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## **The Multidimensional Poverty Measurement in Mexico**

Prepared by the National Council for Evaluation of Social Development  
Policy (CONEVAL), Mexico<sup>1</sup>

### **Abstract**

In Mexico, in 2004 the General Law on Social Development (LGDS) was issued, whereby the National Council for Evaluation of Social Development Policy (CONEVAL) is created as an agency with technical autonomy, mainly formed by prominent Academic Researchers, which provides it with independence and methodological rigor. CONEVAL is responsible for establishing official methodological criteria for measuring poverty multidimensionally in Mexico.

The LGDS establishes that: a) the CONEVAL measurement of poverty must be multidimensional, so it considers not only monetary poverty, but it must take into account simultaneously a number of other dimensions related to the fulfillment of social rights (education, health, social security, quality and basic services of housing and access to food) and to the territorial context (social cohesion); b) it must use a reliable and rigorous data source, so it must use information generated by the National Institute of Statistics and Geography (INEGI); and, c) it should be carried out every two years nation-wide and by state, and every five years at the municipal level, in order to assess progress and identify important challenges for public policy.

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To comply with the mandates of the LGDS it was necessary to create a methodology that measured poverty in a multidimensional way, and to generate a new source of information: the Socioeconomic Conditions Module (MCS) of the Mexican Income and Expenditure Survey to include all necessary variables to measure poverty having the whole country and each state as an statistical domain. The methodology was the result of extensive research and consultation processes with national and international experts and institutions related to the topic which lasted four years, and culminated with its publication in 2009.<sup>2</sup> The MCS was designed in a close collaboration between INEGI and CONEVAL.

Thus, Mexico was the first country having an official multidimensional method for measuring poverty that, unlike previous approaches, transcends unidimensional measures derived from only considering income/consumption, and which is regularly and systematically reported since 2008.

The paper proposed for the seminar has two objectives: the first one is to describe the methodology for measuring multidimensional poverty in Mexico, and the second one is to present an evaluation of the statistical design of MCS. The methodology developed in Mexico is based on a human rights approach, and it will be shown how the principles of universality, indivisibility and interdependence associated with them led to solve key methodological issues associated with the definition of a general multidimensional threshold, and that, being human rights, each and every one of the indicators are equally important in terms of the weights assigned to them.

In addition, the Mexican methodology identifies poverty status on two analytic spaces: the space of economic well-being and the social rights space. The first one is measured through people income, recognizing that a fundamental element of well-being is given by their ability to consume and therefore recovers the traditional approach to poverty lines for measuring poverty; the second, and integrated in the method, analytic space is determined by deprivation on the other six indicators (education, health, social security, housing (2), and food), and accounts for the existence of essential elements to a minimum and effective exercise of social rights, and consequently for social development of the population.

Through the combination of both spaces, a person can be classified into one of four groups: i) multidimensional poor, ii) vulnerable due to social deprivations, iii) vulnerable due to income, and iv) not poor and not vulnerable. Additionally, within the poor, a subset in extreme poverty can be defined. This marks a substantial difference from other multidimensional measures and approaches.

Another feature of the Mexican methodology is that it possess the analytical properties of any robust method: disaggregation by dimensions, disaggregation by population groups and comparability across time, which are very important issues for tracking public policy.

From a statistical perspective, the MCS was designed under a complex multistage, weighted sample design to give results at national and state level. To date, there are three rounds of poverty measures (2008, 2010 and 2012), and on July 2015 the results for the 2014 round will be published, so it will be important in the paper to explore the actual design effect, the precision of the estimates and the non-response rates observed over time for the main indicators used in the multidimensional measurement

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<sup>2</sup> The document was first published in Mexico's Official Gazette (2009), and as the internal publication Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) (2010). *Metodología para la medición multidimensional de la pobreza en México*, México, CONEVAL. In January 2015, the second edition of this book has just been issued. The most distinctive features of the methodology were also published as an academic paper in Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL), "Medición multidimensional de la pobreza en México". *El Trimestre Económico*, Vol. LXXXI (1), Num. 321, enero-marzo 2014, pp. 5-42. Both documents are available on [www.coneval.gob.mx](http://www.coneval.gob.mx). English versions can be obtained by emailing the authors.

# **The Multidimensional Poverty Measurement in Mexico<sup>1</sup>**

**Gonzalo Hernández-Licona<sup>2</sup> – Ricardo Aparicio-Jiménez<sup>3</sup>**

## **Paper for Seminar on Poverty Measurement**

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### **1. Introduction**

#### **i. The General Law on Social Development**

The General Law on Social Development (LGDS, in Spanish) promulgated on 2004 in Mexico establishes the objectives and principles for implementing the National Social Development Policy. The LGDS creates the National Council for the Evaluation of Social Development Policy (CONEVAL) as a public organization with technical and administrative autonomy with two main responsibilities: 1) to regulate and coordinate the evaluation of social development policies and programs and 2) to establish guidelines and criteria for the definition, identification and measurement of poverty in the country. Being mostly integrated by academic researchers bestows CONEVAL independence and technical rigor.

#### **ii. Poverty Measurement criteria**

The LGDS decrees the set of criteria that CONEVAL must follow to measure poverty. First, the measurement of poverty should be carried out every two and five years at the state and municipality levels, respectively. In addition, the National Institute of Statistics and Geography (INEGI) should generate the information to be used for poverty measurement. Furthermore, Article 36 determines that CONEVAL must set the guidelines and criteria for the definition, identification and measurement of poverty, which shall consider at least the following eight indicators: 1) current per capita income; 2) educational gap; 3) access to health services; 4) access to social security; 5) quality and spaces of the dwelling; 6) access to basic services in the dwelling; 7) access to food, and, in the territorial context, 8) the degree of social cohesion.

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## 2. Methodology for Multidimensional Poverty Measurement in Mexico

### i. The multiple dimensions of poverty

Poverty in Mexico has been traditionally conceptualized and measured from an unidimensional perspective. Usually, a person is considered poor when her/his income is lower than the one needed to purchase a basket of essential goods. From this perspective, income is used as a proxy for measuring the economic welfare of the population.

Despite its utility and wide use, unidimensional poverty measures have been subject to some reviews and criticism (CDESC, 2001, DWP, 2003; ONU, 2004). It has been pointed out that one of their main limitations is that the concept of poverty encompasses a range of dimensions which cannot be grasped exclusively by the goods and services available through markets (CDESC, 2001; CTMP, 2002; Jahan, 2002; Kakwani and Silber, 2008; O'Neil, 2006). Poverty is also associated with the incapability to meet a number of essential needs, such as access to sanitation or public safety, or with the impossibility of fulfilling fundamental human rights (CDESC, 2001; Kurczyn and Gutiérrez, 2009; ONU, 2004). Although there are a variety of approaches to identify what makes an individual poor, there is a consensus on the multidimensional nature of poverty. It is widely acknowledged that factors involved in being able to decide in a free, informed and egalitarian way are unlikely to be properly reduced to a single dimension (Alkire and Foster, 2007; CDESC, 2001; Kakwani and Silber, 2008).

### ii. Domains of the poverty measurement

Consistent with the international academic debate, Article 36 of the LGDS establishes that the measurement of poverty in Mexico should consider social rights and economic welfare. According to this legal background, CONEVAL decided to define two domains of measurement. The first domain accounts for economic well-being and it has been associated with the approaches of unmet basic needs, assets, and capabilities (Attanasio and Székely, 2001.1999; Rio Group, 2006; Ravallion, 1998; Sen, 1992, 1980). The second domain assesses deprivations in human rights: economic, social, cultural and environmental. Thus, the second domain is related to the perspective that poverty is in itself a denial of human rights which are considered as fundamental, inalienable, irreplaceable and interdependent (UNDP, 2003b; Robinson, 2001; CDESC, 2001; ONU, 2004).

CONEVAL decided to use the standard method of income poverty to identify whether a person is deprived in the welfare dimension. Per capita income is compared to the value of two baskets, one which entails only food and other that, in addition to food, considers all goods and services commonly consumed. This value is called the *wellbeing threshold (LB)*. Thus, it is said that a person  $i$  is deprived in the wellbeing domain if the *per capita* income of the

household ( $b$ ) to which he/she belongs is lower than  $LB$ , and he/she is not deprived in this domain when the income is equal or higher than such threshold. In formal notation:

*i*) Person  $i$  is deprived ( $P_i = 1$ ) if the *per capita* income of the household to which he/she belongs ( $Y_i$ ), is such that  $Y_i < LB$ , namely when  $(Y_i - LB) < 0$ .

*ii*) The person is not deprived ( $P_i = 0$ ) if  $Y_i \geq LB$ , in such way that  $P_i = 0$ , or,  $(Y_i - LB) \geq 0$ .

Complying with the LGDS, six dimensions constitute the human rights domain: education lag, access to health services, access to social security, access to food, quality and spaces of dwelling and access to basic services in the dwelling. Thresholds in the domain of human rights are analogous to poverty lines in the welfare dimension. They are defined, sequentially, by the following criteria: (i) applying a legal norm; (ii) if no legal rule exists, using the expertise from people in the public institutions involved on issues associated with each indicator; (iii) if the above criteria were inconclusive, implementing statistical methods, and iv) at last, CONEVAL academic board would set the threshold based on well-documented grounds. Adhering to the human rights approach outlined in the LGDS involved three methodological decisions: (i) deprivations should be measured by dichotomous variables. Exercise of a human right is reached or not, there is no partial attainment, so it is not recommended to measure the deprivation on an ordinal scale, (ii) every human rights are equally important, each of them counts equal or, in other words, in a linear combination they all should have the same weight, and (iii) a person who is deprived in any of her/his human rights becomes deprived on the human rights domain. These features allow building an additive index or a linear combination of the variables measuring each human right.

A person  $i$  is said to be deprived in the social rights domain if he/she presents any deprivation  $j$ ,  $j = 1, \dots, 6$ . The identification of the social deprivations takes into consideration that rights are indivisible and indissoluble, so it is enough to classify a person  $i$  as deprived if she/he has at least one deprivation ( $C_{ij}$ ).<sup>4</sup> The first of these properties allow assigning to deprivation  $j$  of person  $i$  the value 1 ( $C_{ij} = 1$ ) and on the opposite, the value 0, ( $C_{ij} = 0$ ). Since there is no hierarchy among rights, there is no possibility of assigning them different weights and, thus, they can be aggregated by simple addition. The addition of the deprivations ( $C_{ij}$ ) of person  $i$  (number of deprivations) allows building his/her Social Deprivation Index, which is expressed as follows:

$$IP_i = \sum_{j=1}^6 C_{ij}$$

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<sup>4</sup> In this paper,  $C_1$  stands for educational gap,  $C_2$  for deprivation in access to health services,  $C_3$  for deprivation in access to social security,  $C_4$  for deprivation in quality and spaces of the dwelling,  $C_5$  for deprivation in access to basic services in the dwelling, and  $C_6$  for deprivation in access to food.

### iii. Identifying the poor

According to CONEVAL, a person can be deprived in two domains: the economic and the social domain. A person is multidimensionally poor if and only if that person is both economically and socially deprived. Once her/his income and social deprivation index is known, anyone can be assigned to one of the following categories described below and shown on Graph 1.

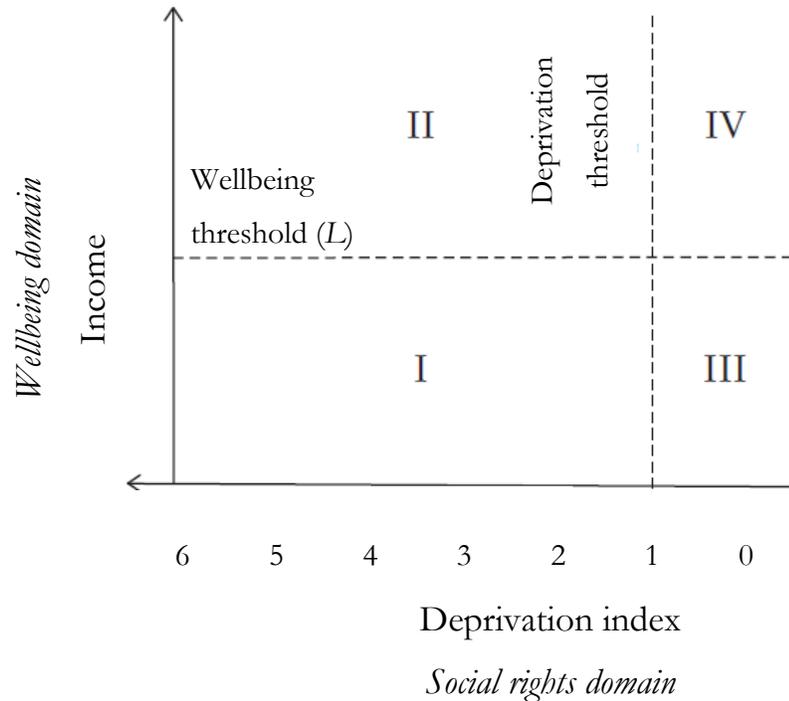
- I. *Multidimensionally poor*. A person  $i$  whose income is lower than the one needed to purchase a basket of basic goods and services (with an estimated value  $LB$ ) and she/he is socially deprived, that is: if  $Y_i < LB$  e  $IP_i \geq 1$ . This population is subdivided in two groups:
  - a) *Population in extreme multidimensional poverty ( $Q^{1e}$ )*: people who even using their whole income to purchase food, they could not afford the nutrients which are necessary for a healthy life, that is:  $Y_i < LBM$ .<sup>5</sup> Additionally, they suffer from at least three social deprivations:  $IP_i \geq 3$ .
  - b) *Population in moderate multidimensional poverty ( $Q^{1m}$ )*: people who are multidimensional poor but are not part of the extreme poor population, that is:  $Q^{1m} = Q^1 - Q^{1e}$ .
- II. *Vulnerable in the social domain ( $Q^2$ )*: a person who is socially deprived but she/he has an income which is enough to purchase goods and services required to meet their basic needs, that is: if  $Y_i \geq LB$  and  $IP_i \geq 1$ .
- III. *Vulnerable in the economic domain ( $Q^3$ )*: a person whose income cannot afford her/him a basket of basic goods and services but she/he has not social deprivation, that is: if  $Y_i < LB$  and  $IP_i = 0$ .
- IV. *Not multidimensionally poor and not vulnerable ( $Q^4$ )*: a person who is not deprived in the economic nor the social domain; that is,  $Y_i \geq LB$  and  $IP_i = 0$

Graphically, multidimensional poor people are represented in quadrant I of graph 1. In this quadrant, people that present one or more social deprivations and whose incomes are below the wellbeing threshold can be found. People located in quadrant II are qualified as vulnerable due to social deprivation: they are not deprived in the wellbeing dimension but they are in the social rights domain. In quadrant III can be found those vulnerable due to income: people whose economic resources are lower than the wellbeing threshold and who do not have deprivations. Quadrant IV includes neither people who do not have social nor income deprivations.

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<sup>5</sup> LBM is called the *minimum wellbeing line*, which stands for the amount per capita needed to buy the food basket.

**Graph 1. Identification of multidimensional poverty**



**iv. Indicators of multidimensional poverty and its properties**

After identifying the poor individually, the next step is to generate aggregated indicators of poverty. Such indicators must satisfy the following properties: a) poverty measures must allow comparability at the national, state and municipal levels, and across time; b) it should be feasible to assess the contribution of each state and municipality to national poverty, and c) it must provide information about the contribution of each of the dimensions to the global multidimensional poverty.

CONEVAL defined three indicators of multidimensional poverty: incidence, depth and intensity of multidimensional poverty.

- I. *Incidence of multidimensional poverty.* It is used to account for the occurrence of deprivations in each of the indicators within the social and economic domains. There are thirteen incidence indicators reported by CONEVAL:<sup>6</sup>
  1. Population with income lower than the minimum wellbeing threshold
  2. Population with income lower than the wellbeing threshold

<sup>6</sup> See Table A in Appendix for 2010 and 2012 figures.

3. 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 with at least one social deprivation
10. Population with at least three social deprivations
11. Population living in poverty
12. Population living in extreme poverty
13. Population living in moderate poverty

The incidence of multidimensional poverty meets two of the three properties mentioned above. Poverty and deprivation rates are comparable across time and between states and municipalities. Moreover, it allows disaggregating national measures in order to evaluate the participation of states and municipalities (or other population groups) in determining overall poverty measures.

At the same time, the incidence of multidimensional poverty has two important limitations. First, it is not possible to discriminate the contribution of each of the social and economic dimensions to overall poverty measurement. Second, this indicator is not sensitive to the severity of poverty: given a group of population deprived in the economic domain, the incidence of multidimensional poverty does not distinguish whether they are deprived in just one, in several or in all of the social dimensions considered.

- II. *Depth of multidimensional poverty.* Each domain of multidimensional poverty has its associated depth indicator.

In the social domain, the depth of multidimensional poverty is estimated by the average proportion of social rights, in a given population group, which are not satisfied. This indicator is reported for the following four groups: people in multidimensional poverty, people in extreme multidimensional poverty, people vulnerable in the economic domain and people with at least one social deprivation.

Depth indicators have the property of allowing comparability between different regions, across time and they can be decomposed for several subpopulations. Furthermore, they are indeed sensitive to modifications on life conditions of the poor.

- III. *Intensity of multidimensional poverty.* Alkire and Foster (2007) proposed an aggregate measure of poverty in order to overcome the limitations of incidence indicators. The intensity of multidimensional poverty is estimated by multiplying the incidence and depth of multidimensional poverty.

CONEVAL estimates three intensity measures:

a) Intensity of multidimensional poverty. It is defined as the product of the incidence of multidimensional poverty and the average proportion of social rights that are not satisfied for multidimensionally poor people.

b) Intensity of extreme multidimensional poverty. It is defined as the product of the incidence of extreme multidimensional poverty and the proportion of social rights that are not satisfied for extreme multidimensionally poor people.

c) Intensity of poverty of people deprived in at least one social right. It is defined as the product of incidence people deprived in at least one of their social rights and the average proportion of social rights which are not satisfied for this population.

Besides satisfying the properties of both incidence and depth measures, intensity indicators provide information of the contribution of each social dimension to the poverty in that domain. Intensity of multidimensional poverty indicators are particular cases of the Alkire and Foster (2007) method.

### **3. Source of information and statistical design**

Besides defining the theoretical and methodological framework of multidimensional poverty measurement, a process that lasted from 2006 to 2009, CONEVAL developed another research project oriented to the generation of the information necessary to actually carry out the measurement. After two years of planning and testing processes in close institutional partnership with INEGI, the Socioeconomic Conditions Module of the National Household Income and Expenditure Survey (MCS-ENIGH in Spanish) was launched. The MCS-ENIGH allowed, for the first time in the country, to generate in 2009 estimates of multidimensional poverty at national and state level for the year 2008. The Module is a household survey and consists of four instruments: a household questionnaire; a questionnaire for children under 12

years of age; another for persons 12 years of age or older, and a business questionnaire for cases where there is a business in the household.<sup>7</sup>

The MCS-ENIGH is a complementary survey of the ENIGH, developed by the INEGI since 1990, with a probabilistic sample design. To withdraw the additional sample needed for the MCS-ENIGH, INEGI used the National Housing Framework built from cartographic and demographic information obtained from the Census of Population and Housing of the years 2000 and 2010. This framework is actually a master sample for all housing surveys conducted by INEGI. The design of this framework is probabilistic, stratified, two-staged and clustered.

The MCS-ENIGH is designed to provide accurate results at national and state levels. The total sample consists of approximately 64,000 dwellings –nearly 2,000 for each of the 32 states. To calculate the sample size the reference variable is the average quarterly current household income. MCS-ENIGH is funded by CONEVAL, and the ENIGH samples by INEGI.

To date, three rounds of poverty measures have been published (2008, 2010 and 2012), and on July 2015 data for the 2014 round will be released. In table 1 some basic MCS-ENIGH characteristics are presented for the three rounds of poverty measures (2008, 2010 and 2012), and an advance for 2014 is also shown. As it can be seen, non-response rates have remained below those stipulated in the sample design (15%). A short-term challenge for the upcoming 2016 round is a revision of the sample size, in order to take into account the experience already gathered between 2008 and 2014.

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<sup>7</sup> From 2008 onwards, data collection instruments have remained essentially the same.

**Table 1**

**Characteristics of the Socioeconomic Conditions Module of the National Household Income and Expenditure Survey (MCS-ENIGH) by year**

Characteristic	Year			
	2008	2010	2012	2014
Study population	Households of inhabited dwellings in Mexico			
Study Domains	National level, urban and rural areas and by state level (32 states)			Same as 2008-2012 and also for five selected municipalities
Sample design	Probabilistic, stratified, two-staged and clustered			
Sampled Units	Dwelling			
Observational units	Household			
Applied instruments	1) household questionnaire, 2) questionnaire for children under 12 years of age, 3) questionnaire for persons 12 years of age or older, and 4) business questionnaire			
<b>National Dwelling Framework (NDF) used</b>				
Year of update	2002	2002	2002	2012
Fieldwork period	August 21 - November 28, 2008	August 21 - November 28, 2010	August 21 - November 24, 2012	August 11 - November 18, 2014
Sample size (dwellings)	70,106	68,505	64,246	64,000
ENIGH sample	35,146	30,169	10,062	nd*
MCS-ENIGH sample	34,960	38,336	54,184	nd*
Sample size (households)	71,282	69,777	65,367	nd*
Non-response rate	15.6%	11.4%	12.4%	15%***
Design effect	3.3	3.3	3.34	3.34
Confidence level	90%	90%	90%	90%
Upper bound relative errors	4.0%	3.5%	10.7%	10.7%

\* This information will be available in July 2015. \*\* Fixed in the sample design.

SOURCE: Sample designs and Fieldwork reports for the MCS-ENIGH 2008-2014.

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## APPENDIX

Table A. *Percentage, number of people and average deprivations per poverty indicator, Mexico, 2010-2012*

<i>Indicators</i>	<i>Percentage</i>		<i>Million people</i>		<i>Average deprivations</i>	
	2010	2012	2010	2012	2010	2012
<i>Poverty</i>						
Population living in poverty	46.1	45.5	52.8	53.3	2.6	2.4
Population living in moderate poverty	34.8	35.7	39.8	41.8	2.2	2.0
Population living in extreme poverty	11.3	9.8*	13.0	11.5	3.8	3.7
Population vulnerable due to social deprivations	28.1	28.6	32.1	33.5	1.9	1.8
Population vulnerable due to income	5.9	6.2	6.7	7.2	0.0	0.0
Population not poor and not vulnerable	19.9	19.8	22.8	23.2	0.0	0.0
<i>Social deprivation</i>						
Population with at least one social deprivation	74.2	74.1	85.0	86.9	2.3	2.2
Population with at least three social deprivations	28.2	23.9*	32.4	28.1	3.6	3.5
<i>Indicators of social deprivation</i>						
Educational gap	20.7	19.2*	23.7	22.6	3.1	2.9
Deprivation in access to health services	29.2	21.5*	33.5	25.3	3.0	2.8
Deprivation in access to social security	60.7	61.2	69.6	71.8	2.5	2.3
Deprivation due to quality and spaces of the dwelling	15.2	13.6*	17.4	15.9	3.6	3.4
Deprivation in access to basic services in the dwelling	22.9	21.2*	26.3	24.9	3.3	3.2
Deprivation in access to food	24.8	23.3*	28.4	27.4	3.0	2.9
<i>Wellbeing</i>						
Population with income below the minimum wellbeing threshold	19.4	20.0	22.2	23.5	2.9	2.5
Population with income below the wellbeing threshold	52.0	51.6	59.6	60.6	2.3	2.1

SOURCE: CONEVAL estimates based on the MCS-ENIGH, 2010 and 2012.

\*  $P < 0.05$  (one-tail difference hypothesis testing 2010-2012).