CONEVAL
Consejo Nacional de Evaluación de la Política de Desarrollo Social

# Methodology for Multidimensional Poverty Measurement in Mexico

**Consejo Nacional de Evaluación de la Política de Desarrollo Social**

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Consejo Nacional de Evaluación de la Política de Desarrollo Social

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# Foreword

*The Mexican State has undertaken through its laws the commitment to guarantee the full exercise of social rights and to ensure access to social development for the population as a whole. In this context, poverty is the starkest and most unacceptable form of social deprivation persisting in our country, since it imposes serious limitations on physical and social development, denies equal opportunities and demonstrates the failure of our society to put an end to its large social inequalities.*

*Even though progress has been achieved in several dimensions of social development over the past few decades, the remaining challenges in terms of overcoming poverty make it necessary to reinforce and complement social policies and programs in order to consolidate these achievements. In a complex economic, social and political context, resources must be used in the best way in order to assure that social programs effectively reach the people most in need.*

*This document describes the methodological criteria that the Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) adopted for multidimensional poverty measurement in Mexico. These criteria are the result of an intensive and careful process of research, analysis and consultation with some of the best national and international experts on poverty measurement, as well as with a number of institutions and agencies that offered their experience and knowledge to CONEVAL.*

*The participation of several academic researchers enriched the content of the methodology, both through a constant drive to adopt a rigorous research program, and also for their plurality of approaches and viewpoints. We should also acknowledge the work done by the team of professionals supporting the Council through the Office of the Executive Secretary, which provided an enormous amount of analysis, research and support without which the methodology could not have been taken to an end.*

*The methodology provides elements to evaluate poverty in our country from a new perspective, which is consistent with the Mexican legal regulations as well as with some recent academic developments in poverty measurement.*

*In addition, the methodology enhances the study of poverty by complementing the well established income poverty tradition with a new perspective that also takes social rights*

*and spatial patterns into consideration. These components will make it possible to monitor the extent of social deprivation and they will be systematically published and reported by CONEVAL.*

*By publishing the methodology for multidimensional poverty measurement, CONEVAL complies the mandate that the Ley General de Desarrollo Social (General Social Development Law) has entrusted it with in terms of the definition and measurement of poverty and provides an instrument for the analysis and evaluation of public social policies.*

*Gonzalo Hernández Licona*
*Executive Secretary*

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***The Executive Commission***

*Gonzalo Hernández Licona*

*Félix Acosta Díaz*

*Fernando Alberto Cortés Cáceres*

*Agustín Escobar Latapí*

*María Graciela Freyermuth Enciso*

*Juan Ángel Rivera Dommarco*

*Graciela María Teruel Belismelis*

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## Introduction

The main goal of the Ley General de Desarrollo Social (LGDS), unanimously approved by the Chambers of Deputies and Senators, and enacted on January 20, 2004, is "… to guarantee the full exercise of the social rights set forth in the Political Constitution of Mexico, ensuring access to social development to the population as a whole".[1] The law establishes as goals of the Política Nacional de Desarrollo Social (National Policy for Social Development), the promotion of conditions that allow enjoyment of social rights —both individual and collective—, as well as the promotion of economic development with a social perspective aimed to raise population income and to reduce economic and social inequality. Freedom, distributive justice, solidarity, social participation and respect for diversity, transparency and people's free will are the basic principles on which social policy should rest, according to the law.

The incorporation of institutional mechanisms for evaluating and monitoring social development policies is a fundamental landmark of the LGDS. In order to do so, it creates the Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL), a public institution bearing technical and administrative autonomy; its mission is to regulate and coordinate the evaluation of social development policies and programs and to establish the guidelines and criteria for the definition, identification and measurement of poverty. The connection between these two activities highlights the role of poverty measurement in evaluating the Política Nacional de Desarrollo Social (PNDS). Although the law establishes as its main goal to guarantee the exercise of social rights for the whole population, it also states that the population living in poverty should be the main focus of public social policies.

The LGDS establishes a set of criteria that CONEVAL must follow in measuring poverty; for example, that it must be carried out every two years at the state level and every five years at the municipal scale, and that CONEVAL should use the information generated by the Instituto Nacional de Estadística y Geografía (INEGI).[2] Likewise, article 36 stipulates that CONEVAL must issue a set of guidelines and criteria for the definition, identification and measurement of poverty, within which, at least, the following eight indicators must be incorporated:

[1] According to article 6 of the LGDS, the rights to social development —or social rights— are those having to do with nondiscrimination, education, health care, food, housing, enjoying a healthy environment, work and social security.
[2] On April 16, 2008 the Diario Oficial de la Federación published the Ley del Sistema Nacional de Información Estadística y Geográfica (LSNIEG, National System of Statistical and Geographical Information Law), through which the name of the Instituto Nacional de Estadística, Geografía e Informática changed to Instituto Nacional de Estadística y Geografía.

- Current per capita income.
- Average educational gap in the household.
- Access to health services.
- Access to social security.
- Quality and spaces of the dwelling.
- Access to basic services in the dwelling.
- Access to food.
- Degree of social cohesion.

The mandates of the LGDS in terms of poverty measurement involve two conceptual, methodological and empirical challenges: first, including eight indicators, at the least, requires multidimensional measurements of poverty, for which a general method has still not been found in the academic bibliography (Kakwani and Silber, 2008); second, the periodicity and geographical disaggregation of poverty measurement require new data sources to be generated.

In order to provide with a methodological response to LGDS regulations, CONEVAL developed two lines of research between 2006 and 2009: the first, focused on defining the theoretical and methodological framework for multidimensional poverty measurement; while the second centered on generating the information necessary to carry these tasks out.

The first line of research consisted in carrying out a number of studies and seminars with national and international experts. During the first stage, a group of well known experts on poverty measurement were consulted in order to identify the main challenges in defining and measuring multidimensional poverty. Based on the results of those first sessions, in 2007, on a second stage, CONEVAL asked a group of experts to elaborate a methodological proposal that solved the problem of multidimensional poverty measurement according to the LGDS mandates.[3] These proposals were presented at two internal workshops and an international academic seminar, during which, their main features, properties and scope were discussed.[4]

As a result of the discussion of the methodological proposals, CONEVAL undertook, during a third stage, the task of proposing a poverty measurement methodology that would satisfy the legal

[3] The specialists who were asked to present methodological proposals were Julio Boltvinik, Satya Chakravarty, James Foster, David Gordon and Rubén Hernández and Humberto Soto.
[4] A compendium of the final proposals of the specialists will be published in the book *Medición multidimensional de la pobreza en México* (Multidimensional poverty measurement in Mexico), edited by CONEVAL and El Colegio de México (2010).

regulations, be sensitive to Mexico´s social setting, and that was grounded on strong methodological basis. This proposal was discussed with a group of specialists during the last quarter of 2008 at one national and one international academic seminars. As a result, and after an intensive internal discussion process about the available methodological options and its implications, CONEVAL produced this document, which was enriched by the contributions and comments from Sabina Alkire, James Foster and David Gordon.

The methodology for multidimensional poverty measurement in Mexico was developed by CONEVAL based on the requirements of the LGDS, the proposals presented by the experts and the accumulated scientific and technical background on poverty measurement.

The solution was aimed to take into account a number of legal conditions that were set up along with the Council, in 2004. We should point out that two are the main functions of CONEVAL:

(i) To establish the guidelines and criteria for the definition, identification and measurement of poverty, and
(ii) To regulate and coordinate the evaluation of social development policies and programs.

Taking into consideration this normative background, CONEVAL decided to separate two spaces, economic wellbeing and social rights, given their different theoretical and conceptual nature. This led to the definition of a bi-dimensional measure for identifying poor people: the first dimension relates to the economic wellbeing space and, the second, to deprivation of economic, social, cultural and environmental rights (ESCER). In this way, CONEVAL´s multidimensional poverty measure provides information that allows to target the population to be attended by a number of social programs, which, until now, used to be evaluated according to their impact on monetary poverty, even when their actions had a distant relation with it.

Four out of the five proposals received by CONEVAL from the experts combined all dimensions in only one index, unlike that proposed by David Gordon, who adopted Townsend's concept of poverty (1962) and who identifies poor people depending upon their resources (measured through income) and their standard of living (measured through the material and social conditions that each person bears, as well as the participation on social, cultural and political activities of the society where she lives).

The close link between poverty and evaluation of social programs makes it especially useful to refer to Sen (1976) who points out that, in the definition of any poverty measurement methodology, two key decisions have to be made: the first one corresponds to identifying poor people—those who should be

the main target population of social programs— and the other relates to the aggregation of the poor people in a summary measure that should be able to recognize the macro characteristics of poverty, including its territorial landmarks and its change across time.

In terms of identifying individuals deprived on the economic wellbeing space, it was decided to use the standard monetary poverty method, which compares per capita income with the monetary value of two baskets, one for food and other that includes, besides food, any other good or service usually consumed by the Mexican families. On the social rights space, deprivation identification requires to establish the threshold that separates deprived from non deprived people.

Thresholds on the social rights space are equivalent to the poverty lines/thresholds on the economic wellbeing space and were determined following sequentially the following criteria: (i) to apply legal norms, if they existed; (ii) if it was impossible to meet the previous criteria, CONEVAL decided to use the knowledge and experience from experts working at public institutions related to any specific indicator; (iii) if the application of these criteria were not conclusive, it was agreed to use statistical methods to establish them, and, (iv) in last case, the thresholds would be established by CONEVAL based on supported arguments.

To respect the rights approach recognized in the LGDS led to three methodological decisions: (i) deprivations had to be measured by means of dichotomic variables, in the sense that the right is either met or not met, because it does not exist an intermediate value on the fulfillment of any right; hence, there is not an ordinal scale; (ii) no right is superior to any other; therefore, all of them should "have the same value", in other words, given a linear combination of indicators, all of them should be equally weighted; and (iii), the deprivation of any right makes a person socially deprived. The characteristics of the ESCER allowed us to build up a simple additive index, that is to say, one that is calculated by means of a linear combination of the variables that measure deprivations, and where all of these variables bear the same relative importance; the resulting index reflects the number of unfulfilled rights for any person. To this linear combination, CONEVAL named it as the *social deprivation index*.

However, from the perspective of social policy it is necessary to differentiate levels of rights deprivation, in an analogous way as it is done for the wellbeing space. For example, a person with a value for the deprivation index equal to one is less poor than someone for whom the value of the deprivation index is six. Let us assume that $C$ represents the value of deprivation index, it is then possible to find out a $C^*$ value that allows to differentiate people with some deprivation from people that experiences extreme deprivations. In order to find $C^*$, the method proposed by David Gordon was used; it consists of selecting the regression equation with the best fit out of five logistic models whose

regressors were income and a set of social and demographic variables; the dichotomic dependent variables were defined as follows: (1) one *vs* two or more deprivations; (2) up to two deprivations *vs* three or more, and so on, until (5) up to five deprivations *vs* six.

The five experts consulted by CONEVAL suggested to use a linear combination of variables. However, although the method used by CONEVAL for defining the deprivation index also uses a linear combination, it should be differentiated from the proposals of Boltvinik, Foster, and Hernández and Soto because these assigned different weights to the variables. On the contrary, the method adopted by CONEVAL agrees with that of Gordon and Chakravarty, who use equally weighted variables. However, it should be mentioned that the last author did not specify the criteria or arguments to support his decision. In any case, these two last solutions meet a series of properties that can be classified as "good poverty measures".

Deprivation and extreme deprivation considerations in the social rights space can be enriched by measuring its depth —defined as the average proportion of deprivations.— So every person can have a number between zero (when she is not deprived) and one (when she suffers all deprivations).

CONEVAL establishes that a person is considered to be multidimensional poor if she is deprived in both the economic wellbeing space and the rights space.

Once the identification of poor people has been done according to the previous definition, what follows is to generate an aggregated measure of poverty. In order to calculate the headcount ratio (that is the proportion of poor people in a given population), people identified under that condition should be added up and the sum should be divided by the number of people in the population. The extreme multidimensional poverty headcount ratio is calculated in an analogous way.[5]

After the definition of aggregated measures of multidimensional poverty, CONEVAL decided to set out some independent additional measures corresponding to the wellbeing and the rights spaces, respectively. By using the FGT index in the wellbeing space (associated to monetary poverty) not only the incidence, but also depth and inequality of monetary poverty can be measured. An analogous measure on the rights space has been provided by Alkire and Foster (2007) —that was enriched by a memorandum received from Alkire— who define the intensity of deprivations as the product of the incidence and the depth of poverty. These amounts to the proportion of deprivations among the poor population with respect to the maximum number of deprivations that could be experienced in the whole population where poverty is evaluated.

[5] Because the ultimate goal of social policy has to be the overall erradication of deprivations for the whole population, the methodology proposed by CONEVAL does not only identify poor but also vulnerable people in the wellbeing and rights spaces.

At the same time, the second line of research was divided, in turn, into two lines of work. One of them consisted in developing, over a two years period, an intensive process of institutional collaboration with INEGI, which involved planning, pilot testing and consolidation of the Socioeconomic Conditions Module of the National Survey of Household Income and Expenditures, 2008 (MCS-ENIGH 2008).[6] The MCS-ENIGH 2008 provides information, for the first time in Mexico, that makes it possible to generate calculations of multidimensional poverty at the state level, as it is established by the LGDS.

The second line of research was organized through the integration of working groups aiming to gain an operational definition of the social indicators that should be used: educational gap, quality and spaces of the dwelling, access to basic services in the dwelling, access to health services, access to social security, access to food and the degree of social cohesion. Discussion groups also dealt with those issues related to labor market, gender perspective, discrimination issues and vulnerable population groups. These work groups involved the participation, individually or institutionally, of several experts on each domain.

The process was supported by various institutions, including the Economic Commission for Latin America and the Caribbean (ECLAC), the Comisión Nacional de Vivienda (CONAVI), the Consejo Nacional de Población (CONAPO), the Consejo Nacional para Prevenir la Discriminación (CONAPRED), the United Nations Children's Fund (UNICEF), the Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE), the Instituto Mexicano del Seguro Social (IMSS), the Instituto Nacional de Ciencias Médicas y Nutrición "Salvador Zubirán" (INNSZ), the Instituto Nacional de Estadística y Geografía (INEGI), the Instituto Nacional para la Evaluación de la Educación (INEE), the Instituto Nacional de las Mujeres (INMUJERES), the Instituto Nacional de Salud Pública (INSP), the Food and Agriculture Organization of the United Nations (FAO), the Secretaría de Desarrollo Social (SEDESOL), the Secretaría de Salud (SS), the Sistema Nacional de Información en Salud (SINAIS) and Transparencia Mexicana.

With this document, CONEVAL presents to the Mexican society the methodological criteria it will use to periodically measure poverty at the national, state and municipal scale; CONEVAL promotes accountability by making transparent these criteria to society. The analytical approach adopted aims to capture the spirit of a law based on a broad consensus and social legitimacy, while incorporating some of the best available practices and methodological advances. In this way, CONEVAL complies with the normative regulation the LGDS has charged it with in terms of the identification and measurement of poverty, and contributes to the analysis and evaluation of public social policies.

[6] As part of the attempt to define the questions to be used in multidimensional poverty measurement, CONEVAL also designed the *National Survey on Poverty Thresholds*, which was carried out at the end of 2007.

# The LGDS and the concept of poverty

## The multiple dimensions of poverty

Poverty is associated with living conditions that infringe upon people's dignity, limit the exercise of their fundamental rights, prevent satisfying their basic human needs and make their full social integration impossible. Even though there are several theoretical approaches to identifying what makes an individual poor, there is a growing consensus on the multidimensional nature of this concept. This conception recognizes that the elements that any person needs to make free choices among the range of her life options, cannot be reduced to just one dimension (Alkire and Foster, 2007; CESCR, 2001; Kakwani and Silber, 2008).

Poverty measurement in Mexico has been usually carried out taking into consideration a unidimensional perspective, in which income is used as an approximation to the population economic wellbeing. Under this perspective, a poverty threshold is defined that represents the minimum income needed to buy a basic basket of goods. This threshold is compared to a households' income in order to determine who is poor. This approach makes it possible to identify the population lacking the conditions necessary to satisfy its human needs, as long as they can be obtained through the markets.

In spite of their usefulness, as well as their broad international acceptance,[7] unidimensional measurements of poverty have been subject to some criticism (CESCR, 2001; DWP, 2003; UN, 2004). It is argued that one of their main limitations is that the concept of poverty comprises various components or dimensions, that is to say, it is a multidimensional phenomenon that cannot be expressed, solely and exclusively, by the goods and services that can be bought in the market (CESCR, 2001; CTMP, 2002; Jahan, 2002; Kakwani and Silber, 2008; O'Neil, 2006). Poverty is also associated with the incapability to meet various basic necessities, many of which are provided by the State (such as access to sanitation services or public safety), or which are considered basic because they form part of the economic, social and cultural rights (CESCR, 2001; Kurczyn and Gutiérrez, 2009; UN, 2004).

In close agreement with the academic discussion and international debates, article 36 of the LGDS establishes that social rights and economic wellbeing must be considered in the measurement of

[7] The main measure of poverty used by the Organization for Economic Cooperation and Development and the European Union is the poverty line defined by an income level set at fifty percent of the mean income per household; the United States bases its official measurement on a poverty line defined by the cost in dollars of a set *food plan*; the World Bank defines extreme poverty as living on less than USD$1.25 a day.

poverty in Mexico. Thus, social rights and economic wellbeing, both associated with the universal and inalienable principle of individual freedom, reflect the spirit of a law that contemplates a contractual social relationship between the State, the community and the population. This social contract is not only political in nature, but it is also normative, and it is based on the criteria established in the LGDS, which fundamental goal is to guarantee access for the entire population to social and human development. The path toward a more inclusive and equalitarian society depends, to a large extent, on the enforcement of this social pact between government and society, which should be reflected on a set of consensual rights and duties for everyone (ECLAC, 2006). Thus, achievement of wellbeing and full exercise of human rights should not be considered, in this approach, merely an aspiration or a "programmatic norm", but legally established duties and responsibilities for the Mexican State (Jahan, 2002; Kurczyn and Gutiérrez, 2009).

Although the academic debate and legal regulations call for a multidimensional approach to poverty measurement, this is not an easy task. There are several conceptual challenges that should be addressed, including the definition of the relevant dimensions to be considered, the interaction between these dimensions and data sources limitations. These challenges have given rise to broad debates and discussions, where the need to adopt a multidimensional approach is generally recognized, but the difficulties in making operational this kind of measurement are also acknowledged (Alkire and Foster, 2007; Bourguignon and Chakravarty, 2003; Kakwani and Silber, 2008).[8] Thus, a multidimensional measurement of poverty should include criteria allowing for a systematic, transparent, impartial and technically rigorous solution to these conceptual and empirical issues.

From a multidimensional perspective, poverty can be understood as a set of deprivations defined in multiple domains, such as the opportunity to participate in collective decisions, the mechanisms of resources appropriation, or the fulfillment of rights granting access to physical, human or social capital, among others. The multidimensional nature of poverty, however, does not mean that deprivation in all possible domains in which any individual's life may develop should be taken into consideration. The number and type of dimensions to be considered are directly related to the way in which minimum or acceptable living conditions for an adequate life for all members of society are conceived under a particular philosophical, political and analytical perspective.

[8] In this regard, countries such as Argentina, Chile and Uruguay represent an important exception; in these countries there is a long tradition of using a mixed or combined perspective, in which the insufficiency of income is related to other social deprivations (Feres and Mancero, 2000). This approach has recently been revived due to research carried out in the United Kingdom and Europe (Gordon, 2006).

## Social rights and economic wellbeing

LGDS regulations make it possible to identify, at the least, two main approaches to analyzing the nature of multidimensional poverty: the wellbeing approach and the human rights approach. The first includes the unmet needs approach, the assets approach, and the capabilities approach, among others (Attanasio and Székely, 2001, 1999; Rio Group, 2006; Ravallion, 1998; Sen, 1992, 1980); the second is associated with the existence of universal, inalienable, irreplaceable and interdependent human rights, so that, under this perspective, poverty is, in itself, a denial of human rights (UNDP, 2003b; Robinson, 2001; CESCR, 2001; UN, 2004).

In the wellbeing approach, the fundamental objective is to identify the dimensions and conditions that limit people's freedom. It is assumed that every person, given her personal circumstances and preferences, develops the set of capabilities that define the range of life options she has reasons to value and that may choose among. If these options do not allow her to have an acceptable living standard in her society, that person is considered poor.

Although there is no consensus about what is the best way to deal with the issue of multidimensional poverty in the wellbeing approach, the majority of measurements made under this approach consider the availability of an enough amount of economic resources to be a key element. This recognizes the great importance that income has in most societies for getting a large variety of goods and services (UN, 2004).

In recent years, however, the approach to poverty based on human rights considerations has become increasingly important. This approach is based on the recognition of human rights as "the expression of the needs, values, interests and goods that, due to their urgency and importance, have been considered fundamental and common to every human being" (Kurczyn and Gutiérrez, 2009: 3-4). Thus, it is considered that everybody should bear a series of indispensable guarantees for human dignity, which, having been adopted within the national legal framework and ratified through the signing of international instruments that protect them, become obligations of the Mexican State, which must create the mechanisms that will progressively allow full access to human rights for everybody.

The rights approach is based on the premise that any individual must meet a series of conditions considered fundamental to guarantee human dignity; these conditions tend to be incorporated into the legal framework of each society: any person, by virtue of being one, must be guaranteed a set of irrevocable and irreplaceable social rights (UN, 2004). In addition, this approach considers poverty as

"the denial not only of any specific right or category of rights, but of human rights as a whole" (Despouy, 1996: 6).

This approach, in addition to providing an ethical framework for the evaluation of social development policies, also provides a legal framework with practical consequences for the evaluation of social responsibilities and public policies aimed at overcoming poverty (CESCR, 2001; UN, 2004). Further, it makes it possible to consider minimum norms and legal principles, not only in terms of the results achieved, but also during the process of implementing strategies to overcome poverty.

Recognizing that poverty is directly related to a failure in exercizing human rights, compels the responsible authorities to establish priorities for actions and to guarantee that they are carried out through "progressive achievements". This, in turn, incorporates a temporal horizon that should lead to establishing priorities for public funds allocation (CESCR, 2001; UN, 2004; Tomasevski, 2006).

Each of these two approaches recognizes that poverty relates directly to limitations of life options, and seeks to identify those deprivations or living conditions that could limit the exercise of individual and collective freedoms. In addition, both perspectives adopt different assumptions in order to define the relevant dimensions and the criteria for establishing whether a person is poor or not: in the wellbeing approach, living conditions offering individuals life options that are minimally acceptable to their society are sought, whereas in the rights approach the relevant dimensions are known *a priori*. These dimensions have to do with human rights, which, because of their universal, indivisible and interdependent nature, must be fully satisfied in order to ensure acceptable living conditions.

Both the wellbeing and the human rights perspectives permit a conceptually solid approach to solve the problem of multidimensional poverty measurement. However, it is also possible to adopt a perspective in which both viewpoints come together. This is due to the fact that the rights approach offers an option for determining the relevant dimensions in the study of poverty which is consistent with the wellbeing approach, as it proposes conditions that every individual should be guaranteed with in order to be able to function in society. In this sense, securing social rights leads to the necessary conditions to offer minimally acceptable life options (Jahan, 2002; Mackinnon, 2006). Education makes a suitable example, as it represents the basic knowledge needed to make a person able to take informed decisions regarding her life; in addition, since it is considered a human right, it is recognized as an inalienable and fundamental element for individuals to be free and actively participate in society.

Although the rights approach offers elements necessary for individuals and social groups to exercise their freedom, given the importance of goods and services that can be acquired on the market, it is also advisable to complement it with an evaluation of the monetary resources available to people.

In this regard, the wellbeing approach offers a framework for analyzing an individual's access to these necessary goods and services. Thus, it is then possible to join the rights and wellbeing approaches so that the wellbeing reached through monetary resources and the ability to exercise social rights become two complementary aspects that reinforce each other and converge, but that, being qualitatively different, must be theoretically and methodologically differentiated.

## The territorial context

Poverty is a specific, local and circumstantial experience (UN, 2004), or, as it has been pointed out in the study The Voices of the Poor, "…poverty is suffered at the local scale, within a specific framework, in a particular place and within the framework of concrete social interactions" (Nayaran *et al.,* 2000: 230). This highlights the increasing importance the bibliography assigns to the need to incorporate aspects that go beyond the individual sphere (these aspects may refer to a wide range of geographical, social or cultural characteristics), which influence and individual's life options and, therefore, the actual possibilities of exercising his/her freedom. However, these contextual aspects cannot be framed within the approaches to the phenomenon of poverty that have been discussed so far. A person's social rights and her income are individual or household attributes, while the analysis of contextual factors requires that local elements be taken into consideration, and these elements depend on territorial criteria for their identification.

The LGDS, by incorporating social cohesion among the indicators of poverty, recognizes the importance of these contextual factors, which, although may be analyzed from the perspective of their influence on society and the effects that society infringes on them, they can only be measured a territorial scale. Hence, it is necessary to complement the poverty measurement approach with the consideration of a third analytical space, which should register the phenomena unfolding in the space of social interaction, as is the case of social cohesion.

In Latin America, the development of the concept of social cohesion has been directly linked to the resolution of historical social problems, such as poverty, social inequality, discrimination and social exclusion (ECLAC, 2007a; De Ferranti *et al*., 2004). After making an overall review of several definitions of the concept of social cohesion, one comes to recognize the lack of a single conceptual *corpus* that can guide an operative definition for its measurement.

Nonetheless, specialists agree that it is possible to link the concept of social cohesion and social development, inasmuch as it the result of a combination of disadvantages in wellbeing, integration

mechanisms and a sense of belonging to a particular population group or a community (ECLAC, 2007a). According to this, social cohesion brings together three components: the dimension of perception, the dimension of the economic and social disadvantages, and the dimension of the institutional mechanisms of social inclusion or exclusion (by means of the market, the state and society).

This definition allows to make some preliminary views on its connection with the definition and measurement of poverty. In the first place, the relational nature of the concept prevents it from being considered part of the constitutive nucleus of poverty at the individual or household level, since it is a phenomenon that can only be observed at a higher level of aggregation (Boltvinik, 2007; Foster, 2007; Gordon, 2007). In the second place, there is no demonstrated nexus, unidirectional and direct, between poverty and social cohesion that allows for identification of the latter as an intrinsic component of the first. From an institutional viewpoint, for example, it is believed that a high degree of social cohesion will only have a significant effect on poverty if it is complemented with the establishment of social networks and institutions external to the community (Woolcock, 1998). In the same vein, Boltvinik (2007) argues that people's poverty condition is not directly associated with low levels of social cohesion and that, therefore, this should not be included as a component of poverty, but rather as a variable that helps to explain its structure and dynamics, that is to say, as an indicator exogenous to the identification of poverty.

An approach in which rights and wellbeing come together, and which takes into consideration the territorial context, presents four advantages compared to a unidimensional approach. First, it places a society made up by social groups and free and participative individuals at the center of the policies aimed to overcoming poverty. Second, it assumes a system based on democratic values and the operation of social institutions under the rule of law. Third, it considers the specific and heterogeneous social and territorial context in which individual capabilities develop. And finally, it makes it possible to establish public policy priorities in terms of differentiated goals and attention to vulnerable groups, with concrete criteria regarding responsibility and accountability on the part of each of the actors involved in the strategies to overcome poverty.

In the following chapter, the specific criteria CONEVAL adopted to define the methodology for poverty measurement will be presented. We should emphasize that these criteria must, necessarily, deal with the unavoidable link between the various deprivation spaces. It will be left for a later chapter the definition of the indicators to be used in the actual measurement.

# Methodology for multidimensional poverty measurement

## Theoretical considerations

In the first chapter it was established that the indicators in article 36 of the LGDS make it possible to identify three analytical spaces for the study of poverty: the first has to do with the wellbeing approach, in terms of the necessities that can be acquired through the population's monetary resources; the second is linked to the individual's fundamental social rights, whereas the third is determined by relational and community aspects that are expressed territorially.

In this chapter, these conceptual elements are revisited in order to establish a methodology for poverty measurement that meets the following criteria: first, it follows on the main traditional measures of poverty in Mexico, especially those that have used the household monetary resources as indicative of wellbeing (CTMP, 2002);[9] second, it considers the methodological proposals, especially the Latin American ones, that combine income-based measurement of poverty with unmet basic needs (Becaria and Minujin, 1988; Feres and Mancero, 2000; Gordon, 2006); finally, it includes some of the recent theoretical developments available in the specialized bibliography.[10]

According to Sen (1976), the basic problems a poverty measurement methodology should address are twofold: identification and aggregation or measurement. The solution to the problem of identification is to establish the criteria that will be used to determine whether or not a person is poor. The measurement problem can be solved by determining the way in which deprivations are to be aggregated in order to create a summary measure of poverty.

In most applications of Sen's ideas, the solution to the problem of identification has adopted an unidimensional view;[11] however, Bourguignon and Chakravarty (2003) point out that, in the multidimensional approach it is necessary to establish the precise dimensions to be considered and the way to identify the population living in poverty based on its attributes in each of these dimensions. This process implies that the measurement methodology should specify criteria for making comparisons between qualitatively different dimensions, such as health, education or housing.

In order to present the methodology, we describe first the general methodological criteria; secondly, the definition of poverty is presented; third, the criteria to identify the population in

[9] The methodology proposed by the Comité Técnico para la Medición de la Pobreza (CTMP) in 2002 is an important reference. More detailed information on CTMP's research can be consulted in Székely (2005).
[10] See a more complete description in Boltvinik (2007).
[11] The unidimensional approach takes into consideration a variable that is significant in measuring poverty, generally the income or expenses of the population.

multidimensional poverty are specified, and, finally, we describe the criteria for carrying out aggregated poverty measurements at the national, state and municipal levels.

## Methodological criteria

The LGDS states that CONEVAL, the institution in charge of evaluating social policy, is also mandated to measure poverty. In this context, poverty measurement may be viewed as a global evaluation of social development policies that makes it possible to visualize the extent of social deprivation among the population, and to evaluate, in the long term, the performance of policies aimed to overcoming poverty.

Poverty measurement, in addition, plays a key role in visualizing the progress and challenges faced to fully reach social development. Hence, it should be easily communicable and it should be subject to public scrutiny, so that any interested person can use the information it provides. For these reasons, the poverty measurement methodology must be backed up by rigorous theoretical and conceptual considerations; it must also document its basic assumptions; and it must be simple, statistically robust and easily replicated. Furthermore, it must enable diagnoses providing levels, trends, and profiles of the phenomenon and favor the evaluation of current policies as well as the design of new policies or programs.

CONEVAL, as the agency of the Mexican State mandated with establishing the guidelines and criteria for the definition, identification and measurement of poverty, must guarantee that the measurement methodology satisfies the following criteria:

1. Comply with the requirements of the LGDS and other legal regulations.
2. Produce results that make it possible to identify the population in poverty.
3. Incorporate the relevant indicators of poverty.
4. Make it possible to identify the contribution each dimension has in determining poverty.
5. Be able to be disaggregated for different population groups.
6. Allow to carry out comparable measurements over time.
7. Bear applicability on the basis of information provided by INEGI.
8. Offer a framework for analyzing social deprivation among the population and in identifying regions and social groups highly deprived or poor.

9. Satisfy a set of axiomatic properties, such as monotonicity and normalisation, among others.[12]

These criteria aim to establish a connection between the theoretical and technical considerations underlying the methodology and the institutional and legal context in which it is framed, in order to ensure that multidimensional poverty measurement provides valuable information to cope with the various needs of the population, civil society and the federal, state and municipal government agencies.

## On the concept and definition of poverty

Given the requirements of the LGDS, and according to recent developments in the measurement of multidimensional poverty, the definition to be adopted by the Mexican State must analyze the social situation of the population based on three spaces: economic wellbeing, social rights and the territorial context.

In the previous chapter, it was argued that individuals and households play a central role in the consideration of the spaces associated with economic wellbeing and social rights, while the territorial space deals mainly with concepts having to do with communities and social collectives. The concept and definition of poverty used in this methodology considers only the spaces of economic wellbeing and social rights. The territorial context (and specifically social cohesion) is seen as an important tool for the analysis of the context in which social processes that include or give rise to poverty occur.

Because both spaces that define poverty at the individual level offer a diagnosis of the limitations and restrictions people face, differentiated criteria have been established to define the presence or absence of deprivation. In the wellbeing space, a minimum amount of monetary resources (defined by the poverty line) required to satisfy people's basic needs has been set. In the space of social rights, as these are considered universal, interdependent and indivisible human rights, a person is considered as unable to fully exercise her rights when she shows deprivation in at least one of the six indicators specified in article 36 of the LGDS: educational gap, access to health services, access to social security, quality and spaces of the dwelling, access to basic services in the dwelling and access to food.

Although deprivation in any of the two spaces imposes a series of specific limitations that violate people´s freedom and dignity, the simultaneous presence of deprivation in both spaces considerably worsens their living conditions, which gives rise to the following definition of multidimensional poverty:

[12] For more information about these properties, see Alkire and Foster (2007) and Bourguignon and Chakravarty (2003).

**A person is considered to be multidimensional poor when the exercise of at least one of her social rights is not guaranteed and if she also has an income that is insufficient to buy the goods and services required to fully satisfy her needs.**

Once multidimensional poverty has been defined, the following section will outline the criteria used for making the measurement of multidimensional poverty operational. In addition, some criteria will also be established to classify the population according to the depth and intensity of deprivation.

## Identifying population in poverty

In this section, the criteria followed by CONEVAL to identify multidimensionally poor people will be described. Likewise, the criteria used to classify them according to the depth of their respective social deprivations are also shown. Identification of the population in poverty is carried out in two stages: in the first, CONEVAL established whether or not an individual's income is sufficient to meet her needs and if she shows deprivation in any of the six social indicators; in the second stage, the indicators generated by the first stage are combined to identify the population living in multidimensional poverty.

In order to do so, the dimensions to be considered are established first. Secondly, general criteria to determine if a person is deprived in any particular dimension are defined. Since every dimension bears some conceptual and empirical particularities, in the next chapter we will present the specific criteria that were actually used. On the other hand, the criteria to determine whether a person is multidimensionally poor will be discussed at the end of this chapter.

### Choosing the relevant dimensions

This methodology includes all the constitutive dimensions of poverty the Mexican State identified in the article 36 of the LGDS, except for social cohesion. In order to identify the population in poverty, and according to the conceptual framework, these dimensions are divided into two groups:

- The dimension associated with economic wellbeing, which is measured operationally by current per capita income.

- The dimensions associated with social rights: education, health, social security, food, housing and services in the dwelling, which are measured through the six indicators of social deprivation.

## Identifying deprivations

In order to identify the population deprived in each dimension the following criteria were adopted:

- *Economic wellbeing*. The population with an income insufficient to acquire the goods and services required to satisfy its needs is identified.
- *Social rights*. The population deprived in at least one of the six social indicators. By adding up the number of deprivations we define the social deprivation index.

### *Economic wellbeing*

As we have already mentioned, the economic wellbeing space will be analyzed based on people's income, specifically current income. This income represents the inflow, both monetary and non-monetary (this may include products received or available in kind, among others) that makes it possible for households to obtain the necessities they require, without decreasing the goods or assets they possess.

In order to compare households of diverse composition and not underestimate or overestimate the resources available to them to satisfy their needs, the current income of the household is adjusted so as to reflect the differences in the household's composition (according to its size, the age of the members and other characteristics). Thus, the indicator of current income in the household is used, according to the stipulations of article 36 of the LGDS.

In order to identify the population with an income insufficient for necessary goods and services, the wellbeing threshold and the minimum wellbeing threshold have been established. The wellbeing threshold, on the other hand, makes it possible to identify the population that does not have sufficient resources to acquire the necessary goods and services to satisfy their needs (food and non-food). The minimum wellbeing threshold makes it possible to identify the population that, even when using all of their income to purchase food, cannot acquire enough of it to ensure adequate nutrition.

***The social deprivation index***

There are two steps for identifying deprivation in the social rights space:

1. *Deprivation identification*. For each of the six social indicators a binary variable is generated. Those variables make it possible to determine whether a person presents deprivation in the corresponding dimension. The indicators take the value one when an individual is deprived and zero otherwise.
2. *Social deprivation index*. This index is built as the sum of the six indicators associated with social deprivation. According to the suggestions made by Gordon (2007), CONEVAL will carry out statistical procedures to verify that the social deprivation index is valid, reliable and additive.

According to the definition of multidimensional poverty, a person exhibits deprivation in the space of social rights when the value of the social deprivation index is equal or greater than one, that is to say, when she presents at least one social deprivation. This cutoff point ($C$=1) is called the *deprivation threshold.*

Defining the social deprivation index as the sum of the six deprivation indicators assumes that every deprivation has the same relative importance. This feature, as well as the decision to adopt one single deprivation as the deprivation threshold, are based on the principles of indivisibility and interdependence of human rights, which recognize that the non-fulfillment of any of the human rights infringes upon the fulfillment of the others, and that there is no human right that can be considered more important than any other.

On the other hand, akin to the wellbeing threshold that was defined in the space of economic wellbeing, the population presenting a significant number of social deprivations is identified through the definition of a *extreme deprivation threshold (C*)*, which makes it possible to identify the population living in *extreme multidimensional poverty*. There is no single methodological criterion for determining a threshold of this sort. Therefore, in order to avoid using discretionary criteria, the Executive Commission of CONEVAL decided to apply the criteria proposed by Gordon (2007) to determine the $C^*$ value by resorting to statistical methods. The method used tries to separate the population into two groups (based on each person's income and the value of the index of deprivation), so that the differences between them are maximized, while, at the same time, the groups are as homogenous as possible. By applying this method, the value of $C^*$ was found to be three.

***Combining income and the social deprivation index***

As it has been mentioned, income and the social deprivation index offer, independently, since they correspond to different analytical spaces, a diagnosis of the monetary restrictions and the social deprivation affecting the population. Since these restrictions and deprivations are different, both conceptually and qualitatively, CONEVAL considered that it would not be methodologically consistent to combine them into a single multidimensional poverty index.

According to the poverty definition, however, it is necessary to consider simultaneously both spaces in order to offer an exact delimitation of those individuals living in multidimensional poverty. To do so, the classification method illustrated in Figure 1 is used.

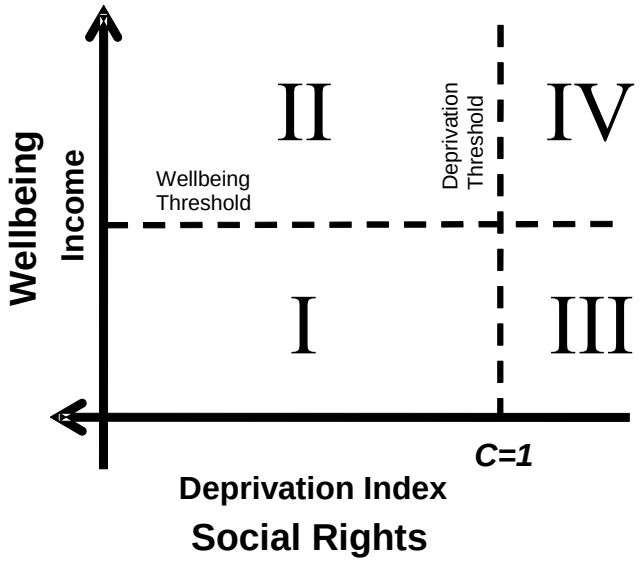


Figure 1. Population living in multidimensional poverty

The vertical axis of Figure 1 represents the space of economic wellbeing, which is measured by people's income. The wellbeing threshold makes it possible to differentiate whether or not people have sufficient income.

The horizontal axis represents the space of social rights, measured through the social deprivation index. Unlike the usual representation in Cartesian graphs, individuals located to the left of this axis show more deprivations than those to the right. Given that people who show at least one social

deprivation are considered socially deprived, the value of the deprivation threshold is one. This threshold makes it possible to differentiate people showing deprivation from those exhibiting none.

According to this figure, once her income and social deprivation index are determined, any person may be classified in one, and only one, of the following groups:

I. *Multidimensional poor*. People with an income below the wellbeing threshold and with one or more social deprivations.
II. *Vulnerable due to social deprivation*. Socially deprived people with an income higher than the wellbeing threshold.
III. *Vulnerable due to income*. Population with no social deprivations and with an income below the wellbeing threshold.
IV. *Not multidimensional poor and not vulnerable*. Population with an income higher than the wellbeing threshold and with no social deprivations.

Among the multidimensional poor, it is also possible to identify the population in extreme multidimensional poverty, as shown in Figure 2.

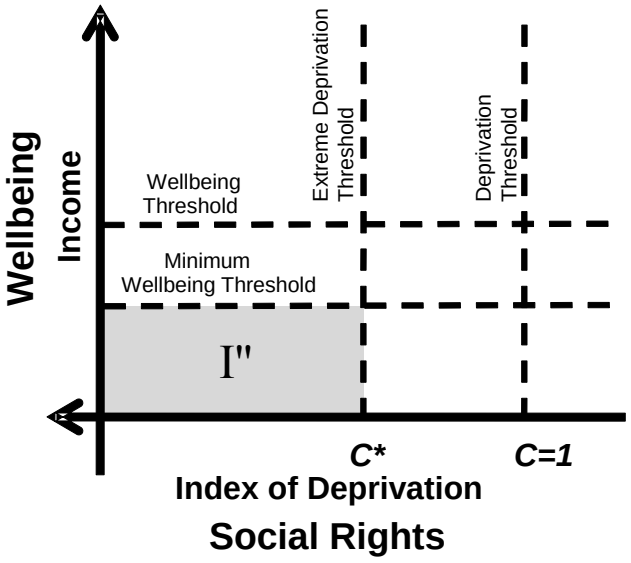


Figure 2. Population living in extreme multidimensional poverty

Figure 2 incorporates the minimum wellbeing threshold and the extreme deprivation threshold ($C^*$). This makes it possible to locate, in quadrant **I** of Figure 1, the subset of people who define subquadrant **I''.** This subquadrant represents the population in *extreme multidimensional poverty*, that is defined as those individuals having an income that is so low that, even if spent entirely on food, they could not buy the necessary nutrients for a healthy life; in addition, they exhibit at least three of the six social deprivations. The population in multidimensional poverty that is not included in extreme multidimensional poverty is defined as living in *moderate multidimensional poverty.*

## Aggregating poor people

Once the problem of identification has been solved, an aggregated measure of multidimensional poverty must be specified. This involves determining the criteria to aggregate individuals' characteristics in order to create indicators that will make it possible to analyze the magnitude and evolution of this problem.

Aggregated poverty measures must satisfy the following properties: ensure measurement comparability at the national, state and municipal scale over time; make it possible to evaluate the overall contribution of states and municipalities to national poverty; allow for determining the contribution to multidimensional poverty of every dimension, and, finally, bear some desirable analytical properties.[13]

Within this framework, three types of measures of multidimensional poverty are defined: headcount ratio, depth and intensity.

### Incidence of poverty

These measures refer to the percentage of the population, or from a specific population group, that exhibits some sort of economic or social deprivation. The thirteen indicators of incidence of multidimensional poverty, wellbeing or social deprivation that CONEVAL will report are the following:

1. Population whose income is lower than the wellbeing threshold.
2. Population whose income is lower than the minimum wellbeing threshold.

[13] Some of the properties of aggregated multidimensional poverty measures can be seen in Alkire and Foster (2007).

3. Deprivation due to educational gap.
4. Deprivation in access to health services.
5. Deprivation in access to social security.
6. Deprivation due to quality and spaces of the dwelling.
7. Deprivation in access to basic services in the dwelling.
8. Deprivation in access to food.
9. Population showing one or more social deprivations.
10. Population showing three or more social deprivations.
11. Population in multidimensional poverty.
12. Population in extreme multidimensional poverty.
13. Population in moderate multidimensional poverty.

The headcount ratio of multidimensional poverty has the following three advantages: first, it makes it possible to determine the percentage of the population in poverty as well as the number of people in that condition. It is a well known measure and is easily interpretable. Third, it satisfies most of the four criteria established in the previous section. One especially important feature is that incidence poverty measures can be decomposed and, therefore, the contribution of the different states and municipalities in determining national poverty can be calculated.

Nevertheless, the headcount ratio of multidimensional poverty has two important limitations. First, it does not allow to know the contribution of the various dimensions to overall poverty. And second, although it provides important information to evaluate social development policies, it is insensitive to the number of deprivations among the multidimensional poor: given a certain percentage of the population with an income under the wellbeing threshold, the headcount ratio would be the same whether the entire poor population is deprived in only one or in all the six social dimensions.

### Depth of poverty

Two measures of depth of poverty are reported: the first has to do with the wellbeing space, whereas the other is directly related to the social deprivation index. With respect to the wellbeing space, CONEVAL adopted the measurement of poverty intensity developed by Foster, Greer and Thorbecke (1984) for income poverty. This is a measure of the depth of poverty given by the average distance from the income of the population with an income lower than the wellbeing threshold to that threshold.

This measure is presented both for the population with social deprivations as well as for that without them.

On the other hand, the depth of social deprivation is reported through the average proportion of deprivations. CONEVAL must report this indicator for the following groups: the population in multidimensional poverty; the population in extreme multidimensional poverty; the population with an income higher than the wellbeing threshold and that has at least one social deprivation, and for the population group who is deprived in at least one social indicator.

### Intensity of poverty

Alkire and Foster (2007) proposed an aggregated multidimensional poverty index in order to sort out the limitations of incidence measures. This index is calculated by multiplying the headcount ratio by the measure of depth. These measures are sensitive to changes in social deprivation among the population living in multidimensional poverty.

CONEVAL will estimate the following three measures of intensity of poverty:[14]

1. *Intensity of multidimensional poverty*. The headcount ratio times the average proportion of social deprivations among the population in multidimensional poverty.
2. *Intensity of extreme multidimensional poverty*. The product of the headcount ratio and the average proportion of social deprivations among the extreme multidimensional poor.
3. *Intensity of deprivation among the socially deprived*. The product of the headcount ratio and the average proportion of social deprivations among the population that is socially deprived.

Intensity measures of poverty make it possible to estimate the contribution each social dimension has in determining multidimensional poverty, a key element in evaluating social development programs and policies. In addition, the indicators of intensity of multidimensional poverty are specific cases of the proposal for multidimensional poverty measurement proposed by Alkire and Foster (2007),[15] with the

[14] Appendix D presents the methodology used to construct these indicators.
[15] Alkire and Foster (2009) show that the criteria defined by CONEVAL to identify the population living in multidimensional poverty are equivalent to their methodological proposal (Alkire and Foster, 2007; Foster, 2007) when a specific set of quantifiers are used for each

difference that, according to CONEVAL's theoretical framework, it would be inappropriate to include income into the calculation of the depth and intensity measures.

In accordance to LGDS regulations, CONEVAL will report the aggregate measurements of poverty and social deprivation described above every two years at the national and state levels, and every five years at the national, state and municipal scale.

## Social cohesion

Since the degree of social cohesion is the only indicator associated with the territorial context included in article 36 of the LGDS, measurement of this space will be carried out through social cohesion indicators. To do so, the following indicators will be estimated:[16]

1. The Gini Index.
2. The degree of social polarization of every state and municipality.
3. The income ratio of the population living in extreme multidimensional poverty relative to the population that is not living in multidimensional poverty and that is not vulnerable.
4. The social networks perception index.[17]

As Boltvinik (2007) recommended in his proposal, a classification of states (or municipalities) will be made according to their degree of social cohesion. In order to carry out this classification, statistical stratification techniques will be used.

indicator of deprivation and income is included in the indicators. Therefore, CONEVAL will also report this measurement for use by the interested public.

[16] The criteria used to define these indicators are presented in chapter 3.

[17] This indicator will only be estimated at the state level.

# Criteria for defining poverty indicators

## Introduction

The three spaces established during the development of the methodology have specific characteristics that influence the definition of suitable indicators. This chapter presents the criteria CONEVAL adopted to identify the population that does not meet the respective thresholds for each space and dimension.

## Measuring the wellbeing space

Up until 2006, Mexico's official measurement of poverty followed the methodology defined by SEDESOL, based on the methodological recommendations of CTMP in 2002. That methodology uses income as the single dimension for evaluating the standard of living (CTMP, 2002). In the context of developing a new methodology that measures multidimensional poverty, CONEVAL established several lines of research in order to find a measurement that was compatible with stipulations in the LGDS, and departing from the work done by CTMP (Székely, 2005). Among the research themes pursued, were:

- Design and estimation of a new food basket: it was considered appropriate to define a new basic food basket for Mexico, that reflected current consumption patterns.
- Estimation of non-food necessities: several methodologies available for estimating non-food necessities of the population were analyzed in order to identify the one that best fit the Mexican context.
- Incorporation of economies of scale and adult equivalence scales: to allow for comparison between the incomes of households of different demographic composition. Available bibliographical options were explored, such as adult equivalence scales (which assume that different people require different amounts of resources depending on their age or other characteristics), and economies of scale (in which the assumption is that a cost per person in any standard of living is lower when individuals live together rather than apart).

Each of these research lines was pursued by CONEVAL, with support of several researchers who studied the problem and came up with solutions applicable to the Mexican context.[18] In order to determine the new wellbeing and minimum wellbeing thresholds, CONEVAL decided to adopt the following specific criteria:

- For the definition of rural an urban areas set the cutoff point at 2,500 inhabitants.
- Determine the value of the wellbeing and minimum wellbeing thresholds based on observed patterns of expenditure and consumption.
- Use ENIGH 2006 to construct the wellbeing and minimum wellbeing thresholds.
- To construct the income at a household level and determine if it is below or equal to the wellbeing or minimum wellbeing threshold, and assign to all the members of a domestic unit the characteristic of the household to which they belong.
- Use household income to contrast with wellbeing threshold and minimum wellbeing threshold first and then assign the corresponding status to every member of the household.
- Draw on international references.

Based on these criteria and considering the results of the studies and research carried out, two basic baskets were defined, one for food and one for non-foods. Both allow to make calculations at the urban and rural level. Based on these basic baskets, the wellbeing threshold is determined (equivalent to the sum of the costs of both the food and non-food baskets) and the minimum wellbeing threshold (equivalent to the cost of the food basket only).

As for the definition of income to use, there were brought into play discussions with experts, and a review produced by the Canberra Group (2001) and the International Labour Organization (ILO) (2003), current income was adopted as the chosen definition. According to these institutions, total current income is comprised of the sum of payments made to members of the household, including monetary and non-monetary resources, and incorporating labor income, income from self-owned businesses, capital gains, transfers, income from cooperatives, the value assigned to auto-consumption, in-kind payments or gifts and an estimation of the imputed rent for the dwelling.

According to the suggestions made by the experts, the definition of income was adjusted in order to adequately reflect the resources available to households to satisfy their needs. In the first place, only

[18] Among the studies carried out are Calderón (2007), the "Taller para la Elaboración de Canastas Básicas Alimentarias y No Alimentarias, offered by ECLAC in July 2008; Hernández *et al*. (2009), and Santana (2009).

payments and in-kind gifts received more than once a year will be considered, given the randomness and frequency with which they occur. Moreover, given that imputed rent is not fungible and so households cannot make use of it to satisfy needs, this item was excluded from the definition of income. Likewise, in order to compare the income levels of households with different demographic compositions, current income is adjusted by adult equivalent scales, as well as for economies of scale. The above mentioned criteria make it possible to identify both households whose total per capita current income (adjusted by equivalent scales and economies of scale) is below the value of the wellbeing threshold and below the value of the minimum wellbeing threshold.[19]

## Social deprivation indicators

The social rights space establishes a close relationship between the extent to which human rights are fulfilled and the measurement of poverty. However, the measurement of the full exercise of a given social right involves a number of methodological challenges, and some issues which are both observable and unobservable should be considered too.[20] Therefore, the indicators of social deprivation used to measure poverty should be such that they identify some fundamental elements of the corresponding social right, without which it can be assured, that a person does not exercise or is not able to exercise that social right. This criterion allows for an operative identification of deprivation. However, it should be clear that, under such classification, if a person does not appear to experience a given deprivation, it cannot be assumed that he/she is ensured the full exercise of the right in question.

Because of this, and due to the characteristics of the measurements specified in the previous chapter, the indicators of social deprivation have been defined according to the following general criteria:

- The unit of analysis: it is the individual. When it is not possible to have individual measurements, household level measures are used and then applied individually to every member of the household.

[19] Appendix A shows the specific criteria adopted for the construction of income and the definition of the wellbeing and minimum wellbeing thresholds.
[20] Take for example the right to education, regarding which the Political Constitution of Mexico establishes: "Every individual has the right to receive education. The State -federation, states, Federal District and municipalities- will offer preschool, elementary and secondary education. Preschool, elementary and secondary education constitute the basic mandatory education. The education offered by the State will tend to harmoniously develop all the faculties of the human being and will foment in her, at the same time, a love of country and an awareness of international solidarity, in independence and justice". Although it is easy to identify the educational level achieved by an individual, it is quite difficult to obtain information regarding to whether or not the education she has received has made it possible for her to harmoniously develop all her faculties.

- Conceptual relevance: the indicators of deprivation to be used should express a fundamental element of any particular social right.
- Empirical feasibility: the indicators should be valid, precise and reliable[21] and must be estimated at the state and municipal levels with information generated by INEGI.
- Specificity: the indicators should clearly identify the population with deprivations, in order to construct the dichotomic indicators of social deprivation.
- Usefulness for public policy: a reduction of the level of deprivation should be possible, even to zero, which implies that it must be feasible to overcome that deprivation.

One key component in the definition of deprivation indicators consists in setting the threshold used to determine whether a person is deprived in any specific dimension. For that reason, specific methodological criteria were established. These criteria are as follows:

1. Apply legal norms, if they exist.
2. Apply specific criteria defined by experts of specialized public institutions working on the field of each deprivation indicator.
3. Apply criteria based on statistical analysis.
4. The Executive Committee of CONEVAL shall determine the threshold, after taking into consideration the opinion of experts.

Therefore, in order to define deprivation indicators, a review of the legislation applicable to each dimension was carried out first. Where the legislation did not provide enough information to define a precise indicator of deprivation and its associated threshold, specialists in the field were consulted, especially those from official institutions devoted to generating or analyzing statistical information related to a particular social dimension.

The following sections explain the fundamentals for building deprivation indicators for educational gap, access to health services, access to social security, quality and space of the dwelling, basic services in the dwelling and access to food.[22] In order to offer detailed information regarding the characteristics and causes of social deprivation, CONEVAL will also report several supplementary indicators that will provide a deeper understanding with regards to each dimension.[23]

[21] For a precise definition of these properties, as well as some suggestions for evaluating them, see Gordon (2007).
[22] Appendix B shows the specific criteria for constructing the deprivation indicators defined in this section.
[23] Appendix C presents some of the indicators CONEVAL will report.

## Educational gap

Education is the most important channel through which skills, knowledge and ethical values are internalized by the population. It is also a basic mechanism of transmission and reproduction of knowledge, attitudes and values that is essential to the process of social, economic and cultural integration. Being unable to read, write or solve simple mathematical problems, or not having the minimum mandatory schooling years, limits the cultural and economic prospects of human beings, restricting their ability to interact, to make decisions and to actively function in their social and cultural environment.

Within the Mexican legal framework, Article 3 of the Political Constitution of Mexico (CPEUM) and articles 2, 3 and 4 of the Ley General de Educación (LGE, General Education Law) establish that the entire population must have preschool, elementary and secondary school, which comprise the mandatory basic education. Article 31 of the Constitution and article 4 of the LGE stipulate the parents' obligation to send their children to public or private schools in order to achieve nine years of mandatory education. In addition, the Ley Federal del Trabajo (Federal Labor Law), prevents minors under the age of fourteen to work; a similar constraint exists for those children aged fourteen to fifteen years old who have not completed their mandatory education.

In recent years, several reforms on education have been incorporated into the Mexican Constitution and some other laws regarding the norm about the number of schooling years mandatory education comprises.[24] For that reason, it is not possible to set the same educational threshold for everyone; instead, CONEVAL defined thresholds in such a way that they reflected the normative changes that have taken place.

In order to define the threshold for this dimension, CONEVAL consulted the Instituto Nacional para la Evaluación de la Educación (INEE), the agency in charge of evaluating education in Mexico. INEE proposed CONEVAL to use the Norma de Escolaridad Obligatoria del Estado Mexicano (NEOEM, Mexican State Mandatory Schooling Regulation), according to which the population meeting any of the following criteria is considered educationally deprived:

[24] The threshold of mandatory education recognized in the Constitution has been broadened over time. In 1934, the Constitution incorporated as a basic right the mandatory teaching of elementary school; since 1908, during the final days of Porfirio Díaz's administration, Justo Sierra promoted an educational reform to that effect. In 1993, it was increased so that the mandatory offering included secondary. Recently, at the end of 2002, preschool was deemed mandatory, but gradually.

- For people aged three to fifteen years old. When they lack mandatory basic education and are not attending a formal educational center.
- For people born before 1982. If they do not meet the minimum mandatory basic education level that prevailed at the time they should have attended elementary school.
- For people born from 1982 onwards. If they have not completed the minimum current mandatory basic education requirement (secondary school).

The NEOEM offers information about the capacity the Mexican State has to guarantee basic mandatory education for its whole population. This is a basic component of the right to education that CONEVAL will report periodically, in order to inform the progress made and to assess the persisting challenges in terms of educational gaps. The analysis of progress towards the full exercise of the right to education will be complemented with the report of other indicators, such as universal access to current mandatory education and the quality of education.

### Access to health services

Access to health services provides a precondition to support life and adequate physical and mental functions for the human being. When people lack access to timely and effective health services, the cost of facing an illness or an accident can wipe out familial economic resources or even the physical integrity of its members.

Article 4 of the Constitution establishes that all Mexicans have the right to health protection. In terms of the Ley General de Salud (LGS, General Health Law), this Constitutional norm addresses the right that all Mexicans have to be enrolled in the Sistema de Protección Social en Salud (Social Health Protection System) (article 77 b1 of the LGS). Thus, any family or individual who is not covered by social security institutes or that does not have any other mechanism of social protection with regard to health, should be enrolled in this health protection system (article 77 b 3 of the LGS).

Based on these criteria, a person is considered to be deprived of access to health services when:

- She is not enrolled in or entitled to receive medical services from any institution offering them, including the Seguro Popular, the social security public institutions (IMSS, federal or state ISSSTE,[25] Pemex,[26] Army or Navy) or private medical services.

The norm established in the LGS offers a minimum ground to guarantee that everybody may fulfill their constitutional right to health protection. However, this right should also comprise available, accessible, suitable and good quality health services (OHCHR, 2004).

Therefore, in addition to evaluating access to health services, it is also desirable to have information about some other elements associated with the right to health, such as the timeliness and effectiveness of the services. Nonetheless, there exist conceptual and methodological limitations to analyze these issues. For example, although the distance to the nearest medical unit is very important, one must also consider the type of care required, the method of transportation, and the sort of medical treatments that can actually be carried out. Therefore, these and other elements will be reported by CONEVAL as part of the supplementary indicators.

### Access to social security

Social security can be defined as the set of mechanisms designed to guarantee an individual´s subsistence means when facing shocks such as accidents or illnesses. It also includes social protection for disabled, pregnant and the elderly. Exclusion from social protection mechanisms makes the ability of individuals to respond to crises more dubious (ECLAC, 2006).

In Mexico, social security regulations are established in Article 123 of the Constitution, which is devoted to labor rights. In that article, the minimum social coverage that must be granted to workers and their families is defined.[27] The Ley del Seguro Social (LSS, Social Security Law), which regulates social protection for workers listed under heading A,[28] establishes that the goal of social security is to guarantee the right to health care, medical assistance, protection of subsistence means and to those

[25] ISSSTE is the national institute in charge of the social security of Mexico´s governmental workers.
[26] Pemex is the organism in charge of the activities related with the petroleum industry in Mexico.
[27] Fraction XXIX of heading A in this article stipulates: "The LSS is of public usefulness, and it shall include insurance for disabilities, old age, life, involuntary severance from work, illness and accidents, day care services and any other one aimed at the protection and wellbeing of the workers, peasants, unsalaried laborers and other social sectors and their families."
[28] The stipulations of the Constitutional Article 123 with regard to social security are divided under two headings: those of heading A, that apply to workers, day workers, domestic employees, artisans and in general, to all work contracts, and those of heading B, for the state workers. The provisos of heading A are applicable in general for the working population not included in heading B, since, according to fraction XXIX of this heading: "The LSS is useful, and shall include […] and any other intended for the protection and *wellbeing of the workers*, peasants, unsalaried laborers and other social sectors and their families."

social services needed for the individual and collective wellbeing. This law stipulates two ways for accessing to social security: one mandatory and one venue which allows for voluntary individual enrollment. The population included under heading B enjoys a similar scheme to those workers under heading A, but they are regulated by the Ley del Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (Law of the Institute for the Security and Social Services for State Workers).

In the case of the non working population, both systems offer three mechanisms of access: a direct one, through employment retirement and pensions; an indirect one, through kinship networks with population currently enrolled or that receive a pension, and finally, through orphanhood or widowhood pensions. One relevant feature of the social security system is its dynamic nature. Even though at a given moment it is possible to know how many workers are enrolled in the system, this enrollment does not necessarily imply the enjoyment of basic benefits, such as a pension for disability or death, or medical attention for some ailments.[29] However, current enrollment in the system is a necessary condition to be able to enjoy them.[30]

In the context of poverty measurement, it is recognized that access to social security depends upon a subset of the members of each household; specifically, those who are enrolled or enjoy the benefits of previous enrollments. The members not meeting this requirement may have access through kinship networks or through some other mechanisms, such as voluntary access to the mandatory regime or enrollment in an Afore.

There are other mechanisms of access to the benefits derived from social security, specifically the pension programs for the population aged sixty five years or older. Although the benefits of these programs do not offer complete access to social security, to a certain extent they ensure the subsistence means for that population group. Therefore, CONEVAL considers that the population supported by senior citizens programs has access to this right.[31]

Based on these considerations, the population deprived of access to social security will be defined using the following criteria:[32]

- For those who are economically active, it is considered that they are not deprived in this dimension if, through their job, they enjoy the benefits established in the law.

[29] The enjoyment of these benefits is conditional upon a minimum period of enrollment.
[30] Depending on the worker's decisions and the collective work contract that applies to them, the age of eligibility can be lower or higher than that stipulated in the legislation.
[31] CONEVAL will perform a meticulous follow up on the pensions granted by these programs in order to evaluate the degree to which they ensure the subsistence means of this population.
[32] In contrast to other dimensions, in which the population suffering a deprivation is identified, given the various sources of access to social security contemplated in the legislation, this indicator will register the population not exhibiting deprivation to simplify exposition of the criteria.

- For non paid workers and for workers on their own, given the voluntary nature of enrollment in the system, they are considered to have access to social security when they receive medical services as a job benefit or when they are actually voluntarily enrolled and when, in addition, they bear a retirement plan.
- For the general population, people are considered to have access when they benefit from a retirement program or pension or when one of their relatives has access to social security.
- In the case of people in retirement ages (sixty five years or older), people are considered to have access to social security if they benefit from a social pension program for senior citizens.
- The population not meeting any of the above criteria is considered deprived due to access to social security.

The indicator of deprivation in access to social security includes minimum conditions without which any individual cannot fulfill this social right. Notwithstanding, it is important to deepen into some aspects of this dimension, such as the quality of the pensions or the access to other benefits.

### Quality and spaces of the dwelling

The physical surroundings where people live have a fundamental influence on their quality of life. The dwelling is particularly important because it is there where many daily social activities take place. Both the physical components of the housing —its dimension, furnishings, infrastructure and materials— as well as the relational ones —familial, cultural and environmental— constitute important factors in the process of personal development and adaptation to the socio-cultural and economic environment in which people live (Tello i Robira, 2003). A dwelling with floors, roofs and walls made of resistant and appropriate materials, that do not harm the health of its inhabitants and protect them adequately from natural risks, diminishes the incidence of diseases and other adverse shocks (Cattaneo *et al*., 2007). On the other hand, lacking of sufficient space for the inhabitants of a dwelling has implications for the privacy and free circulation of the residents. As several studies have shown, overcrowding is associated with housing shortages and lacking options to acquire appropriate living spaces (Anzaldo and Bautista, 2005).

Article 4 of the Constitution establishes the right of all families to live in a suitable and proper dwelling. However, the specifications for the minimum requirements of a suitable and proper housing

are not defined in either the Constitution or the Ley de Vivienda (Housing Law). Therefore, CONEVAL requested the Comisión Nacional de Vivienda (CONAVI)[33] for an opinion regarding this issue.

The criteria formulated by CONAVI for the indicator of the quality and spaces in the dwelling include two sub-dimensions: first, the construction materials of the dwelling and second, its spaces. In the case of construction materials, CONAVI proposed using information about the material of floors, roofs and walls. In the case of spaces, it recommended evaluating overcrowding. For each of the indicators, CONAVI suggested ranking the characteristics of the dwelling in terms of their quality. Based on this ranking and the threshold established by CONAVI, it is possible to identify dwellings that meet the minimum conditions to reside in.

So, it is possible to classify the population into categories, identifying those deprived due to lack of quality and spaces of the dwelling. They are those individuals living in dwellings that have at least one of the following conditions:

- If the dwelling has dirt floor.
- If the roof of the dwelling is made of cardboard sheets or waste.
- If the walls of the dwelling are made of mud or daub and wattle; reed, bamboo or palm tree; cardboard, metal or asbestos sheets; or waste.
- The ratio of the number of members of the household per room is greater than 2.5 (overcrowding).

The indicator of deprivation due to quality and spaces in the dwelling takes into account the minimum characteristics for a proper dwelling. Nonetheless, there are other relevant aspects that can broaden our understanding of the housing conditions, such as its geographical location (especially for those dwellings in high risk zones) or the legality status of the land. Some of these indicators will be incorporated in the supplementary indicators.

[33] The Ley de Vivienda establishes that CONAVI is the agency in charge of formulating, executing, conducting, evaluating and following up on the Política Nacional de Vivienda (National Housing Policy).

## Access to basic services in the dwelling[34]

As in the case of the indicator for quality and spaces of the dwelling, access to basic services is a fundamental component of the context in which people interact. Although having a dwelling built with solid materials that adequately protects its inhabitants is a necessary element, the availability of basic services such as clean water and electricity is also relevant.

As in the case of the previous indicator, CONAVI was consulted with regard to the basic services that were absolutely necessary in any dwelling. CONAVI's proposal identified four sub-dimensions: access to drinking water, availability of drainage services, electricity and fuel for cooking. For each of the proposed indicators, CONAVI established classification criteria which allowed to identify those dwellings with inadequate living conditions.

According to these criteria, people living in dwellings with at least one of the following characteristics are considered to be deprived of basic services in the dwelling:

- Water is obtained from a well, river, lake, stream, or truck; or when piped water is carried from another dwelling or gotten at a public faucet or hydrant.
- There is no drainage service, or when the drainage is connected to pipes leading to a river, lake, sea, ravine or crack.
- The dwelling has no electricity.
- Wood or coal with no chimney are used for cooking or heating food inside the dwelling.

Although the availability of other services in the dwelling is very important, the characteristics chosen are those that should necessarily be present at the time of occupation. Others, such as garbage disposal, availability of toilets and the frequency of availability of water in the dwelling, will be presented in the set of supplementary indicators. These will allow for a deeper understanding of the living conditions in the dwellings.

[34] In order to build this indicator, CONEVAL originally suggested CONAVI to consider the following variables: supply and frequency of water, availability of drainage, availability of a toilet, exclusive use of the toilet, running water in the toilet, availability of electricity, garbage removal and fuel for cooking. The final selection of the indicators and variables is based on the recommendations of CONAVI.

## Access to food

Everyone has the right to enjoy physical and economic access to an adequate nutrition and to the means to obtain it (OHCHR, 2004). Not to experience hunger is the minimum level that should be universally guaranteed with respect to the right to food. However, unlike the other social rights, the Mexican Constitution incorporates the right to food only for girls and boys, but not for the rest of the population. Therefore, it is important that the LGDS had established access to food as one of the rights for social development.

In spite of the lack of criteria in the Constitutional legal framework to define the components of the right to food, it is possible to turn to some International Pacts signed and ratified by Mexico. The International Covenant on Economic, Social and Cultural Rights[35] states the right of everyone to an adequate standard of living for herself and her family, including adequate food. Likewise, the 1996 Rome Declaration on World Food Security reaffirms the right to have access to safe and nutritious food, consistent with the right to adequate food and to be free from hunger.[36]

In order to provide a measurement for evaluating the progress towards the right to food fulfillment, several international organizations and institutions have developed the concept of food security. According to FAO (2006), food security includes access to enough food to live an active and healthy life, which is closely associated with the concepts of food stability, sufficiency and variety. This concept relates to access to food as well, and it is considered appropriate for measuring of deprivation for this dimension.[37]

Food security scales evaluate aspects such as worrying over lack of food, changes in the quality or quantity of food, or even hunger experiences. In the case of Latin America, a group of nutrition specialists has made an adaptation of this scale.[38]

[35] Signed by Mexico on March 23, 1981.
[36] The text of the International Covenant on Economic, Social and Cultural Rights (ICESCR) can be consulted on the following web page: http://www2.ohchr.org/english/law/cescr.htm. The text of the Rome Declaration on Food Security can be consulted on the following web page http://www.fao.org/docrep/003/w3613e/w3613e00.htm.
[37] There are at least five methods of measuring the concept of food security. Two of them are based on information regarding households income. Other methods require information whose cost and level of specialization make their use unviable at a municipal scale (for example, anthropomorphic and food consumption measurements). The food security scales based on experience have been developed since the late eighties and present the advantage of requiring a small number of questions and that the validity of food insecurity scale has been shown not only for the case of Mexico, but for at least other twenty countries. For more information about food insecurity scales and their properties, see Bickel *et al.* (2000), Hamilton *et al.*(1997), Moncada and Ortega (2006) and Pérez-Escamilla and Segall-Correa (2008).
[38] In addition to the information contained in the ENIGH 2008 and the MCS-ENIGH 2008, information on the scale has been gathered from other sources: Termómetro Capitalino (2003), the Centro de Estudios de Opinión Pública; Guanajuato state survey (2007), Data OPM; the Survey of Multidimensional Poverty Thresholds (2007), CONEVAL; Survey of Political Culture of Democracy: México (2008), Vanderbilt University in the framework of the Latin American Public Opinion Project. For more information on the studies carried out in this area, see Parás and Pérez-Escamilla (2004); Pérez-Escamilla *et al.* (2005), and Melgar-Quiñonez *et al.* (2005).

In order to evaluate the exercise of the right to food, CONEVAL uses a scale of food security based on the proposal of Pérez-Escamilla, Melgar-Quiñonez, Nord, Álvarez and Segall.[39] This scale recognizes four possible levels of food insecurity: severe food insecurity, moderate food insecurity, mild food insecurity and food security.

Despite the fact that any of these four categories of food insecurity imply a significant restriction in the access to food, there are some cultural and contextual factors that may make difficult to compare the degree of food security among households. In order to measure the existence of significant limitations in the fulfillment of the right to food as precisely as possible, households will be considered deprived in access to food if they present moderate or severe food insecurity.

To complement the information contained in this indicator, the four degrees of food insecurity will be reported in the supplementary indicators, along with other indicators reflecting different aspects of the fulfillment of this social right.

## Degree of social cohesion

A thorough review of various definitions of social cohesion shows that there is not a single conceptual *corpus* that precisely defines its components and scope. In addition, it is possible to point out the ambiguity of its use in relation to other associated terms, such as social capital, social inclusion and exclusion, social integration or social ethics, among others (Berger-Schmidt and Noll, 2000; Rajulton, Ravanera and Beajout, 2003). This complicates the adoption or construction of a single indicator for measuring this dimension.[40]

Although it is not possible to attain a unique definition of social cohesion, consultation with experts in the field brought about three main elements: first, social cohesion is a relational concept, which means that the analysis unit is not the individual, but rather communities or social groups. Therefore, social cohesion is a concept that can only be measured as a characteristic of population groups. Second, in some situations, poverty can be a phenomenon that diminishes or affects social cohesion in a country, while the opposite is true in another. For this reason, it is not evident that social cohesion is an intrinsic component of poverty. Third, a more equitable society may generate better conditions for developing cohesion among its members.

[39] See: Pérez-Escamilla *et al.* (2007) and Melgar-Quiñonez *et al.* (2007)
[40] Some of these phenomena are violence, social inequality, crime rates, discrimination, corruption, social networks, solidarity and reciprocity, citizen awareness, belonging to groups, civic commitment, political participation, analysis of institutional operation, among others. See, for example, IDB (2005) and ECLAC (2007a).

Given the variety of concepts associated with social cohesion, during the process of defining the methodology various alternatives were explored, as the one presented by ECLAC (2007a), according to which social cohesion has various sub-dimensions that could be considered at the household level: social networks, discrimination, social participation and trust.

Another indicator of social cohesion could be assessed through inequality measurement, since, if we recognize that inequality can be manifested in various spheres of social life, the greater social disparities in education, housing, health care or food are, the more polarization exists, which, in turn, would tend to reinforce poverty.[41]

Given the diversity of concepts and approximations involved in this dimension, it was decided to rely on the proposal made by Boltvinik (2007) for measuring the degree of social cohesion in the territorial space. Accordingly, social cohesion will be measured at the municipal and state levels by four indicators: economic inequality (Gini coefficient); the proportion of income of the population living in extreme multidimensional poverty relative to the income of the population not living in multidimensional poverty and not vulnerable; social polarization,[42] and social networks (only measured at the state level).

## Data sources

The solution to the problem of the identification of multidimensional poverty requires having information sources that, in one single statistical database, incorporate all the information to calculate the indicators to be used. Therefore, CONEVAL and INEGI worked closely together to generate the data sources that would allow to carry out the multidimensional measurement of poverty.[43] As a result, the 2008 Socioeconomic Conditions Module (MCS-ENIGH 2008) was designed, which broadened the topics dealt with in the National Survey of Household Income and Expenditures (ENIGH 2008). The MCS-ENIGH 2008 makes it possible to obtain information on income, sociodemographic characteristics and indicators for measuring multidimensional poverty at the national and state scale.[44]

[41] Although poverty levels may be relatively low, as Sen (2000) explains, social cohesion may produce serious problems in a society that is sharply divided between a great majority with high levels of wellbeing and a minority group that has even the minimum conditions of wellbeing unmet.
[42] To create this indicator, the proposal of Rubalcava (2007, 2006, 2001) was adopted.
[43] The regulations attached to the LGDS establish in article 38 that "the censuses and surveys carried out by the Instituto Nacional de Estadística y Geografía must generate sufficient information regarding the indicators referred to in article 36 of the LGDS. To this end, the opinions of CONEVAL and of the Secretaría de Desarrollo Social will be taken into consideration".
[44] Until 2006, the ENIGH only made it possible to obtain estimates at a national level and for rural and urban areas. Although in some previous surveys there is information on certain federal entities, this has been due to oversampling financed by the corresponding state governments and there is no information for every year. To carry out measurements at the municipal level, CONEVAL has a collaboration agreement with INEGI that made it possible to identify the questions to be incorporated into the questionnaire for the 2010 Population Census.

Embedded in the MCS-ENIGH 2008 is the experience gathered during various meetings, the application of two pilot studies, the design, application and analysis of the *National Survey on Poverty Thresholds*[45] and the result of meetings held with various specialists in each dimension. These studies made it possible to evaluate the performance of the questions incorporated into the ENIGH 2008, in order to validate if the information gathered in the MCS-ENIGH 2008 was reliable.

Although the MCS-ENIGH 2008 offers information on a broad range of issues, according to article 37 of the LGDS, CONEVAL must, in addition, report poverty rates at the municipal level every five years. Therefore the indicators of deprivation should be constructed based on information that should be technically and economically feasible to incorporate in a population and household census. Because of this, the definition of deprivation indicators sought to allow for the greatest comparability possible between census and national surveys data.

## Updating indicators and thresholds

One relevant element for defining indicators and thresholds is the ability to recognize that some of the conditions and criteria just adopted may vary over time, when the patterns and dynamics of the Mexican society and the legal framework are modified. This could imply some changes in the diagnosis and monitoring of the deprivation levels of each indicator.

In order to ensure that the measurements carried out with this methodology allow for certain continuity, the methodological criteria must remain unaltered for a reasonable time period. This will allow the measurements to become accepted by the general public. Therefore, modifications of these methodological criteria should be carried out only after an interval of time not smaller than ten years.

Likewise, CONEVAL will report —along with the estimations of poverty— a series of supplementary indicators associated with the analysis of the living conditions of the population in each social dimension. Appendix C presents some examples of the supplementary indicators that CONEVAL will systematically report.

[45] This survey, designed by CONEVAL in 2007, contained the questions tested in the first pilot study of the MCS-ENIGH 2008, as well as a variety of additional questions aimed at investigating some conceptual and methodological aspects related to the measurement that had not yet been decided upon at that time.

# Some final considerations

Mexico is the first country whose normative framework created the legal basis for adopting a poverty measurement that recognizes its multidimensional nature. Therefore, the methodology for poverty measurement presented in this document has been developed based on the stipulations of the legal framework of the Mexican State, especially the LGDS.

By assigning to CONEVAL the task of evaluating social policies and programs and defining the criteria for poverty measurement, the LGDS establishes poverty measurement as a fundamental element of social development evaluation.

The multidimensional poverty measurement adopted by CONEVAL conceives poverty in terms of three spaces: social rights, economic wellbeing and the territorial context. A society that, through its laws, recognizes the existence of a social contract that aims to guarantee its entire population access to social and human development, reinforces its political commitment to achieve the goal that social rights and wellbeing, both associated with the universal and inalienable principles of human dignity and individual freedom, may become actual living conditions and that they are not mere social aspirations. The methodology presented here aims to make a contribution towards this goal.

By combining the three spaces in the official measurement of poverty, CONEVAL provides a powerful tool for evaluating social policy. The wellbeing space, measured through household income, offers a framework for the analysis of the central role economic policy plays in determining the population's standard of living.

The social rights space provides a useful tool for analyzing actual achievements and remaining challenges towards fully exercising social rights, especially on those aspects that the LGDS establishes as constitutive of poverty. The adoption of this approach makes it possible to evaluate the progress of social policies and programs, for the population as a whole and, especially, for the poor or deprived people.

Taking into consideration the territorial context space in poverty measurement makes it possible to analyze the effect of the phenomena and problems of communities and localities on the range of life options individuals have. This feature allows examining the relationships between poverty and mechanisms of social inclusion, as well as seeking sustainable social development. Likewise, given that information will become available at the state and municipal scales, it will be possible to identify and monitor regional gaps in social development over time.

This framework leads to the recognition and identification of population groups with needs that are not only specific, but also heterogeneous and of varying magnitudes. So, the deprivation indicators can be calculated for different population groups; in addition, they can be compared across time and they provide a technically rigorous, but flexible scheme, to fit the specific targets of different social development programs.

It is important to emphasize the commitment of the Mexican State to ensuring universal exercise of social rights. That is why the identification of people presenting one or more social deprivations is an especially important element of this methodology. Nonetheless, in order to guide public policy, it is also necessary to recognize that deprivations and needs are different for different groups and that, some individuals, families, population groups and regions require immediate, timely and efficient attention, due to their very low income and the large number of deprivations they present.

This methodology should be understood as a first step in the analysis of social gaps in Mexico; we should mention that data limitations lead to some challenges that should still be worked out. Even though for poverty measurement purposes CONEVAL has incorporated all the indicators specified in article 36 of the LGDS, the complexity of the problem of social development demands to deepen the analysis of each dimension, incorporating aspects such as the quality of services, as well as other aspects that have a direct influence on the quality of life of the population, like discrimination or access to social infrastructure.

CONEVAL should also promote the collection of more and better information about the various elements that make it possible to evaluate social policy, not only at a state and municipal scale, but also at the local one, in order to provide decision makers with the elements needed to design results oriented public policies.

This points to the necessity that CONEVAL continues working on the development of a National System of Social Indicators that goes beyond poverty indicators and that includes the whole set of social rights in its broadest sense. This would make it possible to enhance CONEVAL recommendations with regards to social policy.

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# Abbreviations and acronyms

| | |
|---|---|
| **AC** | Energy Adjustment Coefficient |
| **Afore** | Retirement Fund Administrator |
| **BFB** | Basic food basket |
| **BMI** | Body Mass Index |
| **CESCR** | Economic, Social and Cultural Rights Committee |
| **CESOP** | Center for Social Studies and Public Opinion of the Chamber of Deputies |
| **Conapo** | National Population Council |
| **CONAVI** | National Housing Commission |
| **CONEVAL** | National Council for the Evaluation of Social Development Policy |
| **CPEUM** | Political Constitution of Mexico |
| **CTMP** | Technical Committee for Poverty Measurement |
| **DATA OPM** | Data Public Opinion and Markets |
| **DWP** | Department of Work and Pensions |
| **ECLAC** | Economic Commission for Latin America and the Caribbean |
| **ENIGH** | National Survey of Household Income and Expenses |
| **Enlace** | National Evaluation of Academic Achievement in Schooling Centers |
| **Excale** | Quality and Educational Achievement Tests |
| **FAO** | Food and Agriculture Organization of the United Nations |
| **FE** | Food expenditure |
| **ICTPC** | Total per capita current income |
| **IDB** | Inter American Development Bank |
| **IEMP** | Intensity of extreme multidimensional poverty |
| **ILO** | International Labour Organization |
| **IMP** | Intensity of multidimensional poverty |
| **IMSS** | Mexican Social Security Institute |
| **INEE** | National Institute for Educational Evaluation |
| **INEGI** | National Institute of Statistics and Geography |
| **INNSZ** | "Salvador Zubirán" National Institute of Medical Sciences and Nutrition |
| **INPC** | National Index of Consumer Prices |
| **INSP** | National Public Health Institute |
| **ISSSTE** | Institute for Social Security and Services for State Workers |
| **LGDS** | General Social Development Law |
| **LGE** | General Education Law |
| **LGS** | General Health Law |
| **LSNIEG** | National System of Statistical and Geographical Information Law |
| **LSS** | Social Security Law |
| **MCS-ENIGH** | Socioeconomic Conditions Module of the National Survey of Household Income and Expenses |
| **NEOEM** | Mexican State Mandatory Schooling Regulation |
| **NOM** | Mexican Official Norm |
| **OHCHR** | Office of the High Commissioner for Human Rights of the United Nations |
| **Pemex** | Mexican Petroleum |
| **PISA** | Programme for International Student Assessment |
| **PNDS** | National Social Development Policy |
| **PNEA** | Non-economic active population |
| **RPS** | Reference population stratum |
| **SAR** | Retirement Saving System |
| **SEN** | National Educational System |
| **TE** | Total Expenditure |
| **UN** | United Nations |
| **UNAM** | National Autonomous University of Mexico |
| **UNDP** | United Nations Development Programme |

| | |
|---|---|
| **WHO** | World Health Organization |
| **WL** | Wellbeing threshold |

# APPENDIXES

# Appendix A.[46] Measurement of the wellbeing space

The measurement of this space takes place in two stages: the construction of the wellbeing and minimum wellbeing thresholds, and the construction of the income indicator.

## Construction of the food basket for Mexico

This section describes an overview of the methodology used for the construction of the basic food basket which is used as reference for the value of the minimum wellbeing threshold.

### Caloric intake determination

#### *Supplies for consumption analysis*

For the construction of the basket, three basic sources were used to analyze the energy and other nutrients consumption of the Mexican population: the nutritional properties of each food item, the requirements and recommendations regarding nutritional intake, and the data on expenditure and frequency of food consumption within the households.

The first source is the nutritional value tables for each food item, as well as their edible portion. In order to construct the food basket, it was developed a table of properties using information of calories, proteins, vitamins A and C, and minerals iron and zinc. The data was based on the information provided by specialists from the Instituto Nacional de Salud Pública (INSP), nutritional value tables of the Instituto Nacional de Ciencias Médicas y Nutrición "Salvador Zubirán" (INNSZ, 2002), tables developed by ECLAC (ECLAC, 2007b) and the book "Tablas de Valor Nutritivo de los alimentos" by Miriam Muñoz de Chávez and José Ángel Ledesma Solano (2002).

The second one includes two different sources of information. First, the energy requirements based on the principles and applications of the new energy requirements for Mexico, according to the FAO/WHO 2004 Expert Committee, which suggest requirements to be made by age, sex and for rural

[46] The variables used in the construction of indicators mentioned in Appendixes A, B, C and D kept their original names.

and urban areas. The second source is the requirements and recommendations of other nutrients based on the information contained in the document "Recomendaciones de Ingestión de Nutrimentos para la Población Mexicana" (Rosado, Casanueva and Bourges, 2005), which presents an updated study of the recommendations for micronutrient intake according to age and sex.

The third source of information is the analysis of cost and frequency of food consumption in Mexican households, which was obtained from the ENIGH 2006, carried out by INEGI.

***An analysis of energy intake inside the household***

Based on the ENIGH 2006, patterns of food consumption in Mexican households were obtained, according to expenditure and frequency of purchase during the reference period of the survey.[47] Later, the amount consumed was calculated according to the edible or useable portion of each food and these quantities were converted into daily calories and other nutrients according to the tables of nutritional value of foods.

In the analysis of consumption, some products such as salt, animal food, water and tobacco, as well as the expenses related to the preparation and storage of the food, were excluded.

***An analysis of energy intake outside the household***

Due to the diversity of food that the members of a household may consume outside of it, there is no information that makes it possible to identify its quality and composition; however, there are several methods that help to estimate its nutritional contribution. For the construction of this food basket, it was selected a method that makes it possible to estimate calories consumed outside the household according to the income decile to which each household belongs (ECLAC, 2007b; Medina, 2000).

The method used is based on the hypothesis that the cost of calories consumed inside and outside the household is the same for the first income decile and in the other deciles it increases in relation to the cost per calorie of the first. A conversion factor $k_i$ is proposed for each income decile, defined as the quotient of the cost per calorie of the first decile and the cost per calorie of the following deciles. Once the factor has been calculated, the total calories consumed outside the household are obtained by

[47] Although expenditure is not really consumption, it is the best approximation there is in terms of the available information. A survey on consumption would be very expensive because it implies verifying the composition of the foods, their preparation, laboratory validation, among other things.

dividing the expenditure on these foods by the conversion factor, multiplied by the calorie cost within the household.

Finally, the total calories consumed by household are obtained by adding up the calories consumed inside and outside the household.

## Selection of the reference population stratum (RPS)

This methodology selects a reference population stratum which consumption estimate coincides with a nutritional recommendation. To do so, the amount of the food items purchased by each household in a given period (monthly, weekly or daily) is converted into nutrient consumption according to the nutritional value tables. The amounts of nutrients consumed are added up and compared to the consumption recommendations for each household, according to its composition by age and sex, to determine whether the consumption of recommended nutrients is sufficient or not.

### *Energy adjustment coefficient*[48]

The Energy Adjustment Coefficient (AC) is the indicator used to identify and construct the reference population stratum which is used to analyze the energy consumption of households. The AC makes it possible to construct a reference stratum of the households whose nutritional intake is appropriate to their demographic composition, as consumption is related to the nutritional requirements of each household.

In order to build the AC, the total energy intake of the household was determined first, and then, the requirement for each household, by adding up the calories required by each member according to their age and sex. Thus, the energy adjustment was obtained from the ratio between the amount of energy consumed by the members of the household and their energy requirement:

$$AC = \frac{\text{calories consumed in the household}}{\text{required calories in the household}}.$$

[48] This methodology is presented in a document prepared by the Statistics and Economic Projections Division of ECLAC as input for the Taller de Expertos **"**Revisión de la metodología de la CEPAL para la medición de la pobreza en América Latina y el Caribe" (Experts Workshop "A Review of ECLAC's Methodology for Poverty Measurement in Latin America and the Caribbean") held on October 18 and 19, 2007 in Santiago de Chile. Its content describes a work in progress and its findings are not final, hence it is not available to the general public. However, CONEVAL had the author's permission to use it.

The adjustment coefficient is interpreted as follows:

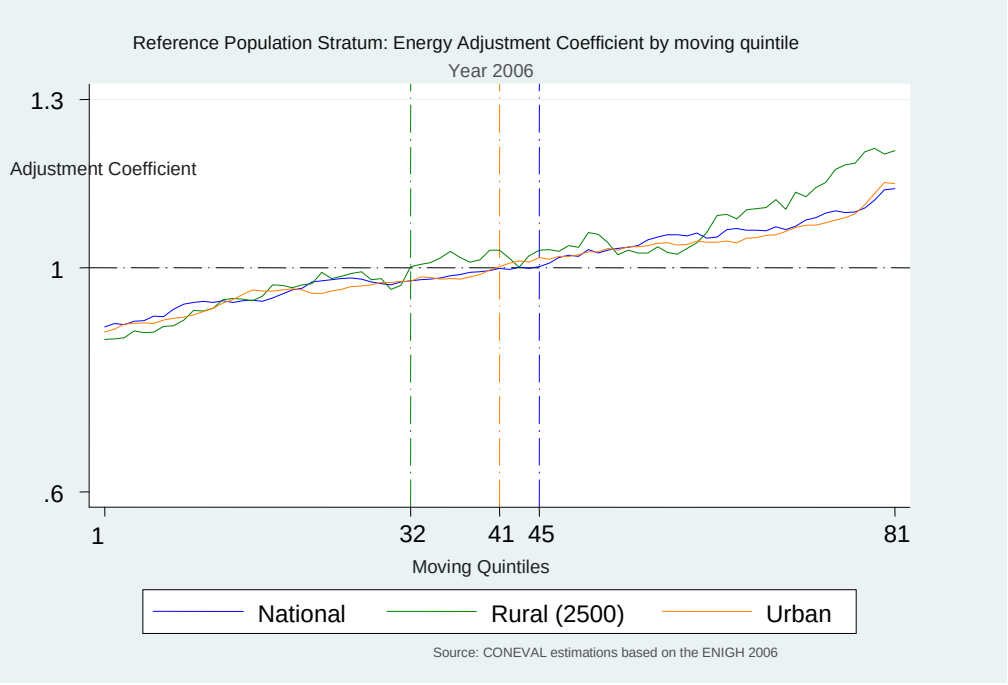
AC<1 ⇒ the energy intake of the household members does not cover the requirement.

AC=1 ⇒ the energy intake of the household members adjusts to the requirement.

AC>1 ⇒ the energy intake of the household members exceeds the requirement.

Because the AC calculations produced caloric intake atypical values, those greater than four were eliminated, that is to say, those households in which apparently it is consumed more than 400 percent of the energy requirement given their structure. Consequently, 262 households, which represent 1.20 percent of the sample, were eliminated.

The national rural and urban percentiles of current per capita income were obtained, and it was calculated the adjustment coefficient by moving income quintiles in the different levels. The criterion used for selecting the RPS is that of households that manage to cover their energy requirements at the most efficient cost, which places AC equal to one on a national level at the 45$^{th}$ percentile; in the rural areas at the 32$^{nd}$ percentile, and in the urban areas at the 41$^{st}$ percentile.



## Construction of rural and urban basic food baskets

Selection of the urban RPS: 41 to 60 percentiles
Selection of the rural RPS: 32 to 51 percentiles

Once the households making up the RPS were identified, the intake pattern and the list of products and amounts consumed by the stratum were analyzed according to the headings included in the ENIGH 2006. A data base using the codes of the food items consumed by stratum, the quantities, the quarterly expenditure, the number of households consuming each product and the energy and nutritional content of each food was constructed.

The food items were classified under 46 headings and the percentages of frequency of consumption by headings and food expenditure were obtained. Based on this, those products meeting the following criteria were selected:

- the percentage of frequency of food consumption with respect to its heading was greater than 10 percent.
- the percentage of expenditure for each food item with respect to the total expenditure was greater than 0.5 percent.

In addition, the nutritional adjustment was carried out following the recommendations of the Norma Oficial Mexicana NOM-043-SSA2-2005.[49] The adjustment involves two parts: the first is to incorporate the products that do not meet the criteria of frequency of consumption and expenditure, but that are part of the three food groups that make up an adequate diet defined by the norm; the second is to adjust the consumption quantities of some products in order to achieve the intake requirements and recommendations.

Food items were included based on the consumption pattern of the stratum, that is to say, the products were ranked by criteria of frequency and expenditure and, when they did not meet the corresponding 10 and 0.5 percentages, the products with the closest values were included and, therefore, they are part of the consumption structure of the RPS. Likewise, for both strata, the daily intake of other products was scaled in grams and milliliters per person, in order to reach the required proteins, vitamins A and C, iron and zinc.

[49] Information regarding the law can be obtained at: http://www.dof.gob.mx/documentos/871/SALUD/SALUD.htm.

***Monetary calculation of the rural and urban food baskets***

In order to obtain the monetary value of the food basket, a data base of prices was created based on the information of the ENIGH 2006. The implicit price of each heading was calculated as the geometric mean of the ratios between expenditure and amount by heading for all the households. Finally, the corresponding deflator of the products was applied to bring them up to August 2008 prices.

Finally, the cost of the basket was obtained by multiplying the price for the consumption of each food item. The monthly per capita cost of each basket is obtained by adding all the prices of the food items codes that make it up and multiplying this by 30.

**Rural food basket**

| Group | Name | Intake (grxday) | Price x kg/L | Cost |
|---|---|---|---|---|
| | | **1354.3** | | **$613.80** |
| Maize | Whole maize | 70.2 | 3.5 | 0.2 |
| | Maize tortilla | 217.9 | 9.2 | 2.0 |
| Wheat | Pasta | 7.8 | 21.3 | 0.2 |
| | Cookies | 3.1 | 33.4 | 0.1 |
| | Bread | 11.2 | 21.5 | 0.2 |
| | Sweet bread | 18.0 | 27.7 | 0.5 |
| Rice | Whole rice | 14.0 | 14.6 | 0.2 |
| Beef and veal | Steak: rump, round, shoulder, | 18.5 | 61.4 | 1.1 |
| | shank, neck with bone | 14.8 | 42.5 | 0.6 |
| | Ground beef | 13.6 | 53.9 | 0.7 |
| Chicken | Leg, thigh and breast with bone | 27.9 | 35.4 | 1.0 |
| | Whole or in parts | 32.5 | 34.0 | 1.1 |
| Fresh fish | Whole fish | 6.3 | 29.4 | 0.2 |
| Milk | Cow's, pasteurized, whole, light | 119.0 | 11.1 | 1.3 |
| | Raw milk | 37.0 | 6.0 | 0.2 |
| Cheeses | Fresh | 5.0 | 50.7 | 0.3 |
| Eggs | Chicken | 29.6 | 22.2 | 0.7 |
| Oils | Vegetable oil | 17.6 | 21.8 | 0.4 |
| Raw or fresh tubers | Potato | 32.7 | 9.3 | 0.3 |
| Fresh vegetables | Onion | 39.4 | 14.7 | 0.6 |
| | Chili* | 10.5 | 23.9 | 0.3 |
| | Tomato | 67.1 | 14.7 | 1.0 |
| Legumes | Beans | 63.7 | 14.8 | 0.9 |
| Fresh fruit | Lemon | 22.4 | 7.7 | 0.2 |
| | Apple and pear | 25.8 | 15.8 | 0.4 |
| | Orange | 24.8 | 4.2 | 0.1 |
| | Banana | 32.5 | 7.2 | 0.2 |
| Sugar and syrups | Sugar | 20.0 | 10.1 | 0.2 |
| Prepared foods for home consumption | Roasted chicken | 3.5 | 48.4 | 0.2 |
| Non alcoholic beverages | Bottled water | 241.8 | 0.9 | 0.2 |
| | Cola and other soft drinks | 106.2 | 8.3 | 0.9 |
| Others | Food and beverages consumed outside the household | | | 3.3 |
| | Other prepared food | | | 0.7 |

*Average price of jalapeño, poblano, serrano and other chilies.

**Urban food basket**

| Group | Name | Intake (grxday) | price x kg/L | Cost |
|---|---|---|---|---|
| | | **1592.5** | | **$874.63** |
| Maize | Maize tortilla | 155.4 | 9.3 | 1.4 |
| Wheat | Pasta | 5.6 | 21.4 | 0.1 |
| | Bread | 26.0 | 22.9 | 0.6 |
| | Sweet bread | 34.1 | 35.0 | 1.2 |
| | Sandwich bread, hamburger buns | 5.6 | 34.6 | 0.2 |
| Rice | Whole rice | 9.2 | 16.4 | 0.2 |
| Other cereals | Corn, wheat, rice, oat cereal | 3.6 | 42.6 | 0.2 |
| Beef and veal | Steak: rump, round, shoulder, shank | 21.1 | 64.9 | 1.4 |
| | Ground beef | 13.9 | 56.9 | 0.8 |
| Pork | Rib and chop | 20.3 | 52.6 | 1.1 |
| Processed meats | *Chorizo* and sausage | 3.1 | 52.3 | 0.2 |
| | Ham | 4.1 | 52.0 | 0.2 |
| Chicken | Leg, thigh and breast with bone | 15.8 | 36.9 | 0.6 |
| | Boneless leg, thigh and breast | 4.5 | 51.1 | 0.2 |
| | Whole or in parts | 17.1 | 33.3 | 0.6 |
| Fresh fish | Whole fish | 3.4 | 38.1 | 0.1 |
| Milk | Cow's, pasteurized, whole, light | 203.8 | 10.8 | 2.2 |
| Cheese | Fresh | 4.8 | 50.7 | 0.2 |
| Other dairy products | Yogurt | 6.7 | 26.3 | 0.2 |
| Eggs | Chicken | 33.4 | 20.5 | 0.7 |
| Oils | Vegetable oil | 10.9 | 21.9 | 0.2 |
| Raw or fresh tubers | Potato | 44.6 | 9.1 | 0.4 |
| Fresh vegetables | Onion | 42.3 | 14.2 | 0.6 |
| | Chili* | 10.2 | 23.6 | 0.2 |
| | Tomato | 63.0 | 14.7 | 0.9 |
| Legumes | Beans | 50.6 | 16.6 | 0.8 |
| Fresh fruit | Lemon | 26.0 | 7.0 | 0.2 |
| | Apple and pear | 29.9 | 18.2 | 0.5 |
| | Orange | 28.6 | 4.1 | 0.1 |
| | Banana | 34.7 | 7.4 | 0.3 |
| Sugar and syrups | Sugar | 15.1 | 10.4 | 0.2 |
| Prepared foods for home consumption | Roasted chicken | 8.7 | 54.8 | 0.5 |
| Non alcoholic beverages | Bottled water | 411.5 | 1.1 | 0.4 |
| | Packaged juices and nectars | 56.1 | 12.7 | 0.7 |
| | Cola and other soft drinks | 169.0 | 7.7 | 1.3 |
| Others | Food and beverages consumed outside the household | | | 7.9 |
| | Other prepared foods | | | 1.5 |

*Average price of jalapeño, poblano, serrano and other chilies.

# Construction of the basic non-food basket for Mexico, 2006

The construction of the non-food basket takes place in three stages. The first stage is the selection of a reference population stratum in order to analyze non-food expenditure patterns. The second one is the calculation of the amounts spent to cover non-food necessities based on observed patterns of expenditure in the reference stratum. The third stage is the disaggregation of the components of expenditures on non-food goods and services and the updating of their monetary value.

## Selection of the reference population stratum

The reference population stratum is the same used for the construction of the food basket, and it ensures that, according to the observed food expenditure, the households in this stratum on average cover their minimum nutritional requirement. Therefore, the non-food consumption pattern for this stratum can be taken as a reference for the integration of the minimum non-food consumption.

## Determination of the non-food expenses

The construction of the non-food basket was based on the comparison of two methodologies. The first one consists on applying a factor that expands the food basket value, known as the Engel coefficient´s reciprocal, or the Orshansky coefficient. The second methodology was proposed by Hernández Laos; it takes preferences, consumption frequency and proportion of expenditure, and combines them with information taken from the ENIGH and a specific survey.

## The Engel coefficient

The Engel coefficient methodology involves constructing a factor that expands the value of the food basket so that the expanded value represents the income necessary to satisfy the needs of the members of the household, in addition to food needs. This factor is obtained using the reciprocal of the Engel coefficient, that is to say, the proportion that represents food expenditure (FE) with respect to total expenditure (TE) for all of the goods that cover food and non-food needs of the household, according to the following formula, where PGA is the Engel coefficient:

$$PGA = FE / TE.$$

In order to obtain a wellbeing threshold that takes into account the value of the basic non-food basket using the Engel coefficient method, it was used the consumption pattern of the same RPS used in the construction of the food basket. This stratum was treated as a model household that represented the consumption pattern of the population. In this case, the wellbeing threshold (WL) is obtained by multiplying the value of the basic food basket (BFB) and the reciprocal of the Engel coefficient (PGA) as follows:

$$WL = BFB * \left( \frac{1}{PGA_{RPS}} \right).$$

## Determination of the minimum necessary expenses

Once the total required expenses were defined, the headings considered in the total non-food expenses were compared with the methodological proposal of Hernández Laos, which uses the following criteria for inclusion under each heading:

1. That the items have an income elasticity less than one, since these are classified in economic theory as necessary goods.
2. That the perception of need for the item or service is greater than 50% of the households. This is determined through a perception survey.
3. That the item´s expense with respect to the total expenditure in the reference stratum is greater than the average for all goods, which is 0.16 percent.
4. That the percentage of households that consume the item or service in the reference stratum is greater than 20.

Once the expenses of the reference stratum were analyzed according to these criteria, the total expenditure required to cover the minimum needs was obtained.

## Disaggregation of expenses for non-food goods and services

Once the values of Engel coefficient´s reciprocal were obtained, and after applying the methodological criteria of Hernández Laos (2009), the components of the expenditure on non-food goods and services were disaggregated by heading in the reference population stratum for each sphere.

After this, the expenses were adjusted using the food basket value for the year 2006. The reason for this adjustment is the idea that households satisfy their basic food needs before they satisfy their non-food ones. The adjustment was made using the following formula:

$$\text{Expenditure on the item } i = \frac{\sum \text{expenditure}_i}{\text{food expenditure}} \text{ x value of the food basket.}$$

Once the expenditure for 2006 was calculated, the value of each heading of goods and services was updated to August 2008 prices. This was made using the price index listing for each item or service contained in the Índice Nacional de Precios al Consumidor (INPC, National Index of Consumer Prices).

| | Urban basket | | Rural basket | |
|---|---|---|---|---|
| Group | Cost | # goods or services | Cost | # goods or services |
| Public transportation | $ 140.09 | 5 | $ 85.65 | 4 |
| Home cleaning and care | $ 50.72 | 15 | $ 46.10 | 14 |
| Personal care | $ 101.30 | 16 | $ 64.18 | 14 |
| Education, culture and entertainment | $ 195.65 | 23 | $ 73.40 | 18 |
| Communications and vehicle services | $ 92.54 | 6 | $ 25.31 | 5 |
| Housing and conservation services | $ 141.52 | 4 | $ 80.39 | 5 |
| Clothing, shoes and accessories | $ 139.30 | 90 | $ 91.08 | 98 |
| Glassware, linens and domestic utensils | $ 14.55 | 21 | $ 11.42 | 20 |
| Health care | $ 129.51 | 70 | $ 87.98 | 66 |
| Domestic possessions and housing maintenance | $ 18.69 | 11 | $ 11.14 | 9 |
| Recreation articles | $ 6.31 | 6 | $ 2.21 | 5 |
| Other expenses | $ 16.94 | 2 | $ 10.14 | 3 |
| Basic food basket | $ 874.63 | - | $ 613.80 | - |
| Total | $ 1,921.74 | 269 | $ 1,202.80 | 261 |

## Income indicator

The income indicator is based on the elements described above. The criteria for its construction are the following:

- To consider monetary and non-monetary flows that do not jeopardize or diminish the household assets.
- To consider the frequency of transferences and to eliminate those not recurrent.
- Do not include as part of the income the estimate of lease or ascribed rent.
- To consider economies of scale and equivalence scales within the households.

**Definition of income with the multidimensional poverty measurement (MCS-ENIGH)**

| | | |
|---|---|---|
| *Total current income* | = *current monetary income* | + *current non-monetary income* |
| | **Remuneration for subordinate work**<br>**Independent work income (including self-consumption)**<br>**Property rental income**<br>**Other work-related income**<br>**Transferences** | **Payment in kind**<br>**Transferences in kind (gifts in kind, one off transferences are excluded)**<br>**It does not include ascribed rent** |

Thus, the total current per capita income of each household, adjusted by economies of scale and equivalence scales, when the size of the household is over one, was determined according to the following formula:

$$\text{ICTPC} = \frac{\text{total current income of the household}}{1 + d_i n_i}$$

Where $n_i$ is the number of household members in each age group $i$; $d_i$ is the equivalence scale (with economies of scale) corresponding to each age group $i$. The scales used according to the demographic composition of each household are the following:

**Equivalence scales, Mexico**

| Age group *(i)* | Scale |
|---|---|
| 0 to 5 years | 0.70 |
| 6 to 12 years | 0.74 |
| 13 to 18 years | 0.71 |
| 19 to 65 years | 0.99 |

Source: Santana (2009)

# Appendix B. Definition of social deprivation and territorial context indicators[50]

## Indicator of deprivation due to educational gap

According to Article 3 of the CPEUM, mandatory education includes preschool, elementary and secondary school levels. The LGE sets that the minimum age for enrolling in basic education at the preschool level is three years old and six years old for elementary school. According to current study plans for preschool,[51] elementary[52] and secondary school,[53] these grades take three, six and three years of schooling, respectively. Therefore, the minimum schooling age goes from three to fifteen years old. The Ley Federal de Trabajo establishes that "minors under 14 years old or minors under 15 years old who have not finished their mandatory education are forbidden to work […]" (Robles *et al.*, 2008b).

On this ground, a person who meets any of the following criteria is considered educationally deprived:

- For people aged three to fifteen years old. When they lack mandatory basic education and are not attending a formal educational center.
- For people born before 1982. If they do not meet the minimum mandatory basic education level that prevailed at the time she should have attended elementary school.
- For people born from 1982 onwards. If they have not completed the minimum current mandatory basic education requirement (secondary school).

[50] The use of subscript is defined as follows:
*i*.- For variables reported at the individual level.
*ih*.- For variables reported at the household level, the value corresponding to the household is assigned to every individual within it.
*ihv*.- For variables reported on a dwelling level, the value corresponding to the dwelling is assigned to every individual within it.
[51] The information mentioned may be consulted at:
http://www.reformapreescolar.sep.gob.mx/ACTUALIZACION/PROGRAMA/Programa2004PDF.PDF
[52] The information mentioned may be consulted at:
http://basica.sep.gob.mx/reformaintegral/sitio/pdf/generalizacion_p_estudios.pdf
[53] The information mentioned may be consulted at:
http://www.reformasecundaria.sep.gob.mx/doc/programas/2006/planestudios2006.pdf

This indicator is defined on the basis of the following variables: age, year of birth, school attendance and educational level of the members of the household. We present next the definition of each variable:

*Age.* Age of the person at the moment she was interviewed.

$edad_i = \text{age reported by person } i \text{ at the time of the interview.}$

*Year of birth.*[54] Difference between the year in which the measurement is carried out (*año_med*) and $edad_i$.

$$anac\_e_i = año\_med - edad_i .$$

*Non-attendance to school*. It identifies if a person is not attending a school of the Sistema Educativo Nacional (SEN).[55]

$$inas\_esc_i = \begin{cases} 0 & \text{if person } i \text{ attends an institution of SEN,} \\ 1 & \text{if person } i \text{ does not attend an institution of SEN.} \end{cases}$$

*Educational Level.*[56] Maximum level of schooling a person reports to have completed.

$$niv\_ed_i = \begin{cases} 0 & \text{if person } i \text{ has incomplete elementary schooling or less} \\ 1 & \text{if person } i \text{ has complete elementary schooling or incomplete secondary schooling} \\ 2 & \text{if person } i \text{ has complete secondary schooling or a higher education level} \end{cases}$$

[54] To calculate this variable, the source of information used does not report the date of birth, so an approximate calculation of the year of birth is made.

[55] It is considered that a person is attending an educational institution regardless if it is a public or private school and the teaching modality at any level of education: preschool, elementary school, secondary school, technical trade with secondary school completed, junior high school or high school, technical trade with high school diploma, teacher's training, bachelor's, master's or doctorate.

[56] In the case of technical or teaching colleges, a person is considered to have completed secondary schooling under the following conditions:

- if she studied a technical or commercial trade with elementary school completed and finished at least three grades;
- if she studied teacher's college with elementary school completed and finished at least three grades.

The level completed is considered the one finished and at least three grades of technical or commercial trade school or teacher's college.

Based on the previous attributes, it is possible to define the indicator of deprivation due to educational gap for each person as follows:

*Indicator of deprivation due to educational gap*

$$ic\_rezedu_i = \begin{cases} 1 & \text{if } edad_i \geq 3 \text{ and } edad_i \leq 15 \text{ and } inas\_esc_i = 1 \text{ and } niv\_ed_i < 2, \\ 1 & \text{if } anac\_e_i \geq 1982 \text{ and } edad_i \geq 16 \text{ and } niv\_ed_i < 2, \\ 1 & \text{if } anac\_e_i \leq 1981 \text{ and } edad_i \geq 16 \text{ and } niv\_ed_i = 0, \\ 0 & \text{if } edad_i \leq 2, \\ 0 & \text{if } edad_i \geq 3 \text{ and } edad_i \leq 15 \text{ and } inas\_esc_i = 0, \\ 0 & \text{if } edad_i \geq 3 \text{ and } edad_i \leq 15 \text{ and } niv\_ed_i = 2, \\ 0 & \text{if } anac\_e_i \geq 1982 \text{ and } edad_i \geq 16 \text{ and } niv\_ed_i = 2, \\ 0 & \text{if } anac\_e_i \leq 1981 \text{ and } edad_i \geq 16 \text{ and } niv\_ed_i \geq 1. \end{cases}$$

The value one identifies an individual who is deprived due to educational gap, while the value zero identifies a non deprived person.

## Indicator of deprivation in access to health services

Article 4 of the CPEUM establishes that all Mexicans have right to health protection. In the LGS, this constitutional right refers to the right to be enrolled in the Sistema de Protección Social en Salud (Social Health Protection System or Seguro Popular) (article 77 bis of the LGS). Thus, families and people who are not affiliates of any social security institute, or that do not have any other mechanism of social protection with regard to health, should be enrolled in this system (article 77 bis 3 of the LGS).

Based on these criteria, a person is considered to be deprived due to lack of access to health services when:

- She is not enrolled in or entitled to receive medical services from any institution offering them, including the Seguro Popular, any social security public institutions (IMSS, federal or state ISSSTE, Pemex, Army or Navy) or private medical services.

In order to calculate the indicator, people who have access are identified through the following variable:

*Health services*. It identifies if a person is enrolled to receive health services from a public or private institution. It is defined as follows:

$$serv\_sal_i = \begin{cases} 1 & \text{if person } i \text{ has Seguro Popular,} \\ 2 & \text{if person } i \text{ receives medical services from IMSS,} \\ 3 & \text{if person } i \text{ receives medical services from ISSSTE or state ISSSTE,} \\ 4 & \text{if person } i \text{ receives medical services from Pemex, the Department of Defense or the Navy,} \\ 5 & \text{if person } i \text{ is provided other medical services,} \\ 0 & \text{if person } i \text{ does not receive services from any of the above mentioned sources.} \end{cases}$$

The indicator of deprivation due to lack of access to health services is then defined as follows:

*Indicator of deprivation due to lack of access to health services:*

$$ic\_asalud_i = \begin{cases} 1 & \text{if } serv\_sal_i = 0, \\ 0 & \text{if } serv\_sal_i \geq 1. \end{cases}$$

The value one identifies the population that shows deprivation due to lack of access to health services and the value zero in the opposite case.

## Indicator of deprivation in access to social security

Access to social security depends on a group of members of each household, specifically, those enrolled in a social security institute or those who enjoy the benefits of having been enrolled while they worked. The members who do not meet this requirement may have access through kinship relationship or through some other mechanisms defined in the LSS, such as voluntary access and enrollment in an Afore.

There are other mechanisms of access to the benefits of social security, specifically pension programs for senior citizens. Although the benefits of these programs do not offer complete access to social security, to a certain extent, they protect the subsistence means of the population.

According to these considerations, the population deprived due to lack of access to social security is identified using the following criteria:

- For those who are economically active, it is considered that they are not deprived in this dimension if, through their job, they enjoy the benefits established in the law.
- For non paid workers and for workers on their own, given the voluntary nature of enrollment in the system, they are considered to have access to social security when they receive medical services as a job benefit or when they are actually voluntarily enrolled and when, in addition, they bear a retirement plan.
- For the general population, people are considered to have access when they benefit from a retirement program or pension or when one of their relatives has access to social security.
- In the case of people in retirement ages (sixty five years or older), people are considered to have access to social security if they benefit from a social pension program for senior citizens.
- The population not meeting any of the above criteria is considered deprived due to access to social security.

The definition for this indicator for the first criterion identifies the working population with access to social security and also those people who benefit from a retirement or pension plan.

*Economically active population*. It is the population aged sixteen years or older[57] who declared themselves as workers or as unemployed; it also identifies those people who said they were engaged in non-economic activities (PNEA).[58] This indicator is defined as follows:

$$pea_i = \begin{cases} 1 & \text{if person } i \text{ is employed and } edad_i \geq 16, \\ 2 & \text{if person } i \text{ is unemployed and } edad_i \geq 16, \\ 0 & \text{if person } i \text{ belongs to } pnea \text{ and } edad_i \geq 16. \end{cases}$$

[57] According to the Ley Federal del Trabajo, in article 22: "Minors under fourteen years of age or over this age and under sixteen who have not finished their mandatory education are forbidden to work".
[58] This population group includes people who state that they rent or lease a property, that are retired or pensioned, devote themselves to housework, students and people with a physical or mental disability that prevents them from working for the rest of their lives.

*Type of work.* It identifies, for any worker, whether she is a subordinate employee or if she is self employed.[59]

The variable $tipo\_trab_i$ is defined as follows:

$$tipo\_trab_i = \begin{cases} 1 & \text{if } pea_i = 1 \text{ and person } i \text{ works (with or without payment) for an economic unit in which she is subordinate to a boss,} \\ 2 & \text{i } pea_i = 1 \text{ and person } i \text{ is self - employed with no boss and receives a salary,} \\ 3 & \text{if } pea_i = 1 \text{ and person } i \text{ is self - employed with no boss and does not receive a salary.} \end{cases}$$

It is also required to determine if workers enjoy any of the following basic benefits: medical services, disability leave or Afore.[60]

*Medical services*. It refers to whether a person is enrolled in an institution that provides health services as a job benefit or not.

$$smlab_i = \begin{cases} 1 & \text{if person } i \text{ is given access to medical services as a job benefit,} \\ 0 & \text{if person } i \text{ does not have access to medical services as a job benefit} \end{cases}$$

*Disability leave*. It is the benefit through which, in case of an illness, an accident or pregnancy, a worker may be absent without being penalized.

$$inclab_i = \begin{cases} 1 & \text{if person } i \text{ has disability leave as a job benefit,} \\ 0 & \text{if person } i \text{ does not enjoy disability leave as a job benefit.} \end{cases}$$

[59] This distinction should be made for each occupation reported by the same person. In the case of the MCS-ENIGH 2008, only the main and secondary occupations of the working population are reported, and it is determined whether or not the worker has access to social security in each of her occupations.
[60] These variables are also determined for each of the occupations reported by the worker.

*Afore.* Job benefit designed to save funds for retirement.

$$aforlab_i = \begin{cases} 1 & \text{if person } i \text{ has access to a retirement program or pension,} \\ 0 & \text{if person } i \text{ does not have access to a retirement program or pension.} \end{cases}$$

The following indicators are constructed for people who state to have access to medical services and to an Afore through voluntary enrollment:

*Voluntary medical services.* It identifies if a person receives medical services through voluntary enrollment.

$$smcv_i = \begin{cases} 1 & \text{if person } i \text{ has acces to medical services through voluntary enrollment,} \\ 0 & \text{if person } i \text{ does not have access to medical services through voluntary enrollment.} \end{cases}$$

*Voluntary Afore.* It refers to whether a person has access to a retirement system or pension through voluntary enrollment.

$$aforecv_i = \begin{cases} 1 & \text{if person } i \text{ has access to a retirement system or pension through voluntary enrollment,} \\ 0 & \text{if person } i \text{ does not have access to a retirement system or pension through voluntary enrollment.} \end{cases}$$

The following step for building the indicators is to identify the population that has direct access to social security, that is to say, for retired or pensioned people.

*Retired and pensioned.*[61] People who stated they were retired or pensioned at the time of the interview.

[61] People are considered retired or with a permanent disability if they receive income in cash derived from retirement and/or pensions from social security, seniority, age or work accidents in a regular way. In the case of social security from the children toward their parents, the origin of the retirement or pension should be distinguished, as there are several mechanisms for receiving a pension, not all of which can be passed on to parents. If there is no information on the origin of the pension, it will be considered that only the population of twenty six years or older may offer social security to their parents (since from that age on they cannot receive a pension due to their parents).

$$jub_i = \begin{cases} 1 & \text{if person } i \text{ is retired or pensioned,} \\ 1 & \text{if person } i \text{ declared that she benefits from a retirement program or pension} \\ 1 & \text{if person } i \text{ declared that she receives medical services due to retirement,} \\ 0 & \text{otherwise.} \end{cases}$$

Based on the above definitions, direct access to social security is determined as follows:

$$ss\_dir_i = \begin{cases} 1 & \text{if } tipo\_trab_i = 1 \text{ and } inclab_i = 1 \text{ and } aforlab_i = 1 \text{ and } smlab_i = 1, \\ 1 & \text{if } tipo\_trab_i = 2 \text{ and } (aforlab_i = 1 \text{ or } aforecv_i = 1) \text{ and } (smlab_i = 1 \text{ or } smcv_i = 1), \\ 1 & \text{if } tipo\_trab_i = 3 \text{ and } aforecv_i = 1 \text{ and } (smlab_i = 1 \text{ or } smcv_i = 1), \\ 1 & \text{if } jub_i = 1, \\ 0 & \text{otherwise.} \end{cases}$$

Members of the household who have access to social security through their kinship networks are also specified. In order to do so, we define the variable $par_i$ as follows:

$$par_i = \begin{cases} 1 & \text{if person } i \text{ is the head of household,} \\ 2 & \text{if person } i \text{ is the spouse of the head of household,} \\ 3 & \text{if person } i \text{ is a child of the head of household,} \\ 4 & \text{if person } i \text{ is a parent of the head of household,} \\ 5 & \text{if person } i \text{ is the mother - in - law or father - in - law of the head of household,} \\ 6 & \text{otherwise.} \end{cases}$$

To determine those members of the household that are able to grant access to other members, auxiliary variables to identify whether or not certain members of the household have direct access were generated:[62]

$$jef\_ss_{ih} = \begin{cases} 1 & \text{if the head of household has direct access to social security,} \\ 0 & \text{otherwise.} \end{cases}$$

[62] These variables are determined for all the members of the household.

$$cony\_ss_{ih} = \begin{cases} 1 & \text{if the spouse of the head of household has direct access to social security,} \\ 0 & \text{otherwise.} \end{cases}$$

$$hijo\_ss_{ih} = \begin{cases} 1 & \text{if any child of the head of household has direct access to social security} \\ & \text{and is not retired or pensioned,} \\ 1 & \text{if any child of the head of household has direct access to social security,} \\ & \text{is retired or pensioned and } edad_i > 25, \\ 0 & \text{otherwise.} \end{cases}$$

The third criterion identifies the members of the household who have access to medical services through other kinship relationships, or through voluntary enrollment.

$$s\_salud_i = \begin{cases} 1 & \text{if person } i \text{ declares that she has access to medical services from a} \\ & \text{social security institution through a family member inside or outside} \\ & \text{the household, as a widowhood benefit or through voluntary enrollment,} \\ 0 & \text{otherwise.} \end{cases}$$

The last criterion identifies people who state to receive some income from the Programa de Adultos Mayores (PAM, Senior Citizens Program), which is determined as follows:

$$pam_i = \begin{cases} 1 & \text{if person } i \text{ is 65 years or older and benefits from PAM,} \\ 0 & \text{if person } i \text{ is 65 years or older and does not benefits from PAM.} \end{cases}$$

Based on the above attributes, the *Indicator of deprivation due to lack of access to social security* is defined as follows.[63]

[63] In order to build this indicator, the variable non-attendance to school (*inas_esc*) from the educational gap indicator will be used.

$$ic\_ss_i = \begin{cases} 0 & \text{if } ss\_dir_i = 1, \\ 0 & \text{if } par_i = 1 \text{ and } cony\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 1 \text{and } pea_i = 0 \text{ and } hijo\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 2 \text{ and } jefe\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 2 \text{ and } pea_i = 0 \text{ and } hijo\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 3 \text{ and } edad_i < 16 \text{ and } jefe\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 3 \text{ and } edad_i < 16 \text{ and } cony\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 3 \text{ and } edad_i \in [16,25] \text{ and } inas\_esc_i = 0 \text{ and } jefe\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 3 \text{ and } edad_i \in [16,25] \text{ and } inas\_esc_i = 0 \text{ and } cony\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 4 \text{ and } pea_i = 0 \text{ and } jefe\_ss_{ih} = 1, \\ 0 & \text{if } par_i = 5 \text{ and } pea_i = 0 \text{ and } cony\_ss_{ih} = 1, \\ 0 & \text{if } s\_salud_i = 1, \\ 0 & \text{if } pam_i = 1, \\ 1 & \text{otherwise.} \end{cases}$$

This indicator takes the value one when the person shows deprivation due to lack of access to social security, and zero if the person does not.

## Indicator of deprivation due to quality and spaces of the dwelling

Although Article 4 of the Constitution and the Ley de Vivienda (Housing Law) establish the right to a suitable dwelling, these laws do not specify the housing characteristics associated to this concept.

The criteria suggested by CONAVI to define the indicator of deprivation due to quality and spaces of the dwelling include two sub-dimensions: the construction materials of the dwelling and its spaces. The first uses indicators of the materials of floors, roofs and walls. The second one uses the degree of overcrowding. The unit of study is the dwelling; hence, the value of the indicator is assigned to any individual living in that house.

According to the criteria proposed, it is possible to identify the population deprived due to quality and spaces of the dwelling if it meets any of the following conditions:

- If the dwelling has dirt floor.
- If the roof of the dwelling is made of cardboard sheets or waste.

- If the walls of the dwelling are made of mud or daub and wattle; reed, bamboo or palm tree; cardboard, metal or asbestos sheets; or waste.
- If the ratio of the number of members of the household per room (overcrowding) is greater than 2.5.

*Material of the floor.* The prevailing material of the floors of the dwelling is classified according to the following criteria:

$$cv\_pisos_{ihv} = \begin{cases} 1 & \text{if the dwelling } v \text{ has dirt floor,} \\ 2 & \text{if the dwelling } v \text{ has cement or solid floor,} \\ 3 & \text{if the dwelling } v \text{ has linoleum, congoleum or vinyl floor,} \\ 4 & \text{if the dwelling } v \text{ has laminated floor,} \\ 5 & \text{if the dwelling } v \text{ has tile, marble or ceramic tile floor,} \\ 6 & \text{if the dwelling } v \text{ has wood, floorboard or parquet floor.} \end{cases}$$

*Material of the roof.* The prevailing material of the roof of the dwelling:

$$cv\_techos_{ihv} = \begin{cases} 1 & \text{if the dwelling } v \text{ has waste material roof,} \\ 2 & \text{if the dwelling } v \text{ has carboard sheet roof,} \\ 3 & \text{if the dwelling } v \text{ has metal sheet roof,} \\ 4 & \text{if the dwelling } v \text{ has asbestos sheet roof,} \\ 5 & \text{if the dwelling } v \text{ has palm tree or thatched roof,} \\ 6 & \text{if the dwelling } v \text{ has wood or } tejamanil \text{ roof,} \\ 7 & \text{if the dwelling } v \text{ has tile roof,} \\ 8 & \text{if the dwelling } v \text{ has flat roof with beams,} \\ 9 & \text{if the dwelling } v \text{ has concrete block or jack arch brick roof.} \end{cases}$$

*Material of the walls.* The prevailing material of the walls of the dwelling:

$$cv\_muros_{ihv} = \begin{cases} 1 & \text{if the dwelling } v \text{ has walls of waste material,} \\ 2 & \text{if the dwelling } v \text{ has walls of carboard sheets,} \\ 3 & \text{if the dwelling } v \text{ has walls of metal or asbestos sheets,} \\ 4 & \text{if the dwelling } v \text{ has walls of reed, bambu or palm tree,} \\ 5 & \text{if the dwelling } v \text{ has walls of mud or daub and wattle,} \\ 6 & \text{if the dwelling } v \text{ has walls of wood,} \\ 7 & \text{if the dwelling } v \text{ has walls of adobe,} \\ 8 & \text{if the dwelling } v \text{ has walls of cement block, bricks,} \\ & \text{stone or concrete.} \end{cases}$$

*Overcrowding Index*. It is the result of dividing the number of people living in the dwelling by the number of rooms.

$$cv\_hac_{ihv} = \frac{num\_ind_{ihv}}{num\_cua_{ihv}},$$

where:

$num\_ind_{ihv}$: number of residents of the dwelling,

$num\_cua_{hv}$: number of rooms of the dwelling.

The subindicators of deprivation due to quality and spaces of the dwelling are determined as follows:

*Indicator of deprivation due to floor materials*

$$icv\_pisos_{ihv} = \begin{cases} 1 & \text{if } cv\_pisos_{ihv} = 1, \\ 0 & \text{if } cv\_pisos_{ihv} > 1. \end{cases}$$

*Indicator of deprivation due to roof materials*

$$icv\_techos_{ihv} = \begin{cases} 1 & \text{if } cv\_techos_{ihv} \leq 2, \\ 0 & \text{if } cv\_techos_{ihv} > 2. \end{cases}$$

*Indicator of deprivation due to walls materials*

$$icv\_muros_{ihv} = \begin{cases} 1 & \text{if } cv\_muros_{ihv} \leq 5, \\ 0 & \text{if } cv\_muros_{ihv} > 5. \end{cases}$$

*Indicator of deprivation due to overcrowding*

$$icv\_hac_{ihv} = \begin{cases} 1 & \text{if } cv\_hac_{ihv} > 2.5, \\ 0 & \text{if } cv\_hac_{ihv} \leq 2.5. \end{cases}$$

Finally, people living in dwellings that lack quality in the construction materials and spaces are identified in order to define the indicator to be used in the measurement of multidimensional poverty.

*Indicator of deprivation due to quality and spaces of the dwelling*

$$ic\_cv_{ihv} = \begin{cases} 1 & \text{if } icv\_pisos_{ihv} = 1 \text{ or } icv\_techos_{ihv} = 1 \\ & \text{or } icv\_muros_{ihv} = 1 \text{ or } icv\_hac_{ihv} = 1, \\ 0 & \text{if } icv\_pisos_{ihv} = 0 \text{ and } icv\_techos_{ihv} = 0 \\ & \text{and } icv\_muros_{ihv} = 0 \text{ and } icv\_hac_{ihv} = 0. \end{cases}$$

The indicator takes the value one if the person shows deprivation due to quality and spaces of the dwelling, and zero if the person does not.

## Indicator of deprivation in access to basic services in the dwelling

As with the previous indicator, CONAVI was consulted with regard to the basic services a dwelling should have. Their proposal identified four services: access to drinking water, availability of drainage service, electricity and the type of fuel for cooking.

According to the criteria proposed by CONAVI, people living in dwellings with at least one of the following characteristics are considered deprived due to lack of access to basic services in the dwelling:

- Water is obtained from a well, river, lake, stream, or truck; or when piped water is carried from another dwelling or gotten at a public faucet or hydrant.
- There is no drainage service, or the drainage is connected to pipes leading to a river, lake, sea, ravine or crack.
- The dwelling has no electricity.
- Wood or coal with no chimney are used for cooking or heating food inside the dwelling.[64]

*Access to water*. Water service available in the dwelling.

$$sb\_agua_{ihv} = \begin{cases} 1 & \text{if dwelling } v \text{ gets water from a well, lake, stream or other,} \\ 2 & \text{if dwelling } v \text{ gets water from a truck,} \\ 3 & \text{if dwelling } v \text{ carries piped water from another dwelling,} \\ 4 & \text{if dwelling } v \text{ gets piped water from a public faucet or hydrant,} \\ 5 & \text{if dwelling } v \text{ gets piped water from outside the dwelling but within the land,} \\ 6 & \text{if dwelling } v \text{ gets piped water from inside the dwelling.} \end{cases}$$

*Drainage service.* Availability of drainage whereby sewage and soapy water are eliminated from the dwelling.

[64] The information needed to evaluate the fuel used for cooking has not been incorporated into the information sources to be used for measurement in 2008 (see the section on "Information Sources"). Therefore, this will not be considered in the multidimensional poverty measurement for 2008, but will be in that of 2010 and onwards.

$$sb\_dren_{ihv} = \begin{cases} 1 & \text{if dwelling } v \text{ does not have drainage,} \\ 2 & \text{if dwelling } v \text{ has drainage connected to a pipe that fees from a river, lake or sea,} \\ 3 & \text{if dwelling } v \text{ has drainage connected to a pipe that fees into a ravine or crack,} \\ 4 & \text{if dwelling } v \text{ has drainage connected to a septic tank,} \\ 5 & \text{if dwelling } v \text{ has drainage connected to the public system.} \end{cases}$$

*Electrical service*. Availability of electricity in the dwelling.

$$sb\_luz_{ihv} = \begin{cases} 1 & \text{if dwelling } v \text{ has no electricity,} \\ 2 & \text{if dwelling } v \text{ gets electricity from a solar panel or other source,} \\ 3 & \text{if dwelling } v \text{ gets electricity from a private generator,} \\ 4 & \text{if dwelling } v \text{ gets electricity from the public service.} \end{cases}$$

*Fuel for cooking.*[65] Fuel used in the dwelling for preparing or heating up food.

$$sb\_combus_{ihv} = \begin{cases} 1 & \text{if dwelling } v \text{ uses wood or coal with no chimney for cooking,} \\ 2 & \text{if dwelling } v \text{ uses wood or coal with chimney for cooking,} \\ 3 & \text{if dwelling } v \text{ uses gas from a tank for cooking,} \\ 4 & \text{if dwelling } v \text{ uses natural or piped gas for cooking,} \\ 5 & \text{if dwelling } v \text{ uses electricity for cooking.} \end{cases}$$

Based on each of these variables and thresholds, the indicators of access to basic services in the dwelling are constructed as follows:

*Indicator of deprivation due to lack of access of water in the dwelling*

$$isb\_agua_{ihv} = \begin{cases} 1 & \text{if } sb\_agua_{ihv} \leq 4, \\ 0 & \text{if } sb\_agua_{ihv} > 4. \end{cases}$$

[65] Currently available technologies that use wood or coal represent a safe, efficient and low cost option for rural localities, as long as they are respectful of the environment. However, the sources of information available do not make it possible to distinguish dwellings equipped with these technologies. The necessary information to calculate this indicator will be available in 2010.

*Indicator of deprivation of drainage service in the dwelling*

$$isb\_dren_{ihv} = \begin{cases} 1 & \text{if } sb\_dren_{ihv} \leq 3, \\ 0 & \text{if } sb\_dren_{ihv} > 3. \end{cases}$$

*Indicator of deprivation of electrical service in the dwelling*

$$isb\_luz_{ihv} = \begin{cases} 1 & \text{if } sb\_luz_{ihv} = 1, \\ 0 & \text{if } sb\_luz_{ihv} > 1. \end{cases}$$

*Indicator of deprivation of fuel for cooking in the dwelling*

$$isb\_combus_{ihv} = \begin{cases} 1 & \text{if } sb\_combus_{ihv} \leq 1, \\ 0 & \text{if } sb\_combus_{ihv} > 1. \end{cases}$$

People living in a dwelling with access to all of the aforementioned basic services, are non-deprived. Hence this indicator is defined as follows:

*Indicator of deprivation in access to basic services in the dwelling*

$$ic\_sbv_{ihv} = \begin{cases} 1 & \text{if } isb\_agua_{ihv} = 1 \text{ or } isb\_dren_{ihv} = 1 \\ & \text{or } isb\_luz_{ihv} = 1 \text{ or } isb\_combus_{ihv} = 1, \\ 0 & \text{if } isb\_agua_{ihv} = 0 \text{ and } isb\_dren_{ihv} = 0 \\ & \text{and } isb\_luz_{ihv} = 0 \text{ and } isb\_combus_{ihv} = 0. \end{cases}$$

The value one represents deprivation in access to basic services in the dwelling and the value zero represents that no deprivation is observed.

## Indicator of deprivation in access to food

Unlike the other indicators, the Constitution has not incorporated the right to food as an individual guarantee, except under the stipulations of Article 4, which establishes the right to food for girls and

boys. However, under the commitments undertaken by the Mexican State by signing international agreements, such as the International Covenant on Economic, Social and Cultural Rights and the 1996 Rome Declaration on World Food Security, the food security level, associated with experiencing hunger, is added to this dimension.

In the case of this indicator, the unit of study is the household and the corresponding value is assigned to all of its members. In order to define this indicator, the following variables are specified:

*Food insecurity*. To determine this variable, we differentiate between households with members under eighteen years old and households with no members under eighteen years old. For households with no members under the age of eighteen, CONEVAL identifies those in which one or more adults, due to lack of money or resources, had a diet based on very little food variety; skipped breakfast, lunch or dinner; ate less than they should; ran out of food; went hungry but did not eat; or only had one meal or did not eat for a whole day. In the case of households with members under eighteen, the same experience is documented, and also that for any child or teenager under that age.

To operationalize the definition of the access to food indicator, the households with members under eighteen years old are identified first, according to the following criteria:

$$id\_men_{ih} = \begin{cases} 1 & \text{if there are people under 18 years old in the household,} \\ 0 & \text{if there are only people aged 18 or older in the household.} \end{cases}$$

Second, CONEVAL identifies the households that registered at least a positive answer to the questions of the food security scale:

$$ia\_1_{ih}^{ad} = \begin{cases} 1 & \text{if during the last three months, due to lack of money or resources,} \\ & \text{an adult in the household had a diet based on} \\ & \text{very little food variety,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_2_{ih}^{ad} = \begin{cases} 1 & \text{if during the last three months, due to lack of money or resources,} \\ & \text{an adult in the household skipped breakfast, lunch or dinner,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_3_{ih}^{ad} = \begin{cases} 1 & \text{if during the last three months, due to lack of money or resources, an adult in the household ate less than she felt she should,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_4_{ih}^{ad} = \begin{cases} 1 & \text{if during the last three months, due to lack of money or resources, the household members ran out of food,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_5_{ih}^{ad} = \begin{cases} 1 & \text{if during the last three months, due to lack of money or resources, any member of the household was hungry but did not eat,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_6_{ih}^{ad} = \begin{cases} 1 & \text{if during the last three months, due to lack of money or resources, any member of the household had only one meal or did not eat for a whole day,} \\ 0 & \text{otherwise.} \end{cases}$$

In households with people under eighteen years old (minors), in addition to the above questions, the following information is also considered:

$$ia\_7_{ih}^{men} = \begin{cases} 1 & \text{if } id\_men_{ih} = 1 \text{ and if during the last three months, due to lack of money or resources, a minor had a diet based on very little food variety,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_8_{ih}^{men} = \begin{cases} 1 & \text{if } id\_men_{ih} = 1 \text{ and if during the last three months, due to lack of money or resources, a minor in the household ate less than she should,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_9_{ih}^{men} = \begin{cases} 1 & \text{if } id\_men_{ih} = 1 \text{ and if during the last three months, due to lack of money or resources, a minor had the amount of food served at meals reduced,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_10_{ih}^{men} = \begin{cases} 1 & \text{if } id\_men_{ih} = 1 \text{ and if during the last three months due, to lack of money or resources, a minor in the household was hungry but did not eat,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_11_{ih}^{men} = \begin{cases} 1 & \text{if } id\_men_{ih} = 1 \text{ and if during the last three months, due to lack of money or resources, a minor in the household went to bed hungry,} \\ 0 & \text{otherwise.} \end{cases}$$

$$ia\_12_{ih}^{men} = \begin{cases} 1 & \text{if } id\_men_{ih} = 1 \text{ and if during the last three months, due to lack of money or resources, a minor in the household had only one meal or did not eat for a whole day,} \\ 0 & \text{otherwise.} \end{cases}$$

Based on these variables, a new variable that represents the number of affirmative answers is generated; this variable is assigned to all the members of the household. If the household has only members of eighteen years or older, the following sum is defined:

$$tot\_ia_{ih}^{ad} = ia\_1_{ih}^{ad} + \cdots + ia\_6_{ih}^{ad} \text{ ; if } id\_men_{ih} = 0.$$

For households with members under eighteen years old, the sum is defined as follows:

$$tot\_ia_{ih}^{men} = ia\_1_{ih}^{ad} + \cdots + ia\_6_{ih}^{ad} + ia\_7_{ih}^{men} + \cdots + ia\_12_{ih}^{men} \text{; if } id\_men_{ih} = 1.$$

Depending upon the value of these sums, the degree of food insecurity is defined as follows:

- Severe: households with only people of eighteen years of age or older where the answer to five or six questions of the scale was affirmative; for households with people under eighteen years old, those where an affirmative response to eight to twelve questions of the scale was obtained.
- Moderate: households with only people of eighteen years or older where the answer to three or four questions of the scale was affirmative. For households with people under eighteen years old, those where an affirmative response to four to seven questions of the scale was obtained.
- Mild: households with only people of eighteen years or older where the answer to one or two questions of the scale was affirmative. For households with people under eighteen years old, those where an affirmative response to one to three questions of the scale was obtained.
- Food security: households with only people of 18 years or older and households with people under 18 years of age in which the answer to no question of the scale was affirmative.

The variable that identifies the degree of food insecurity is, therefore, determined as follows:

$$ins\_ali_{ih} = \begin{cases} 0 & \text{if } tot\_ia_{ih}^{ad} = 0 \text{ or } tot\_ia_{ih}^{men} = 0, \\ 1 & \text{if } tot\_ia_{ih}^{ad} = 1,2 \text{ or } tot\_ia_{ih}^{men} = 1,2,3, \\ 2 & \text{if } tot\_ia_{ih}^{ad} = 3,4 \text{ or } tot\_ia_{ih}^{men} = 4,5,6,7, \\ 3 & \text{if } tot\_ia_{ih}^{ad} = 5,6 \text{ or } tot\_ia_{ih}^{men} = 8,9,10,11,12. \end{cases}$$

Finally, it is considered that the members of a household show deprivation due to the lack of access to food if they present moderate or severe food insecurity.

*Indicator of deprivation due to lack of access to food*

$$ic\_ali_{ih} = \begin{cases} 1 & \text{if } ins\_ali_{ih} = 2 \text{ or } ins\_ali_{ih} = 3, \\ 0 & \text{if } ins\_ali_{ih} = 0 \text{ or } ins\_ali_{ih} = 1. \end{cases}$$

The indicator takes the value one if the household members present deprivation and zero otherwise.

## Territorial and social context indicators

*Social polarization.* It is defined at the municipal and state level, based on information from the marginalization index calculated by the Consejo Nacional de Población (CONAPO).

The indicator at the municipal level is calculated as follows: the population is disaggregated first according to the locality degree of marginalization (very low, low, medium, high or very high). The population of localities that belong to the same municipality is added up, but they are differentiated according to their degree of marginalization. Therefore, for each municipality, it is possible to calculate the percentage of population living in localities with the five degrees of marginalization. Once the percentages have been obtained, the following table is used for classifying the municipalities:

| Type of municipality | Criteria |
|---|---|
| Polarized | Less than 20% of the population living in localities with "Medium" degree of marginalization and each extreme ("High" and "Very high" and "Low" and "Very low") above 30%. |
| Not polarized | |
| Left pole | More than 70% of the population in localities with “High” and “Very high” degree of marginalization. |
| Right pole | More than 70% of the population in localities with "Low" and "Very low" degree of marginalization. |
| No pole | Municipalities that are polarized, not polarized with left pole and not polarized with right pole are excluded from this residual category. |

The process used for classifying states is the same as before, except that, in this case, the marginalization index at the municipal level is used. The population of the municipalities is disaggregated with respect to their degree of marginalization. Then, the population of the municipalities of a given state is added up according to their degree of marginalization, and the percentages for each state and degree are obtained. The criteria to classify states are as follows:

| Type of state | Criteria |
|---|---|
| Polarized | Less than 20% of the population living in municipalities with “Medium” degree of marginalization and each extreme (“High” and "Very high" and "Low" and "Very low") above 30%. |
| Not polarized | |
| Left pole | More than 70% of the population in municipalities with “High” and “Very high” degree of marginalization. |
| Right pole | More than 70% of the population in municipalities with "Low" and "Very low" degree of marginalization. |
| No pole | States that are polarized, not polarized with left pole and not polarized with right pole are excluded from this residual category. |

*Gini Index*. It is calculated at the municipal and state level,[66] and the political units are grouped through optimal stratification.

*The social networks perception index*. It is defined as the degree of perception of the easiness or difficulty that people bear regarding to obtaining help in several hypothetical situations: being cared for during an illness; obtaining the monthly amount of money made in the household; finding a job; being accompanied to see a doctor; obtaining cooperation to make improvements in the neighborhood or locality and taking care of the child/children in the household.

The indicators of perception are determined as follows:

*Indicators of perception of easiness*

$$PFR_i^{cuiden} = \begin{cases} 1 & \text{if the person perceives that it would be easy or very easy to get help in being cared for during illness,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PFR_i^{dinero} = \begin{cases} 1 & \text{if the person perceives that it would be easy or very easy to get the amount of money earned in the household in a month,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PFR_i^{trabajo} = \begin{cases} 1 & \text{if the person perceives that it would be easy or very easy to get help in finding a job,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PFR_i^{acomp} = \begin{cases} 1 & \text{if the person perceives that it would be easy or very easy to find someone to go to the doctor with,} \\ 0 & \text{otherwise.} \end{cases}$$

[66] For more information about calculating the Gini coefficient, see Atkinson and Bourguignon (2000).

$$PFR_i^{mejoras} = \begin{cases} 1 & \text{if the person perceives that it would be easy or very easy to get cooperation to improve the neighborhood,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PFR_i^{cmenores} = \begin{cases} 1 & \text{if there are people under 12 years old in the household and the person perceives that it would be easy or very easy to get help to take care of children,} \\ 0 & \text{otherwise.} \end{cases}$$

The number of situations for which it is easy to get social networks support is defined as follows:

$$NSF_i = \begin{cases} PFR_i^{cuiden} + PFR_i^{dinero} + PFR_i^{trabajo} + PFR_i^{acomp} + PFR_i^{mejoras} + PFR_i^{cmenores} \\ \text{if someone below 12 years old lives in the household,} \\ PFR_i^{cuiden} + PFR_i^{dinero} + PFR_i^{trabajo} + PFR_i^{acomp} + PFR_i^{mejoras} \\ \text{if no one under 12 years old lives in the household.} \end{cases}$$

*Indicators of perception of difficulty*

$$PDR_i^{cuiden} = \begin{cases} 1 & \text{if the person perceives that it would be difficult or impossible to get help in being cared for during illness,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PDR_i^{dinero} = \begin{cases} 1 & \text{if the person perceives that it would be difficult or impossible to get the amount of money earned in the household in a month,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PDR_i^{trabajo} = \begin{cases} 1 & \text{if the person perceives that it would be difficult or impossible to get help in finding a job,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PDR_i^{acomp} = \begin{cases} 1 & \text{if the person perceives that it would be difficult or impossible to find someone to go to the doctor with,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PDR_i^{mejoras} = \begin{cases} 1 & \text{if the person perceives that it would be difficult or impossible to get cooperatio n to improve the neighborho od,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PDR_i^{cmenores} = \begin{cases} 1 & \text{if there are people under 12 years old in the household and the person perceives that it would be difficult or impossible to get help to take care of children,} \\ 0 & \text{otherwise.} \end{cases}$$

The number of situations for which it is difficult to get social networks support is defined in the following way.

$$NSD_i = \begin{cases} PDR_i^{cuiden} + PDR_i^{dinero} + PDR_i^{trabajo} + PDR_i^{acomp} + PDR_i^{mejoras} + PDR_i^{cmenores} \\ \text{if someone below 12 years old lives in the household,} \\ PDR_i^{cuiden} + PDR_i^{dinero} + PDR_i^{trabajo} + PDR_i^{acomp} + PDR_i^{mejoras} \\ \text{if no one under 12 years old lives in the household.} \end{cases}$$

*Indicators of neutral perception*

$$PNR_i^{cuiden} = \begin{cases} 1 & \text{if the person perceives that it would be neither easy nor difficult to get help in being cared for during illness,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PNR_i^{dinero} = \begin{cases} 1 & \text{if the person perceives that it would be neither easy nor difficult to get the amount of money earned in the household in a month,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PNR_i^{trabajo} = \begin{cases} 1 & \text{if the person perceives that it would be neither easy nor difficult to get help in finding a job,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PNR_i^{acomp} = \begin{cases} 1 & \text{if the person perceives that it would be neither easy nor difficult to find someone to go to the doctor with,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PNR_i^{mejoras} = \begin{cases} 1 & \text{if the person perceives that it would be neither easy nor difficult to get cooperatio n to improve the neighborho od,} \\ 0 & \text{otherwise.} \end{cases}$$

$$PNR_i^{cmenores} = \begin{cases} 1 & \text{if there are people under 12 years old in the household and the person perceives that it would be neither easy nor difficult to get help to take care of children,} \\ 0 & \text{otherwise.} \end{cases}$$

The number of situations for which it is neither easy nor difficult to get social networks support is calculated as follows:

$$NSN_i = \begin{cases} PNR_i^{cuiden} + PNR_i^{dinero} + PNR_i^{trabajo} + PNR_i^{acomp} + PNR_i^{mejoras} + PNR_i^{cmenores} \\ \text{if someone below 12 years old lives in the household,} \\ PNR_i^{cuiden} + PNR_i^{dinero} + PNR_i^{trabajo} + PNR_i^{acomp} + PNR_i^{mejoras} \\ \text{if no on under 12 years old lives in the household.} \end{cases}$$

The degree of support from social networks is then determined for each person as follows:

$$GA_i^{redes} = \begin{cases} low & \text{if } NSD_i > NSF_i \text{ and } NSD_i > NSN_i, \\ medium & \text{if } NSN_i > NSD_i \text{ and } NSN_i > NSF_i, \\ medium & \text{if } NSN_i = NSF_i \text{ and } NSN_i > NSD_i, \\ medium & \text{if } NSN_i = NSD_i \text{ and } NSN_i > NSF_i, \\ medium & \text{if } NSN_i = NSD_i = NSF_i, \\ medium & \text{if } NSF_i = NSD_i \text{ and } NSF_i > NSN_i, \\ high & \text{if } NSF_i > NSD_i \text{ and } NSF_i > NSN_i. \end{cases}$$

Finally, for each federal entity *k* in the country, the index of perception of support from social networks is defined as:

$$IPD_k^{redes} = \begin{cases} low & \text{if the proportion of people perceiving a high degree of support from social networks is less than 20 percent,} \\ medium & \text{if the proportion of people perceiving a high degree of support from social networks is equal or greater than 20 percent and less than 40 percent,} \\ high & \text{if the proportion of people perceiving a high degree of support from social networks is equal or greater than 40 percent.} \end{cases}$$

*Income ratio*. It is determined as the ratio of the total current per capita income of the population in extreme multidimensional poverty with respect to the total current per capita income of the population that is not in multidimensional poverty and that is not vulnerable.

# Appendix C. Supplementary indicators

Defining the methodology for multidimensional poverty measurement involved the participation of experts in the various dimensions. After meeting with these experts, there were some recommendations about the indicators to be considered. Some of these indicators are not part of the measurement mainly due to limitations of the information that can be gathered at the municipal level. Nonetheless, many of them can be recorded at the national or state level.

In this appendix, CONEVAL proposes a set of indicators to complement the multidimensional poverty measures. We should mention, however, that these indicators represent only a first stage towards building a social development indicators system in Mexico. As long as there is available information, CONEVAL will systematically report also these supplementary indicators.

## Education

Although the indicator of deprivation due to educational gap provides valuable information about the level of schooling of the population, it does not allow to get information about how the indicator varies in different age groups, nor the academic results achieved. CONEVAL will report supplementary educational indicators regarding educational gaps by age, educational level of the head of household and his/her spouse, illiteracy rates and educational results; these indicators are defined as follows:

*Illiteracy.* The percentage of people aged fifteen years or older who do not know how to read or write.

*Mandatory basic education according to age groups.* The percentage of the population aged sixteen years or older that has not completed the mandatory basic education by age groups.

*Mandatory basic education of the head of household and his/her spouse.* The percentage of households where the head of household and/or his/her spouse have not completed the mandatory basic education.

*School attendance by age groups.* The percentage of the population between three and fifteen years old that does not attend school, by age groups (from three to five, from six to eleven and from twelve to fifteen years old).

*Educational academic results.* This information comes from three different national and international evaluation schemes: Exámenes de la Calidad y el Logro Educativos (*Excale*, Educational Quality and Achievement Tests), Programme for International Student Assessment (PISA) and the Evaluación Nacional del Logro Académico en Centros Escolares (*Enlace*, National Evaluation of Academic Achievement in Schooling Centers).

*Excale* results. The percentage of students that get a "Below basic" educational achievement score in Spanish and Mathematics. Excale results are available for preschool, elementary and secondary school.[67]

PISA results. The percentage of students aged fifteen years old with low performance in Reading, Mathematics and Science competitions.

*Enlace* results. The percentage of students that obtain "Insufficient" and "Elementary" achievement scores in Spanish and Mathematics in elementary and secondary school.[68]

*Educational coverage.* The percentage of students on certain educational level, with respect to the population that should be attending that educational level according to their age. This indicator is reported for medium high and higher education.

*Average educational gap in the household.* Average ratio of the household members with deprivation due to educational gap and the total members of the household.

[67] The indicators for *Excale* results and PISA results have been taken from Robles *et al*. (2008b).
[68] This indicator has been taken from http://enlace.sep.gob.mx .

## Health

The indicator of deprivation in access to health services makes it possible to know if the right to health protection is being fully met. However, though the indicator measures an important aspect of the access to health services, it does not provide information about how timely or effective the services are. In order to get a better insight and provide valuable information for designing public health policies and strategies, indicators related to timely and effective access to health care are also provided. The supplementary indicators associated with the dimension of health care are the following:

*Timely access to medical attention.* The percentage of households whose members would take more than two hours to reach a hospital in case of a health emergency.

*Effective access to health care services.* The percentage of the population that experienced pain, discomfort, illness or accidents that prevented them from carrying out their everyday activities and did not receive medical attention.

*Utilization of preventive services.* For the construction of this indicator, three variables were considered: weight and size control, diabetes detection and arterial hypertension detection. The first indicator is calculated for the entire population, while the other two are calculated only for the population aged thirty years or older, because it is considered a risk group.

Weight and size control. The percentage of the population that has not been weighed or measured by a doctor or a nurse during the last twelve months.

Diabetes detection. The percentage of the population aged thirty years or older that has not had a finger-prick blood test taken to detect diabetes during the last twelve months.

Arterial hypertension detection. The percentage of the population aged thirty years or older that has not had their arterial pressure read during the last twelve months.

*Prevalence of excess weight in women between twenty and forty nine years of age*. The percentage of women between twenty and forty nine years old with a Body Mass Index (BMI) whose value is equal or greater than 25.[69]

*Prevalence of obesity in women between twenty and forty nine years of age*. The percentage of women between twenty and forty nine years old with a Body Mass Index (BMI) whose value is equal or greater than 30.

*Infant mortality.* Mortality of children under five years old (deaths per thousand births). [70]

*Maternal mortality.* Ratio of maternal mortality (deaths per hundred thousand births).

*Specialized care during childbirth.* The proportion of births attended by a medical doctor.

*Life expectancy (years).* The average number of years a person is expected to live.

## Social security

Although for poverty measurement CONEVAL built an indicator to determine access (or lack thereof) of each individual to social security, there exist important information related to this dimension that is specific for certain population groups, either by age, occupational status, or the time they have been enrolled in a given social security system. The supplementary indicators associated with the dimension of social security are the following:

*Social security system coverage.* The percentage of the economically active population aged sixteen years or older that has never been enrolled in a social security institute.

*Access to a pension system.* The percentage of the population aged sixty five years or older that does not receive support from a retirement or pension program, is not spouse of a retired or pensioned

[69] The BMI is defined as the weight in kilograms divided by the square of the size in meters (kg/m2). The BMI is an indicator of the correlation between weight and size in adults.
[70] The indicators of infant mortality, maternal mortality and specialized care during childbirth have been taken from Presidencia de la República and the UN (2006).

person, and does not receive the support of the Programa de Adultos Mayores (PAM, Senior Citizens Program).

*Voluntary access to social security.* The percentage of unsalaried employed population that does not have access to medical services or an Afore through voluntary enrollment or as a job benefit.

*Access to the mandatory social security regime.* The percentage of employed and salaried population that does not have access to medical services, disability leave or an Afore as a job benefit.

*Social security benefits.* The percentage of the employed and salaried population that stated to receive the social security benefits stipulated in the Mexican Constitution:

Illness, accident or maternity disability leave. The percentage of the employed and salaried population that declared to have access to disability leave in case of illness, accident or maternity as a job benefit.

Day care and child care centers. The percentage of the employed and salaried population that declared receiving access to day care and child care centers as a job benefit.

SAR or Afore. The percentage of the employed and salaried population that declared receiving SAR or Afore as a job benefit.

Life insurance. The percentage of the employed and salaried population that declared receiving a life insurance as a job benefit.

Pension for disability. The percentage of the employed and salaried population that as a job benefit, declared they would have access to a pension in case of disability.

Pension for family members in case of death. The percentage of the employed and salaried population that is entitled to receive a pension for their family members in case of his/her death.

*Elderly population that has never been enrolled in the social security system.* The percentage of the population in retirement age *(sixty five years or older)* that has never been enrolled in the social security system.

## Housing

Housing protects human beings from the weather inclemencies, and it is a suitable place for satisfying their physiological needs. In addition, if it is self owned, it offers legal security. These attributes are not taken into account in the measurement of multidimensional poverty. Therefore, CONEVAL has aggregated a set of indicators aimed to complement the information available regarding the characteristics of Mexican's dwellings.

*Existence of a room used exclusively for cooking.* The percentage of households living in dwellings that do not have a room used exclusively for cooking or where it is also used as a bedroom.

*Dwelling ownership.* The percentage of households living in dwellings that are leased, rented, borrowed or where the inhabitants do not have a deed of ownership.

*Existence of electrical appliances.* The percentage of households with no television, refrigerator, washing machine or stove.

*Inadequate garbage disposal.* The percentage of households where the garbage is burned, buried or dumped on an empty lot, street, river, lake, sea or ravine.

*Frequency of water supply.* The percentage of households living in dwellings that do not have water from the public network or where it is not available at least one day a week.

*Availability of a toilet in the dwelling.* The percentage of households living in dwellings that do not have toilet, or that have toilet, but it cannot be flushed.

*Access to communications services.* The percentage of dwellings with no telephone, mobile, cell phone, paid TV nor cable.

## Food

For the dimension associated with food, this methodology incorporates the indicator of food insecurity to establish whether or not the members of a household have access to food. Another way of examining the extent to which the population meets this basic human need is by assessing if the amount of money devoted to food expenditure is higher or lower than the cost of the basic food basket. The supplementary indicators associated with the dimension of food are constructed as follows:

*Expenditure on food.* The percentage of households where the food expenditure, adjusted by economies of scale and adult equivalence scales, is lower than the cost of the basic food basket.

*Prevalence of low size among children under five years of age*.[71] The percentage of the population between zero and four years of age with chronic undernutrition.

*Prevalence of wasting among children under five years of age*. The percentage of the population between zero and four years of age with acute undernutrition.

*Prevalence of stunting among children under five years of age*. The percentage of the population between zero and four years of age with low size for their age and chronic undernutrition.

## Other supplementary indicators

In addition to the indicators in article 36 of the LGDS, there are other aspects of the standard of living that make it possible to get a deeper insight into several social issues such as discrimination, income inequality and environmental issues, among others. The supplementary indicators associated with these other dimensions of social development that CONEVAL will report are the following:

*The ratio between the total income of the tenth and the first decile.*[72] The ratio of total income of the population belonging to the tenth decile divided by the total income of the population in the first decile.

[71] The indicators of low size, low weight and wasting among children under five years of age are taken from the National Survey of Health and Nutrition (Shamah, Villalpando and Rivera, 2007).
[72] For the construction of this indicator, the total current per capita income was used. See Appendix A.

*Women in the Chamber of Deputies.* The proportion of women in the Cámara de Diputados (Chamber of Deputies).

*Women in the Chamber of Senators.* The proportion of women in the Cámara de Senadores (Chamber of Senators).

*Discrimination against women, homosexuals, indigenous people, people with disabilities, religious minorities and senior citizens.* The percentage of people who belong to one of these groups and declare that they have suffered any act of discrimination.

*National surface covered by forests and jungle.* The percentage of the territorial surface covered by forest and jungle.

## Appendix D. Construction of intensity measurements

This section explains the methodology adopted to construct the intensity measures of multidimensional poverty. These measures are sensitive to changes in the social conditions of the poor population. They are the *Intensity of multidimensional poverty*, the *Intensity of extreme multidimensional poverty* and the *Intensity of the population with at least one social deprivation.* They were derived as an adaptation of the methodology proposed by Alkire and Foster (2007). First, it will be determined the way to measure the *Intensity of multidimensional poverty*, and then, the way in which the other two measures are obtained will be outlined.

The *Intensity of multidimensional poverty* measurement is constructed in two stages: the first is the identification of the population living in multidimensional poverty, and the second is related to the aggregation of the deprivations shown by this population group. To accomplish this, the indicators of deprivation $C_{i,k}$ are considered. They take the value one when the person $i$ ($i= 1, 2,\ldots, N$) shows deprivation $k$ ($k=1,2,\ldots, d$), and the value zero otherwise. Based on these indicators, the matrix $P_{Nxd}$ is constructed; this matrix includes all the indicators of social deprivation for each member of the population. Afterwards, each line of matrix $P$ is added up in order to obtain the number of indicators in which the individual is considered socially deprived. Thus, a column vector is obtained, which shows the deprivation index for each individual ($IP$).

Then, it is established a multidimensional threshold, $u_p$, which makes it possible to distinguish a given number of indicators associated with social rights for the population living in multidimensional poverty. According to the definition of poverty of CONEVAL, a person is in multidimensional poverty when she is not guaranteed the exercise of at least one of her social rights and has an insufficient income to buy the goods and services required to satisfy her needs. Consequently, the multidimensional threshold ($u_p$) associated with the social rights takes the value of one.[73]

[73] A similar exercise should be applied to people in extreme multidimensional poverty. In this case, a person is living in extreme multidimensional poverty when she is not guaranteed at least three social rights and her income is below the minimum wellbeing threshold. Therefore, the extreme multidimensional threshold associated with social rights takes the value three.

The next step is to identify the submatrix *(M1)* in matrix *P*, which corresponds to the population living in multidimensional poverty.[74] It is important to note that, in order to analyze the measurement of the intensity of multidimensional poverty, the income of this population is not considered.[75]

Once the population living in multidimensional poverty is identified in matrix *P,* the next step is the aggregation of the data of the population in a measurement of intensity. To do so, the headcount ratio of the population living in multidimensional poverty (*H*) is calculated. *H* corresponds to the quotient of the population living in multidimensional poverty (*q*), with respect to the total population (*N*).

Once the headcount ratio of multidimensional poverty (*H*) has been obtained, based on matrix *M1,* the proportion of deprivations among the people living in multidimensional poverty (*A*) is calculated. *A* is obtained by dividing the $IP_i$ by the total number of indicators *(d)* associated with social deprivation (six in this methodology). Then, the average of the proportion of deprivations among the population living in multidimensional poverty is calculated. Thus, *A* takes the following form:

$$A = \frac{1}{q} * \left( \frac{1}{d} * \sum_{i=1}^{i=q} IP_i \right)$$

The measurement of the intensity of multidimensional poverty *(IMP)* is obtained as the product of the headcount ratio of multidimensional poverty (*H*) and the average proportion of social deprivations of the population living in multidimensional poverty (*A*). Then, *IMP* is defined by:

$$IMP = H * A = \left( \frac{q}{N} \right) * \left[ \frac{1}{q} * \left( \frac{1}{d} * \sum_{i=1}^{i=q} IP_i \right) \right]$$

The measure *IMP* is such that, if a poor person becomes deprived in an additional dimension, index *A* increases and, therefore, the same happens to the product of these two indexes.

The *Intensity of extreme multidimensional poverty* (*IEMP*) is defined as the product of the headcount ratio of extreme multidimensional poverty ($H_{q'}$) and the average proportion of social deprivations among the population living in extreme multidimensional poverty ($A_{q'}$). This measure foresees changes in the living conditions of the population living in extreme multidimensional poverty (*q'*). Therefore, *IEMP* takes the following form:

[74] That is to say, in *M1* we find the population whose income is lower than the wellbeing threshold and which $IP_i \geq u_p$. Therefore, the population not in *M1* is grouped in a submatrix *M2,* which includes the population with an income lower than the wellbeing threshold and which $IP_i < u_p$, or that has an income above the wellbeing threshold and which $IP_i \geq u_p$ or $IP_i < u_p$ .

[75] The same applies to measurement of the intensity of extreme multidimensional poverty.

$$IEMP = H_{q'} * A_{q'} = \left(\frac{q'}{N}\right) * \left[\frac{1}{q'} * \left(\frac{1}{d} * \sum_{i=1}^{i=q'} IP_i\right)\right]$$

The *Intensity of population with at least one social deprivation* is defined as the product of the headcount ratio of the population with at least one social deprivation and the average proportion of social deprivations among that population. Therefore, this measurement takes into account changes in the living conditions of the population reporting at least one deprivation.

It is worth noting that all of these measures of intensity can be disaggregated for different population subgroups, in addition to making it possible to determine the contribution of each deprivation to the overall multidimensional poverty. For more detailed information, as well as an explanation of the axiomatic properties of these measurements, see Alkire and Foster (2007).