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Institutional qualities, health development assistance, and population health: Evidence from African countries

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Abstract

This study examines how institutional qualities influence population health across the region over an extended period, addressing the limited empirical evidence on the institutional determinants of health outcomes. The research focuses on the ways governance structures shape life expectancy and infant mortality, thereby filling a gap in understanding the indirect but foundational role of institutional environments in public health. Using Generalized Method of Moments and Random Effect estimation techniques, the analysis evaluates the effects of control of corruption, government effectiveness, rule of law, and regulatory quality on two central indicators of population health. Although some institutional variables exhibited unexpected directional relationships with life expectancy and infant mortality, their statistical relevance was inconsistent. By contrast, rule of law and regulatory quality showed positive and significant associations with improved health outcomes, highlighting the importance of legal stability and regulatory soundness in strengthening public health performance. Overall, the findings suggest that improvements in institutional conditions may generate more sustainable health gains than relying solely on increases in health development assistance. The study underscores the need for policy approaches that prioritize governance reforms as a complement to traditional health sector investments.

***Keywords*:** Governance; health outcomes; institutional quality; public policy; sustainable development.

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1. INTRODUCTION

Some of the essential and pressing challenges that societies are confronting include war and terrorism, economic crises, high living costs, health-care system crises, climate change, and the spread of new viruses and epidemics. However, at the center of these essential challenges is the cardinal crisis in governance. To responsibly handle these outlined challenges in a society is the fundamental institution referred to as governance (McLennan, 2022). In addition, to expertly face or tackle these mentioned challenges or confrontations, the fundamental institution (governance) must find or create a specialized system properly positioned to tackle these stated challenges in an aimed manner (Bayarsaikhan et al., 2022). Frenk & Moon (2013) state that towards this end, fundamental institutions (governance) shoulder the responsibility of designing and implementing the health system to tackle society's health-related challenging issues. Office of the United Nations High Commissioner for Human Rights Publications (2024) defines "Governance" as all processes of governing, the institutions, processes, and practices through which issues of common concern are decided upon and regulated. In precise terms, good governance refers to the political and institutional processes and outcomes that are essential to attain the goals of development. The important question is: are the institutions of governance expertly guaranteeing the right to health, adequate housing, sufficient food, quality education, fair justice, and personal security?

Khan et al., (2022) put that in economic literature, governance is referred to as the collective institutions consisting of government, judiciary, and parliament. Worldwide Governance Indicators (2023) identifies six (6) indicators of good governance to be: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. All these indicators are always used to assess the institutional quality of a country.

Rehmat et al. (2020) state that institutional quality has a considerable influence on health, and also clearly show that health has an important role in the whole welfare of a country, so they submitted that it is essential to have a better and improved quality of institutions in a country. In line with this, Hadipour et al., (2023) demonstrate empirically using a panel of 158 countries that higher institutional quality (measured via components such as control of corruption, rule of law, regulatory quality, government effectiveness, voice and accountability, political stability) is significantly associated with lower infant mortality and higher life expectancy, underlining the centrality of institutional quality to national health outcomes. A comprehensive 2023 scoping review of governance interventions in low- and middle-income countries (LMICs) points to evidence that governance mechanisms, including accountability, transparency, financing structures, private-sector partnerships, community engagement, regulation, and system design, influence the quality of healthcare service delivery (George et al., 2023). De Luca et al. (2023) emphasize that institutional quality impresses the regulatory framework and the surrounding environment in which healthcare providers work; they believe, this, in turn, influences the inducements towards quality and suitability of care, and thus patients' health outcomes in a country.

The relationship between governance, health expenditure, and health outcomes is further nuanced by Rahman et al. (2025), which shows that good governance significantly moderates and amplifies the positive impact of public health spending on broader health goals (SDG3), and mitigates the negative effects often associated with private health expenditure in contexts of weak regulation. Azimi et al. (2023) equivocally posit that the penetration of healthcare, availability, and accessibility of people to quality healthcare services are the key dimensions of human well-being and have direct effects on human capital development, reduction of mortality rates, and contemporary living standards. They went further to state that on a contrary, it is well-noticeable in low- and middle-income countries that the healthcare sector falls short of providing the desired quality of healthcare services to people as a result of low institutional quality occasions from low regulatory quality, extensive corruption, low efficiency of government, absence of the absolute rule of law, political instability and weak accountability. Moreover, a 2025 analysis of the member states of the West African Economic and Monetary Union (WAEMU) found that public health expenditure only yields improvements in life expectancy when

governance quality crosses a threshold, indicating that poor governance undermines the effectiveness of public health spending (Boundioa & Thiombiano, 2025). Yang et al., (2021) also clearly state that low governance (institutional quality) efficacy not only traps people in losing their money; it also perpetuates the existing rampant corruption in the administration of healthcare services, limits accessibility to healthcare, increases unnecessary patients' costs, deprives poor people of essential healthcare services, and thereby significantly impacts the overall social and economic development of a country. Challe et al. (2019), however, defined 'institutions' as a set of rules and constraints that shape economic attitude and stimulus, and also important elements or incentives of economic development. They further state that, in the specific context of open economies, the importance of having suitable economic institutions domestically is regularly seen as a precondition for capital inflows to lead to balanced economic activity and stable long-run growth. However, little is known about the reverse impact of capital inflow (health aid) on local economic institutions.

Jude and Levieuge (2017) emphasized that poor institutional quality is linked with high transaction costs, increased risk for long-term commitment, loosening the bridges or connections between foreign affiliates (external donors inclusive) and domestic firms, and also government agencies that receive foreign aid, and therefore, borders the over-abundance or bubble effect. In contrast to the negative effects of poor institutional quality, they stated further that better institutional quality reduces the crowding out effect of foreign aid (health aid inclusive) and foreign direct investment (FDI), and by so doing spurring foreign aid and foreign investment into the country, so that the growth effects of foreign aid and foreign direct investment will be further enhanced. Going with this argument of theirs, it is therefore positioned that the positive effect of foreign health aid (health development assistance) on health outcome indicators will be stronger in countries with relatively high institutional quality.

The study's novelty incorporates the determination of the effects of institutional qualities on population health as a new step in the existing literature.

1.1. Theoretical framework

According to Hassoun (2012), the best theoretical argument for making aid conditional on good institutional quality is the moral hazard argument. The moral hazard argument claims that if foreign aid is given to countries on the basis of poorness or poverty, their leaders will keep their countries poor because an incentive has been created for their leaders to keep their countries in perpetual poverty so that they can get more aid. He argued that, to counter this idea of leaders keeping their countries in perpetual poverty to get more foreign aid, foreign aid should instead be given to poor countries that have good policies (institutional qualities). The basis of his argument is that giving to the poorest countries, on any of these measures (the previous allocation formulas used to allocate aid to the poor countries), might not be the best way to minimize poverty for reasons other than the idea that these foreign donors have to take into account institutional quality to reduce poverty in the poor countries.

Since most of these foreign donor agencies in the past have not been considering good policy (institutional quality) as one of the bases for the determination of where they disbursed their aid to but had majorly based it on poverty factor, it is high time these foreign donors started considering disbursement of aid on the bases of those factors they have been considering in the past couples with better good policies of a country (better institutional qualities).

Since institutional quality has become another factor to reckon with in fast-tracking the development of the health sector in developing countries, its appraisal of health outcome indicators in the region becomes of keen interest. Although there is a dearth of empirical literature that examined this appraisal, to bring to light the works of earlier researchers, more research outcomes closely linked with this appraisal in the region, SSACS must be

brought to light. Meanwhile, concordance seems not to be found in the literature with respect to the effect of institutional quality on the health outcome indicators of SSACs.

A study by Hadipour et al. (2023) conducted research into the impact of institutional quality on health system outcomes from 158 countries spanning between 2001-2020 the worldwide governance indicators. Fixed effects and Generalized Method of Moments estimation techniques were employed. The study revealed that the institutional qualities used hurt infant mortality and a positive impact on life expectancy. In the same vein, De Luca et al. (2023) examined the incentives towards quality and appropriateness of care, and so patients' health outcomes. The study beamed its searchlight on the relationship between institutional quality and health outcomes. Findings revealed that higher institutional quality improves health outcomes in hospitals in Italy (this is measured by the reductions in heart attack, hip fracture, and stroke mortality rates). Trailing behind the above journals, Sharma et al. (2022) delved into the effect of the quality of economic institutions on health outcomes for the European Union countries from 2000-2018. The study made use of secondary data from the World Bank and employed fixed and random effects models to analyze the results of the variables. Findings revealed that an enhancement in the quality of economic institutions has a favorable effect on the health of the selected countries.

Similarly, De Luca et al. (2021) investigated the effect of institutional quality on the availability of health care provision in Italy within the period spanning between 2007-2012. Endogeneity of institutional quality was dealt with through the employment of historical instruments. The study found that institutional quality has a favorable effect on the health care provision in Italy. Still trailing the above-reviewed journals, Ouedraogo et al. (2020) conducted research to determine the institutional qualities that are most relevant to the improvement of health outcomes of 45 sub-Saharan African countries between 1996-2018. The study made use of the two-stage least squares method to estimate the model, and data were sourced from the World Bank. Findings revealed that the rule of law, control of corruption, government effectiveness, voice and accountability, political stability, and absence of violence are the most relevant institutional qualities that positively impact health outcomes in the region. Rehmat et al. (2020) investigated the effect of institutional quality on infant mortality rate and life expectancy (population health outcomes) using some explanatory variables like government stability, corruption, and others to represent institutional qualities. It selected 105 countries for the study, and the period of the study was between 1984-2012. Data were sourced from World Development Indicators (2023), and the estimation techniques employed include fixed effects, random effects, and GMM. The findings revealed that institutional qualities used in the study increased life expectancy and reduced the infant mortality rate.

Makuta and O'Hare (2015) beamed their searchlight on the relationship between public spending on health and quality of governance (institutional quality) in 43 sub-Saharan African countries between 1996-2011 with the employment of a two-stage least squares regression estimation technique. Findings revealed that good governance has a positive effect on public health spending. A larger effect is recorded in those countries where the quality of governance is greater. This means that an increase in public health spending prunes infant mortality and raises life expectancy greatly, and this contradicts the results from other countries with poor quality of governance (Gutiérrez et al., 2025). Moreover, Nadpara and Samanta (2015) delved into the effect of corruption on population health in 30 (thirty) countries spanning between 1996-2011. Health status is proxied by life expectancy (at birth) and infant mortality (per 1000 live births). Two categories of corruption were considered: "corruption without theft," which decreases the quantity of medical services, and "Corruption with theft," which decreases the quality and efficiency of medical services. The results of the study indicated that health is seriously affected by corruption in poor developing countries than in developed countries. Meanwhile, good governance focusing on the execution of law and order improves health outcomes.

Considering the above-reviewed literature, some pinpointed lacunas which include, among others, confined scope in terms of chosen periods, few or limited chosen countries, not focusing on the African context, absence

of a theoretical framework, non-usage of appropriate methodology, and the inclusion of one or two institutional qualities instead of using more than one or two were observed.

1.2. Purpose of study

This study examines how institutional qualities influence population health across the region over an extended period, addressing the limited empirical evidence on the institutional determinants of health outcomes.

2. METHOD AND MATERIALS

2.1. Model specification

Based on Sharma's (2020) explicit functional specified model, the adjusted and adopted model of this study is stated thus:

Population Health = *f*(*Economic freedom, control variables*) ……. 1

The above equation is adjusted by expunging economic freedom and replacing it with institutional qualities.

Population Health = *f*(*Institutional qualities, control variables*) …….. ……2

The above equation 2 is specified to achieve the stated objective of this study.

Population Health = (*GDP, GHE, Control of Corruption, Government Effectiveness, Rule of Law, Regulatory Quality*.....3

Econometrically,

$PHit = \alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 logHDA_{it} + \alpha_3 CC_{it} + \alpha_4 GE_{it} + \alpha_5 RL_{it} + \alpha_6 RQ_{it} + \varepsilon_{it}$ 4

The two dependent variables used to represent Population Health (PH) in this study are infant mortality rate (IMR) and Life Expectancy at Birth (LEB), while the independent variables are represented with log of Gross Domestic Product (*ln*GDP), log of Health Development Assistance (*ln*HDA) and the other independent variables represented by institutional qualities are Control of Corruption, Government Effectiveness, Rule of Law and Regulatory Quality in country *i* at year *t* and ε_t is the error term.

Following the previous studies (such as Lu et al., 2018; Sharma, 2020), population health is measured by life expectancy at birth (LEB) and infant mortality rate (IMR).

$LEBit = \alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnHDA_{it} + \alpha_3 CC_{it} + \alpha_4 GE_{it} + \alpha_5 RL_{it} + \alpha_6 RQ_{it} + \varepsilon_{it}$ ……. 5 $IMRit = \beta_0 + \beta_1 lnGDP_{it} + \beta_2 lnHDA_{it} + \beta_3 CC_{it} + \beta_4 GE_{it} + \beta_5 RL_{it} + \beta_6 RQ_{it} + \varepsilon_{it}$ ……. 6 In equ. 5, α_0 $is\ an\ intercept$, $\alpha_3 - \alpha_6$Are parameters of interest which are expected to be positive; the higher the institutional qualities, the higher the life expectancy at birth (LEB), while the parameters β_3- β_6 in Equation 6 is expected to be negative because the higher the institutional qualities, the lower the infant mortality rate in the selected countries ought to be, and β_0It is an intercept of the equation. 6. ε signifies the error term, *t* = 1, … T denotes time, while *i* = 1, …, N stands for country.

2.2. Estimated techniques

To estimate the models in this study, the Generalized Method of Moments estimation technique was used first, and to test for the robustness of the results, the Random Effect Model was also used as another estimation technique, which is in tandem with the work of Rehmat et al. (2020).

2.3. Data and measurement of variables

To examine the effects of institutional qualities chosen in this study on population health, life expectancy at birth (LEB), and infant mortality rate (IMR) are chosen as dependent variables. The simple justification for selecting these dependent variables is that they are the most frequently suitable or used measures of health status and essential barometers of human development since both short-term and long-term population health spending and interventions are displayed by these barometers (Oduyemi & Owoeye, 2020). The data of the chosen variables in this study were sourced from the Worldwide Governance Indicators (2023) and the World Health Organization (2023).

Life Expectancy at Birth: It is defined as how long or average number of years that an infant or newborn could expect to live if he or she were to pass through life exposed to the sex-and age-specific death rates prevailing at the time of his or her birth, for a specific year, in a particular country, territory, or geographical location. It is measured in years. It was measured in the number of years.

***Infant Mortality Rate*:** It is defined as the number of infant deaths for every 1,000 live births. It is an essential marker of the overall health of a society. Infant mortality is defined as the death of an infant or newborn baby before his/her first birthday. It was measured as deaths per 1000 live births.

Gross Domestic Product: It is defined as the total market value of the goods and services produced by all the economic agents located in that country, regardless of their ownership, and that are not resold in any form. It was measured in current US dollars.

Health Development Assistance: It is financial and in-kind donations put together by means of development partners or donors – specifically, by institutions or principal development agencies whose main purpose is to channel aid (development assistance) for the betterment of or upgrade health in poverty-stricken countries. It was measured in million US dollars.

Control of Corruption: It reflects the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by the elites and private interests. Its measure ranges from -2.5 (weak) to 2.5 (strong) governance performance.

Government Effectiveness: It reflects the perceptions of the quality of public service, the quality of civil service and the degree of its independence from political pressure, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Its measure ranges from -2.5 (weak) to 2.5 (strong) governance performance.

Regulatory Quality: It reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Its measure ranges from -2.5 (weak) to 2.5 (strong) governance performance.

Rule of Law: It reflects perceptions to the extent to which agents have confidence in and abide by the rules of the society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Its measure ranges from -2.5 (weak) to 2.5 (strong) governance performance.

2.4. Scope of the study

The research covered the time periods of 1996-2022 and utilized cross-sectional and annual time series data, consequently, for 30 selected African countries. The countries selected are Central African Republic, Chad, Equatorial Guinea, Gabon, DR Congo, Ethiopia, Kenya, Madagascar, Mauritius, Tanzania, Angola, Botswana, Lesotho, South Africa, Zambia, Benin Republic, Cote D'ivoire, Ghana, Nigeria, Senegal, Congo Republic, Uganda, Zimbabwe, Mali, Togo, Sudan, Rwanda, Mozambique, Morocco and Libya.

2.5. Validity and reliability

Since this research made use of pre-existing data, validity and reliability concepts were considered. Considering validity, all the data used in this work were sourced from credible and reputable international organizations known for their accuracy in data gathering (data source evaluation); the data collection method used, the instruments, the procedures used by the organizations were sourced from another secondary sources (data collection methods); the data employed for this work adequately answered the question investigated in this work (relevance); the data employed have been consistent and stable over time and across various sourced channels. Regarding ethical considerations of this research, the interpreted results of this work reflected the analyzed results without being circumvented (unbiased) to reflect the research opinion. Secondary (quantitative) data sourced from different international organizations' databases were identified properly and correctly, to guard against data reappearances (data privacy and confidentiality). Collected data were properly handled and securely kept in order to prevent unpermitted individuals from gaining access to it (data management and security). All the databases' sources of the international organizations where data were collected were referenced (transparency and acknowledgement). The research was conducted with the genuine intention of avoiding harm to all the organizations involved and those who would like to use the findings of the work. This work was built on blending qualitative techniques (reviewed literature) and quantitative techniques (data collection, mining, analysis, and interpretations), and this was tailored to achieve synergy, flexibility, and a holistic approach among different techniques that were employed to actualize the objective of this work (research philosophy).

3. RESULTS

Results in Table 1 present the summary of the descriptive statistics of the studied variables of the panel data collected from various organizations' databases spanning the period 1996-2022 and covering 30 selected African countries. The average LEB of all the selected countries within the period covered was 58.1 years. Also, the average IMR of 1000 live births was 60, while the average GDP (current US dollars) within the period was 4.24E+10. Meanwhile, HDA (Million US Dollars), Control of Corruption (ranges from -2.5-2.5), Government Effectiveness (ranges from -2.5-2.5), Rule of Law (ranges from -2.5-2.5), and Regulatory Quality (ranges from -2.5-2.5) averaged 2.39E+08, 0.69886, -0.73052, -0.693208, and -0.662203. Within the same specified period, the maximum values of all the employed variables are thus stated: 74.5 years for LEB, 139.6 deaths for IMR, 5.74E+11 for GDP, 1.97E+09 for HDA, 1.244 for CC, 1.1504 for GE, 1.0239 for RL, and 1.1969 for RQ. Moreover, the minimum value for LEB was 40.6 years, 9.2 deaths for IMR, 2.3E+08 for GDP, and 0.000 for HDA. Also, the minimum values for CC, GE, RL, and RQ were 2.096, -1.879, -1.9183, and -2.3023.

Table 1
Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Max	Min
LEB	810	58.11043	7.341289	74.51463	40.64000
IMR	810	59.73074	26.24333	139.6000	9.200000
GDP	810	4.24E+10	8.27E+10	5.74E+11	2.32E+08
HDA	810	2.39E+08	3.22E+08	1.97E+09	0.000000
CC	810	0.698863	0.621121	1.244920	2.096586
GE	810	-0.730520	0.608452	1.150494	-1.879460
RL	810	-0.693208	0.638680	1.023956	-1.918399
RQ	810	-0.662203	0.661217	1.196947	-2.302320

Abbreviations: *LEB= Life Expectancy at Birth (in years); IMR = Infant Mortality Rate (number of infant deaths per 1000 live-births); GDP = Gross Domestic Product (*current US dollars*); HDA= Health Development Assistance (Million USD); CC =Control of Corruption (ranges between -2.5 to 2.5); GE = Government Effectiveness (ranges*

between -2.5 to 2.5); RL = Rule of Law (ranges between -2.5 to 2.5); RE = Regulatory Quality (ranges between -2.5 to 2.5).

The pairwise correlation coefficients' results of all variables incorporated in this study suggest that a high negative relationship of -0.84 exists between IMR and LEB. However, weakly positive relationships of 0.0903, 0.1790, 0.2416, and 0.26310 exist between GDP, HDA, CC, RQ, and LEB, while moderate positive relationships of 0.33204 and 0.37057 exist between GE, RL, and LEB. However, weakly negative relationships of 0.13451 and -0.23016 exist between GDP, HDA, and IMR; while moderate negative relationships of -0.3723, -0.43217, -0.45234, and -0.33867 exist between CC, GE, RL, RQ, and IMR. Contrarily, while a moderate positive correlational relationship of 0.5816 exists between HDA and GDP, weakly positive correlational relationships of 0.0116, 0.1116, 0.0458, and 0.1144 exist between CC, GE, RL, RQ, and GDP. On the contrary note, also, weakly negative correlational relationships of -0.1087, -0.0409, -0.0451, and -0.0396 exist between CC, GE, RL, RQ, and HDA. Contrarily, high positive correlational relationships of 0.85817, 0.85986, and 0.85627 exist between GE, RL, RQ, and CC. Similarly, high positive correlational relationships of 0.89909 and 0.88931 exist between RL, RQ, and GE. Finally, a high positive correlational relationship of 0.87819 also exists between RQ and RL.

Table 2

Correlation coefficients

	LEB	*IMR*	*GDP*	*HDA*	*CC*	*GE*	*RL*	*RQ*
LEB	1.00000							
IMR	-0.847352	1.0000						
GDP	0.090396	- 0.13451	1.000					
HDA	0.179032	-0.23016	0.5816	1.0000				
CC	0.241691	-0.37231	0.0116	-0.1087	1.0000			
GE	0.332049	-0.43217	0.1116	-0.0409	0.85817	1.0000		
RL	0.370574	-0.45234	0.0458	-0.0451	0.85986	0.89909	1.0000	
RQ	0.263107	-0.33867	0.1144	-0.0396	0.85627	0.88931	0.87819	1.00000

The study estimates the empirical model outlined in Equation 5 using the random effects and GMM approaches. These results are presented in Table 3, which shows the regression coefficients. The first and second columns show the GMM and RE results when the population health variable is the life expectancy at birth. Starting with GMM results, it shows that one-period lagged life expectancy at birth (LEB) has a significant and positive effect on present year LEB at a one percent level of significance. This implies that a one percent improvement in the value of life expectancy at birth in the previous year led to more than 0.82% increase in the value of life expectancy at birth in the present year. The result further shows that the log of gross domestic product has a positive and significant effect on life expectancy at birth. It shows that one standard deviation in the log of gross domestic product is associated with a 208-day rise in life expectancy at birth and is statistically significant at 1%. It also shows that the log of health development assistance has a positive and significant effect on life expectancy at birth. It shows that one standard deviation in the log of health development assistance is associated with 87 87-day rise in life expectancy at birth and is statistically significant at 1%. Control of corruption is negatively associated with life expectancy at birth and is statistically insignificant. Also, government effectiveness is negatively associated with life expectancy at birth, but is statistically significant at 1% level. On the other hand, the rule of law is positively associated with life expectancy at birth but is statistically insignificant. Similarly, regulatory quality has a positive association with life expectancy at birth and is statistically significant at 5% level. It shows that one standard deviation in regulatory quality is associated with a 146-day rise in life expectancy at birth and is statistically significant at 5%. Turning to RE results for life expectancy at birth. These results indicate a positive association between the log of gross domestic product and life expectancy at birth. The result shows that

one standard deviation in the log of gross domestic product is associated with 4.84 days' rise in life expectancy at birth and is statistically significant at 1%. Log of health development assistance is positively associated with the life expectancy at birth, but is not statistically significant (0.0773). Control of corruption is negatively associated with life expectancy at birth and is statistically insignificant. Also, government effectiveness is negatively related to life expectancy at birth and is statistically nonsignificant. On the other hand, the rule of law is found to be positively associated with life expectancy at birth and is statistically significant. This shows that one standard deviation in rule of law increases life expectancy at birth with 2 days' rise in life expectancy at birth. Lastly, regarding RE results, regulatory quality is positively associated with life expectancy at birth, but it is not statistically significant.

Table 3

Summary of panel regression model result for life expectancy at birth (LEB)

Variable	GMM	Random Effect
L1.LEB	0.8228***	
	(0.0126)	
lnGDP	0.5740***	4.8470***
	(0.0954)	(0.6061)
LnHDA	0.2385***	0.0773
	(0.0426)	(0.2561)
CC	-0.1932	-0.6545
	(0.0227)	(0.8603)
GE	-1.2091***	-0.1142
	(0.2160)	(1.3392)
RL	0.1562	2.3773**
	(0.1888)	(0.9711)
RQ	0.4782**	0.2405
	(0.2248)	(1.5339)
Constant	-7.8302***	-55.7283***
	(1.3222)	(11.8258)

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

The estimated GMM and Random effect results are presented in Table 4. Beginning with GMM results, it reveals that one period lagged infant mortality rate (IMR) has a significant and positive effect on present year IMR at a one percent level of significance. The result further shows that the log of gross domestic product hurts the infant mortality rate and is significant at 1% level. It shows that one standard deviation in the log of gross domestic product reduces infant deaths by 2. Also, the log of health development assistance has a negative but insignificant effect on the infant mortality rate. Control of corruption has a positive and insignificant effect on IMR. Government effectiveness has a negative and significant effect on IMR; one standard deviation in government effectiveness reduces infant deaths by 4 at 1% level. Also, the rule of law impacts IMR negatively and is significant at 5% level. This shows that one standard deviation in the rule of law reduces infant deaths by 2. Also, regulatory quality impacts IMR negatively but is statistically insignificant. Turning to the Random effect results, the log of gross domestic product hurts the infant mortality rate. It indicates that one standard deviation in the log of gross domestic product reduces infant deaths by 19. The result further shows that health development assistance has a positive but insignificant effect on the infant mortality rate. Control of corruption results show that it impacts IMR negatively (-3.0452) but is statistically insignificant. Similarly, government effectiveness impacts IMR negatively but also with an insignificant sign. Contrarily, the rule of law impacts IMR negatively and is statistically significant at the 10% level. This implies that one standard deviation in the rule of law reduces infant deaths by 7. Lastly, regulatory quality impacts IMR positively and is statistically insignificant.

Table 4

Summary of panel regression model result for infant mortality rate (IMR)

Variable	GMM	Random Effect
L1.IMR	0.8565***	
	(0.0114)	
lnGDP	-2.1869***	-19.1794***
	(0.3792)	(0.8558)
lnHDA	-0.1051	0.2028
	(0.2110)	(1.0764)
CC	0.3235	-3.0452
	(0.9423)	(2.2388)
GE	-4.2093***	-0.2000
	(0.9219)	(3.8032)
RL	-1.5244**	-6.5633*
	(0.7681)	(3.7343)
RQ	-1.3715	2.3381
	(0.9687)	(4.9055)
Constant	61.7827***	500.7412***
	(7.3109)	(34.4099)

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

4. DISCUSSION

This essential work examines the in-depth effects of institutional qualities and health development assistance on population health (life expectancy at birth and infant mortality rate) in the African region, making use of a panel data-set spanning between 1996-2022 with the employment of Generalized Method of Moments (GMM) and Random Effect (RE) estimation techniques. Log of gross domestic product, health development assistance, control of corruption, government effectiveness, rule of law, and regulatory quality were used as explanatory variables in this research, of which health development assistance, control of corruption, government effectiveness, rule of law, and regulatory quality are primary variables of interest.

Considering the results of health development assistance under LEB under the two estimation techniques used, the expected signs of the log of HDA were found, but they were insignificant under RE. Relating to the institutional qualities used in this study under LEB, the expected signs were not found for control of corruption and government effectiveness, and where they were found for rule of law and regulatory quality, some were significant, and some were not. Under IMR (Table 4), the log of HDA results display expected and unexpected signs, but none of the results were significant. Control of corruption and regulatory quality display expected and unexpected results' signs but none of the results were significant. Government effectiveness displays the expected signs, but one was insignificant. Only the rule of law displays the expected results and is also significant. Log of gross domestic product displays the expected results and is statistically significant under the population health used in this study. This shows the importance of GDP, which trickles down to people in the form of a higher income level, and this helps people to demand health, thereby improving LEB and reducing IMR in the region. The effectiveness of HDA on LEB and IMR is in accordance with the works of Gutema and Mariam (2018), Lu et al. (2018), and Zounkifirou (2020). On the other hand, the current findings contradict prior conclusions that claim that HDA does not affect health outcome indicators (Williamson, 2008 & Wilson, 2011). The finding that institutional qualities have effects on population health is in accordance with findings of Razvi and Chakraborty (2016), Sharma (2020), and contradicts Nadpara and Samanta (2015).

5. CONCLUSION

In conclusion, the results of this work show that health development assistance has an effect on LEB but does not have any effect on IMR in the African region, and also has mixed results relating to the institutional qualities employed in this work. This study informs that mere reliance on increasing health development assistance without focusing on the institutional environment may not yield a desirable effect on population health on the continent.

Health development assistance and institutional qualities have important roles in accelerating growth and development in Africa's health sector. It is therefore recommended that the policy-makers on the continent should ceaselessly advise African leaders to always improve the institutional qualities and reduce regulatory constraints, as these would in no doubt increase the effectiveness of health development assistance as well as population health of the continent.

Also, the donor agencies should not only monitor the disbursements of HDA but should also monitor the application and utilization of HDA to achieve the desired and expected results. Limitations of this work stem from the available time period of data for institutional qualities (1996-2022); the employment of only four (4) institutional qualities from many of the available ones; and thirty (30) African countries used from the fifty-four (54) countries on the continent.

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