



Research Article

Remittances and Public Health Status in Sub-Saharan African Countries: A Comprehensive Analysis

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ABSTRACT:

Background: A particular expectation about many people is that diaspora remittances should be used by poor people in developing countries to augment the payment of their healthcare bills since most of these people are not covered by private or government health insurance schemes. These remittances channeled to family members, relatives and friends by migrant workers hope to remediate the wellness condition of the people of African territory. This study examines the influences of internationally transferred funds (diaspora remittances) on the health status of Africans in the 25 selected countries of the continent between 2000-2020.

Methods: The study was related to the Grossman Model while Pooled Ordinary Least Square, Fixed Effect, and Random Effect were adopted in the scrutinization of the associations of the variables.

Results: The study revealed mixed results as it indicates that remittance is not a significant determinant of life expectancy at birth (LEB) in African countries but a significant determinant of infant mortality rate in the region. The results of remittances to LEB are -0.2884, 0.1160, and 0.2675 which are insignificant. The results of remittances to infant mortality rate (IMR) are 0.0990 which is insignificant and -1.5513 and -1.8485 which are significant.

Conclusions: The study indicates that remittances have no remediating consequence on life expectancy at birth but have improving consequences on IMR. These results stress the inherent function of the remittances in buttressing wellness outcomes, especially in minimizing the infant mortality rate. The policy-makers are advised to embark on strategies capable of guaranteeing growth and advancement, especially raising income to an acceptable level in the region.

KEYWORDS: Public Health, Remittances, Mortality, Life expectancy, African countries.

INTRODUCTION

One of the greatest constituents in the assessment of human advancement gauge is health. It is widely also believed to be a rallying-place of earthborn general welfare; a reason responsible for raising a universal sense of worry over the years regarding the collaboration between health outcome indicators grabbed by life expectancy rate and rate of mortality (maternal mortality, child mortality and others). The disquietness to set-up additional investments for global wellness protection, an avenue for ceaseless streams of remittances, so that the impoverished

nationals' and small-wage earners can utilize these diasporas' transfers that can be used as out-of-pocket expenditure to gain entry to healthcare services, since government planned healthcare spending was incapable of providing for that is of the utmost importance to the entire countries of the world (Chika & Omeje, 2022). So, the purpose of personal remittances in attaining positive outcomes in health outcome indicators like Life Expectancy Rate (LEB), negative outcome (lower rate of mortality) in health outcome indicators like Neo-natal Rates, Maternal Mortality Rates (MMR), Infant Mortality Rates (IMR), Child Mortality Rates (CMR), Adult Mortality Rates (AMR), a negative outcome in morbidities like cholera, malaria incidences, tuberculosis incidences and negative outcome in disability like visual impairment, physical incapacitation, intellectual incapacitation, cognitive health conditions and others may be seen as fascinating component of an excellent and rewarding labour force, which seriously and voluminously impacts the economic growth of a country.

Weil (2007) and Carstensen and Gundlach (2006) state firstly that, the condition of wellness of the populations is a significant preoccupation hitherto as it ascertains the degree of progress of the productivity of the working population and adds to economic expansion likewise to prune abject-poverty level in the country. They further state that the primary function of health as an ingredient for advancement was re-established at the global level by the Millennium Development Goals (MDGs) in which three (3) out of its eight (8) objectives are focused positively on health; these are: motherly health, combat Human Immune Virus (HIV)/Acquired Immune Deficiency Syndrome (AIDS) and minimization of child death. Next to the above, the contradiction to which emerging nations are faced depends on the number of their requirements in the accessibility to health care services in a setting of tough cash-required limitations. General aid to development that persists as one of the chief fountains of the foreign funding of wellness care services in third-world nations in general and Africa especially is instead stalling compared with the circumstances of the domestic sources of funding health care in these countries are additionally limited by the dearth of fiscal resources and by multiple conventional difficulties.

Macrotrends (2023) states that the current life expectancy for Africa in 2022 was 63.82 years in 2022 and in America (76.5years), Asia (78.5years), Australia (83years), Europe (81.5years) and Oceania (75.5years) (WorldData.info, 2022). These available data indicate that African governments need to do more by looking for other means to finance the gap in the health sector that can improve quality of life, and reduce mortality, morbidity and disability through greater access to essential health services in the region. These available data also indicate that Africa's forward motion was documented to be least as set against various regions of the world. The wellness of the entire public is to be the elementary impetus to economic expansion and economic advancement in a nation, by its possibilities: rise in labour output, reducing wastes in the creation of goods and rendering services because of workers' ill-health, receiving incomes from saved monies for withdrawal from active service as a result of expanded life expectancy, shrinking death rate of any kind and realize excellent analytical framework (World Bank, 2016). United Nations Inter-Agency Group for Child Mortality Estimation Report (2022) stresses that the authenticity may likely vary based on the sourced write-up in Africa as child mortality globally in 2021 stood at seventy-four (74) deaths per 1,000 live births- this indicates that child deaths in Africa are fifteen (15) times greater than what is obtainable in Europe and Northern America and similarly nineteen (19) times greater than what occurred in Australia axis. Africa's poor state of health outcomes like the number of years to be lived by someone on earth (LEB) and great child death rate may not be unconnected with the circumstance that the region has diverse wellness challenging concerns, rally with ill medical

assistance services emanating voluminously from small government budgeted expenditure and great out-of-pocket medical expenditure from each person, and that these stated factors may be important drivers of low LEB and huge child deaths in the region. An instance to be considered is this, African health expenditure in 2020 attained US\$ 117.3 billion out of global health spending of nine trillion US dollars (US\$9.0 trillion) expended on health in the same year while developed nation's expenditure accounted for 80.9% of this global health spending in 2020, Africa's healthcare expenditure shows a shoot up of 1.2% from 2019, estimating for a mean of 5% of black continent gross domestic product (GDP) (ONE Campaign, 2023). The low government health spending in Africa has resulted in a great degree of out-of-pocket (OOP) expenses for medical care and; this has rendered numerous persons susceptible to impoverishment and digresses from the Universal Health Coverage (UHC) aim of making available financial security for medical-care (Albert, 2022). These contrarities in the indicators of health outcome (low life expectancy rate and high mortality) appeared argued to be the consequences of meager invested funds in medical-care and the region's manpower.

Alhassan and Abdu (2017) emphasized that while the developed countries take pleasure in improved standardized-medical-care equipment and enhanced health results because these countries expended more funds on medical needs; the third-world nations go through poverty-stricken health outcome indices as a result of their meager investments in health and/or human capital. It is believed that each invested fund in health would lead to lowered yields as a higher output of labour and capability, greater income and unspent incomes (saving), the equaled situation for the invested fund on projects and programmes, and economic expansion and advancement.

The past two decades have experienced a rising trend in the amount of private Diaspora international financial transfers emerging from an intense increase in international migration, especially from the developing world. Most countries in the world are confronting an extraordinary new era of international mobility and migration occasioned by globalization and knowledge of opportunities across the globe, enhanced and low-cost or reasonable means of travel. The issues brought to the limelight by international migration are starting to absorb the awareness of national governments and non-governmental bodies, such as the International Monetary Fund (IMF), World Bank (WB), United Nations (UN) and European Union (EU), amongst others. One of the topics raised in the report prepared by the Secretary General of UN General Assembly in 2006, was the role of migrant remittances, as well as the encouragement of an integrated approach to migration and development (Kwaku, 2012). Migration Data Portal (2023) states that remittances to Low-Middle Income Countries (LMICs) tripled the amount of Official Development Assistance (ODA) in a decade plus. It states further that in 2022, remittance flows to LMICs are estimated to have been hiked by 8% to get to US\$647 billion, surpassing earlier estimates of UD\$626 B-billion. However, slow growth of remittances to LMICs in 2023 was envisaged and expected as a result of slow GDP growth in high-income countries, conflict in Ukraine and Russia, continued high interest rates, volatile oil prices and others; Despite all these mentioned threats to growth of remittances, remittances is projected to grow by 1.4 percent increase to US\$840 billion globally in 2023. Considering, the cost of sending money to LMICs in 2022, LMICs continue to record the highest average costs of sending money, 6.2 percent and this is far beyond the set target of 3 percent of the Sustainable Development Goal (SDGs).

It is widely believed that migrants' remittances turned out to be an essential basis of earning for SSACs because remittances to households are utilized to foot the bills of important goods

or services such as accessibility to food, housing expenses or academic fees, healthcare expenses and others while remittances to governments in the structure of assistances from the multinational territory and establishments, foreign assistance are used for capital medical spending of her health section (Knoema, 2020). Similarly, the continued challenging related problems in health in SSACs invigorate the necessity to delve into choices to cope with all identified hurdles. Countries' governing bodies' health spending has incessantly produced specific influences but, it is expedited to look into other efficient earning bases capable of subduing these threats to health in SSACs. Remittance is considered one of the viable and efficient options (Kolma, 2018). In the same vein, Akanle, Kayode and Abolade (2022) state that several attempts have been put in motion to attain advancement in third-world countries but additional efforts are required to attain expected outcomes. They further state that Overseas Development Assistance (ODA) and Foreign Direct Investments (FDIs), which happened to directly influence advancement in Africa, have regularly declined and this has resulted in development efforts' struggles that African governments continue to experience and battle with. Ongoing destitution relief attempts and advancement funding approaches in the continent happened to center on the influence of remittances and their abilities to reach and impact households.

This growth in the magnitude of international remittances as reported by Migration Data Portal (2023) amplifies a question relating to the effect international remittances have on household beneficiaries.

THEORETICAL FRAMEWORK AND EMPIRICAL REVIEW OF LITERATURE

A model propounded by Grossman (1972) serves as a basic theoretical underpinning of this study. This model conceives that the quality of health assets effectively demanded, the state of health, people's unspent income (saving) and earning, lastingness of individual and learning induce the creation of health. The emphasis of the model is that humankind demands health and that the direct acquisition of it in the market place as it is been done to other goods is impossible; it is created through the acquisition of medical inputs with time. Another characteristic identified by this model is that, with the passage of time health too depreciates just the same way other capital stock or goods depreciate; towards this end, health is to be reasoned as an investment and consumption good. Grossman's (2000) representation further buttresses that wellness is considered an asset good that generates net proceeds on wellness outcome indicators like soaring life expectancy and low mortality rate (neo-natal mortality, infant mortality, adult mortality, child mortality, maternal mortality and others) over time; and that these net gains result into an economic expansion. This simply signifies that those private remittances utilized as an OOP healthcare expenditure are an asset on health goods, that will generate net proceeds or gains on wellness outcome indicators, thus, having inducement on the economic growth of a country.

Since remittances have become another source of income to fast-track development in developing nations, the scrutinization of its influence on the wellness state remains imperative. The dearth of scholarly empirical literature that examined this effect is an invitation to investigate SSACs single-handedly. In the interim, an agreement is not established in the literature on the effect of diaspora's financial transfers (remittances) on the health result indicators in SSACs.

The study by Ojijieme and Chui (2022) examined the influence of remittances on the active social and physical functioning of Nigeria's elderly adults using data from the 2018/2019

Nigerian Living Standard Survey (NLSS). Logistic regression-adjusted predicted probabilities and predictive margins were employed by the study. Findings revealed greater active social functioning probabilities for recipients with remittances than non-recipients of remittances. It further found that remittances' influences on social functioning is determined by the proportion of remittance inflows. Bare, Bani, Ismail and Roseland (2021) carried-out a study on the remittances' effect on wellness outcomes for thirty-nine (39) in the selected sub-Saharan African countries between 1996-2016. Findings indicated that diaspora transfers (remittances) enhanced wellness outcomes, whereas complements of remittances came from financial development and institutional quality. Suitable levels of improvement in financial sectors and quality of institutions which are prerequisites to ease remittances are recommended.

Sophia (2020) delved into the impactful nature of international individuals transmitted funds on wellness (health) outcomes in Tajikistan controlling for the endogeneity of remittances with instrumental variables. A direct and significant association was found between internationally individuals transferred funds and health (wellness) outcomes.

Imran, Devadason and Cheok (2019) employed time series information to examine the form of developmental influences of internationally transferred funds for emigrant families in Punjab, Pakistan of Punjab between 2014 and 2015. Findings revealed that families receiving internationally transferred funds showed an admirable condition than those without this increase (surge) in pay.

Komla (2018) embarked on research to uncover the influences of internationally transferred funds on knowledge acquisition (education) and wellness (health) outcome indicators in SSACs between 1975 and 2014 employing SGMM estimation technique. It indicated that remittances significantly improve health in SSACs region. Howard and Stanley (2017) investigated the effect of internationally transferred funds on kids' bodily physical sizes and the nourishing patterns of the families they stay with employing datasets from many countries. Generally, internationally transferred funds improve schooling and medical care of the family.

Amakom and Iheoma (2014) employed the Two Stage Least Square estimation technique to examine the consequences of international individual transfer of funds (remittances) on LEB. The finding indicated that a 10% increase in these transfers improved LEB by one point two percent (1.2%) on the median term. The effect of these international individual transfers of funds (remittances) on per capita was higher than that of government spending on health; which showed half of one (0.5) percent in the medium term for every ten (10) percent rise in government spending on health.

In the same vein, Zhunio, Vishwasrao and P (2012) investigated international remittances and health in sixty-nine (69) low- and average-bracket income countries. The finding indicates that a percent increase in real (deflated) international individual transfers (remittances) per capita hikes LEB by 0.03% and prunes infant deaths by 0.15%.

Ifeyinwa (2010) beamed his searchlight on the influences of international individual transfer of funds (remittances) on destitution and human capital formation in the most populous black country (Nigeria) in the world. His finding revealed that one percent in international remittances pruned child death by 1.66 percent in the country. Chauvet, Gubert, and Mesplé-Somps (2009) study of cross-country on the influence of international individual transfer of funds (remittances) and wellness (health) outcome indicators in eighty-four (84) nations; found that these transfers pruned infant and child mortalities in these countries.

Lopez-Cordova (2006) used instrumental variables and Two Stage Least Square (2SLS) premised on municipal-level data to examine the influence of international individual transfer of funds (remittances) on infant deaths in Mexico. Findings indicated that a one percent rise in the households receiving remittances reduced one-eleven months babies' mortality by one point two (1.2) lives. Duryea, Cordova and Olmedo, (2005) employed 2SLS and instrumented remittances to examine the effect of international individual transfer funds (remittances) on health outcome indicator (IMR) in a Mexican country. Findings revealed that the infant mortality rate declines in the first of life as a result of international remittances. The significant reduction manifested in big urban settlements while the insignificant reduction occurred in rural areas.

However, contrary to the above studies that found international remittances having a direct influence on LEB and inverse influence on deaths, a study by Hao, Yang, Akinbode and Aderemi (2023) employed System Generalized Methods of Moment estimation technique to examine the connectivity between financial international individual transfer funds (remittances) and health outcome indicators in SSA, utilized the data sourced from World Development Indicator (WDI) between 1990-2021, found that international individual transfer funds (remittances) failed to significantly enhance LEB and IMR in sub-Saharan Africa. Assessment of the effect of exodus by Lu, Yeung, Liu and Treiman (2019) on the healthiness of uninvited children in China and the mediating channels utilizing cross-sectional data from 2012 to 2013 showed that the wellness of the uninvited kids in the countries by the two parents is worse than the kids staying with their parents.

Also, a study by UNICEF (2013) in conjunction with the Government of Jamaica on the influence of international remittances on wellness (health) outcome gauge found insignificant disparities in wellness (health) outcome indicators of kids from remittance-receiving households and non-remittances-receiving households despite hike spending on health in remittances-receiving families. Some of the identified criticisms in the reviewed journals include among others limited scope in terms of chosen periods, selected countries, non-inclusion of theoretical framework and non-employment of up to two estimation techniques.

MODEL SPECIFICATION

The modelling representation is hypothetically expressed on the account that it bridges from a micro viewpoint to a macro viewpoint amid international individual transfer funds (remittances) and health outcome indicators. Innumerable input factors in health (wellness) production reveal the connecting channels of health outcome indicators, hence necessitating the need to elucidate the basis of the Grossman Model in this work. Toward this end, this work represents this explicit function as a health production function, thus stating the Health Status as:

$$\text{Health Status (HS)} = f(\text{Input factors}) \dots (1)$$

The above equation exhibits the health status of the Grossman Model, where, Health Status (HS) measures a shift in individual health or condition as a result of a particular intervention. The input factor, in this work, is taken to be a vector of individual input to the health production function (f). The Grossman hypothetical examination regarding the health (wellness) production to the micro level with the above-stated equation. Considering the health status (HS) in respect of macro analysis by re-arranging the inputs variables as economic and factors gives:

$$\text{HS} = f(\text{Economic, Social}) \dots (2)$$

Where, Eco indicates variables. As a result of the availability of data, this work employed government health expenditure (GHE), real Gross Domestic Product Per Capita, remittances, Physicians Per 1000 people and the unemployment rate as economic variables; while educational level is treated as a social variable. Modification of the above-stated model concerning the aim of this work turns it into:

$$HS = f(GHE, RGDPPC, RM, PHYS, UNEMP, EDUC) \dots (3)$$

The econometric specification for the model is depicted in equation (3):

$$HS_{it} = \alpha_0 + \alpha_1 GHE_{it} + \alpha_2 \log RGDPPC_{it} + \alpha_3 \log RM_{it} + \alpha_4 PHYS_{it} + \alpha_5 UNEMP_{it} + \alpha_6 EDUC_{it} + \varepsilon(i,t) + \mu(i) + \mu(t) \dots (4)$$

Where: HS_{it} is the Health Status of country i at time t (proxy by life expectancy at birth and infant mortality rate).

GHE_{it} = Government Health Expenditure

$\log RGDPPC_{it}$ = log of Real Gross Domestic Product Per Capita

$\log RM_{it}$ = log of Remittance received by country i in time t .

$PHYS_{it}$ Physician density per 1000 individuals

$UNEMP_{it}$ = unemployment level

$EDUC_{it}$ = log Education level

country i at time t for $i = 1, 2, \dots, 20$ (number of countries), $t = 1, 2, 3, 4$ (number of time units), $\varepsilon(i,t)$ is an error term, $\mu(i)$ and $\mu(t)$ are country- and time-specific effects, respectively.

All these are $\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ and α_6 are coefficients of independent variables.

Worthy to note here is that those variables that hitherto put in an appearance of rate forms (LEB & IMR) did not take logarithms form, similarly, those that appearances were in percentages (GHE, PHYS, UNEMP and EDUC) were exempted from logarithm forms also while RGDPPC and RM were treated in logarithm forms in line with Iyoboyi and Pedro (2014).

The expected parameters or coefficients of the independent variables are deemed to be positively related to the life expectancy rate model except for unemployment while inversely related association is contemplated in the second model (IMR).

Equation (5) puts forward the complete model:

$$HS_{it} = f(GHE_{it}, \log RGDPPC_{it}, \log RM_{it}, PHYS_{it}, UNEMP_{it}, EDUC_{it}) \dots (5)$$

Specification models of the dependent variables are estimated as follows:

Model I:

$$LEB_{it} = f(GHE_{it}, \log RGDPPC_{it}, \log RM_{it}, PHYS_{it}, UNEMP_{it}, EDUC_{it}) \dots (6)$$

Where, LEB_{it} is the life expectancy at birth in country i at time t

Model II:

$$IMR_{it} = f(GHE_{it}, \log RGDPPC_{it}, \log RM_{it}, PHYS_{it}, UNEMP_{it}, EDUC_{it}) \dots (7)$$

Where, IMR_{it} is the infant mortality rate in country i at time t .

RATIONALE FOR VARIABLES INCLUSION

Variables included in the model are health outcome indicators (proxy by Life expectancy at birth and Infant mortality rate are the proxies used to stand for health outcome indicators (dependent variables), while government health expenditure, remittances, real GDP per capita, PHYS per 1000 individuals, unemployment rate, and education level are employed as independent and control variables. Inclusions of variables such as Life expectancy rate, infant mortality rate and remittances are done because they are the bases and the principal variables of the model. The justified premise for the choices of LEB and IMR is that the two variables are the largely employed barometers in most of the literature and adequate for the evaluations of the consequences of various mediation programmes with the intention of the improvement of infant mortality rate and enhancing LEB (United Nations Report, 2005). The inclusion of real GDP per capita is justified on the basis that findings from many empirical studies revealed a direct association between it and health outcome indicators i.e the greater the GDP per capita to an individual in a country, the greater the probability of an individual in a country that will be seeking for health-care services in both public and private health-care providers (Oseni, Odusanya & Akinbode, 2022). Health spending by the government (GHE) goes a long way in measuring or gauging the quality of health services in the public domain which hereafter, also goes a long way to determine the level of health outcome situation, this is in conformity with Akinbode and Oseni (2022).

Physician per 1000 individuals indicates the easiness of a patient to have accessibility to medical doctors, it is believed that the greater the ratio, the easier the accessibility of a patient to a medical doctor. The inclusion of this in the model was evidenced by the numerous previous studies that employed it as one of the independent variables. Furthermore, the inclusion of the unemployment rate indicates low earning status that constraints accessibility to health-care services and this has an instant impact on health outcome indicators. Finally, the inclusion of education level into the model is premised on the fact that migrants with a higher educational qualification have a better advantage in high-income countries thereby resulting in higher income for the migrants and enhancing their financial capabilities the more to transfer (remit) more hard-earned-income of theirs to their countries of origin (Amega,2018).

VARIABLES MEASUREMENT AND DATA SOURCES

Table 1: Definitions, measurements of variables and data source

Variables	Definition	Measurement	Source
GHE	Government Health Expenditure	Percentage of GDP	WDI
RGDPPC	Real GDP Per Capita	Current local currency unit (current LCU)	WDI (World Development Indicators)
RM	Remittances	Current US Dollars	WDI
PHYS		No of physicians per 1000 individuals	WHO
UNEMP		Percentage of total labour force	WDI

EDUC		Percentage of relevant age group	WDI
LEB		Years	WDI
IMR		Deaths recorded among babies of 1- < 12 months in every one thousand live-births.	WDI

Estimated Technique

System Generalized Methods of Moment (GMM) was adopted in this study and to check for the robustness of the result, Pooled Ordinary Least Square (OLS) and fixed effect models were also adopted.

Scope of the study

The time-frame of this work spans from 2000-2020 with the employment of cross-sections datasets of 25 sub-Saharan African countries (SSACs) based on the annual time series data. The choices of the countries were premised on the essential four axes of SSACs, LICs (Low-Income Countries), LMICs (Lower-Middle Income Countries), UMICs (Upper-Middle Income Countries); and HICs (High-Income Countries). The selected countries are:- Botswana, Central African Republic, Chad, DR Congo, Equatorial Guinea, Gabon, Ethiopia, Kenya, Madagascar, Mauritius, Tanzania, Angola, Lesotho, South Africa, Zambia, Benin Republic, Cote D'ivoire, Ghana, Nigeria, Senegal, Congo Republic, Uganda, Mali, Togo; and Zimbabwe.

RESULTS AND DISCUSSION

Descriptive statistics that evidenced the results of collected panel data from different organization's databases embracing 25 selected countries from the African region are shown in Table 2 below. The Table revealed that the average LEB in the selected 25 African countries over 21 years (2000-2020) was 57.6 years while the average IMR of 1000 live births was 60 in the same region. The average GHE (% of GDP) of the selected countries was 66%; also, the average RGDPPC of the selected countries involved in this study was 765901.4 local current units. The average RM of the study was 1.04E+09 US dollars, while the average number of Physicians per 1000 individuals was 0.1256. The average unemployment rate during the period covered in the selected countries was 3.6% of the total labour force while the education of the relevant age group in these selected countries was 41.8%. The maximum values for the employed variables in this study were: it was 74.5 years for LEB, 122 for IMR per 1000 live births, 6.09% for GHE, 9576212 LCU for RGDPPC, 2.43E+10 US dollars for RM, 2.71 number of Physician per 1000 individuals, 35.5% for unemployment rate; and 105.1 for education of relevant age group. However, the minimum values of all the employed variables within the period covered were thus stated: 41.9 years for LEB, 12.5 for IMR per 1000 live births, 0.00% for GHE, 138 LCU for RGDPPC, 0.00 US dollars for RM, likewise 0.000 for a physician per 1000 individuals, unemployment rate and education.

Pairwise correlation coefficients' results of variables included in this study suggest that a high negative relationship of -0.78 exists between IMR and LEB. However, while a weakly positive relationship of 0.041 exists between GHE and LEB, weakly negative relationships of -0.2256 and -0.114 exist between RGDPPC and LEB; and also, between RM and LEB. While a

moderate positive relationship of 0.47 exists between PHYS and LEB, however, weakly positive relationships of 0.073 and 0.1821 exist between UNEMP and LEB; and also, between EDUC and LEB. Both GHE and RGDPPC show weakly negative correlational relationships of -0.283 and -0.0381 with IMR.

Table 2: Descriptive statistics of Variables

Variable	Obs	Mean	Std. Dev.	Max	Min
LEB	525	57.625	6.514590	74.51463	41.95700
IMR	525	59.723	22.48487	121.9000	12.50000
GHE	525	66.107	1.313863	6.092366	0.000000
RGDPPC	525	765901.4	1375208	9576212	138.0717
RM	525	1.04E+09	3.43E+09	2.43E+10	0.000000
PHYS	525	0.125651	0.330311	2.712700	0.000000
UNEMP	525	3.578076	7.281383	35.46000	0.000000
EDUC	525	41.80332-	35.50068	105.1478	0.000000

Abbreviations: LEB= Life Expectancy at Birth (number of years); IMR = Infant Mortality Rate (number of infant deaths per thousand (1000) live-births); GHE = Government Health Expenditure (% of current health expenditure); RGDPPC= Real Gross Domestic Product Per Capita (USD); RM =Remittances (Million in US Dollars); PHYS = (Number of Physician per 1000 individual); UNEMP = Unemployment (Percentage of Total Labour Force); EDUC = Education (Percentage of relevant Age Group).

However, RM shows a weakly positive relationship of 0.1070 with IMR. The remaining three variables of PHYS, UNEMP and EDUC show a moderate and weakly negative relationship of -0.439, -0.241 and -0.291 with IMR. While RGDPPC and RM show weakly negative relationships of -0.266 and -0.133 with GHE, however, both PHYS and EDUC show weakly positive relationships of 0.076 and 0.0856 with GHE, however, UNEMP shows a high positive relationship of 0.624 with GHE. Remittances (RM), PHYS, UNEMP and EDUC show weakly negative relationships of -0.0653, -0.0779, -0.1861 and -0.1920 with RGDPPC. While PHYS shows a weakly positive relationship of 0.0193 with RM, however, both UNEMP and EDUC show weakly negative relationships of -0.0235 and -0.0615. Meanwhile, both UNEMP and EDUC show weakly positive relationships with PHYS. Finally, EDUC shows a weakly positive relationship of 0.0637 with UNEMP.

Table 4 presents the results of the Pooled Ordinary Least Square (OLS), Fixed effect (FE) and Random effect (RE) estimates respectively for Life Expectancy at Birth (Model 1). In the first model, the coefficient estimate of GHE is statistically insignificant (-0.0171), suggesting that a percentage increase in GHE does not have a significant effect on LEB when controlling for other factors. However, in Fixed and Random effect models, the coefficient estimates turn plus (positive) and statistically significant at the 5 percent (%) level (1.0880 and 1.2941), indicating a 1% hike in GHE (Government Health Expenditure) is related to higher LEB. The study finds more consistent results across the different regression models for *lnRGDPPC*. The coefficient estimates are consistently show positive results and statistically significant at one percent. The coefficients' estimates range from 0.7597 to 3.8127 across the different models, indicating that a one-unit increase in *logRGDPPC* leads to approximately 0.76-3.8 days'

increase in LEB. This suggests that higher $\ln RGDPPC$ is associated with higher LEB. Considering the principal variable of interest, $\ln RM$ has a negative value (-0.2884) that is statistically significant at 5% under Pooled-OLS model but has positive values (0.1160) and (0.2675) that are statistically insignificant under Fixed and Random effects models. This indicates that when remittances to the selected African countries increase by a unit, LEB decreases by 0.2884 day(s).

Table 3: Correlation coefficient

	<i>LEB</i>	<i>IMR</i>	<i>GHE</i>	<i>RGDPPC</i>	<i>RM</i>	<i>PHYS</i>	<i>UNEMP</i>	<i>EDU</i>
LEB	1.00000							
IMR	-0.7891	1.0000						
GHE	0.04135	-0.2830	1.000					
RGDPPC	-0.2256	-0.0381	-0.266	1.0000				
RM	-0.11422	0.1070	-0.133	-0.0653	1.0000			
PHYS	0.47669	-0.4394	0.076	-0.0779	0.0193	1.0000		
UNEMP	0.07368	-0.2410	0.624	-0.1861	-0.0235	0.1338	1.0000	
EDUC	0.1821	-0.2912	0.0856	-0.1920	-0.0615	0.3189	0.0637	1.00000

In addition, physician's density revealed a positive and statistically significant coefficient under Pooled-OLS model and positive but insignificant under the Fixed and Random effects models. Considering the positive value under Pooled-OLS, it indicates that when Physician density increases by a unit, LEB increases by 8 days. Unemployment results under the three models show positive values and negative values that are not statistically significant. It indicates that unemployment does not have any effect on LEB in this study. Similarly, education has both negative values and positive values and is statistically insignificant under the three models in this study. It shows that education does not have any significant effect on LEB in this study.

The estimated Pooled-Ordinary Least Square (POLS), Fixed effect (FE) and Random effect (RE) results of IMR (Infant Mortality Rate) are shown in the Table below. Pooled-Ordinary Least Square (POLS), Fixed effect (FE), and Random effect (RE) coefficients estimates for GHE showed negative relationships to infant mortality rate (-3.7859, -0.3744 and -1.1870) but only the estimate under Pooled-OLS is statistically significant at 1%. This implies that when government health spending increases by a percent, the deaths of infants less than one year in the region are reduced by 4 per 1,000 live births.

Similarly, the coefficient estimates of $\ln RGDPPC$ show negative values and are statistically significant across the different estimation techniques employed. This reveals that a unit increase in $\ln RGDPPC$ results in a reduction in infant deaths by 1 or up to 10 per 1,000 live births. Turning to the principal variable of interest, the coefficient estimates of $\ln RM$ are 0.0990, -1.5513 and -1.8485, while the first value is statistically insignificant, the remaining two have statistically significant values at 10 percent and 5 percent. The results reveal that a unit increase in $\ln RM$ reduces infant deaths by 2. The results of Physician density show -22.9789, 4.1270 and 3.0568, and only the first value has a statistically significant value at 1 percent. It indicates a unit hike in physician density results in the reduction of infant deaths by 23 per thousand (1,000) live births.

Table 4: Summary of Panel Regression Model Result for Life Expectancy at Birth

Variable	Pooled-OLS	Fixed-Effect	Random-Effect
<i>GHE</i>	-0.0171 (0.2858)	1.0880** (0.5113)	1.2941** (0.5243)
<i>lnRGDPPC</i>	0.7597*** (0.1244)	3.8127*** (0.8101)	3.1433*** (0.6999)
<i>lnRM</i>	-0.2884** (0.1215)	0.1160 (0.2038)	0.2675 (0.2395)
<i>PHYS</i>	7.7846*** (0.6116)	0.0953 (1.1173)	0.6794 (0.8594)
<i>UNEMPL</i>	0.0334 (0.0493)	-0.0113 (0.0256)	0.0002 (0.0271)
<i>EDUC</i>	-0.0024 (0.0072)	-0.0043 (0.0078)	0.0038 (0.0084)
Constant	54.2873*** (2.9806)	9.5011 (9.3924)	14.1780 (9.3897)

[Source: Author's Computation]

Note: Standard error in bracket. *** $p < 1\%$, ** $p < 5\%$, * $p < 10\%$ **Table 5: Summary of Panel Regression Model Result for Infant Mortality Rate**

Variable	Pooled-OLS	Fixed-Effect	Random-Effect
<i>GHE</i>	-3.7859*** (0.7366)	-0.3744 (1.5065)	-1.1870 (1.4199)
<i>lnRGDPPC</i>	-1.2566*** (0.3583)	-10.5006*** (2.3210)	-9.1719*** (2.0969)
<i>lnRM</i>	0.0990 (0.4511)	-1.5513* (0.8082)	-1.8485** (0.8684)
<i>PHYS</i>	-22.9789*** (2.3326)	4.1270 (4.6992)	3.0568 (4.1111)
<i>UNEMPL</i>	-0.1350 (0.1185)	-0.0850 (0.1007)	-0.1270 (0.1017)
<i>EDUC</i>	-0.0304 (0.0242)	-0.0122 (0.0132)	-0.0137 (0.0134)
Constant	79.7809*** (10.2164)	210.4631*** (22.3830)	201.8064*** (25.1671)

[Source: Author's Computation]

Note: Standard error in bracket. *** $p < 1\%$, ** $p < 5\%$, * $p < 10\%$

Unemployment coefficient estimates show negative values across the different estimation techniques employed but are not statistically significant. This indicates that unemployment does not have a significant influence on IMR in the present study. Similarly, education's coefficient estimates across the different estimation techniques show negative values that are

also insignificant statistically. This also reveals that education has an insignificant effect on the infant mortality rate in this present study.

CONCLUSION

This study investigates the influence of remittances on health condition status (LEB and IMR) in African countries utilizing panel data-set between 2000 and 2020 through the employments of Pooled-Ordinary Least Square (POLS), Fixed effect (FE) and Random effect (RE) estimation techniques. GHE, lnRGDPPC, Physician density, unemployment and education were used as independent varying factors in the econometrical analysis of this research. Results clearly show that a unit increase in remittances from abroad results in decreases in both LEB and IMR. A decrease in LEB as a result of inflows of remittances from abroad means that remittances did not improve LEB in the region while a decrease in IMR as a result of inflows of remittances from abroad indicates that remittances improve or have a beneficial effect on IMR. The result that remittances have a negative effect (unimproved effect) on LEB follows the findings of Hao, Yang, Akinbode and Aderemi (2023). The result is not exceptionally astonishing as internationally transferred funds (remittances) have numerous purposes for instance., procurement of belongings (properties), the sum of money for feeding or costs of schooling etc. Towards this end, its usage in making sure that better healthcare is delivered may be insignificant at an instance.

However, the result was contrary to the findings of Amakom and Iheoma (2014) and Zhunio, Vishwasrao and P (2012). Also, the result that internationally transferred funds (remittances) have an inverse influence on IMR (improving effect) corroborates the findings in Sophia (2020); and Komla (2018) but contravenes results in Lim and Simmons (2016) and Howard and Stanley (2017). Different results of real Gross Domestic Product Per Capita (RGDPPC) improved LEB and IMR in African countries in this study. People's level of income significance in making demand for health services in a country is stressed with this result and this may partly explain to reason low IMR is evident in high-income countries as contrary to high IMR that manifests in low-income bracket territory (low-income countries). Toward this end, the essentiality is stressed that internationally transferred funds (remittances) together with GHE, physician's density and GDPPC are major determining variables of LEB and IMR in African countries. Thus, the findings of this study emphasize the important role of internationally transferred funds (remittances) in enhancing health outcome indicators; specifically, in minimizing IMR in the Africa region.

Conclusively, the results of this study provide evidence that remittances are related to falls in LEB (Life Expectancy at Birth) and IMR (Infant Mortality Rate) in the region. These findings indicate that remittances have no improving influence on LEB but have on IMR. Thus, the results stress the significant role being played by remittances in the improvement of health outcome indicators, especially the reduction in IMR. Senior managers in this region should deem it fit to create permitting terrains that enhance influxes of internationally transferred funds (remittances) to the African continent. Similarly, emphasis should also be placed on the appointment of additional skilled and experienced medically-trained doctors coupled with the plans fit to ensure and promote economic expansion and advancement, to be aggressively accompanied by the senior managers in Africa to promote increment of income to an agreeable standard, since many findings revealed that improvement in health conditions (status) for LEB and IMR is occasioned by high-income level.

Although unemployment and education did not have any significant effect on the health status used in this study, the policymakers should make frantic efforts in the region to make sure that unemployment is reduced to a barest minimum as this will provide a multiplier effect by ensuring that additional money is available in the economy to cater for healthcare-services expenses that will result into improved LEB, reduced IMR; and also quality education that can impact meaningfully on LEB and IMR should be given attention to and seriously pursued in African continent.

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