Measurement of the Millennium Development Goals

The Issue of Inequality: Multidimensional Poverty Indices on Trial

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Introduction

➤ The Millennium Development Goals: A different way of measurement?

➤ The Strengths and weaknesses of the Multidimensional Poverty Index (MPI)

➤ The Correlation Sensitive Poverty Index: A possible way to overcome the weaknesses of the MPI
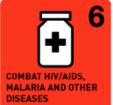
➤ Empirical evidence

➤ Conclusion

The MDGs: "Dashboard" vs. "Mashup"

➤ The Millennium Development Goals (MDGs) comprise eight overarching goals that are captured by more than 60 indicators

➤ So far, the MDGs have been analysed separately, i.e. goal by goal, indicator by indicator ("dashboard" (Ravallion 2010))

➤ One could, however, think of a different, a simultaneous approach, i.e. to merge different goals into one single composite index ("mashup" (Ravallion 2010))

➤ While the latter approach admittedly has disadvantages, it has two main strengths:

- It can fuel political interest (example: HDI)

- It can capture synergies between different goals

The MDGs: "Dashboard" vs. "Mashup"

➢ **"This Assessment notes that there are important synergies among the MDGs - acceleration in one goal often speeds up progress in others. […] Given these synergistic and multiplier effects, all the goals need to be given equal attention and achieved simultaneously."**

UNDP (2010): What will it take to achieve the Millennium Development Goals?
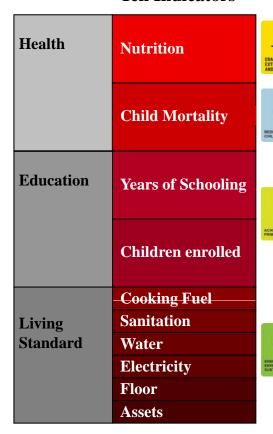
The Multidimensional Poverty Index (MPI)

➢ A very prominent example for a composite index is the Multidimensional Poverty Index (MPI)

➢ The MPI has been introduced in the 2010 Human Development Report as a response to the claim of the aforementioned report:

➢ **"What is distinctive about this multidimensional poverty index, or MPI, is that it reflects the overlapping deprivations that members of a household experience. By providing information on the joint distribution of deprivations related to the MDGs […] we have tried to explore how better measures could support efforts to accelerate the reduction of multidimensional poverty."**

Alkire and Santos (2010): Acute Multidimensional Poverty: A New Index for Developing Countries

The Composition of the MPI

Ten Indicators

Three Dimensions

Health	Nutrition
	Child Mortality
Education	Years of Schooling
	Children enrolled
Living Standard	Cooking Fuel
	Sanitation
	Water
	Electricity
	Floor
	Assets

➢ The MPI comprises three equally weighted dimensions: health, education and living standards

➢ The dimensions are measured by an overall of ten indicators, related to the MDGs 1, 2, 4 and 7

Strengths of the MPI

➢ The MPI measures overlapping deprivations, i.e. the multiple deprivations that households face at the same time. This approach reveals a lot more, and more precise information about poverty than averages could ever provide.

➢ It can be decomposed by region, population sub-groups and dimension.

➢ It is very easy to understand and calculate.

➢ All these properties make it a rather interesting tool for policy makers.

Strengths of the MPI

➤ The simplicity of the MPI is a result of its counting approach: The MPI counts the number of (weighted) indicators that lack in each household.

➤ Afterwards, it uses a cut-off to identify poor households:

➤ Each household that lacks at least 33% of the weighted indicators is considered poor.

➤ Each household that lacks less than 33% of the weighted indicators is considered non-poor and therefore not included in the MPI.

Calculating the MPI: An Example from India

➢ Consider household 2 and 3 in the example below that is taken from the 2005 Indian Demographic and Health Survey (DHS)

➢ Household No. 2 is deprived in five indicators: years of schooling (weight: 1/6), electricity, water, floor and cooking fuel (weight: 1/18). Therefore, its MPI value is **1x1/6 + 4x1/18 = 0.389**

➢ Household No. 3 is also deprived in five indicators: electricity, water, sanitation, floor and cooking fuel (weight: 1/18). Therefore, its MPI value is 0: **5x1/18 = 0.278 < 0.333**

A Comparison of Five Indian Households (DHS 2005)										
HH	**Education**		**Health**		**Living Standard**						**MPI**
	Years	Attendance	Mortality	Nutrition	Electricity	Water	Sanitation	Floor	Cooking	Assets	
1	yes	yes	yes	no	yes	yes	no	yes	no	yes	0.722
2	**yes**	no	no	no	**yes**	**yes**	no	**yes**	**yes**	no	0.389
3	no	no	no	no	**yes**	**yes**	yes	**yes**	**yes**	no	0.000
4	no	yes	no	no	no	no	yes	no	no	no	0.000
5	no	yes	no	no	no	no	no	no	no	no	0.000

Methodological Weaknesses of the MPI

➢ **1. The MPI is unable to capture any kind of correlation between the poverty indicators**

The acknowledgement of the correlations between indicators has been one of the core statements of the UNDP report (2010). It is rather safe to say that, for instance, proper sanitation, safe drinking water etc. are correlated with the health and education indicators.

In addition, Duclos et al. (2006) show that accounting for correlations between indicators may have very important policy implications.

Methodological Weaknesses of the MPI

➢ **2. The MPI is unable to capture inequality among the poor**

Already in 1976, Nobel laureate Amartya Sen required good poverty indices to be decomposable in the following three components of poverty:

- **Incidence:** The number of the poor

- **Intensity:** The mean number of deprivations suffered by the poor

- **Inequality:** The distribution of deprivations among the poor

The MPI is not able to capture the last component: the index will not change if, through a transfer from a poor to a less poor household, the number of deprivations suffered by the poorer household increases.

Therefore, the fastest reductions in the MPI can be achieved if the households closest to the cut-off are lifted out of poverty. The households with the farthest distance to the cut-off, i.e. the neediest, are given least priority.

Methodological Weaknesses of the MPI

➢ **Consider the following example:**

➢ Household No. 1 is deprived in years of schooling (weight: 1/6), electricity, cooking fuel, water and assets (weight: 1/18). Therefore, its MPI value is: 1x1/6 + 4x1/18 = 0.389

➢ Household No. 2 is deprived in all indicators but electricity and assets. Therefore, its MPI values is: 4x1/6 + 4x1/18 = 0.889

➢ The overall MPI is: ½ **(0.389 + 0.889) = 0.639**

Methodological Weaknesses of the MPI

➢ **Consider a (fictive) transfer of assets from household No. 2 to household No. 1**

➢ The new MPI value of household No. 1 is:
1x1/6 + 3x1/18 = 0.333

➢ The new MPI value of household No. 2 is:
4x1/6 + 5x1/18 = 0.944

➢ The new overall MPI is exactly the same as the old MPI: **½ (0.333 + 0.944) = 0.639**

➢ **Now, consider an additional (fictive) transfer of electricity from household No. 2 to household No. 1**

➢ The new MPI value of household No. 1 is: $1 \times 1/6 + 2 \times 1/18 = 0$ (0.278 < 0.333)

➢ The new MPI value of household No. 2 is: $4 \times 1/6 + 6 \times 1/18 = 1.000$

➢ The new overall MPI has decreased: **½ (0 + 1.000) = 0.500**

Methodological Weaknesses of the MPI

➢ **3. The MPIs 30% cut-off introduces an additional arbitrariness in poverty measurement**

A different choice of cut-off changes poverty values as well as country rankings.

Due to the discontinuity produced by the cut-off, minor changes in household conditions or minor measurement errors may have significant impact on poverty rates.

Methodological Weaknesses of the MPI

➤ **4. The MPI leads to problematic distortions in poverty rates**

Due to the discontinuity produced by the cut-off, there is an inflation (deflation) of poverty rates in poorer (less poor) countries.

As a result, the neediest of the neediest receive less (more) attention in the poorer (less poor) countries.

This is rather problematic from a policy perspective. In the poorest countries with the most severe budget constraints, targeting the neediest is of utmost importance.

➤ **But is there a way to overcome these weaknesses of the MPI?**

The Correlation Sensitive Poverty Index (CSPI)

➢ The CSPI is a count index like the MPI, i.e. it counts the number of (weighted) indicators that lack in each household.

➢ However, the CSPI abandons the use of a cut-off to separate between poor and non-poor. Instead, it utilises a weighting scheme to differentiate between different degrees of poverty severity.

➢ The more (weighted) indicators a household lacks, the higher its degree of poverty severity and thus the higher the weight attached to this household.

➢ Consider household 3 in the example that has been introduced before

➢ Household No. 3 is deprived in five indicators: electricity, water, sanitation, floor and cooking fuel (weight: 1/18). Therefore, its **degree of poverty severity** is 5x1/18 = 0.278.

➢ Thus, its CSPI value is **(0.278)x(5x1/18) = 0.077**

A Comparison of Five Indian Households (DHS 2005)

HH	Education		Health		Living Standard						MPI	CSPI
	Years	Attendance	Mortality	Nutrition	Electricity	Water	Sanitation	Flooring	Cooking	Assets		
1	yes	yes	yes	no	yes	yes	no	yes	no	yes	0.722	0.522
2	yes	no	no	no	yes	yes	no	yes	yes	no	0.389	0.151
3	no	no	no	no	yes	yes	yes	yes	yes	no	0.000	0.077
4	no	yes	no	no	no	no	yes	no	no	no	0.000	0.049
5	no	yes	no	no	no	no	no	no	no	no	0.000	0.028

Strengths of the CSPI

➢ **Like the MPI, the CSPI is:**

- Measures overlapping deprivations, i.e. the multiple deprivations that households face at the same time Easy to calculate

- Decomposable by region, population sub-groups and dimension

- Easy to understand and calculate

➢ **However, different from the MPI, the CSPI:**

- Increases when deprivations are associated, acknowledging the correlation between indicators

- Is sensitive to inequality among the poor and thus decomposable according to all poverty components, incidence, intensity and inequality

- Does not display the distortions generated through the MPIs cut-off

Strengths of the CSPI

➢ **Consider the following example:**

➢ Household No. 1 is deprived in years of schooling (weight: 1/6), electricity, cooking fuel, water and assets (weight: 1/18). Therefore, its degree of poverty severity is 1x1/6 + 4x1/18 = 0.389 and thus its CSPI value: (0.389)x(1x1/6 + 4x1/18) = 0.151

➢ Household No. 2 is deprived in all indicators but assets. Therefore, its degree of poverty severity is 4x1/6 + 5x1/18 = 0.944 and thus its CSPI value: (0.944)x(4x1/6 + 5x1/18) = 0.892

➢ The overall CSPI is: ½ **(0.151 + 0.892) = 0.522**

Strengths of the CSPI

- ➢ **Consider a (fictive) transfer of assets from household No. 2 to household No. 1**

- ➢ The new CSPI value of household No. 1 is (0.333)x(1x1/6 + 3x1/18) = 0.111

- ➢ The new CSPI value of household No. 2 is (1.000)x(4x1/6 + 6x1/18) = 1.000

- ➢ The new overall CSPI is greater than the old one: **½ (0.111 + 1.000) = 0.556 > 0.522**
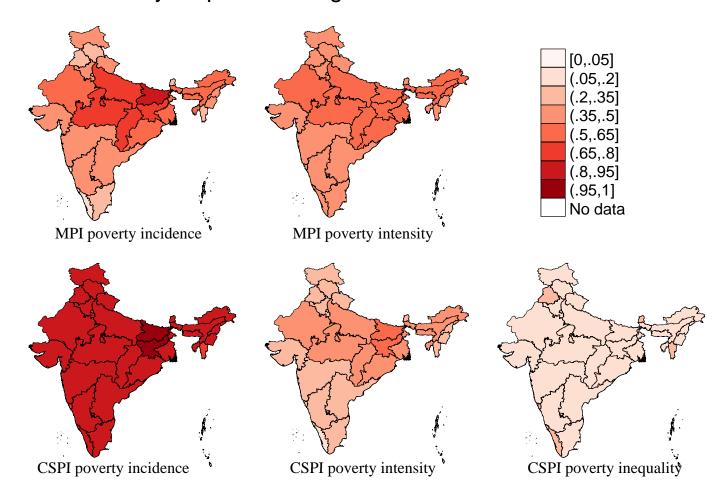
Empirical Evidence

➤ Applying both indices, MPI and CSPI, to real world data reveals the relevance of the differences between them.

➤ The empirical evidence for this comparison is based on national and sub-national poverty calculations for a sample of 28 countries.

➤ The poorest country in the sample, Niger, has a CSPI poverty rate of 47.5% and a MPI poverty rate of 64.2% (inflation).

➤ The least poor country in the sample, Armenia, has a CSPI poverty rate of 0.8% and a MPI poverty rate of 0.4% (deflation).

➤ Yerevan has a MPI poverty rate of 0%. The CSPI poverty rate is very low, 0.4%, but acknowledges that poverty exists in the Armenian capital.

Indian Poverty Maps

➢ Indian Poverty Maps according to MPI and CSPI:

MPI poverty incidence

MPI poverty intensity

CSPI poverty incidence

CSPI poverty intensity

CSPI poverty inequality

Legend:
- [0,.05]
- (.05,.2]
- (.2,.35]
- (.35,.5]
- (.5,.65]
- (.65,.8]
- (.8,.95]
- (.95,1]
- No data

Conclusions

➢ Exact measures are important to adopt the right policies

➢ The close correlation between the MDGs recommends a simultaneous approach to measurement to capture synergies

➢ The development of the MPI has been a major step forward that opened up new ways to better understand and capture the overlapping deprivations that people face

➢ Despite all the strengths, the MPI has some methodological weaknesses

➢ Measurement should refrain from taking simple averages: the utilisation of household data is associated with a great deal of effort, thus none of the valuable information that surveys provide should be wasted

➢ Without sacrificing any of the strengths of the MPI, a methodological adjustment like done in the CSPI can achieve:

➢ Sensitivity with regard to the correlations between different goals

➢ Sensitivity with regard to inequalities among the poor, allowing the decomposition of the index in poverty incidence, intensity and inequality

Thank you for your attention!

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