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Deciphering Multidimensional Poverty in South Africa: Exploring the Socio and Macroeconomic Factors

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ABSTRACT

Poverty in South Africa extends beyond income deprivation, reflecting a complex web of constraints that limit individuals' freedoms and capabilities. Grounded in Amartya Sen's Capability Approach, this article redefines poverty as the lack of opportunity to achieve well-being across multiple dimensions with the primary objective to analyze multidimensional poverty in South Africa, and to establish how it can be measured to more specifically address and alleviate it in all its dimensions. This article evaluates poverty through seven interconnected dimensions: living standards, inequality, unemployment, education, health, interest rates and inflation, and financial inclusion. Methodologically, the study adopts a mixed approach combining qualitative insights with quantitative analysis through the Vector Error Correction Model (VECM) and supporting diagnostic tests. The most significant finding is that unemployment, school enrolment, real interest rates, and net personal wealth are the most influential drivers of poverty. These results confirm the complex and multifaceted nature of deprivation in South Africa. The article further shows that multidimensional poverty can be measured dynamically through time-series analysis, which reveals long-term relationships between key socioeconomic variables and economic well-being. Recommendations include integrating education with employment pathways and stabilizing macroeconomic variables such as interest rates and inflation to support sustainable poverty reduction.

1. Introduction

Multidimensional poverty is a compounded subject that extends far beyond the conventional measures of poverty. It encompasses a variety of deprivations in a broad radius of dimensions of the well-being of humans.

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As a means to address this issue effectively, it is important to have comprehensive, all-inclusive, understanding of multidimensional poverty and its variables, both socio economic and macroeconomic, that contribute to it. As noted by Fransman and Yu (2019); Bila & Biyase, (2021); UNECE, (2021), poverty can be assessed using either objective or subjective measures. An example of subjective poverty would be someone deeming themselves poor due to a comparison made to those in the same circles or even the same neighborhood. Poverty is also often times defined using income, however, over the years there have been developments and advancements to the measurement of poverty, including multidimensional poverty such as The Multidimensional Poverty Measure (MPM) which is calculated by the world bank (World bank, 2024). These provide harmonized indicators on education and basic infrastructure alongside a monetary headcount (World Bank, 2025; OPHI & UNDP, 2024).

South Africa also uses a national MPI (SAMPI) that adapts the global framework and adds an economic-activity dimension via unemployment, offering a context-specific lens (Parliamentary Budget Office/MPPN Roundtable Summary, 2024). Now this calculation only includes access to education and infrastructure in addition to the monetary headcount ratio which excludes a variety of dimensions of poverty that need to be included to effectively address poverty. There are more measures beyond fragmented education and infrastructure in which people experience deprivations, such as health, inequality, living standards, access to resources, including the impact of interest rates and inflation. Measuring poverty is one of the most important tools in efforts to tackle it. By identifying who falls into the different dimensions of multidimensional poverty, these measurements help allocate resources more effectively and guide interventions in a more focused way. They offer a sense of how severe poverty is and how it shifts across different regions and over time. This makes it possible to pinpoint which programs are likely to have the greatest impact in reducing poverty. For example, in South Africa: (i) energy-supply constraints and load-shedding hinder study time and service delivery; (ii) clinic distance/transport costs reduce health-service use; (iii) youth unemployment elevates the SAMPI economic-activity deprivation; and (iv) rate hikes and inflation raise debt burdens for low-income households (World Bank, 2024). Alongside to analyzing the socioeconomic and macroeconomic dimensions of poverty in South Africa, it is crucial to include financial inclusion as a dimension of poverty with the purpose of eventually solving for how financially excluded people can be accommodated in a way that does not further deprive them in addition to the deprivations that they already face. This study seeks not only to develop a measurement of multidimensional poverty, but to also address the disparities that come with falling into one or more of the categories (FinScope South Africa, 2023; Global Findex, 2021).

A number of scholars (Bronfman, 2014; Kane, 2008; Bici & Çela, 2017; Rodrigue, Kneebone, and Reeves, 2016; OPHI & UNDP, 2024; World Bank, 2024; Jackson, 2023) have explored various ways to measure poverty through a multidimensional lens, yet such studies have seldom concentrated on the Sub-Saharan African region. Sida (2017) identifies essential aspects like access to opportunities and resources as vital elements of poverty, while Bici and Çela (2017) underscore the pivotal role of education. Similarly, Rodrigue, Kneebone, and Reeves (2016) stress the importance of healthcare access and employment status as integral to understanding poverty's complexity. These differing perspectives highlight the absence of a unified framework for defining the dimensions of poverty. Given recent global and local developments, such as the COVID-19 pandemic, ongoing conflict in Israel, severe power outages, and rising unemployment, there is a pressing need for updated, context-specific research, especially focused on the realities in South Africa. Now, this study aims to focus on socioeconomic and macroeconomic dimensions of poverty, including financial inclusion, that mainly affect

South Africa namely, standard of living, inequality, unemployment, education, health, interest rates and inflation and financial inclusion.

According to the World Bank (2024) South Africa has taken a just number of steps in improving the well-being and general standard of living of its citizens since apartheid ended in 1994, where many inequalities that exist today stem from. progress has stalled in recent years amid weak growth and service-delivery constraints. The Macro Poverty Outlook (2024) and Poverty & Equity Briefs highlight persistent poverty at higher national/income-class lines despite post-pandemic rebounds. Now, with how young South Africa's democracy is, there is a theoretical and empirical gap in the discussion on multidimensional, hence there is a need for this study. In addition to the structural challenges and weakened economic growth that have undermined its progress in alleviating poverty, the covid-19 pandemic further contributed to the inflated numbers of poverty in South Africa which is another context where multidimensional poverty has not been explored. With approximately 30% of South Africans still living below the extreme poverty line of $1.90 per day, there is a clear and urgent need for further research that conducts a thorough multidimensional examination of poverty across the African continent (Statista, 2023). The primary objective of this study is to analyze multidimensional poverty in South Africa to establish how poverty can be measured to more specifically address and alleviate it in all its dimensions.

2 Literature Review

A theoretical framework, on the other hand, provides a foundation for this study and provides a reputable reference for the arguments made in this study. It also provides for context for the comprehension of the findings which informs the data analysis approach and many of the approaches used to complete this study. Using a solid theoretical foundation has been effective in studies about socio-economic issues because it allows the researcher to collate multidimensional perspectives (Comim and Puyana, 2020; UNDP HDR 2022).

A literature review is particularly essential for this study for 5 reasons. Firstly, it assists in the construction of theoretical framework for the study by highlighting the significant concepts and theories that are relevant and material to multidimensional poverty. It also allows the researcher to comprehend how multidimensional poverty has been identified and measured (Bhatta and Palikhe, 2020; Booth et al., 2022; D'Attoma & Matteucci, 2023). Secondly, it is significant in identifying research gaps in the study on the various multidimensional poverty aspects South Africa and reveals areas that may require further research which guarantees that the study addresses unexplored aspects of multidimensional poverty (Shrestha, 2021; UJ, 2020). Thirdly, it ensures that there is no duplication of research because a comprehensive literature review will assist in avoiding repetition of work that has already been previously done and ensures that the research is unique in its findings on multidimensional poverty and builds on what currently exists (Snyder, 2019; Booth et al., 2022). The fourth reason is that it allows for methodological insights because by reviewing past literature, insights into how multidimensional poverty is measured will come forth and allow for refinement and choice in the necessary tools to measure multidimensional poverty (Toracco, 2021). Lastly, a literature review establishes context and relevance by placing the study in a broader context of poverty which showcases it relevance with respect to ongoing discussions in this particular field which demonstrates its contribution to the field of multidimensional poverty (UNDP HDR 2022; World Bank, 2022; World Bank, 2024).

While a theoretical framework is also essential to this study for the following 3 reasons. Firstly, it facilitates a multidimensional approach by allowing a cross-factor analysis of the various contributors of poverty. Secondly,

it provides support for the study to explore the intricate essence of poverty in a manner that analyses poverty multidimensionally. Lastly, it offers an organized approach in identifying the key areas where policy intervention can be the most effective (Comim and Puyana, 2020; Gasper, 2019; Alkire et al, 2020, UNDP HDR 2022). By rooting this study in a well-defined framework, the study will align with an established theory and build on the potential of the framework to provide valuable findings and recommendations.

Some main theoretical frameworks closely align to the purpose of this study and have been extensively evaluated before selecting the framework that this study needs to stand firm on, namely, the basic needs approach, the social exclusion theory, Maslow's hierarchy of needs and the capability approach. Below is a high-level overview of each of these frameworks and how they align with the concept of multidimensional poverty.

Basic Needs Approach (BNA)

The Basic Needs Approach is a development theory that is focused on ascertaining that people have access to basic goods and services needed to achieve the minimum standard of living. It came about in the 1970s as a reactionary measure to the restrictions of income-based poverty measures by the International Labor Organization (ILO), placing an emphasis on the fulfilment of basic human needs as the key goal objective of development policies (Streeten et al., 1981; ILO, 1976). This approach was formed on the foundation of earlier thinkers such as Paul Streeten and Mahbub ul Haq, who worked tirelessly on development economics and alternative poverty alleviation measures (Haq, 1976).

Social Exclusion Approach

The Social Exclusion Approach is a multidimensional poverty framework that was first introduced by René Lenoir in his book Les Exclus (1974), who was a French sociologist. Lenoir (1974) used the term 'Social Exclusion' to describe individuals who were excluded from society, such as individuals with disabilities, unemployed individuals, or marginalized groups of people. This approach analyses poverty and inequality through the perspective of exclusion from significant economic, social, and political resources. It outlines the way in which individuals or societies are excluded from completely participating in the economy due to structural restrictions, discrimination, or systemic inequalities. As opposed to income-based poverty measures, this approach takes into consideration the relational and societal components that contribute to deprivation.

Time to time variation

Poverty in South Africa has passed through crucial changes from the past to the present where forecasts of future developments have highlighted progress while challenges have persisted. Historically, South African poverty has been deeply rooted in apartheid, colonialism and racial segregation that was institutionalized which restricted the majority of the black population from gaining access to economic opportunities. Now, post-apartheid, there have significant strides that have been made in an effort to alleviate poverty through government interventions such as public expenditure, social grants and initiatives such as the National Development Plan (NDP). However, Statista (2020) reports that poverty levels in South Africa peaked in the early 2000s where different poverty alleviation programs eventually led to decreased poverty levels until 2011 when economic stagnation began to increase and there were also increased unemployment and inequality rates.

In terms of the future, the country's Vision 2060 and the NDP's 2030 goals continue to aim towards decreased levels of poverty and economic growth that is inclusive, improved education, healthcare and increased employment. However, the COVID-19 pandemic and the global economic shocks such as the Ukraine-Russia

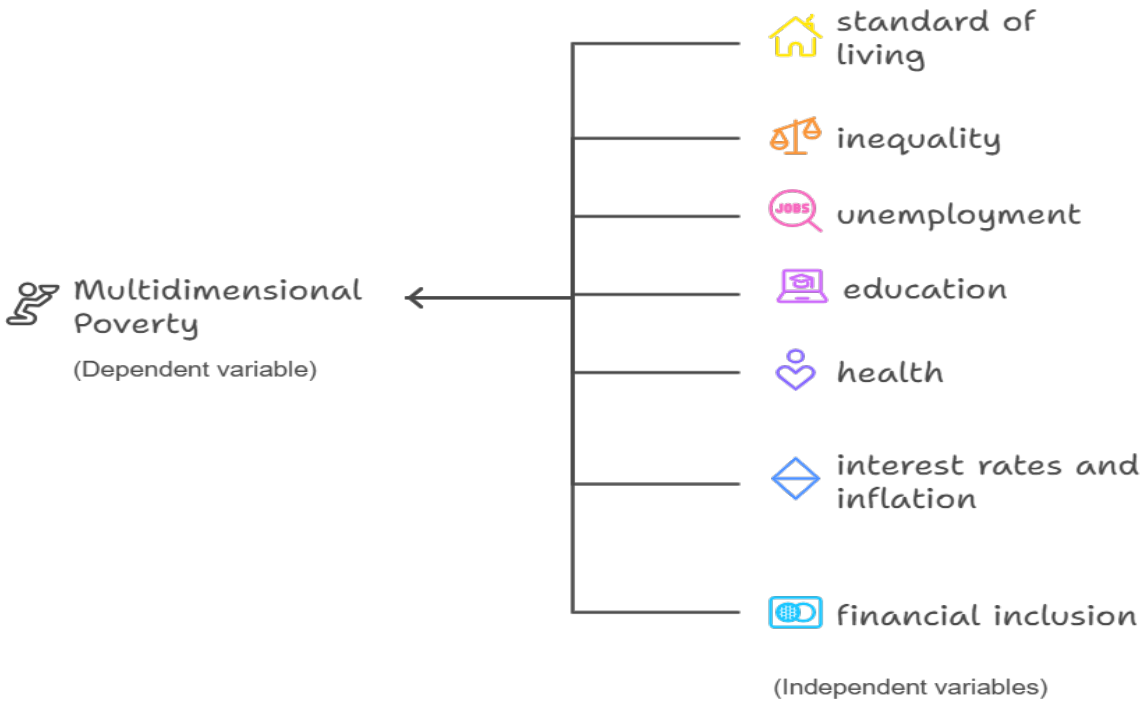
conflict and the global financial crisis continue to pose significant challenges to achieving these goals (National Planning Commission, 2020; Stats SA, 2020).

Conceptual Framework

This study embraces a multidimensional approach to thoroughly comprehend poverty by conceptualizing multidimensional poverty as the dependent variable impacted and influenced by different dimensions of the socio-economic well-being of people within South Africa. The conceptual framework submits that multidimensional poverty is a compounded concept influenced by various dimensions namely, standard of living, inequality, unemployment, education, health, interest rates and inflation and financial inclusion. Every one of the dimensions constitutes distinct characteristics of the lived experiences of individuals that contribute to their poverty status. By studying the influence of the various dimensions of poverty, this study focuses on furnishing information into the dynamic fundamental drivers of poverty and to inform policy interventions directed at addressing poverty in the South African context.

The relationship between the various dimensions of poverty and multidimensional poverty needs a conceptual framework to clearly define the influence each dimension has on multidimensional poverty, as illustrated in Figure 1.

Figure 1: Conceptual framework



Source: Realeboga and Mpundu (2025)

Macroeconomic variables often have the potential to construct environments that put people in climates where they are more susceptible to poverty while on the other hand, socio economic factors such as unemployment, education and healthcare also hold a significant place in shaping the outcomes of poverty (Ozili, 2020). Now, financial inclusion is quite a key socio-economic dimension that provides marginalized groups with access to financial services such as lending and investments to better facilitate and empower themselves to not only

improve their economic well-being but to also increase their chances of living a life outside of poverty and in an environment where they can practice freedom of choice (Ibrahim et al., 2022).

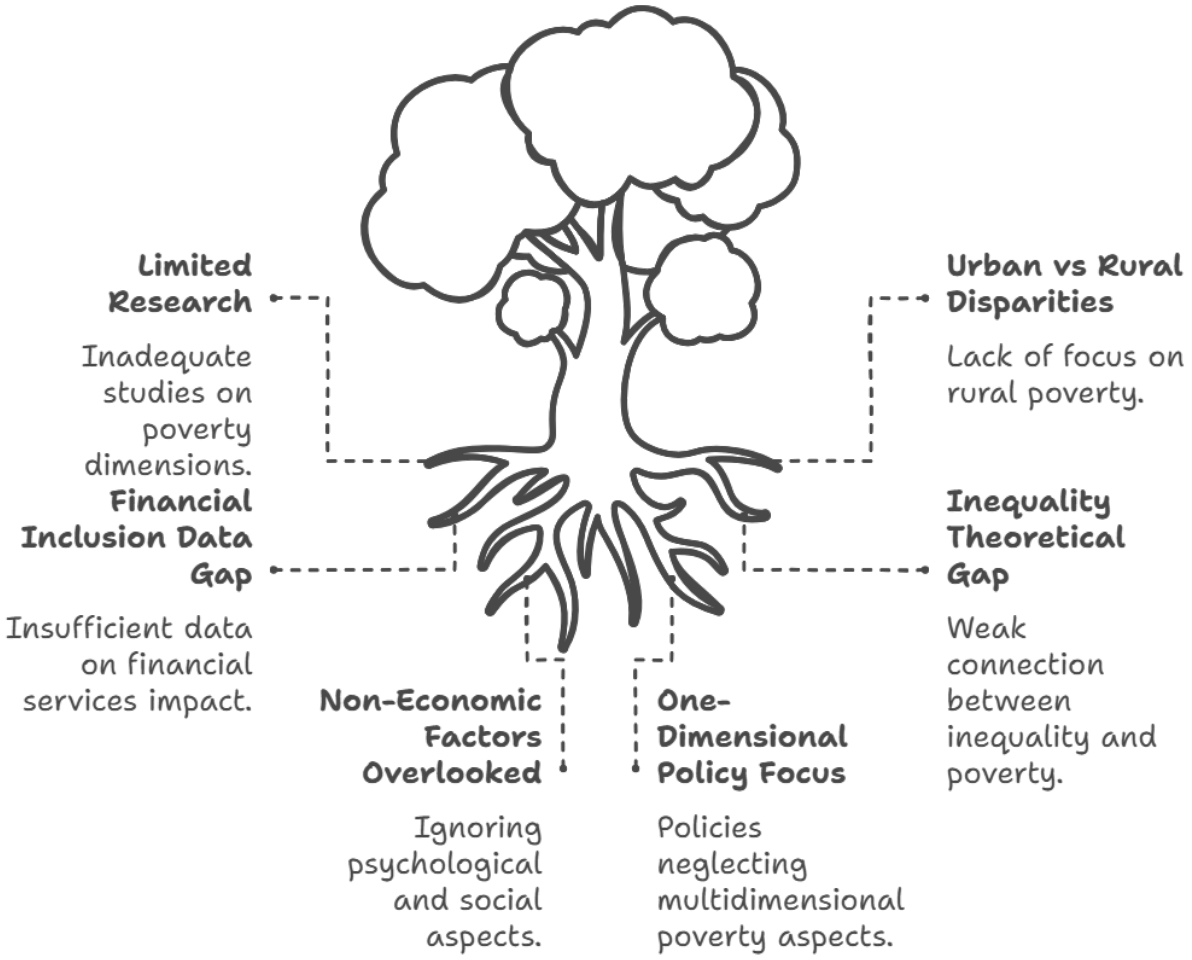
Table 1: Dimensions of Poverty, factors influencing Poverty

Dimension	**Poverty enablers**	**Poverty inhibitors**
Living Standards	Lack of basic goods, shelter and sanitation	Public expenditure on infrastructure
Inequality	Income inequality	Equality promotion policies and wealth distribution
Unemployment	Increased unemployment	Increased employment opportunities
Education	Poor quality education	Improved quality education
Health	Inadequate healthcare systems	Adequate healthcare systems
Interest rates and Inflation	High inflation and interest rates	Stable inflation rates and favorable interest rates
Financial Inclusion	Lack of access to financial services	Increased access to financial services

Source: Source: Realeboga and Mpundu (2025)

The table above presents the 7 dimensions of poverty that illustrate how particular factors can either increase or decrease the levels of poverty and each dimension is significant for addressing poverty at a local, national and global level. For example, UNESCO (2019), completed a study that indicated that increasing global access to education for children living in extreme poverty could reduce the levels of poverty by up to 7%. The covid-19 pandemic highlighted the significance of adequate healthcare systems in reducing the levels of poverty because it was the poorest of populations that were disproportionately impacted. South Africa's Expanded Public Works Programme (EPWP) was crafted to create temporary employment, and it created over 2 million employment opportunities across South Africa between 2019 and 2022 which is an example of how government intervention in employment has the possibility to provide immediate poverty relief. These are some examples of how the above dimensions have had a significant impact on poverty.

Figure 2: Multidimensional poverty gap analysis



Source: Source: Realeboga and Mpundu (2025)

In conclusion, by addressing these research gaps that exist in multidimensional poverty literature, this study aims to contribute to an extensive and multidimensional comprehension of poverty in South Africa by considering the research gaps stated above. The focus on financial inclusion, inequality and the relationship between the different factors provides new awareness on how poverty can be alleviated within the South African context.

Scope and limitations of study

A key strength of this study lies in its foundation on secondary data which provides access to large datasets that have been collated over long periods of time which provides an extensive basis for the investigation which enables the study to produce findings from well documented trends in poverty fluctuations. This also aligns with South African government initiatives such as Sustainable Development Goals (SDGs) that are aimed at poverty alleviation.

However, reliance on secondary sources also constrains variable choice, update frequency, and cross-survey harmonisation. Definitions of indicators (e.g., “employment”, “access to basic services”) may change over time or differ across datasets, which can introduce comparability issues and attenuate estimated relationships.

Nonetheless, like any study, this study is not without limitations. Firstly, the availability and quality of data are possible constraints as valuable data may lack specific factors that the researcher would have collected from primary sources of data. This limitation may therefore impact the extent of the research, especially where particular dimensions are not extensively presented. Specifically, one of the data limitations has been finding data for life expectancy, which is a proxy for health, the model has therefore had to be completed without life expectancy. In addition, due to the absence of reliable data for the living standards dimension, the model could not include a direct indicator such as housing quality, access to water, sanitation, or electricity. The conventional proxy for living standards in poverty research is GDP per capita; however, in this study GDP per capita has been employed instead as a proxy for overall poverty. This choice reflects its widespread use as a summary indicator of economic welfare (Ravallion, 2016; World Bank, 2020) and its ability to provide a consistent macroeconomic benchmark when multidimensional datasets are incomplete. Nonetheless, GDP per capita is limited: while it captures average output, it fails to account for intra-household distribution and non-income deprivations, which are central to multidimensional poverty (Alkire & Foster, 2020; Stats SA, 2023a). This reliance may therefore understate or overlook poverty in contexts where economic growth coexists with inequality, service delivery gaps, and spatial disparities in access to basic services. Even though this dimension (health) has a theoretical impact as shown in the literature review, there is no data to show the empirical impact. Excluding a health proxy, risks understating deprivations for populations where morbidity and access barriers are binding. This omission may bias composite indices downward for high-burden areas and weaken the study's ability to detect interactions between health and other dimensions (education, employment, living standards). Similarly, relying on GDP per capita as a proxy for multidimensional poverty may obscure localised deprivation in provinces or groups where aggregate income levels are rising but multidimensional deficits remain entrenched. Measurement error (e.g., recall bias in household surveys), non-response, and under-coverage of informal settlements may further affect external validity. Where possible, imputation or sensitivity checks are reported; however, the absence of a health indicator remains a material limitation.

Secondly, contextual limitations appear from using data in the South African context. Now, while that data will provide information on poverty alleviation strategies in South Africa, it may not be applicable to other economies that have not experienced apartheid and particular economic disparities experienced by the individuals in South Africa. Lastly, this study will be susceptible to a time-frame limitation as the study will only source data from the past 6 years to ascertain relevance, it may not present long-term patterns or cumulative endeavors to address poverty.

Findings are most generalizable to South Africa's institutional and historical setting; extrapolation to other countries should be cautious. Subnational heterogeneity (province/metro/rural) and service-delivery variation may produce local effects that national aggregates obscure (ecological fallacy risk). The six-year window improves topical relevance but reduces the ability to observe slow-moving structural shifts or intergenerational dynamics; it may also coincide with shocks (e.g., pandemic, energy constraints) that induce structural breaks, complicating trend inference. Because the analysis is observational, causal attribution is limited; results indicate associations rather than treatment effects. Model choices (indicator selection, cut-offs, and weights) can influence rankings; although robustness checks are outlined, residual specification risk remains.

Identified research gaps (arising from the limitations)

- Dynamic poverty transitions: Limited capacity to track movements into/out of multidimensional

poverty at the individual or household level over time (chronic vs transient poverty).

- Health and wellbeing measurement: Lack of a workable health proxy (e.g., mortality/HALE/self-reported health or service-use indicators) restricts analysis of health–education–employment linkages.
- Multidimensional poverty measurement: Absence of direct data for the living standards dimension meant the study relied on GDP per capita as a proxy for overall poverty. While widely used, GDP per capita captures average income/output but masks non-income deprivations.
- Intersectionality and vulnerable groups: Insufficient granularity to analyse intersecting deprivations by gender, age (youth/elderly), disability status, migrants, and residents of informal settlements.
- Spatial precision: Gaps in ward- or settlement-level indicators limit the identification of high-deprivation pockets for targeted interventions.
- Financial inclusion dimension depth: Data are thin on usage quality (over-indebtedness, fees, digital exclusion), making it hard to distinguish mere access from meaningful use.
- Energy and climate stressors: Current indicators only partially capture energy poverty, load-shedding impacts, and climate-related shocks on livelihoods and service delivery.

3 Methodology

The scope of this study is confined to analyzing multidimensional poverty in the context of South Africa using secondary data from reliable sources. This study therefore explores the 7 dimensions of poverty; living standards inequality, unemployment, education, health, interest rates and inflation and financial inclusion by centering the study on the relationship between these various dimensions to accelerate the levels of poverty. However, due to data limitations, the empirical model used in this research does not include the health and living standards dimensions, despite their recognized significance in multidimensional poverty assessments. Through the examination of these dimensions of poverty, this study aims to add to the growing body of research focused on strategies for poverty alleviation, particularly in developing economies such as South Africa. Data was analyzed using Eviews 14.

$$GDP\ per\ capita_t = \alpha + \beta_1 PNW_t + \beta_2 UNM_t + \beta_3 SE_t + \beta_4 RIR_t + \beta_5 INF_t + \beta_6 DC_t + \varepsilon_t \ldots\ldots\ldots \text{eqn 1.}$$

Where:

$GDP\ per\ capita$ – Gross Domestic Product

PNW – Personal Net Wealth (proxy for Inequality)

UNM – Unemployment

SE – School Enrolment (proxy for Education)

RIR – Real Interest Rates

INF – Inflation Rates

DC – Domestic Credit (proxy of Financial Inclusion)

α - intercept

β_1 ----- β_6 – parameter estimates

ε_t – error term

Table 2: Indicators and Data sources for measuring dimensions

Dimensions	Indicators
1. Inequality	Personal Net Wealth (PNW)
2. Unemployment	Unemployment rate (UNM) (Poverty and Employment in South Africa, 2021).
3. Education	School enrollment (SE) (Education and Development in South Africa, 2022).
4. Real interest rates	Real interest rates trends (RIR) (National Treasury (South Africa), 2020).
5. Inflation	Inflation rates trends (INF)
6. Financial inclusion	Domestic credit (DC)

Source: Realeboga and Mpundu (2025)

Stationarity tests

Time series data regularly exhibit non-stationarity which may lead to factitious regression results if they are not correctly addressed. A stationary time series is made up of statistical properties such as variance, mean and autocorrelation that remain unchanged over time (Gujarati & Porter, 2009). However, non-stationarity data, may carry trends or changing variances which makes it challenging to establish significant relationships between factors. If a model is implemented to non-stationarity data, the approximated relationships may be deceptive, as factors may appear to have relationship purely because they follow alike trends and do not have an actual causal link (Enders, 2014).

Cointegration tests

Cointegration tests analyze whether a set of non-stationary move in conjunction with one another in the long run, proposing an equilibrium relationship regardless of short-term fluctuations. If cointegration is found, it substantiates the use of the VECM model, ascertaining those short-term fluctuations from equilibrium are rectified over time. Johansen's cointegration tests will be used by employing 2 main test statistics. The first test is max-eigenvalue test which is a test that analyzes the null hypothesis of at most r cointegrating equations opposed to the alternative of $r+1$ cointegrating equations. A significant test statistic therefore displays the existence of added cointegration relationships (Johansen & Juselius, 1990). The second test is the trace test which is a test that examines the null hypothesis that there are at most r cointegrating equations opposed to the alternative larger number. A significant test statistic in this case therefore displays cointegration between the variables. These tests play a crucial role in validating the validity of the model and its appropriateness in extensively analyzing multidimensional poverty in South Africa.

Stability tests

Stability testing is a crucial diagnostic step in time series analysis, primarily used in this study to evaluate whether this study's model is both reliable and robust over time. A stable model ensures that the relationships among the variables do not change unpredictably, which is essential for accurate forecasting and valid statistical inference.

One widely used method for assessing model stability is by reviewing the inverse roots of the autoregressive (AR) characteristic polynomial. This technique is particularly relevant in models such as ARMA (Autoregressive Moving Average) or VAR (Vector Autoregression) models.

4 **Data Analysis and Interpretation**

Unit Root Test

Table 3 presents the unit root test results using the ADF and PP tests at the level form, while Table 3 displays the tests at the first difference. Additionally, Table 4 shows the results of the unit root tests at the second difference, as not all variables became stationary after the first differencing. The determination of stationarity is based on the p-value, where the null hypothesis is rejected if the p-value is less than the significance level of 5%, indicating that the variable is
stationary.

Table 3: ADF and PP at level

Variable	**Model Specification**	**ADF test**	**PP Test**	**Conclusion**
	LEVEL			
GDPC	Intercept	0.602	0.561	Non-stationary
NPW	Intercept	0.145	0.120	Non-stationary
UNM	Intercept	0.988	0.995	Non-stationary
SE	Intercept	0.586	0.569	Non-stationary
RIR	Intercept	0.121	0.109	Non-stationary
INF	Intercept	0.013	0.000	Non-stationary
DC	Intercept	0.250	0.261	Non-stationary

Table 4 ADF and PP at 1st difference

Variable	**Model Specification**	**ADF test**	**PP Test**	**Conclusion**
	1st LEVEL			
GDPC	Intercept	0.003	0.004	Stationary
NPW	Intercept	0.000	0.000	Stationary
UNM	Intercept	0.001	0.001	Stationary
SE	Intercept	0.011	0.009	Stationary
RIR	Intercept	0.000	0.000	Stationary
INF	Intercept	0.000	0.000	Stationary
DC	Intercept	0.000	0.000	Stationary

Stationary at Level: All variables are non-stationary at level based on the ADF test, though further investigation could be useful due to the inconsistency with the PP test.

Stationary after 1st Differencing: Stationarity is attained for all variables after applying the first difference.
The results in Table 3 indicate that all variables are non-stationary at level form, suggesting that differencing is required. However, as shown in Table 4, all variables are found to be stationary at first difference, denoted as I(1). In cases where discrepancies arise in the stationarity results across different model specifications, the results

with the intercept model should generally be preferred, as it is the most commonly used in practice for representing the variables (Wooldridge, 2013).

Johansen Cointegration test

Table 5: Cointegration analysis with Trace Values

Hypothesized no. of CE(s)	Eigenvalue	Trace statistic	0,05 Critical Value	Probability **
None*	0.907	191.133	125.615	0.000
At most 1*	0.758	119.878	95.754	0.000
At most 2*	0.652	77.348	69.819	0.011
At most 3	0.595	45.701	47.856	0.079
At most 4	0.331	18.581	29.797	0.523
At most 5	0.173	6.534	15.495	0.632
At most 6	0.027	0.826	3.841	0.363

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 6: Cointegration analysis with Maximum Eigen Values

Hypothesized no. of CE(s)	Eigenvalue	Max- Eigen Statistic	0,05 Critical Value	Probability **
None*	0.907	71.255	46.231	0.000
At most 1*	0.758	42.53	40.078	0.026
At most 2	0.652	31.647	33.877	0.090
At most 3	0.595	27.119	27.584	0.057
At most 4	0.331	12.047	21.132	0.543
At most 5	0.173	5.708	14.265	0.651
At most 6	0.027	0.826	3.841	0.363

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The trace and eigenvalue test results presented in the tables indicate the presence of three cointegrating equations at the 5% level of significance. The trace test is especially useful when there may be more than one cointegrating relationship among the variables. It tends to be preferred in such cases because it accounts for multiple cointegrating vectors under the alternative hypothesis.

The trace test rejects the null hypothesis of no cointegration (None) because the probability value (0.000) is well below the 5% threshold, and the trace statistic (191.133) exceeds the critical value (125.615) at the 5% significance level. The same is observed for “At most 1” and “At most 2” hypotheses, where their respective

probabilities (0.000 and 0.011) are less than 0.05, and their trace statistics (119.878 and 77.348) exceed the corresponding critical values (95.754 and 69.819).

Vector Error Correction Model

This model operates by restricting the long-run behavior of the endogenous variables to ensure they gradually return to their cointegrating equilibrium path, while still permitting short-run deviations. It effectively captures the speed at which variables adjust when they deviate from the long-run equilibrium, which is crucial for understanding how quickly equilibrium is restored after a shock.

A key feature of the VECM is the Error Correction Term (ECT). If the coefficient of the ECT is negative and statistically significant, it suggests that any short-term imbalances between the variables will gradually correct themselves, reinforcing the stability of the long-run relationship. In other words, the system has a built-in mechanism that counteracts deviations and helps bring the variables back to equilibrium over time.

Table 7: Results of the VECM for GDP per Capita in the long run

Variable	Cointegrating Equation	T-stat	Standard Error	Constant
GDPC(-1)	1.000			35531.11
NPW(-1)	-9600.269	-5.722	1677.83	
UNM(-1)	-356.187	-15.608	22.821	
SE(-1)	-255.653	-28.401	9.001	
RIR (-1)	-239.511	-12.458	19.226	
INF(-1)	-47.196	-2.117	22.297	
DC(-1)	-15.844	-4.554	3.479	

Table 8 Results of the VECM for GDP per Capita in the short run

Error Correction	Cointeq1	T-stat	Standard Error
ΔGDPC	-0.613	-1.773	0.345
ΔNPW	0.000	0.832	0.000
ΔUNM	0.000	0.96	0.000
ΔSE	0.003	2.716	0.001
ΔRIR	-0.003	-2.349	0.001
ΔINF	0.002	1.993	0.001
ΔDC	0.003	0.608	0.005

The long-run cointegrating equation indicates the relationships between GDP per capita (GDPC) and a set of macroeconomic variables using annual data. The coefficients represent the impact of a one-unit change in each independent variable on the long-term level of GDPC.

- There exists a statistically significant negative long-run relationship between Net Personal Wealth (NPW) and GDP per capita (GDPC). Specifically, a one-unit increase in NPW is associated with a decrease of 9,600.269 units in GDPC. The corresponding t-statistic of -5.722 exceeds the critical threshold of 2 in

absolute value, confirming the significance of this relationship.

- Unemployment (UNM) also demonstrates a significant negative long-run relationship with GDP per capita (GDPC). A one-unit rise in the unemployment rate corresponds to a 356.187 unit decline in GDPC. The t-statistic of -15.608 strongly confirms the statistical significance of this relationship. This finding is consistent with economic theory, as elevated unemployment levels generally suppress economic productivity and growth.
- The coefficient of school enrolment (SE) is -255.653, with a highly significant t-statistic of -28.401. This implies that an increase in SE leads to a fall in GDP per capita. While this appears counterintuitive from a traditional Keynesian perspective, it might reflect structural inefficiencies or misallocation of savings/investment in the economy.
- A one-unit rise in the real interest rate (RIR) correlates with a 239.511 decrease in GDPC, with a t-statistic of -12.458. This strong negative and significant relationship is consistent with theory, higher interest rates can dampen investment and output.
- Inflation (INF) also shows a negative long-run relationship with GDPC. A one-unit rise in INF reduces GDPC by 47.196, and the t-statistic of -2.117 confirms significance. This suggests that inflation may be eroding purchasing power or destabilizing economic growth.
- Lastly, domestic credit (DC) shows a negative and significant effect on GDPC, with a coefficient of -15.844 and a t-statistic of -4.554. This may indicate that excessive debt accumulation is not fueling productive growth.

The constant term is 35531.11, which is positive, consistent with long-run economic theory that posits the constant captures the mean-reverting trend or baseline level of the dependent variable.
The short-run analysis evaluates the speed and pattern with which the system adjusts back to equilibrium after a shock, while also examining the impact of short-term variations in the explanatory variables on GDP per capita (GDPC).

- The error correction term (ECT) is -0.613, with a t-statistic of -1.773. While this is negative, indicating a tendency to restore long-run equilibrium after short-term shocks, the t-statistic is just below the threshold for significance, suggesting only marginal statistical evidence for adjustment.
- In the short run, changes in NPW (ΔNPW) and UNM (ΔUNM) have coefficients close to zero and t-statistics of 0.832 and 0.960, respectively, indicating insignificant effects on GDPC.
- The coefficient of ΔSE is 0.003, with a t-statistic of 2.716, which is positive and statistically significant. This means changes in expenditure/savings have a short-term positive effect on GDPC, which may suggest that short-term injections into the economy do yield a growth response.
- The real interest rate (ΔRIR) has a coefficient of -0.003 and a significant negative t-statistic of -2.349. This aligns with theory, where increases in interest rates reduce short-run growth.
- Inflation (ΔINF) has a coefficient of 0.002 and a t-statistic of 1.993, suggesting marginal significance. In the short term, inflation might positively impact nominal GDP due to pricing effects, though it may not reflect real economic growth.
- Domestic credit (ΔDC) has a coefficient of 0.003 and a t-statistic of 0.608, indicating a positive but insignificant short-run relationship with GDPC.

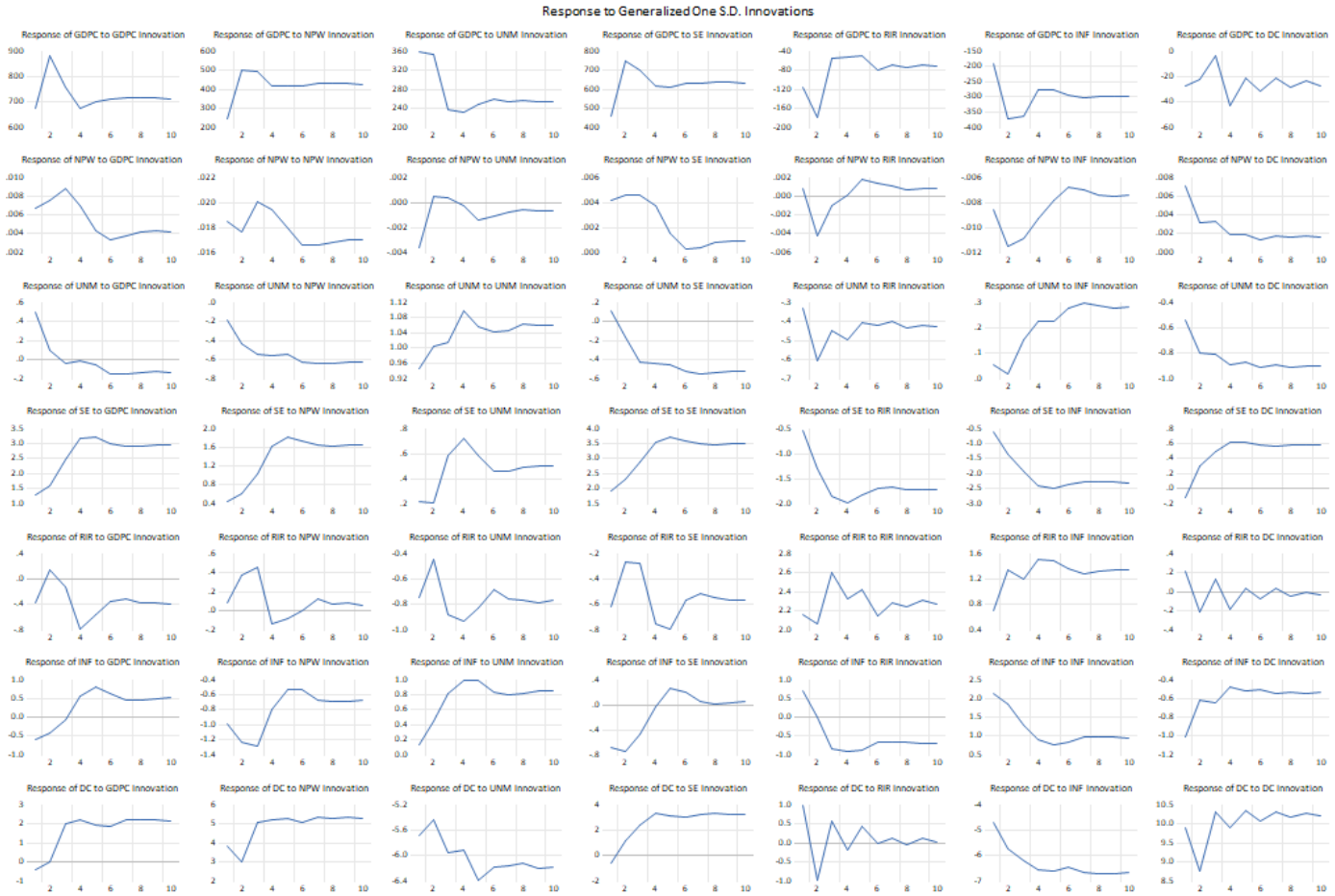
Variance Decomposition

Table 9: Results of variance decomposition

Variance period	Decomposition S.E	GDPC	NPW	UNM	SE	RIR	INF	DC
1	676.504	100	0	0	0	0	0	0
2	1150.962	93.371	2.744	0.161	3.453	0.066	0.033	0.178
3	1433.674	88.183	4.428	0.503	5.301	1.117	0.244	0.223
4	1617.018	86.691	4.751	0.568	5.928	1.538	0.193	0.323
5	1786.898	86.416	4.849	0.611	5.9	1.746	0.175	0.302
6	1946.046	86.229	4.867	0.616	6.063	1.749	0.162	0.315
7	2095.841	86.039	4.935	0.633	6.129	1.798	0.16	0.313
8	2235.559	85.875	4.978	0.641	6.214	1.818	0.153	0.316
9	2367.564	85.733	5.027	0.653	6.26	1.857	0.15	0.322
10	2491.475	85.615	5.058	0.659	6.317	1.879	0.145	0.326

- The focus of this comprehensive study is on multidimensional poverty in South Africa, with GDP per capita (GDPC) serving as the proxy for economic wellbeing. The variance decomposition results in Table 6 reveal that variations in GDPC are predominantly explained by its own past values, indicating strong inertia in the system. Over the long run, approximately 85.615% of the variation in GDPC is due to shocks in GDPC itself, followed by 6.316% from school enrollment (SE), 5.058% from net personal wealth (NPW), 0.659% from unemployment (UNM), 0.326% from domestic credit (DC), 0.145% from inflation (INF), and 1.879% from the real interest rate (RIR).
- During the initial period, the entire variation in GDPC is explained by its own past values, as expected, since no external effects have had time to propagate. By the third period, the share of variation due to GDPC itself declines to 88.183%, while SE accounts for 5.301%, NPW for 4.428%, RIR for 1.118%, and smaller shares from UNM (0.503%), INF (0.244%), and DC (0.223%).
- By the fifth period, GDPC still explains 86.416% of its own variation, with notable contributions from SE (5.900%), NPW (4.849%), and RIR (1.746%). The remaining variation is distributed among UNM (0.611%), INF (0.175%), and DC (0.302%).
- These findings indicate that in the short run, GDP per capita, as a proxy for multidimensional poverty, is primarily driven by its own momentum, reflecting structural consistency or persistence in economic conditions. In the medium to longer term, there is a gradual but visible influence from economic variables closely linked to poverty dynamics, particularly school enrollment behavior, personal net wealth accumulation, and financial variables like interest rates and credit access. This suggests that while GDP growth patterns are resilient, poverty-alleviation strategies must consider the cumulative and delayed effects of these macroeconomic variables.

Figure 3: Results of the Impulse Response Function



Source: Own compilation, EViews 14

The analysis in Figure 3, provides insight into how various macroeconomic variables dynamically respond to generalized shocks over a ten-quarter horizon, using a Vector Error Correction Model (VECM). The visualized impulse response functions depict the intensity and direction of responses, with above-zero movements indicating positive effects and below-zero movements indicating negative ones. These results reveal both short- and long-term interdependencies among critical economic indicators.

The response of Gross Domestic Product per Capita (GDPC) to its own innovation is immediately strong and positive, reaching a peak in the first quarter before gradually tapering off. This behavior implies a significant short-term self-reinforcing effect of GDP growth. However, GDPC's response to shocks in net personal wealth (NPW), unemployment (UNM), and inflation (INF) is more nuanced. While there is a slight initial increase, the response quickly turns negative in the subsequent quarters, particularly in the second and third, before returning toward a neutral position, indicating these effects are short-lived and primarily transitory.

Unemployment (UNM) shows a notable inverse relationship with GDP per capita, as evidenced by a sharp and immediate drop when GDP increases. This supports the traditional view that economic growth reduces unemployment. In contrast, a shock to unemployment itself initially causes a spike, suggesting a short-term amplification in joblessness due to labor market disruptions, followed by a gradual stabilization.

Overall, the impulse response analysis underscores the interconnected nature of macroeconomic variables, showing how shifts in one area can lead to significant, albeit sometimes short-lived, effects in others.

5 Conclusion and Recommendation

Key Themes and Insights from empirical results and discussions

Stationarity and Cointegration: The variables became stationary after first differencing, validating their suitability for VECM. The Johansen test revealed three cointegrating relationships, implying a long-term equilibrium among poverty dimensions and GDP per capita.

Negative Long-Run Relationships: The VECM long-run estimates showed that unemployment, real interest rates, inflation, net personal wealth, and school enrolment all have significant negative impacts on GDP per capita. These findings suggest that, structurally, increases in these indicators are associated with a decline in economic well-being, possibly due to inefficiencies or systemic issues in South Africa's labor and financial markets.
Short-Run Adjustment and Dynamics: In the short term, only school enrolment (positive) and real interest rates (negative) showed statistically significant effects on GDP per capita, highlighting areas for immediate policy intervention. The error correction term, although only marginally significant, indicates a moderate pace of adjustment back to equilibrium.

Variance Decomposition and Inertia: Over a ten-period horizon, GDP per capita was primarily influenced by its own shocks, reflecting high structural inertia in the South African economy. However, school enrolment and net personal wealth began to exert increasing influence, underscoring their growing relevance in shaping long-run poverty outcomes.

Impulse Response Analysis: The IRFs demonstrated that shocks to unemployment, inflation, and net wealth result in transitory negative effects on GDP per capita, while GDP's own shocks are strongly self-reinforcing. These patterns highlight the need for responsive and preventive policy mechanisms that can counteract short-term shocks before they affect long-term outcomes.

Implications for Policy and Research

The results affirm that poverty alleviation must go beyond income transfers, focusing instead on improving educational access, reducing unemployment, and ensuring affordable, productive credit systems. The negative long-run effect of school enrolment on GDP per capita may indicate mismatches between education and labor market needs, calling for curriculum reforms and job-readiness programs.

The dual nature of financial variables, showing both short-term and long-term influences, signals the need for nuanced financial inclusion policies, not merely expanding access, but also ensuring sustainable borrowing and investment practices. The significant equilibrium relationships found suggest that macroeconomic stability and poverty reduction are interdependent goals. Policies that affect interest rates, inflation, or credit markets must account for their knock-on effects on poverty dynamics.

Stabilize Macroeconomic Variables Affecting the Poor

An unexpected result of this study was the greater-than-anticipated influence of inflation and interest rates on poverty. These macroeconomic shocks disproportionately impact low-income households, especially where food and transport dominate household expenditure. Therefore:

- The South African Reserve Bank (SARB) and National Treasury should implement pro-poor inflation targeting strategies, particularly for essential goods.
- Social grants and food security programs should be indexed to inflation to preserve purchasing power among vulnerable groups.
- Introduce community-based monitoring mechanisms to assess and report inflation-related hardships in real time, allowing quicker policy responses.

These measures will provide relief while also fostering economic resilience.

Localize Poverty Interventions and Improve Rural Data Representation

Given the urban-centric focus of most poverty data, rural and informal communities remain under-represented in policy and planning. The following should be considered:

- Develop localized multidimensional poverty indices at municipal and provincial levels.
- Promote community mapping projects that allow residents to identify poverty dimensions and priorities in their own contexts.
- Ensure that rural development policies are tailored, not transplanted, from urban frameworks.

Such localized evidence-based strategies will foster greater policy relevance and impact, particularly in historically neglected regions.

Align National Strategies with the SDGs and the Capability Approach

This study's conceptual framework is rooted in the Capability Approach, which emphasizes not only the availability of resources but also the freedoms people have to use them meaningfully. Therefore:

- Poverty alleviation strategies must be multi-sectoral and multidimensional, addressing interlinked deprivations simultaneously.
- South Africa's National Development Plan (NDP) and provincial development strategies should be realigned with SDG targets, particularly Goals 1 (No Poverty), 4 (Quality Education), 8 (Decent Work), and 10 (Reduced Inequality).
- Use the Capability Approach to assess the effectiveness of poverty interventions, not just through income but by evaluating people's real freedoms and opportunities.

This ensures that anti-poverty policies not only alleviate suffering but enable choice, dignity, and long-term empowerment.

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