AGRO PRODUCTIVIDAD

Colegio de Postgraduados

Provision of urban amenities and public works analysis in the City of Chihuahua, Mexico

Quintana-Pérez, Luis Enrique[1]; García-Muñoz, Silvia Amanda[1]; Leyva-Chávez, Arwell Nathan[1]; Piña-Ramírez, Francisco Javier[1]; Porras-Flores, Damián Aaarón[1]; Ortega-Rodríguez, Anabel[1*]

[1] Universidad Autónoma de Chihuahua, Facultad de Ciencias Agrotecnológicas, Av. Pascual Orozco s/n, Campus 1, Santo Niño, Chihuahua, Chihuahua, México, C.P. 31000.

* Correspondence: aortegar@uach.mx

ABSTRACT

Objective: To identify the basic geostatistical areas (AGEBS) that until 2019 were classified as priority attention zones, in order to analyze the lack of amenities and to assess indicators for monitoring sustainable development in the urban area of the municipality of Chihuahua.

Design/Methodology/Approach: An analytical-synthetic methodology was used. Bibliographical and statistical techniques were applied to study the levels that are reflected at the national and municipal scales, as well as the indicators of socially underdeveloped areas, in order to make proposals for their improvement.

Results: Based on a diagnosis of the marginalization levels in the City of Chihuahua, Chih., 3% of the city population lives in areas with scarce or non-existent amenities, generating low development in its inhabitants.

Study Limitations/Implications: The distances between the different types of amenities in the city were determined, as well as the access to essential amenities (*i.e.*, education and health). These amenities are located at inaccessible distances.

Findings/Conclusions: We would like to propose a compact and connected city model where amenities are nearby. This proposal includes the densification of the main sub-centers of the city, as well as the optimization of the required resources and the necessary infrastructure for the provision of services and urban equipment. The ultimate objective is to prevent the ongoing and disproportionate growth of the city.

Keywords: geostatistics, urban amenities, services, sustainable development.

Citation: Quintana-Pérez, L. E., García-Muñoz, S. A., Leyva-Chávez, A. N., Piña-Ramírez, F. J., Porras-Flores, D. A., & Ortega-Rodríguez, A. (2022). Provision of urban amenities and public works analysis in the City of Chihuahua, Mexico. *Agro Productividad*. https://doi.org/10.32854/agrop.vi.1661

Academic Editors: Jorge Cadena Iñiguez and Libia Iris Trejo Téllez

Received: December 02, 2021.
Accepted: May 14, 2022.
Published on-line: July 01, 2022.

Agro Productividad, 15(6). June. 2022. pp: 75-81.

INTRODUCTION

In first-world cities, the provision of urban amenities has been increasingly implemented, including those aimed at providing health care to the citizens. Urban development implies compliance with planning strategies; consequently, a city achieves, to a greater or lesser extent, specific goals, such as the adequate distribution of urban amenities and infrastructure which enables citizens to develop (Mauricio and Bass, 2015).

Image by wonderland woo at Pixabay

The second chapter of the Ley General de Asentamientos Humanos, Ordenamiento Territorial y Desarrollo Urbano highlights that the construction of infrastructure works and amenities for regional, urban and rural development should promote access for all to the services, benefits, and prosperity offered by the cities. These efforts should be promoted in coordination with the state and municipal governments and the territorial demarcations and should include the participation of the social and private sectors (Cámara de Diputados del H. Congreso de la Unión, 2016).

The socioeconomic differences in the urban space become evident over time and they entail disadvantages for the most vulnerable groups, who find themselves in a very precarious habitat, as a result of the scarce provision of urban infrastructure and the low or null presence of urban services. The situation is aggravated by the economic crisis that Latin American countries face, which makes it impossible for the governments of the large metropolis to respond to the housing demand and to provide urban services in the poorest areas. All this articulation exacerbates the disadvantages of these zones and works as a social exclusion mechanism against the most disadvantaged groups (Aguilar and López, 2016).

Mexico ranked among the Latin America countries with the worst cases of territorial inequality. According to the Latin American Center for Rural Development, from 2005 to 2010, poverty was reduced in 60% of its municipalities; however, in the rest of the country the poverty levels were considerable (Tourliere, 2018).

Among the states with numerous settlements with a very low marginalization level, Chihuahua, Baja California, and Jalisco stand out with 456 (13.1% of the total of localities), 304 (8.7%), and 289 (8.3%) localities, respectively (Consejo Nacional de Población, 2010).

The objective of this study is to identify and analyze the basic geostatistical areas that need priority attention, detect the lack of amenities, and assess indicators for sustainable development in the urban area of the city of Chihuahua. This essential information can help to detect the urban amenities needs, prioritizing the outskirts, which lack educational, health, social assistance, and other types of services. These findings show that the lack of amenities in the said study areas is a reality.

MATERIALS AND METHODS

The research was carried out in the city of Chihuahua. Different sources of information were used to achieve a more comprehensive understanding of the subject. Based on the various sources of information that present social underdevelopment indicators, the municipal and the national levels were identified. These findings allowed us to determine the level of underdevelopment that exists in the city of Chihuahua. Tools such as ArcGis were used to map and analyze the necessary data.

In the case of data collection from priority attention zones, information from the Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL, 2010) was consulted. CONEVAL handles social development data from urban and rural areas at all levels (municipal, state, and national). The following data were collected: development indexes, poverty indicators, marginalization level, etc.

In addition to the data from the municipality of Chihuahua obtained from the Instituto Nacional de Estadística y Geografía (INEGI, 2016), this research was supported by the Instituto Municipal de Planeación (IMPLAN Chihuahua, 2016), which has a very extensive database regarding the amenities of the city of Chihuahua.

RESULTS AND DISCUSSION

In 2010, the city of Chihuahua had 819,543 inhabitants (Figure 1), out of which, 25,129 people (3% of the total population of the city) lived in priority attention zones.

Potable water

Regarding domestic potable water supply per five-year periods, an important increase (94.7 to 98.0%) can be seen in a 20-year period (Table 1). However, the sustainability of such infrastructure (Figure 2) is problematic: the network is old, which results in a 10-20% leakage, mainly in old areas of the city such as the urban center. Major works have been carried out to divide the network into sectors, seeking to control the leaks that have occurred.

The needs are accentuated in the so-called priority attention polygons where 3.1% of the total population of the city lives. They are settled in areas that are generally characterized by natural risks, land irregularity, and limited-service provision feasibility.

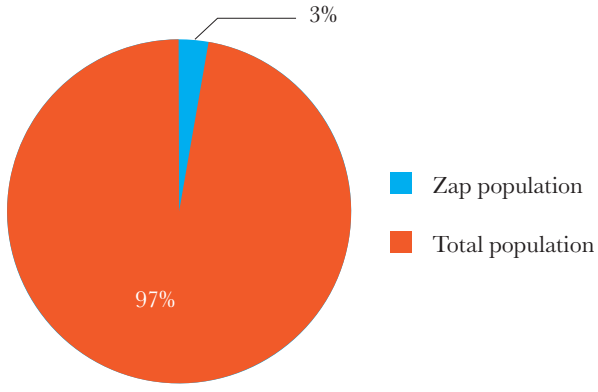

Figure 1. Population in priority attention zones (ZAP) and population in the urban area of the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

Table 1. Houses with potable water per five-year periods in the city of Chihuahua, Chihuahua, México (2010).

Source	Period	Households inhabited individuals	Houses with water	%
Population and Housing Count 1995	1995	155,359	147,082.00	94.67
XII General Population and Housing Census 2000	2000	173,640	167,544.00	96.49
II Population and Housing Count 2005	2005	208,235	191,727.00	92.07
Census of population and housing 2010	2010	237,106	222,833.00	93.98
Intercensal Survey 2015	2015	264,300	259,014.00	98.00

Source: Quintana (2019).

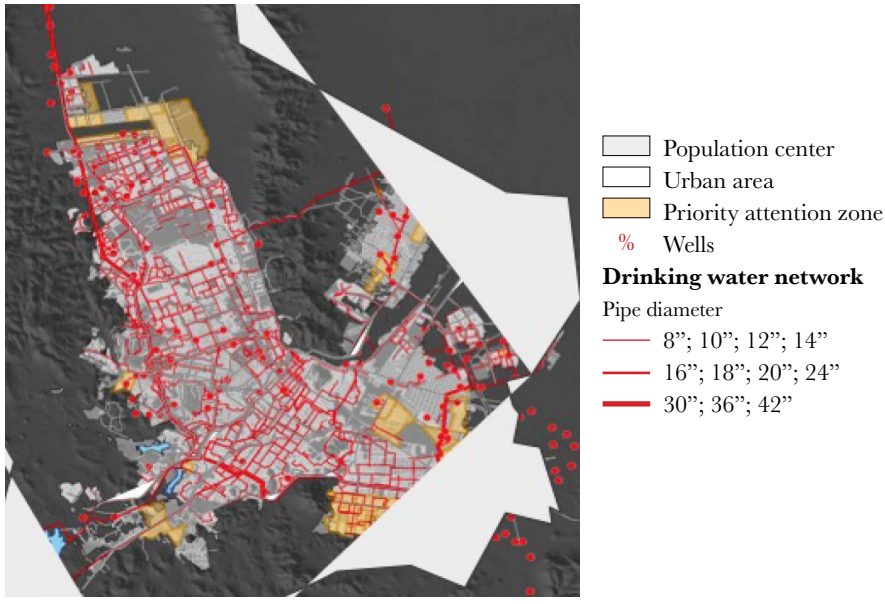

Figure 2. Potable water infrastructure of the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

Sewerage system

The sewerage system advances are even more significant: coverage increased from 92 to 98% in 10 years (Table 2). There are 1,362 houses in the city that still do not have the service; most of them are located within the already defined priority attention polygons (Figure 3).

Electrical grid

From 2005 to date, the electrical grid coverage had an equally notable advance (from 94 to 96%) (Table 3). These services need to be provided in the south and north of the city, near the Sacramento River (Figure 4). There was a remarkable setback in terms of service coverage during the year 2005 with respect to previous periods.

Street lighting

Eighty-six percent of the city has total or partial street lighting coverage. Only 14% of the city does not have consolidated services (Figure 5). These areas require land regularization to receive the said essential service. There are areas that lack any kind of public lighting infrastructure; these areas are considered priority attention zones (Figure 6).

Table 2. Houses with sewerage system per five-year periods in the city of Chihuahua, Chihuahua, México (2010).

Source	Period	Inhabited private homes	Houses with drainage	%
Population and Housing Count 1995	1995	155,359.00	144,139	92.78
XII General Population and Housing Census 2000	2000	173,640.00	165,957	95.58
II Population and Housing Count 2005	2005	208,235.00	194,219	93.27
Census of Population and housing 2010	2010	237,106.00	225,866	95.26
Intercensal Survey 2015	2015	264,300.00	262,978	99.50

Source: Quintana (2019).

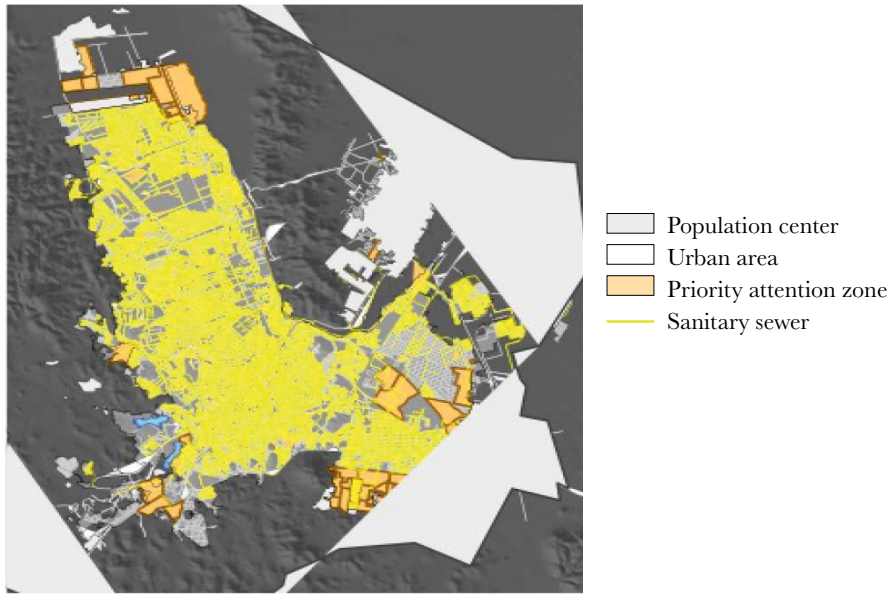

Figure 3. Sewerage system coverage in the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

Table 3. Electrical grid domestic coverage per five-year periods in the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

Source	Period	Inhabited private homes	Homes with electricity	%
Population and Housing Count 1995	1995	155,359	152,764	98.33
XII General Population and Housing Census 2000	2000	173,640	170,350	98.11
II Population and Housing Count 2005	2005	208,235	194,848	93.57
Census of population and housing 2010	2010	237,106	227,587	95.99
Intercensal Survey 2015	2015	264,300	253,728	96.00

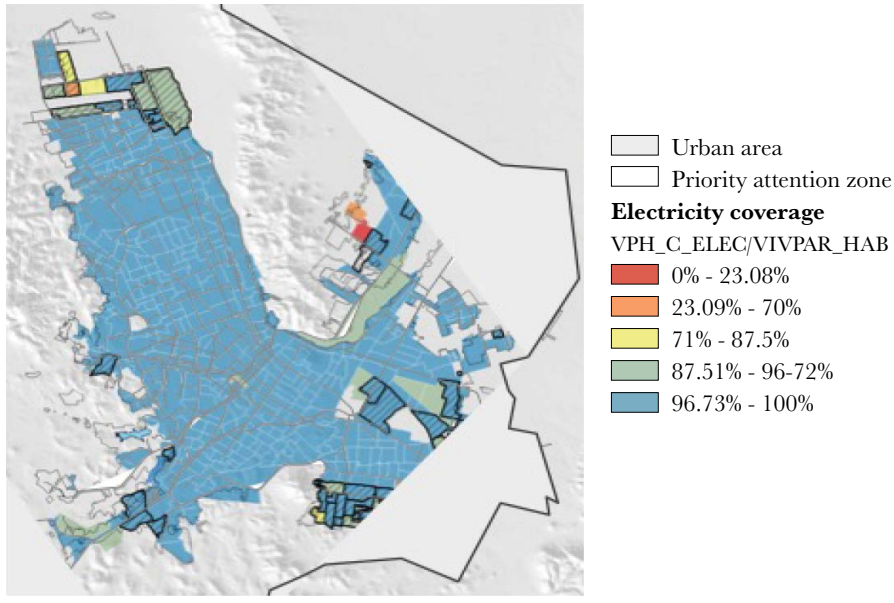

Figure 4. Electrical grid coverage in the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

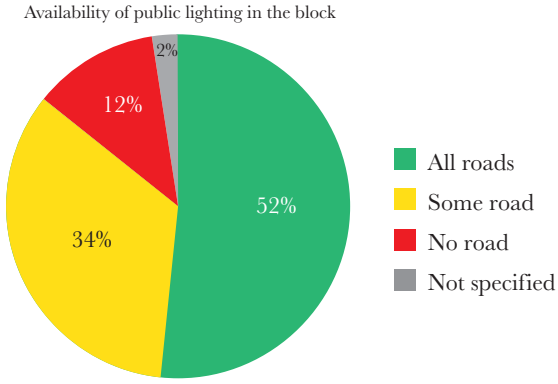

Figure 5. Street lighting availability in the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

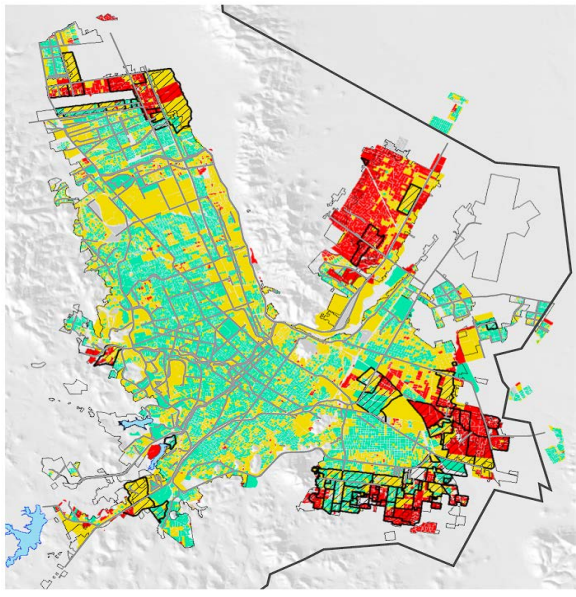

Figure 6. Street lighting coverage in the city of Chihuahua, Chihuahua, México (2010). Source: Quintana (2019).

According to data from INEGI (2016), the street lighting coverage in the urban area is optimal (86% of the blocks have total or partial coverage) and, according to municipal information, 74,857 lights have been installed in roads and public spaces. The remaining 14% is made up of irregular origin areas and suburban farms that do not have consolidated services and require specific land regularization programs that facilitate access to the service. Several of the deficient areas are included within the priority attention polygons defined by the Secretaría de Desarrollo Agrario, Territorial y Urbano (SEDATU, 2016).

CONCLUSIONS

Urban amenities provide the material basis for the basic services that the population requires. In close link with housing, infrastructure, and land, they allow a socio-spatial distribution, provide an internal structure to the city, and enable territorial planning. The

city-wide coverage in the various amenity headings is acceptable, taking into consideration the 4,970 consolidated modules of the different subsystems at all levels. However, some settlements are still devoid of services as a result from their distance to the consolidated urban area or their irregular origin. A detailed analysis of the current conditioning factors is necessary to supply and consolidate the various types of urban amenities. This analysis must be based on the physical, population, and social conditions of deprived areas and the sociodemographic dynamics that determine the temporality of their situation as reserve areas. Likewise, priority coverage mechanisms must be implemented in the following zones: Low-income settlements of low urban quality, Areas lacking social urban amenities, Areas with dispersed amenities (that is to say, that have no order), Areas far from primary amenities, Settlement areas with priority attention polygons, Short-term growth reserve zones, Zones without urban center area, urban sub-center, district center, or metropolitan vision coverage.

REFERENCES

Aguilar G. A., & López, F. M. (2016). Espacios de pobreza en la periferia urbana y suburbios interiores de la Ciudad de México. Las desventajas acumuladas. *EURE, 42*(125), 5-29.

Mauricio, R., & Bass, S. (2015). Planificación urbana y equipamiento para la salud en Ciudad Juárez. En V. Orozco (Ed.). *Chihuahua Hoy* (pp. 401-441). Chihuahua: UACJ Libros Electrónicos.

Cámara de Diputados del H. Congreso de la Unión. (2016). *Ley General de Asentamientos Humanos, Ordenamiento Territorial y Desarrollo Urbano*. Ciudad de México: Secretaría de Servicios Parlamentarios.

CONEVAL. (2010). *Lineamientos y criterios generales para la definición, identificación y medición de la pobreza*.

Consejo Nacional de Población. (2010). *Índice de marginación por localidad*. México: Consejo Nacional de Población.

IMPLAN Chihuahua. (2016). *Plan de Desarrollo Urbano de la Ciudad de Chihuahua: Visión 2040*. Chihuahua: Instituto Municipal de Planeación.

INEGI. (2016). *Inventario Nacional de Viviendas 2016*.

SEDATU. (2016). *Polígonos de atención prioritaria a nivel nacional*.

Tourliere, M. (2018). México, el caso más grave en desigualdad territorial en América Latina. *Proceso*, 1-1.