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To cite this article: Yufei Cao, Aftab Hussain Tabasam, Syed Ahtsham Ali, Anam Ashiq, Carlos Samuel Ramos-Meza, Vipin Jain & Malik Shahzad Shabbir (2023) The dynamic role of sustainable development goals to eradicate the multidimensional poverty: evidence from emerging economy, Economic Research-Ekonomiska Istraživanja, 36:3, 2153715, DOI: [10.1080/1331677X.2022.2153715](https://doi.org/10.1080/1331677X.2022.2153715)

To link to this article: <https://doi.org/10.1080/1331677X.2022.2153715>



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Published online: 12 Dec 2022.



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The dynamic role of sustainable development goals to eradicate the multidimensional poverty: evidence from emerging economy

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ABSTRACT

This study empirically investigates the multidimensional poverty index (MPI) level and vulnerability to poverty in Pakistan. This study explores MPI province-wise. The MPI consists of three equally weighted dimensions: schooling, health well-being and living standards. This investigation uses a systematic random sampling approach to gather the data from householders from 2003 to 2018. The empirical result demonstrates that 24% of the population was multidimensionally poor in 2007, 20.2% in 2011, 18% in 2014 and 16.4% in 2018, respectively. It identified major determinants of poverty as children mortality and school attendance, cooking fuel and nutrition.

ARTICLE HISTORY

Received 31 July 2021

Accepted 27 November 2022

KEYWORDS

Multidimensional poverty; Alkire–Foster method; Pakistan; sustainable development

JEL CLASSIFICATION

A10; A13; B55; E09

1. Introduction

Many countries have succeeded in reducing hunger and poverty by adopting sustainable millennium development goals (MDG). Nonetheless, various countries still face extreme levels of poverty. Pakistan is a developing nation with limited capital resources to overcome the financial gap between savings and investments. For this reason, Pakistan depends heavily on foreign capital inflows. In addition to the saving-investment gap, Pakistan also suffers from economic and political instability, lack of physical and trained human capital, and for these reasons foreign inflows are needed to supplement its development.

Based on Pakistan Social and Living Standards Measurement Survey (PSLM) 2007–2008 recognized that overall Pakistan 54.6% of households were poor

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This article was originally published with errors, which have now been corrected in the online version. Please see Correction <http://dx.doi.org/10.1080/1331677X.2023.2185068>.

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multidimensionally. A higher incidence of energy poverty was found in rural households in overall Pakistan and also in all provinces (Awan et al., 2012). A study measured Multidimensional poverty (MEP) head count for the provinces of Pakistan and found that 69%, 66%, 51% and 47% of households residing in Khyber Pakhtoon Khwa (KPK), Baluchistan, Sindh and Punjab, respectively, were energy poor.

In Pakistan Social and Living Standards Measurement Survey (PSLM) 2014–2015 data empirically estimated the incidence and intensity of energy poverty in Pakistani households. Liu et al (2022) constructed various indexes for measuring inconveniences faced by households and investigated the consequences and features of different energy sources. The study found that the percentage of rural households facing energy poverty was 96.6 for overall Pakistan and 91.7 for Punjab province. You et al. (2019) proposed that a firewood plantation is a solution to reduce poverty as the plantation increases agricultural labor productivity.

The importance of trade in the promotion of environmentally sustainable technologies cannot be overlooked. Since it has the potential of transferring clean energy technologies, trade is crucial for ‘greening’ the energy market. Trade openness is advantageous due to the efficient utilization of resources and the benefits of economies of scale. Furthermore, both export and import can offer better inputs for green energy consumption. In a nutshell, trade liberalization will further foster renewable energy sources. Hence, green energy sources, it has the potential to be a major factor in long-term economic growth and climate change. There have been few empirical studies on the connection between renewable energy consumption and foreign trade (Amri, 2019), and their results are often inconclusive, indicating disagreement among economists and researchers. In short, the magnitude and direction of the impact of trade openness on REC are critical because it may have consequences for OECD countries’ foreign trade and climate policies.

The consequences of poverty are multidimensional (Jun et al., 2021; Sadiq et al., 2022; Shabbir & Wisdom, 2020), making these economies more vulnerable. Ogotu and Qaim (2019) proposed a scheme to reduce poverty through commercialization as it enhances income and reduces multidimensional poverty. The determinants of MPI are another tool to identify factors causing an increase in poverty. It estimated that agricultural productivity, effective utilization of labor and improving income by using different livelihood activities would cause compress multidimensional poverty (Gebrekidan et al., 2021). Muhammad and Ab-Rahim regressed that higher education in Nigeria is the strongest determinant to combat multidimensional poverty.

Multidimensional poverty (SDG # 1) has been measured to inspect critically for its eradication by using Alkire and Foster’s (2011) methodology. Poverty is a serious problem in developing countries around the globe. In 2015, there were 38 million hungry people in the world, and raised to 85 million in 2016 (World Bank, 2017). The World Bank reports indicate that out of 1.42 billion poor people and around 500 million people are from South Asia. This study consists of three core areas: health, education and standards of living to examine the influence of SDGs to eradicate the multidimensional poverty in Pakistan. This study takes four provinces of Pakistan to investigate this relationship under the domain of SDGs. However, Pakistan is the second highest populated country among South Asian states with a lower middle-

income status. It is noted that 29.5% of the population is living below the poverty line (Tang, 2019). Since its inception, the economy of Pakistan has experienced dynamic trends of poverty over time and across space.

2. Literature review

Along with a variety of macro- and micro-issues, economic development is considered a high-level issue. Barnes et al. explore multidimensional poverty and its welfare impacts on households in rural Bangladesh by using cross-sectional dataset. The results revealed that the impacts of modern sources of energy were high as compared to traditional sources. Although, both traditional and modern sources enhanced the consumption in rural households in Bangladesh and poverty was estimated at 58% in households. Energy poverty was studied in Indian urban and rural areas. The study revealed 20% of households were income poor and 28% was poor in urban areas. The rural households were more vulnerable to income and poverty with 22% and 57%, respectively. Multidimensional poverty and energy poverty were correlated as the people residing in developing countries were more deprived of modern energy.

In China, the reduction in multidimensional poverty was observed and attributed to improving the availability, affordability and efficiency of energy services. The study justified the opinion that freedom from energy poverty is not linked with freedom from income poverty as acute energy poverty was observed in some of the economically well-developed regions. Although poverty decreased in China, the dependency on solid fuels in rural households remained high. A study discovered that the standard of living is adversely affected by energy poverty in Kenya. Another study found the problems associated with health status, education attainment, living standards and inadequacy within the territory to address some of the SDGs through MPI (Wang et al., 2022).

Human rights-based approach can contribute to poverty reduction and reflects the critical tendency of human rights research to embed poverty analysis in somewhat undocumented allegations such as the impact of neoliberal policies (Sano, 2020). Mustafa et al. (2021) exposed five key dimensions, i.e., use of health services, quality of health services, maternal health, child health and malnutrition have contributed to the overall profile of multidimensional health poverty. Cuesta et al. (2020) developed an innovative political economy framework for poverty measurement and used reliable and sustainable multidimensional child poverty (MDCP) measures if and only if three conditions coalesce: consensus, capacity and polity. Focusing on indicators such as healthcare, electricity, education, clean water and housing, it concluded that multidimensional poverty is indeed widespread in Nigeria and, thus, they recommend social inclusion as the solution (Akinyetun et al., 2021). A study debated the Sustainable Development Goals' progress by evaluating the MDGs achievements in South Asia regarding the policy and institutional challenges deriving from such experience (Asadullah et al., 2020). Another study analyses the prevalence of extreme and multidimensional poverty in line with the sustainable development agenda. In addition to it, this study examines the drivers of extreme poverty while accounting for the potential spillover effect of poverty in that region.

Whereas, Amin et al. investigated how multidimensional poverty and economic development are correlated in South Asian economies. They used panelized quantile regression (PQR) and autoregressive distributed lags (ARDL) and panel integration to demonstrate the short- and long-run relationships. The estimates revealed the negative impact of energy poverty on economic development. Oum measured the poverty in Lao PDR and found it affected the health status and years of schooling. Lin and Okyere exhibited that energy poverty intensifies the probability of being mentally unhealthy in Ghana. Burchi et al. analysis rely on two individual-based indices, the G-CSPI and the G-M0, which combine three dimensions: education, health and employment, derived through the constitutional approach.

Whereas, Yin et al. explored Spatiotemporal dynamics of multidimensional poverty and identified causing and reducing factors of poverty in China. They used the panel vector autoregressive (PVAR) model and used exploratory spatial-temporal data analysis (ESTDA) from 2007 to 2017 at the provincial level. In the results, factors that caused poverty were the crop to disaster ratio and the social gross dependency ratio. Whereas declining poverty factors were high per capita GDP, per capita public health expenditure and per capita expenditure on research and development. Findings also show that multidimensional poverty has significantly reduced with strong spatial dynamics between provinces. Liu et al. (2022) examined the impact of sustainable development goals to eradicate multidimensional poverty and improve social well-being. The findings of their study show that multidimensional poverty has been influenced by social welling's.

3. Methodology

This study examines the sustainable development goals (SDGs) effect on multidimensional poverty in Pakistan. This exploration includes four provinces of Pakistan: Baluchistan, Khyber Pakhtunkhwa (KPK), Punjab and Sindh. This study takes dataset from Pakistan Social and Living Standard Measurement (PSLM) survey from 2003 to 2018. All datasets have taken from Pakistan Bureau of Statistics (PBS) and used the repeated cross-sections of multiple indicator cluster survey (MICS) data. This study measures three sections: quality of life, education and health standards simultaneously observed and experienced by households in order to better understand the different level of poverty in Pakistan. This study adopted Alkire and Foster's (2011) approach to measure multidimensional poverty. They used systematic random sampling approach to gather the data from householders. The development of multidimensional poverty index (MPI) consists of three equally weighted dimensions: education, health and living standards. These sectors are further classified into different subdimensions/indicators.

MPI declares a Household (HH) poor if she has deprived in at least one-third of the weighted indicators or a threshold poverty cut-off (k) (Alkire & Santos, 2010; Mustafa et al., 2021; Sano, 2020). MPI is calculated as shown in Eq. (1)

$$M_0 = H \times A = \text{MPI} \quad (1)$$

where M_0 is named as adjusted headcount (H), is the headcount ratio and A is the average intensity of poverty. H is easy to understand and calculate but in case of

increasing deprivation. Whereas, H is multiplied by the intensity of deprivations (A). The absolute rate of change is the simple difference in MPI between two time periods as shown in Eq. (2).

$$\Delta M_0 = M_0(Y_{t^2}) - M_0(Y_{t^1}) \quad (2)$$

Changes in MPI across two time periods were also reported as a relative rate. The relative rate of change is the difference in levels across two time periods as a percentage of the initial period. The relative rate of change, say \emptyset is the difference in MPI as a percentage of the initial MPI. It is computed as shown in Eq. (3).

$$\emptyset M_0 = \left[\frac{M_0(Y_{t^2}) - M_0(Y_{t^1})}{M_0(Y_{t^1})} \right] (100) \quad (3)$$

After computing, a weighted sum of censored ratio can be used to verify the MPI values for all three years as shown in Eq. (4).

$$\text{MPI} = Q_1 R_1 + Q_2 R_2 + \dots + Q_{10} R_{10} \quad (4)$$

Q_1 is the weight of the first indicator, called nutrition and R_1 is the censored head-count ratio used for nutrition.

The Table 1 shows complete details of all the variables their indicators and deprivations.

4. Results and discussion

Table 2 shows estimates of poverty in Pakistan for the years 2003, 2007, 2011, 2014 and 2018 in terms of the average intensity of poverty (A), multidimensional head-count ratio (H) and MPI (M_0). Moreover, absolute and relative measures of change have also been estimated, 24% of population was multidimensional poor in 2007, 20.2% in 2011, 18% in 2014 and 16.4% in 2018. These results are in line with the latest poverty analysis done at Planning Commission of Pakistan who investigated poverty using multiple episodes of PSLM data. It is observed that percentage of multidimensionality poor people (H) from 2003 to 2007 and 2007 to 2011, from 2011 to 2014 and from 2014 to 2018 has reduced but at a higher rate in the former periods than later. An overall downturn in MPI from 0.11 to 0.07 indicates a reduction of around 40% of the base time (Tables 1 and 2).

The MPI analysis so far has pointed out estimation and variation in MPI over the years in Table 3. A reduction of about 4 pc points of the contribution of health sector deprivations from 2007 to 2011 but got a bit worse from the year 2011–2014. These results are in line with the female multidimensional poverty in South Africa.

It is observed from table that contributed to the overall poverty. The education dimension was investigated as the least deprived dimension, i.e., around 8% as compared to the other dimensions. However, an increasing trend in the education sector's deprivation has been identified (Arslan et al., 2022; Bai et al., 2022; Ji et al., 2022; Khan et al., 2021; Liu et al., 2022; Muhammad et al., 2021; Niazi & Khan, 2012;

Table 1. MPI aspects, indicators, proportions and cut-offs for deprivations.

Aspects (Weight)	Indicators	Deprived if ...
Health (1/8)	Nutrition	A child under the age of five has a z-score of tallness-for-age that is less than minus two standard deviations from the reference population median.
	Mortality in Children	A youngster of less than five years have passed away in the HH.
Education (1/8)	Schooling	No one in the group has accomplished five years of study.
	Student enrollment	At least one school-matured kid are not going to class up to the age at which they would finish middle school.
Living Standards (1/8)	Electricity	HH does not have access to energy.
	Water	HH obtains drinking water from an unguarded well, an unsafe spring, a tanker truck, a vehicle with a small drum/tank, groundwater, municipal water, a turbine, a secured well external dwelling, water assortment; the trek to get water and return take more than 30 min.
	Sanitation	HH discovered pit latrines, bucket latrines, general populace latrines and no infrastructure.
	Cooking Fuel	HH uses solid fuels such as charcoal, firewood, coal, grass, livestock manure and crop leftovers to cook.
	Flooring	The floor is built of sand, manure or primitive (Katcha) materials.
	Electricity	HH does not have access to energy.

Source: Pakistan Brurer of Statistics (PBS).

Salahuddin & Zaman, 2012; Saleem et al., 2019; Shabbir & Zeb, 2020; Sial et al., 2015; Wen et al., 2022; Yaqoob, Ali, et al., 2022; Yu et al., 2020). From 2007 to 2011, deprivation in education has increased by 18% and got a further worsening of 15.49% from 2011 to 2014. In addition, the literature showed that a lack of cooking fuel and other technologies of cooking leads to health issues and speeds up deforestation (Anser et al., 2021; Arasu et al., 2021; Arif, 2004; Cao et al., 2022; Chandrasiri et al., 2012; Chen et al., 2022; Chevalier & Ouédraogo, 2009; Dai et al., 2022; Ge et al., 2022; Liu et al., 2022; Mughal et al., 2022; Salahuddin & Zaman, 2012; Saleem et al., 2022; Shabbir, 2020; Uroos et al., 2021; Yaqoob, Jain, et al., 2022; Yikun et al., 2020). We have also recourse to provinces-level estimations for headcount and contribution of each dimension and the indicator that exacerbates poverty (Table 4).

The estimated headcount has ranged from 6.09 (rank # 1) to 44.99 (rank # 36) for all the years. The rural areas of Sindh, KPK and Baluchistan have found more depression in poverty as relative to urban areas. Southern Punjab is also badly affected by low nutrition and needs optimal measures (Muhammad et al., 2022; Shabbir et al., 2021; Shahid et al., 2020). However, the percent contribution of each dimension and indicator responsible for poverty has been estimated and shown in Table 5 (columns 2–5).

5. Conclusion

This study has estimated the MPI for four provinces of Pakistan. These sectors are further classified into different subdimensions/indicators such as schooling, health and living standards. Moreover, absolute and relative measures of change have also been estimated. We have also estimated the percentage contribution of each indicator and dimension to poverty. Child mortality, nutrition, child school attendance and

Table 2. Different dimensions of multidimensional poverty.

Years	Pakistan										Changes in absolute terms						Changes in relative terms					
	2003-2004	2007-2008	2011-2012	2014-2015	2018-2019	2003 vs. 2007	2007 vs. 2011	2011 vs. 2014	2014 vs. 2018	2018 vs. 2019	2007 vs. 2011	2011 vs. 2014	2014 vs. 2018	2018 vs. 2019	2007 vs. 2011	2011 vs. 2014	2014 vs. 2018	2018 vs. 2019				
H (%)	27	24	20.2	18	16.4	-4.5	-4.1	-1.9	-2.1	16.4	-4.1	-1.9	-2.1	16.4	-16.7	-9.09	-11.2	-11.2				
MPI (M0)	0.13	0.11	0.09	0.1	0.07	-2.76	-1.71	-0.81	-0.89	0.07	-1.71	-0.81	-0.89	0.07	-16.2	-9.2	-11.5	-11.5				
A (%)	44	41.5	41.7	42	41.3	0.35	0.24	-0.08	-0.46	41.3	0.24	-0.08	-0.46	41.3	0.61	-0.09	-0.99	-0.99				

Source: Author own estimation.

Table 3. Different indicators and dimensions contribution of MPI (%).

Indicator/dimension	2003–2004	2007–2008	2011–2012	2014–2015	2018–2019
Health indicators	59.80	58.00	54.01	53.99	52.09
Child mortality	33.19	30.69	26.09	27.01	25.02
Nutrition	29.50	27.90	26.69	27.03	27.09
Education indicators	9.15	8.05	13.09	15.49	17.09
Child school attendance	6.34	7.69	11.02	12.09	15.00
Years of schooling	0.51	0.71	2.31	3.03	2.59
Living standard indicators	35.06	33.06	32.90	30.19	30.00
Flooring	9.24	8.20	8.59	8.21	8.10
Improved sanitation	8.54	7.50	7.55	7.00	6.70
Assets ownership	3.06	4.04	3.20	2.30	1.59
Electricity	2.06	1.26	1.06	0.72	0.89
Improved drinking water	0.86	0.66	1.14	1.56	2.61
Cooking fuel	13.29	11.69	11.37	10.62	10.14

Source: Author own estimation.

Table 4. Proportion contribution of subdimensional factors in multidimensional poverty.

Provinces	Years of schooling	Nutrition	School attendance	Child mortality	Sanitation	energy	Flooring	Water	Assets	Cooking fuel
Baluchistan	1.67	28.69	15.97	20.16	8.13	0.16	11.3	0.12	1.01	12.78
KPK	7.16	28.04	13.39	36.25	2.23	0	1.97	3.09	2.16	5.72
Punjab	3.08	27.8	14.89	28.25	7.3	0.54	5.81	2.05	1.68	8.59
Sindh	0.78	27.56	7.23	37.87	6.81	0.26	2.64	2.95	3.4	10.58

Source: Author own estimation.

Table 5. Headcount ranks and multidimensional poverty.

Provinces	Headcounts ranks 2003	Headcounts ranks 2007	Headcounts ranks 2011	Headcounts ranks 2014	Headcounts ranks 2018
Baluchistan	524	549	589	634	675
KPK	567	583	631	667	697
Punjab	634	675	745	825	895
Sindh	532	566	602	668	696
Total	2257	2373	2567	2794	2963

Source: Author own estimation.

cooking fuel have been identified as major determinants of poverty. The empirical findings of our exploration assure past researches without a doubt, so the strategies. In any case, this similitude of results demonstrates that strong arrangements could not be carried out at the provinces level. The ramifications of our review are added to ensure that the schooling area, human health reforms and expectations for everyday comforts are the critical elements to advance them as a general rule and to adjust their arrangements to the separate necessities of each district, specifically.

The primary reason is that multidimensional destitution incorporates those variables that have more grounded social connections. Social advancement is the way to decrease destitution. It further helps the public authority in deciding a person's socio-economic life, forming economic and social approaches, apportioning government reserves, anticipating destitution decrease and decision making. Therefore, policy-makers should adopt those policies that mobilize social welfare in order to combat poverty and enhance social well-being in these regions. The future researchers may use country-level dataset and compare the results with each country to better understand the real facts and figure behind these countries policies implications. Future

researchers may also use cross-region dataset with different groups of states or countries and then compare their results.

Disclosure statement

No potential conflict of interest was reported by the authors.

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