Closing the Indigenous Gap in Mexico: A Comparative Report on Multidimensional Poverty Estimates from an Ethnic Perspective

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Abstract

Indigenous people in Mexico are most likely to be disadvantaged and live in poverty than non-indigenous people. This paper reports, from an ethnic perspective, on the findings of multidimensional poverty estimates to provide a deeper understanding of the forms in which indigenous people in Mexico experience poverty. The premise guiding this exercise is that the primary purpose for poverty measurement is to provide a continuous assessment of how to better target poverty in Mexico. The analysis utilizes Alkire and Foster's specific multidimensional measurement framework. It also employs the Mexican official poverty measurement methodology. Both methods are applied to 2014 data provided by the Mexican National Household Expenditure Revenue Survey (ENIGH) to study the appropriateness of each methodology by comparing the results obtained. In addition, the analysis places special emphasis on the measures' population decomposability and dimensional decomposability to explore the extent to which the privation of social rights influences the living conditions of Mexico's indigenous poor to better target poverty alleviation efforts. Results showing higher levels of deprivation in the social rights domain for indigenous people than for non-indigenous people reveal the need for the Mexican government to articulate social policies that are specifically designed to tackle the social rights deprivations that the indigenous poor endure.

I. Introduction

Worldwide, indigenous populations are among the most vulnerable and marginalized. This is particularly true in Mexico, where disadvantage among indigenous people is well documented. While indigenous people account for only 10 percent of the country's total population, the National Council for the Evaluation of Social Development Policy (CONEVAL, by its Spanish acronym) estimates that the percentage of indigenous people who live in poverty in Mexico is nearly double that of the general population; 76.8 percent versus 43 percent in 2012 (CONEVAL, 2012). In addition to income poverty, indigenous people face serious deprivations in terms of equitable access to basic social rights such as health services, education, food, and housing.

In this context, the present study aims to analyze multidimensional poverty estimates for indigenous and non-indigenous people in Mexico using the definition of indigeneity of the National Commission for the Development of Indigenous People (CDI, by its acronym in Spanish)–where a person is considered indigenous if he/she forms part of a household where the head of the household, their spouse, or any of their relatives declares speaking an indigenous tongue– to identify the indigenous population in the ENIGH survey. This research also seeks to provide, to a greater extent than previous studies have done, a broader understanding of indigenous multidimensional poverty by looking at particular poverty characteristics that predominantly affect indigenous groups vis-à-vis non-indigenous groups.

To implement this comparison, this research follows both the Alkire-Foster (2007) multidimensional poverty methodology and CONEVAL's newly developed multidimensional poverty measurement for assessing both income poverty and unequal access to basic services. CONEVAL's new methodology was developed in accordance to Alkire and Foster's methodology in that it incorporates a social rights approach by measuring indicators for each type of deprivation poor people experience (access to education, food, housing, dwelling, among other social rights) and differs from the Alkire-Foster method only in the weights given to each indicator. By using data from the National Household Expenditure Revenue Survey (ENIGH) 2010-2014, the study will attempt to show, under each methodology, the likelihood of falling into multidimensional poverty and of being socially deprived in basic social rights, based on a person's ethnicity.

The paper is organized as follows. The following section begins with the analysis of multidimensional poverty measurements and provides a systematic overview of Alkire-Foster's (2007 & 2011) multidimensional poverty methodology, as well as the multidimensional poverty measurement methodology that was developed by CONEVAL in 2008 and that is currently being used to measure Mexico's poor. The third section provides an international definition of indigenous peoples, highlights the drawbacks of using Mexico's definition of indigenousness, and provides a brief review of the existent research on poverty analysis from an ethnic

perspective in Mexico. In addition, this section briefly explains the importance of accounting for rural bias when estimating poverty among indigenous people in Mexico. Using CONEVAL's multidimensional methodology, the fourth section focuses on poverty analysis results between indigenous and non-indigenous population groups in Mexico. This section also contains some elementary observations based on the impact of each social deprivation dimension on indigenous people's vulnerability to poverty and explores how poverty estimates in Mexico would vary by taking into account an equally weighted measurement for each dimension considered as presented in Alkire-Foster's (2007 & 2011) multidimensional poverty methodology. The fifth section places special emphasis on the Alkire et al. (2015) measure's dimensional decomposability and subgroup decomposability by estimating the Censored Headcount Ratio–or incidence of poverty (H_0)–as well as the contribution of each dimension to the Censored Headcount Ratio within each population subgroup and the overall Adjusted Headcount Ratio (M_0). The following section provides a state-level decomposition of multidimensional poverty in Mexico to allow for spatial assessments of the depth of poverty. Given that the results of the analysis indicate that indigenous poor people experience deeper levels of deprivation in the social rights dimension, the seventh section discusses the importance of poverty alleviation programs that target poverty by taking into account deprivation in multiple dimensions. Finally, the eight section offers some concluding suggestions for better designing targeted policies aimed at reducing poverty among ethnic minority groups in Mexico.

II. Measurement Methodology

Poverty is a social issue that imposes serious limitations on the physical, intellectual, and social development of the people who endure it. Thus, poverty is multidimensional and its effects are not restricted only to the privation of income. In 1985, Amartya Sen introduced the first multidimensional poverty measurement, known as the capability approach. According to Sen, a multidimensional poverty measurement method should follow three steps to incorporate other non-income capabilities: (1) selecting the space for evaluation; (2) establishing cutoffs to identify the poor in each dimension considered; and (3) finding an appropriate aggregation method to combine the data into an overall measurement of poverty (Sen, 1990). Following Sen, numerous scholars have proposed multidimensional poverty measurements such as Chakravarty et al. (1998), Bourguignon and Chakravarty (2003), and Duclos et al. (2004), and most recently, Alkire and Foster (2007 & 2011) and Alkire et al. (2015).

The way poverty is measured directly influences how we come to understand the phenomenon and how governments design policies to address it. At present there are two main approaches to identifying the multidimensional poor. To date, the Alkire and Foster method (the AF method) of multidimensional poverty measurement is the most widely used by governments and poverty eradication efforts (Alkire and Foster, 2007). This framework is based on Sen's methodology for poverty measurement and it is motivated by a counting-based, union approach because it

considers someone who is deprived in a single dimension (or in k-dimensions) as poor in the multidimensional sense.

Alkire-Foster Multidimensional Poverty Methodology

In a one-dimensional analysis, a person is identified as poor through the use of a poverty line cutoff or threshold, where poor people are identified as those whose household income levels fall below the established poverty line. However, in the multidimensional measurement setting, which is based on a concept of poverty as multiple deprivations that are simultaneously experienced and so, consequently, analyzes poverty according to multiple variables or dimensions, there are numerous thresholds for each dimension measured. Thus, a multidimensional analysis of poverty requires an identification function that incorporates different social deprivations to determine whether each person is to be considered poor.

Alkire and Foster (2011) introduce a union methodology of multidimensional poverty measurement that incorporates a number of social and economic dimensions of poverty and deprivation to create a measure methodology that complements the one-dimension poverty indexes. The Alkire-Foster (AF) method considers a plurality of deprivation indicators, summarizing the information into a consistent parametric class of multidimensional poverty indexes. These indexes can be then decomposed by population subgroups (e.g. sex, ethnicity, geographic area, etc.), a trait that makes them suitable for policy analysis and design.

The AF method can be divided into two sequential steps: (1) the identification of individuals who are deprived, and (2) the measure of poverty based on such identification. In that sense, the AF methodology introduces a "dual-cutoff" identification method that can be explained as follows.

First, the methodology provides a deprivation cutoff for each dimension. That is to say, for each poverty dimension j, a deprivation cutoff or threshold z_j is defined as the minimum achievement required of any given indicator in order to be non-deprived. If a person falls short of the deprivation cutoff z_j for a given dimension, the person is said to be deprived in that dimension. For each dimension, if a person is said to be deprived he/she will receive a 1 score; if he/she is not deprived in that dimension, a 0 score will be given. Since a person may experience deprivation in a number of dimensions, deprivation cutoffs are collected in the d-dimensional vector z.

Indicators of each dimension can enter the analysis with different weights depending on their relevance. Weights are collected in a vector $\omega = (\omega_1, \dots, \omega_D)$ with $0 < \omega_j < 1$ and $\sum_{j=1}^{D} \omega_j = 1$. That is to say, if each indicator is viewed as having equal importance, then all weights will be equal to $1/D$, where D is the total number of dimensions. Alkire and Foster's poverty measurement methodology, based on deprivation counts and simple averages, implicitly assigns an equal

weight of $\omega_j = 1/D$ to each dimension j, given that the dimensions have been chosen to be of relative equal importance.

Second, in addition to the deprivation cutoffs, Alkire and Foster (2011) use a second cutoff or threshold to identify the multidimensional poor by defining a poverty cutoff. The methodology incorporates an identification method (ρk) that identifies whether a person is poor or not by counting the amount of dimensions in which he/she is deprived and the weight given to such dimensions. The poverty cutoff is the minimum deprivation score a person needs to exhibit to be identified as poor. If the person is poor, the identification function takes on a value of 1; if the person is not poor, the identification function takes a value of 0. That is to say, ρk identifies person i as poor when his or her deprivation score is at least k; if the deprivation score falls below the cutoff k, then person i is not poor according to ρk. Both the indicators and the poverty cutoffs constitute the "dual-cutoff" approach when referring to the AF method.

Third, the identification function ρk (γ_i, z) modifies the entries of matrix of g^{α}as g^{α}_{ij} ρk (γ_i, z), so that if a person i is not identified as poor, the row vector $g^{\alpha}(k)$ is replaced with zeroes. At this point in the analysis, the measurements focus only on the poor and the dimensions in which they are deprived. All information on the non-poor is replaced with zeroes—what is usually referred to as the Censored Deprivation Matrix. People with ρk deprivations are poor, while those with a range of deprivations $< k$ are not.

Finally, multidimensional poverty is measured by the Censored Headcount Ratio–or incidence of poverty–H_0. This measures the proportion of people who are poor in at least d dimensions according to ρk, where:

$$H_0 = \frac{\sum_{i=1}^{N} \rho k\ (\gamma_i, z)}{N} = \frac{q}{N}$$

However, H_0 does not increase when a person becomes deprived in a new dimension. Instead, the Adjusted Multidimensional Poverty Headcount Ratio, M_0, calculates the ratio between the weighted number of deprivations faced by the poor and the number of poor in the population. Let $|\ g^0(k)|$ be the ratio of the weighted number of deprivations faced by the poor, expressed as the sum of all entries of matrix $g^0(k)$: $|g^0(k)| = \sum_{j=1}^{D} \sum_{i=1}^{N} g^0_{ij}\ (k)$, and let $A = \frac{|\ g^0(k)|}{q}$ be the number of poor individuals such that:

$$M_0 = H * A = \frac{|\ g^0(k)|}{N}$$

Unlike the Censored Headcount Ratio, the Adjusted Poverty Headcount Ratio is sensitive to income decrements among the poor and registers an increase when the shortfall of a poor person rises. If a person becomes more deeply deprived, then the respective $|g^0(k)|$ will rise and so will

M_0. Because of this relationship, the Adjusted Poverty Headcount Ratio is said to satisfy the monotonicity axiom (if a poor person's level of deprivation increases, poverty should rise) (Alkire et al., 2015).

The AF method allows for multidimensional poverty measures to be further decomposed by each dimension of deprivation. For example, consider $|g_j^{\alpha}(k)|$ the sum of the j–column entries of g^{α}(k); then, for $M_{\propto}=\sum_{j=1}^{D}\frac{|g^{\alpha}(k)|}{N}$, the percentage contribution of each indicator to the multidimensional poverty measure will be $CI_{\propto j} = \frac{|g_j^{\propto}(k)|}{N*M_{\propto}}$.

Mexico's Multidimensional Poverty Measurement

For decades, Mexico lacked an official measurement of poverty. However, in 2006, the Mexican Congress approved the General Law for Social Development (LGDS). This legislation was responsible for setting forth CONEVAL, a public body with technical autonomy and management whose purpose was to ensure a more transparent and comprehensive measurement of poverty. Since then, CONEVAL has had the sole task of regulating and coordinating the evaluation of policies and programs for social development. By its very nature, the CONEVAL council is responsible for establishing guidelines and criteria for the definition, identification, and measurement of poverty.

In 2008, CONEVAL developed the first multidimensional approach to measuring poverty in Mexico, using an approach similar to the AF method and information derived from the National Household Expenditure Revenue Survey (ENIGH). As with the AF method, in addition to the income-based approach, CONEVAL's new methodology also focused on social rights. According to the LGDS, it was established that CONEVAL was to measure poverty using six social dimensions in addition to income: access to education, access to health services, access to social security, quality of living spaces, access to basic services in the dwelling, and access to food.

Thus, this multidimensional poverty methodology incorporates two elements of the Mexican population's living conditions: economic wellbeing (measured through income) and social rights. In terms of identifying individuals deprived on the economic wellbeing space, CONEVAL uses the standard monetary poverty method, which compares per capita income measured by the ENIGH as the reported household income with the monetary value of two baskets, one including food and the other one includes any additional goods or services usually consumed by Mexican families. This income cutoff selected by CONEVAL is the asset poverty line.

A second income cutoff, the capabilities line, is also used. The capabilities line is grounded in a social rights approach, based on the premise that any individual is entitled to a series of conditions that are considered fundamental for human dignity. Hence, a person is considered to

be multidimensionally poor if he/she is deprived in both economic wellbeing and in social rights. In the arena of social rights, deprivation identification requires a threshold that separates deprived from non-deprived. Thresholds on the social rights space are equivalent to the poverty line-thresholds on the economic wellbeing space and are defined for each of the six dimensions listed above according to the following criteria:

(1) Where education is concerned, the indicators for educational deprivation focus on people aged 2-15 and those who are above 16 years of age. A person aged 2-15 is considered deprived of education if he/she is not receiving formal education (attending school). For the population above 16 years of age, deprivation is calculated according to how much a person lacks the mandatory basic education that was current at the time he/she should have completed his/her primary education.

(2) Deprivation of health services is measured based on access to popular insurance, a social security public institution, or a private medical service. Thus, a person is considered deprived of health services if he/she is not enrolled in or not entitled to receive medical services from public or private institutions, including Popular Insurance (*Seguro Popular*), social security institutions (federal or state IMSS, ISSSTE; PEMEX, Army or Navy), or if he/she lacks access to private medical services.

(3) On the other hand, deprivation of social security is measured through direct or family supported access to an existing plan for medical services and pensions for senior citizens, or voluntary enrolment in another institution that provides access to the same services. As expected, a person is considered deprived in the dimension of social security if he/she does not receive medical services and pensions through a public, voluntary or a family network.

(4) The dimension that measures the quality and availability of space in housing considers the adequacy of the living space. It is calculated by two variables as specified in the General Law of Social Development: the number of persons living per bedroom and the materials used to build the living space. According to CONEVAL, a family will be counted as deprived in this dimension if there are more than two persons living per bedroom or if one of the following conditions is met: the floors are made of soil, the dwelling has walls made of throwaway material, or the dwelling has a roof made of throwaway material or soil.

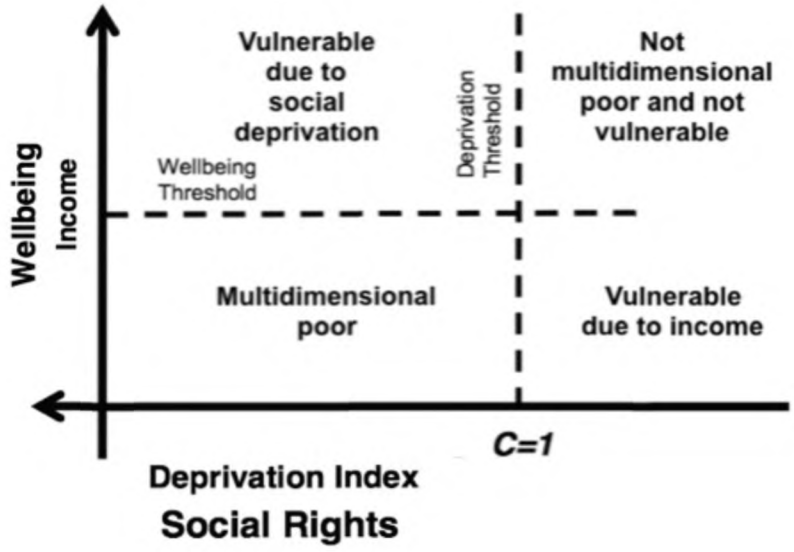
(5) The measurement of deprivation in dwelling quality is related to the dimension that measures the quality and availability of space in housing in that it analyzes the conditions of the house where a person's family lives. The following factors are used to determine if a person is deprived in basic dwelling-related services: availability of electricity and public drainage services, measured through access to water; sewage; and a toilet.

(6) Access to food is determined by a measurement on a spectrum of food security where food insecurity can be characterized as slight, moderate, or severe. The food security scale

used by CONEVAL evaluates aspects such as worrying over lack of food, changes in the quality or quantity of food, or even experiences of hunger. People living in households with a moderate or level of severe food insecurity are considered deprived in this dimension.

According to CONEVAL and based on the principles of indivisibility and interdependence of human rights, for a person to be multidimensionally poor he/she must possess an income below the wellbeing threshold and must have at least one or more social deprivations. This cutoff point (C=1) is called the deprivation threshold. Income and social rights are equally weighted. Each social right is likewise equally weighted, giving an effective weight of 50 percent to all six social rights and the other 50 percent to income. A person is considered to live in extreme poverty if he/she is deprived in income according to the food basket metric and is simultaneously deprived in three or more social rights. CONEVAL's multidimensional poverty index "dual cutoff" method classification method is illustrated in Figure 1.

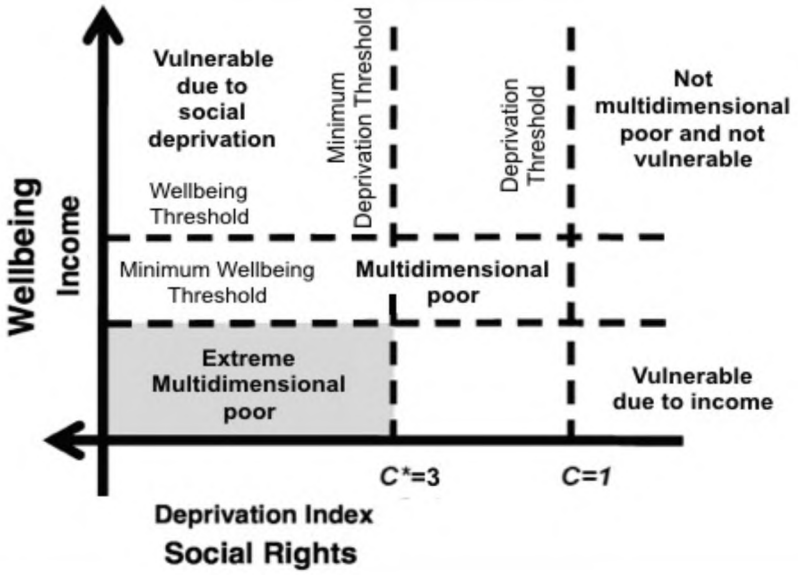
Figure 1: Multidimensional Poverty Classification Method (CONEVAL, 2014)



Source: **CONEVAL 2014.**

The vertical axis on Figure 1 represents the field of economic wellbeing, which is measured by people's income according to the wellbeing poverty line (cost of a basic needs-basket). The horizontal axis represents the space of social rights, measured through the social deprivation index. A person is considered socially deprived when he/she experiences a deprivation in one or more social dimensions.

Figure 2: Extreme Multidimensional Poverty Classification Method (CONEVAL, 2014)



Source: **CONEVAL 2014.**

Figure 2, shown above, incorporates the minimum welfare line and the threshold of extreme deprivation threshold (C*). This allows us to locate, in quadrant I of Figure 1, the subset of people who are living in extreme multidimensional poverty according to the minimum welfare line, meaning that their income is so low that, even if their income were completely devoted to purchasing food, they could not acquire the necessary nutrients for a healthy life. In addition, the minimum deprivation threshold (C=3) considers a person as extremely socially deprived if he/she is experiencing at least three of six social deprivations. Multidimensionally poor people not included within the extreme multidimensionally poor population are said to be in a situation of moderate multidimensional poverty.

III. Poverty Estimates for Indigenous People in Mexico

Scholarly research on the relationship between poverty and indigenous populations in Mexico is limited. Though some national reports have been conducted by CONEVAL to measure the level of poverty among indigenous people, to date, researchers have neglected to perform multidimensional poverty comparisons among indigenous and non-indigenous groups. The limited number of studies in this regard mirrors the small number of government policies in place to address inequality among indigenous and non-indigenous people, and the consequent impact of those policies on the incidence of poverty for the former population group.

Aside from the limited quantity of previous research on the subject, the study of indigenous poverty and inequality in Mexico presents numerous challenges. The first relates to the lack of reliable national-level data on indigenous people due to Mexico's adopted definition for identification of an indigenous person. As mentioned above, in Mexico, indigenous language has been used to statistically identify the indigenous population ever since the first Census was held in 1895. However, at the international level, the concept of ethnicity has been constructed around a modern understanding of indigeneity based on the following criteria: (1) being a descendant of indigenous peoples and to self-identify as such, (2) speaking a native or indigenous language, (3) cultural affinity with pre-colonial or pre-settler societies, and (4) distinct social, economic or political systems (Psacharopoulos and Patrinos, 1994).

It has been argued by many scholars that the methodology employed by the Mexican government is unsuited for identifying indigenous populations, given that it is based on a self-reported characteristic and that being indigenous is often associated with ethnic discrimination. What is more, it is stressed in the literature that this approach largely underestimates the size of the indigenous population, since it relies mainly on the preservation of indigenous language through generations; some people may choose not to reveal their origins. Furthermore, while younger generations tend to neglect their indigenous cultural heritage, including their language, they are still subject to deprivations that result from inequality of opportunities and social segregation such as labor market discrimination (Patrinos, 2000).

Psacharopoulos and Patrinos (1994) were the first scholars to explore the disadvantaged socioeconomic conditions of indigenous people in Latin America from an economic perspective. The authors analyzed the incidence of poverty among indigenous peoples in Mexico, Guatemala, Bolivia, and Peru, and they found evidence of a significant gap between indigenous peoples' living conditions and those of non-indigenous peoples, as well as a positive correlation between being indigenous and living in deprivation. An increasing number of studies that analyze poverty dynamics from an ethnic perspective in Latin America have followed, though few have studied this relationship in Mexico using a multidimensional poverty approach.

In 2005, Castañeda-Navarrete contributed to the study of poverty from an ethnic perspective in Mexico; the author used the Mexican Family Life Survey (MxFLS) to conduct empiric research of indigenous peoples' welfare and poverty dynamics from 2002 to 2005. The study focuses on the determinants of chronic and transitory poverty between indigenous and non-indigenous people. By following a components approach, which looks into non-income deprivations in addition to income poverty lines, the research highlights the leading factors that contribute to explaining the disadvantaged living conditions faced by indigenous people. Her results indicate that indigenous peoples face greater difficulties in escaping poverty, particularly due to their experience of socio-economic disadvantages such as inferior levels of schooling, lack of adequate infrastructure, labor discrimination, and vulnerability to natural disasters (Castañeda-

Navarrete, 2005).

Five years later, based on ENIGH's definition of indigenous population, González de Alba (2010) used the Atkinson principle of poverty dominance, a different criterion for analyzing the degree of poverty experienced, to compare poverty in indigenous and non-indigenous households in Mexico, using the cumulative density function.[1] He then differentiated between urban and rural areas to show that, in each area, the indigenous population is poorer than the nonindigenous population. Another significant finding is that the gap between indigenous and non-indigenous groups is smaller but significant in urban areas than it is in rural areas (González de Alba, 2010). Nonetheless, this study by Gonzalez de Alba does not carry out an indigenous and non-indigenous comparison of poverty estimates revolving around multidimensional poverty measures.

In 2014, CONEVAL published a working paper that used the 2012 ENIGH Data to analyze in detail the relationship between poverty and ethnicity in Mexico. The research presents the poverty profile of the population defined by ENIGH as indigenous as well as the association between being poor and the different attributes that characterize indigenous people. While this study shows that the relationship between being poor and belonging to an indigenous group is pronounced, there is no information on the causes or social deprivations that may lead to such poverty levels. In this regard, CONEVAL's recently adopted multidimensional poverty deprivation measurements could be a significant tool to better assess the living standards among indigenous peoples in Mexico (CONEVAL, 2014).

Distinguishing Urban and Rural Population Groups

According to the Mexican National Institute of Statistics and Geography (INEGI), although only one quarter of the Mexican population lives in rural areas, more than 33 percent of the country's poor are rural (INEGI, 2014). What is more, the majority of indigenous people live in rural areas, where poverty rates are higher on average. INEGI reports that in 2000, more than 70 percent of indigenous peoples lived in communities with fewer than 15,000 inhabitants; researchers' rural-poverty biases have thus caused indigenous poverty evaluations to be overestimated (Borja-Vega, Lunde and García-Moreno, 2007).

For aggregate poverty comparisons, not only to capture urban-rural differences but also to account for differences between indigenous and non-indigenous people, the present analysis looks at indigenous/non-indigenous differences in urban and rural areas separately. Urban areas are defined according to CONEVALS's definition—as localities with 2,500 or more people—while rural areas are those with fewer than 2,500 inhabitants (CONEVAL, 2014).

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[1] If the cumulative density function for distribution A is nowhere above and somewhere below that for distribution B for all values of the poverty line z over some plausible range $[z, z]$, then distribution A is said to first order dominate distribution B.

IV. Analyzing Multidimensional Poverty in Mexico from an Ethnic Perspective

Using both the AF Method and CONEVAL's multidimensional poverty methodology to compare the differences in weights attributed to each dimension, this section presents poverty estimates for indigenous and non-indigenous people in Mexico, working with data from the ENIGH 2014[2]. According to the data, in 2014, 45 percent of Mexico's population lived in poverty. As shown in Table 1, there is a sizable gap in poverty incidence between indigenous and non-indigenous people. The results show that 82 percent of the indigenous rural population lived below the income wellbeing poverty line. Nearly 99 percent of indigenous rural people and 91 percent of indigenous urban people had one or more social deprivations, compared to 91 percent and 74 percent of rural and urban non-indigenous people respectively. According to CONEVAL's multidimensional poverty measurement methodology, 81 percent of the indigenous rural population met the criteria defining poverty.

Table 1: Mexico's Multidimensional Poverty Headcount Ratios for Indigenous and Non-Indigenous Groups (2014)

Group	Incidence of Poverty (*H*)			Multidimensionally Poor (Adjusted Headcount Ratio)
	Income Below the Poverty Line	1 or More Social Deprivations	Multidimensionally Poor	
Indigenous Urban	70%	91%	67%	.48
Non-indigenous Urban	49%	74%	40%	.26
Indigenous Rural	82%	99%	81%	.59
Non-indigenous Rural	56%	91%	54%	.36

Source: **Estimations drawn from the ENIGH 2014.**

Both in the urban and rural settings, indigenous people experienced more poverty than non-indigenous people; however, in congruence with González de Alba's (2010) findings, indigenous people in urban areas appear less poor than non-indigenous people in rural areas. This suggests that indigenous poverty continued to be mainly a rural issue, although indigenous people also faced significant urban poverty, which indicates that the rural/urban geographical component must be taken into account when estimating poverty in Mexico (González de Alba, 2010). Nevertheless, within each area, the indigenous population was significantly poorer than the non-indigenous population (see Table 1).

On the other hand, according to CONEVAL's multidimensional extreme poverty measurement

[2] Multidimensional poverty estimates were constructed from the ENIGH 2014 using CONEVAL's methodology. Observations with missing data were dropped for purposes of these estimations.

methodology, in which a person must experience income below the minimum wellbeing poverty line as well as deprivation in 3 or more social deprivations, 45 percent of indigenous rural people and 25 percent of indigenous urban people were extremely poor, compared to 14 percent and 5 percent of rural and urban non-indigenous people respectively (see Table 2).

Table 2: Mexico's Extreme Poverty Headcount Ratios for Indigenous and Non-Indigenous Groups (2014)

Group	Income Below the minimum poverty line	3 or More Social Deprivations	CONEVAL's Multidimensionally Extreme Poor (Intersection)
Indigenous Urban	36%	47%	25%
Non-indigenous Urban	16%	14%	5%
Indigenous Rural	56%	73%	45%
Non-indigenous Rural	25%	38%	14%

Source: **Estimations drawn from the ENIGH 2014.**

Table 2 also shows that while within each area the indigenous population continue to be significantly poorer, when comparing estimates of multidimensional extreme poverty with estimates of multidimensional moderate poverty, indigenous people appear to suffer more than non-indigenous people, independently of the urban or rural setting. What is more, in both Table 1 and Table 2, indigenous and non-indigenous people appear to be more socially deprived than income deprived. However, in the case of multidimensional extreme poverty (Table 2), this gap between social and economic deprivation is significantly smaller for non-indigenous people. That is to say, the difference between the percentage of the population that was income deprived (according to the food basket) and the percentage of the population that had three or more social deprivations is smaller for indigenous people than for non-indigenous people; the data show that, overall, a larger percentage of indigenous people than of non-indigenous people experience both types of deprivations. While indigenous people depend more on agriculture and non-waged activities for their livelihood, they also tend, because of the geographic situations of many of their communities, to lack access to more basic services than non-indigenous groups.

These results shown in the table are in accordance with the findings of Borja-Vega et al. (2007), which argue that indigenous people's vulnerability to income deprivation can be largely explained by labor market discrimination (Borja-Vega et al., 2007). In addition, these results confirm that in Mexico, indigenous people are over-represented among the poor and extremely poor and that marginalization within Mexico is greater among indigenous peoples.

Indigenous peoples' vulnerability to multidimensional poverty is further illustrated in Table 3, which compares the percentage of each of the four subgroups that falls into each category of

CONEVAL's multidimensional poverty measurements (see Figure 1). As shown in Table 3, in each quadrant, indigenous groups are significantly poorer. That is to say, following CONEVAL's methodology, they are deprived in more than one social dimension and their household income lies below the income poverty line.

In addition, Table 3 displays how indigenous peoples face deeper poverty. The vast majority of the indigenous rural population (81 percent) were deprived in income and in more than one social dimension; 18 percent of the indigenous rural population was not vulnerable due to income but was vulnerable to social deprivation, meaning that they experienced more than one social deprivation; only one percent was estimated to be not poor and not vulnerable. These figures stand out when compared to non-indigenous groups which are, on average, less income deprived and less socially deprived. On the other hand, Table 3 also indicates that, while not considered poor by CONEVAL's multidimensional methodology, the percentage of the population in each subgroup that is not income deprived but is considered socially vulnerable (deprived in more than one social dimension) is substantial. Finally, it is important to note that urban/rural variations are also present, and that the urban non-indigenous subgroup appeared notably less vulnerable to poverty than the non-indigenous rural subgroup.

Table 3: CONEVAL's Classifications of Poverty for Indigenous and Non-Indigenous Groups (2014)

Group	Multidimensionally poor	Vulnerable due to social deprivation	Vulnerable due to income	Not poor and not vulnerable
Indigenous Urban	67%	21%	3%	8%
Non-indigenous Urban	40%	26%	9%	26%
Indigenous Rural	81%	18%	0%	1%
Non-indigenous Rural	54%	37%	2%	8%

Source: **Estimations drawn from the ENIGH 2014.**

When looking at the levels of multidimensional poverty among population subgroups as displayed below in Table 4, it becomes clear that, regardless of the urban/rural setting, indigenous people are more likely to face extreme poverty, and there is a greater incidence of poverty among indigenous people than among non-indigenous people (see Figure 2 to identify the quadrant corresponding to each level of poverty).

Table 4: Mexico's Multidimensional Poverty Censored Headcount Ratio for Indigenous and Non-Indigenous Groups (2014)

Group	Extreme Poor	Poor	Moderate Poor
Indigenous Urban	25%	67%	42%
Non-indigenous Urban	5%	40%	35%
Indigenous Rural	45%	81%	36%
Non-indigenous Rural	14%	54%	40%

Source: **Estimations drawn from the ENIGH 2014.**

Estimates of Multidimensional Poverty, from an Ethnic Perspective

In order to better understand the intensity of poverty experienced by indigenous and non-indigenous people in Mexico, Table 5 further illustrates vulnerability to poverty by displaying the intensity of social deprivations and the FGT (Foster-Greer-Thorbecke) Index with a focus on subgroup decomposition. The FGT Index[3] with $\alpha = 1$ is commonly referred to as the Poverty Gap Index (P_1) because it accounts for the intensity or depth of poverty; it indicates the average extent to which an individual falls below the wellbeing poverty line.[4]

According to CONEVAL's methodology, the measurement of the intensity of social deprivations reflects the depth of social deprivations experienced by each subgroup of the population; it is built for each person by adding the six indicators associated with social deprivations and then computing the average for each population subgroup. In this context, it is significant that, although urban indigenous people are sometimes determined to be less poor than rural non-indigenous people, indigenous people in both urban and rural areas are more extensively socially deprived than non-indigenous people; access to basic social rights is thwarted due to indigenous people's geographically excluded communities and their impoverished living conditions.

On the other hand, the Poverty Gap Index calculation by subgroup suggests that while differences exist between indigenous and non-indigenous groups, the rural population is notably more vulnerable to income poverty. Overall these figures show that when accounting for

[3] The head-count ratio, the poverty-gap, and the FGT Index can each be interpreted as a weighted sum of the poverty gap ratio.

[4] CONEVAL's wellbeing poverty line is defined as the population that, when making use of their entire household income, is not able to cover the cost of their basic needs. The minimum wellbeing poverty line is defined as the population that, when making use of their entire household income in purchasing food, would be unable to acquire the indispensable food to have an adequate nutrition.

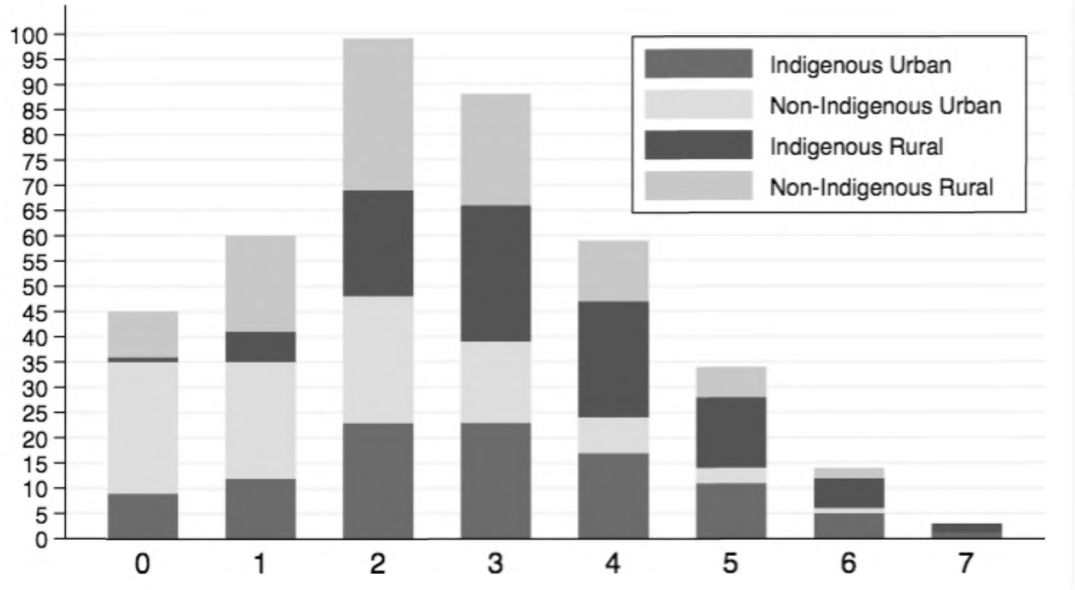
urban/rural variations, regardless of the type of poverty index estimated, indigenous people consistently have greater poverty index values compared to non-indigenous people within each area.

Comparison of Multidimensional Poverty Estimates with a Dimension Component

When considering income and the six social dimensions together to analyze the percentage of each subgroup population that experiences each level of dimensional deprivation, as graphically displayed in Figure 3, it is possible to remark that indigenous people in both urban and rural areas experience significant disadvantages in social wellbeing outcomes, leaving them the country's poorest of the poor.

While a significantly larger percent of indigenous people within each area is socially deprived, as the number of social deprivations increases, indigenous people comprise an increasing percentage of the population experiencing that level of deprivation, regardless of urban and rural distinctions, experiencing on average between three and four social deprivations. In addition, Figure 3 illustrates the extent to which rural indigenous people are more socially vulnerable.

Figure 3: Percentage Distribution of Indigenous and Non-indigenous People by Number of Social Deprivations (CONEVAL's Multidimensional Poverty Methodology, 2014)



Source: **Estimations drawn from the ENIGH 2014.**

In order to further show the percentage of each population subgroup that experiences deficiencies in each dimension component of the multidimensional poverty measure, Table 6 exhibits the Uncensored Headcount Ratio of each dimension—the percentage of indigenous and

non-indigenous people in Mexico who suffer from each of the seven deprivations considered by CONEVAL's multidimensional poverty methodology for urban and rural areas, regardless of whether those people are defined as poor or not.

Table 6: Dimensional Uncensored Headcount Ratio for Indigenous and Non-Indigenous Groups (2014)

	H_1	H_2	H_3	H_4	H_5	H_6	H_7
Subgroup	**Income Deprivation**	**Education Deprivation**	**Space availability and Quality of Living Spaces Deprivation**	**Access to Basic Dwelling-Related Services Deprivation**	**Food Deprivation**	**Access to Health Services Deprivation**	**Access to Social Security Deprivation**
Indigenous Urban	70%	44%	28%	48%	33%	19%	68%
Non-indigenous Urban	49%	15%	9%	10%	21%	17%	51%
Indigenous Rural	82%	45%	41%	86%	45%	16%	89%
Non-indigenous Rural	56%	29%	17%	49%	30%	16%	76%

Source: **Estimations drawn from the ENIGH 2014.**

Once again, these Uncensored Headcount Ratios make clear that the vast majority of indigenous people is deprived in at least one dimension, particularly the dimensions of income (H_1) access to education (H_2) and quality of living spaces (H_3). In terms of a multidimensional poverty assessment, data analysis shows that the urban areas are less socially deprived than the rural areas and that within each area, indigenous people are substantially more deprived than non-indigenous people. Access to health services (H_6) is the only social dimension in which this relationship is not that conspicuous. This is probably due to the existence of *Seguro Popular*, a public health insurance program that was created in 2002. According to World Bank data, between 2006 and 2012, because of *Seguro Popular* the gap in insurance coverage rates between the indigenous and the non-indigenous population was virtually eliminated (Bonilla-Chacín and Aguilera, 2013).

Table 6 shows that indigenous peoples are severely disadvantaged with regards to the range of socioeconomic indicators used to construct CONEVAL's social dimensions. Multidimensional poverty among Mexico's indigenous populations is pervasive and severe. Additionally, the living conditions of indigenous people are generally abysmal, especially when compared to the non-indigenous population. This gap between indigenous and non-indigenous people is particularly

marked when considering access to social dimensions such as the availability and quality of living spaces, quality of dwelling services, food security, education, and overall household income.

The AF Method Comparison: An Equally Weighted Structure Approach

As discussed in Section 2, CONEVAL's multidimensional approach to poverty weighs income higher than the six social dimensions by assigning a 50 percent weight to income deprivation and the remaining 50 percent to deprivations in the other six dimensions. This is often known as a "nested" weighting structure in which the dimensions of deprivation are first separated into certain meta-categories receiving equal weight: income (w = ½) and other capabilities (w = ½); each of the six "other capabilities" (social) dimensions is accorded equal weight. While income plays a key role in overcoming deprivations in other dimensions, the wide use of the uni-dimensional income-based methodologies in poverty evaluations often causes policymakers to overlook important additional information regarding capability deprivations, information that can be useful in addressing poverty and diagnosing its origins (Foster, 2007).

Table 7: Comparison, for Indigenous and Non-Indigenous Groups, between CONEVAL's Multidimensional Poverty Estimates and Poverty Estimates Based on the AF Method (2014)

Group	CONEVAL's Multidimensionally Poor	AF Method with k=2
Indigenous Urban	67%	79%
Non-indigenous Urban	40%	51%
Indigenous Rural	81%	93%
Non-indigenous Rural	54%	72%

Source: **Estimations drawn from the ENIGH 2014.**

Thus, Table 7 and Table 8 provide a comparison of multidimensional poverty levels for each subgroup in Mexico, accounting for different measures of poverty and for the weighting structures w^e and w^0, where w^e refers to the equal weighing structure and w^0 is the weighted average structure currently adopted by CONEVAL. Under the nested weighting structure w^0, which CONEVAL currently uses to measure multidimensional poverty, a dimensional cutoff of w = 50 percent implies that the set of poor individuals includes the population who are income-deprived, regardless of their non-income capability levels, and all persons who are not income-deprived but are deprived in the remaining social dimensions. On the other hand, the equally weighted structure w^e, considers a person to be in multidimensional poverty if he/she is deprived in two of the seven possible dimensions; to be in extreme poverty, he/she must be deprived in four of the seven possible dimensions. Note that under the equally weighted structure, income-

deprivation is not a prerequisite for a person to be considered poor, as it is in the CONEVAL structure—instead, income is considered just one of the seven possible dimensions of deprivation relevant to assessing poverty. Thus, k will denote the threshold number of dimensions in which a person must be deprived to be considered poor: lowering k eventually lowers the number of dimensions needed for a person to be considered poor, while raising it raises the number of dimensions required.

How does the picture of multidimensional poverty in Mexico change if w^0 is altered? Table 7 displayed above allows us to answer this question by showing how multidimensional poverty estimates for indigenous and non-indigenous people differ when using CONEVAL's nested-weight measure compared to the AF method that equally weighs each dimension. Suppose that instead of using CONEVAL's multidimensional poverty methodology in which income has a weight of 50 percent, instead we weigh income equally with any other social dimension. In order to be considered poor under CONEVAL's methodology, a person must be deprived in income and in at least one of the other six social dimensions; thus, for comparison purposes, under the AF method we choose a poverty threshold of k=2. Such a poverty threshold defines as poor not only a person who is deprived in income and one social dimension but also a person who is deprived in two social dimensions but not in income. Table 7 reiterates that the number of poor rises within each subgroup and indigenous people continue to display more poverty concentrations than non-indigenous people.

Table 8: Comparison Between CONEVAL's Extreme Poverty Estimates and Extreme Poverty Estimates Based on the AF Method for Indigenous and Non-Indigenous Groups (2014)

Group	CONEVAL's Extreme Multidimensionally Poor	AF Method with k=4
Indigenous Urban	25%	33%
Non-indigenous Urban	5%	11%
Indigenous Rural	45%	45%
Non-indigenous Rural	14%	20%

Source: **Estimations drawn from the ENIGH 2014.**

Comparably, when contrasting CONEVAL's extreme poverty estimates for 2014 with extreme poverty estimates derived from the AF method (equal weighted structure) and k=4, it is possible to distinguish two other striking findings (as shown in Table 8). On the one hand, comparably to Table 7, patterns of indigenous disadvantage persist within each area, and the percentage of the population within each subgroup that is considered extremely poor rises. On the other hand, as

displayed below, extreme poverty estimates for indigenous people living in rural settings remain consistent, while those estimates increase significantly for non-indigenous people within this area. While applying the AF methodology's equally weighted definition of extreme poverty increases the number of extremely poor indigenous urban people by eight percentage points, it only presents a six percent increase for non-indigenous urban people. At the same time, the percentage of indigenous rural people who are considered extremely poor remains the same under both the equally weighted methodology and the weighted average structure adopted by CONEVAL, while the percentage of non-indigenous rural people increases by six percent.

These findings indicate that Mexico's poverty measurement methodology does not account for important ancillary information about social capabilities—information that could be useful in addressing indigenous people's vulnerability to poverty. Following Foster (2007), Table 8 illustrates the potential loss of information in a nested weighting structure that overemphasizes income deprivation over other capabilities and displays how poverty estimates vary when the poverty cutoff (k) is increased (Foster, 2007). Nonetheless, as pointed out by Foster (2007), regardless of the cutoff chosen and the weighted structure, there will inevitably be some arbitrariness introduced in the selection of dimensions (Foster, 2007).

V. Multidimensional Poverty Breakdown by Dimension

One of the most important practical properties of the AF measure is that it can satisfy decomposability. While, as shown in the analysis above, population decomposability allows for the incidence of poverty at the national level to be broken down into population subgroups, dimensional decomposability links the overall level of multidimensional poverty to analogous indices of domain-specific deprivations, allowing for the estimation of how each of CONEVAL's seven dimensions contributes to overall multidimensional poverty.

According to Alkire et al. (2015), the Censored Headcount Ratio of any dimension or $h_j(k)$ can be defined as the percentage of the population who are multidimensionally poor and also deprived in that specific dimension. The Censored Headcount Ratio shows the extent of deprivations among the poor, but does not reflect the relative magnitude of each dimension. The contribution to each dimension depends on both the Censored Headcount Ratio and the weight assigned to each dimension. Thus, the contribution of dimension j to the Adjusted Headcount Ratio M_0 can be denoted as ϕ_j^0 , where:

$$\phi_j^0\,(k) = w_j \frac{h_j(k)}{M_0}, \text{ for each } j = 1 \ldots d$$

As shown earlier, the Adjusted Headcount Ratio, M_0, is the product of two partial indices: the

Censored Headcount Ratio–or the incidence of poverty (H_0)–and the average deprivation share of the poor–or the average intensity of poverty (A_0). The Adjusted Headcount Ratio helps us identify who is poor and how poor they are. Its additive structure allows it to be expressed as a weighted sum of the Censored Headcount Ratios. Thus, two population subgroups may experience the same Adjusted Headcount Ratios but demonstrate very different incidences of poverty (Alkire et al., 2015).

Table 9: Dimensional Decomposition: Censored Headcount Ratio, Adjusted Headcount Ratio and Percentage Contribution of Each Dimension With an Equal Weight System (2014)

Subgroup		$w = 1/7$	$w = 1/7$	$w = 1/7$	$w = 1/7$	$w = 1/7$	$w = 1/7$	$w = 1/7$	M_0
		Income Deprivation	**Education Deprivation**	**Space availability and Quality of Living Spaces Deprivation**	**Access to Basic Dwelling-Related Services Deprivation**	**Food Deprivation**	**Access to Health Services Deprivation**	**Access to Social Security Deprivation**	
Indigenous Urban	h_j (k)	.508	.334	.268	.187	.287	.166	.493	
	M_j	.073	.048	.038	.027	.041	.024	.070	.320
	$\phi_j^0(k)$	**22.69%**	**14.94%**	**11.74%**	**8.34%**	**12.82%**	**7.41%**	**22.05%**	**100%**
Non-indigenous Urban	h_j (k)	.234	.089	.077	.059	.139	.113	.239	
	M_j	.033	.013	.011	.008	.020	.016	.034	.136
	$\phi_j^0(k)$	**24.61%**	**9.36%**	**8.11%**	**6.22%**	**14.66%**	**11.90%**	**25.14%**	**100%**
Indigenous Rural	h_j (k)	.658	.386	.401	.245	.422	.153	.676	
	M_j	.094	.055	.057	.035	.060	.022	.097	.420
	$\phi_j^0(k)$	**22.37%**	**13.13%**	**13.63%**	**8.32%**	**14.36%**	**5.20%**	**23.00%**	**100%**
Non-indigenous Rural	h_j (k)	.351	.197	.160	.112	.233	.118	.392	
	M_j	.050	.028	.023	.016	.033	.017	.056	.223
	$\phi_j^0(k)$	**22.46%**	**12.58%**	**10.24%**	**7.17%**	**14.89%**	**7.57%**	**25.09%**	**100%**

Source: **Estimations drawn from the ENIGH 2014.**

Table 9 and Table 10, below, show the contribution of each dimension to the overall Adjusted Headcount Ratio, M_0. The dimensional cutoffs are different in Table 9 and Table 10 in order to compare Mexico's multidimensional poverty estimates using the AF Method (with an equal

weight system for all seven dimensions) with estimates based on CONEVAL's nested weighted system. Consequently, Table 9 uses w^e or the equal weighted structure, while Table 10 shows the contribution of each dimension to overall multidimensional poverty with the nested weighted average structure w^0 currently adopted by CONEVAL (income deprivation receives a w of 50 percent while the remaining six social capabilities also receive a w of 50 percent). In addition, the population is partitioned into the same four subgroups as in the tables presented in the results analysis: Indigenous Urban, Non-Indigenous Urban, Indigenous Rural, and Non-Indigenous Rural.

Whenever a certain dimension's contribution to poverty greatly exceeds its weight, we can say there is a relatively high Censored Headcount Ratio for this indicator. As revealed in Table 9, income deprivation contributes most to poverty for all four subgroups. The "access to social security" dimension also contributes highly to multidimensional poverty in Mexico, meaning that the vast majority of the population lacks access to an existing plan for insurance for medical services and old-age pensions. This reflects the magnitude of Mexico's informal economy (60 percent of the Work Force and more than 26 percent of the country's Gross Domestic Product (GDP)).

By looking at how dimensions other than income and access to social security affect the Adjusted Headcount Ratio (M_0) on the level of population subgroups, it is possible to conclude that indigenous urban people suffer the most from education deprivation and food deprivation, while the non-indigenous urban group is more deprived in food than the indigenous urban group. On the other hand, in the rural setting, food deprivation is shown to be substantial for both indigenous and non-indigenous people living in poverty. Urban and rural indigenous people, and the subgroups of rural people in general, lack significant access to basic dwelling services and to quality of living spaces; this is most likely due to living in isolated areas that lack access to water and electricity (Servan-Mori, 2014). It is important to note that being deprived in the "access to basic dwelling services" dimension is a significant occurrence that causes rural people to live in relegated conditions, and that indigenous urban and rural poor people are more likely to be deprived in this dimension than non-indigenous people.

Table 10, shown bellow, undertakes the same analysis as Table 9 but uses CONEVAL's nested weight system where the income dimension is assigned $w^0 = \left(\frac{1}{2}\right)$, while the remaining six social dimensions are assigned $w^0 = \left(\frac{1}{2}\right) * \left(\frac{1}{6}\right)$. As follows, note that the Adjusted Headcount Ratio for indigenous people is almost twice as large as for non-indigenous people within each area; however, the contributions of each dimension to the overall Adjusted Headcount Ratio vary significantly among each of the four population subgroups. As expected, income deprivation is shown to be a substantial factor affecting Mexico's poor, regardless of the population subgroup.

With income having half the total weight in the identification and aggregation steps, we would expect the figures for the social dimension cutoff to be lower than under the equal weights case suggested in the AF Method. Under CONEVAL's nested weight system, the income dimension has a lower contribution to the Adjusted Headcount Ratio (M_0) for indigenous people than for non-indigenous, as it accounts for a smaller share of the deprivations experienced by the poor in the non-indigenous subgroups.

Table 10: Dimensional Decomposition: Censored Headcount Ratio, Adjusted Headcount Ratio and Percentage Contribution of Each Dimension Under CONEVAL's Nested Weight System (2014)

Subgroup		$w = .50$	$w = 0.083$	$w = 0.083$	$w = 0.083$	$w = 0.083$	$w = 0.083$	$w = 0.083$	M_0
		Income Deprivation	**Education Deprivation**	**Space availability and Quality of Living Spaces Deprivation**	**Access to Basic Dwelling-Related Services Deprivation**	**Food Deprivation**	**Access to Health Services Deprivation**	**Access to Social Security Deprivation**	
Indigenous Urban	h_j (k)	.668	.349	.237	.165	.270	.137	.545	
	M_j	.334	.029	.020	.014	.022	.011	.045	.475
	$\phi_j^0(k)$	**70.27%**	**6.09%**	**4.13%**	**2.88%**	**4.72%**	**2.40%**	**9.51%**	**100%**
Non-indigenous Urban	h_j (k)	.397	.096	.066	.049	.151	.096	.321	
	M_j	.198	.008	.005	.004	.013	.008	.027	.263
	$\phi_j^0(k)$	**75.38%**	**3.04%**	**2.08%**	**1.56%**	**4.77%**	**3.03%**	**10.14%**	**100%**
Indigenous Rural	h_j (k)	.810	.368	.360	.216	.384	.133	.746	
	M_j	.405	.031	.030	.018	.032	.011	.062	0.588
	$\phi_j^0(k)$	**68.86%**	**5.18%**	**5.08%**	**3.05%**	**5.42%**	**1.87%**	**10.52%**	**100%**
Non-indigenous Rural	h_j (k)	.534	.180	.124	.085	.202	.089	.478	
	M_j	.267	.015	.010	.007	.017	.007	.040	.363
	$\phi_j^0(k)$	**73.52%**	**4.12%**	**2.84%**	**1.95%**	**4.62%**	**2.04%**	**10.92%**	**100%**

Source: **Estimations drawn from the ENIGH 2014.**

Additionally, it is possible to point out that indigenous people are more education-deprived than non-indigenous people, particularly in the urban setting. However, non-indigenous rural people also experience considerable levels of education deprivation. As was the case in Table 9, indigenous people–regardless of urban or rural setting–are greatly deprived in the dimension of

access to space availability and quality of living spaces. As mentioned above, access to health services is becoming less of an issue for Mexicans living in poverty as a result of the public health care system *Seguro Popular*; consequently, this specific dimension now affects non-indigenous urban poor people the most. Finally, as expected, Table 10 also identifies access to social security as a major issue among Mexico's poor; however, its contribution is diminished in comparison to Table 9 due to the disproportional increase in the weight of the income dimension in the measurement criterion.

VI. Comparison of Multidimensional Poverty Estimates at the State Level

In addition to population subgroup decomposition, the multidimensional measurement of poverty in Mexico may be complemented by decomposing poverty estimates at the state or municipality level to identify spatial differences amongst people living in poverty. Thus, it is possible to pinpoint the regions where the population is subject to experience more poverty as well as the geographic characteristics corresponding to certain privations. This analysis is an important component in addressing poverty through better targeted public policies that seek to improve universal access to social rights. Furthermore, it is essential for informing the efficient allocation of public resources amongst regions where tackling poverty has become a pressing issue.

Table 11: Indigenous and Non-Indigenous Multidimensional Poor Decomposition By State (2014)

State	Poverty Headcount Ratio (H_0)	Rank	Indigenous Urban Headcount (Rank)	Non-indigenous Urban Headcount	Indigenous Rural Headcount (Rank)	Non-indigenous Rural Headcount
Nuevo Leon	0.210	1	0.27 (1)	0.19	0.00 (1)	0.41
Baja California	0.286	2	0.77 (24)	0.28	0.25 (6)	0.20
Sonora	0.294	3	0.48 (8)	0.29	0.48 (8)	0.29
Mexico City	0.297	4	0.53 (11)	0.29	0.38 (7)	0.32
Baja California Sur	0.299	5	0.37 (4)	0.30	0.24 (5)	0.25
Coahuila	0.313	6	0.33 (2)	0.29	--	0.51
Aguascalientes	0.348	7	0.72 (22)	0.35	0.00 (4)	0.34
Colima	0.349	8	0.77 (25)	0.34	1.00 (29)	0.39
Queretaro	0.355	9	0.55 (13)	0.31	0.69 (15)	0.40
Chihuahua	0.356	10	0.38 (5)	0.32	0.90 (27)	0.42
Jalisco	0.363	11	0.50 (9)	0.34	--	0.42
Quintana Roo	0.373	12	0.43 (6)	0.31	0.76 (18)	0.59
Tamaulipas	0.379	13	0.44 (7)	0.36	0.00 (2)	0.50
Sinaloa	0.389	14	0.33 (3)	0.34	0.55 (10)	0.49

Nayarit	0.401	15	0.62 (16)	0.36	0.85 (23)	0.44
Campeche	0.439	16	0.54 (12)	0.35	0.71 (16)	0.61
Durango	0.440	17	0.63 (18)	0.40	0.73 (17)	0.51
Yucatan	0.468	18	0.69 (21)	0.39	0.60 (14)	0.35
Guanajuato	0.472	19	0.50 (10)	0.45	0.00 (3)	0.51
Tabasco	0.496	20	0.57 (14)	0.48	0.55 (11)	0.50
San Luis Potosi	0.501	21	0.60 (15)	0.38	0.86 (24)	0.64
Mexico	0.505	22	0.68 (20)	0.49	0.57 (12)	0.52
Morelos	0.522	23	0.66 (19)	0.52	0.83 (20)	0.50
Zacatecas	0.526	24	0.88 (32)	0.46	1.00 (30)	0.61
Hidalgo	0.559	25	0.78 (26)	0.51	0.86 (25)	0.47
Veracruz	0.590	26	0.80 (27)	0.50	0.84 (21)	0.65
Tlaxcala	0.592	27	0.80 (28)	0.61	0.51 (9)	0.47
Michoacán	0.593	28	0.83 (29)	0.57	0.57 (13)	0.60
Puebla	0.620	29	0.85 (30)	0.56	0.84 (22)	0.72
Guerrero	0.658	30	0.62 (17)	0.59	0.81 (19)	0.72
Oaxaca	0.668	31	0.74 (23)	0.54	0.90 (26)	0.64
Chiapas	0.754	32	0.86 (31)	0.62	0.97 (28)	0.79

Source: **Estimations drawn from the ENIGH 2014.**

As shown above in Table 11, comparing the headcount ratio of multidimensional poor in Mexico at the state level with the percentage of indigenous and non-indigenous poor allows us to identify which states have both the highest levels of indigenous peoples residing and the utmost fraction of multidimensional poor. As depicted above, the states of Chiapas, Oaxaca, Guerrero and Puebla have more than 60 percent of their population living in poverty. In comparison, the states of Chiapas, Zacatecas, Puebla and Michoacán show the highest rates of urban indigenous poor (more than 80 percent of the indigenous urban population), while Zacatecas, Chihuahua, Chiapas and Colima have the highest proportion of rural indigenous poor. Furthermore, from Table 11 it can be gathered that multidimensional poverty in Chiapas significantly affects both urban and rural indigenous people. Thus, by looking at these spatial patterns in conjunction with a social rights dimensional decomposition analysis, it is possible to pointedly inform anti-poverty targeting policies. Furthermore, these relationships can be further explored by looking at poverty estimates at the municipality level.

VII. Targeting Multidimensional Poverty to Bridge the Indigenous Gap in Mexico

Having shown earlier how the way multidimensional poverty is measured directly influences our understanding of poverty, it is now important to turn to a key question: How can the Mexican government allocate resources to better tackle this issue and improve the living conditions of

population subgroups that are most in need of poverty alleviation interventions? The present section argues that taking into account deprivation in multiple dimensions for specific population subgroups, such as the indigenous poor, is key for designing programs with more robust targeting rules that might alleviate poverty more efficiently.

The set of rules that are contemplated to select who is to benefit from a given poverty alleviation program are commonly referred to as targeting mechanisms. Thus, "targeting" involves the design of schemes or measures that seek to ensure that specific population subgroups will benefit from antipoverty initiatives (Bouillon and Yáñez-Pagans, 2011). Targeting is rarely uniform across population groups; policymakers are often constrained by budgetary restrictions and must rely on certain observable socio-demographic characteristics or on regional boundaries that serve as key indicators to allocate resources in an unevenly way so that they will have the largest impact on poverty reduction (Besley and Kanbur, 1991).

To date, poverty alleviation programs commonly use a one-dimension targeting method, such as income information or evidence of belonging to a well defined group (e.g. rural/urban, regional boundaries or minority groupings). However, these methods have proven to lead to problems of leakages, sub-coverage and inefficient spending (Bouillon and Yáñez-Pagans, 201, and Duclos et al., 2013). Irregularities generally occur because, as pointed out earlier, social rights deprivations tend to be both correlated and mutually reinforced. As exemplified in Duclos et al. (2013), income poverty is usually correlated with child malnutrition, which will in turn have a negative effect on schooling performance and long-term labor outcomes. Decreasing privation in any given dimension is likely to have an indirect effect on the level of joint deprivation, either because of an income effect or because of a spill-over effect. Therefore, employing a one-dimension targeting method to reduce multidimensional poverty rather than a multidimensional targeting approach is likely to result in the misallocation of resources and less efficient poverty reduction efforts (Azevedo and Robles, 2013; Bouillon and Yáñez-Pagans, 2011; and Duclos et al., 2013).

Thus, poverty alleviation programs are increasingly adopting a multidimensional targeting approach when looking to impact numerous deprivation outcome variables. In addition, programs are not only seeking to target beneficiaries with regards to multidimensional deprivation indicators but are also increasingly adopting conditionality designs that require beneficiaries to overcome multiple deprivations simultaneously (Duclos et al., 2013). It is precisely the multidimensional conditionality of the cash transfer programs that has made conditional cash transfers (CCTs) so successful in reducing poverty. Such programs generally intend not only to reduce income poverty through monetary transfers but seek also to ease the poor's privations by restricting cash transfers to certain outcome levels in the social rights dimension such as schooling or medical attendance (Duclos et al., 2013).

Furthermore, studies have shown that, in addition to reducing poverty and improving the living conditions of he poor, targeting poverty multidimensionally increases efficient government spending and transparency. Such is the case of Barbieri and Higgins (2017) who argue that allocating resources separately to improve deprivation in multiple dimensions –as opposed to using a one-dimension targeting method to impact multidimensional poverty measures– reduces the free-rider problem that arises when government ministers are all positively affected by a decrease in the measured poverty. This in turn creates incentives for policymakers to lessen ambiguous antipoverty spending (Barbieri and Higgins, 2017).

CCTs for Poverty Alleviation in Mexico: The Case of *Prospera*

Over the past two decades, the Mexican government has turned to CCT programs to reduce poverty. *Prospera* (previously known as *Oportunidades* (2002) and earlier called *Progresa* (1997)) currently reaches around a fifth of all Mexican households (Azevedo and Robles, 2013). The program aims at improving poverty measures through cash transfers to poor households that are conditioned on human capital investments, particularly on health, education and nutrition — leading to a decrease in the level of deprivation experienced in the social rights dimension and the consequent reduction of poverty.

Currently, *Prospera* is targeted using both geographical identification methods and proxy means tests or indicator targeting. First, geographic targeting methods are used to identify the poorest localities and then households are deemed eligible by combining both self-selection (families voluntarily ask to be incorporated into the program) and the analysis of socioeconomic information of the all households living in intervention localities (Azevedo and Robles, 2013).

Numerous studies provide evidence of *Prospera–Oportunidades–Progresa* having a positive effect on the improvement of health and schooling outcomes and reducing Mexico's current multidimensional poverty headcount (Levy 2006, and Fiszbein and Schady 2009). Nonetheless, an increasing amount of empirical literature is pointing out to the need for poverty alleviation programs to adopt multidimensional targeting methods to generate more dynamically robust targeting mechanisms (Azevedo and Robles, 2013; Bouillon and Yáñez-Pagans, 2011; and Duclos et al., 2013).

Bouillon and Yáñez-Pagans (2011) argue that, even though *Prospera–Oportunidades* is relatively well targeted to the poorest population, there are issues in terms of the dynamic consistency of its targeting method. Their findings show that households deprived on multiple dimensions are more likely to remain deprived as opposed to a household that was considered less deprived in the social dimensions but significantly deprived in the income dimension (Yáñez-Pagans, 2011). Analogously, Azevedo and Robles (2013) compare the performance of *Oportunidades* under alternative targeting models and find that the multidimensional model identifies monetary poor more precisely than the current targeting model. Furthermore, it is

important to pinpoint that *Prospera's* current cash transfer targeting method involves high costs for the program as it requires intensive interaction for both identification and monitoring (Azevedo and Robles, 2013).

Multidimensional Poverty Targeting for the Indigenous Poor

The newly developed empirical literature on multidimensional poverty targeting for the Mexican case emphasizes the need to move from one-dimensional to multidimensional targeting methods. A more recent study by De la Peña (2017) analyzes the incompatibility of the requirements imposed by *Prospera-Oportunidades* on the indigenous poor. His findings reveal a mismatch when targeting indigenous households in need (De la Peña, 2017). For example, he finds that indigenous children with poor knowledge of Spanish tend to drop out of school despite the conditionality of the program.

Studies such as De la Peña (2017) illustrate the need for policymakers to evaluate targeting mechanisms in the context of certain affected population subgroups. Therefore, multidimensional targeting methods for indigenous poor should focus on the population decomposability aspect of the identification function ρk (γ_i, z), as well as the spatial (urban/rural) decomposition property to identify those dimensions indigenous poor need CCT programs to prioritize.

Following these results, future studies of this type are needed to shed light on how decomposing multidimensional poverty estimates for population subgroups may inform targeting algorithms used by development programs and contribute to a more efficient allocation of public resources. Improving poverty alleviation targeting mechanisms for the indigenous poor is essential to reducing the prevalence of multiple deprivations they face in comparison to the general population and may allow policymakers to explore other conditionality techniques that can more explicitly take into account the welfare dynamics of this particular population subgroup.

VIII. Conclusions

Public policies in Mexico are designed to have universal application while seeking to address heterogeneous realities. By analyzing multidimensional poverty estimates, it can be once again confirmed that, despite a decade of efforts to promote social welfare programs, poverty persists, and it is a significant burden for the indigenous people within Mexican society. Compared to non-indigenous people, indigenous people have experienced the most deprivations, both in the urban and rural settings. In the majority of cases, the living conditions of these people result in deprivations of fundamental social rights. The systemic nature of these deprivations appears to be associated with indigenous people's belonging, by definition, to a culturally distinct ethnic group—thus revealing existing social disadvantages for indigenous people that must be addressed.

The present paper has identified the following gaps or challenges indigenous people particularly face. Relevant policy prescriptions arise from the estimates presented in the results section of this paper.

First, in addition to income deprivation, access to social security affects the largest percentage of the deprived population, regardless of the population subgroup. This dimension contributes, on average, to more than 10 percent of the Adjusted Headcount Ratio of each subgroup. Moreover, indigenous people show the highest incidence of deprivation within this dimension. While universal coverage of health services has been practically achieved through *Seguro Popular*, the social program *70 y Más*, a non-contributory pension program that aims at providing cash transfers for adults 70 years or older, has not been enough to guarantee universal access to pensions for senior citizens, partly because this government transfer crowds out the support that the elderly receive from their families (Amuedo-Dorantes and Juarez, 2015). The fact that a significantly large share of the population lacks social security shows the need for the Mexican government to escalate access to disability, work-risk, and retirement contributory pensions for the elderly; however, this can only be achieved by increasing incentives for the population to join formal employment. These policies may be particularly challenging when it comes to aiding the indigenous population, given that indigenous workers are overrepresented in the informal economy.

Second, when looking at estimates of extreme poverty, it becomes evident that the majority of Mexico's poor population is unable to satisfy its basic nutrition needs. More alarming, 38 percent of indigenous poor rural people and 27 percent of indigenous poor urban people suffer from some level of food insecurity. Again, although the federal government recently implemented the program *Sin Hambre* to significantly reduce hunger in Mexico, estimates confirm an ongoing need to address this issue, which continues to significantly affect the population's wellbeing.

Third, a higher share of the poor indigenous population than the share of the poor non-

indigenous population lacks access to basic dwelling services; this is particularly true for the poor rural indigenous population (21 percent). While disadvantage in urban areas is still apparent, the significantly lower standards of housing in remote areas for the rural indigenous population calls for attention. By evaluating the dimensional decomposition within each state, the federal government could better target the communities in greatest need of improved dwelling conditions—those communities for which this dimension makes the highest contribution to their overall Adjusted Headcount Ratio. Improving access to quality housing, water, and electricity in indigenous communities could significantly advance their living conditions and their health.

Fourth, the estimates presented confirm existing and significant educational attainment gaps among ethnic groups in Mexico. While the indigenous educational achievement gap in Mexico is well documented and is shown to be narrowing (Guichard, 2005), the differences in these estimates among indigenous and non-indigenous people convey the need for the Mexican government to specifically address indigenous educational disadvantages to improve equal access to quality education. Such policies should be twofold: while improving the educational infrastructure in indigenous communities is paramount, the Ministry of Education should also focus on improving the quality of the education provided to indigenous children through a comprehensive pedagogical program that takes into consideration the linguistic disadvantages and the cultural isolation many of these communities face.

Looking at poverty measures according to specific dimensions and with population and geographic decomposability can be key to identifying the most widespread deprivations for each subgroup of people in Mexico. This approach is crucial to redefining and even redirecting public interventions and efforts that for several years have approached poverty issues through uniform lenses which do not consider the specific needs of all disadvantaged population subgroups. Knowing the current state of each social deprivation and income indicators is essential for the Mexican government to design public policies that aim at achieving universal access to social rights which the poor lack the most. Thus, in light of these results, it would be advisable to review public policies and to specifically target those population subgroups in the future in accordance with their most pressing needs.

IX. References

Alkire, S., and J.E. Foster 2007. "Counting and Multidimensional Poverty Measures." Oxford: Oxford University Press. Available at: http://www.ophi.org.uk/wp-content/uploads/ophi-wp7.pdf

Alkire, S., and J.E. Foster. 2011. "Understandings and Misunderstandings of Multidimensional Poverty Measurement." Oxford: Oxford University Press. Available at: http://www.ophi.org.uk/wp-content/uploads/ophi-wp43.pdf

Alkire, S., J.E. Foster, S. Seth, M.E. Santos, J.M. Roche, and P. Ballon. 2015. *Multidimensional Poverty Measurement and Analysis*. Oxford: Oxford University Press.

Amuedo-Dorantes, Catalina, and Laura Juarez. 2015. "Old-Age Government Transfers and the Crowding Out of Private Gifts: The 70 and Above Program for the Rural Elderly in Mexico." *Southern Economic Journal* 81 (3): 782-802. Available at: http://www.banxico.org.mx/publicaciones-y-discursos/publicaciones/documentos-de-investigacion/banxico/%7BF6ED38BB-89C6-7F8F-A6B7-A91138D12321%7D.pdf

Azevedo, Viviane, and Marcos Robles. 2013. "Multidimensional targeting: Identifying beneficiaries of conditional cash transfer programs." Available at: http://www.chronicpoverty.org/uploads/publication_files/azevedo_robles_multidimensional.pdf

Barbieri, Stefano, and Sean Higgins. 2017."The Political Economy of Antipoverty Spending and Poverty Measurement." Available at: http://econ.tulane.edu/RePEc/pdf/tul1604r.pdf

Besley, Timothy, and Ravi Kanbur. 1991. "The principles of targeting." In *Current issues in development economics*, pp. 69-90. Macmillan Education UK.

Bonilla-Chacín, M.E., and N. Aguilera. 2013. "The Mexican social protection system in health." The World Bank Group.

Borja-Vega, C., T. Lunde, and V. García-Moreno. 2007. "Economic Opportunities for Indigenous Peoples in Latin America in Mexico." The World Bank Group. Available at: http://siteresources.worldbank.org/EDUCATION/Resources/278200116923540181 5/Mexico.pdf

Bouillon, César P., and Patricia Yáñez-Pagans. 2011. "Dynamic consistency of multidimensional and income targeting: an application for Mexico using panel data information."

Catañeda-Navarrete, J. 2013. "Poverty Dynamics in Mexico, 2002 and 2005. An Ethnicity-Based Approach." *Brazilian Review of Econometrics* 33 (1): 69-89.

CONEVAL. 2010. "Lineamientos y criterios generales para la definición, identificación y medición de la pobreza." Available at: http://www.coneval.org.mx/rw/resource/coneval/med_pobreza/DiarioOficial/DOF_lineamientos_pobrezaCONEVAL_16062010.pdf

CONEVAL. 2014. *La pobreza en la población indígena de México*. Available at: http://www.coneval.gob.mx/Informes/Coordinacion/INFORMES_Y_PUBLICACIONES_PDF/POBREZA_POBLACION_INDIGENA_2012.pdf

De la Peña, Guillermo. 2017. "Indigenous Urban Families and the Oportunidades Program in Mexico." In *Indigenous Education Policy, Equity, and Intercultural Understanding in Latin America*, pp. 121-143. Palgrave Macmillan US.

Duclos, Jean-Yves, Luca Tiberti, and Abdelkrim Araar. 2013. "Multidimensional poverty targeting." Available at: http://econpapers.repec.org/paper/fdiwpaper/1589.htm

ENIGH. 2014. "Encuesta Nacional de Ingresos y Gastos de los Hogares." Available at: http://www.inegi.org.mx/est/contenidos/Proyectos/encuestas/hogares/regulares/enigh/

Fiszbein, Ariel and N.R. Schady. 2009. *Conditional cash transfers: reducing present and future poverty*. World Bank, Washington DC. Available at: http://siteresources.worldbank.org/INTCCT/Resources/5757608-1234228266004/PRR-CCT_web_noembargo.pdf

Foster, James, Joel Greer, and Erik Thorbecke. 1984. "A class of decomposable poverty measures." *Econometrica: Journal of the Econometric Society* 52 (3): 761-766. Available at: http://www.jstor.org/stable/1913475?seq=1#page_scan_tab_contents

Foster, J.E. 2007. "A Report on Mexican Multidimensional Poverty Measurement." Oxford Poverty and Human Development Initiative (OPHI). Available at: http://www.ophi.org.uk/wp-content/uploads/ophi-wp40.pdf

Garcia-Moreno, Vicente, and Harry Anthony Patrinos, 2011. Education and Poverty in Mexico: Indigenous Peoples. Columbia University, Teachers College, New York, and World Bank, Human Development Department, Washington, D.C.

Gillette, H., and H.A. Patrinos. 2006. *Indigenous Peoples, Poverty and Human Development in Latin America.* London: Palgrave MacMillan.

González de Alba, I. G. 2010. "Poverty in Mexico from an Ethnic Perspective." *Journal of Human Development and Capabilities* 11 (3): 449-465. Available at: http://dx.doi.org/10.1080/19452829.2010.495518.

Guichard, Stéphanie. 2005. "The Education Challenge in Mexico: Delivering Good Quality Education to All. OECD Economics Department Working Papers, No. 447." *OECD Publishing (NJ1)*.

Hall, G., and H.A. Patrinos. 2006. *Indigenous Peoples, Poverty and Human Development in Latin America*. New York: Palgrave Macmillan.

INEGI. 2014. *Censo de Población y Vivienda*. Available at: http://www.inegi.org.mx/est/contenidos/proyectos/ce/ce2014/

Levy, Santiago. 2006. *Progress against Poverty*. Brookings Institution Press. Washington D.C. Available at: https://www.brookings.edu/book/progress-against-poverty/

Patrinos, Harry Anthony. 2000. "The cost of discrimination in Latin America." *Studies in Comparative International Development* 35 (2): 3-17. Available at: http://link.springer.com/article/10.1007/BF02687467

Psacharopoulos, G., and H.A. Patrinos. 1994. *Indigenous People and Poverty in Latin America: An Empirical Analysis*. World Bank, Washington, D.C. Human Resources Development and Operations Policy. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2000/02/23/000009265_3970311123315/Rendered/PDF/multi_page.pdf

Sen, Amartya Kumar. 1990. "Development as capability expansion." (1990).

Servan-Mori, Edson, Pilar Torres-Pereda, Emanuel Orozco, and Sandra G. Sosa-Rubí. 2014. "An explanatory analysis of economic and health inequality changes among Mexican indigenous people, 2000-2010." *International journal for equity in health* 13 (1): 21.

UNDP. 2010. *The Human Development Report on Indigenous Peoples in Mexico: The Challenge of Inequality of Opportunity 2010*. New York: United Nations Development Program. Available at: http://hdr.undp.org/sites/default/files/mexico_nhdr_2010.pdf