Education and poverty nexus in Libya: granger causality approach period (2000-2022)

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العلاقة بين التعليم والفقر في ليبيا: استخدام نهج السببية للفترة (2000-2022)

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Abstract:

Using yearly data from 2000 to 2022, the study examines the causal relationship between Libya's poverty rate and education spending. To examine the causal relationship between the variables, we employed the Granger causality test framework of the vector autoregressive (VAR) model. the results of testing Granger's causality that runs EDX to POVR for Libya country is a causal relationship. It is also clear from the results that there is not a causal relationship from POVR to EDX.

Keywords: Expenditure on Education, Poverty Reduction, Granger Causality Test, Libya.

الملخص

باستخدام البيانات السنوية من عام 2000 إلى عام 2022، تدرس هذه الدراسة العلاقة السببية بين معدل الفقر في ليبيا والإنفاق على التعليم. حيث تم فحص العلاقة السببية بين المتغيرات، وتم استخدام اختبار السببية لجرانجر لنموذج الانحدار الذاتي المتجهي . وكانت نتائج اختبار سببية جرانجر التي تربط (الانفاق على التعليم) بـ (معدل الفقر) لدولة ليبيا هي علاقة سببية. ومن الواضح أيضًا من النتائج أنه لا توجد علاقة سببية من (معدل الفقر) إلى الانفاق على التعليم في ليبيا.

الكلمات المفتاحية: الإنفاق على التعليم، والحد من الفقر، اختبار السببية لجرانجر ، ليبيا.

Introduction

Poverty is a complex issue that impacts many people around the globe, restricting their access to essential needs, healthcare, and education. Among the different ways to fight poverty, putting money into education has shown to be vital for steady growth and development. Education acts as a strong means to help end the poverty cycle by giving people the skills and knowledge they require for better job chances and a higher quality of life. In Libya, a nation struggling with ongoing political issues and economic difficulties, it is very important to understand how spending on education relates to reducing poverty.

Millions of people throughout the world struggle with poverty, which restricts their access to healthcare, education, and basic necessities. Among the many tactics to fight poverty, funding education has emerged as a key component of both economic expansion and sustainable development. By giving people the information and skills, they need to access better employment possibilities and enhance their quality of life, education may effectively break the cycle of poverty. It is crucial to comprehend the connection between education spending and reducing poverty in Libya, a nation that has experienced protracted political unrest and economic difficulties.

The term "education expenditure" describes the money that individuals, businesses, or governments set aside for educational programs. This investment includes funding for learning materials, infrastructure, teacher salaries, and other resources that guarantee the caliber and accessibility of education. Spending money on education may

be a game-changer in tackling poverty in emerging nations like Libya, where social and economic disparities are severe. Education spending promotes the development of human capital, which increases social mobility and overall economic production in addition to improving individual talents.

Over the last few decades, Libya's socioeconomic environment has experienced substantial changes brought about by changes in oil income, political unrest, and foreign interventions. Public policies in the country, notably those pertaining to education, have been greatly impacted by these causes. Libya faces inequalities in economic distribution and access to essential services, such as education, even though it is one of the most resource-rich countries in Africa. Resources allocated to education have changed over time, reflecting the nation's fluctuating objectives as well as its economic instability. Examining the ways in which education affects both individual and community results is necessary to comprehend the effects of such spending on reducing poverty.

Most people agree that education is a means of empowering people by giving them the means to actively engage in the political, social, and economic realms. For example, persons with greater levels of education have the ability to earn more money, be less dependent on social aid, and have better health outcomes. Additionally, education encourages entrepreneurship and innovation, which helps civilizations diversify their economies and lessen their reliance on unstable sectors like the oil industry. Reforms and investments in education can open the door to a more resilient and diverse economy in Libya, where the public sector plays a significant role in the labor market. Studies conducted in other emerging nations emphasize how important education spending is to reducing poverty. For instance, sub-Saharan African research discovered that nations with more elementary and secondary education spending saw notable drops in poverty rates (UNESCO, 2022). In a similar vein, data from Southeast Asia shows that focused investments in rural education infrastructure have significantly increased equity and access (World Bank, 2021). These results highlight the possible advantages of giving education a priority in national budgets, particularly in areas with socioeconomic difficulties.

However, there are many contextual elements that impact the complicated link between poverty alleviation and education spending. The quality of government, the openness of resource distribution, and the fit between educational programs and labor market demands all affect how successful education investment is in Libya. The intended advantages of spending money on education can be undermined by poor governance and corruption, which can result in waste and inefficiency. Furthermore, whether education results in real economic prospects for graduates depends on how relevant curricula are to regional and international employment markets.

Ongoing political unrest and violence in Libya have made it difficult to improve education since they have interrupted schools, uprooted populations, and put a strain on public resources. The disparity between urban and rural communities in Libya is widened by the absence of proper infrastructure, qualified educators, and educational resources in many places. In order to address these discrepancies, more financing is needed, but strategic planning is also necessary to make sure that investments reach the most vulnerable groups. Programs that put an emphasis on digital literacy, technical and vocational training, and females' education can aid in closing these gaps and promoting inclusive development.

The poverty threshold in Libya was set at 400 dinars (314 dollars) per month in 2006 by the General People's Committee (Prime Minister). When creating the economic changes, consideration was given to the current state of affairs in the nation. Libya should therefore reevaluate its poverty classifications, rates, and levels. People may suffer from the agony of travel and high medical expenses in developing countries like Libya. Additionally, there aren't enough drugs and vaccinations for cardiac patients. There is a lack of sugar in the hospitals as well. Schools are now displaced places where fighting take place. Communication is negatively impacted by prolonged power outages, and internet speeds are quite poor. Due to the depletion of sewage channels, the streets flood during the winter. Some of the places are very unhygienic. In Libya, the price of oil has dropped. Many people who had been enjoying the "generosity of the state" have now fallen into poverty as a result of the disruption to the output. According to a UN assessment cited by the bank, 435,000 people are internally displaced in the country. Food is inaccessible to more than 1.3 million people. Approximately 2.4 million people needed humanitarian assistance in 2014. Hence, the high unemployment rate contributed to Libya's instability. Significant violence in 2011 sparked a new civil war in April 2019, which resulted in the addition of 2.4 million impoverished people to Libya's 6.888 million inhabitants in 2022. Libya's poverty is caused by a number of circumstances, especially following the February 2011 revolution. A sluggish economy, rising inflation and unemployment, a drop in government spending, and a pervasive corruption issue were some of these causes.

Relationship between Education Expenditure and Poverty

Particularly in less developed nations, there is a strong correlation between poverty and educational spending. Putting money into education is frequently regarded as a crucial tactic to combat poverty. Numerous studies demonstrate that increasing public investment on education not only stimulates economic growth but also increases social equity, such as those by Barro (1991), and Tanzi and Chu (1998).

The relationship between education and poverty reduction has been extensively documented in global studies. Education is seen as a primary driver of economic growth and individual empowerment. Psacharopoulos and Patrinos (2018) found that each additional year of schooling increases earnings by about 10%, underscoring

education's role in enhancing income potential. Moreover, UNESCO (2020) reported that universal secondary education could lift 420 million people out of poverty globally, demonstrating education's transformative power. Poverty and Education can be used as a method to end the cycle of poverty in Libya. Education promotes economic mobility and employability by giving people the information and abilities required for the workforce. However, Libya's education system's capacity to considerably reduce poverty is hampered by structural inefficiencies. Realizing the full benefit of education is still hampered by the discrepancy between job market demands and educational performance. Since the 2011 revolution, Libya has seen years of political unrest and conflict, which has seriously disrupted the country's educational system. According to the United Nations Development Programme (UNDP), conflict has caused population displacement, damaged schools, and interrupted the flow of education. Nearly 300,000 Libyan children are not attending school, especially in areas that have been severely impacted by violence, according to UNICEF (2021). This statistic illustrates the difficulties in attaining universal education and is a major obstacle to educational access. The quality of education in Libya has drastically decreased, in addition to problems with access. Teachers frequently lack assistance and training, and many schools function without sufficient funding. Libya's high young unemployment rate of over 40% is partially caused by an education system that is out of step with the demands of the labor market, according to the World Bank (2019). The dearth of STEM (science, technology, engineering, and mathematics) education and vocational training is one area where this mismatch is very noticeable.

Theoretical Background
Poverty and education have been the subject of several studies, the most well-known of which are:
Farhan et al (2024). defined Iraq spent very little on education between 2004 and 2021, mostly as a result of crises and shifting oil prices. Therefore, its contribution to reducing poverty was little since attempts to reduce poverty were not greatly impacted by inadequate investment in education, they found. Iraq spends too little on education to reduce poverty, and public spending and education budget were impacted by outside shocks.

Jain et al. (2024) investigate the connection between global poverty reduction and educational investment. It seeks to determine how rising educational spending affects poverty rates by examining data from 1960 to 2023, including 71 nations.In support of education's function in reducing poverty, the study discovered a negative association between poverty rates and educational investment, showing that a 1% increase in educational spending as a proportion of GDP corresponds with a 3.09% decrease in poverty rates.

Xiaowen et al (2023) The study examines education investment's impact on poverty alleviation in Yunnan's poor counties. Analyzed 30 counties from 2007 to 2020 using various econometric models. Education investment significantly reduces poverty at both static and dynamic levels. Diminishing marginal effects of education investment observed under different poverty levels. The findings are relevant as Yunnan has achieved absolute poverty eradication.

The goal of Sri, Isnowati et al.'s (2023) analysis was to examine how poverty in Indonesia's Central Java Province was impacted by government spending on infrastructure, health care, and education. 35 districts and cities in the Central Java Province provided data for this study between 2018 and 2020. Multiple regression analysis using panel data is the data analysis strategy used in this study. The analysis's findings indicate that the variable government expenditure on education had a negative regression coefficient. Poverty levels are negatively impacted by health spending. In Indonesia's Central Java Province, spending on public works has a detrimental impact on poverty levels. According to this program, local governments have a significant role in lowering poverty in Central Java, hence a bigger budget is.

The analysis by Abd Elqadir et al. (2015) Iraq's poverty and educational system "Challenges and Reality" The research's objectives are to determine how poverty affects education by examining the state of education in Iraq, outlining the future of poverty, and elucidating the causes of individual poverty and how it affected net school enrollment rates, which in turn caused the educational system to deteriorate and have a detrimental effect on Iraqi society, the study uses the descriptive analytical method, which is backed up by statistical tables and formulations and conclusions based on a particular theory. Its most significant finding is that poverty and education are related because high rates of poverty result in lower levels of education. The study's main recommendation is to develop an educational strategy that can lower poverty and thereby advance and mature the development of the educational system.

Liu and Jialu (2019) this paper aimed to investigate the impact of government spending on education on poverty in China from 1997 to 2017, where poverty was measured by beneficiaries of social assistance programs, such as the minimum living guarantee system, five guarantee, and support systems for needy families. Revealed that over the past four decades, more than 740 million people have been lifted out of poverty in China, and the Chinese government has set the goal of eliminating extreme poverty and removing all poor provinces from the poverty list by 2020. The general budget fund for education, taxes and fees collected by governments at all levels for educational purposes, accreditation of institutions for schools run by institutions, and revenue from institutions managed by schools comprise the independent variable, government appropriations for education. Government spending on education is substantially inversely correlated with the headcount ratio, as are social services utilized

for educational purposes and other national appropriations for education. While rural household net income is negatively correlated with the poverty rate, urban residents have two contradictory findings, which raises an intriguing research question. Private investment in education also helps to reduce poverty and seems to be a potential means of improving the quality of education.

Bangura, S. et al. (2017) investigated the relationship between poverty and education in Africa using data from Sierra Leone. They discovered that while education spending has a long-term positive impact on welfare through the indirect effect of covariates, it may have a short-term negative direct impact. This explains why policy trade-offs are inevitable given the simultaneous decision-making issues that impoverished households face, which occasionally require reducing health spending in favor of child education.

There are numerous reasons why government spending affects poverty, including how it is allocated. The results, however, may alter based on the exact time of the inquiry because different spending patterns have immediate and direct effects on poverty. Conversely, other spending types (such as infrastructure, education, and health investment) only have longer-term, more indirect effects. The spending patterns that are more significant for extremely poor households might also be influenced by the degree of poverty. Numerous scholars have examined the relationship between poverty and economic status and various government funding categories. Because it has been found that improvements in education are closely linked to economic growth, many scholars have focused on government spending (Bloom & Canning, 2000; Jung & Thorbecke, 2003; Triest, 1997). The results of several studies show a link between poverty, drug and alcohol use, and mental health issues. Therefore, poverty should be affected by the funding of programs that help people with these problems (Baingana et al., 2006). The Temporary Assistance to Needy Families (TANF) program, which targets low-income families with children, their parents, and carers, is one example of a state welfare program that may have an effect on poverty (Lower-Basch, 2011). The results of these studies indicate that the public welfare budget should be used to fund programs that address issues of poverty. One could argue that most studies on poverty in developing countries focused more on various forms of government spending than on the profound political changes that have occurred in some of these countries.

The Concept of Poverty

Poverty is a complex idea with aspects related to economics, sociology, and ethics. It is commonly described as the incapacity to obtain the necessities for a minimal standard of living. This definition has changed over time to reflect shifts in societal norms, income disparity, and the overall state of the economy. Poverty is a serious problem that has an impact on people and society on many levels. It includes not only a lack of money but also restricted access to basic services like education. Poverty has a significant effect on education in Libya, a nation dealing with political unrest and economic difficulties, impeding equality, quality, and access. Understanding how poverty and education are dynamically related is essential to comprehending the challenges facing Libya's social and economic advancement.

The term "poverty" has been defined and described in a variety of ways by scholars and scientists. In our view, poverty results from a market economy's shifting income inequality as well as other social, economic, medical, and demographic factors, as well as a shortage of the items that people need to meet their basic needs. Contrarily, poverty is the outcome of persistent poverty and denotes the inability of an individual to acquire the resources and income required for subsistence Kholmurodov, N. Q. (2022).

Furthermore, some economists defined poverty as a condition of material deprivation, with the most significant symptoms being low food consumption in terms of both quantity and quality, low housing, health, and educational status, lack of ownership of durable goods and other material assets, and loss of reserve (guarantee) to deal with challenging circumstances like illness, disability, and disasters Al-Fares (2001).

When people or groups don't have enough money to cover necessities like food, clothing, housing, healthcare, and education, they are said to be living in poverty. Poverty is a complicated, multidimensional problem that may be viewed from a number of angles:

1. Absolute poverty: People who are unable to meet the bare necessities of life are said to be in this state. A certain income threshold, such as subsisting on less than $1.90 per day, as set by the World Bank, is frequently used to measure it.

2. Relative Poverty: This is the state in which people or families earn much less than the average, which prevents them from enjoying the same level of living as other members of society. It is common practice to evaluate relative poverty in light of the community's economic standing.

3. Multidimensional Poverty: This concept takes into account various factors beyond income, such as education, health, and living standards. The Multidimensional Poverty Index (MPI) is one tool used to measure this type of poverty.

4. Causes of Poverty Environmental causes, political instability, and social structures are important contributors to poverty, as are economic instability, lack of education, unemployment, discrimination, and insufficient access to resources.

5. Effects of Poverty: Poverty has wide-ranging effects that affect not just individuals but also communities and countries. Poor health outcomes, restricted educational opportunities, social exclusion, and elevated crime rates are all consequences of poverty. It often perpetuates a cycle of disadvantage across generations.

6. Poverty Alleviation: A variety of tactics, such as social welfare programs, economic development, education campaigns, and advancements in healthcare access, are used to fight poverty. Governments, non-profits, and international organizations frequently collaborate to put policies meant to combat poverty into action.

Methodology

The purpose of the research design is to answer the research questions and set goals for the investigation. Time series data gathered from the World Bank database and the online edition of the Central Bank of Libya Statistical Bulletin 2023 are used in the analysis. In order to address the research issues, the Ordinary Least Squares method is used to analyses the time series data for the components of government expenditure, specifically government spending on education, over the years 2000–2022.

According to Engle and Granger (1987), a linear combination of two or more non-stationary series (with the same order of integration) may be stationary. If such a stable linear combination is found, the series are considered cointegrated and long-term equilibrium relationships exist. In order to test for Granger causality of the series in at least one direction, the cointegration model could be constructed utilising these cointegrated features. The Granger Causality Test is specifically used in this study to investigate the Granger causality between poverty Rate (POVR), and education expenditure (EDX)

$$POVR_t = f(EDX_t) \qquad (1)$$

Stochastically, the model is specified as: $\qquad POVR_t = \beta_0 + \beta_1 EDX_t + \mu_t \qquad (2)$

A priori expectations: $\beta_1 < 0$.

The Granger Causality Test, cointegration, and stationarity

Because the use of the ECM requires cointegration with the same order, the series must first be tested for stationarity and cointegration. A series is considered nonstationary (or stationary) if its mean, variance, and autocovariance vary over time at various lags. It is said to be integrated of order d if a nonstationary series must be differentiated d times before becoming stationary, i.e. I(d).

Dickey & Fuller (1979) developed the augmented Dickey–Fuller (ADF), and Elliott, Rothenberg, and Stock (1992) created a new, high-power unit-root test. These authors examine the asymptotic power envelope for several unit-root tests, and they suggest a straightforward modification to the ADF test called the DF-GLS test, which can almost attain the power envelope. For both tests, we are testing the null hypothesis H_0, that Y_t is nonstationary, against H_1, that Y_t is stationary.

Once both series are integrated in the same order, we can test for cointegration using the Johansen maximum likelihood method (Søren Johansen, 1988; Soren Johansen & Juselius, 1990). If a long-run cointegrating relationship is found between the series, an additional error-correction term will be added to the ECM. The Johansen technique is a test on limits imposed by cointegration in the unrestricted VAR that uses vector autoregressive (VAR) data; the null hypothesis under investigation is H_0, which states that there are a different number of cointegration relationships, as opposed to H_1 (that all series in the VAR are stationary). Table 1 shows the results of the ADF and DFGLS tests on the integration properties of poverty rate (POVR) and education expenditure (EDX). The two series are determined to be nonstationary at level based on the results of the two tests. However, stationarity results from these series' initial differences. These indicate that the integration of poverty Rate (POVR) , and Education expenditure (EDX) for Libya is of order one, i.e. I(1).

Table 1: Results of ADF and DFGLS tests

Variables	ADF		DFGLS	
	Levels	1st Difference	Levels	1st Difference
POVR	-2.34	-5.932**	-3.335	-6.769**
EDX	-1.94	-4.09**	-2.024	4.873**

Asterisks:(**) indicates statistically significant t 5 present level

Co-integration Analysis

Given that all of the variables in the model are stationary at first difference, econometric methodologies recommend cointegration analysis to ascertain the long-term relationship between the variables. The Johansen and Juselius (1990) approach is a suitable choice for co-integration, and it has been used to ascertain the long-term relationship between the use of electricity and economic expansion.

The study selects the proper lag duration using the Hannan-Quinn Criterion (HQ), the final prediction error (FPE), the Schwartz Bayesian Criterion (SBC), and the Akaike information criterion (AIC). The findings are presented

in Table 2. As shown FPE,AIC , HQ and SBC propose lag lengths of 4 and 1 respectively. The study chooses lag length of one as appropriate lag length by following Johansen and Juselius (1992).

Table 2: Lag Length Selection Criteria for Order of VAR Model

Lag	LL	LR	FPE	AIC	HQ	SBC
0	-825.867	NA	6.7e+21	61.5383	62.6424	62.2557
1	-787.259	126.71	1.2e+23	58.1303	58.7424	58.8581
2	-727.476	33.546	7.3e+22	59.4797	57.970	61.0947
3	-716.028	22.102*	6.5e+21*	57.506*	58.0236*	58.8125*
4	-735.729	16.288	8.1e+24	59.7682	57.3524	61.5065

The number of co-integrating vectors is ascertained using the Maximum Eigenvalue and Trace Statistic tests. The model with "unrestricted intercept and no trend" is the most appropriate of the five co-integration models, according to the Pantula principle. Different intercept and trend term specifications are considered in these models. ASTERIOU & Hall (2007) state that the "unrestricted intercept and no trend" model assumes that the intercept in the Vector Autoregressive (VAR) model cancels out the intercept in the co-integrating equation. Consequently, the constant term (or intercept) is not reported in the computed model.

The results of the Maximum Eigenvalue test and the Trace Statistic test are displayed in Tables 3 and 4, respectively. The Trace Statistic reports a single co-integrating vector and maximum.

Table 3: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.74768	75.4538	46.8571	0.0000
At most 1 *	0.42437	30.1034	28.7960	0.0432
At most 2	0.28167	13.6975	13.7580	0.1349
At most 3	0.08175	2.6979	2.9787	0.0734

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

Table 4: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.7467	42.9552	26.5843	0.0003
At most 1 *	0.3436	18.6705	22.1218	0.1325
At most 2	0.2516	8.7800	13.2445	0.2386
At most 3	0.0825	3.9796	3.7423	0.0734

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

According to the statement you gave, the Trace statistic is recommended when the Maximum Eigenvalue test and the Trace value test in cointegration analysis clash. ASTERIOU & Hall (2007) and Johansen and Soren Johansen & Juselius (1990) claim that the Trace statistic is more potent since it accounts for all of the smallest eigenvalues. It is hence capable of identifying more cointegrating correlations between variables in a model.

According to this interpretation, the study you cited only considered one cointegrating link among the model's components. This suggests that the researcher believed the variables under study had a single, long-term relationship.

It is noteworthy that cointegration analysis is frequently employed to investigate the long-term correlations between variables and whether they move in tandem over time. The particular research issue, the properties of the data, and the model's underlying assumptions all influence which of the Trace and Maximum Eigenvalue statistics is used. The appropriateness of each statistic for their specific analysis should be carefully considered by researchers.

Granger Causality Test
Using the Schwarz Information Criterion (SIC) to choose the best answer, the test for the direction of causation is predicated on the idea that there are between one and seven lags. The findings of testing Granger's causality, which runs POVR to EDX for the Libyan country, are shown in Table 5. Granger causality is not present in POVR to EDX. Additionally, table 5 makes it evident that EDX and POVR are causally related.
Where,
POVR and EDX: Poverty Rate and Education Expenditure respectively.

Table 5: Granger Causality Test Results

Null Hypothesis:	Obs	F-Statistic	Probability	Decision
EDX does Granger cause POVR	20	12.126	0.0003	EDX→ POV
POVR does not Granger cause EDX	20	1.0736	0.3128	No causality

Conclusions and Recommendations

Conclusions

A complex interaction between poverty and education can be shown in Libya 2000 to 2022. Though obstacles like political unpredictability, economic volatility, and unequal access to resources have limited its efficacy, education has the potential to be a significant instrument for ending the cycle of poverty. Even while Libya has made progress in raising literacy rates and expanding access to education, problems with low-quality education, insufficient infrastructure, and regional imbalances still exist. The evaluation period also demonstrates how governance issues and wars have worsened poverty and caused disruptions in the educational system.

Recommendations

1. Invest in Education Infrastructure: To guarantee fair access to high-quality education, schools should be renovated and updated, particularly in underprivileged areas.

2. Strengthen Teacher Training: Create all-encompassing initiatives to assist and train educators, hence raising the standard of instruction.

3. Focus on Vocational and Technical Education: Align educational programs with market demands to equip students with skills for employment and entrepreneurship.

4. Strengthen Policies and Governance: Develop and implement policies that address poverty reduction through education, guaranteeing openness and accountability.

5. Offer Social Support: To lessen the financial strain on families, implement initiatives like school meal plans, scholarships, and transportation services.

6. Encourage Community Engagement: Motivate nearby communities to take part in developing educational programs and efforts to reduce poverty.

7. Take Advantage of Global Assistance: Work with global organisations to obtain resources, know-how, and best practices for educational change.

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