

ORIGINAL RESEARCH ARTICLE

Political factors, household income, under five survival, and life expectancy in the Sahel region

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Abstract

In recent decades, the Sahel region has experienced ongoing health crises, including high fertility rates, declining life expectancy, and low under-five survival rates. As such, this study investigates the impact of political factors and household income on under-five survival and life expectancy in the Sahel region, using secondary data from seven countries in the area. The data for the study was extracted from the World Development Indicators, and a panel Autoregressive Distributed Lag model was applied for analysis. The findings reveal that individuals in the Sahel region have a life expectancy of approximately 57 years, with an alarming rate of approximately 102 children per 1,000 births not surviving beyond age five. Political factors significantly contribute to reduction of under-five survival and life expectancy in the region, as does household income. Therefore, addressing government effectiveness, political stability, and household income is crucial to improving health outcomes in the Sahel countries, ultimately enhancing under-five survival rates and life expectancy across the region. (*Afr J Reprod Health* 2023; 27 [12]: 63-71).

Keywords: Government effectiveness, infant mortality, per capita income

Résumé

Au cours des dernières décennies, la réglementation du SAHEL a expérimenté la stimulation de la santé en cours, notamment des taux élevés de flexibilité, une baisse des extesteurs de vie et de faibles taux de S. urvival de moins de moins de moins de moins de personnes. La survie et l'attention de la vie dans la région de Sahel, en utilisant des données secondaires de sept pays de la région. Les données de l'étude ont été extraites des indicateurs mondiaux de développement, et un modèle de décalage distribué autorégressif a été appliqué pour l'analyse. Les résultats révèlent que les individus Dans la région de Sahel, a une espérance de vie d'environ 57 Years, avec un taux alarmant d'environ 102 enfants pour 1 000 naissances qui ne survivent pas au-delà de l'âge de l'âge. Revenu des ménages. Par conséquent, aborder les gouvernements efficacité efficace, stabilité politique et incial des ménages à améliorer les résultats pour la santé dans le nombre de Ries, améliorant finalement les taux de survie des moins de cinq ans et l'espérance de vie dans la région. (*Afr J Reprod Health* 2023; 27 [12]: 63-71).

Mots-clés: Efficacité gouvernementale, mortalité infantile, revenu par habitant

Introduction

The Sahel region, spanning across the African continent, has long grappled with a complex web of challenges, including persistent health crises, soaring fertility rates, and rising youth unemployment rates. These challenges, compounded by rapid population growth, have resulted in staggering poverty rates, making the Sahel sub-region stand out with one of the highest poverty rates in the African continent¹. In the face of these formidable obstacles, governance in the Sahel has often shown vulnerabilities, hindering the

region's progress toward sustainable development and improved public health.

The significance of health outcomes, as a substantial component of human capital and an indicator of the quality of life, cannot be overstated². However, amidst the myriad health indicators, two paramount metrics - life expectancy and under-five survival - serve as crucial barometers of a nation's overall health status³. Under-five mortality, in particular, captures the probability of a child dying before reaching the age of five while life expectancy is the average number of years a person is expected to live.

The two indicators are enshrined as the third Sustainable Development Goal (SDG3), aiming to reduce under-five mortality rates to at most 25 deaths per 1000 live births and increase life expectancy across all nations by 2030⁴⁻⁶.

While developed nations have made commendable strides in reducing child mortality and improving life expectancy, the Sahel sub-region, predominantly composed of low-income countries, lags considerably behind in achieving this goal⁷. This concerning disparity underscores the urgent need for a deeper exploration of the factors influencing life expectancy and under-five survival in the Sahel Region. This research paper seeks to address this critical gap in existing literature by delving into the complex interplay of political factors and household income as determinants of under-five survival and life expectancy in the Sahel Region. Despite the growing body of research examining health outcomes, few studies have examined the impact of political factors and household income in shaping health indicators within this specific geographic context. By focusing on these pivotal factors, this research aims to shed light on the intricate dynamics at play and provide valuable insights for policymakers and stakeholders working towards improved public health in the Sahel region. In doing so, this study contributes to our understanding of the multifaceted challenges and opportunities facing the Sahel region, ultimately striving to pave the way for more targeted and effective interventions to enhance under-five survival and life expectancy in this vital part of the African continent.

Literature review

Owumi and Eboh⁸ evaluated the consequence of healthcare spending on lifespan at conception in Nigeria for a span of 18 years (2000-2017). The analysis found that for the time period under consideration, Nigeria's life expectancy was significantly positively impacted by general government healthcare spending, personal health spending, and external health spending. Uche⁹ used historical data from Nigeria between 1980 and 2017 to assess the connection between healthcare expenditures and healthcare performances. The

findings demonstrated that governance effectiveness, healthcare expenditure had no discernible impact on healthcare outcomes. Maternal mortality decreased as a result of the connection between healthcare expenditure and governance impact as well as the effort to combat corruption, whereas maternal death increased as a result of lower healthcare expenditure and diminished rule of law. Matthew¹⁰ investigated the impact of greenhouse gases on lifespan in West Africa utilizing data from the years 2000 to 2018. According to the study's outcomes, lifespan increased as a result of a surge in greenhouse gases, suggesting that greenhouse gases enhance lifespan in West Africa.

Lokonon and Mbaye¹¹ looked into how human development and its components such as lifespan at conception, actual and projected duration of education affect living conditions in sub-Saharan Africa (SSA). In non-Sahel countries, temperature has a favorable impact on human development, while in Sahel economies, it has a U-shaped effect. In SSA nations, there is an inverted U-shape association between rainfall and birth weight and life expectancy. In non-Sahel economies, floods have a beneficial effect on lifespan at conception, while droughts have beneficial effects in Sahel nations.

Muhammad *et al.*¹² studied Nigeria's main public healthcare issues. Infectious diseases, vector disease control, maternal and infant's death, inadequate cleanliness and sanitation, monitoring of illness, non-transmissible illness, crashes on the road, etc. are the major healthcare issues Nigeria faces. Gayawan *et al.*¹³ looked at the residual regional differences in new-born and child mortality and how the various risk factors affect spatial inequality in West African nations. In the study, distinct spatial trends for new-born and child mortality were discovered. Akinyemi *et al.*¹⁴ looked at the trajectory of childhood death in Nigeria, evaluated how well the 2006 child healthcare strategy goals had been achieved, and identified the unusual causes of childhood mortality in different parts of the country. According to the research, childhood mortality remained constant at 207/1000 live deliveries until the year 2000, when it began to fall linearly and reached 137/1000 live deliveries in 2010 at an average of 4.91% annually (confidence

interval: 4.52-5.29). The South West (2.97%) and the North Central (7.40%) had the lowest and highest rates of drop, respectively.

Alfani *et al*¹⁵. formulated a fresh approach to measure household resilience utilizing widely accessible cross-section data in four Sahel-region nations. It was discovered that the chronically poor made up a substantial percentage of the population in Niger, Burkina Faso, and Northern Nigeria: 48, 34, and 27%, respectfully. Only 4% of people lived in severe poverty in Senegal. In Senegal, the middle group—the non-resilient—makes up around 70% of households, compared to 34–38% in the other nations. Excluding for Niger, where the ratio was about 18%, resilient households make up about 33% of the population in each nation. Matthew *et al*.¹⁶ analyzed the effect of government healthcare expenditure on healthcare performances in Nigeria between 1979 and 2012. The research found that public healthcare expenditure and healthcare performances in Nigeria are significantly correlated. Yaqub *et al*¹⁷. looked into how Nigerian governance affects the efficacy of government healthcare expenditure. The outcome demonstrated that when the government factors are taken into account, government healthcare expenditure had an adverse impact on child mortality and children less than five mortalities.

Methods

Research design

The use of an *ex-post facto* research design was considered as an appropriate research design in this study due to the fact the investigation commences after the occurrence of the fact without the goal of this study is the exploration of how variation in under five survival and life expectancy is predicted by the set of explanatory variables.

Data analysis

Method of data analysis

In order for this study to achieve the set objective, some estimation techniques were utilised as follows; firstly, the panel unit root test was used to determine the stationarity or otherwise of the series. Consequently, the Panel ARDL technique was

estimated to analysis the data. This technique was employed because it possesses the capacity to explain the short run, the long run and the adjustment dynamic between the short-term and the long-term relationship among the variables of interest in the study.

Scope of the study and sources of data

The study focuses on eight Sahel countries due to availability of data relevant to this study. The countries are listed as follows; Burkina Faso, Chad, Mali, Mauritania, Niger, Nigeria, and Senegal. Meanwhile, secondary data between 2005 and 2020 were employed for this study. These periods were considered for this study due to the availability of data. Also, these data were extracted from the World Development Indicators and World Governance Indicators published by the World Bank²².

Empirical model

In estimating the nexus among under five survival, political factors and household income in the Sahel region, we draw an insight from the works of Olanipekun *et al*¹⁸. and Okoh *et al*¹⁹. To improve the robustness of the model, some control variables were equally introduced into the model by following Lawal *et al*²⁰. and Lucas *et al*²¹. as follows;

$$UFS = F (PF, HI, GFC, INF, GDPCA) \quad (1)$$

In linearizing the model (1) in a panel form, model 2 is emerged as thus;

$$UFS_{it} = +\alpha_i + \alpha_2 PF_{it} + \alpha_3 HI_{it} + \alpha_4 GFC_{it} + \alpha_5 INF_{it} + \alpha_6 GDPCA_{it} + u_{it} \quad (2)$$

Similarly, to estimate the nexus among life expectancy, political factors and household income in the Sahel region, this study adapted model from the works of Zhou *et al*³. as follows;

$$LEX = F (PF, HI, GFC, INF, GDPCA) \quad (3)$$

In order to transform Model (3) into econometrics model for policy interpretation of the dependent variable and explanatory variables, model (4) is erupted as follows;

$$LEX_{it} = +\alpha_i + \alpha_2 PF_{it} + \alpha_3 HI_{it} + \alpha_4 GFC_{it} + \alpha_5 INF_{it} + \alpha_6 GDPCA_{it} + u_{it} \quad (4)$$

Consequently, it is important to stress that the estimation of models (2) and (4) would provide empirical analysis for the nexus among political

Table 1: Description of the variables

Abbreviation	Full Meaning	Operational Definition
UFS	Under Five Survival	Mortality rate, under-5 per 1,000 live births
LEX	Life Expectancy	Life expectancy at birth, total (years).
PF	Political Factors	Governance effectiveness - this assesses the perception of public service quality, the efficiency of the civil service independent from political influence.
HI	Household Income	Adjusted net national income per capita (annual % growth).
GFC	Gross Fixed Capital Formation	Gross fixed capital formation as percentage of GDP.
INF	Inflation Rate	Inflation, consumer prices (annual percentage).
GDPCA	GDP per capita	GDP per capita (current annual % growth)

factors, household income and under five survival and life expectancy in the Sahel region. In the same vein, it is expected that the a priori expectation in model (2) follows this pattern; $\alpha_2, \alpha_3, \alpha_4, \alpha_5$ and $\alpha_6 < 0$. However, it is expected that the a priori expectation in model (4) follows this pattern; $\alpha_2, \alpha_3, \alpha_4, \alpha_5$ and $\alpha_6 > 0$

Full meanings of abbreviations and measurement of variables

To examine the decade's impact of political factors and household income on under five survival and life expectancy, the operational definitions of the study's variables are provided in Table 1.

Ethical consideration

The data in the WDI were obtained using appropriate ethical procedures and guidelines. Consequently, further ethical issues were minimal. The data were completely anonymized, while the data was already freely available to the general public. Hence, further ethical clearance was not obtained for this study.

Results

Table 1 gives an account of descriptive statistics of all the data used in this study. For instance, growth rate of GDPCA has mean value of 1.4%, alongside the minimum value of -9.1% and maximum value of 14.9% respectively. The mean value of gross fixed capital formation is 24.4%. Whereas, the minimum value of the variable is 14.1% and the maximum value is 45.3%. Annual growth rate of household income has a mean value of 1.6%. Also,

it has a maximum and minimum values of 38.8% and -17.8% simultaneously. Meanwhile, the lowest level of inflation rate is -8.9%, and peaked at 17.8%. It has the average value of 3.8%.

However, the life expectancy ranges between 48 years and 67 years. The mean value is 57 years. In the case of government effectiveness, it ranges between -1.6 and -0.03, and possesses the mean value of -0.86. Finally, the value of under-five survival ranges between 38 and 170, and average value of 102.

Stationarity test

Stationary test represents another important test that must be carried out to verify the behaviour of time series data. It is instructive to stress that government effectiveness and gross fixed capital formation variables are stationary at first differencing. Whereas, the rest of the variables are stationary at level. This connotes that the study is made up of combination of I (0) and I (1) variables. In a scenario like this, ARDL technique becomes the best estimation technique, because it gives platform for short run and long estimation, following the submission of Pesaran *et al*²³, Aderemi *et al*²⁴, and Imeokparia *et al*²⁵. Hence, this study utilized a panel ARDL as its main estimation technique.

In Table 3, the long run estimates that show the connection between political factor, household income, under five survival and life expectancy in the Sahel region have been presented in the following ways; political factor and life expectancy have a negative but significant relationship. Household income and life expectancy possess a significantly inverse relationship with each other. In the same vein, both gross fixed capital and inflation

Table 1: Descriptive statistics

	GDPCA (%)	GFC (%)	HI (%)	INF (%)	LEX (Yr.)	PF	UFS
Mean	1.408054	24.26452	1.696128	3.824846	57.85877	-0.866131	102.4929
Median	1.458217	21.40689	1.875586	2.316601	57.87400	-0.805495	101.9000
Maximum	14.99794	45.37365	38.86057	17.86349	67.94100	-0.034974	170.2000
Minimum	-9.156942	14.16873	-17.82363	-8.974740	48.25200	-1.608000	38.10000
Std. Dev.	3.317456	7.035160	6.297004	4.723257	5.262177	0.343927	34.26739
Skewness	0.510830	0.917694	1.388212	0.762373	0.067164	-0.254973	0.024221
Kurtosis	6.389865	3.338019	13.13279	3.423317	1.943637	2.751915	1.949003
Jarque-Bera	58.49654	16.25354	515.1154	11.68556	5.291752	1.500762	5.165730
Probability	0.000000	0.000296	0.000000	0.002901	0.070943	0.472187	0.075557
Sum	157.7020	2717.626	189.9664	428.3828	6480.182	-97.00662	11479.20
Sum Sq. Dev.	1221.612	5493.776	4401.401	2476.316	3073.646	13.12970	130342.2
Observations	112	112	112	112	112	112	112

Source: Authors' computation (2023)

Table 2: Unit root test

Variables	Levin, Lin and Chu (LLC)		Decision
	Level	1st difference	
UFS	-2.80983* (0.0025)	NA	I(0)
LEX	-2.64241* (0.0041)	NA	I(0)
PF	-0.06083 (0.4757)	-1.87378* (0.0305)	I(1)
HI	-4.02571* (0.0000)	NA	I(0)
GFC	-0.67208 (0.2508)	-3.98825* (0.0000)	I(1)
INF	-5.29284* (0.0000)	NA	I(0)
GDPCA	-1.97148* (0.0243)	NA	I(0)

Source: Authors' Computation (2023)

rate have an inverse relationship with life expectancy, though, gross fixed capital formation is significant while reverse is the case of inflation rate. In the case of GDP per capita growth, it has a positive and significant relationship with life expectancy.

Furthermore, there is a positive and significant relationship between political factor and infant mortality rate. Similarly, GDP per capita growth and infant mortality rate possess a significant direct relationship. On the other hand, both household income and gross fixed capital formation have a negative impact on infant mortality rate, gross fixed capital has significant effect but household income proves otherwise.

In Table 4, the short run estimates that show the connection between political factor, household income, under five survival and life expectancy in the Sahel region have been presented. The inferences from this table are enunciated as follows; firstly, the Error Correction Model in both of the equations follows the a-priori expectation by possessing the appropriate sign and significant at the same time. This implies that the speed of adjustment between the short run and the long run dynamic in equations 2 and 4 is 5.9% and 7.2% respectively.

Consequently, it is instructive to state that none of the short run parameters is significant. This is convincing evidence that the relationship

Table 3: Panel ARDL estimation of long run estimates between political factor, household income, under five survival and life expectancy in the Sahel region

Variables	Dependent (LEX)	Dependent (UFS)
	Equation 4	Equation 2
PF	-4.743899** (0.0024)	11.70937** (0.0172)
HI	-0.089005** (0.0042)	-0.227764 (0.1343)
GFC	-0.084646** (0.0372)	-0.938043* (0.0000)
INF	-0.043773 (0.6293)	-0.452275** (0.0140)
GDPCA	0.419337* (0.0000)	1.029410* (0.0001)

Source: Authors' Computation (2023) Notes: *Significant at 1% **significant at 5% ***Significant at 10%

Table 4: Panel ARDL estimation of short run estimates between political factor, household income, under five survival and life expectancy in the Sahel region

Variables	Dependent (LEX)	Dependent (UFS)
	Equation 4	Equation 2
ECM	-0.072310* (0.0000)	-0.059618* (0.0006)
D(PF)	-0.111511 (0.8082)	-0.338629 (0.2177)
D(HI)	-0.002941 (0.6840)	-0.039427 (0.2398)
D(GFC)	-0.002868 (0.6454)	-0.014625 (0.5022)
D(INF)	0.002592 (0.4998)	-0.004053 (0.4861)
D(GDPCA)	0.012948 (0.1387)	0.012948 (0.1387)

Source: Authors' Computation (2023) Notes: *Significant at 1% **significant at 5% ***Significant at 10%

between political factor, household income, under five survival and life expectancy in the Sahel region is a long run phenomenon. Therefore, this study focuses on the long run aspect of the results because the short run estimates lack substantial value.

Discussion

The results of this study indicate that between 2005 and 2020, the average annual growth rate of household income in the Sahel region was 1.6%.

This implies that the annual growth rate of net national income per capita is low as required produce a substantial household income in the Sahel. The mean value of government effectiveness is -0.86. This is an indication of deficiency in good governance stimulated by political factor in the Sahel. Meanwhile, the life expectancy ranged between 48 years and 67 years, with an average value of 57 years. This shows that on average, the residents of the Sahel region die around age of 57 years. In the same vein, infant mortality rate averaged a value of 102. This indicates that about 102 children die per 1,000 births before 5 years in the Sahel region. Based on this evidence, we submit that under five survival is low in this region. The low life expectancy and under-five survival in the Sahel could be attributed to low household income and absence of good governance that are highly predominant in the Sahel. This underscores the imperativeness of income status of households, and the presence of good governance in determining health outcomes of citizens. This may partly explain while high income countries have low infant mortality rate and high life expectancy as compared with low-income countries, like the Sahel region.

Furthermore, political factors and life expectancy have negative but significant relationship. From the results, a unit change in political factor brings about a reduction in life expectancy by 4.7 years. This implies that political factor in the light of the current rule of law, institutions and government policy are pertinent variables that the Sahel policymakers need to improve substantially in order to bring about a reasonable rise in life expectancy in the region. Finding from this study justifies the submissions of Uche⁹ and Lokonon and Mbaye¹⁰ similar studies focusing on Nigeria and Sub Saharan respectively.

Similarly, reduced household income is associated with a significant reduction in life expectancy. As such, a unit change in household income brings about reduction in life expectancy by 0.08 year. This shows the income of the household is a very strategic factor that determines how long an individual within the household lives. This is because the out-of-pocket expenditure in the Sahel region is huge, and as such, low-income household will not have enough funds to access balance diets

and adequate health care facilities that can improve life expectancy.

In addition, there is a positive and significant relationship between political factors and infant mortality rate. The results of this study suggests that negative political factors in the Sahel increases infant mortality. A unit change in political factor increases infant mortality by 11 children per 1,000 births. This is an indication that under five survival is highly bedeviled by political factor. This finding is in tandem with the conclusion of Yaqub *et al*¹⁷. Therefore, if the political situation of the Sahel is not improved through stable policies, good governance, and the absence of corruption, it is expected that the number of under-five survival will continue to decline by 11 children in every 1,000 births in the sub region. Similarly, GDP per capita growth and infant mortality rate possess a significant direct relationship. This shows that GDP per capita growth increases infant mortality. Based on this evidence, a unit change in GDP per capita growth leads to a rise in infant mortality by 1 child per 1,000 births. This means that the rate of GDP per capita growth in the Sahel region does not have a favourable influence on under-five survival in the region. The implication of this is that the current living standard in the Sahel region does not provide a strong framework for under-five survival. This finding contradicts the submission of Zhou *et al*³.

However, both household income and gross fixed capital formation have negative impacts on infant mortality. Though, gross fixed capital formation has significant effect but household income proves otherwise. In this light, a unit change in gross fixed capital formation results in a reduction in infant mortality in the Sahel by 0.9 child per 1,000 births. In order words, gross fixed capital formation contributes a meaningful impact to under-five survival in the Sahel.

Consequently, based on the above findings, it is pertinent to enunciate that for under-five survival to increase to at least 975 children per 1000 live births and life expectancy to improve significantly in tandem with the Sustainable Development Goal (SDG3) in the Sahel region, the policymakers should be committed to good governance, and as well possess political will to address various health challenges reducing under

five survival and life expectancy in the region. In particular, policies and programmes that will stimulate a rise in household income should be embarked upon by policymakers in the Sahel region. A rise in household income will automatically strengthen the financial capacity of households to afford basic health care, balanced diet and other life enhancing amenities that could catalyze the survival of under-five children and a rise in life expectancy respectively. The results underscore the potential role of capital formation in improving health outcomes, particularly increasing under-five survival. As such, the policymakers should create investment friendly environment that stimulates GDP per capita growth in the Sahel region.

Strength and Limitations

The study's strengths lie in its clear research question, robust analysis and emergence of the short run and the long run empirical evidence in the study. The limitation of study is primarily attributed to its scope, as the study focuses on only Sahel countries. Further studies could therefore be carried out on Sub Saharan Africa to provide a wider policy implication for the entire continent.

Conclusion

This study therefore concludes that the residents of the Sahel region die around age of 57 years, and about 102 children die per 1,000 births before 5 years. Similarly, the annual growth rate of net national income per capita is very low to produce a substantial household income, and deficiency in good governance is highly prevalent in the Sahel. Political factor contributes a significant reduction to under five survival and life expectancy in the Sahel region. In the same vein, household income causes a significant reduction in both life expectancy and under-five survival in the Sahel region. Thus, this study advocates the need to improve government effectiveness, political stability and household income in order to achieve a positive change in health outcomes- increasing both under five survival and life expectancy across the Sahel countries.

Contribution of authors

Ying Tang conceived and designed the study, wrote the introduction, collected and analysed the data

Guanxiufeng Lan reviewed empirical studies, designed the methodology and edited the paper.

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