MEASURING THE IMPACT OF ECONOMIC GROWTH ON INFANT MORTALITY IN SUB-SAHARAN AFRICA: THRESHOLD REGRESSION APPROACH

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Abstract

Given continual child death in the Sub-Saharan Africa region, this study utilizes the threshold regression investigates the impact of economic growth on infant mortality and suggests policies to reduce infant mortality in SSA**.** This technique analysis the level of economic growth required to reduce infant mortality and also allows for the assessment of higher and lower dependent regime. The findings show that from 2002 to 2022, economic growth demonstrate a negative relationship with infant mortality at both levels of dependent regime while education also has negative relationship but not significant. More so, the role of education in the region has been very vita at reducing mortality as well as immunization which has negative and significant effect at reducing the level of child death in the region. The study concluded that economic growth over a particular threshold reduces infant mortality in Sub-Saharan Africa. Among other variables, education and immunization improvements reduce infant mortality. It is therefore recommended that it is critical to implement policies that prioritize concentrated investment in healthcare infrastructure, particularly in areas with lower rates of economic growth. Such policies include increasing the total capacity of healthcare systems, ensuring the availability of essential medical supplies, and developing and refurbishing medical facilities.

Keywords: economic growth, threshold, infant mortality, dependent regime

JEL classification: H51, I15, I18

1. INTRODUCTION

All Global attempts to minimize infant mortality are showing results, with considerable reductions in under-five death rates over the last couple of decades (Nabila, *et al.,* 2022). Nevertheless, issues remain, notably in Sub-Saharan Africa (SSA), where many nations tend to suffer from substantial rates of infant death (Joy, *et al.,* 2023). Restricted availability of healthcare services, low public health budget,

and the influence of globalization on healthcare systems are all factors that contribute to high infant death rates in SSA. Evidence have shown that on average, 15,000 children died before age 5 every day in 2018 compared to 34,000 in 1990 and 27,000 in 2000 (UNICEF, 2018). While in 2020, an estimated 5.2 child death occurred globally, more than half of those death come from SSA (WHO, 2020).

Regardless of the progress accomplished through the Sustainable Development Goals (SDGs) in lowering infant mortality rates worldwide, many Sub-Saharan African (SSA) countries have struggled to meet Millennium Development Goal targets and are at risk of failing to meet SDG targets by 2030 (Zulfiqar & Bhutta 2023). Preventable illnesses, hunger, and a lack of access to safe drinking water and sanitation all contribute significantly to child mortality in SSA nations, accounting for half of all child fatalities (Bolajoko, *et al.*, 2022). The United Nations Inter-agency Group for Child death Estimation reported a global decrease in newborn and under-five death rates, demonstrating progress but also emphasizing the obstacles that remain in reaching these goals, particularly in places such as SSA (Nyovani, *et al.*, 2023).

However, it is worth noting that a significant proportion of these fatalities could have been averted through the implementation of several uncomplicated interventions. These interventions include the administration of immunizations, antibiotics, insecticide-treated bed nets, vitamin supplements, improved family care practices, and the promotion of breastfeeding. If such had been properly implemented, the investment package could have saved 70% of neonatal deaths, equating to 1.93 million newborn deaths each year (WHO, 2018).Such reductions in mortality and morbidity among impoverished populations are widely recognized as significant public health issues of utmost importance, especially in the contemporary global context (Dhrif, 2018).

More importantly, empirical evidence in developed economies found it completely difficult to establish whether increasing health expenditure reduced infant mortality (Olaniyi, & Adekanmbi, 2022).Yet, the case of considering spending money on health care is worthwhile because it is one of the primary contributors of economic growth. A healthy population is crucial to higher production and higher per capita income (WHO, 2005; WHO, 2017). Improved health expenditure does only aid human capital output, but also serves as an important driver for economic growth and development (Kurt, 2015; Piabuo & Tieguhong, 2017). In addition, investments in human health, leads to increase labor productivity, higher earnings, and improved population well-being (Kurt, 2015; Piabuo & Tieguhong, 2017; Raghupathi & Raghupathi, 2020).

A physically strong worker in most cases aids market motivation; and this engenders improved labor skills and they expect to reap long-term benefits (Bloom & Canning, 2000). Contrarily, employees in poor health conditions, have a detrimental effect on productivity, which is one of the factors that explain why different parts of the world are developing differently (Cole & Neumayer, 2016; Okuneye, Olaniyi, & Adekanmbi, 2023). More so, financing for health-care system

is crucial since it does not only preserve lives, but also increases economic activities (Piabuo & Tieguhong, 2017).

This means that in any country, enhanced human capital is seen as a critical aspect in achieving targeted economic growth and development (Rahman, Khanam & Rahman, 2018); thus, in order to improve the health results, productivity is acknowledged as having a strong link to health (Grossman, 2000; Dimble & Menon, 2017; Siddiquea, Mohey-ud-dinb & Adiqa, 2020; Olaniyi, & Adekanmbi, 2022).

Many scholars have researched extensively on similar topic, in Africa. For instance, Novignon & Lawanson, 2017; Sarpong & Owoo, 2018; Kiross, Chojenta, Barker, & Loxton., 2020; Modibbo & Saidu, 2020). While some of them consider the effects of heath expenditure on economic growth (Yasin, 2003; Bein, Unlucan, Olowu, & Kalifa, 2017); others concentrated on the effect of economic growth on infant mortality (Piabuo & Tieguhong, 2017; Kiross *et al.*, 2020).

However, this study contends that identifying the effect of economic growth is of little importance in the region especially to the policy makers unless a threshold is established at which economic growth reduced infant mortality in the region. More so, while earlier research concentrated on specific regions within SSA, proposing solutions tailored to those areas, this study takes a holistic approach, addressing the entire SSA region. It outlines a comprehensive strategy for countries within the region to instigate meaningful transformations, thereby optimizing the efficacy of initiatives targeted at curbing infant mortality.

The present study adds substantially to the body of knowledge by concentrating on two important research gaps. The initial component of the study looks at the association between economic growth and infant mortality. Examining the relationship between economic growth and infant mortality might provide important context for the SSA's pursuit of sustainable development.

By analyzing the associations between economic growth and infant mortality in Sub-Saharan Africa, this study intends to furnish policymakers with a framework. To accomplish this objective, an exhaustive analysis of the SSA economy from 2002 to 2022 is necessary. The threshold estimator is utilized to ascertain the degree of economic expansion that is necessary to mitigate infant mortality in the given area. The following sections comprise the remainder of the research article. In Section 2, the research methodology is described. The third section is devoted to discussions and the presentation of results. In Section 4, policy implications are presented, and the study is concluded.

2. EMPIRICAL LITERATURE

Nishiyama (2011) looked at the effects of GDP per capita on the child mortality by employing panel data combined with a model of fixed effects across 83 developing nations across a 40-year period. While economic growth significantly lowers the death rate of infants, the influence that economic progress upon asymmetrical infant mortality during booms and busts. While negative economic

growth exerts a substantial, unfavorable influence, positive economic growth could have minor, mixed impacts on a decrease in infant mortality.

Similarly, Gong, *et al.,* (2012) used fixed effect specification to evaluate the impact of health capital on economic growth in 28 Chinese provinces from 1978 to 2003. They discovered that raising one's health consistently results in higher economic growth, though whether one's health is higher or lower is determined by whether the efficiency advantage of health outweighs the crowding out effect of investments within physical capital for health care. The amount of earnings elasticity, according to Baltagi et al. (2016), is dependent on where various nations fall in the global distribution of income, with less fortunate nations exhibiting higher elasticity. Yet, findings differ significantly based on the sub-sample investigated.

The result of this study was questioned in a G7 countries' study but the effects of recession was not put into consideration where Namini (2018) examined the relationship that exist among total healthcare expenditure, economic growth, and inflation in using panel cointegration, a vector error correction model, as well as an impulse response structure, in the G7 countries between 1995 and 2013. This is similar to the findings of Amiri & Linden (2016) about the causal relationship between GDP and total healthcare spending theoretically predicted to be in either or both directions using the sample of 22 OECD nations examined between 1970 and 2012.

Importantly, Chu, *et al.,* (2019) examined the threshold effects of inflation on the economic growth using a panel-based study involving 18 developed countries between 1980 and 2016. The researchers employed a dynamic panel thresholds regression model, as suggested by Kremer, *et al.,* (2013), and included relevant factors such as the index of consumer prices and Gross Domestic Product. The results of the study indicated that, when compared to the four percent influence of inflation on growth in lower price regimes, which becomes positive and statistically significant at the 5% level, many central banks' target inflation rate of 2% is a sensible choice. According to the study, higher inflation regimes are associated with slower economic growth; the relationship between inflation and growth is negative and statistically significant at 1%.

3. METHODOLOGY

This study is sub-Saharan Africa based and makes use of a panel data for 2002-2022. The selection of the start date was determined not only by the establishment of the global fund to fight infectious diseases, which supports countries in their efforts to combat major infectious diseases that affect humanity, including children but also based on the availability of reliable and comprehensive data on economic indicators and infant mortality rates, which are essential for conducting research.

Infant mortality (denoted as IM) is the dependent variable for this study. Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year (Akinlo & Sulola, 2018). It is proxied in this

study using mortality rate, under-5 (per 1,000 live births). Gross domestic product per capita is gross domestic product divided by midyear population. It denoted as GDP and is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources (Spiteri & Brockdorff, 2019). This is measured using GDP per capita (constant 2010 US$).Infant mortality (denoted as IM). Female literacy (denoted as EDU) represents the female literacy rate and it is the proxy for education and a measure of human capital. It is measured using educational attainment, at least completed primary, population 25+ years, female (%) (cumulative). Immunization (denoted as IMM) is defined as the no of children immunized per country. It measures the percentage of children aged 12-23 months who received vaccinations before 12 months or at any time before the survey. (Akinlo & Sulola, 2018). Table 1 presents the descriptions and sources of the variables employed in the study.

Table 1. *Description of variables*

Abbreviation	Description	Source
IM	Infant mortality	World Development Indicator, (WDI)
RGDP	Gross domestic product	World Development Indicator, (WDI)
EDU	Female literacy	World Development Indicator, (WDI)
IMM	Immunization	World Development Indicator, (WDI)

Source: Authors' Compilations (2024)

3.1 THEORETICAL CLARIFICATION

As developed by economists such as Adam Smith, David Ricardo, and subsequently formalized by Robert Solow, the Classical Growth Model emphasizes on the part of capital accumulation, labor growth, and technical advancement in propelling economic development. The model suggests that effective use of these elements will help to attain long-term economic development. The Cobb Douglass production function, which has the following form, is thought to be a generic neoclassical growth model.

$$Y = A\,f(K, N) \tag{1}$$

Where Y denotes the amount of output per worker, K denotes capital, N denotes labor, and A denotes the determinant level of technology income, often known as the GDP, within the country's economy. A higher percentage of GDP must be invested in order to accelerate economy's growth, according to the model. As a result, the rate of output growth can be expressed as:

$$\frac{\Delta y}{y} = \frac{\Delta A}{A} + \alpha_K \frac{\Delta K}{K} + \alpha_N \frac{\Delta N}{N} \tag{2}$$

As $\Delta y = \frac{\Delta Y}{Y}$ remains the frequency of growth in output, $\frac{\Delta A}{A}$ has been the rate of progress of efficiency in productivity, $\frac{\Delta K}{K}$ has become the rates of improvement of labour, α_k remains the ratio of the elasticity of production with regards to capital, α_N is an elasticity of production in reverence to labor, each of α_K and α_N is below

one given the decreasing marginal returns. Analysing the relative relevance of several growth factors requires breaking rise in output to constituents: productivity gains, invested capital expansion, and labor investment advancement.

Furthermore, improving living standards, healthcare infrastructure, nutrition, and education all of which are vital elements in lowering infant mortality rate and especially pertinent for underdeveloped areas like SSA, where increasing capital accumulation and technological advancement are absolutely essential for economic development.

3.2 MODEL

The model for the influence of economic growth on infant mortality is as stated:

$$IM = f\ (RGDP, EDU, IMM) \tag{3}$$

The model is thus specified in a linear form as:

$$IM = \ \beta_0 + \ \beta_1 RGDP_t + \ \beta_2 EDU_t + \ \beta_3 IMM_t + U_{it} \tag{4}$$

EDU denotes the level of female literacy, while IMM represents the level of immunization in the region during the period and the RGDP also denotes the real gross domestic product (a proxy for economic growth). In the model, αi is the constant term, and β_1 through β_3 are the coefficients. u_{it} represents the error term.

The empirical strategy used in the present research is intended for estimating the threshold influence of economic growth on infant mortality and have been widely utilized in the field of econometrics for a considerable period. They have gained popularity in recent years as a means of examining the level of influences. To establish the threshold of economic growth required to reduce infant mortality would be estimated through a panel threshold regression (PTR) model proposed by Hansen (1999). This permits the estimation of the endogenous threshold as follows:

$$(Y_{it,}\ X_{it}\ :\ 1 \leq i \leq n,\ :\ 1 \leq t \leq T) \tag{5}$$

Where subscript *i* denoted the indexes the individual and the subscript *t* also indexes time. The dependent variable noted as y_{it} and the independent threshold variable as $q_{it} = q(x_{it})$ denoted an element or characteristic of the vector x_{it} of exogenous variables.

3.3 EMPIRICAL STRATEGY

The study aimed to explore the effect of economic growth on infant mortality in SSA. Descriptive statistics were used to effectively show, describe, and summaries the data. Furthermore, the study sought to evaluate whether the data had a normal distribution by analyzing their means, medians, and standard deviation values. The study utilized cross-sectional dependency analysis to establish the presence of cross-sectional independence within the panel. The framework determined through threshold variables is presented as follows:

$$IM_{it} = \alpha_0 + (\beta_1 GDP, EDU, IMM)\, \delta_1 I\,(q_{it} \leq \Upsilon) + (\beta_2 GDP, EDU, IMM)\, \delta_1 I\,(q_{it} > \Upsilon) + z_{it} + U_{it1} \quad (6)$$

Where α_i represents unobserved country specific effect; q_{it} was threshold variable that separated the findings into two regimes identified by different regression slopes β_1 and β_2; Υ denotes threshold level of *GDP*; *I*(.) is an indicator variable; δ_1 is the regime intercept which played a crucial function in determining the threshold panel analysis and minimizes the risk of biased estimators in the threshold effects.z_{it} is a set of other control.

4 RESULT

4.1 DESCRIPTIVE STATISTICS

The findings of the descriptive statistics are presented in Table 2. It can be inferred from the results that all variables have mean and median values that lie between their minimum and maximum values. This suggests an extremely high probability of a normal distribution for all variables. The absence of statistical significance at the 5% level for all p-values provides evidence in favor of the Jarque-Bera statistics' assertion that the series follows a normal distribution. Consequently, this confirms the alternative hypothesis that each variable adheres to a normal distribution.

Table 2. *Descriptive statistics*

Variables	IM	GDP	EDU	IMM
Mean	58.805	2.850E10	34.974	74.587
Median	57.200	9.510E+09	29.493	77.000
Maximum	139.500	5.030E+11	94.277	99.000
Minimum	11.800	1.570E+08	2.561	16.000
Std. Dev	24.255	6.810E+10	22.199	17.540
Jarque-Bera	14.888	2.408E+04	70.712	69.709
Observation	966	966	966	966

*Note: *P < 0.01, **P < 0.005.*
Source: Author's Computation, 2024

4.2 TEST OF MULTICOLLINEARITY

To determine if there was multicollinearity among the predictor variables (immunization, education, economic growth, and infant mortality), a correlation matrix was computed. Table 3 shows the matrix of correlation. The research reveals that there are no significant correlations among the variables, which guarantees the reliability of the results.

Table 3. *Correlation Matrix*

Variables	IM	GDP	EDU	IMM
IM	1.000			
GDP	0.015**	1.000		

EDU	-0.303*	0.232*	1.000	
IMM	-0.027*	-0.210*	0.178*	1.00

*Note: *P < 0.01, **P < 0.005.*
Source: Author's Computation, 2024

The correlation matrix statistics can be seen in Table 3, which shows both positive and negative correlation coefficients between the variables in the matrix. It is clear that there is no multicollinearity between the variables since the correlation values are weak and negative. The correlation between infant mortality and economic growth is positive, with a coefficient of 0.015. EDU is negatively correlated with infant mortality with a coefficient value of -0.303 and the immunization (-0.027).

4.3 CROSS SECTIONAL DEPENDENCE

The results of Cross sectional Dependence confirmatory tests are presented in Table 4.

Table 4.*Results of cross-sectional dependence test. Panel A: Pesaran (2004) Cross-sectional dependence test*

Variables	CD-Test	Abs (Corr.)
IM	117.76 ***	0.91
GDP	114.25 ***	0.800
EDU	-0.48	0.170
IMM	59.31 ***	0.47

*Note: ***, **, * denote the level of Significant at 1%, 5%, 10% respectively.*
Source: Author's Computation, 2024.

There is cross-sectional dependence in all of the variables in Table 4, except for education (EDU), which has cross-sectional independence within the group. Tests of the unit root using second-generation unit root are not suitable because not all variables involved the panel support the null hypothesis for cross-sectional dependence.

4.4 ESTIMATION RESULTS

This sub section presents the results of the threshold of economic growth on infant mortality in SSA. The result is reported in table 5 where the upper portion of the table displayed the predicted economic growth threshold and the equivalent 95% confidence interval. The regime-dependent variable coefficients for economic growth on infant mortality in lower (higher) economic growth regimes are displayed in the middle of the result. The predicted threshold value for 19.70 percent was not only within the lower and upper arm of economic growth, but also within the confidence interval. The means that the lower region of economic growth (19.57 percent) was below the threshold value and upper region (20.30 percent) was above the threshold parameter.

The coefficient of economic growth in the lower regime dependent was negatively correlated with infant mortality and significant. This implies that when

economic growth is equal to or below 19.5715 percent, infant mortality will reduce. More specifically, an increase of one percent of economic growth below the threshold value decreases infant death by 0.330% and is significant. This may be due to the improvements in the provision of healthcare services especially improvements of primary health care services across the region.

However, above the threshold level in higher threshold regime, the coefficient economic growth was also negatively correlated with child mortality. A 1 percent increase in economic growth decreased infant mortality in higher regime by 0.296 percent and was statistically significant. This shows that economic growth will not only reduce infant mortality in the lower threshold regime alone but also at higher regime. This could also be caused by technological advances that previously lasted decades to realize while being introduced for medical sector in most African nations to scale-up health deliveries from affluent nations may now be available for a lot cheaper. For example, ultra-modern pregnant scanning machines and many other such machines are being used recently across SSA region.

Also, one percent rise in immunization decreased child death by 0.159 percent and this was statistically significant. Increasing campaign on the importance of regular antenatal as well as timely vaccination of the pregnant women and perhaps their offspring are to blame for the observed decline in infant death through immunization. Likewise, the coefficient of education also reduces infant mortality in the region. Precisely, an increase of in the level of female literacy through education in the region reduced infant mortality by 0.012 though not significant at this time. As evident in table 5, the reduction may be based on many factors such as the situation where people who get education are better able to make informed decisions regarding their health, such as safe birthing, vaccinations, diet, and prenatal care. People with higher levels of education are also more likely to be aware of and have access to healthcare resources, which increases the likelihood that they will receive the right treatment during pregnancy and labor. Infant mortality rates are decreased as a result of the early identification and treatment of possible problems.

One effective strategy for giving women more influence in society is education. Women who receive an education learn about family planning, health, and their rights. They are therefore more likely to seek prompt prenatal care and make educated decisions regarding their reproductive health. Further lowering the incidence of newborn mortality, educated mothers are also better able to care for their babies by providing optimum diet, cleanliness, and medical attention.

Table 5*.Threshold of Economic Growth on Infant Mortality in SSA*

Model	Threshold Level	Lower	Upper
Th-1	19.7009	19.5715	20.3062

Note: Estimator (level = .95)

Variables Dep. Lnim					
	Coefficient	**Std.err**	**t- Statistic**	**prob.**	**95% conf.**
Lnedu	- 0.0116	0.0088	-1.32	0.189	-.0288
Lnimm	- 0.1595	0.0296	- 5.38	0.000***	-.2177

Cat c. lngdp					
0	-0.3305	0.0231	14.05	0.000***	.3766
1	-0.2964	0.0207	14.29	0.000***	.3371
Cons	14.2959	0.3872	36.92	0.000***	15.0558
R- sq	--				
Within	0.7212				
Between	0.0057				
Overall	0.0301				
Obs	966				
groups	46				
Prob > F	0.0000				

*Note ***, **, * Statistical significance at 1%, 5%, and 10% level of significance, respectively.*

Source; Author, 2024

4.5 DISCUSSION

Economic Growth on Child Mortality

The threshold of the economic growth on infant mortality result has been presented in Table 5 showed the predicted threshold level of 19.70 percent below which economic growth cannot reduce infant mortality the region. Health has been found to have a strong link with economic growth; more so, improved health status has been recognized as one of the catalyst for income generation (Newhouse, 1977; Mehrara & Musai, 2012). The result confirmed for the SSA region at the lower regime of economic growth was negative and also significant; indicating reduction in the level of child mortality during the time of this study. The result corroborated Jeffrey, Coffie, & Firmin, (2018).Similarly, the result of higher regime of economic growth was also negative and significant.

This result impliedly means that at any level of economic growth (higher/ lower) infant mortality will reduce significantly. The result was similar to Wilhelmson & Gerdtham (2006) which employed economic growth as a control variables in investigating maternal newborn health in developed countries. The reduction in infant mortality may be attributable to the situation or region where there exists an improved or higher rate of economic growth.

The effect of economic growth on child mortality model presented in Table 5, showed revealed there was a considerable detrimental impact of economic growth on infant mortality as expected and corroborated Nishiyama (2011) used panel data from 83 developing nations over a 40-year period to examine the effects of GDP per capita on infant death. This was also in line with Bul & Moracha's (2020) investigation into the relationship between economic growth and health in Sub-Saharan Africa using data from 1991 to 2015. They used a pooled OLS and two-ways fixed effect technique to analyze the data. The results demonstrated a statistically significant adverse effect of economic growth.

Analysis revealed that through increasing access to healthcare services, economic growth lowers child mortality rates. The coefficient result for public health

spending had been discovered to have been negative and significant, which was consistent with the a priori expectation. It should be remembered that throughout the past few decades, government spending on public health has been one of the main targets of intensive criticism. The intention was to evaluate and support government spending on social programmes like health care or broader government involvement.

Nevertheless, one of these earliest investigations in this area found little evidence of a major impact of aid on health indices (Boone, 1995). The fact that data from countries with various economies were combined may be what's causing this disagreement. The result of economic growth showed negative coefficient on infant mortality in the region. The result also conformed Erdogan, *et al.,* (2013) who empirically examined, for a sample of 25 high-income OECD nations, the link between economic growth and IMR for the years 1970–2007. The actual data shows that in certain of the countries, the IMR and real per capita GDP have a strong and adverse relationship. It was claimed that as each nation's GDP increased and more resources were readily accessible to address the health of children, the IMR of the nations fell.

Additionally, the analysis supported Gonzalez and Quast's (2010) comparison of Mexican states with varying degrees of expansion, which demonstrated that death rates tend to fall amid economic downturns in higher-income states and rise in regions with lower levels of development. Nevertheless, the relationship between death rates and economic growth has been well studied in the published literature, though with contradictory results. Numerous studies have also suggested that lower mortality rates encourage economic growth (Bhalotra, 2006).

Immunization on Child Mortality

The adverse effect of immunization on child mortality was expected. The result of this study corroborated that of Kim & Lane (2013), who evaluated public health consequences and government health spending. The study was a comparative study among 17 countries and implications for US health care reform. It was reported that immunization becomes an important factor that facilitated reduction in the level of infant mortality and child death. Education this study showed a negative and significant coefficient implying that increase in education especially female education reduces infant mortality in the region. This is in line with Fayissa & Gutema (2005), who made the argument that better education will enhance health outcomes because people, particularly women, become more effective with the use of healthcare facilities as well as taking good care of their infant's health by obtaining appropriate medical attention.

Education on Infant Mortality

Government action is necessary to tackle the problems of poor hygiene and illiteracy as well as to enhance numerous other social sector consequences. The findings of this study were consistent with those of Gupta et al. (2002), who discovered that public spending on primary healthcare was important to lowering child mortality and advised wise use of resources in the health sector to produce

desired results. The results supported Rajkumar and Swaroop's (2008) contention that significant advancements in health could be attained with economic growth that increases private healthcare resources whereas public spending alone is insufficient for enhancing health status, even though public health spending is more important for lowering child mortality.

5 CONCLUSION

This paper investigates the effect of economic growth on infant mortality with a focus on in SSA. Unlike previous studies, this study employs a threshold regression analysis to assess the level of economic growth required to reduce infant mortality in the region from 2002 to 2022.

Notably, at the lower thresholds of economic development, a discernible reduction in infant mortality rates is observed. This phenomenon can be attributed to the potential of economic growth to enhance healthcare accessibility, improve living conditions, and bolster overall societal well-being. However, this negative impact is most effective when coupled with investments in education. Education emerges as a formidable ally in reducing infant mortality by empowering communities with essential knowledge on maternal and child health, fostering healthier practices, and enhancing overall health awareness.

The combined influence of economic growth and education forms a synergistic approach that, when implemented inclusively, can create a conducive environment for sustained improvements in infant health outcomes. It is imperative, therefore, that developmental efforts in SSA prioritize not only economic growth but also educational advancements to address the multifaceted challenges associated with infant mortality, ensuring a comprehensive and lasting impact on the region's healthcare landscape. This makes the study emphasizes the importance of policies that encourage decreased child mortality through numerous pathways.

In the study’s recommendations, it is critical to implement policies that prioritize concentrated investment in healthcare infrastructure, particularly in areas with lower rates of economic growth. This includes increasing the total capacity of healthcare systems, ensuring the availability of essential medical supplies, and developing and refurbishing medical facilities. By closing these critical gaps, Sub-Saharan African (SSA) countries can successfully translate economic growth into measurable advances in maternal and child health outcomes, resulting in a decrease in infant mortality rates.

Policymakers should aim to encourage inclusive economic growth that benefits all socioeconomic groups. Ensuring that disadvantaged populations benefit from economic success requires tackling income inequality and fostering equitable access to opportunities. Targeted social welfare projects, skill-building initiatives, and activities can achieve this to empower underprivileged communities. In the end, this will improve the living conditions and health of pregnant mothers and their newborns. Policies should also emphasize extending educational opportunities, particularly for women, given the vital role education plays in reducing infant mortality. Adopting efforts that promote women's education improves childrearing practices while also giving women with the knowledge and skills they need to make

informed healthcare decisions. Furthermore, health awareness programmes should be included into school curricula and community outreach initiatives to ensure that the good impacts of education result in healthier habits and a long-term reduction in infant mortality in Sub-Saharan Africa.

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