axis of socio-economic segregation: high land values and low relative presence of women in the north-east, while the inverse pattern dominates the south-west.

Table 1 presents the global regression adjustment diagnostics, and Table 2 presents the estimated coefficients. This begins with a linear model where the variable to be predicted is the child population; three explanatory variables are contrasted (supply, land price, and proportion of women). The low R^2 (0.038) and the elevated Akaike (3231) indicate a limited explanatory capacity. However, two coefficients are statistically significant: (i) the educational offer ($\beta = 0.109$; $p < 0.001$) is positively associated with child demand: more enrolments coincide, on average, with a greater presence of children; and the land value ($\beta = -0.190$; $p < 0.001$) shows an adverse effect, which demonstrates that families with children are preferably located in areas with cheaper land. The proportion of women lacks global significance ($p = 0.394$). The contrast between the magnitude of the errors and their significance suggests that the relationship between child demand and facilities is heterogeneous. This premise justifies the introduction of geographically weighted regression to increase the accuracy and achieve greater explanatory capacity of the model.

Table 3 summarizes the GWR fit diagnostics, and Table 4 summarizes the statistics of the local coefficients. The model incorporates Kernel adaptive and Euclidean distance,

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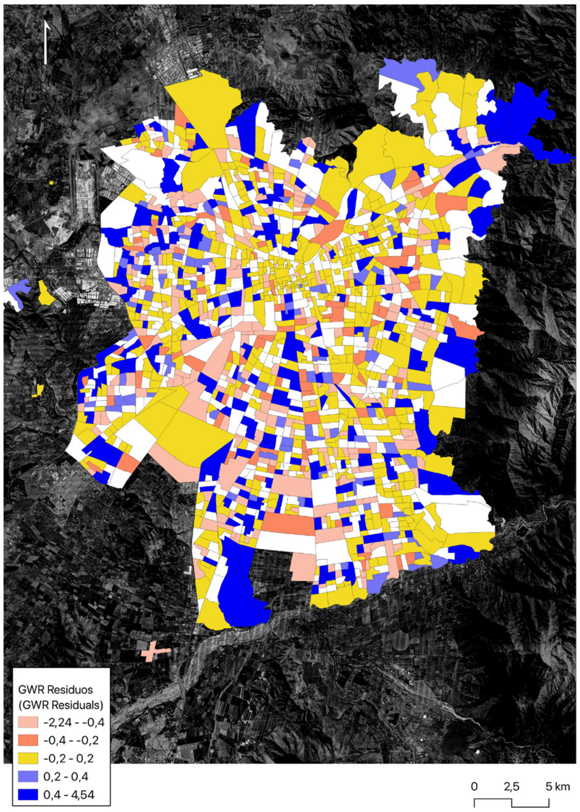

Figure 5. Residuals of the geographically weighted regression.
Source: Preparation by the authors.

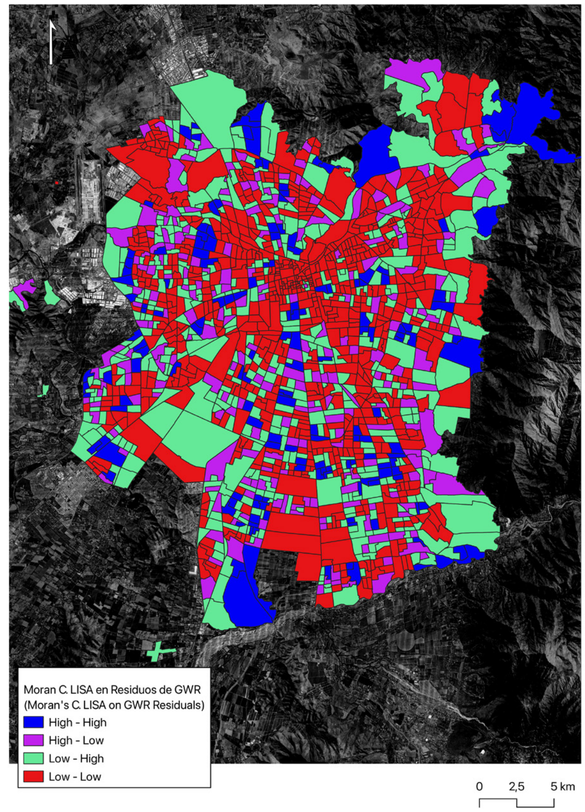

Figure 6. LISA by Moran with geographically weighted residuals.
Source: Preparation by the authors.

optimized via AICc. The improvement is substantial: the R^2 rises to 0.477, and the sum of residual squares is reduced by almost half. The average coefficient for the variable "educational offer" is 0.068; however, its range is -0.554 to 2.101.

The average land value is -0.099, but the range (-1.811 to 1.981) shows sign inversions. Although the proportion of women is not significant globally, it acquires relevance locally.

Figure 5 shows the residuals of the geographically weighted regression (GWR) applied to the analysis of the distribution of children and educational offer in the study area. The colors represent different ranges of residuals, where yellow indicates residuals close to zero (between -0.2 and 0.2), suggesting a good fit of the model in those zones. The red and orange tones represent negative residuals, with values ranging from -0.2 to -2.24, indicating the areas where the model underestimated the observed value of the dependent variable. On the other hand, the blue areas, with residuals between 0.4 and 4.54, show areas where the model overestimated the observed values. The spatial distribution of these residuals reveals patterns that suggest local variations in the model's accuracy, possibly associated with factors not fully captured by the selected covariants. This spatial variability in the residuals highlights the importance of adjusting educational infrastructure distribution policies according to each area's local characteristics. To draw more irrefutable conclusions, a spatial autocorrelation analysis of the residuals is applied using a categorical Moran Index.

Figure 6 presents a local spatial association analysis [LISA] on the residuals of the geographically weighted regression [GWR] in the study area, using the Moran index to detect spatial autocorrelation clusters between nearby census tracts. The clusters in blue represent High-High areas, where the residuals are consistently high in neighboring areas. This pattern suggests a systematic overestimation in the model for these areas, possibly due to local factors that increase the discrepancy between educational supply and child

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demand. The clusters in red represent Low-Low areas, where residuals are consistently low in neighboring areas, indicating a homogeneous underestimation. This could reflect local characteristics where the educational offer is insufficient compared to the demand. On the other hand, the purple (High-Low) and green (Low-High) zones represent areas of spatial heterogeneity, where the residuals of one area contrast with its neighbors. In the High-Low areas (purple), the areas with high overestimation are surrounded by zones of underestimation. In contrast, the Low-High (green) areas present underestimation in areas surrounded by overestimation. These heterogeneous patterns reveal local variations that the GWR model fails to explain fully, suggesting the presence of additional or specific contextual factors to be considered.

V. DISCUSSION

The reviewed literature suggests that proximity to educational centers can influence children's attendance and academic and socio-emotional development, an argument supported by Dussaillant (2016) and Fantuzzo et al. (2005). However, the GWR model's results indicate that tuition fees are not evenly distributed, creating gaps in areas with high child demand and low service supply. This evidences patterns of territorial inequality similar to those described by Kim and Wang (2019). On the other hand, the land value shows a negative correlation with the presence of children, which suggests that areas of high real estate value are less accessible to families with small children. This finding aligns with Bergantino et al.'s (2022) and Bucaite-Vilke's (2021) studies. This exclusionary dynamic also highlights the need for public policies integrating access to critical infrastructure in areas of high real estate cost.

The Moran index allows a more nuanced understanding of spatial inequity in the distribution of educational services by overcoming traditional approaches that do not consider local specificities, as Kim and Nicholls (2016) point out in their application of GWR to assess access to public spaces. Operationally, this indicates a lack of preschool availability in the Metropolitan Area of Santiago.

The results suggest that disparities in the distribution of educational services linked to gender factors exist, an aspect less developed in urban literature. Although the proportion of women did not show a consistent pattern, their inclusion opens the discussion on how gender structures can influence educational planning and the spatial organization of urban services, which is relevant for future studies.

This modeling allows detecting some limitations that appear with the evidence. The first is that using urban variables such as facilities and land value to explain a demographic phenomenon implies an indirect relationship: families choose to reside where affordable prices and the availability of services converge. The model captures that structural nexus, but does not include specific family motivations or housing attributes. This could require a specific survey and qualitative analysis in sectors that this study finds interesting. Then, the educational offer was assigned to the census tract where each preschool facility is located. In bordering areas, this can explain some mismatches of the model in terms of seeking to increase its explanatory capacity. A structural proxy was considered, but daily mobility was not modeled. An analysis of isochrons or transport networks would improve the accessibility metric.

VI. CONCLUSIONS

This study shows that the supply of preschool education in the Metropolitan Area of Santiago has an unequal spatial distribution. Areas with a high concentration of children lack sufficient enrollment, while in neighborhoods with higher real estate values, the infrastructure exceeds the local demand. The application of a geographically weighted regression [GWR] revealed that the availability of places partly explains the location of early childhood. However, that land value acts as an economic barrier, moving young families to more accessible urban perimeters. In addition, the spatial variability of the coefficients and the autocorrelation of the residuals show omitted factors, such as housing typologies and mobility patterns, that influence actual access to preschool services.

The findings underline the need to integrate educational planning with housing and transportation policies, so that future interventions specifically identify points of insufficient supply, where demand is most critical. It is recommended that the model be enhanced by incorporating variables related to family life cycles and real accessibility based on travel times. Likewise, a mixed approach that includes interviews with families could clarify the motivations of choice and qualitative barriers.

VII. CONTRIBUTION OF AUTHORS CRediT:

Conceptualization.; Data curation, F.V.-P.; Formal analysis, F.V.-P.; Acquisition of financing, F.V.-P.; Research, F.V.-P.; Methodology, F.V.-P.; Project management, F.V.-P.; Resources, F.V.-P.; Software, F.V.-P.; Supervision, F.V.-P.; Validation, F.V.-P.; Visualization, F.V.-P.; Writing – original draft, F.V.-P.; Writing – revision and editing, F.V.-P.

VIII. BIBLIOGRAPHIC REFERENCES

Alaníz Hernández, C. (2021). Políticas educativas para primera infancia en Chile y México:reconocimiento legal, cobertura y atención. *Revista Colombiana de Educación, 1(*82), 37-60. https://doi.org/10.17227/rce.num82-10514

Allel, K., Narea, M., & Undurraga, E. A. (2020). Centre-based care is a significant predictor of lower body mass index in early childhood: Longitudinal evidence from Chile. *Journal of Global Health, 10*(1), 010419. https://doi.org/10.7189/jogh.10.010419

Alonso-Pastor, A., Olaya Acosta, G., & Calmet, E. (2024). Segregación Educativa y Desigualdad Social en el Perú: Un Análisis Espacial en el Nivel Secundario. *REICE. Revista Iberoamericana Sobre Calidad, Eficacia y Cambio en Educación*, *23*(1), 1–26. https://doi.org/10.15366/reice2025.23.1.001

Arbour, M., Soto, C., Alée, Y., Atwood, S., Muñoz, P., & Marzolo, M. (2023). Absenteeism prevention in preschools in Chile: Impact from a quasi-experimental evaluation of 2011–2017 Ministry of Education data. *Frontiers in Education, 7*, 975092. https://doi.org/10.3389/feduc.2022.975092

Bassok, D., Finch, J. E., Lee, R., Reardon, S. F., & Waldfogel, J. (2016). Socioeconomic Gaps in Early Childhood Experiences: 1998 to 2010. *American Educational Research Association (AERA) Open, 2(*3), 2332858416653924. https://doi.org/10.1177/2332858416653924

Bergantino, A. S., Biscione, A., De Felice, A., Porcelli, F., & Zagaria, R. (2022). Kindergarten Proximity and the Housing Market Price in Italy. *Economies, 10*(9), 222. https://doi.org/10.3390/economies10090222

Bucaite-Vilke, J. (2021). Family Choices on Welfare and Territorial Disadvantages: The Perception of the Child Care Services Approach in Urban and Rural Areas. *Sage Open, 11*(3), 21582440211032641. https://doi.org/10.1177/21582440211032641

Cabannes, Y., & Lipietz, B. (2018). Revisiting the democratic promise of participatory budgeting in light of competing political, good governance and technocratic logics. *Environment and Urbanization, 30(*1), 67-84. https://doi.org/10.1177/0956247817746279

Catalán Catalán, M. (2024). Propuesta metodológica para analizar la participación de la niñez en la planificación territorial en la ciudad de Valparaíso, Chile. *Investigaciones Geográficas,* (115), e60904. https://doi.org/10.14350/rig.60904

Cheadle, J. E. (2008). Educational Investment, Family Context, and Children's Math and Reading Growth from Kindergarten Through the Third Grade. *Sociology of Education, 81*(1), 1–31. https://doi.org/10.1177/003804070808100101

Cloney, D., Tayler, C., Hattie, J., Cleveland, G., & Adams, R. (2016). The Selection of ECEC Programs by Australian Families: Quality, Availability, Usage and Family Demographics. *Australasian Journal of Early Childhood, 41*(4), 16–27. https://doi.org/10.1177/183693911604100403

Correa-Parra, J., Vergara-Perucich, J. F., & Aguirre-Nunez, C. (2020). Towards a Walkable City: Principal Component Analysis for Defining Sub-Centralities in the Santiago Metropolitan Area. *LAND, 9*(10), 362. https://doi.org/10.3390/land9100362

Correa Parra, J., Vergara Perucich, F., & Aguirre Núñez, C. (2022). La ciudad de 15 minutos en Chile: Análisis empírico para Gran Santiago, Concepción y Valparaíso. *Cuadernos de Vivienda y Urbanismo*, *15*(1), 17. https://doi.org/10.11144/Javeriana.cvu15.cmca

Correa-Parra, J., Vergara-Perucich, J. F., Truffello, R., & Aguirre-Núñez, C. (2023). Housing deficits in Greater Santiago: Empirical evidence on conflicts and arguments for rethinking metropolitan planning. Urbe Revista Brasileira de Gestão Urbana, 15, e20210251. https://doi.org/10.1590/2175-3369.015.E20210251

Correia, N., Aguiar, C., & Amaro, F. (2023). Children's participation in early childhood education: A theoretical overview. *Contemporary Issues in Early Childhood, 24*(3), 313–332. https://doi.org/10.1177/1463949120981789

Crosnoe, R., Purtell, K. M., Davis-Kean, P., Ansari, A., & Benner, A. D. (2016). The selection of children from low-income families into preschool. *Developmental Psychology, 52*(4), 599–612. https://doi.org/10.1037/dev0000101

Duarte-Cunha, M., Almeida, A. S. D., Cunha, G. M. D., & Souza-Santos, R. (2016). Geographic weighted regression: Applicability to epidemiological studies of leprosy. *Revista da Sociedade Brasileira de Medicina Tropical, 49*(1), 74–82. https://doi.org/10.1590/0037-8682-0307-2015

Dussaillant, F. (2016). Usage of Child Care and Education Centers: The Proximity Factor. *Sage Open, 6*(2), 2158244016652668. https://doi.org/10.1177/2158244016652668

Encinas, F., Truffello, R., Aguirre-Nunez, C., Puig, I., Vergara-Perucich, F., Freed, C., & Rodriguez, B. (2022). Mapping Energy Poverty: How Much Impact Do Socioeconomic, Urban and Climatic Variables Have at a Territorial Scale? *LAND, 11*(9), 1449. https://doi.org/10.3390/land11091449

Espinoza, O., Gonzalez, L. E., Castillo, D., & McGinn, N. (2020). Classification of Dropouts to Improve Student Re-Engagement: The Case of Chilean Secondary Opportunity Centers. *Urban Education, 58*(9), 2177-2208. https://doi.org/10.1177/0042085920948949

Fantuzzo, J. W., Rouse, H. L., McDermott, P. A., Sekino, Y., Childs, S., & Weiss, A. (2005). Early Childhood Experiences and Kindergarten Success: A Population-Based Study of a Large Urban Setting. *School Psychology Review, 34*(4), 571–588. https://doi.org/10.1080/02796015.2005.12088018

Findlay, P., Findlay, J., & Stewart, R. (2009). The consequences of caring: Skills, regulation and reward among early years workers. *Work, Employment and Society, 23*(3), 422–441. https://doi.org/10.1177/0950017009337057

Garreton, M. (2017). City profile: Actually existing neoliberalism in Greater Santiago. *Cities, 65*, 32–50. https://doi.org/10.1016/j.cities.2017.02.005

Gelber, D., Castillo, C., Alarcon, L., Trevino, E., & Escribano, R. (2021). COVID-19 and the right to education in Chile: An opportunity to revisit our social contract. *International Review of Education, 67*(1–2), 79–101. https://doi.org/10.1007/s11159-021-09881-2

Instituto Nacional de Estadísticas [INE]. (2017). *Resultados del Censo 20217.* http://resultados.censo2017.cl/

Instituto Nacional de Estadísticas [INE]. (2025). *Sistema de Indicadores y Estándares de Desarrollo Urbano. SIEDU.* http://www.ine.gob.cl/herramientas/portal-de-mapas/siedu

Hartas, D. (2011). Families' social backgrounds matter: Socio-economic factors, home learning and young children's language, literacy and social outcomes. *British Educational Research Journal, 37*(6), 893–914. https://doi.org/10.1080/01411926.2010.506945

Jimenez, M. E., Wade, R., Lin, Y., Morrow, L. M., & Reichman, N. E. (2016). Adverse Experiences in Early Childhood and Kindergarten Outcomes. *Pediatrics, 137*(2), e20151839. https://doi.org/10.1542/peds.2015-1839

Kim, H., & Wang, F. (2019). Disparity in Spatial Access to Public Daycare and Kindergarten across GIS-Constructed Regions in Seoul, South Korea. *Sustainability, 11*(19), 5503. https://doi.org/10.3390/su11195503

Kim, J., & Nicholls, S. (2016). Using Geographically Weighted Regression to Explore the Equity of Public Open Space Distributions. *Journal of Leisure Research, 48*(2), 105–133. https://doi.org/10.18666/jlr-2016-v48-i2-6539

Kim, M.-K., & Graefe, D. (2020). Geographically Weighted Regression to Explore Spatially Varying Relationships of Recreation Resource Impacts: A Case Study from Adirondack Park, New York, USA. *Journal of Park and Recreation Administration, 39*(2), 43-63. https://doi.org/10.18666/JPRA-2020-10515

Kofman, E., & Lebas, E. (1996). *Henri Lefebvre: Writings on Cities*. Wiley-Blackwell.

Lu, B., Brunsdon, C., Charlton, M., y Harris, P. (2017). Geographically weighted regression with parameter-specific distance metrics. *International Journal of Geographical Information Science, 31*(5), 982–998. https://doi.org/10.1080/13658816.2016.1263731

Marcuse, J., Connolly, J., Novy, J., Olivo, I., Potter, C., & Steil, J. (Edrs.). (2009). Searching for the Just City: Debates in Urban Theory and Practice. Routledge Taylor & Francis Group

Martinez Bascunan, M., & Rojas Quezada, C. (2016). Geographically weighted regression for modelling the accessibility to the public hospital network in Concepción Metropolitan Area, Chile. *Geospatial Health, 11*(3), 263–273. https://doi.org/10.4081/gh.2016.451

MINEDUC. (2025). Datos Abiertos. CEM. Centro de Estudios Mineduc, (27 de mayo, 2025), https://datosabiertos.mineduc.cl/

Moraga-Aros, L., Aubert-Valderrama, J., Correa-Ramirez, A., & Monsalves-Villalobos, M., (2022). Oral health situation of Chilean preschool children in the years 2007-2015: Systematic review and analysis at individual level. *Journal of Oral Research, 11*(2), 1–21. https://doi.org/10.17126/joralres.2022.020

Morrissey, K. (2015). Exploring Spatial Variability in the Relationship between Long Term Limiting Illness and Area Level Deprivation at the City Level Using Geographically Weighted Regression. *AIMS Public Health, 2*(3), 426–440. https://doi.org/10.3934/publichealth.2015.3.426

Muñoz-Oyarce, M. F. (2021). Políticas Neoliberales y Primera Infancia: Una Revisión Desde el Enfoque de Derechos y la Inclusión Educativa en Chile. *Revista Brasileira de Educação Especial, 27*, e0039. https://doi.org/10.1590/1980-54702021v27e0039

Otero, G., Carranza, R., & Contreras, D. (2017). `Neighbourhood effects' on children's educational achievement in Chile: The effects of inequality and polarization. *Environment and Planning A: Economy and Space, 49*(11), 2595–2618. https://doi.org/10.1177/0308518X17731780

Perez-Silva, R., Fernández, I. C., Matas, M. I., & Villalobos, E. (2023). Green cover and socioemotional and academic outcomes of school-age children. The case of Santiago, Chile. *Landscape and Urban Planning, 233*, 104688. https://doi.org/10.1016/j.landurbplan.2023.104688

Prado-Galbarro, F.-J., Pérez-Ferrer, C., Ortigoza, A., López-Olmedo, N. P., Braverman-Bronstein, A., Rojas-Martínez, R., De Castro, F., & Barrientos-Gutiérrez, T. (2021). Early childhood development and urban environment in Mexico. *PLoS ONE, 16*(11), e0259946. https://doi.org/10.1371/journal.pone.0259946

Ramond, Q. (2025). Separate and Unequal Childhoods: Residential Segregation and Neighborhood Inequalities of Children in Chile. En M. Vicuña y E. Giorgi (Eds.), *Intersections* (pp. 203–215). Springer Geography. https://doi.org/10.1007/978-3-031-76402-8_14

Rivera Flores, P., & Orozco-Martínez, S. (2022). Las Técnicas en Atención de párvulos en Chile: Formación inicial y Relaciones educativas en la primera infancia. *Pulso. Revista de Educación*, (45), 57–72. https://doi.org/10.58265/pulso.5277

Romanillos, G., & García-Palomares, J. C. (2018). Accessibility to Schools: Spatial and Social Imbalances and the Impact of Population Density in Four European Cities. *Journal of Urban Planning and Development*, *144*(4), 04018044. https://doi.org/10.1061/(ASCE)UP.1943-5444.0000491

Saib, M.-S., Caudeville, J., Carre, F., Ganry, O., Trugeon, A., & Cicolella, A. (2014). Spatial Relationship Quantification between Environmental, Socioeconomic and Health Data at Different Geographic Levels. *International Journal of Environmental Research and Public Health, 11*(4), 3765–3786. https://doi.org/10.3390/ijerph110403765

Sassera, J. S. (2022). Desigualdad espacial, segmentación educativa y diferenciación institucional: Aportes de representaciones cartográficas en una localidad. *OBETS. Revista de Ciencias Sociales, 17*(1), 153-172. https://doi.org/10.14198/OBETS2022.17.1.09

Tran, T. D., Luchters, S., & Fisher, J. (2017). Early childhood development: Impact of national human development, family poverty, parenting practices and access to early childhood education. *Child: Care, Health and Development, 43*(3), 415–426. https://doi.org/10.1111/cch.12395

Truffello, R., & Hidalgo, R. (2015). Policentrismo en el Área Metropolitana de Santiago de Chile: Reestructuración comercial, movilidad y tipificación de subcentros. *EURE, 41*(122), 49-73. https://doi.org/10.4067/S0250-71612015000100003

Ullauri-Ugalde, A. C., Idrovo-Soliz, A. S., & Hermida-Palacios, C. M. (2024). Movilidad del cuidado alrededor de un centro de desarrollo infantil municipal en Cuenca, Ecuador. *Revista Urbano, 27*(49), 40–51. https://doi.org/10.22320/07183607.2024.27.49.03

Ulloa-Leon, F., Correa-Parra, J., Vergara-Perucich, F., Cancino-Contreras, F., & Aguirre-Nuñez, C. (2023). "15-Minute City" and Elderly People: Thinking about Healthy Cities. *Smart Cities, 6(*2), 1043–1058. https://doi.org/10.3390/smartcities6020050

Vergara-Perucich, F., & Aguirre-Nuñez, C. (2020). Urban capital gain recovery simulation for Line 3 of the Santiago Metro. *ACE: Architecture City And Environment, 14*(42), 8963. https://doi.org/10.5821/ace.14.42.8963

Vergara-Perucich, J. F., Aguirre-Nuñez, C., & Marmolejo-Duarte, C. (2023). Investification en el mercado de la vivienda: Estudio exploratorio en Santiago de Chile. *Urbano, 26(*48), 56–67. https://doi.org/10.22320/07183607.2023.26.48.05

Wu, X., Li, X., & Miao, J. (2024). Early Childhood Development and Social Mobility in China. *ECNU Review of Education,7*(4), 991-1008. https://doi.org/10.1177/20965311241240479

Xu, Y., Olmos, L. E., Abbar, S., & González, M. C. (2020). Deconstructing laws of accessibility and facility distribution in cities. *Science Advances*, *6*(37), eabb4112. https://doi.org/10.1126/sciadv.abb4112

Zurayk, H., Tawil, M., & Gangarosa, E. (1982). Effect of urban versus rural residence and of maternal education on infant health in South Lebanon. *Journal of Epidemiology & Community Health, 36*(3), 192–196. https://doi.org/10.1136/jech.36.3.192

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