

## **SOCIOECONOMIC INEQUALITIES AMONG THE MUNICIPALITIES OF CHIHUAHUA, MEXICO**

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### **ABSTRACT**

The objective of this paper is to analyze the nature of inequalities among the municipalities of Chihuahua State, Mexico and the factors that contribute to the disparity. The state of Chihuahua has a deep household inequality due to the nature of the inhabitants' occupations and comprises a significant percentage of the people living in poverty in Mexico because of social deprivation and low income. Previous studies on inequality in Mexico show that significant differences among the municipalities is caused by factors such as marginalization, low economic activity, and informal activities while some other studies have used similar variables selected from social and economic sphere. All these works used these variables to obtain the socioeconomic development index for each region under study. Following the methodology used in de Haro *et al.* (2017), this paper examines the social and economic conditions of the 67 municipalities of Chihuahua State by calculating the Socioeconomic Development Index (SEDI) of each municipality using the data compiled on variables such as marginalization, degree of urbanization, gross economic activity rate, economic dependence coefficient and density of paved roads. The result shows that two municipalities: Juarez and Chihuahua City have the most favorable socioeconomic conditions due to a high urban density and a low marginalization. On the other hand, Batopilas, Carichí, El Tule, Balleza, Dr. Belisario Domínguez, Chínipas, Rosario, Uruachi, Morelos, San Francisco de Borja, Urique, Nonoava and Temósachi have the most unfavorable conditions due to high marginalization and high economic dependence coefficient. The policy implications of the study are stated in the conclusion which recommends that the Mexican government must concentrate efforts on education through incentives that will encourage schooling in order to increase the pool of human capital in deprived municipalities. Likewise, creating considerate fiscal policies for poorer regions-all for the purpose of attracting businesses that can create employment. Lastly, the government should work on providing enough amenities, infrastructures and better town planning.

**JEL Classifications:** O18, R10, R58.

**Keywords:** Regional Development, Uneven Development, Poverty, Economic Policy.

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### **INTRODUCTION**

The State of Chihuahua is one of the 32 federal entities of Mexico. It is located in North-western Mexico and is bordered by the states of Sonora to the west, Sinaloa to the southwest, Durango to the south, and Coahuila to the east. To the north and northeast, it has a long border with the U.S. adjacent to the U.S. states of New Mexico and Texas. The total area of the state is 247,455 km<sup>2</sup> with a population of 3,569,479 inhabitants (INEGI, 2015) which is 3.2% percent of the total population of Mexico. The dependency ratio is

53.0 and the population density is 14.4 (INEGI, 2015). The capital is Chihuahua city but the largest city in the state is Juárez and the other cities with the largest population are Parral, Cuauhtémoc, Delicias. Together, they form a population of 2,695,279 (INEGI, 2015) which is 75.8% of residents in the state. In contrast, Huejotitán, Manuel Benavides, Maguarichi, represent 0.11% of the state in total (INEGI, 2015). Some of the mineral resources abundantly found in Chihuahua are iron, lead, zinc, gold, silver, and copper. In the districts where irrigation is practicable; cotton maize (Hard *et al.*, 2014)) and beans (Minnis, 2017) are the main crops, and apples and nuts are also significant products although scarcity of water has been a challenge to agricultural development in the state. In the western mountainous districts of the state -the Sierra Madre Occidental-, there is more rainfall (Standish, 2009) and therefore crop and livestock farming -cattle rearing- are the source of livelihood of the local people (Hard *et al.*, 2014, Martinez *et al.*, 2007). The state comprises 67 local governmental units called municipalities and each of them may include a city or town and its hinterland or a group of villages.

**TABLE 1. MUNICIPALITIES OF CHIHUAHUA STATE**

Ahumada	Cuauhtémoc	Jiménez	Ojinaga
Aldama	Cusihuirachi	Juárez	Pradexis Guerrero
Allende	Delicias	Julimes	Riva Palacio
Aguiles Serdán	Dr. Belisario Domínguez	La Cruz	Rosales
Ascensión	El Tule	López	Rosario
Bachíniva	Galean	Madera	San Francisco de Borja
Balleza	Gómez Farias	Maguarichi	San Francisco de Conchos
Batopilas	Gran Morelos	Manuel Benavides	San Francisco del Oro
Bocoyna	Guachochí	Matachí	Santa Bárbara
Buenaventura	Guadalupe	Matamoros	Santa Isabel
Camargo	Guadalupe y Calvo	Meoqui	Satevó
Carichí	Guazapares	Morelos	Saucillo
Casas Grandes	Guerrero	Moris	Temósachi
Chihuahua	Hidalgo del Parral	Namiquipa	Urique
Chínipas	Huejotitán	Nonoava	Uruachi
Coronado	Ignacio de Zaragoza	Nuevo Casas Grandess	Valle de Zaragoza
Coyame del Sotol	Janos	Ocampo	

*Source: Sistema Nacional de Información Municipal, INEGI.*

### **High Level of Inequality and Poverty in the State of Chihuahua**

Reports from CONEVAL (2010) show that 21 municipalities of Chihuahua are in the Gini coefficient range of 0.3490-0.3991, while 37 municipalities are in the range of 0.3991-0.4992, 8 municipalities are in the range of 0.4492-0.4993, while 1 municipality is in the range of 0.4993-0.5494 making them the areas with the highest level of inequality. In the same publication from CONEVAL, it is stated that the state of Chihuahua has 39.2% of

the total population living in poverty. The vulnerable population in the state due to social deprivation is 23.5% while 12.6% are vulnerable due to income.

Inequality is evident in the wide income gap based on the types of occupations. Four in every ten employees in Chihuahua are performing unpaid work or earn less than twice the minimum wage (roughly USD 8.80 per day); the proportion expands to two-thirds of total employment for those earning less than three minimum wages (USD 13.20) per day. Marginalized neighbourhoods are present in some rural communities, but they concentrate in urban areas. Six out of ten marginalized inhabitants in the state are urban dwellers of one of the state's largest cities. The human development index (HDI) levels for Chihuahua's non-indigenous population stood in 2006 at 26% more than the levels for indigenous groups. Inequality is particularly acute in municipalities with difficult geographical access where most indigenous people live (OECD, 2012). Considering the above, this article is divided into four parts. In the first, the literature review is presented, in the second the methodology, in the third the results and finally the conclusions.

## LITERATURE REVIEW

Socioeconomic development index has been used in other studies such as the research on the disparity among regions in Nayarit. This work identifies inequalities between the municipalities of the state of Nayarit, Mexico. The results show significant differences caused by factors such as marginalization, low economic activity, poor road structure, low level of population qualification and low occupation in secondary and tertiary economic activities. Of the twenty municipalities analysed, three municipalities have the greatest disadvantage, while one region shows the best condition (de Haro *et al.*, 2017).

In other studies, some attempts were made to design other measurements for development such as the research conducted by Lever (2000) whose study sought to develop a valid and reliable instrument to measure quality of life among the inhabitants of Mexico City. Based on an analysis of the content of their responses, quality of life items were selected for the sample. Then a Likert instrument was applied, containing the items obtained from the open interview. Factorial analyses and tests for internal consistency were applied to ascertain the factorial components of quality of life. This allowed statistically significant differences to be observed between quality of life factors and certain socioeconomic variables.

Socioeconomic index has been used in many countries such as Australia where there are four types but generally, the index is a number that is used to describe the relative socioeconomic advantage or disadvantage an area, or a region has. The advantage comprises of certain characteristics which are observed during every census in Australia, but those characteristics are changed at every census. Some of them are high unemployment rate, low incomes, a high proportion of people with poor English proficiency, many people without qualifications, a high rate of single parent families, etc. The higher number indicates that a region has desirable characteristics while a lower number shows that the characteristics of a region are not desirable and therefore constitutes lack of development. The government of Australia uses the ranking to target regions for scarce resource allocation, for determining areas that require funding and services, identifying new business opportunities and to research into the relationship between

socioeconomic disadvantage and various health and educational outcomes (Australian Bureau of Statistics 2018).

Several studies have used various forms of socioeconomic index for research. For instance, Saif-Ur-Rahman *et al.* (2018) studied the use of indices to measure socioeconomic status in South-Asian and concluded that among the cross-sectional studies, asset-based wealth index was the most commonly used indicator followed by income, expenditure, occupation, education and lastly, wealth index combined with education

Mutlaq (2011), studied the advantage of using socioeconomic development index rather than using Human Development Index (HDI) because it contains several weaknesses and is an inappropriate mechanism by which to measure human development. Additionally, the HDI does not take into account further important indicators, such as unemployment, poverty and environment, alongside GDP per capita; expected years of schooling and mean years of schooling; and life expectancy at birth and therefore proposed the Social Economic Development Index (SEDI) as a new means to measure the development level of countries because the SEDI uses more indicators than those examined in the HDI.

Ozaslan *et al.* (2006) studied the disparity among regions in Turkey by using a Socioeconomic Development Index. The study reported that (SEDI) rankings have contributed to the filling of the gap in the field of development by providing a considerable data input to development and planning initiatives conducted in Turkey on the basis of territories of various scales (districts, provinces, geographical regions, NUTS I, II, III regions). The main findings of the research covered 81 provinces according to the existing administrative structure of Turkey and includes 58 variables selected from social (demographic, employment, education, health, infrastructure, other welfare) and economic (manufacturing, construction, agriculture, financial) spheres. The result showed that territories that are underdeveloped in terms of certain indicators such as population dependency rate, average household size and infant mortality rate are fairly above the average of Turkey.

Many authors and organizations have written about inequality and its consequences in Mexico. One of such organizations is ECLAC (2018) that focuses mainly on economic issues of Latin America and the Caribbean in its 37<sup>th</sup> edition of report, it discusses the cost of inequality, failure of fiscal policy on inequality in Mexico, positive and negative interactions between distribution, growth and investment. Scott (2008) wrote about the performance of redistributive spending and identified the constraints as political and structural factors. Socioeconomic inequalities occur naturally among regions during the process of economic growth (Lewis, 1954) but when the disparity is wide and extremely significant, it can lead to major social problems such as conflict and violence, social exclusion and low self-esteem (Sen, 2000). In addition, it retards the overall rate of economic growth of the state. Higher inequality causes growth to remain low because lower-income households cannot afford health services and accumulate physical and human capital (Galor and Moav, 2004; Aghion, Caroli & Garcia-Penalosa, 1999). An evidence to prove this phenomenon is the study on how the advent of industrialization came with a widening disparity between northern regions and southern regions of Mexico and the result shows that northern regions improved in the rate of development rapidly while the southern region fell farther behind with the rate of development becoming slower than before. It was proven that the difference between the levels of human capital in the two regions played a decisive role in the exacerbation of this inequality (Oreggia, 2003).

In concordance to Lewis theory, a study conducted by IMF (2015) showed that increasing the income share of the poor and the middle class actually increases growth while a rising income share of the top 20 percent results in lower growth—that is, when the rich get richer, benefits do not trickle down. This suggests that policies need to be country specific but should focus on raising the income share of the poor and ensuring there is no hollowing out of the middle class to tackle inequality. Inequality negatively affects growth and its sustainability (Ostry, Berg & Tsangrides, 2014).

The scope of development has been widened. In addition to being concerned with the efficient allocation of existing scarce (or idle) productive resources and with their sustainability, it has now included the aspects of economic, social, political, and institutional mechanisms, both public and private, which is essential in creating rapid (at least by historical standards) and large-scale improvements in the standard of living of the peoples of Africa, Asia, Latin America, and the formerly socialist transition economies, increasing national production, raising levels of living, and promoting widespread employment opportunities are all as much a function of the local history, expectations, values, incentives, attitudes and beliefs, and institutional and power structures of both the domestic and the global society as they are the direct outcomes of the manipulation of strategic economic variables such as savings, investment, product and factor prices, and foreign-exchange rates while paying attention to the crucial roles that values, attitudes, and institutions play in the overall development process (Todaro and Smith, 2014).

A study by IMF shows that some policies and program created in Mexico to reduce poverty has produced positive results in offsetting the rise in labor income inequality since 2014. The programs are (i) the conditional cash transfer program *Prospera*, formerly known as *Oportunidades* and *Progresa*, (ii) the non-contributory pension program for elderly adults *Programa Pension para Adultos Mayores*, formerly called *Programa 70 y Mas*, (iii) the farmland subsidies program *Proagro* (formerly *Procampo*), (iv) government scholarships, and (v) non-monetary medical transfers in the form of free or subsidized medical services provision. Without *Prospera* and non-contributory pensions, the poverty index would be 2.3 percentage points higher, increasing from 18.7 to 21 percent, and the Gini coefficient would increase from 44.9 to 46.2 in 2016. Not only do these transfers reduce poverty and overall inequality, they also have an equalizing impact on ex ante opportunities. The other three programs are relatively successful: transfers increase with income but represent a smaller portion of richer households' net market income— that is, their income before transfers. While *Proagro*'s subsidies are the highest for the poorest and richest households and lower for middle-income households, government scholarships and medical non-monetary transfers are consistently higher for richer households. The study concluded that *Prospera*, the non-contributory pension program for elderly adults, and *Proagro* are ten times more effective at reducing income inequality than government scholarships and government transfers subsidizing healthcare consumption (Lambert & Park, 2019).

The causes of regional disparity in Mexico were identified by González (2009) to be accelerated urbanization, a process which began between 1960 to 1980, urban population grew from 45.5% of the total population in 1975 to 72.3% in 2009 as a result of the newly industrialized areas. The governmental capacities were insufficient for the needs of the rising urban population in the cities. Also, the rural-urban migration caused labor shortage in rural areas thereby retarding economic growth in rural areas. In addition,

high ratio of population growth to economic growth; a disproportionate population growth of 15.2% between 2000 and 2010 compared to GDP growth of 2.3% exacerbates regional disparity. Capital agglomeration-uneven concentration of capital is another cause. This trend began with the adoption of the Import Substitution Model which created a tendency for capital to accumulate in certain regions of the country. The same was the case with the NAFTA and other free trade agreements that were implemented afterwards. Most of these free trade agreements in Mexico are focused on manufacturing industries in the northern part of the country. Consequently, the benefits of FDI are concentrated in that region. Yet another cause is the constant economic crisis which causes contraction in government spending which prevents execution of public projects in struggling areas.

On the other hand, a study on wage inequality and economic growth in Mexican regions by Tello & Ramos (2012) provide evidence about the association of inequality and growth across 32 Mexican states (31 states and the Federal District) over a period of 10 years (1998-2008) by using several measures of inequality and different econometric specifications. They found evidence of a positive relationship between changes in inequality and changes in growth by estimating different models, including OLS, FES, FE-IV and IV-GMM, and obtained mixed evidence on the relationship between inequality and growth which shows that existing income and human capital inequality are likely to increase growth, but the magnitude of their effect is relatively small. The positive or negative effect of wage inequality on growth is caused by differences in the estimation techniques, the variables used in the analysis, the source of the data used to measure inequality, the level of regional analysis and the differences within regions. Second, the positive and negative influences of inequality on growth are mostly associated with inequality in different parts of the income distribution.

Herrero, Figueroa & Sanz (2006) observed smaller units, and applied a model of economic convergence to smaller territorial units. They explain the situation of the level of socioeconomic development of the municipalities and analyse the absolute convergence to identify territorial disparities, using a synthetic indicator that requires many variables. In other work, Herrero, Figueroa & Sanz (2010), show the evolution of disparities through synthetic indicators of development with municipal disaggregation. For its part, also at the municipal level, Fuentes (2007) analyses the evolution of municipal disparities in Mexico, and reports high inequality between municipalities according to level of economic development; its analysis is based on the relationship of public investment in infrastructure and the state's internal product. In a similar work, using a composite index, Reig (2010) analysed the relative socioeconomic potential in rural municipalities, among which he found heterogeneity. Reig begins with the characterization of the socioeconomic level and then classifies the municipalities as deficient and efficient (with greater socioeconomic potential).

Finally, in the study of regional disparity among municipalities of Nayarit by de Haro *et al.* (2017), the results show significant inequalities between the municipalities of Nayarit, Mexico, in terms of education and paved roads indicating that there is no distribution of resources as required by each of the municipalities. The results can guide the government on how to design the programs to raise the quality of education and integral road to benefit the municipalities that are most in need. It was identified that marginalization, poor economic activity and economic dependence, in addition to the poor road structure have a significant negative effect on the increase of socioeconomic

inequality. Likewise, the low level of qualification of the population, the low occupation in secondary and tertiary economic activities and the geographical situation of the municipalities were associated with the growing inequalities of the development potential of the municipalities.

#### **METHODOLOGY: SOCIOECONOMIC DEVELOPMENT INDEX**

In our work we follow the paper of de Haro *et al.* (2017), the SEDI evaluates the differences and similarities in socioeconomic development among municipalities. The difference in development levels is defined as the qualitative expression that indicates the socio-economic disproportion between municipalities. The SEDI was established based on the following indicators: index of marginalization, degree of urbanization, gross rate of economic activity, coefficient of economic dependence and density of paved roads. These indicators were preferably chosen because they reflect the economic condition of the people living in Chihuahua more satisfactorily. Marginalization index, for instance, captures a wide range of living conditions. It is the analysis of communities which have a high level of social vulnerability and takes into account a wide variety of variables such as rate of illiteracy among 15 years old and above, percentage of population without primary education, percentage of occupants in homes without drain or toilet, percentage of occupants in homes without electric power, percentage of occupants in houses without pipe borne water, percentage of homes with some level of overcrowding, percentage of occupants in houses with earth floor, percentage of population in localities with less than 5,000 population, percentage of population earning income up to two minimum wage. The index value can be negative (-), zero (0), or positive (+).

Urban density is an important factor that contributes to socioeconomic development because cities operate more efficiently when residents live in denser urban surroundings. Gross economic activity rate is an important indicator because it drives long term economic growth. It shows the number of economically active workers that are available to produce goods and services and therefore indicates the level of productivity in an economy (UN & ILO, 2010). A high economic dependence coefficient can cause reduction in the growth of productivity.

When the unproductive percentage of the population grows, it will diminish the productive capacity and could lead to a lower economic growth in the long run. Density of paved roads is also included in the SEDI index in this study because roads link producers to markets, workers to jobs, students to school, the sick to hospitals. In general, they bring economic and social benefits therefore they are vital to any development agenda. (World Bank, 2015).

To construct the SEDI index we use as a model the work of de Haro *et al.* (2017) and the index was constructed with five variables as indicated above, four variables were taken from the INEGI (National Institute of Statistics and Geography) and one from CONAPO (National Population Council); all of them corresponding to the year 2015. The SEDI index was built as a follow:

$$SEDI = f(M, DU, GEAR^+, EDC^-, DPR^+) \quad (1)$$

Where:

SEDI = Socioeconomic Development Index

M = Marginalization index

DU = Degree of Urbanization

GEAR= Gross Economic Activity Rate

EDC = Economic Dependence Coefficient

DPR= Density of Paved Roads

As can be seen in equation 1, the marginalization index and the economic dependency coefficient have an inverse relationship to the level of development. The marginalization index shows the global impact of the deficiencies suffered by the population because of the lack of access to education and health services, inadequate housing, lack of assets and low monetary income. It was taken from CONAPO estimates for the year 2015. The Degree of Urbanization (DU) estimated at the local level is the proportion of the urban population (Pu) it represents, with respect to the total population (Pt) at the local level. Conventionally, a population of 15,000 and more inhabitants is considered to be an urban characteristic (based on Unikel, 1968). This indicator assumes that the greater the degree of urbanization, the higher the level of development achieved:

$$DU = \frac{P_u}{P_t} 100 \quad (2)$$

The Gross Economic Activity Rate (GEAR) shows the importance of the working population within the economic framework. It represents the proportion of the population that is economically active (PEAO) and the total (PT). It is considered that the higher the calculated rate of economic activity, the higher the level of socioeconomic development of a territory.

$$GEAR = \frac{PEAO}{PT} 100 \quad (3)$$

The Economic Dependence Coefficient (EDC) shows relationship between the economically active employed population (PEAO) and the unemployed population (PEI, PEAD,  $p < 12$ ), it measures the degree of dependence that on average, a person with a job has to cope with a person that does not have a job. It is assumed that the greater the dependence, the lower the level of socioeconomic development, because there are more people who lack a salary.

$$EDC = \frac{P < 12 + PEAD + PEI}{PEA} 100 \quad (4)$$

The Density of Paved Roads (DPR) expresses the level of accessibility of the population, as it is a relationship between the Length of Paved Network (LPN) and the surface of the municipality (S). It is assumed that the higher the density of paved roads in a municipality, the easier it is to have access to the Municipality.

$$DPR = \frac{LPN}{S} \quad (5)$$



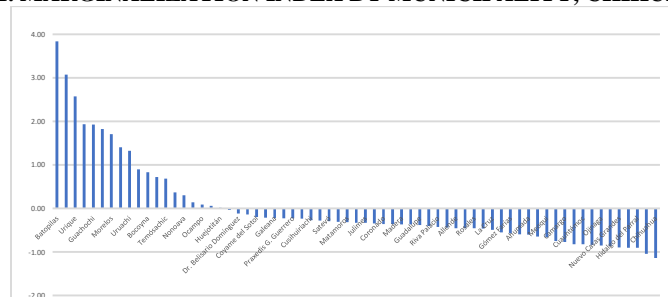
The SEDI index began with the individual calculation of the socioeconomic development indicators for each municipality. Then, the indicators were standardized so that they were comparable; In this procedure, the direct values were transformed into normalized values of a distribution characterized by the mean and standard deviation arguments. The formula used to standardize was  $Z = (X - \mu)/\sigma$ , where  $Z$  is the standardised value of the indicators which will be obtained,  $X$  is the value to be normalized,  $\mu$  the arithmetic mean and  $\sigma$  the standard deviation of the population. Next, the average indices of each municipality were calculated, adding the rows of the corresponding values to each indicator, and dividing by the number of indicators (five). The value of the marginalization index and the economic dependence coefficient were multiplied by (-1), before averaging them, because they have an inverse meaning at the level of development. Finally, according to the value of the average index, the municipalities were classified into five levels of socioeconomic development: very low (less than -0.50), low (from -0.50 to 0.00), medium (from 0.01 to 0.50), high (from 0.51 to 1.00) and very high (greater than 1.00) (de Haro *et al.*, 2017: 127).

## RESULTS

### Marginalization Index

Batopilas is the municipality with the highest level of marginalization which is 4, followed by Carichi and Urique with a marginalization index of 3, the next marginalization level of 2 consists of Balleza, Guachochi, Guadalupe y Calvo and Morelos, the group of municipalities with marginalization of 1 are Maguarichi, Uruachi, Guazapares, Bocoyna, Chínipas, Temósachic, the areas with a marginalization value close to zero (0) below and above are Moris, Nonoava, El Tule, Ocampo, Rosario, Huejotitán, San Francisco de Borja, Dr. Belisario Domínguez, Guerrero, Coyame del Sotol, Gran Morelos, Galeana, Manuel Benavides, Praxedis G. Guerrero, Matachí, Cusihuirachi, Buenaventura, Satevó, Valle de Zaragoza. The areas with a marginalization index of (-1) La Cruz, San Francisco del Oro, Gómez Farías, San Francisco de Conchos, Ahumada, Saucillo, Meoqui, Juárez, Camargo, Aquiles Serdán Cuauhtémoc, Aldama, Ojinaga, Santa Bárbara, Nuevo Casas Grandes, Delicias, Hidalgo del Parral, Jiménez and Chihuahua. Chihuahua has the lowest marginalization index.

**FIGURE 1. MARGINALIZATION INDEX BY MUNICIPALITY, CHIHUAHUA, 2015**



[Click here to see full graph](#)

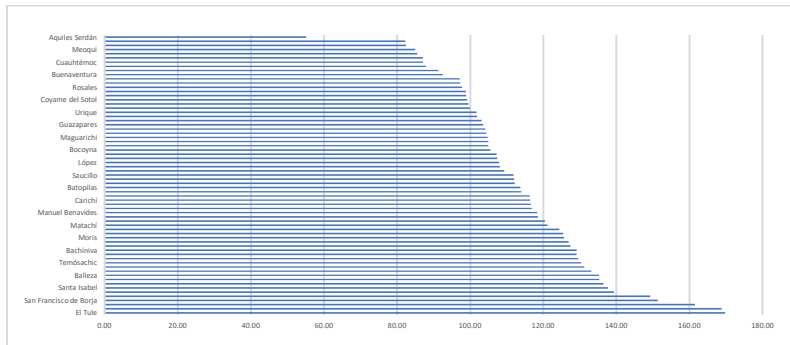
Source: Prepared by the authors, based on data from CONAPO.



**Coefficient of Economic Dependence**

The municipalities with the highest coefficient of economic dependence are El Tule, Belisario, Domínguez and Rosario. This means that in the case of El Tule the municipality with the highest coefficient, approximately 170 people without employment are being supported by 100 people with formal employment. Chihuahua and Juarez are among the lowest but Aquiles Serdán has the lowest coefficient of 55.12%. As seen in Figure 4.

**FIGURE 4. COEFFICIENT OF ECONOMIC DEPENDENCE, CHIHUAHUA, 2015**



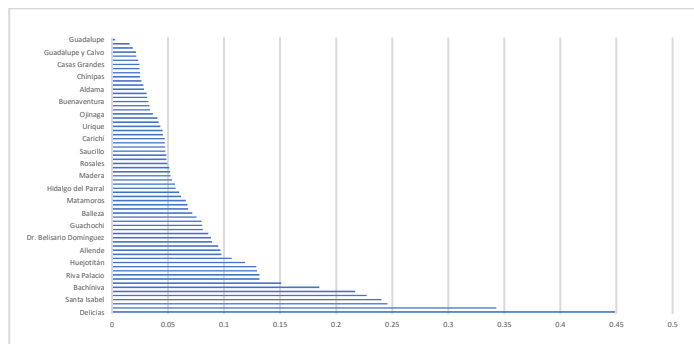
[Click here to see full graph](#)

Source: prepared by the authors, based on data from INEGI .

**Density of Paved Roads**

The municipal with the highest index of density of paved road is Delicias followed by Meoqui, Matachí, Santa Isabel, Gómez Farías, Gran Morelos, the municipalities with the lowest index are Ascensión, Coyame del Sotol, Guadalupe. As seen in Figure 5.

**FIGURE 5. DENSITY OF PAVED ROADS, 2015, (KM / 100 KM<sup>2</sup>)**



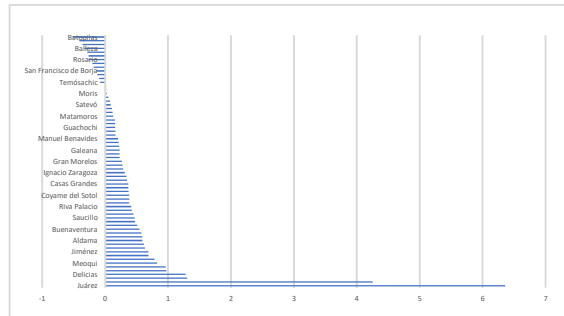
[Click here to see full graph](#)Source: Prepared by the authors, based on data

from INEGI.

### Socioeconomic Development Levels of the Municipalities

The general analysis of the socioeconomic conditions represented by the socioeconomic index of all the 68 municipalities is shown in Figure 6. Batopilas has the lowest socioeconomic index due to the very high level of marginalization index and a relatively high level of economic dependence rate, these factors show the low socioeconomic development level of the municipality. Other contributing factors to this low rate are the low degree of urbanization, low density of paved roads. However, the municipality has a high gross economic activity rate lowering the margin of socioeconomic index for the municipality. The municipality with the highest socioeconomic index is Juarez which has the highest urban density (which means most people in Juarez live in urban conditions) followed by Chihuahua which also has the second highest urban density and the second lowest economic dependence coefficient after Juarez.

**FIGURE 6. SEDI INDEX, CHIHUAHUA, 2015.**



[Click here to see full graph](#)

*Source: Prepared by the authors.*

#### **Very Low Level**

The municipalities in this category are Batopilas, Carichí, El Tule, Balleza, Dr. Belisario Domínguez, Chínipas, Rosario, Uruachi, Morelos, San Francisco de Borja, Urique, Nonoava, Temósachi and they all have a high economic dependence coefficient (101.74–169.73), another common characteristics they share are low urban density with a value within a range of (0.05-0.59) and a high marginalization index between (-0.04-3.84). These factors contribute to the low SEDI in these municipalities.

#### **Low Level**

The municipalities in this category are Gómez Farías, Riva Palacio, Cusihuirachi, Madera, Coyame del Sotol, Coronado, Julimes, Casas Grandes, Allende, López, Ignacio Zaragoza, Santa Bárbara, Ocampo, Gran Morelos, Bocoyna, Valle de Zaragoza, Galeana, San Francisco de Conchos, Matachí, Manuel Benavides, Guadalupe, La Cruz, Guachochi, Bachíniva, Guazapares, Matamoros, San Francisco del Oro, Huejotitán, Satevó, Santa Isabel, Praxedis G. Guerrero, Moris, Guadalupe y Calvo, Maguari which all have a marginalization index ranging from ( -0.20 – 1.93 ), they all have in common, a lower rate of economic dependence coefficient ranging between (97.16 -137.72). In addition, they have an urban density in the range of (0.03 -1.57).

***Medium Level***

The municipalities in this category are Cuauhtémoc, Delicias, Aquiles Serdán, Hidalgo del Parral, Meoqui, Nuevo Casas Grandes, Camargo, Jiménez, Ascensión, Ojinaga, Aldama, Janos, Ahumada, Buenaventura, Rosales, Namiquipa, Saucillo and Guerrero. The marginalization indices are low (-1.04 to -0.14), the economic dependent coefficient of these municipalities range from 84.98 to 111.83 which is lower than the previous categories making the socioeconomic development more improved.

***High Level***

The only municipality in this category is Chihuahua with a SEDI index of 4.25, making it the municipality with the second-best socioeconomic conditions. The economic dependence coefficient is 82.49 which is much lower, urban density is 24.60 which is the second highest among all the municipalities, density of paved roads is 0.0675 km/100 km<sup>2</sup>. The marginalization index is the lowest for Chihuahua at -1.14.

***Very High Level***

Juarez has the highest SEDI index at 6.31 which shows the municipality has the most favorable socioeconomic conditions. with a highest urban density of 39.87, this shows that the number of people living in urban areas compared to those in rural area is high. The economic dependence coefficient is 6.36 and a low marginalization index of -0.75.

**CONCLUDING REMARKS**

Inequality is the uneven dispersion of income as well as uneven distribution of economic development opportunities which is a detriment to development. These results can serve as a guide for the redistributive policies created by the government in order to target regions that lack economic development opportunities.

The results show that there is high level of inequality between a few municipalities (Juarez and Chihuahua city) and the rest of the municipalities. These two municipalities have a very low rate of marginalization and the coefficients of economic dependence are lower compared to the rest of the municipalities. The SEDI index for these two municipalities also indicates that socioeconomic conditions are more favorable.

Marginality –from the point of view of United Nations University’s publication from the beginning of eighties about natural resources for human development (Ruddle & Rondinelli, 1983) –derives from physical remoteness (low accessibility to services and working places), ecological fragility, low population density, ethnic structure, having an underdeveloped economy, the unavailability of resources or inability to use them and isolation from political influence (Pelc *et al*, 2017). Therefore, regions with a high marginalization index experience some of these negative situations in various ways while areas with low marginalization rate such as Juarez and Chihuahua city experience less of these negative factors as indicated in the analysis.

The lower level of economic dependence in Juarez and Chihuahua city proves further the accuracy of the study that concluded that industrialization due to disparity in human capital availability among regions increases inequality whereby northern border regions experience more growth than southern regions. Juarez and Chihuahua city belong

to the group of northern border regions where there is presence of “Maquiladoras” (manufacturing industry) and other businesses both local and foreign therefore there are more employment opportunities.

The high urban density of these two municipalities is a good feature that promotes the level of development in the regions because a high urban density leads to increased human activity, a more economically dynamic retail environment (Jacobs, 1961), it reduces capital costs for infrastructure such as water, sewer, electricity generation plants, less costs of constructing distribution systems of pipes and wires as a result of shorter distances within the region where residents live (IBI Group, 1991).

To eliminate the high level of economic dependence that is observed among most of the municipalities in the state of Chihuahua, the government should focus on creating more business opportunities by providing incentives for schooling to boost the pool of human capital, and by implementing favorable fiscal policies that will be peculiar to each region (regional policies) such as setting interest rates with the aim of attracting investors in order to increase the rate of employment and reduce economic dependence. To reduce the high level of marginalization, expansionary policies must be implemented to provide amenities and infrastructures, and better town planning in the areas with a lower SEDI index. It is necessary to consider many factors such as cultural factor that might cause the suggested policies to be ineffective as a subject in further studies.

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