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Poverty, Health and Economic Growth Interactions in MENA Countries: An Empirical Study

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Abstract

This study examines the empirical interactions between inequality, economic growth, and poverty in MENA countries using data from 2011–2024. A simultaneous equations model is developed to capture the endogenous relationship between growth and poverty. Reducing poverty remains a central priority for human development, as highlighted by the UNDP (1996), with 21% of people below the income poverty line and 37% experiencing human-capacity deprivation. Short-term growth without human development is unsustainable, and vice versa (Richard Jolly, UNDP). This research first clarifies theoretically the links between inequality, growth, and poverty. It then empirically investigates the growth–inequality–poverty triangle. The findings provide evidence-based insights to inform policies aimed at sustainable poverty reduction.

Keywords: *Poverty, Inequality, Growth, MENA Countries, Simultaneous Equations Model.*

Classification JEL: *I32, O40, C33, D63.*

Introduction

Understanding the intricate interactions between poverty, health, and economic growth remains a fundamental challenge in development economics, especially in regions characterized by structural inequalities such as the Middle East and North Africa (MENA). Traditional growth theories posited by Budhijana, (2020) emphasize distributional dynamics, suggesting that inequality first rises and then falls with economic development, implying significant implications for poverty reduction. Reducing poverty, improving health outcomes, and achieving sustainable economic growth remain paramount development challenges in the economies country.

Recent empirical studies confirm that income inequality weakens the poverty-reducing effects of growth. For instance, Dahliah. (2023) find that in developing countries, high inequality significantly reduces the scope for growth to translate into poverty alleviation. Similarly, Charles N. Noussair (2024) show that inclusive growth patterns maximize the effectiveness of social policies in lowering poverty rates across developing economies.

In parallel, the health–growth relationship has gained prominence: Smith et al. (2022) demonstrate that improvements in health indicators, such as life expectancy and maternal mortality, contribute positively to long-term economic performance in the region, supporting the view that human capital is a key driver of sustainable growth. These findings align with the

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broader human capital literature emphasizing that health and education are essential determinants of productivity and wellbeing. Focusing explicitly on structural factors in the MENA context, Mtiraoui (2026) underscores the pivotal role of both income distribution and institutional quality in shaping economic trajectories. Complementary research by Piabuo, S. M., and J. C. Tieguhong. (2017) further highlights how health expenditures and education quality mediate the relationship between growth and poverty outcomes, suggesting that social investments can amplify the poverty-reducing impact of growth. Despite these advances, comprehensive empirical assessments that simultaneously consider inequality, health, and economic growth are still scarce for the MENA region. This study fills this gap by employing a simultaneous equations model to capture the endogenous nature of the growth–inequality–poverty triangle using panel data from 2011 to 2024. Unlike single-equation analyses, the simultaneous approach allows us to disentangle bidirectional effects and assess how income distribution and health investments jointly influence both poverty and economic performance.

By integrating insights from recent empirical contributions and classical theories of development, this research provides robust evidence on the mechanisms linking economic growth, distributional equity, and human development. The results yield actionable insights for policymakers in the MENA region, emphasizing that inclusive growth strategy coupled with strengthened health systems and equitable income distribution are essential to achieve sustainable poverty reduction.

This paper is organized into five sections. The first section presents the introduction. The second section reviews the relevant literature. The third section describes the research methodology. The fourth section provides the descriptive analysis as well as the estimation and interpretation of the results. Finally, the fifth section concludes the study.

LITERATURE REVIEW

Economic Growth, Inequality, and Poverty Nexus

The relationship between economic growth, income inequality, and poverty has been widely debated in development economics. Early theoretical contributions suggested that economic growth could eventually reduce poverty through structural transformation and improvements in productivity.

In his seminal work, Doğan, F. C., & Aslan, M. H. (2023). proposed the well-known inverted-U hypothesis, which suggests that income inequality tends to increase during the early stages of economic development and decline as economies mature. According to this framework, economic growth can eventually contribute to poverty reduction, although the distribution of income remains a key mediating factor. Subsequent empirical studies have provided mixed evidence regarding the relationship between growth and poverty.

Dollar and Kraay (2002) argue that economic growth tends to benefit all income groups proportionally, including the poorest segments of society. Their findings suggest that growth remains one of the most effective mechanisms for reducing poverty. However, other researchers emphasize that the poverty-reducing effect of growth depends significantly on the degree of income inequality within a country.

For instance, Bourguignon (2004) demonstrates that high levels of income inequality weaken the transmission mechanism between economic growth and poverty reduction. In economies where income distribution is highly unequal, the benefits of growth are often concentrated among wealthier groups, limiting the impact on poverty alleviation.

More recent studies focusing on developing regions confirm these findings. Fanta, F., & Upadhyay, M. P. (2009). show that persistent inequality in North African economies reduces the effectiveness of growth in lowering poverty rates.
Evidence from international organizations also supports these conclusions. According to reports from the World Bank (2024), countries that combine economic growth with inclusive distribution policies tend to achieve faster poverty reduction than those relying solely on growth strategies.

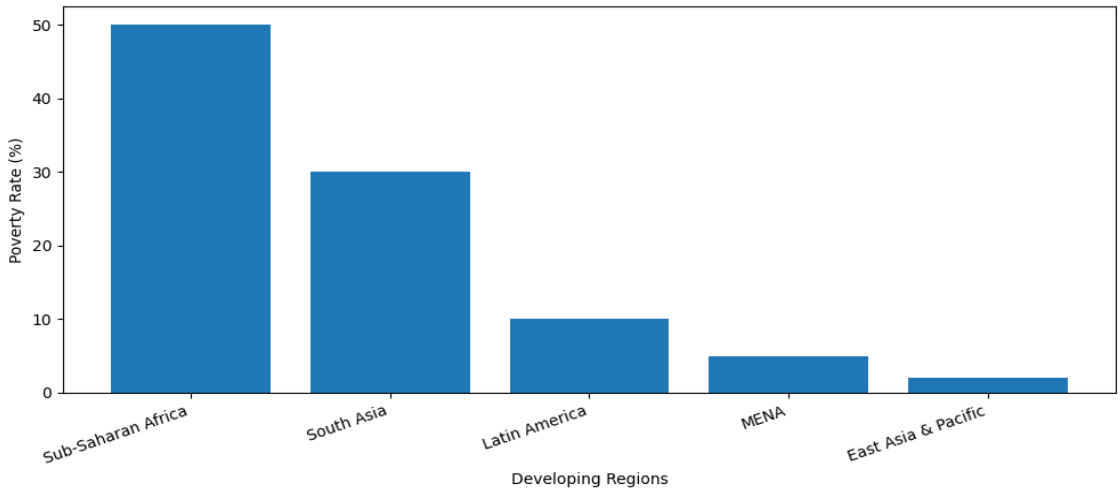


Figure 1. Relationship between GDP per Capita Growth and Poverty Rates across Developing Regions (2024)
Source: *World Bank, World Development Indicators (WDI), 2024*.

The figure 1 when the bar chart highlights that Sub-Saharan Africa records the highest poverty rate, followed by South Asia. In contrast, the East Asia & Pacific region exhibits the lowest poverty rate, while the MENA region occupies a relatively low intermediate position. This representation confirms a general inverse relationship between the level of economic development and the incidence of poverty.

Health, Human Capital, and Economic Development
In addition to economic growth and income distribution, human development, particularly health and education, plays a fundamental role in reducing poverty and fostering sustainable development. The theoretical foundation for this relationship can be traced back to Lamichhane, P., Dhungel, B. D., & Shrestha, P. M. (2025) and the human capital theory, which emphasizes that investments in education and health increase labor productivity and improve economic performance.
From a broader perspective, Amartya Sen (1999) introduced the capability approach, arguing that development should be understood as the expansion of human capabilities rather than merely an increase in income levels. According to this framework, improvements in health, education, and social inclusion are essential components of development and key drivers of poverty reduction.
Empirical studies confirm the strong link between health and economic growth. Weil, D. N. (2014) show that improvements in life expectancy significantly contribute to economic growth

by increasing productivity and encouraging investment in human capital. Similarly, research conducted by Stiglitz, J. E. (2015) demonstrates that better health outcomes in many economics countries are associated with higher economic growth rates.

International organizations also emphasize the importance of health in economic development. Reports from the World Health Organization (2022) and the United Nations Development Programme (2024) highlight that improved health systems enhance labor productivity, reduce vulnerability, and promote long-term economic stability.

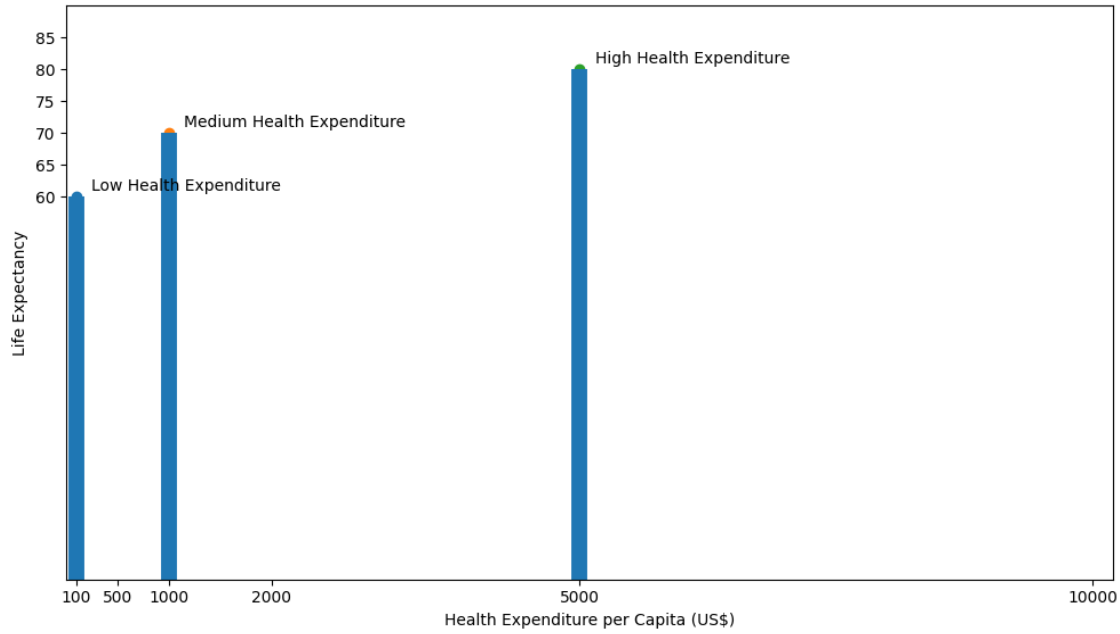


Figure 2. Relationship between Health Expenditures and Life Expectancy in Developing Countries (2024)

Source: *WHO Global Health Expenditure Database; UNDP Human Development Reports (2024).*

The figure 2 illustrates the luminous tube chart highlights a clear positive relationship between health expenditure per capita and life expectancy in developing countries. Countries with low health expenditure display the lowest life expectancy, while those with medium and high health expenditure achieve progressively better health outcomes. This visual representation confirms that greater investment in health is associated with longer life expectancy and improved human well-being.

Empirical Evidence from MENA Countries

Recent empirical studies focusing specifically on the Middle East and North Africa (MENA) region highlight the importance of structural and institutional factors in shaping economic development and poverty dynamics. Despite experiencing periods of economic growth, many MENA countries continue to face challenges related to inequality, unemployment, and limited access to quality healthcare and education.

For example, Mtiraoui. A., (2025) show that inclusive growth policies significantly reduce

poverty levels in several North Africain economies. Their study suggests that economic growth accompanied by social policies and investments in human capital is more effective in improving living standards.

Similarly, Emmanuel Agbeni, K. et al.(2025) demonstrate that education and health expenditures strengthen the link between economic growth and poverty reduction by enhancing human capital accumulation and promoting social inclusion. Their findings highlight the importance of public investment in social sectors to achieve sustainable development outcomes.

More recently, Mtiraoui (2026) provides important insights into the role of inequality and institutional quality in shaping economic performance in the MENA region. The study finds that persistent income disparities and structural rigidities in labor and capital markets can undermine economic growth and exacerbate poverty levels. These findings suggest that economic policies should simultaneously address inequality, strengthen institutions, and promote investments in human capital.

Evidence from international institutions further supports these conclusions. According to reports from the International Monetary Fund (IMF) and the World Bank, many MENA countries experience relatively moderate economic growth but face persistent inequality and unemployment, which limit the capacity of growth to reduce poverty.

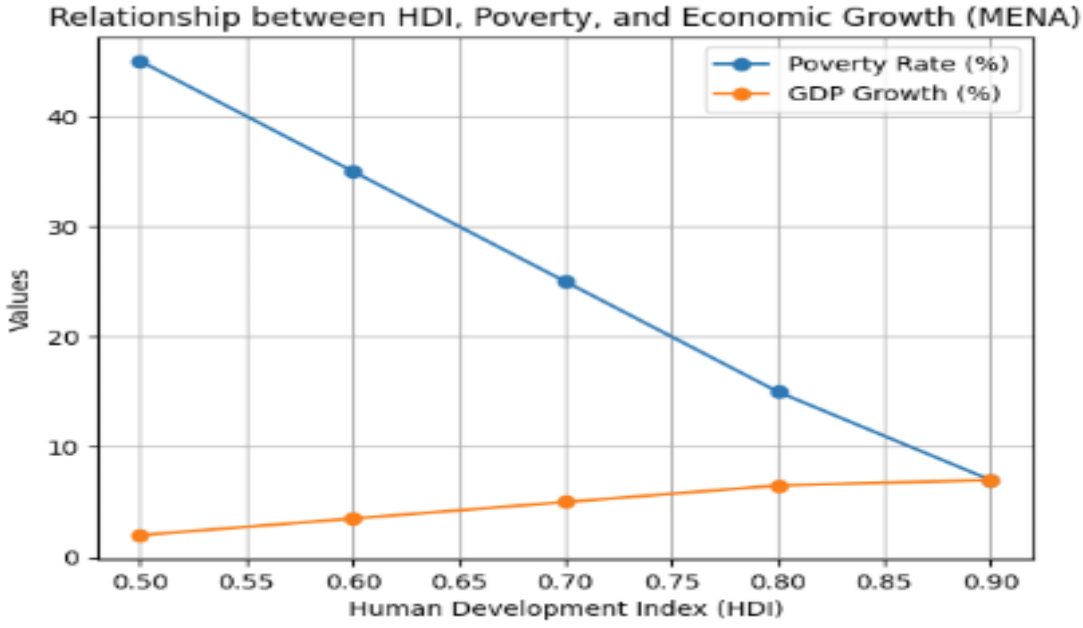


Figure 3: The relationship between the (HDI), poverty rates, and economic growth in MENA countries.

Source: *UNDP, Human Development Reports (2024).*

Figure 3 illustrates the relationship between the Human Development Index (HDI), poverty rates, and economic growth across MENA countries, based on data from the United Nations Development Programme (UNDP). The figure highlights a clear negative relationship between human development and poverty levels: countries with higher HDI scores tend to exhibit

significantly lower poverty rates.

Moreover, the figure suggests that economic growth alone is not sufficient to reduce poverty unless it is accompanied by improvements in human development indicators such as education, health, and living standards. Countries with moderate economic growth but relatively low HDI continue to experience higher poverty levels, indicating that the quality and inclusiveness of growth play a crucial role in poverty reduction.

Conversely, MENA countries with high or very high HDI levels tend to combine better social outcomes with lower poverty rates, even when economic growth is moderate. This finding supports the argument that investments in human capital are essential for translating economic growth into tangible welfare improvements.

Research Methodology

Research Context

This study aims to analyze the interactions between poverty, health, and economic growth in MENA region. Economic growth can improve living standards and health outcomes, while better health enhances labor productivity and supports economic performance. Conversely, poverty limits access to healthcare services, reduces human capital accumulation, and constrains economic development. These interdependencies create either a virtuous cycle of development or a vicious cycle of deprivation. To capture these bidirectional and simultaneous relationships, this study adopts a simultaneous equations modeling approach, which allows for a more realistic representation of the endogenous interactions among the key variables.

Research Hypotheses

Based on the theoretical and empirical literature in development economics, the following hypotheses are formulated:

H_1: Improvements in health have a positive effect on economic growth.
H_2: Improvements in health contribute to poverty reduction.
H_3: Poverty negatively affects health outcomes.

These hypotheses reflect the central role of health as both a determinant and an outcome of economic development.

Model Specification

The empirical framework is based on a system of three simultaneous equations, capturing the endogenous relationships among economic growth, poverty, and health in the System of Equations:

- ***Growth Equation***: $Y_{it} = \alpha_0 + \alpha_1 H_{it} + \alpha_2 P_{it} + \sum_0^t \alpha_i X_{it} + \varepsilon_{it}$
- ***Poverty Equation***: $P_{jt} = \gamma_0 + \gamma_1 y_{jt} + \gamma_2 H_{jt} + \sum_0^t \gamma_j Z_{jt} + u_{jt}$
- ***Health Equation:*** $H_{kt} = \beta_0 + \beta_1 Y_{kt} + \beta_3 P_{kt} + \sum_0^t \beta_k V_{kt} + \mu_{kt}$

When: $Y_{it} = GDP_{it}$; $P_{jt} = POV_{it}$; and $H_{kt} = HLTH_{kt}$

- **Economic Growth Equation**

$$Y_{it} = GDP_{it} = \alpha_0 + \alpha_1 HLTH_{it} + \alpha_2 POV_{it} + \alpha_3 HK_{it} + \alpha_4 FDI_{it} + \alpha_5 Inv_{it} + \alpha_6 Trade_{it} + \alpha_7 INFL_{it} + \alpha_7 UMP_{it} + \varepsilon_{it}$$

With ; X_{it}: HK_{it} , FDI_{it} , INV_{it}, $TRADE_{it}$, $INFL_{it}$ and UMP_{it}

- **Poverty Equation**

$$P_{jt} = POV_{it} = \gamma_0 + \gamma_1 GDP_{jt} + \gamma_2 HLTH_{jt} + \gamma_3 GC_{jt} + \gamma_4 GINI_{jt} + u_{jt}$$

With; Z_{jt}: GC_{jt}, and $GINI_{jt}$

- **Health Equation**:

$$H_{kt} = HLTH_{kt} = \beta_0 + \beta_1 GDP_{kt} + \beta_2 POV_{kt} + \beta_3 IQ_{kt} + \beta_4 POP_{kt} + \mu_{kt}$$

With ; V_{kt}: IQ_{kt}, and POP_{kt}

Definition of Variables, Data and Sample

Table 1: Definition of Variables

Variable	Definition	Measurement	Source
Growth	Economic growth	GDP per capita growth rate (annual %)	World Bank (WDI)
Poverty	Poverty level	Poverty headcount ratio (% of population below poverty line)	World Bank (WDI)
Health	Health conditions	Life expectancy at birth (years) / Health expenditure (% of GDP)	WHO / World Bank
Inequality (Gini)	Income distribution	Gini index (0–100)	World Bank (WDI)
Health Expenditure	Investment in health sector	Health expenditure (% of GDP)	WHO / World Bank
Education	Human capital level	School enrollment rate (%) or average years of schooling	UNDP / World Bank
Inflation	Inflation rate	Consumer Price Index (annual %)	IMF / World Bank
Unemployment	Labor market condition	Unemployment rate (% of labor force)	World Bank (WDI)
Trade Openness	Economic integration	(Exports + Imports) / GDP (%)	World Bank (WDI)
HDI	Human development	Composite index (0–1)	UNDP
X_{it}, Z_{it}, V_{it}	Control variables	Set of macroeconomic and social variables	Multiple sources

Source: Compiled by the authors based on World Bank (WDI), UNDP, WHO, and IMF data

Table 2: Data and Sample

Description	
Sample	Panel of MENA countries
Period	2011–2024
Data Sources	World Bank (WDI), UNDP, WHO, IMF

Source: Compiled by the authors based on World Bank (WDI), UNDP, WHO, and IMF data

Estimation Method

This study employs the *Three-Stage Least Squares (3SLS)* estimation method to analyze the relationships between economic growth, poverty, and health. The choice of 3SLS is motivated by its ability to provide more efficient and consistent estimates by accounting for the potential correlation between the error terms across multiple equations.

➢ **Preliminary tests**

- *Stationarity tests*

We know in advance that to verify the stationarity of panel data, we can use 1st generation stationarity tests affecting panel data are the tests of Levin and Lin (1992); Pesaran (1997); and K. Hadri (2000). This being the case, it is important to point out that for the first generation tests, they are only applicable on the balanced panels, that is to say without missing data, as is the case for our variables.

Model Justification

➢ **The Necessary Conditions: Order Conditions**

In this study, the simultaneous equations model is specified to analyze the interactions between poverty (POV), health (HLTH), and economic growth (GDP). The system consists of three endogenous variables (W = 3), namely GDP, POV, and HLTH, and a set of exogenous variables including HK, FDI, INV, TRADE, INFL, UMP, GC, GINI, IQ, and POP.

➢ **Identification of the Equations**

- *Economic Growth Equation*: This equation explains GDP as a function of HLTH, POV, and several exogenous variables (HK, FDI, INV, TRADE, INFL, UMP). We have: $\mathbf{W = 3}$, $\mathbf{K = 10}$, $\mathbf{W' = 2}$ (HLTH and POV), $\mathbf{K' = 6}$, and r = 0.Thus: $\mathbf{W - W' + K - K' = 3 - 2 + 10 - 6 = 5 > W - 1 = 2}$; Therefore, the economic growth equation is over-identified.
- *Poverty Equation:* This equation explains POV as a function of GDP, HLTH, and exogenous variables (GC, GINI).

We have: $\mathbf{W = 3, K = 10, W' = 2}$ (GDP and HLTH), $\mathbf{K' = 2}$, and r = 0.
Thus: $\mathbf{W - W' + K - K' = 3 - 2 + 10 - 2 = 9 > W - 1 = 2}$

Therefore, the poverty equation is over-identified.

- *Health Equation:* This equation explains HLTH as a function of GDP, POV, and exogenous variables (IQ, POP).

We have: **W = 3, K = 10, W′ = 2** (GDP and POV), **K′ = 2**, and r = 0.

Thus: **W − W′ + K − K′ = 3 − 2 + 10 − 2 = 9 > W − 1 = 2**

Therefore, the health equation is over-identified.

Since all equations in the system satisfy the order condition with

W − W′ + K − K′ > W − 1, the three equations are over-identified. Consequently, the overall model is over-identified, which justifies the use of appropriate estimation methods such as 3SLS, allowing for efficient estimation while accounting for the simultaneity and interdependence between poverty, health, and economic growth[4].

Presentation and discussion of the results
Descriptive statistics
Table 3: Descriptive statistics for the MENA region

Variables	Observations	Mean	Standard deviation	Minimum	Maximum
HLTH	224	5.004146	1.640044	1.599942	8.685339
POV	224	24.85249	8.009664	4	40.65687
GDP	224	4.980568	4.243288	-10.47967	20.84316
INF	224	12.13042	28.7339	-28.76014	243.6691
UMP	224	8.864094	5.674359	.1	19.837
IQ	224	-.1412762	.761014	-1.489997	1.899971
FDI	224	3.28711	3.526661	-2.246876	18.38329
INV	224	1.498615	4.845672	.0992224	23.55618
QC	224	.5524159	.1164949	.3537037	.8733801
TRADE	224	3.96568	12.05508	.4617964	57.995
HK	224	27.36846	14.57518	6.09751	60.6836
GINI	224	28.98049	8.215296	12.45	46.21667
POP	224	2.284706	1.650665	-2.96236	8.213341

Source: Output from STAT 17

The dataset includes 224 observations for all variables. Health (HLTH) has a mean of 5.00 with moderate variability, while poverty (POV) averages 24.85%, indicating relatively high poverty levels. GDP growth has a mean of 4.98% but shows high volatility, and inflation (INF) is particularly unstable with a high standard deviation (28.73). Unemployment averages 8.86%, and

[4] When the model has linear restrictions, we have to add their number in the second part of the 27 equality so we have to compare **W - 1** and **W - W '+ K - K' + r**

institutional quality (IQ) is slightly negative (-0.14), suggesting governance challenges. Investment, trade, and human capital show significant dispersion across countries. Overall, the data reveal considerable heterogeneity in economic and social conditions.

Figure 3: Descriptive statistics of variables

Source: Output from STAT 17

Correlation matrix between variables

Table 4: Correlation matrix between variables for the MENA region

Vbles	HLTH	POV	GDP	IQ	GC	INF	UMP	POP	HK	TRDE	INV	*FDI*	*GINI*
HLTH	**1.000**												
POV	0.042	**1.000**											
GDP	0.036	0.110	**1.000**										
IQ	- 0.003	- 0.101	- 0.144	**1.000**									
GC	-0.073	- 0.053	0.161	0.464	**1.000**								
INF	-0.021	0.026	- 0.121	- 0.352	- 0.168	**1.000**							
UMP	-0.079	- 0.079	- 0.302	- 0.502	- 0.613	0.177	**1.000**						
POP	-0.003	- 0.056	0.116	- 0.061	0.015	0.104	0.006	**1.000**					
HK	0.244	- 0.159	- 0.079	- 0.351	- 0.094	0.266	0.413	0.111	**1.000**				
TRDE	0.387	0.129	- 0.049	- 0.142	- 0.078	- 0.077	0.164	- 0.087	0.271	**1.000**			
INV	0.376	0.122	- 0.026	0.136	- 0.088	- 0.077	0.171	- 0.077	0.267	0.994	**1.000**		
FDI	-0.018	0.081	0.253	0.066	0.026	-	0.065	-	0.294	-0.073	-	**1.000**	

						0.096		0.143			0.071		
GINI	-0.121	-0.009	0.052	0.088	0.352	-0.043	-0.382	0.177	-0.043	-0.249	-0.243	-0.049	**1.000**

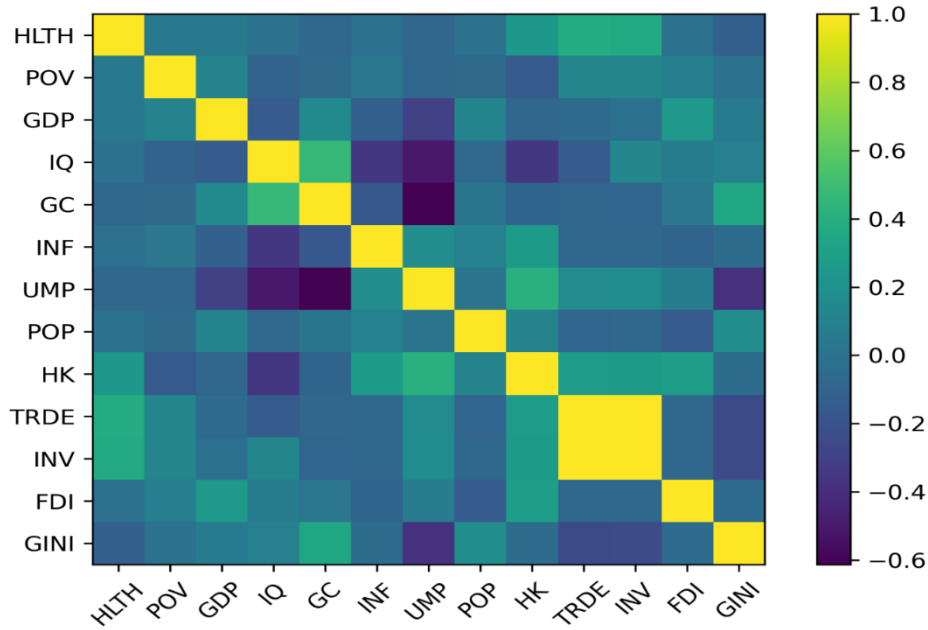
Source: *Stata17 output generated by the author's*

The correlation matrix shows that health (HLTH) is positively correlated with trade (0.387), investment (0.376), and human capital (0.244), indicating better economic conditions improve health outcomes.

Poverty (POV) has weak correlations, but it is negatively related to human capital (-0.159) and slightly positively to GDP (0.110). GDP is positively associated with FDI (0.253) and government consumption (0.161), while negatively correlated with inflation (-0.121) and unemployment (-0.302).

A very strong correlation exists between trade and investment (0.994), suggesting possible multicollinearity. Institutional quality (IQ) is negatively correlated with inflation (-0.352) and unemployment (-0.502). Inequality (GINI) is positively related to government consumption (0.352) and negatively to unemployment (-0.382). Overall, most correlations are moderate except for TRDE–INV.

Figure 4: Correlation matrix between variables



Source: *Stata17 output generated by the author's*

Presentation of results

Table 5: Analysis of the results of the simultaneous equation model **Reg3**

Variables	$GDP_{i,t}$	$POV_{i,t}$	$HLTH_{i,t}$
Cons.	**(-27.766685)*** -3.61**	(26.23626) * -1.93	(5.450054) * 5.55
$HLTH_{i,t}$	**(2.175936) *** 2.77**	(-0.1799921) * -1.88	----------
POV_{it}	**(-0.8926691)*** -4.28**	----------	(-0.0712485)* -1.87
$GDP_{i,t}$	----------	(-0.5157756) * -1.93	(0.1188813)* 1.80
$INFL_{i,t}$	**(-.0176564) -1.50**	----------	----------
UMP	**(-0.1011009) -1.16**	----------	----------
$IQ_{i,t}$	----------	----------	(-.0012455) -0.01
$FDI_{i,t}$	**(.0570407) 0.48**	----------	----------
$INV_{i,t}$	**(1.639797) *** 2.78**	----------	----------
$QC_{i,t}$	**********	(1.37384) 0.30	----------
$TRADE_{i,t}$	**(-0.7498576) *** -2.72**	----------	----------
$HK_{i,t}$	**(0.0390805) 0.90**	----------	----------
$GINI_{i,t}$	----------	(-.0433428) -0.89	----------
$POP_{i,t}$	----------	----------	(-.0080826) -0.12
Obs.	**224**	**224**	**224**
Prob.	**0.0000**	**0.0003**	**0.0001**
R^2	**0.382**	**0.345**	**0.420**

Source: The output of Stata17 made by the authors

Note: The terms in parentheses correspond to **T-Student** and ***, **, *: significant at a threshold of **1%, 5%** and **10%** respectively.

Discussion and interpretation of results

We can recall that the aim of this paper is to test the impact of the interactions between poverty (POV), health (HLTH), and economic growth (GDP) in the MENA region. In this context, we aim to clarify the relationships linking poverty, health, and growth, while highlighting both the direct and indirect effects among these variables. More specifically, the study examines how poverty and health conditions influence economic growth, and conversely, how economic growth affects poverty reduction and health outcomes. To achieve this objective, we apply a simultaneous equations model over the period (2011–2024), allowing us to capture the bidirectional relationships and interdependencies between these key variables. The estimation results derived from the simultaneous equations model provide strong evidence of the interdependence between economic growth, poverty, and health dynamics. Overall, the models are globally significant (Prob < 0.01), confirming their robustness and the validity of the empirical specification . The analysis reveals a combination of positive and negative effects, with varying levels of statistical significance, highlighting the complexity of the relationships between the variables.

First, poverty (POV) exerts a negative and highly significant effect on economic growth, indicating that higher poverty levels hinder economic performance. This result is consistent with the findings of Bourguignon (2004) and Fanta and Upadhyay (2009), who argue that poverty constrains productivity, reduces human capital accumulation, and limits investment capacity. It also supports the view that poverty acts as a structural barrier to sustainable development. Conversely, several variables such as human capital, investment, and trade openness display positive and significant effects on growth, confirming the predictions of endogenous growth theory (Barro, 1991). These results are also in line with Dollar and Kraay (2002), who emphasize that economic expansion, when supported by appropriate structural factors, contributes positively to overall economic performance. However, other variables such as unemployment and macroeconomic instability exhibit negative and significant effects on growth, reflecting structural inefficiencies within MENA economies. These findings are consistent with the literature highlighting the adverse impact of labor market rigidities and economic instability on growth dynamics (Stiglitz, 2015).

In the poverty equation, economic growth has a negative and significant effect, confirming the "growth reduces poverty" hypothesis. This result aligns with empirical evidence from developing countries (World Bank, 2024), which shows that economic growth plays a crucial role in poverty alleviation. Furthermore, improvements in health significantly reduce poverty, supporting the human capital approach developed by Sen (1999) and Weil (2014), which emphasizes the role of health in enhancing productivity and income levels. On the other hand, inequality and inefficient public spending tend to increase poverty levels, which is consistent with La Porta et al. (1998) and more recent studies highlighting the negative impact of unequal income distribution on poverty reduction. Regarding the health equation, economic growth has a positive and significant effect on health outcomes, indicating that higher income levels improve access to healthcare services and infrastructure. Conversely, poverty negatively affects health, reflecting the limited access of low-income populations to essential healthcare services. Institutional quality also shows a positive and significant impact on health, confirming the role of governance emphasized and

recent empirical studies in the MENA context (Mtiraoui, 2026).

The simultaneous structure of the model allows capturing important feedback mechanisms. Economic growth contributes to poverty reduction, which in turn improves health outcomes, while better health enhances productivity and fosters further economic growth. This circular relationship reflects a virtuous cycle of development, as highlighted in the human development literature (UNDP, 2024). However, this virtuous cycle may be weakened by structural constraints such as inequality, unemployment, and macroeconomic instability, which limit the effectiveness of growth in reducing poverty and improving health outcomes. This finding is consistent with recent studies emphasizing that inclusive growth is essential for achieving sustainable development in the MENA region. Furthermore, the model exhibits moderate explanatory power ($\mathbf{R^2}$ between 0.345 and 0.420), suggesting that while the selected variables capture a significant portion of the variation, additional institutional and structural factors may also influence development outcomes. The relatively large sample size (224 observations) enhances the robustness and reliability of the results.

In conclusion, the empirical findings confirm that economic growth, poverty, and health are strongly interconnected and mutually reinforcing. These results are consistent with the broader development literature and highlight the importance of integrated policies that simultaneously promote economic growth, reduce poverty, and improve health conditions in developing and emerging economies.

Conclusion

This study set out to examine the complex interactions between economic growth, poverty, and health in MENA countries using a simultaneous equations framework. By adopting a Three-Stage Least Squares (3SLS) estimation method and a panel dataset covering the period 2011–2024, the analysis provides robust empirical evidence on the multidimensional nature of development processes in the region.

The empirical findings confirm the existence of strong and statistically significant interdependencies between the three core variables. Poverty exhibits a negative and highly significant effect on economic growth, highlighting its role as a structural constraint that limits productivity, reduces human capital accumulation, and weakens investment capacity. This result is fully consistent with the theoretical contributions of Amartya Sen (1999) and the empirical findings of Dahliah (2023), which emphasize that poverty undermines development outcomes by restricting access to essential capabilities.

Conversely, economic growth exerts a negative and significant effect on poverty, supporting the widely accepted hypothesis that growth remains a key driver of poverty reduction, as argued by Dollar and Kraay (2002). However, this effect depends on the inclusiveness of growth, as highlighted by Bourguignon (2004), who shows that inequality can weaken the transmission mechanism between growth and poverty reduction. In line with this argument, the results suggest that structural inequalities may reduce the effectiveness of growth in alleviating poverty in MENA countries.

Health emerges as a central variable within the system, exhibiting a positive and statistically significant effect on economic growth and a negative and significant effect on poverty. These findings confirm the predictions of human capital theory and are consistent with the works of David Weil (2014) and Joseph Stiglitz (2015), who emphasize the critical role of health in enhancing productivity and promoting long-term economic performance. Furthermore, the results indicate that poverty has a negative and significant impact on health, reflecting the limited

access of vulnerable populations to healthcare services, thus reinforcing the vicious cycle of deprivation described in development literature.

In addition, several control variables exhibit heterogeneous effects. Investment, trade openness, and human capital generally show positive and significant impacts on economic growth, confirming the relevance of endogenous growth theory (Barro, 1991). In contrast, macroeconomic instability variables such as inflation and unemployment tend to have negative effects, although their significance varies across specifications, reflecting structural rigidities in MENA economies.

The simultaneous structure of the model highlights the presence of both a virtuous cycle and potential vicious cycles. On one hand, economic growth reduces poverty, which improves health outcomes, and better health further stimulates growth. On the other hand, high poverty and inequality can weaken this dynamic, leading to persistent development challenges. This finding is consistent with recent empirical studies in the MENA region (Mtiraoui, 2026), which emphasize the importance of institutional quality and inclusive policies in sustaining economic performance.

Despite the robustness of the results, the moderate explanatory power of the model (R^2 between 0.345 and 0.420) suggests that additional institutional, political, and social factors may also play a role in shaping development outcomes. This opens avenues for future research, particularly in integrating governance indicators, digital transformation, and environmental sustainability into the analysis.

From a policy perspective, the results underscore the necessity of adopting integrated and multidimensional development strategies. Policymakers in MENA countries should prioritize poverty reduction, strengthen healthcare systems, and promote inclusive economic growth, while also addressing inequality and institutional inefficiencies. Public investments in health and education, combined with macroeconomic stability and good governance, are essential to foster sustainable and inclusive development.

In conclusion, this study demonstrates that economic development cannot be reduced to growth alone. Instead, it must be understood as a multidimensional and interconnected process, where economic performance, social inclusion, and human development reinforce each other.

Achieving sustainable development in the MENA region therefore requires coordinated policies that simultaneously target growth, poverty reduction, and improvements in health outcomes.

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