National Department of Planning

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SISBEN III: Background and Methodology

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- Sisbén III Vs Sisbén II

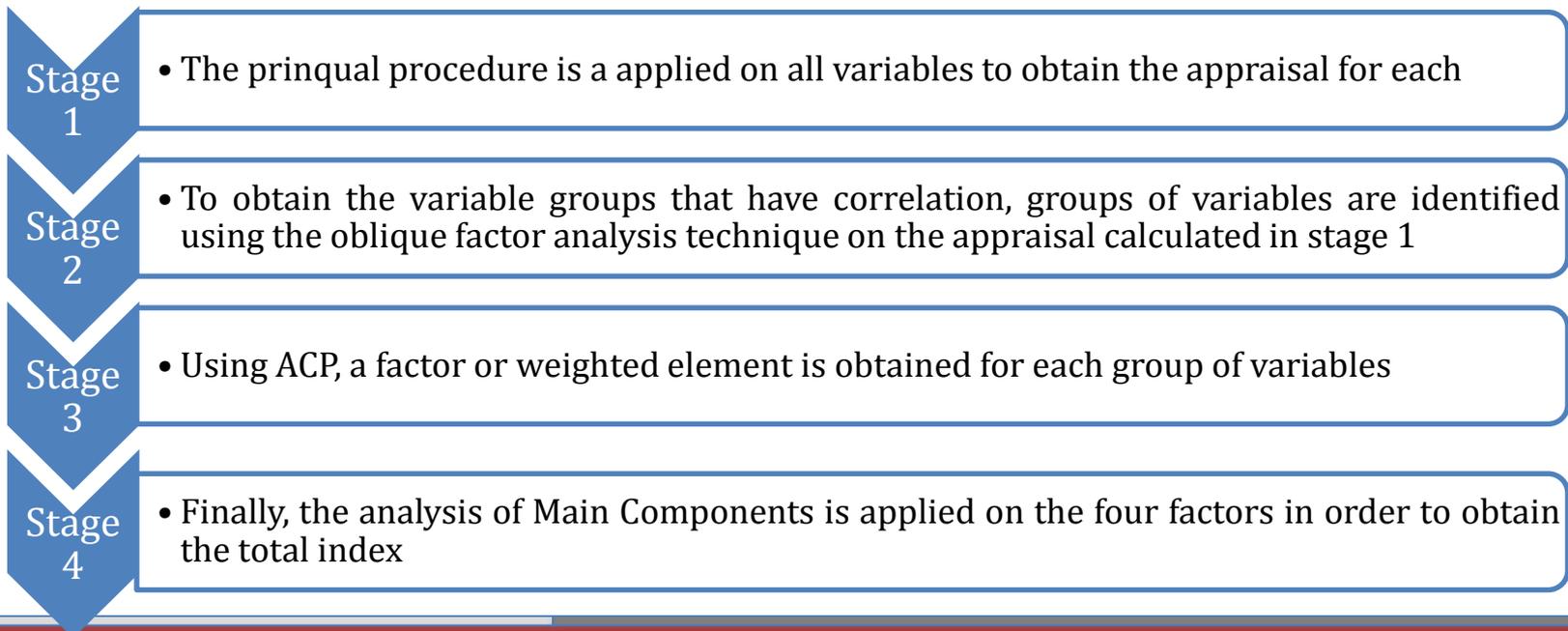- Methodology for defining cutting points or limits of social programs

SISBÉN I

✓SISBÉN I was implemented in 1995 and was constructed, interpreted and evaluated as a approximated index of economic resources (proxy mean test).

✓ The estimation methodology of the index, in its first version, was the Analysis of Main Components along with a prinqual (quantification of qualitative variables), that resulted in scores between 0 and 100, with the poorest being located at the lower levels.

✓The estimation process of the index was carried out in 4 stages:

Stage 1	• The prinqual procedure is a applied on all variables to obtain the appraisal for each
Stage 2	• To obtain the variable groups that have correlation, groups of variables are identified using the oblique factor analysis technique on the appraisal calculated in stage 1
Stage 3	• Using ACP, a factor or weighted element is obtained for each group of variables
Stage 4	• Finally, the analysis of Main Components is applied on the four factors in order to obtain the total index

Variable	Urban zone	Rural zone
Housing factor		
Type of floor	✓	✓
Material of walls	✓	✓
Family equipment (Number of assets)	✓	✓
Material of roofs	✓	✓
Utilities factor		
Elimination of excrement	✓	✓
Water supply source	✓	✓
Time to access water		✓
Garbage recollection	✓	✓
Human capital and social safety		
Education/schooling in those over 11 years of age	✓	✓
Education/schooling level of highest income earner	✓	✓
Social security ofhighest income earner	✓	✓
Demographic factor and income		
Overcrowding	✓	✓
Proportion of children under 6 years of age	✓	✓
Proportion of people in the homethat work	✓	✓
Income per capita expressed in minimum wage salaries	✓	✓

SISBÉN II

✓The SISBÉN II, that was conceived as a living standard index, was implemented in 2005 as the result of the necessity to update considering the manipulation of variables and the low capacity to discriminate that was present.

✓ Although the index estimates by means of the ACP – PRINQUAL, the estimation process varies because in the Sisbén I estimated elements were weighted by dimension, while Sisbén II estimated directly from the contribution from the indicators.
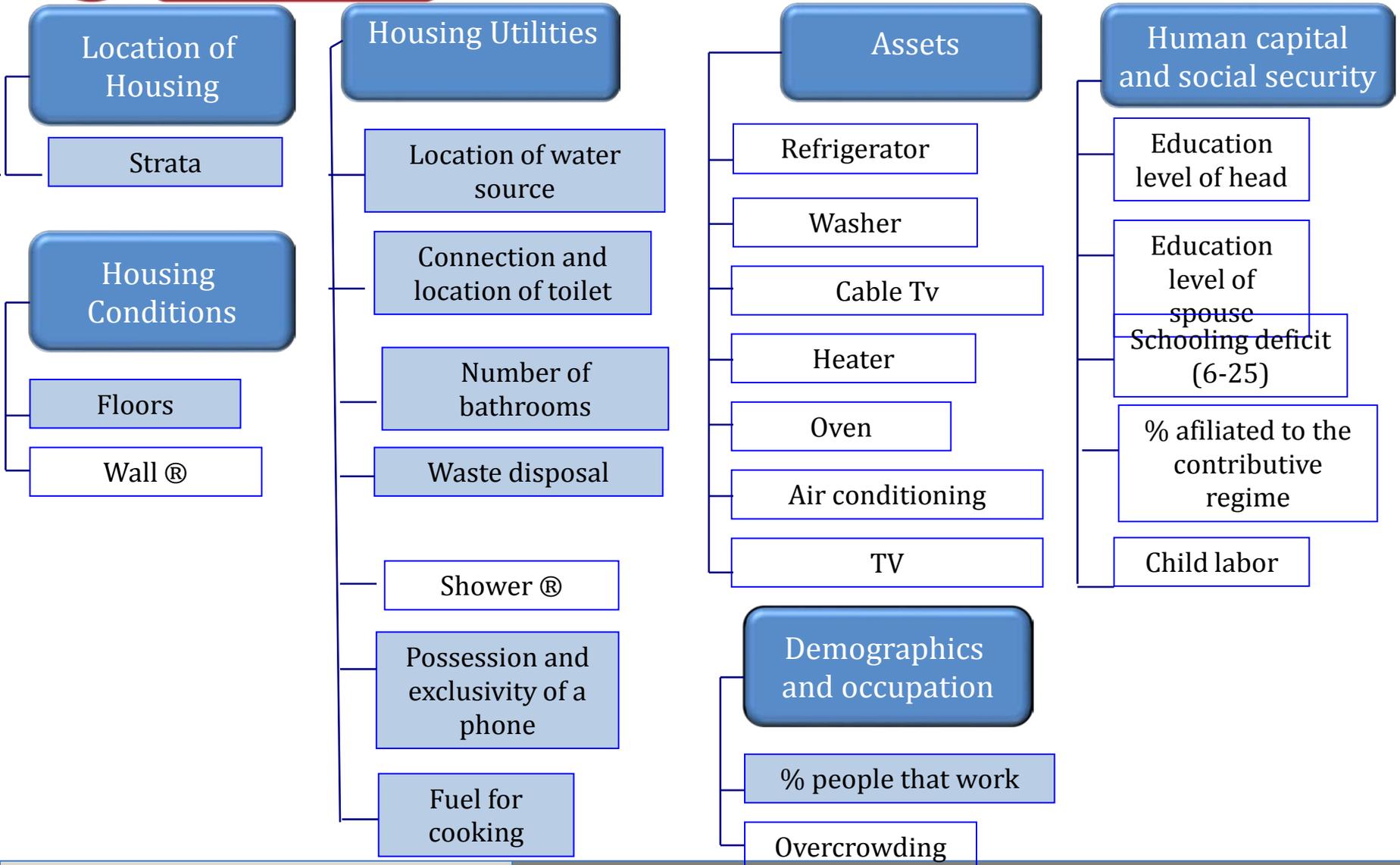
Stage 1
- The prinqual procedure is applied to all variables to obtain the appraisal for each

Stage 2
- Using the Main Component Analysis, the index is estimated, also oscillating between 0 and 100

SISBÉN II: Variables

Location of Housing
- Strata

Housing Conditions
- Floors
- Wall ®

Housing Utilities
- Location of water source
- Connection and location of toilet
- Number of bathrooms
- Waste disposal
- Shower ®
- Possession and exclusivity of a phone
- Fuel for cooking

Assets
- Refrigerator
- Washer
- Cable Tv
- Heater
- Oven
- Air conditioning
- TV

Human capital and social security
- Education level of head
- Education level of spouse
- Schooling deficit (6-25)
- % afiliated to the contributive regime
- Child labor

Demographics and occupation
- % people that work
- Overcrowding

➢ Sisbén III: Justification for the new design

¿Why go from Sisbén II to III?

1 Out of date design of Sisbén II

2 Manipulation/Handling of information

3 Growth in the Sisbén II base

4 Errors in inclusion and exclusion: "Not everybody included should be there and not all that should be there are included"

To take into consideration…

➢ 35 million records in Sisbén II base
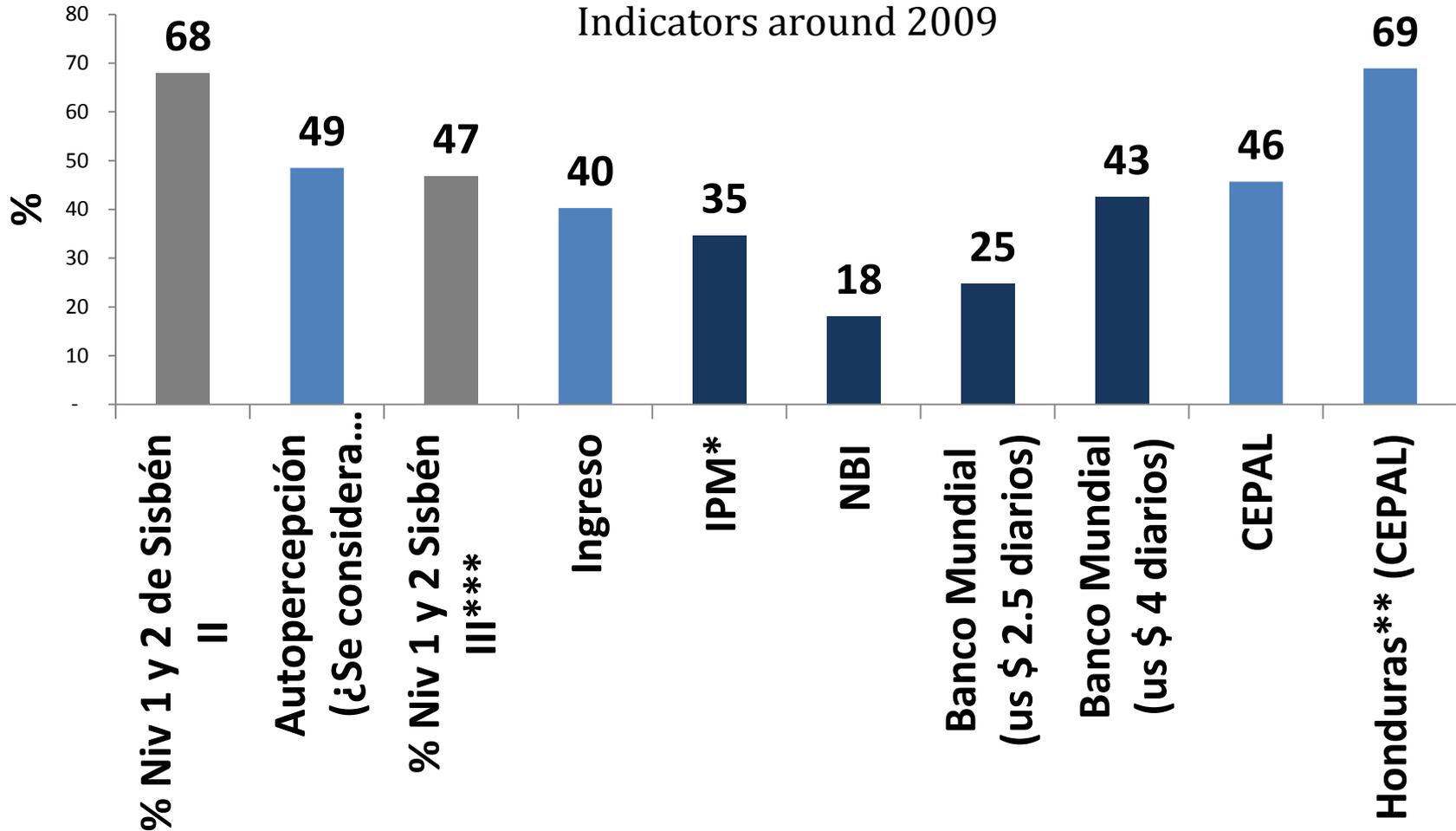
➢ 30.7 million in level 1 and 2 (68% of "poor people"??)

➢ No other poverty or quality of life indicator reveals this magnitude

¿ Why go from Sisbén II to III?

Incidence of poverty in different Indicators around 2009

Chart data (%):
- % Niv 1 y 2 de Sisbén II: 68
- Autopercepción (¿Se considera...): 49
- % Niv 1 y 2 Sisbén III***: 47
- Ingreso: 40
- IPM*: 35
- NBI: 18
- Banco Mundial (us $ 2.5 diarios): 25
- Banco Mundial (us $ 4 diarios): 43
- CEPAL: 46
- Honduras** (CEPAL): 69

*   2008 Data
** 2007 Data
*** 2011 Data

At a municipality level the over-dimensioning of level 1 and 2 of the Sisbén II can also be observed

	Incidence per IPM (2005 Census)	% of total population in levels 1 and 2 of Sisbén II (2009)
Funza	24.6%	65.0%
Madrid	21.9%	73.2%
Girardot	33.4%	72.8%
Facatativá	24.0%	73.9%
Chía	16.0%	49.6%
Cota	29.9%	69.4%
Bogotá	24.3%	42.4%
Bucaramanga	28.5%	43.9%
Medellín	32.4%	50.5%
Armenia	34.3%	60.3%

4 years between measurements

➢ Conceptual Framework of the Sisbén III

Conceptual Framework of Sisbén III

Answers a **multidimensional concept of poverty** (Sisbén II)

Includes elements of the **vulnerability** conditions of the population

Sisbén III = Living Standard Index

- **Measures** in a direct way the type of life people have (or may have)

- **It is NOT** a proxy means test

- **It is NOT** an indirect measurement of the amount of assets or of the level of income

Other countries use a *proxy means test* as focalyzing instrument*:*

- **Peru** (Home Focalization System - SISFOH), **Chile** (Social Protection Chart, Ecuador (Social Record Index), **Costa Rica** (Target Population System - SIPO), among others.

- Emphasis in **housing, public utilities, education and possession of assets**

¿Why a Colombian living standard? (1)

Theoretical Considerations:

•Income (or a proxy of income) is a parameter which is not enough to make comparisons between people (Sen).

•The conversion of assets and resources into well-being depends of the personal characteristics and the context.

¿ Why a Colombian living standard?

Practical Considerations:

•Colombia, unlike other countries, uses the Sisbén to identify potential beneficiaries of additional programs besides Monetary Transfers.

• Interest is not only centered on identifying those that require an additional complement to their income

• It is required for other topics: childhood, adolescence, elderly population, housing, education/training programs, etc.

➢ Dimensions and variables of Sisbén III

Fundamental Dimensions Identified

Method / Dimension	Literature on this Topic	Political Constitution	Dvelopment Objectives for the Millenium	Empirical Studies (Voices of Poor Colombians)	Participative Process (Municipal Sisbén adminis-trators survey)
Life	✔	✔			
Health	✔	✔	✔		✔
Nutrition	✔	✔	✔		✔
Education	✔	✔	✔	✔	✔
Housing	✔	✔			✔
Employment	✔	✔		✔	✔
Segurity	✔	✔		✔	✔
Social interaction (Emotions, autonomy, dignity, freedom of speech	✔	✔			

Variables Sisbén III

Health
- Disability
- Adolescent fertility

Education
- School attendance
- School Lag
- Functional analphabetism
- % Adults with incomplete high-school or less
- Child labor

Housing
- Water source
- Hook-up and exclusiveness of sanitary
- Waste disposal
- Floors
- Walls
- Overcrowding
- Fuel for cooking
- Type of housing unit

Vulnerability
- No. of people
- Type of hierarchy
- Demographic dependance rate
- Assets
- Infant mortality rate (municipal)
- Homicide R. (mun.)
- Net Education Coverage Rate (mun.)
- Use of health services when needed (mun.)

An important change in terms of variables going from Sisbén II to Sisbén III was the **exclusion of socio-economic strata.** Reasons:

• Over-valued the conditions of housing and infrastructure. 90% of result in Sisbén II (urban zone) depended on stratum.

• Made irrelevant the use of an individual focalization instrument (Sisbén) when a great part depended on a geographical focalization instrument (stratum).

• Manipulation at a individual level.

• Manipulation at a municipal level (change of the stratification of all the municipality).

• They go out of date really fast. Besides, the new information is only requested when there it deteriorates.

• Recommendations of the first Sisbén evaluation (NDP 2003, Pages 92-93):

"The variable of reported income is highly vulnerable to distortion in any type of survey; it is said that "the rich don't say and the poor do not know" what their income is; therefore asking about the income will give values very much below the real data. A solution to this problem is measuring the income through the expenses, including self-expense and adding the subsidies. However, this is not possible in a survey such as the one from Sisbén, because the costs of the survey would increase, and there would be the need to have specialized surveyors to fill out the complex questions on expenses. Additionally, it would also be exposed to distortion since it is tied to the delivery of a subsidy".

➢ **Geographic Breakdown of the Index**

Geographic breakdown of the index

Sisbén II

1. Urban

2. Rural

Sisbén III

1. 14 cities

2. Other Urban

3. Rural

- It differentiates the living conditions of the urban area with greater precision, by defining a specific index for the big cities

- Bogotá and Quibdó used to be measured with the same "meter" (both in urban area with Sisbén II)

- This way, the big cities and the small cities are both favored. The indexes are more precise and they are adjusted to the needs of each geographical area.

> Information sources for designing the index

Sisbén II

Change in the **source** for the estimation of the index to capture the new living conditions of the population

ECV 1997

Sisbén III

2005 Population and Housing Census

✓ Most complete source in terms of the information requires for the desing of the index

✓ It has a **greater representativeness compared to other sources**

✓ The information required for the variables related to conextual vulnerability can be obtained at city level

✓ It allows carrying out the breakdown according to the three defined areas

✓It is consistent with the results of other updated sources (GEIH 07 and ECV 03).

➤ Statistical method

➢ The statistical method applied is called Fuzzy Sets

➢ 12 methods were revised

➢ These were pre-selected 2: Main Components (PRINQUAL) and Fuzzy Sets

➢ The choice was made considering the verification of a set of properties: Monotonous level, not over-valuing a single dimension or variable, efficiency to identify deprivation.

Application of classical set theory
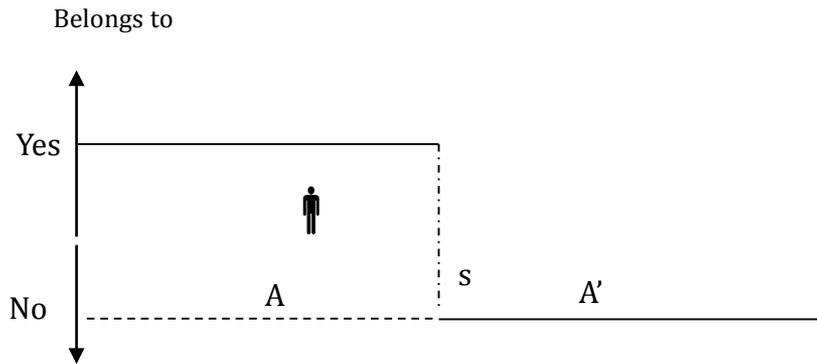
Application of fuzzy set theory

Dicotómico
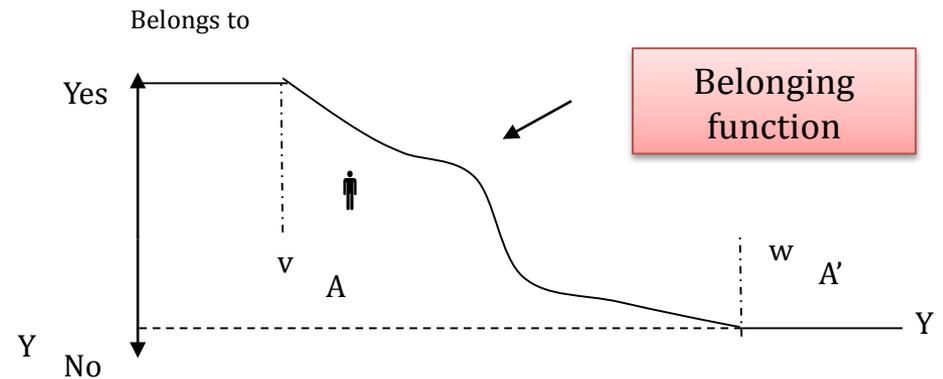
Gradual

- The degree of belonging is defined based on the **acummulated distribution function (**percentage of the population that has a determined category)

- The values zero (0) and (1) represent the best and the worst category in each variable, repectively, **the others are valued considering the belonging function**

$f(x)$

0 = best category = **does not belong to the poor**

Between 0 and 1 = belonging function

1= worst category = **belongs to the poor**

$$\mu(x) = \begin{cases} 0 & si\ x = x^1;\ k = 1 \\ \\ \mu(x^{k-1}) + \dfrac{H(x^k) - H(x^{k-1})}{1 - H(x^1)} & si\ x = x^k;\ K \\ \\ 1 & si\ x = x^k;\ k = K \end{cases}$$

$\mu(x)$ **Belonging function**

k represents each one of the categories associated to risk of deprivation *k =1,..,K*   **(the greater the *k value, the greater the* degree of deprivation).**

H(x) is the **accumulated distribution** of *x.*

For example: 4 categories for floors

From **lowest** to **greatest** **risk of deprivation** these are:

1. Marble ("mármol")
2. Tile ("badosa")
3. Cement ("cemento")
4. Dirt ("tierra")

In this case the functions of belonging shall be:

$$\mu(Mármol) = 0$$

$$\mu(Baldosa) = \mu(Mármol) + \frac{H(Baldosa) - H(Mármol)}{1 - H(mármol)}$$

$$\mu(Cemento) = \mu(Baldosa) + \frac{H(Cemento) - H(Baldosa)}{1 - H(mármol)}$$

$$\mu(tierra) = 1$$

$\mu(x)$ **Function of belonging**

H(x) is the **accumulated distribution of** x.

For example:

•If a high percentage of the population has poor housing conditions, the associated category (e.g. dirt floor) shall receive a lower weight. Poor housing conditions, being of generalized nature in this example, do not discriminate between poor and not poor.
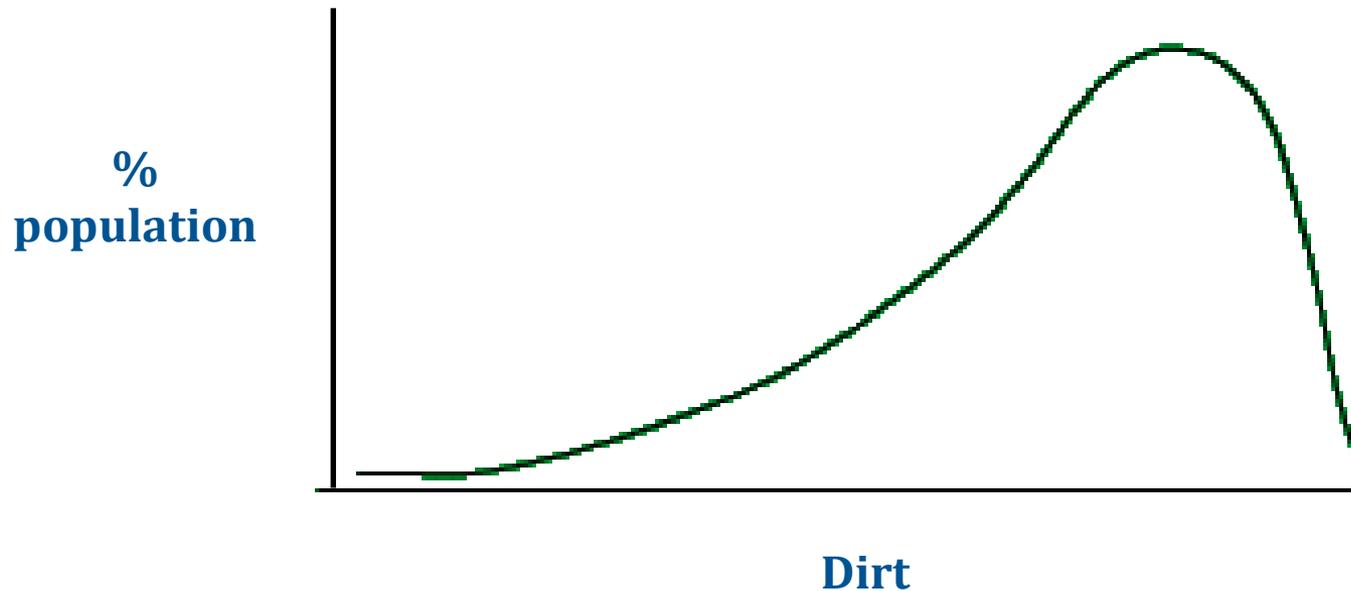
**%
population**
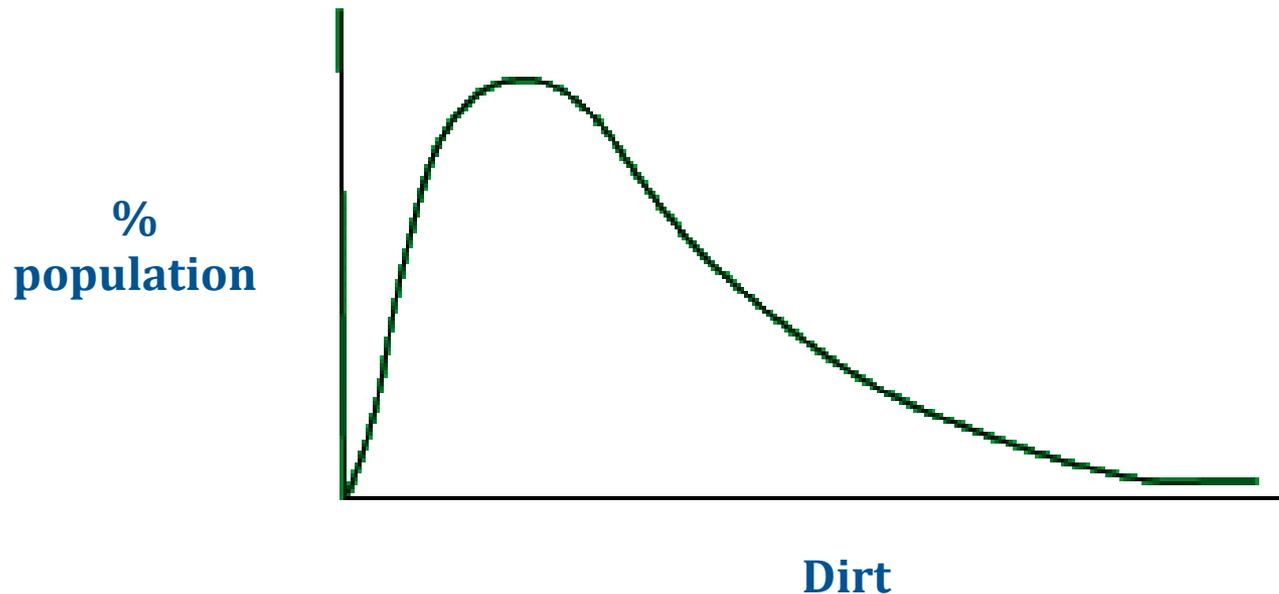
Dirt

For example:

• On the contrary, if the housing conditions are good (there is a high percentage with marble floor), the category that defined deprivation (dirt) shall have a higher associated weight or ponderation.
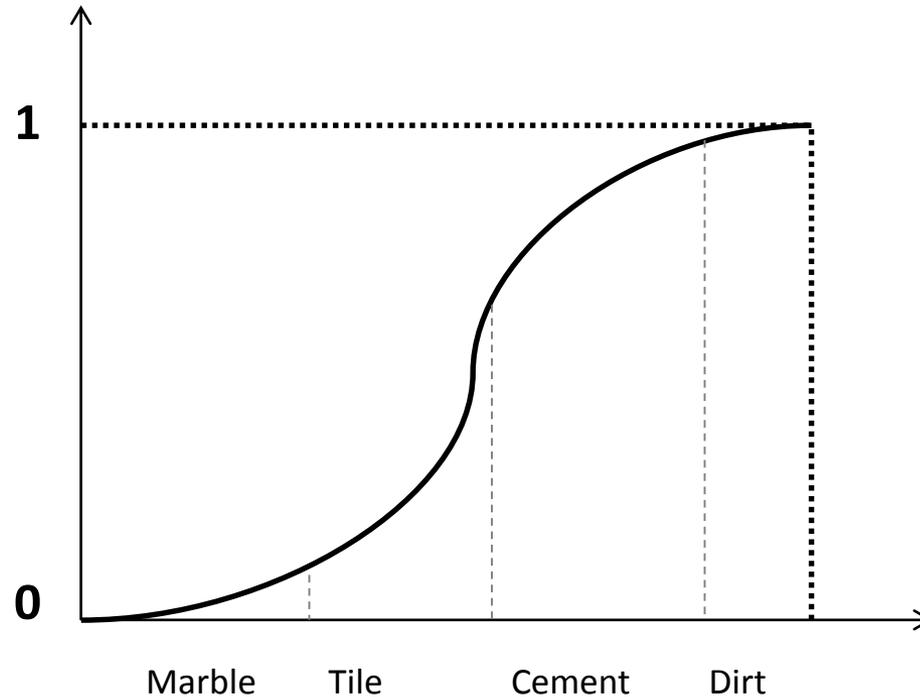

**%
population**

Dirt

Sisbén II	Sisbén III
Design: regional information(ECV)	Design: Municipal Info. (Census)
Housing (stratum) Education Demographics	Housing Education Health (includes disability ad fertility) Demographics Vulnerability
2 index: urban – rural	3 indexes:14 cities, other municipalities and rural
Same cutting criteria points for all programs	Differentiated cutting points

➢ Sisbén III Vs Sisbén II

Indicator	Domain	EI	EE
IPM	14 cities	=	✓
	Other urban	✓	=
	Rural	✓	X
	Total	✓	=
INCOME	14 cities	X	=
	Other urban	✓	X
	Rural	=	X
	Total	=	X
EXPENDITURE	14 cities	X	X
	Other urban	✓	X
	Rural	=	X
	Total	=	X

✓ S3 better than S2

X S2 better than S3

= S3 = S2

➢ Methodology for the definition of cutting points of social programs

Before, the programs that did not have pretensions of universality (PPSAM, housing, *Familias en Acción*, etc.) targeted their beneficiaries by taking levels 1 and 2 of the Sisbén II.

Targeting the beneficiaries of said programs on a universe of 31 million people (levels 1 and 2 of the Sisbén II) contributed to making sure that the beneficiaries belonged to the mid and high levels of that universe (which did not favor progressive targeting).

Sisbén II

Generalized levels for all social programs:

Levels 1, 2, 3, 4 etc.

Sisbén III

Ranges of scores per social program according to :

- Program obectives
- Characteristics of the population

•Minimize errors of inclusion and exclusion
•Results of first Sisbén evaluation
•Social Conpes program No. 100/2006

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Cutting Point Sisbén III

Score to reach it…

Include the greatest amout of the population that requires the program
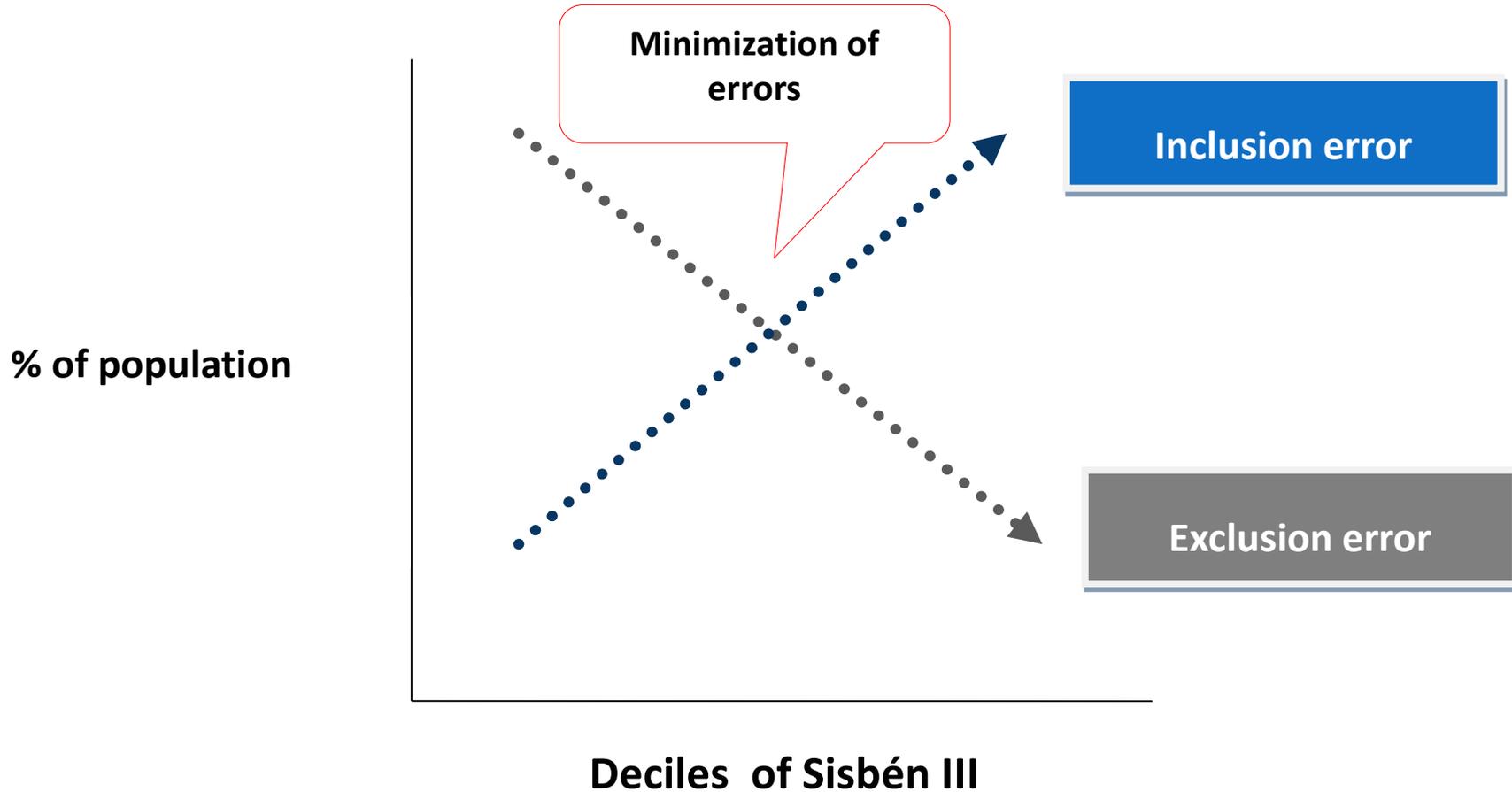
Prevent the enrty of people that do not need the program

Score that best responds to the concept of poverty, deprivation, or vulnerability, of each program

The characteristics that could serve to identify its potential beneficiaries, were obtained from:

CRITERIA	PROGRAMS
Program selection criteria	Familias in action, school food, cooperative fund, rural youngsters, rural housing subsidy, rural opportunities, integral land subsidy
Prescriptions associated to the characteristics of the population	PPSAM, Juan Luis Londoño, First Youth
Payment capacity	Subsidized Regime, exemption from militart I.D. and Citizenship Identification Card

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