Reviewing the Theories of Multidimensional Poverty Measure from a Modern Approach

مراجعة نظريات قياس الفقر متعدد الأبعاد من منظور حديث

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Abstract

The global multidimensional poverty index highlights the complexity of poverty. Different indicators contribute to people experiencing poverty differently, varying from region to region, and between and within societies. Ensuring that data on global poverty is up-to-date and comprehensive is a critical first step in confronting these challenges and sustaining progress towards a more equal world. This study aims to reveal a new approach to measuring multidimensional poverty, by adding a new dimension to the dimensions presented in previous literature, which is the technological dimension, and it considered an addition to the three known dimensions, which are the standard of living, the educational aspect, and the health aspect the development of multidimensional poverty measures from 1891 until now, all equations previously used to calculate multidimensional poverty Index were reviewed, a modern model was developed. Specific to four-dimensional poverty, an equation was developed through which any data that could be obtained can be substituted and converted into a result that reveals the level of multi-dimensional poverty. The difference that we propose, in contrast to previous theories that measure the dimensions of multidimensional poverty, is the fourth dimension of technological poverty, with all this progress and technology and the classification of countries according to their degree of progress, it has become important to add this dimension to the definition Multidimensional poverty, The results of this study have interesting implications as the proposed new model gave a broader picture and better explanation for describing multidimensional poverty, as the technological dimension was added.

Keywords Poverty, Multidimensional Poverty, Multidimensional Poverty Measure, Multidimensional Poverty Index.

المستخلص:

يُسلّط مؤشر الفقر العالمي متعدد الأبعاد الضوء على تعقيد الفقر. تُسهم المؤشرات المختلفة في اختلاف معاناة الناس من الفقر، من منطقة لأخرى، ومن مجتمع لآخر وداخل كل مجتمع. يُعدّ ضمان تحديث بيانات الفقر العالمي وشموليتها خطوة أولى حاسمة في مواجهة هذه التحديات والحفاظ على التقدم نحو عالم أكثر مساواة. تهدف هذه الدراسة إلى الكشف عن نهج جديد لقياس الفقر متعدد الأبعاد، من خلال إضافة بُعد جديد إلى الأبعاد الواردة في الدراسات السابقة، وهو البُعد التكنولوجي، بالإضافة إلى الأبعاد الثلاثة المعروفة، وهي مستوى المعيشة، والجانب التعليمي، والجانب الصحي. وقد رُكّبت مقاييس الفقر متعدد الأبعاد منذ عام ١٨٩١ وحتى الآن، حيث تمت مراجعة جميع المعادلات المستخدمة سابقًا لحساب مؤشر الفقر متعدد الأبعاد، ووُضع نموذج حديث. أما بالنسبة للفقر رباعي الأبعاد، فقد وُضعت معادلة تُمكّن من استبدال أي بيانات مُحصّلة وتحويلها إلى نتيجة تكشف عن مستوى الفقر متعدد الأبعاد. الفرق الذي نقترحه، خلافًا للنظريات السابقة التي تقيس أبعاد الفقر متعدد الأبعاد، هو البعد الرابع وهو الفقر التكنولوجي، ومع كل هذا التقدم والتكنولوجيا وتصنيف الدول حسب درجة تقدمها، أصبح من المهم إضافة هذا البعد إلى تعريف الفقر متعدد الأبعاد، ولنتائج هذه الدراسة آثار مثيرة للاهتمام، إذ أعطى النموذج الجديد المقترح صورة أوسع وتفسيرًا أفضل لوصف الفقر متعدد الأبعاد، حيث تمت إضافة البعد التكنولوجي.

الكلمات المفتاحية: الفقر، الفقر متعدد الأبعاد، مقياس الفقر متعدد الأبعاد، مؤشر الفقر متعدد الأبعاد.

1. Introduction

Poverty in the traditional sense is essentially income poverty, which refers to an individual or family falling into poverty when their income cannot meet their basic living needs. Because income data are easy to collect and manipulate, policymakers often use income poverty to assess the effectiveness of policy implementation. As people's understanding of poverty changes, the meaning of poverty also changes from income poverty to multidimensional poverty.

Poverty means not only a lack of income, but also an inability to change economic conditions, resist risks, and take advantage of economic opportunities. Therefore, the measurement of poverty should not be limited to the income dimension but must also consider other dimensions [Mingyue Liu et al.,2023]. Eradicating poverty is one of the 17 Sustainable Development Goals that the United Nations aims to achieve by 2030. Despite recent progress in reducing poverty around the world, millions of people are still living or

already living in severe multidimensional poverty, particularly in third world nations [Jibrin Gambo et al., 2022].

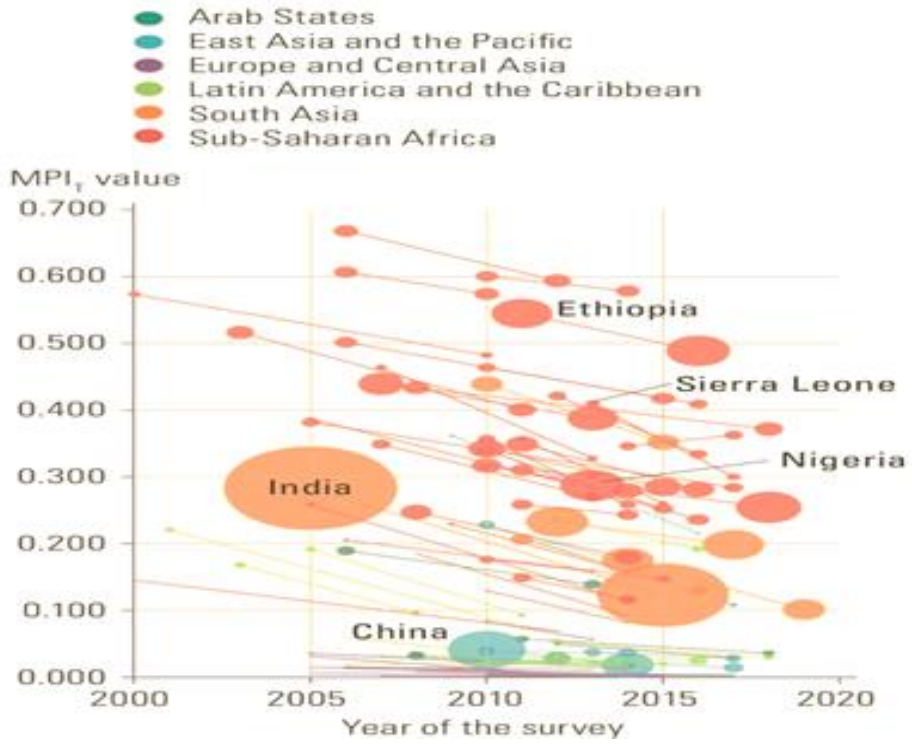


Figure 1 Poorer Countries with the Highest Initial Multidimensional Poverty Index Values

Source: Alkire, Kovesdi, Mitchell and others 2020.

Until the 1980s, monetary approaches were the dominant way of conceptualizing and measuring poverty. On the basis of existing research, we argue that measures of capacity poverty are more accurate because they better account for the complexity of poverty, are based on more realistic assumptions, and measure well-being outcomes rather than resource use. Poverty is increasingly understood as a complex and diverse phenomenon. Poverty goes beyond monetary dimensions, and is more than just the loss of income or the ability to spend. If poverty is a "manifestation of inadequate well-being," it is unlikely to be caused by monetary factors alone – it should include non-monetary variables. People may be disadvantaged in many other ways, especially in the areas of education, health or housing. They may lack access to basic services and health care. Purely monetary

measures do not adequately capture poverty and its manifestations in all its dimensions [Lukas Salecker et al., 2020].

Multidimensional poverty is an approach to understanding the multiple dimensions of poverty and the ways in which they intersect and intersect. These include the challenges, obstacles, problems and adversities that poor people face in their daily lives, including lack of access to health care, education, food, water, energy and family planning. Adopting a narrow definition of poverty and focusing on only one dimension, such as income, does not reflect the true picture of people's circumstances. In contrast, measuring multidimensional poverty provides a more comprehensive approach that better reflects people's life experiences [World Bank, 2023].

The index measures the proportion of deprived households in a country across three dimensions: financial poverty, education, and basic infrastructure services to provide a more comprehensive picture of poverty. Therefore, the researcher seeks to present the development of multidimensional poverty measures, then propose a new dimension to be added to the dimensions adopted by previous literature, and this dimension is linked to the technological aspect, as the researcher's point of view is that the previous dimensions, which are the level of income, the level of education, and the health services available to the individual, are not sufficient to describe the state of poverty. The individual's ability to use technology and the availability of the infrastructure for that technology is one of the dimensions by which an individual's poverty or lack thereof can be determined.

This paper contributes to the existing literature in several ways. First, it adopts a more efficient and consistent methodology relative to most dynamic panel estimators. The employment of this method provides enhanced confidence in the results and findings. Second, the study hypothesized to the literature by clarifying the importance of increasing a new dimension of multidimensional poverty, which is the technological dimension, given its importance in describing poverty in light of the rapid technological development. Third, the results of the paper provide direction for policy action. Policymakers can focus on improving income levels and institutional quality to mitigate environmental issues.

This paper is presented in four sections. Section 2 reviews related past literature and method of analysis. Section 3 presents the results. The findings are concluded in Section 4.

2. Literature Review

Measures of Multidimensional Poverty (according to previous literature)

Many scholars have attempted to construct a theory of multidimensional poverty by relying on extensive field surveys to collect data on families and individuals. The following are some well-known theoretical models that were created to imagine the potential of quantifying dimensional poverty in a strictly academic approach. These models are distinguished by their simplicity of use and compliance with the basic axioms of the quality of the multiple poverty index, which include concentration, detail, stability, and symmetry. These models include a new approach suggested by the author for simplifying the process of assessing multidimensional poverty.

1. The Extended Multidimensional Poverty Index by Foster, Greer, and Warbicki (1891) [Abdul Hamid Nawarek, 2014].

$$p(X_i, Z) = \prod_{j=1}^{J} \left(\frac{z_j - x_{i,j}}{z_j} \right)_+^{\alpha_j}$$

2. The Multidimensional Poverty Index by Chakravarit et al. (1998) [Chakravarty et al., 1998].

$$p(X_i, Z) = \sum_{j=1}^{J} a_j \left(\frac{z_j - x_{i,j}}{z_j} \right)_+^{\alpha}$$

3. Tsui's Multidimensional Poverty Index (2002) [Tsui, 2002].

$$p(X_i, Z) = \prod_{j=1}^{J} \left(\frac{z_j}{\min(z_j; x_{i,j})} \right)^{b_j} - 1$$

4. The (two Dimensions) Multidimensional Poverty Index by Bourguignon and Chakravaret (2003) [Bourguignon, Chakravarty,2003].

$$p(X_i, Z) = \left[C_1 + \beta^{\gamma/\alpha} C_2 \right]^{\alpha/\gamma}$$

Where,

$$C_1 = \left(\frac{z_1 - x_{i,1}}{z_1}\right)^{\gamma}_{+}$$

And

$$C_2 = \left(\frac{z_2 - x_{i,2}}{z_2}\right)^{\gamma}_{+}$$

5. Watts (2005) Extended Multidimensional Poverty Index [Aaberge, Brandolini, 2015].

$$p(X_i, Z) = \sum_{j=1}^{J} a_j \ln\left(\frac{z_j}{\min(z_j; x_{i,j})}\right)$$

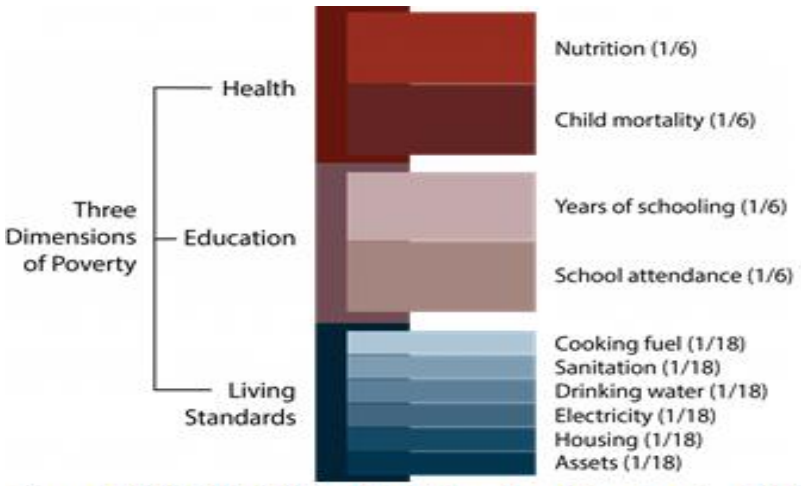
6. Alkire and Foster's Multidimensional Poverty Index (2007) [Alkire, & Foster, 2007].

$$M = H.A$$

$$H = \frac{q}{n} = \sum_{i=1}^{n} \frac{p_k(X_i, Z_j)}{n} \qquad A = \frac{\sum_{i=1}^{q} c_i(k)}{qd}$$

The United Nations Development Program proposed the concept of multidimensional poverty to reflect the fact that not only do people living in extreme poverty no longer contribute to and benefit from socioeconomic development, but also a large proportion of underperforming groups within a given population No longer benefiting from it. From countries that remain resource-constrained will suffer from lack of or limited access to a wide range of services [Omar F. Bizri, 2018]. Alkire-Foster's (AF) approach to constructing multidimensional poverty indices (MDPIs) for populations and subgroups

has had a major impact on poverty analysis and policy. Professors Sabina Alkire and James Foster (2007, 2013) have shown in a series of papers that poverty analysis cannot be narrowly restricted to one-dimensional indicators typically based on income. Instead, poverty indexes need to be developed taking into account a range of disadvantages, such as access to health, food, clean water, sanitation, schooling, housing and self-determination, The University of Oxford confirmed this in its report The Most Detailed Picture to Date of the World's Poorest People for the year 2018, where it divided the multidimensional poverty measure into the same three dimensions [Suresh C. Babu, Shailendra N. Gajanan, 2022].



Source: OPHI (2018). Global Multidimensional Poverty Index 2018: The Most Detailed Picture to Date of the World's Poorest People. Report. Oxford Poverty and Human Development Initiative, University of Oxford.

Figure 2 Global Multidimensional Poverty Index for 2018

Over the years, various methods have been developed to measure poverty from a multidimensional perspective [United Nations, 2015]. In its 2023 report, the United Nations Development Fund divided the basic dimensions of multidimensional poverty, based on previous studies, into three dimensions: the health dimension, the educational dimension, and the dimension related to the standard of living, and divided these dimensions into sub-indicators that express each dimension in this vision [UNDP,2023].

Figure 3 Global Multidimensional Poverty Index for 2023

3. Results and Discussion

3.1. The proposed framework for multidimensional poverty, the researcher's point of view

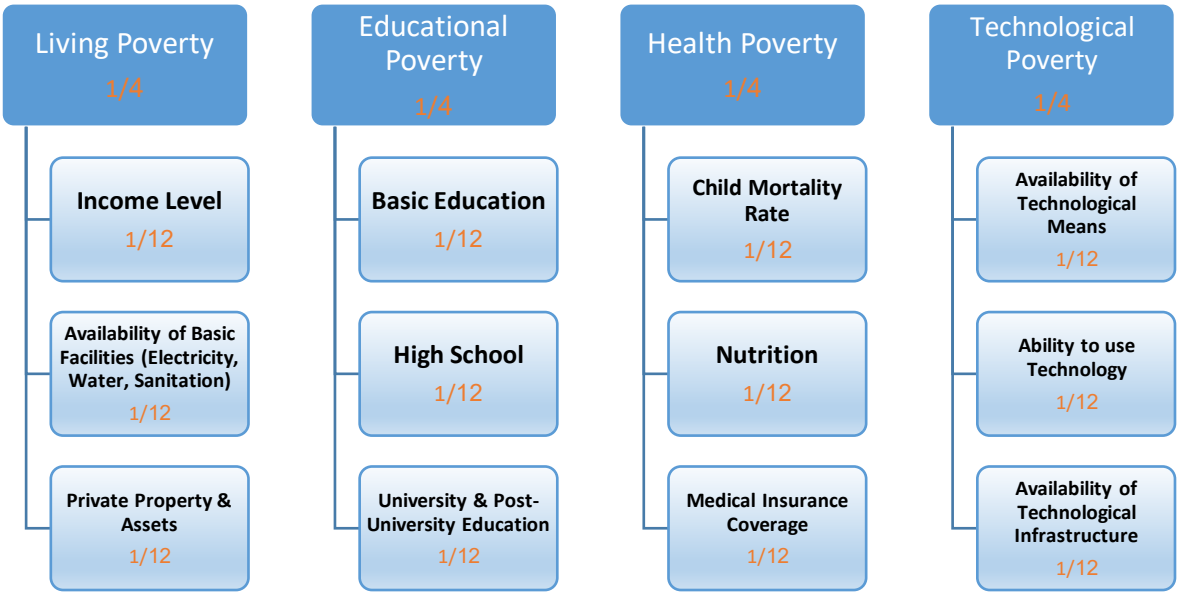


Figure 4 the Four-Dimensional Global Poverty Index
Designed by the Researcher

The difference that we propose, in contrast to previous theories that measure the dimensions of multidimensional poverty, is the fourth dimension of technological poverty, where with all this progress and the information and technology revolution and the classification of countries according to their degree of backwardness, progress and the extent to which they possess the technology that keeps pace with this progress, and within those countries, it can be divided Individuals and families are technologically poor and others are technologically rich, so it has become important to add this dimension to the definition of multidimensional poverty.

3.2. Dimensions of Multidimensional Poverty (from a Modern Approach)

3.2.1. Living poverty:

- Income Level
- Availability of Basic Facilities (electricity, water, sanitation)
- Private Property and Assets

3.2.2. Educational poverty

- Basic Education
- Secondary Education
- University Education

3.2.3. Health poverty

- Child Mortality Rate
- Nutrition
- Medical Insurance Coverage

3.2.4. Technological poverty

- Availability of Technological Means
- Ability to use Technology
- Availability of Technological Infrastructure

3.3. The new equation for calculating multidimensional poverty according to the recent proposal by adding a technological dimension:

$$\boldsymbol{F = \frac{0.25}{12}\sum(\sum_{i=1}^{3} x_i + \sum_{i=1}^{3} y_i + \sum_{i=1}^{3} z_i + \sum_{i=1}^{3} w_i)}$$

Where

$$X = \sum_{i=1}^{3} x_i$$

X *is the living poverty,* x_1 *is the income level ,* x_2 *is theBasic facilities ,* x_3 *is the private proparty.*

$$Y = \sum_{i=1}^{3} y_i$$

Y *is the educational proverty,* y_1 *is the the basic education,* y_2 *is the high school,* y_3 *is the university education.*

$$Z = \sum_{i=1}^{3} z_i$$

Z *is the Health Proverty,* z_1 *is the child mortality ,* z_2 *is the nutrition* z_3 *is the mediacal insurance .*

$$W = \sum_{i=1}^{3} w_i$$

W *is the technological Proverty,*w_1 *is the availability of technological means ,* w_2 *is the ability of use technology ,* w_3 *is the availability of technological infrastructure .*

4. CONCLUSION

The research paper explained the difference between income poverty and multidimensional poverty. The research paper presented the development of multidimensional poverty measures from 1891 until now, and presented a new proposal for a multidimensional poverty measure, in which we take into account the dimension of technological poverty, in terms of the availability of technological means, the ability to use technology, and the availability of technological infrastructure. A model was developed. Specific to four-dimensional poverty, an equation was developed through which any data that could be obtained can be substituted and converted into a result that reveals the level of multi-dimensional poverty, whether for individuals or countries. The proposed model was divided into four dimensions, namely the dimensions of the standard of living, the level of education, the level of health services, and the level of technological progress, and it was given Each dimension has a ratio of (¼), then each dimension was divided into three sub-dimensions for ease of interpretation of the main dimension, and they were given a specific ratio, which is (**1/12**), so that these ratios can be compensated when obtaining appropriate data on the equation that was developed, where the symbol (**F**) was given to describe multi-dimensional poverty, and each main dimension was described by a set of symbols. The standard of living received the symbol (**X**), where (X) = $\sum_{i=1}^{3} \boldsymbol{x_i}$,and X is the living poverty, x_1 is the income level , x_2 is theBasic facilities , x_3 is the private proparty , the level of education received the symbol (**Y**), where (Y) = $\sum_{i=1}^{3} y_I$,and Y is the educational proverty, y_1 is the the basic education , y_2 is the high school , y_3 is the university education **,** the level of health services received the symbol (**Z**), where (Z) =$\sum_{i=1}^{3} z_I$,and Z is the Health roverty, z_1 is the child mortality , z_2 is the nutrition , z_3 is the medical insurance **,**and finally the technological level received the symbol (**W**), where (W) = $\sum_{i=1}^{3} w_I$,and**,** W is the technological Poverty, $\boldsymbol{w_1}$ is the availability of technological means, $\boldsymbol{w_2}$ is the ability

of use technology, w_3 is the availability of technological infrastructure **,** and the ratios that were mentioned were determined. In the previous proposed model is (**0.25/12**).

$$F = \frac{0.25}{12}\sum\left(\sum_{i=1}^{3} x_i + \sum_{i=1}^{3} y_i + \sum_{i=1}^{3} z_i + \sum_{i=1}^{3} w_i\right)$$

where the numbers are substituted into that equation and more illustrative results are obtained to describe multidimensional poverty. Through these results, comparison can be made between one individual and another, or one country and another, or several different countries.

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