Journal of the Knowledge Economy (2024) 15:2241–2273
https://doi.org/10.1007/s13132-023-01318-5

The Role of Institutional Quality in Health Expenditure-Labor Force Participation Nexus in Africa

Olaide Sekinat Opeloyeru[1] · **Temitope Olanike Faronbi**[2] · **Isiaka Akande Raifu**[3]

Received: 7 March 2022 / Accepted: 25 February 2023 / Published online: 16 March 2023

Abstract

The study investigated the role of institutional quality in the relationship between health expenditure and labor force participation (LFP) in Africa, taking into consideration two forms of health expenditures (government health expenditure (GHE) and out-of-pocket health expenditure (OOPHE)) and gender labor force participation dichotomy. We employed data from 39 African countries for the period between 2000 and 2018 using Panel Fixed Effects with Driscoll and Kraay standard errors and a two-stage system Generalized Method of Moments (GMM). The results revealed that GHE yields an increasing effect on total, female, and male LFP. OOPHE, in most cases, leads to a decline in LFP. The institutional quality was found to be detrimental to LFP. The magnitude of the positive effect of GHE on LFP is reduced by the interaction of institutional quality with GHE. In conclusion, we advocate for the improvement in institutional apparatuses across African countries.

Keywords Government health expenditure · Out-of-pocket health expenditure · Labor force participation · Institutional quality · Panel fixed effects · Two-stage system GMM

✉ Olaide Sekinat Opeloyeru
dasola2004@gmail.com; opeloyeruos@tasued.edu.ng

Temitope Olanike Faronbi
faronbitemitope@gmail.com

Isiaka Akande Raifu
heritagetiamiyu@gmail.com

[1] Department of Economics, College of Social and Management Sciences (COSMAS), Tai Solarin University of Education, Ijagun, Ogun State, Nigeria

[2] Department of Economics, Faculty of Economics and Management Sciences, University of Ibadan, Ibadan, Oyo State, Nigeria

[3] Department of Economics, Faculty of Economics and Management Sciences, University of Ibadan, Ibadan, Oyo State, Nigeria

JEL Classification E62 · H51 · J21 · O43

Introduction

In a bid to achieve Universal Health Coverage and to pursue the health goals for Sustainable Development Goals (SDGs), many health policymakers in Africa have seen health expenditure as one of the germane components of health outcomes. At the 2001 Abuja Declaration, African leaders agreed to allocate at least 15% of their yearly budget to the health sector to improve, promote, and foster quality healthcare in their countries, but many of these countries are defaulters of this declaration. For instance, the average total health spending ranges from 5% to 6% of the Gross Domestic Product (GDP) between 2000 and 2015. However, per capita total expenditure increased from $150 to $292 based on the 2015 purchasing power parity (PPP) with variations across different countries in Africa. Available statistics show that, on average, per capita health expenditure in low-income African countries stood at $99, ranging from $23 in the Central African Republic to $256 in Sierra Leone. Middle-income African countries recorded a mean per capita health expenditure of $298, ranging from $147 in Djibouti to $774 in Tunisia. The upper-middle-income African countries have an average per capita income of $914 with a minimum of $481 for Gabon and a maximum of $1,100 for Mauritius (World Bank, 2020a).

Globally, health is financed through government spending, health insurance, and out-of-pocket payments. In Africa, the most common means of financing health include government spending and out-of-pocket payments. Government health expenditure (GHE hereafter) is done via public earning-generated inform of taxes from the public or from the sale of natural resources in the international market. It is often regarded as an unstable source of financing health expenditure since it relies on a budget that is determined by economic activities. It is also unstable because the budgets for health and other necessities are based on the prices of natural resources which are subject to demand and supply fluctuations of natural resources in the international market (Raifu, Aminu and Folawewo, 2020; Raifu, 2021; Raifu and Oshota, 2022). On the other hand, out-of-pocket health expenditure (OOPHE, hereafter) is considered to be cash-to-hand payments from households to healthcare providers at the point of service (Aregbeshola, 2016). The scope of these payments may cover combined drug costs, medical material costs, and consultation fees. This means of payment is dominant in many African countries compared to the rest of the world. The average world OOPHE stood at 22% of the total health expenditure whereas the average OOPHE in Africa stood at 36% of total health expenditure. This phenomenon manifested out of the paucity of government health facilities. The paucity of healthcare facilities has denied majority of African citizens to access quality healthcare. The obvious consequence is lower health outcomes. The situation may not give the majority of the ability to participate in the labor market. This is because it takes a physically healthier individual to energetically participate in the labor market. Grossman (1972) and Bloom and Canning (2000, 2003) asserted that being healthy will not

only be of benefit to the individual in nonlabor market activities but will affect the entire economy through labor market activities. Thus, the combined effect of low government spending on health and heavy dependence on out-of-pocket payments in Africa has however played an important role in the health outcomes of the citizens and affects the participation of labor in productive activities (Osundina, 2020).

Increasing labor force participation can help to achieve SDG 8 which includes the promotion of sustained, inclusive and sustainable economic growth, full and productive employment as well as decent work for all (Cepal, 2018). It has been argued that the increase in labor force participation would generate income that would enable people to have better access to healthcare. In fact, Iregui-Bohórquez et al. (2016) observed that people who participated in the labor force usually report better or sound health. A cursory look at labor force participation data, particularly in sub-Saharan Africa (SSA hereafter), shows that labor force participation has remained high but steadily declined over time until recent times. Besides this, there is uneven participation in the labor force across regions and gender. The average labor force participation between 1990 and 2019 in SSA stood at 69.9% which is greater than the world average within the same period 68.5%. However, there is persisting gender dichotomy in labor force participation in the region. While the male labor force participation stood at 76.3% that of their female counterparts stood at 63.6%. A similar trend is observed for the youth labor force participation rate. The total youth labor force participation rate stood at 50.8%. The gender gap in youth labor force participation stood at 5.5% as the male and female youth labor force participation rates stood at 53.6% and 48.1% respectively (see Table 7 in the appendix for the evolution of labor force participation rate based on gender and age dichotomy). However, the high rate of labor force participation in SSA, especially among the age bracket of 15–64 years, has been attributed to many factors. One of these factors according to ILO is the presence of the working-age population who are striving to survive the limited opportunities offered by their economies (ILO, 2018).

In light of the above, we examine the nexus between health expenditure and labor force participation taking into consideration the types of health expenditure (GHE and OOPHE) and total and gender labor force participation for adults with age bracket (15–64). We also investigate the mediating role of institutional quality in health expenditure and labor force participation nexus. Investigating the mediating role of institutional quality becomes indispensable or crucial because the quality of institutions determines a lot of economic outcomes, including labor force participation (Acemoglu, *et al*. 2005; Acemoglu and Robinson, 2008; Acemoglu, 2010; Agovino, *et al*. 2019). There are ample studies that have examined health expenditure and labor force participation (Farag *et al.*2013; Novignon, *et al*. 2015; Boachie and Ramu, 2015; Rauf, *et al*. 2018). Also, some studies have examined the relationship between institutional quality and health expenditure on one hand and institutional quality and labor force participation on the other hand (Su, *et al*. 2006; Cooray and Dzhumashev, 2018). However, to the best of our knowledge, we do not come across any study that has examined the role of institutional quality in the nexus between health expenditure and labor force participation, especially in Africa. This is the gap this study would fill.

Given the introduction, we proceed with the rest of the study as follows: the "Literature review" section reviews the existing studies. The "Source of Data and Analysis of the Situation" section focuses on data sources and some stylized facts on labor force participation, health expenditure, and quality of institutions. The "Methodology" section presents the methodology. The results are presented in the "Empirical Findings" while the "Conclusion and Policy Implications" section concludes with policy implications.

Literature Review

In the literature, health expenditure serves as one of the health inputs to produce good health as an output, which has been theorized through human capital theory. The role of human capital development has been theorized at the macro and micro level to show its importance on individuals, households, and the economy as a whole. At the macro level, the major discussion is centered around the channels through which health affects economic growth, while at the micro level, the central highlight has been on how health inputs affect an individual's or household's health (health outcomes) in participating in both market and nonmarket activities. A modified neoclassical growth theory by Romer (1990) which emphasizes the role of human capital in creating new ideas for improved growth stated that a higher level of human capital will boost new technological development and spurs growth in the long run. However, it should be noted that education or health is usually used to proxy for human capital as a healthier individual has the opportunity to attend school and be ready to supply labor inputs that will yield improvement in growth. Hence, Romer (1990) and Barro (1991) emphasized that health is the most important factor in determining labor force participation. According to Becker (1962, 1964, 2009), human capital does not only include education, training, and skills but also includes health and other values embodied in individuals, which allow them to be more productive in an economy. The human capital theory developed by Grossman (1972) assumed that an individual has an initial level of health that depreciate/deteriorate as a result of time (age) and can be improved through investment, especially with health inputs such as medical care which incorporates health expenditure, education, exercise, et cetera to produce healthy time. Healthy time allows individuals to participate in nonlabor and labor activities over their lifetime. Based on this theory, a healthy individual may decide to either use his/her healthy time to participate in the labor market (supply labor units) and reinvest in food, medical care, exercise facilities, etc. to gain healthy life or use it as leisure time (nonlabor activities) to derive utility as desired.

Methodologies that have been used so far in studying the relationship between health expenditure and labor force participation vary due to proxies for variables of interest, data availability, and cross-country and single-country analyses (see Piabuo and Tieguhong, 2017). Al-Jebory (2014), Anyanwu and Erhijakpor (2009), Farag *et al.* (2013), Piabuo and Tieguhong (2017), and Thu Ha (2018) used fixed, dynamics, and random effect Panel Ordinary Least Squares for cross-country analysis to account for measurement error and autocorrelation. Also, the

use of the Generalized Method of Moments (GMM) is common in the literature, and it is used to address the endogeneity problem that could plague the relationship between two series, e.g., health expenditure and labor force participation rate (Isiaka, 2020, Novignon et al., 2015; Umoru and Yaqub, 2015). Other methods used for the analysis, especially for a single-country analysis, include Ordinary Least Squares (OLS), Nonlinear Least Squares (NLS), Autoregressive Distributive Lag (ARDL), and Standard Multinomial Logit (SML). In addition, two-stage least square (R2SLS), three-stage least square (3SLS), and Newey-West test have been employed in a study by Anyanwu and Erhijakpor (2009), Boachie and Ramu (2015), and Anochiwa *et al.* (2019) to control for endogeneity and reverse causality and robustness of the estimator.

On the empirical front, there is a paucity of research on health expenditure and labor force participation. However, studies have drawn possible results on the relationship between them using other channels like the link between health expenditure and growth, labor force participation and economic growth, and health expenditure and health outcomes. Al-Jebory (2014) examined the effects of health expenditures on population age distribution and labor participation rates among 84 countries from low- and high-income countries. He established that in high-income countries, health expenditure has a high influence on the labor force participation rates, while in low-income countries; health expenditure has a low influence on the labor force participation rates. Similarly, Powell and Seabury (2018) confirmed that medical care spending can impact health and that health affects labor outcomes. Also, a study by Mushtaq et al. (2013) found evidence that health expenditure has a positive and significant impact on the labor force participation rate in the short run, but this result disappears in the long run. In addition, a recent study by Rauf et al. (2018) affirmed that labor force participation is increased by an increase in health expenditure, secondary school enrolment and Investment both in the short and long run. The results of other channels through which labor force participation/health expenditure is affected by health/economic growth or vice versa include the study from Australia by Laplagne (2007) which averred that better health and education can result in substantially greater labor force participation for those affected. Similarly, Novignon et al. (2015) showed that health status relates positively to labor force participation and the relationship was significant for total and female labor force participation. Also, Isiaka (2020) confirmed that government spending increases the labor force participation rate in the West African Monetary Zone. On the health expenditure side, Anyanwu and Erhijakpor (2009) found that total health expenditures are certainly an important contributor to health outcomes. Farag et al. (2013) also confirmed that government health spending has a significant effect on improving health outcomes and the size of the coefficient depends on the level of good governance achieved by the country. In addition, Umoru and Yaqub (2015) suggested from their result that health capital investment enhances the productivity of the labor force. Similarly, Boachie and Ramu (2015) found evidence that falling health outcomes in Ghana have been influenced by public health spending among other factors. A most recent study by Anochiwa et al. (2019) also established that health expenditure is significant in determining health outcomes but has no significant relationship with economic growth. Contrary to this submission, Thu Ha (2018) investigation

suggested that countries with higher health expenditure and labor force participation rate are expected to have higher GDP.

As regards the role of institutions on health expenditure/labor market participation, researchers have found the mediating role of the quality of institutions to be positive and highly significant. Novignon (2015) showed that high corruption and poor public sector institutions reduced health expenditure efficiency. Also, Makuta and O'Hare (2015) found that public spending impact is mediated by the quality of governance, which has a higher impact on health outcomes in countries with a higher quality of governance and a lower impact in countries with lower quality of governance. It is also the case for Bousmah et al. (2016) and Dhrifi (2020) that institutional quality plays an important and significant role in health expenditure. The result from Massimiliano et al. (2019) has been able to identify that institutional quality has a positive effect on local labor market participation for both men and women in Italy, but it does not affect the participation gap. Abstracting from empirical evidence that most of the studies merry-go-round the relationship between health expenditure and labor force participation with the exclusion of quality of institutions, this study contributes to knowledge by directly showing the empirical relationship between health expenditure and labor force participation as well as emphasizing on the imperative role of institutional quality.

Source of Data and Analysis of the Situation

Sources of Data

This study is aimed at investigating the role of institutional quality in the relationship between health expenditure and labor force participation. To achieve this aim, we utilize the data from 39 African countries covering the period from 2000 to 2018.[1] We chose these countries due to the availability of relevant data. For the dependent variable, we use labor force participation for adults with age brackets (15–64) across gender, females and males. For independent variables, we use GHE as a percentage of current health expenditure for the main analysis. For robustness analysis, we use OOPHE as a percentage of current health expenditure. We control for other variables based on the model of labor force participation and health expenditure model. These variables include GDP per capita growth rate, life expectancy at birth, female life expectancy at birth, male life expectancy at birth, secondary school enrolment, female secondary school enrolment, male secondary school enrolment, infant mortality rate, female infant mortality rate, male infant mortality rate, total fertility rate, and trade openness. All these variables including labor force participation and health expenditures data are obtained from the World Development

[1] Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo Democratic Republic, Congo Republic, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Kenya, Lesotho, Libya, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Togo, and Tunisia.

Indicators (World Bank, 2020a). Based on the aim of this study, we construct an institutional index from six governance indicators which include control of corruption, government effectiveness, political stability, regulatory quality, rule of law and voice, and accountability. The Principal Component Analysis is used to compute the institutional quality index. Following Aluko and Ibrahim, (2020), Alagidede et al. (2020), Ibrahim and Vo (2020) and Raifu et al. (2021), the computed institutional quality index is winsorized to remove possible outliers in the institutional quality index. Thereafter, the winsorized institutional quality index is normalized so that its value ranges from 0 and 1 with zero meaning poor institutional quality and 1 meaning good institutional quality. The governance variables are selected from the World Governance Indicators of the World Bank (World Bank, 2020b).

The summary statistics of the variables are presented in Table 1. As shown in the table, the average values of total labor force participation, male labor force participation, and female labor force participation are 66.1%, 75.1%, and 57.2%, respectively. This suggests that labor force participation has been relatively high and increasing over time in Africa with its mean value being above average over the period considered. GHE ranged from 4.1% to 77.5%of the current expenditure, with an average of 33.5% implying a relatively low % contribution to GHE. OOPHE is averaged at 42.5% with its lowest ebb of 2.99% and highest value at 84.2%.

The institutional quality index ranged from 0 to 1 with an average value of 0.49. This implies that the level of institutional quality in Africa is still below average, although there is a disparity in the institutional quality across the sampled African countries with some countries experiencing a relatively low standard of institutional policy while some still recorded high institutional efficiency of their policies. The average GDP per capita growth rate is 2.16%, with a range of 62.4% to 121.8%. The gap between the minimum and the maximum values of GDP growth rate as well as the standard deviation of 7.01% reveals the wide disparity in GDP growth rate across Africa.

The average life expectancy at birth (LEAB) was 59.5 %. Female LEAB averaged 61.3 % and male LEAB averaged 57.8 %. In addition, secondary school enrolment (SSE) averaged 48.7%, with female SSE averaging 46.4% and male SSE averaging 50.9 %. The infant mortality rate (IMR) ranged from 10.3% to 121.2%, with an average of 56.3%. Also, male infant mortality (MIMR) ranged from 11.3% to 130.8% with an average value of 61.3%, while female infant mortality (FIMR) ranged from 9.1% to 111.1% with a mean value of 51%. With the measures of dispersion of LEAB, SSE, and IMR, it could be observed that there have been improvements in these indicators over time across Africa. The total fertility rate ranged from 1.36% to 7.68% with an average value of 4.66 %. Trade openness has the minimum and maximum values of 17.93% and 193.48% respectively while being averaged at 70.93%.

Table 1 Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
Labor force participation (LFP)	741	66.090	12.353	42.390	90.340	43.270	88.510	−0.097	1.879
Female LFP (FLFP)	741	57.213	18.914	12.710	88.840	14.470	88.150	−0.481	2.250
Male LFP (MLFP)	741	75.072	8.881	50.740	92.160	52.600	91.860	−0.265	2.588
Government health expenditure (GHE)	741	33.487	17.285	4.062	77.476	5.250	73.001	0.606	2.558
Out-of-pocket HE (OOPHE)	741	42.542	20.471	2.993	84.162	4.574	80.661	−0.085	2.035
Institutional quality (IST)	741	0.486	0.222	0.000	1.000	0.000	1.000	0.030	3.001
GDP per capita growth rate (GDPPCGR)	741	2.160	7.077	−62.378	121.780	−12.443	13.743	5.947	127.472
Life expectancy at birth (LEAB)	741	59.514	8.142	42.518	76.693	43.308	76.115	0.242	2.393
Female LEAB	741	61.289	8.394	44.595	78.536	45.407	77.790	0.319	2.328
Male LEAB	741	57.770	7.947	40.418	75.494	41.012	74.694	0.174	2.508
Secondary school enrolment (SSE)	741	48.729	28.082	6.197	153.412	8.624	138.852	0.899	3.624
Female SSE	741	46.435	30.888	4.703	158.485	5.855	142.736	0.972	3.560
Male SSE	741	50.941	26.224	7.514	149.931	8.898	135.337	0.785	3.504
Infant mortality rate (IMR)	741	56.277	25.133	10.200	121.200	12.500	109.800	0.111	2.216
Female IMR	741	50.992	23.193	9.100	111.100	11.100	100.900	0.169	2.248
Male IMR	741	61.297	27.004	11.300	130.800	13.900	117.300	0.064	2.197
Total fertility rate (TFR)	741	4.655	1.430	1.360	7.679	1.550	7.569	−0.296	2.306
Trade openness (TO)	741	70.934	32.559	17.927	193.483	21.853	172.092	0.999	3.789

Compiled by the authors using the data from World Development Indicators and World Governance Indicators

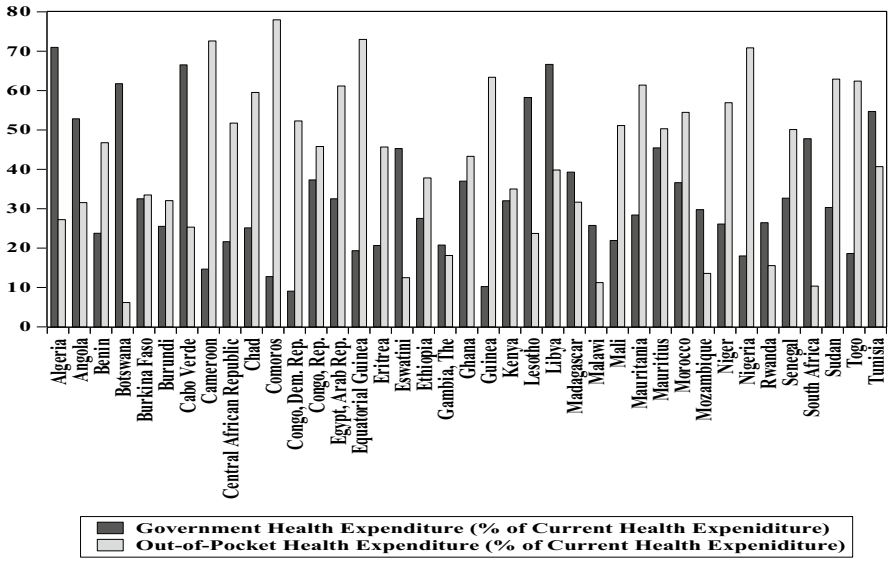

Fig. 1 Government and out-of-pocket health expenditure in Africa. Source: authors' computation using the World Development Indicators (World Bank, 2020a) database

Analysis of the Situation

Health Expenditures in Africa

Figure 1 shows the average GHE and OOPHE in selected African countries over the period of 2000 and 2018. A closer look at Fig. 1 reveals that less than 12 countries among the selected countries have their shares of GHE higher than OOPHE. For instance, on average, Algeria recorded the highest share of GHE out of the total health expenditure, followed by Libya, while the Republic of Congo recorded the lowest value of 9.04%. One common characteristic among countries with more than 65% of GHE is that they are among the top countries exporting refined natural resources in Africa. The periods between 2000 and 2018 which is 17 years after the 2001 Abuja declaration in the African region indicate that many of the countries in this region spent less than 15% of the total health expenditure. For OOPHE, which requires households to pay directly to a healthcare provider, Comoros recorded the highest percentage of 77.95%, followed by Equatorial Guinea, while Botswana recorded the least value of 6.17%. A country where the share of GHE is more than 50% of the total health expenditure is most likely to lessen the burden on households on the use of OOPHE.

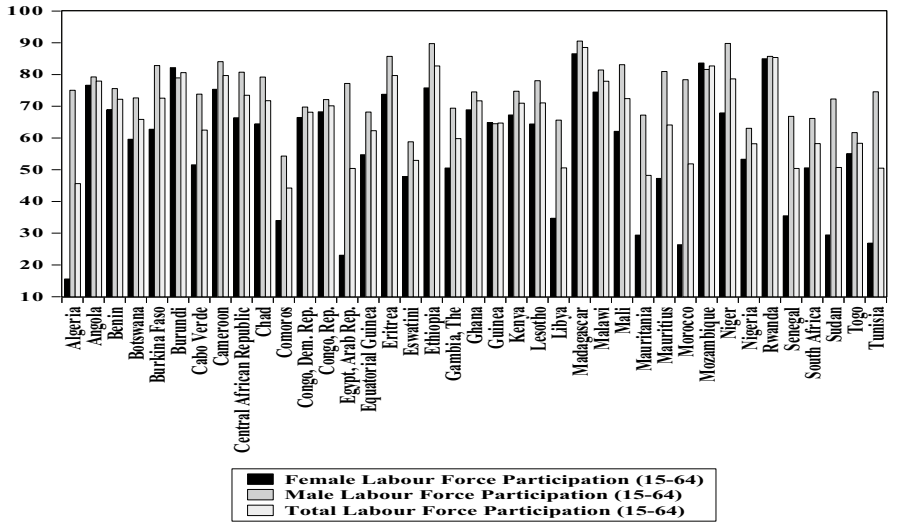

Fig. 2 Labor force participation in Africa (15-64). Source: authors' computation using the World Development Indicators (World Bank, 2020a) database

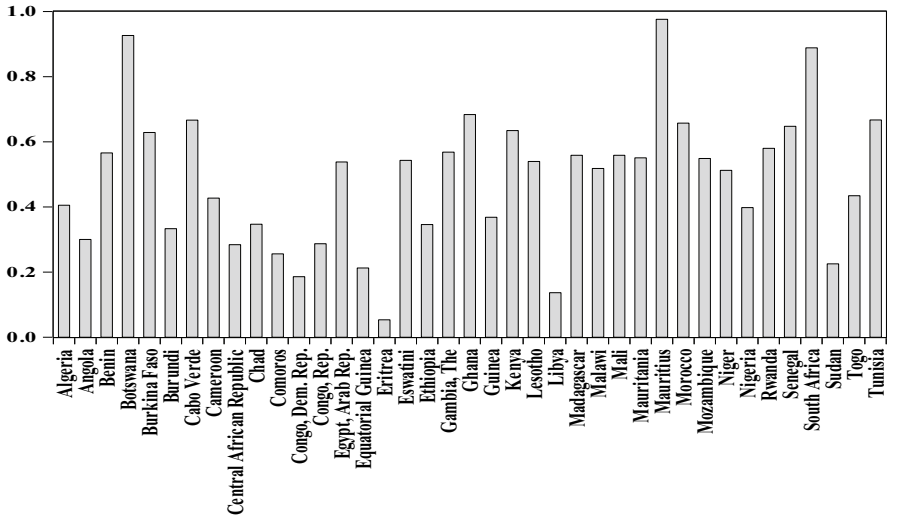

Fig. 3 Institutional quality across African countries. Source: authors' computation using the World Governance Indicators (World Bank, 2020b) database

Labor Force Participation

Figure 2 shows the labor force participation in Africa between the ages of 15 and 65 years. As shown in the figure, the highest average total labor participation

between 2000 and 2018 was recorded in Madagascar (88.52%). This country also exhibits gender equality in Africa, in which the average gap between male and female labor participation rates was just a marginal percentage of 2.01%. Rwanda also recorded an infinitesimal margin between average female and male labor participation rates. In most African countries, the labor market is more biased towards males. The gap is more obvious in countries where their religion and culture allow males to financially fend for the households. For instance, in Algeria, the average labor participation rate for males is 75.05%, while females account for just 15.59%. Similarly, Egypt also recorded an average female labor participation rate of 23.08%, while males account for over 70%.

Institutional Quality

Figure 3 shows, on average, the quality of institutions across the selected African countries. The quality of institutions is computed from six governance indicators which include control of corruption, government effectiveness, political stability, rule of law, regulatory quality, and voice and accountability. We employed Principal Component Analysis for the computation of the institutional quality. The computed institutional quality index is winsorized and normalized so that its values range from 0 to 1. This enables us to have a proper interpretation of institutional quality. As is shown the figure, it is evident that institutional quality varies across the selected African countries. While some countries have good-quality institutions and moderate institutional quality, others are characterized by poor institutional quality. Among the selected African countries, Mauritius, Botswana, South Africa, Carbo Verde, Morocco, Ghana, Senegal, and Tunisia have the best institutional quality. Countries such as Benin, Burkina Faso, Kenya, Madagascar, and Mozambique have relatively better institutional quality above the threshold of 0.5. However, most of the countries in the selected African countries are characterized by poor-quality institutions. In fact, about 17 countries recorded below the threshold of institutional quality; that is, they are less than 0.5. These countries, among others, include Algeria, Burundi, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Congo, Equatorial Guinea, Eritrea, Ethiopia, Guinea, Libya, Nigeria, Sudan, and Togo.

One of the prominent indicators of the existence of good or bad institutions in a given country is the level of corruption. In a highly corrupt country, the probability that other institutional quality indicators would be at a low ebb is very high. A highly corrupt country is likely to be characterized by a disregard for the rule of law, lack of transparency, and accountability among the officeholders and witnessing constant sociopolitical crises. According to the Transparency International report of 2020, most of the countries in Africa are highly corrupt. Botswana is the least corrupt country in Africa, followed by Cabo Verde, Rwanda, Mauritius, Namibia, Sao Tome and Principe, Senegal, South Africa, Tunisia, and Ghana, respectively, while countries such as South Sudan, Somalia, Sudan, Libya, Democratic Republic of Congo, Congo, Burundi, Eritrea, Comoro, Chad, Zimbabwe, and Nigeria are not to mention but a few. Most of these highly corrupt countries fall among the countries we characterized as having poor institutional quality.

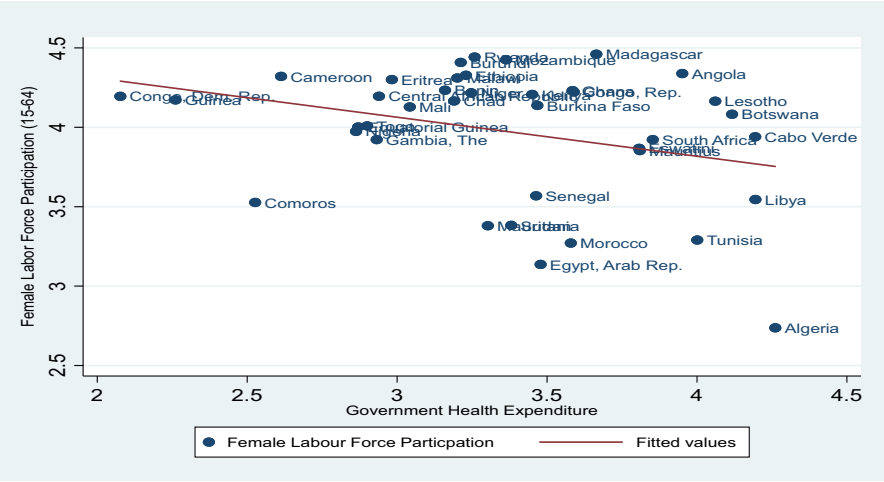

Figure 4 Female labor force participation and government health expenditure. Source: authors' computation using World Development Indicators (World Bank, 2020a)

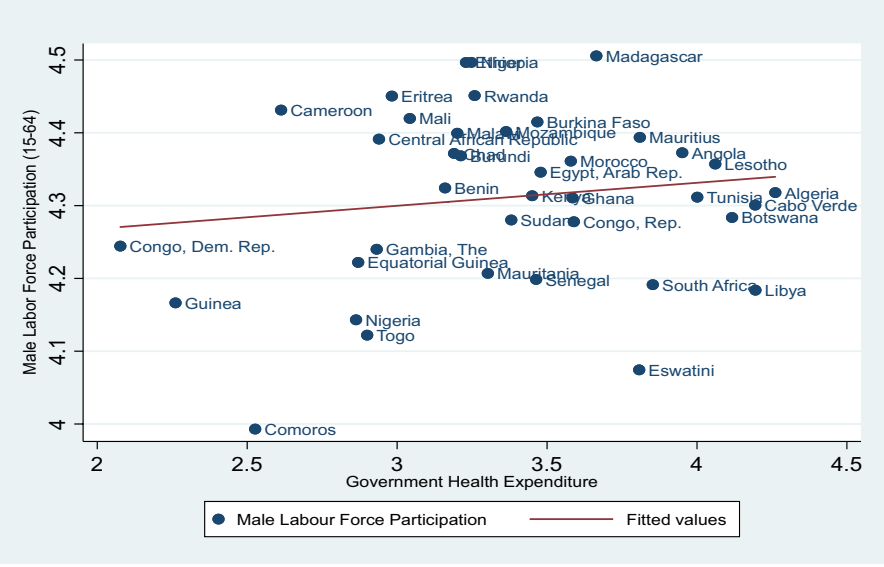

Figure 5 Male labor force participation and government health expenditure. Source: authors' computation using World Development Indicators (World Bank, 2020a)

The Relationship between Health Expenditure and Labor Force Participation

Government Health Expenditure and Labor Force Participation

Figure 4 represents a scatter plot that shows the relationship between the female labor

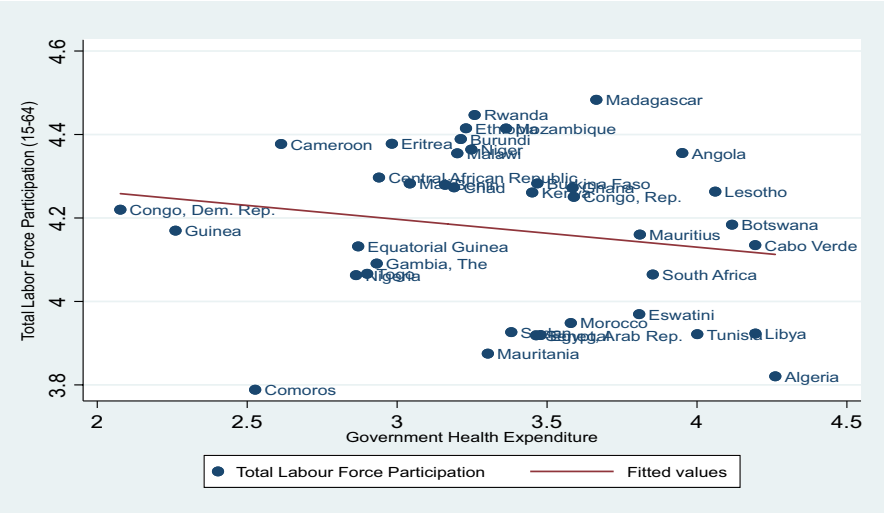

Figure 6 Total labor force participation and government health expenditure. Source: authors' computation using World Development Indicators (World Bank, 2020a)

participation rate (15–64) and GHE among the countries under consideration. The scatter plot indicates that there exists a linear negative relationship between the two variables. This, however, does not suggest that GHE does not encourage female labor force participation but it does mean that governments in Africa like their counterparts in developing countries spend more on health to ensure that their citizens participate in the labor force (Devarajan *et al*., 1996). Moreover, a cursory look at the figure shows that few countries cluster along the fitted line. This is an indication that female labor force participation and GHE are linearly negative correlated in countries like Congo, Mali, South Africa, Libya, Burkina Faso, Chad, Equatorial Guinea, and Botswana.

Figure 5 illustrates the relationship between male labor force participation and GHE. The fitted line is upward sloped suggesting a positive nexus between male labor force participation and GHE. This implies that an increase in GHE would result in more male labor participation. The pattern of the relationship between the total labor participation rate and GHE reported in Fig. 6 is similar to the pattern in Fig. 4; that is, total labor force participation and GHE are inversely related. Close to half of the countries under consideration cluster along the fitted line. Examples of such countries are Congo, Mauritius, Guinea, South Africa, Cabo Verde, Nigeria, Kenya, and Chad.

Out-of-Pocket Health Expenditure and Labor Force Participation

Figures 7, 8, and 9 plot the relationship between labor force participation (female, male and total) and OOPHE. The three fitted values' line demonstrates similar attributes. The line moves from up to down to indicate linear negative relationships. In Fig. 7, a

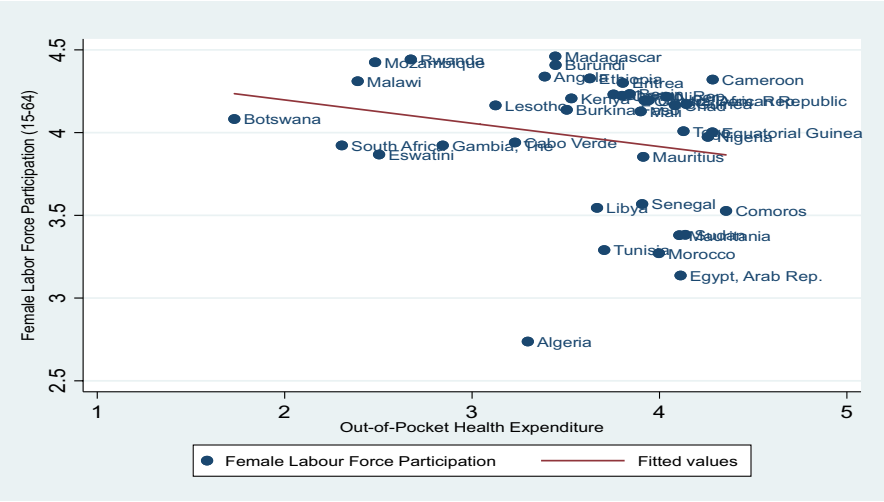

Figure 7 Female labor force participation and out-of-pocket health expenditure. Source: authors' computation using World Development Indicators (World Bank, 2020a)

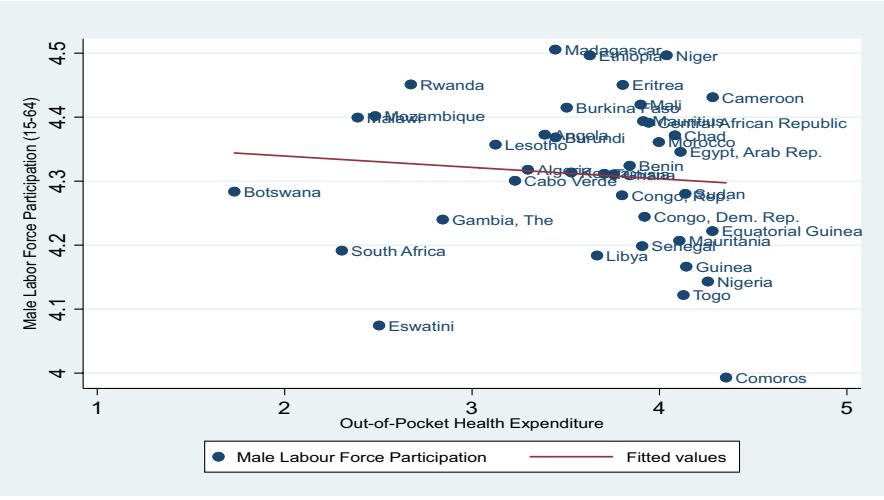

Figure 8 Male labor force participation and out-of-pocket expenditure. Source: authors' computation using World Development Indicators (World Bank, 2020a)

reduction in OOPHE leads to a reduction in the female labor participation rate. Similarly, there is a linear negative correlation between the male labor participation rate and OOPHE. The total labor participation rate also exhibits similar behavior with OOPHE as that of female and male labor participation rates.

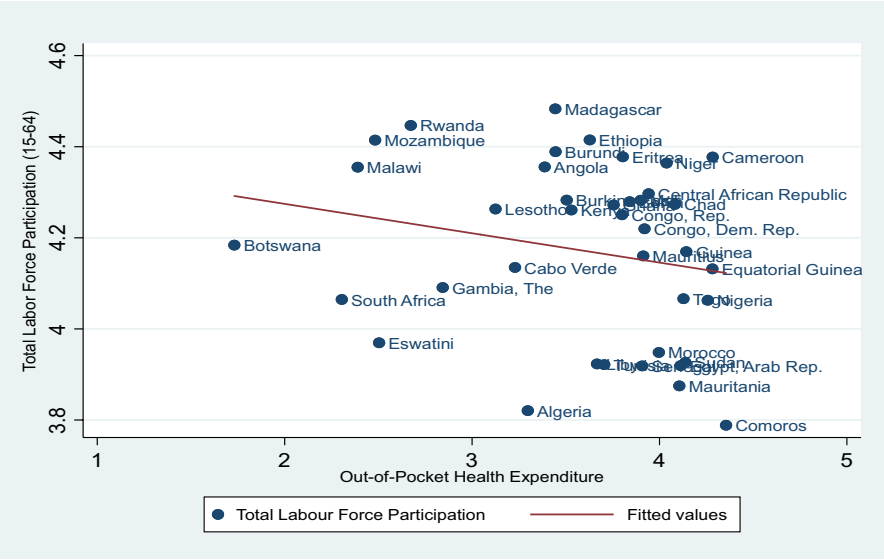

Figure 9 Total labor force participation and out-of-pocket expenditure. Source: authors' computation using World Development Indicators (World Bank, 2020a)

Methodology

In this study, we are particularly interested in addressing two issues in modeling the mediating role of institutional quality in the health expenditure-labor force participation nexus in Africa. The first is to address the spatial dependence or cross-sectional dependence among the countries that have some sort of similar characteristics or coalition among countries. Hence, using conventional ordinary panel OLS as a method of estimation would lead to inconsistent estimated standard error (Driscoll and Kraay, 1998). Given this, Driscoll and Kraay (1998) developed a nonparametric covariance estimation method that yields a robust standard error. The method is also useful when the model is prone to heteroscedasticity and autocorrelation problems (see Hoechle, 2007). Thus, we adopt this method under the fixed effects estimation method. The second issue addressed is the issue of endogeneity between health expenditure and labor force participation as argued above. To address endogeneity between the two variables, early studies used the two-stage-least-squares estimation method (see Stern, 1989; Cai and Kalb, 2006; Cai, 2010). In this study, we follow Nonvignon et al. (2015) by employing the dynamic system Generalized Method of Moments (GMM) developed by Arellano and Bover (1995) and Blundell and Bond (1998). Following the argument above, we proceed to model specification.

Assuming a simple regression in which labor force participation depends on health expenditure and other control variables, we specify linear fixed effect regression as follows:

$$LFP_{it} = \alpha + \beta HE_{it} + X^{'}\gamma + U_i + V_{it} \quad (1)$$

where *LFP*is labor force participation rate, *HE* designates health expenditure, and *X* is a set of control variables used as explanatory variables aside from health expenditure, $\alpha$is a constant, *U*is a country-specific effect, and *V* is the error term assumed to be normally distributed with zero mean and constant variance. We consider labor force participation for adults (15–64) and youths (14–25) across gender, males and females. We also use two forms of health expenditure, and they include GHE as a percentage of current health expenditure and OOPHE as a percentage of current health expenditure. GHE is used for the main analysis while OOPHE is used for robustness analysis. Other sets of explanatory variables include GDP per capita growth rate, life expectancy at birth (total, female and male), gross secondary school enrolment (total, female, and female), infant mortality rate (total, female, and male), total fertility rate, and trade openness. These variables are included whether we are considering total labor force participation, female labor force participation, or male labor force participation for adults and youths.

Considering the main aim of this study, we modify Eq. 1 to allow for the role of institutional quality as follows:

$$LFP_{it} = \alpha + \beta HE_{it} + \lambda IST_{it} + \theta(INT * HE)_{it} + X^{'}\gamma + U_i + V_{it} \quad (2)$$

Other variables remain as previously defined. *IST* is the institutional quality, and $IST^{*}HE$ is the interaction of institutional quality with health expenditure which shows the indirect channel through which health expenditure affects labor force participation. Equations 1 and 2 are estimated using panel fixed effects with Driscoll and Kraay (1998) standard errors.

However, to address the endogeneity problem, we use a dynamic two-stage system GMM. We begin the presentation of the two-step system GMM by incorporating the lag of the dependent variable into equation 2 with slight modification as follows:

$$LFP_{it} = \alpha + \phi LFP_{it-1} + \beta HE_{it} + \lambda IST_{it} + \theta(IST * HE)_{it} + X^{'}\gamma + V_{it} \quad (3)$$

Based on a priori expectation, could either be 0 or 1. If $\phi < 1$, it means that labor force participation declines over time and it does not persist into the future. However, if $\phi > 1$, it means that the past and present labor force participation persists into the future. This suggests that countries with a high level of labor force participation continue to increase labor force participation in the future. Depending on the quality of institutions possessed by a country or a group of countries, institutions could have a positive or negative effect on labor force participation. In a country characterized by poor institutional quality, especially a high rate of corrupt practices among government officials, money meant to finance the provision of healthcare facilities may be misappropriated or end up in the coffer of some unscrupulous government officials. This could lead to a lack of insufficient healthcare provision and delivery with a negative effect on the health status of the citizens and their labor force participation. The reverse is the case for a country or a group of countries with high-quality

institutions. θ is the coefficient of the interactive term of institutional quality and health expenditure ($IST^{*}HE$). This coefficient shows whether or not institutional quality influences positively or negatively the relationship between health expenditure and labor force participation. Thus, when θ is positive and statistically significant, then it implies that institutional quality and health expenditure are complementarities in influencing labor force participation. Here, $V_{it}=\chi_i+\rho_t+v_{it}$ where χ_i is an unobserved country-specific fixed effect, ρ_t is the time effect, and v_{it} is the error term. According to Roodman (2009a, b), estimating equation 3 by OLS would suffer two problems—identification and endogeneity problems. Of particular interest to this study is the issue of endogeneity (Cai and Kalb, 2006). In the literature, one strand of argument posits that health expenditure being a health input affects labor force participation. The amount of expenditure determines the provision and availability of healthcare facilities which in turn also determines the access to healthcare and improvement in the health status of the citizens. When the citizen's health status improves, they tend to be more participating in the labor force and improve their productivity. Thus, health expenditure assumes to have a positive effect on labor force participation judging by human capital theory (Laplagne *et al*., 2007). Conversely, people with poor health tend not to participate in the labor force. Another argument posits that labor force participation affects healthcare status or expenditure (Waghorn and Lloyd, 2005). This is based on the argument that participating in some works may have a detrimental effect on the health of the workforce. Some works lead to stress and creates mental health for the labors. However, ill health may motivate an individual to participate in the labor force in order to raise income to take care of his health condition (Stern, 1989; Laplagne *et al*., 2007). To overcome these problems, especially the problem of endogeneity, we use a two-step system GMM. The two-step system GMM entails two main approaches. It is possible to use the lagged differences of the dependent variable as instruments for level equations and the first differenced equation (Arellano and Bover, 1995). In practice, however, one must avoid the pitfall of instrument proliferation. To avoid this pitfall, Roodman (2009a, b) suggests that the researcher should collapse the instruments.

We implement our study following four-step estimation procedures. First, we estimate the relationship between health expenditure and labor force participation. The essence of this is to isolate the effect of health expenditure on labor force participation. This is important because if we include the other variables *ab initio* the impact of health expenditure on labor force participation may be crowded out. Second, we introduce an institutional quality variable to ascertain the impact of institutional quality on labor force participation. Third, we add an interactive term constructed from the multiplication of health expenditure and institutional quality to determine the mediating role of institutional quality in health expenditure and labor force participation nexus. Fourth, we control for other variables that could serve as determinants of labor force participation. These variables were selected based on a priori expectations and they include GDP per capita growth rate, life expectancy at birth, secondary school enrolment, infant mortality rate total fertility rate and trade openness.

Table 2 Pairwise correlation test results

Variables	LFP	FLFP	MFLP	GHE	OOPHE	IST	GDP-PCGR	LEAB	FLEAB	MLEAS	SSE	FSSE	MSSE	IMR	FIMR	MIRM	TFR	TO
LFP	1																	
FLFP	0.913*	1																
MLFP	0.727*	0.399*	1															
GHE	−0.158*	−0.277*	0.120*	1														
OOPHE	−0.199*	−0.205*	−0.086*	−0.428*	1													
IST	0.018	−0.027	0.127*	0.310*	−0.344*	1												
GDPP-CGR	0.001	−0.011	0.027	0.024	−0.009	−0.035	1											
LEAB	−0.423*	−0.562*	−0.013	0.318*	0.046	0.159*	0.01	1										
FLEAB	−0.424*	−0.560*	−0.015	0.362*	−0.007	0.174*	0.013	0.995*	1									
MLEAB	−0.423*	−0.564*	−0.013	0.274*	0.100*	0.141*	0.007	0.995*	0.981*	1								
SSE	−0.527*	−0.483*	−0.400*	0.367*	−0.211*	0.190*	−0.001	0.626*	0.654*	0.597*	1							
FSSE	−0.505*	−0.477*	−0.355*	0.437*	−0.266*	0.222*	0.005	0.630*	0.662*	0.597*	0.981*	1						
MSSE	−0.536*	−0.480*	−0.427*	0.283*	−0.150*	0.159*	0.000	0.609*	0.631*	0.585*	0.984*	0.937*	1					
IMR	0.395*	0.492*	0.042	−0.545*	0.208*	−0.286*	−0.018	−0.835*	−0.863*	−0.802*	−0.782*	−0.798*	−0.744*	1				
FIMP	0.389*	0.483*	0.041	−0.540*	0.205*	−0.281*	−0.018	−0.835*	−0.863*	−0.802*	−0.782*	−0.799*	−0.744*	0.999*	1			
MIMR	0.399*	0.498*	0.042	−0.548*	0.210*	−0.289*	−0.018	−0.835*	−0.863*	−0.802*	−0.780*	−0.797*	−0.743*	1.000*	0.998*	1		
TFR	0.456*	0.521*	0.147*	−0.580*	0.243*	−0.307*	−0.042	−0.632*	−0.676*	−0.586*	−0.779*	−0.798*	−0.734*	0.855*	0.851*	0.857*	1	
TO	−0.119*	−0.06	−0.168*	0.395*	−0.181*	0.101*	0.097*	0.057	0.089*	0.026	0.327*	0.332*	0.303*	−0.242*	−0.243*	−0.242*	−0.397*	1

*Significance at the 0.05 level. LFP, FLFP, MLFP, GHE, OOPHE, INST, GDPPCGR, LEAB, FLEAB, MLEAB, SSE, FSSE, MSSE, IMR, FIMR, MIMR, FFR, and TO are total labor force participation rate (LFP), female LFP, male LFP, government health expenditure (GHE), out-of-pocket HE (OOPHE), GDP per capita growth rate, life expectancy at birth (LEAB), female LEAB, male LEAB, secondary school enrolment (SSE), female SSE, male SSE, infant mortality rate (IMR), female IMR, male IMR, total fertility rate, and trade openness, respectively

Empirical Findings

Correlation Analysis Results

Table 2 reports the results of the correlation analysis among the variables of interest. The correlation value ($r = -0.158$) between the total labor force participation and GHE shows a negative and significant relationship between the variables. Also, there is a negative level of correlation ($r = -0.199$) between total labor force participation and OOPHE. This is in tandem with what we found from the scatter diagrams. In addition, evidence of negative correlations is established between labor force participation and trade openness life expectancy and secondary school enrolment variables. However, mortality rate variables and total fertility are positively correlated with labor force participation. Among the repressors, the correlations are moderate with varying level of signs and significance. This indicates that the problem of multicollinearity not an issue among the repressors.

Main Results: The Effect of Government Health Expenditure and Its Interaction with Institutional Quality on Labor Force Participation

The key findings of the study are presented and discussed in this section. The study estimated four strategies to implement the impact of the institutional role and health expenditure on labor force participation (LFP) in Africa. The first strategy is the estimation of the effect of health expenditure alone on LFP. The second strategy considered the effect of health expenditure and institutional quality which were estimated on LFP. The third strategy is the inclusion of the interactive term (that is, institutional quality and health expenditure) as one of the independent variables. Hence, health expenditure, institutional quality and interactive term were the independent variables. The fourth strategy is controlling for other variables (such as GDP per capita growth, life expectancy at birth, secondary school enrolment, infant mortality rate, total fertility rate, and trade openness) which serve as determinants of LFP.

Tables 3 and 4 show the effect of GHE and institutional quality on LFP in Africa using panel fixed effects with Driscoll and Kraay (1998) standard errors and dynamic GMM approach respectively. We begin the presentation of the results by presenting the results of Panel Fixed Effects with Driscoll and Kraay (1998) standard errors. This is reported in Table 3. As shown in the table, GHE appears to have a positive effect on LFP (total, female and male) when we regress labor force participation on GHE but the positive effect is not statistically significant. However, the introduction of institutional quality in the second model allows for a positive and significant relationship to be observed between GHE and LFP. Specifically, a percentage increase in GHE raises total and female LFP by 0.005% and 0.006% respectively. This is similar to the findings of Al-Jebory (2014), Isiaka (2020) and Rauf et al. (2018) revealing that health expenditure has a positive influence on the LFP rate.

Institutional quality has a negative influence on LFP, suggesting that poor institutional quality in Africa discourages LFP. This means that an upward trend in poor

Table 3 Effects of government health expenditure and its interaction with institutional quality on labor force participation in Africa

	Model 1				Model 2				Model 3			
	Total labor force participation				Female labor force participation				Male labor force participation			
GHE	0.003	0.005*	0.015***	0.010**	0.001	0.006***	0.015***	0.010***	0.000	0.001	0.009*	0.005
	(0.003)	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)
IST		−0.006**	−0.031***	−0.017**		−0.012**	−0.034***	−0.020***		−0.004	−0.023***	−0.012*
		(0.003)	(0.004)	(0.007)		(0.005)	(0.005)	(0.006)		(0.003)	(0.004)	(0.007)
GHE*IST			0.008***	0.005*			0.007***	0.003			0.006***	0.005
			(0.001)	(0.003)			(0.003)	(0.003)			(0.001)	(0.003)
GDPPCGR				−0.000				−0.000				−0.000
				(0.000)				(0.000)				(0.000)
LEAB				0.223***				0.190***				0.192***
				(0.034)				(0.065)				(0.024)
SSE				−0.060***				−0.044***				−0.054***
				(0.008)				(0.008)				(0.009)
IMR				0.018				−0.037				0.047***
				(0.013)				(0.037)				(0.008)
TFR								0.051**				
								(0.019)				
TO				−0.005				−0.019*				0.002
				(0.004)				(0.010)				(0.004)
CON	4.164***	4.148***	4.117***	3.401***	3.970***	3.942***	3.914***	3.452***	4.310***	4.302***	4.279***	3.529***
	(0.010)	(0.012)	(0.014)	(0.162)	(0.009)	(0.009)	(0.012)	(0.395)	(0.015)	(0.017)	(0.019)	(0.088)
OBS	741	721	721	721	741	721	721	721	741	721	721	721

Table 3 (Continued)

	Model 1				Model 2				Model 3			
	Total labor force participation				Female labor force participation				Male labor force participation			
Within R^2	0.0005	0.0078	0.0209	0.2319	0.0001	0.0098	0.0139	0.0781	0.0000	0.0026	0.0091	0.2527
F-statistics	0.800 (0.3839)	2.590 (0.1023)	24.500 (0.0000)	145.580 (0.0000)	0.370 (0.5523)	5.870 (0.0109)	18.750 (0.0000)	278.770 (0.0000)	0.010 (0.9438)	1.280 (0.3013)	11.810 (0.0002)	76.890 (0.0000)

Standard errors are in parentheses. ***$p<0.01$, **$p<0.05$, and *$p<0.1$. GHE, IST, GEH*IST, GDPPCGR, LEAB, SEE, IMR, TFR, and TO are government health expenditure, institutional quality, the interaction of government health expenditure and institutional quality, total, female and male life expectancy at birth, total, female and male secondary school enrolment, total, female and male infant mortality rate, total fertility rate, and trade openness, respectively. Fixed effects estimation method that controls for Driscoll and Kraay (1998) standard errors is used for the estimation in this table

Table 4 Effects of government health expenditure and its interaction with institutional quality on labor force participation in Africa

	Total labor force participation				Female labor force participation				Male labor force participation			
Lag LFP	1.019***	0.994***	1.000***	1.011***	1.002***	0.994***	0.997***	1.022***	0.997***	0.993***	0.993***	1.022***
	(0.011)	(0.002)	(0.005)	(0.009)	(0.005)	(0.001)	(0.003)	(0.009)	(0.030)	(0.003)	(0.003)	(0.015)
GHE	0.022**	0.002**	0.052***	0.008***	0.030***	0.005***	0.051***	0.007	0.005	0.002**	0.008**	0.005**
	(0.010)	(0.001)	(0.009)	(0.002)	(0.008)	(0.001)	(0.013)	(0.011)	(0.018)	(0.001)	(0.003)	(0.003)
IST		−0.003***	−0.170***	−0.006***		−0.003**	−0.156***	−0.008		−0.004***	−0.021**	−0.011***
		(0.001)	(0.035)	(0.002)		(0.001)	(0.051)	(0.008)		(0.001)	(0.010)	(0.002)
GHE*IST			0.054***	0.002***			0.052***	0.004			0.005*	0.003***
			(0.011)	(0.001)			(0.016)	(0.003)			(0.003)	(0.001)
GDPP-CGR				−0.000				0.000				−0.000***
				(0.000)				(0.000)				(0.000)
LEAB				−0.185***				−0.146*				−0.208***
				(0.036)				(0.074)				(0.037)
SSE				0.012**				0.010				0.019***
				(0.005)				(0.012)				(0.006)
IMR				−0.043***				0.028				−0.044***
				(0.010)				(0.020)				(0.011)
TFR								−0.142***				
								(0.039)				
TO				−0.004**				−0.023**				0.009***
				(0.002)				(0.010)				(0.002)
CON	−0.154***	0.015	−0.172***	0.826***	−0.109**	0.005	−0.148***	0.660**	−0.007	0.019	−0.004	0.791***
	(0.055)	(0.010)	(0.042)	(0.194)	(0.041)	(0.009)	(0.047)	(0.325)	(0.122)	(0.012)	(0.019)	(0.194)
OBS.	702	683	683	683	702	683	683	683	702	683	683	683
F-statistics	4017.96 (0.000)	99145.50 (0.000)	9468.94 (0.000)	3947.87 (0.000)	26240.81 (0.000)	448502.82 (0.000)	23019.43 (0.000)	19464.74 (0.000)	641.98 (0.000)	48047.21 (0.000)	32715.39 (0.000)	2412.23 (0.000)

Table 4 (continued)

	Total labor force participation				Female labor force participation				Male labor force participation			
Diagnostic test												
No. of Instru..	20	21	21	38	20	21	21	38	20	21	21	38
No. of groups	39	39	39	39	39	39	39	39	39	39	39	39
AR(1)	−1.990	−1.810	−1.660	−1.760	−2.180	−2.040	−2.130	−2.070	−1.620	−1.610	−1.630	−1.580
p-value	(0.047)	(0.071)	(0.098)	(0.079)	(0.029)	(0.04)	(0.033)	(0.039)	(0.106)	(0.108)	(0.103)	(0.114)
AR(2)	−0.500	−0.510	−0.610	−0.120	−0.400	−0.390	−0.430	−0.250	−0.220	−0.240	−0.360	0.200
p-value	(0.617)	(0.608)	(0.540)	(0.907)	(0.688)	(0.699)	(0.670)	(0.802)	(0.827)	(0.807)	(0.717)	(0.844)
Sargan test	12.130	174.460	24.740	13.720	9.080	61.130	12.720	15.550	22.670	202.280	188.200	20.810
p-value	(0.792)	(0.000)	(0.074)	(0.989)	(0.938)	(0.000)	(0.693)	(0.961)	(0.160)	(0.000)	(0.000)	(0.833)
Hansen test	14.590	23.740	20.140	30.700	13.240	24.160	12.030	18.290	11.810	26.860	26.040	32.020
p-value	(0.625)	(0.127)	(0.214)	(0.331)	(0.720)	(0.115)	(0.742)	(0.894)	(0.812)	(0.060)	(0.053)	(0.274)
Wald test	5.030	4.700	14.900	20.930	13.260	8.650	13.520	7.320	0.070	6.270	9.170	17.690
p-value	(0.031)	(0.0150)	(0.0000)	(0.0000)	(0.0008)	(0.0008)	(0.0000)	(0.0000)	(0.7881)	(0.0044)	(0.0001)	(0.0000)

Standard errors are in parentheses; ***$p<0.01$, **$p<0.05$, and *$p<0.1$. GHE, IST, GEH*IST, GDPPCGR, LEAB, SEE, IMR, TFR, and TO are government health expenditure, institutional quality, the interaction of government health expenditure and institutional quality, total, female and male life expectancy at birth, total, female and male secondary school enrolment, total, female and male infant mortality rate, total fertility rate, and trade openness respectively. Two-stage system Generalized Method of Moments is used for estimation in this table

institutional quality leads to a decline in total and female LFP by 0006% and 0.012% respectively. When the institutional quality is interacted with GHE, the resulting finding reveals a positive and significant effect on total, female and male LFP. This is in line with the findings of Dhrifi (2020) and Massimiliano et al. (2019). However, a closer look at the estimated coefficients across the models reveals that the coefficients of interaction are lower than the estimated coefficients of GHE alone. This means that poor institutional quality in Africa tends to reduce the positive effect of GHE on labor force participation.

The impact of the control variables captured in the final model revealed that life expectancy at birth (LEAB) spurs total, female, and male LFP by 0.223%, 0.190%, and 0.192%, respectively. However, secondary school enrolment (SSE) tends to reduce total, female, and male LFP. The effect of infant mortality rate (IMR) is not statistically significant on the total and female LFP rates. It is, however, positive and statistically significant on male labor LFP. Total fertility rate (TFR) is also found to positively influence female LFP, suggesting that the increase in the rate of fertility could gear up women to participate in the labor force as they have many children to feed. Trade openness is detrimental to female labor force participation

We would now examine the consistency of the above results when we control for endogeneity in the relationship between GHE and LFP as well as other variables using the two-stage system GMM. As observed in Table 4, we obtain more consistent results from the GMM which conform to the economic expectations. However, the presentation of the results begins with the results of the diagnostic tests. It can be shown that the numbers of groups are found to be greater than the number of instruments used, revealing the validity of the instruments. Furthermore, the post-estimation findings revealed that endogeneity problems had been properly addressed. The second-order autocorrelation values reject the existence of second-order autocorrelation and thus, we accept the null hypothesis of no autocorrelation. Consequently, our models do not suffer from second-order serial autocorrelation (AR (2)). Also, the Hansen/Sagan test of over-identification of instruments results indicates that the instruments included are valid. The fourth model was found to be more reliable. Another important result reported in Table 4 is the result of the lag of the dependent variable (LFP). As shown in the table, a period lag of LFP itself is positive and significant on the current LFP. This implies that the previous LFP improves the contemporary LFP in all the models.

GHE has relatively low positive effects on total and female LFP. In specific terms, an increase in GHE would spur total and female LFP by about 0.022% and 0.030%, respectively. The empirical finding of Al-Jebory (2014) supports the positive effect of health expenditure on LFP. When institutional quality is introduced, the positive effect of GHE is now statistically significant on male LFP. In all the models, it is evident that institutional quality negatively affects all categories of LFP. The interaction of institutional quality and health expenditure though has a positive effect on all LFP; the positive effect occurs at a decreasing rate, suggesting the weight of poor institutional quality in the continent of Africa actually pulls down the positive effect of GHE on LFP.

Table 5 Effects of out-of-pocket health expenditure and its interaction with institutional quality on labor force participation in Africa

	Total labor force participation				Female labor force participation				Male labor force participation			
OOPHE	0.004	−0.002	−0.010	−0.024***	0.826*	0.409	−0.003	0.010	0.003	−0.003	−0.006	−0.036***
	(0.006)	(0.007)	(0.010)	(0.007)	(0.416)	(0.521)	(0.009)	(0.009)	(0.006)	(0.008)	(0.010)	(0.008)
IST		−0.006*	0.044***	0.047***		−0.630**	0.036*	0.004		−0.004	0.016	0.041***
		(0.003)	(0.015)	(0.012)		(0.249)	(0.020)	(0.025)		(0.003)	(0.015)	(0.010)
OOPHE*IST			−0.012***	−0.012***			−0.012**	−0.003			−0.005	−0.010***
			(0.004)	(0.003)			(0.005)	(0.006)			(0.004)	(0.002)
GDPPCGR				−0.000				−0.000				−0.000
				(0.000)				(0.000)				(0.000)
LEAB				0.191***				0.212***				0.132***
				(0.025)				(0.054)				(0.010)
SSE				−0.064***				−0.044***				−0.059***
				(0.008)				(0.008)				(0.011)
IMR				0.011				−0.036				0.037***
				(0.012)				(0.037)				(0.008)
TFR								0.052**				
								(0.020)				
TO				−0.007				−0.017				−0.002
				(0.004)				(0.010)				(0.004)
CON	4.158***	4.174***	4.205***	3.703***	54.258***	55.043***	3.976***	3.348***	4.300***	4.318***	4.330***	3.990***
	(0.018)	(0.022)	(0.032)	(0.127)	(1.539)	(1.766)	(0.033)	(0.313)	(0.018)	(0.023)	(0.032)	(0.096)
OBS.	741	721	721	721	741	721	721	721	741	721	721	721
Within R^2	0.0009	0.0060	0.0105	0.2379	0.0030	0.0091	0.0107	0.0782	0.0005	0.0029	0.0036	0.2767
F-statistics	0.560 (0.4649)	3.190 (0.0653)	(35.49) (0.0000)	88.810 (0.0000)	5.970 (0.0251)	10.470 (0.0010)	9.610 (0.0005)	260.760 (0.0000)	0.290 (0.5968)	1.270 (0.3037)	12.100 (0.0001)	45.950 (0.0000)

Standard errors are in parentheses; ***p<0.01, **p<0.05, and *p<0.1. OOPHE, IST, OOPHE*IST, GDPPCGR, LEAB, SEE, IMR, TFR, and TO are out-of-pocket health expenditure, institutional quality, the interaction of out-of-pocket health expenditure and institutional quality, total, female and male life expectancy at birth, total, female and male secondary school enrolment, total, female and male infant mortality rate, total fertility rate, and trade openness, respectively. Fixed effects estimation method that controls for Driscoll and Kraay (1998) standard errors is used for the estimation in this table

Robustness Results: The Effect of Out-of-Pocket Health Expenditure and Its Interaction with Institutional Quality on Labor Force Participation

We further examine the robustness of our results by using an alternative variable known as OOPHE rather than GHE. Table 5 presents the fixed effects regression results for the effects of OOPHE and its interaction with institutional quality on LFP in Africa.

When LFP is run against the OOPHE alone, it is observed that OOPHE has a positive and significant effect on female LFP only. This suggests that OOPHE only encourages female LFP. In fact, when institutional quality is introduced into the model, the effect of OOPHE on total and male LFP becomes negative but not significant. However, when we control for other variables, the negative effect becomes statistically significant. This suggests that OOPHE discourages total and male LFP. When institutional quality is introduced into model 1, institutional quality has a negative effect on all categories of LFP. However, the introduction of interactive term changes the direction and sign of the effect of institutional quality on LFP as the effect turn positive and, in most cases, statistically significant, especially for total and female LFP. The interactive term on its own has a negative impact on LFP (total, female and male).

The effects of control variables are reported in Table 5 as well. Evidence from the table signifies that life expectancy at birth increases as total, female, and male LFP rise by 0.191%, 0.212%, and 0.132%, respectively. However, SSE leads to a decline in all categories of LFP. This is consistent with other a priori expectation that an increase in time spent in schooling would reduce LFP. This is because, during schooling, citizens that engage in schooling do not participate in the labor force. The more the categories of these people stay in school, the decline in the LFP (Burk and Montes, 2018). The TFR is found to be positively influenced by female LFP.

Table 6 reports the results of the Generalized Method of Moments (GMM) effect on OOPHE and its interaction with institutional quality on LFP in Africa. The post-estimation tests show that the number of instruments does not exceed the number of groups, suggesting the validity of the instrument with the Sargen and Hansen test of over-identification. Also, the AR(2) result shows that the model does not suffer from second-order serial or auto-correlation. The Wald test was also found to be significant. The period lag of the dependent variables has been observed to have a positive and significant impact on the current LFP.

OOPHE decreases total, female, and male LFP by 0.024%, 0.023%, and 0.022%, respectively. The negative effect remains unchanged when institutional quality and interactive term (Institutional quality and health expenditure) are introduced into the models. However, when controlling for other independent variables, OPHE increases as female LFP by 0.013%. Institutional quality, when introduced, has a negative effect on all categories of all LFP. However, when controlling for control variables, the negative effect turns positive in all the models. The effect of interactive term on LFP is negative and significant statistically, implying poor institutional quality affects negatively the more the nexus between OOPHE in African countries.

In system GMM results, LEAB, GDP growth rate, and IMR decrease as total and male LFP rise. Trade openness increases with increasing total and male LFP by

Table 6 Out-of-pocket health expenditure and its interaction with institutional quality on labor force participation in Africa

	Total labor force participation				Female labor force participation				Male labor force participation			
Lag LFP	0.986***	0.992***	1.008***	1.009***	0.987***	0.991***	0.988***	1.025***	0.992***	0.989***	1.022***	1.063***
	(0.008)	(0.002)	(0.009)	(0.008)	(0.002)	(0.001)	(0.001)	(0.007)	(0.016)	(0.018)	(0.011)	(0.017)
OOPHE	−0.024***	−0.004***	−0.034***	−0.009***	−0.023***	−0.005***	−0.024***	0.013***	−0.022***	−0.026***	−0.034***	−0.014***
	(0.003)	(0.001)	(0.007)	(0.002)	(0.002)	(0.001)	(0.001)	(0.005)	(0.006)	(0.005)	(0.006)	(0.003)
IST		−0.005***	0.203***	0.046***		−0.004***	0.068***	0.009		−0.005***	0.210***	0.090***
		(0.001)	(0.057)	(0.012)		(0.001)	(0.006)	(0.022)		(0.002)	(0.042)	(0.012)
OOPHE*IST			−0.051***	−0.012***			−0.019***	−0.002			−0.054***	−0.024***
			(0.015)	(0.003)			(0.002)	(0.005)			(0.011)	(0.003)
GDPPCGR				−0.000**				0.000***				−0.000***
				(0.000)				(0.000)				(0.000)
LEAB				−0.089***				−0.023				−0.143***
				(0.019)				(0.016)				(0.024)
SSE				−0.009*				0.007**				0.009
				(0.005)				(0.003)				(0.006)
IMR				−0.039***				0.039***				−0.041***
				(0.009)				(0.010)				(0.008)
TFR								−0.121***				
								(0.027)				
TO				0.014***				0.005				0.022***
				(0.004)				(0.004)				(0.004)
CON	0.142***	0.039***	0.094**	0.488***	0.138***	0.054***	0.135***	−0.063	0.110	0.134*	0.033	0.402***
	(0.039)	(0.008)	(0.045)	(0.109)	(0.014)	(0.005)	(0.004)	(0.063)	(0.072)	(0.079)	(0.042)	(0.135)
OBS	702	683	683	683	702	683	683	683	702	683	683	683
F-statistics	8742.57 (0.000)	100378.90 (0.000)	3582.21 (0.000)	9197.36 (0.000)	89806.00 (0.000)	333778.44 (0.000)	2.09e+06 (0.000)	47500.14 (0.000)	1871.18 (0.000)	1022.04 (0.000)	3304.50 (0.000)	39480.76 (0.000)

Table 6 (continued)

	Total labor force participation				Female labor force participation				Male labor force participation			
Diagnostic test												
No. of Instru..	20	21	21	38	20	21	38	38	20	21	21	38
No. of groups	39	39	39	39	39	39	39	39	39	39	39	39
AR(1)	−1.790	−1.800	−2.130	−1.910	−2.030	−2.040	−2.060	−2.070	−1.590	−1.610	−2.070	−2.020
p-value	(0.074)	(0.072)	(0.033)	(0.056)	(0.042)	(0.042)	(0.040)	(0.038)	(0.112)	(0.106)	(0.039)	(0.044)
AR(2)	−0.480	−0.500	−0.090	−0.320	−0.330	−0.400	−0.400	−0.240	−0.310	−0.220	0.060	0.300
p-value	(0.632)	(0.619)	(0.931)	(0.747)	(0.742)	(0.687)	(0.687)	(0.812)	(0.755)	(0.823)	(0.949)	(0.767)
Sargan test	51.360	148.580	21.730	24.320	28.760	57.350	56.610	23.680	78.870	52.524	52.460	22.780
p-value	(0.000)	(0.000)	(0.152)	(0.664)	(0.037)	(0.000)	(0.006)	(0.648)	(0.000)	(0.000)	(0.000)	(0.744)
Hansen test	20.970	23.090	14.720	21.32	18.080	25.130	37.930	30.210	23.900	20.560	16.840	27.800
p-value	(0.227)	(0.146)	(0.545)	(0.812)	(0.384)	(0.092)	(0.255	(0.305)	(0.122)	(0.196)	(0.396)	(0.475)
Wald test	51.570	15.820	16.850	11.970	86.250	18.900	55.470	9.710	11.840	15.170	123.72	22.940
p-value	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0014)	(0.0000)	(0.0000)	(0.0000)

Standard errors are in parentheses; ***$p<0.01$, **$p<0.05$, and *$p<0.1$. OOPHE, IST, OOPHE*IST, GDPPCGR, LEAB, SEE, IMR, TFR, and TO are out-of-pocket health expenditure, institutional quality, the interaction of out-of-pocket health expenditure and institutional quality, total, female and male life expectancy at birth, total, female and male secondary school enrolment, total, female and male infant mortality rate, total fertility rate, and trade openness respectively. Two-stage system Generalized Method of moments is used for estimation in this table

0.014% and 0.022% respectively. More precisely, SSE has a positive and significant impact on female LFP while total fertility decreases as female LFP increases and vice versa. The results from the OOPHE do not have an improving impact on LFP. This underscores the importance of GHE despite the increasing rate of over-dependence on OOPHE in Africa.

Conclusion and Policy Implications

In this study, we have examined the effect of institutional role in health expenditure and labor force participation in 39 African countries over the period 2000 and 2018. We consider the impact of GHE vis-à-vis OOPHE on different categories of labor force participation, particularly total, female, and labor force participation. Aside from this, we take into cognize what the role of quality of institutions in Africa has to play in the relationship between health expenditure and labor force participation. In order to implement our objectives, we employ two specific estimation techniques, namely, the Panel Fixed Effects estimation method that accounts for Driscoll and Kraay (1998) standard errors and the two-stage system GMM. While accounting for Driscoll and Kraay (1998) standard errors allow Fixed Effects estimation to address the issue of heteroscedasticity and autocorrelation method, the system GMM addresses the issue of endogeneity characterizing the modeling of nexus between health expenditure and labor force participation.

Interesting findings are found from our study. The supremacy of GHE over OOPHE in spurring all categories of labor force participation is documented in all the estimation techniques employed. This underscores the indispensability of the government's investment in the health sector. Our findings can be explained from two perspectives. Governments have the capability in terms of resources to invest in health infrastructure or equipment that would improve the health status of the citizens which would enable them to participate in the labor force. This is because only healthy citizens can actively participate in the labor force. Second, the majority of the citizens in developing countries are poor even though out-of-health expenditure is on the increase. Hence, they only seek health services when the crucial need arises. In fact, the majority of the citizens in poor countries like many African countries seek health services when it is almost too late. Consequently, their health expenditure may not spur their participation in the labor force as expected.

We also document that the poor quality of institutions in Africa is detrimental to labor force participation either total, female or male labor force participation. This is not surprising considering the low level of institutional quality in many countries that make up the continent. Corruption is still rampant in many African countries, even among the strong and resources-endowed countries. Rule of law and protection of human and property rights are still a mirage in many African countries despite many years of a democratic system of government. The transition from one government to another is still marred with violence that results in political instability. The existence of corruption and political instability in any country has a high tendency to discourage labor force participation. The appalling low institutional quality is manifested in the relationship between health

expenditure and labor force participation. Specifically, we find that institutional quality moderated downwards the positive nexus between GHE and all categories of labor force participation, suggesting that poor quality of institutions worsens the nexus between GHE and labor force participation.

Although the effects of control variables such as GDP per capita growth rate, life expectancy at birth (total, female, and male), gross secondary school enrolment (total, female, and female), infant mortality rate (total, female, and male), total fertility rate, and trade openness on labor force participation varies across models, albeit we can affirm that GPD per capita growth rate does not have any discernible impact on labor force participation. Life expectancy at birth positively influences labor force participation. However, secondary school enrolment reduces labor force participation. Infant mortality rate positively affects labor force participation while the total fertility rate has a positive effect on labor force participation. However, trade openness is only detrimental to female labor force participation.

Two policy implications can be drawn from our findings. First, there is a need to increase health expenditure, particularly GHE so as to spur labor force participation and full and productive employment in the continent of Africa. Also, institutional quality in the continent needs to be improved to ensure that health expenditure is properly spent without being misappropriated by some groups of people.

Appendix

Table 7 Labor force participation rate in sub-Saharan Africa

Year	YFLFP	YMLFP	YLFP	FLFP	MLFP	LFP
1990–1994	51.14	56.41	53.78	63.61	78.60	71.02
1995–1999	50.46	54.73	52.60	64.01	77.66	70.75
2000–2004	49.83	53.46	51.64	64.31	76.76	70.46
2005–2009	48.84	52.45	50.65	64.26	76.09	70.11
2010–2014	46.09	50.32	48.21	63.08	74.76	68.87
2015–2019	45.29	49.27	47.29	62.59	73.90	68.21

Source: computed by authors from the World Development Indicators Database. YFLFP, YMLFP, YLFP, FLFP, MLFP, and LFP are female youth labor force participation rate (15–24 age), male youth labor force participation rate (15–24 age), total youth labor force participation rate (15–24 age), female labor force participation rate (15–64 age), male labor force participation rate (15–64 age) and total labor force participation rate (15–64 age), respectively

Declarations

Competing Interests The authors declare no competing interests.

References

Acemoglu, D. (2010). *Growth and institutions in economic growth* (pp. 107–115). Palgrave Macmillan.

Acemoglu, D., & Robinson, J. (2008). *The role of institutions in growth and development* (Vol. 10). World Bank.

Acemoglu, D., Johnson, S., & Robinson, J. (2005). Institutions as a fundamental cause of long-run growth. *Handbook of Economic Growth, 1*, 385–472.

Agovino, M., Garofalo, A., & Cerciello, M. (2019). Do local institutions affect labour market participation? The Italian case. *The BE Journal of Economic Analysis & Policy, 19*(2).

Alagidede, I., Ibrahim, M., & Sare, Y. (2020). Structural transformation in the presence of trade and financial integration in sub-Saharan Africa. *Central Bank Review (CBR), 20*(1), 21–31.

Al-Jebory, J. (2014). Effects of health expenditures on population age distribution and labor force participation rates: empirical and comparative analysis. Master's Theses*., 516* Retrieved September 23, 2019, from http://scholarworks.wmich.edu/masters_theses/516

Aluko, O., & Ibrahim, M. (2020). Institutions and financial development in ECOWAS. *Journal of Sustainable Finance & Investment, 11*(2), 1–12.

Anochiwa, L., Obila, E., & Enyoghasim, M. (2019). Modeling the effects of health care expenditure and economic growth in Nigeria: an econometric analysis. *Jurnal Perspektif Pembiayaan dan Pembangunan Daerah, 6*(5), 573–582.

Aregbeshola, B. S. (2016). Out-of-pocket payments in Nigeria. *The Lancet, 387*(10037), 2506.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error components models. *Journal of Econometrics, 68*(1), 29–51.

Anyanwu, J. C., & Erhijakpor, A. E. (2009). Health expenditures and health outcomes in Africa. *African Development Review, 21*(2), 400–433.

Barro, R. (1991). Economic growth in a cross-section of countries. *The Quarterly Journal of Economics, 106*(2), 407–443.

Becker, G. (1964). *Human capital: theoretical and empirical analysis*. University of Chicago Press.

Becker, G. (1962). Investment in human capital: a theoretical analysis. *Journal of Political Economy, 70*(5, Part 2), 9–49.

Becker, G. (2009). *Human capital: a theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press.

Bloom, D., & Canning, D. (2000). The health and wealth of nations. *Science, 287*, 1207–1209.

Bloom, D., & Canning, D. (2003). The health and poverty of nations: From theory to practice. *Journal of Human Development, 4*(1), 47–71.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*(1), 115–143.

Boachie, M., & Ramu, K. (2015). Public health expenditure and health status in Ghana. Retrieved September 22, 2019, from https://mpra.ub.uni-muenchen.de/66371/ MPRA Paper No. 66371

Bousmah, M., Ventelou, B., & Abu-Zaineh, M. (2016). Medicines and democracy: the importance of institutional quality in the relationship between health expenditure and health outcomes in the MENA region. *Applied Health, Equity and Development Research Network (AHEAD)* Working Paper No. 01/2016.

Burk, D., & Montes, J. (2018). *Factors affecting the labor force participation of people ages 25-54*. Congress of the United States, Congressional Budget Office.

Cai, L. (2010). The relationship between health and labour force participation: evidence from a panel data simultaneous equation model. *Labour Economics, 17*(1), 77–90.

Cai, L., & Kalb, G. (2006). Health status and labour force participation: evidence from Australia. *Health Economics, 15*(3), 241–261.

Cepal, N. (2018). *Employment situation in Latin America and the Caribbean. Labour market participation of older persons: needs and options*. United Nations Publication.

Cooray, A., & Dzhumashev, R. (2018). The effect of corruption on labour market outcomes. *Economic Modelling, 74*, 207–218.

Devarajan, S., Swaroop, V., & Zou, H. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics, 37*(2), 313–344.

Dhrifi, A. (2020). Public health expenditure and child mortality: does institutional quality matter? *Journal of Knowledge Economy, 11*, 692–706. https://doi.org/10.1007/s13132-018-0567-4

Driscoll, J., & Kraay, A. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics, 80*(4), 549–560.

Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The Stata Journal, 7*(3), 281–312.

Farag, M., Nandakumar, A., Wallack, S., Hodgkin, D., Gaumer, G., & Erbil, C. (2013). Health expenditures, health outcomes and the role of good governance. *International Journal of Health Care Finance and Economics, 13*(1), 33–52.

Grossman, M. (1972). On the concept of health capital and the demand for health. *The Journal of Political Economy, 80*(2), 223–255.

Ibrahim, M., & Vo, X. (2020). Effect of economic integration on sectorial value added in sub– Saharan Africa: does financial development matter? *The Journal of International Trade & Economic Development, 29*(8), 934–951.

International Labour Organisation (2018). World employment and social outlook: trends 2018 (Geneva). Retrieved 25, Septrmber, 2019, from https://www.ilo.org/global/research/global-reports/weso/2018/lang%2D%2Den/index,htm

Iregui-Bohórquez, A., Melo-Becerra, L., & Ramírez-Giraldo, M. (2016). Health status and labor force participation: evidence for urban low and middle income individuals in Colombia. *Portuguese Economic Journal, 15*(1), 33–55.

Isiaka, A. (2020). How does government spending affect labour force participation and unemployment within the WAMZ countries? International Journal of. *Social Science Research, 8*(2). https://doi.org/10.5296/ijssr.v8i2.16412

Laplagne, P., Glover, M., & Shomos, A. (2007). Effects of health and education on labour force participation (0704). Productivity Commission, Government of Australia

Makuta, I., & O'Hare, B. (2015). Quality of governance, public spending on health and health status in Sub Saharan Africa panel data regression analysis. *BMC Public Health, 15*(932). https://doi.org/10.1186/s12889-015-2287

Massimiliano, A., Antonio, G., & Massimiliano, C. (2019). Do institutions affect labour market participation? The Italian case. *The B.E. Journal of Economic Analysis and Policy*, De Gruyter, *19*(2), 1–21.

Mushtaq, A., Mohsin, A., & Zaman, K. (2013). Effects of health on changing labor force participation in Pakistan. *SpringerPlus, 2*(610). https://doi.org/10.1186/2193-1801-2-610

Novignon, J., Nonvignon, J., & Arthur, E. (2015). Health status and labour gorce participation in sub-Saharan Africa: a dynamic panel data analysis. *African Development Review, 27*(1), 14–26.

Osundina, O. (2020). Sustainable development: does improvement in education and health of women improve female labour force participation rate? *Sustainable Development, 28*(1), 13–24.

Piabuo, S., & Tieguhong, C. (2017). Health expenditure and economic growth a review of the literature and an analysis between the economic community for central African States (CEMAC) and selected African countries. *Health Economics Review, 7*(23). https://doi.org/10.1186/s13561-017-0159-1

Powell, D., & Seabury, S. (2018). Medical care spending and labor market outcomes: evidence from workers' compensation reforms. *American Economic Review, 108*(10), 2995–3027.

Raifu, I. A., Aminu, A., & Folawewo, A. O. (2020). Investigating the relationship between changes in oil prices and unemployment rate in Nigeria: linear and nonlinear autoregressive distributed lag approaches. *Future Business Journal, 6*(1), 1–18.

Raifu, I. A. (2021). The institutional role in oil revenue-economic growth nexus in Nigeria. *OPEC Energy Review, 45*(1), 52–84.

Raifu, I. A., & Oshota, S. O. (2022). Re-examining oil price-stock market returns nexus in Nigeria using a two-stage Markov regime switching approach. *International Journal of Energy Sector Management*. https://doi.org/10.1108/IJESM-07-2020-0026

Raifu, I., Nnadozie, O., & Adeniyi, O. (2021). Infrastructure-structural transformation nexus in Africa: the role of financial sector development. *Journal of African Development, 22*(1), 122–163.

Rauf, A., Bashir, M., Asif, K., & Saleem, S. (2018). Impact of health expenditures on labor force participation: evidence from Pakistan. *Asian Journal of Economic Modelling, 6*(4), 419–427.

Romer, P. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5, Part 2), 71–102.

Roodman, D. (2009a). How to do xtabond2: an introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), 86–136.

Roodman, D. (2009b). A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics, 71*(1), 135–158.

Stern, S. (1989). Measuring the effect of disability on labour force participation. *Journal of Human Resources*, 361–395.

Su, T., Pokhrel, S., Gbangou, A., & Flessa, S. (2006). Determinants of household health expenditure on western institutional health care. *The European Journal of Health Economics, 7*(3), 195–203.

Thu Ha, N. (2018). The relationship between GDP, labor force and health expenditure in European countries. In *Econometrics-Term paper* Retrieved September 23, 2019, from https://web.econ.kelo.ac.jp/staff/tets/kougi/tiu/2017/tpapers/Ha_Nguyen.pdf

Umoru, D., & Yaqub, J. (2015). Labour productivity and health capital in Nigeria: the empirical evidence. *International Journal of Humanities and Social Science, 3*(4), 199–221.

Waghorn, G., & Lloyd, C. (2005). The employment of people with mental illness. *Australian E-Journal for the Advancement of Mental Health, 4*(2), 129–171.

World Bank (2020a). World Development Indicators. 2020 version. https://databank.worldbank.org/source/worlddevelopment-indicators

World Bank (2020b). World Governance Indicators, 2020 version. https://databank.worldbank.org/source/worldwide-governance-indicators