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Does women's political empowerment promote public health expenditure in Africa?

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Abstract

This paper analyses the effect of women's political empowerment on public health expenditure in a sample of 48 African countries over the period 2000-2017. Using The Ordinary Least Squares (OLS), the two-step system Generalized Method of Moments (GMM), and the Sequential Linear Panel Dynamic Model (SELPDM), the results provide strong evidence of a positive effect of women's political empowerment on public health expenditure in Africa. This result is robust to additional control variables, to alternative measures of women's political empowerment, to alternative measure of health expenditure, to outliers, and to alternative data structure. Based on these findings, we encourage efforts to promote the African women's political empowerment and suggest an increase in the number of seats held by women in parliaments.

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1. Introduction

Health expenditure reflects the overall level of consumption of health goods and services by the population in different countries (WHO, 2017). Investing in the health system not only improves the health of populations (Bernet et al., 2018), but also reduces poverty (Gupta et al., 2003) and contributes to economic growth (Piabuo and Tieguhong, 2017). In 2015, global health systems spent approximately 7,300 billion euros, which represents nearly 10% of global GDP (WHO, 2017). However, global health spending remains unevenly distributed. Africa is one of the regions with the lowest health expenditure. In 2018, domestic general government health expenditure (% of GDP) in sub-Saharan Africa was only 1.87%, compared to other regions such as Middle East and North Africa (3.4%), Latin America and Caribbean (4.07%), East Asia and Pacific (6.7%) (World Bank, 2021). According to the Abuja Declaration in 2001, the heads of member states of the African Union agreed to allocate at least 15% of annual expenditure to health care. Ten years later, only six countries had reached this target[3]. These statistics reflect the low priority that African governments give to health financing. One consequence of these low investments is that over 10% of the region's population suffers catastrophic health expenditures each year due to out-of-pocket health expenditures (WHO, 2014). Due to its strong socio-economics and political implications, it seems necessary to identify policies to increase public spending on health in this part of the world. This study takes the view that one key determinant which has not been sufficiently analyzed is the women's political empowerment "*which is a process of increasing women's capabilities, leading to greater choice, agency and participation in social decision-making*" (Sundström et al., 2017).

To date, health economics literature highlights macroeconomic determinants of health spending, including per capita income (Khan and Husnain, 2019), natural resources (Cockx and Francken, 2014), and financial development (Rana, 2020). From a demographic perspective, the literature mainly shows the role of population aging (Murthy and Okunade, 2016). Regarding political factors, Liang and Mirelman (2014) and Datta (2019) show that accountability and democracy increase public health expenditure. Despite this growing interest in the political determinants of health spending, little attention has been paid to the role of women's political empowerment. Existing studies have analyzed the role of women in parliament or women in cabinet (Rehavi, 2007; Svaleryd, 2009; Chen, 2010; Mavisakalyan, 2014), without however investigating the direct effect of women's political empowerment. Chen (2010) shows that an increase in the share of female legislators increases the ratio of government expenditure on health and social welfare[4]. Based on a large sample of countries in 2000, Mavisakalyan (2014) shows that an increase in the proportion of women in ministerial cabinets is associated with an increase in public health spending. Similarly, Bhalotra and Clots-Figueras (2014) find that an increase in women parliamentarians in India reduces neonatal mortality and conclude that increasing women's political representation can be an effective and novel way to improve health care delivery in developing countries.

The literature on women's political representation has encouraged the emergence of two approaches. A pessimistic approach (less explored) and an optimistic approach that emphasizes that women's political empowerment contributes to economic growth (Duflo, 2012; Jayasuriya and Burke, 2013), increased spending on education (Chen, 2021), improved climate change policies (Mavisakalyan and Tarverdi, 2019), reduced child mortality (Macmillan et al., 2018; Besnier, 2019), improve happiness (Malah, 2021) and the achievement of the Sustainable Development Goals (SDG) (Mirziyoyeva and Salahodjaev, 2021). Theoretically, we suggest that a better women's political empowerment which include fundamental civil liberties, women's participation in civil society, and the representation of women in formal political positions, increases the budgets allocated to health through the quality of institutions, including the reduction of corruption and the promotion of democracy. Indeed, greater women political empowerment improves the quality of institutions by reducing corruption (Dollar et al., 2001; Jha and Sarangi, 2018). Swamy et al. (2001) show that corruption is less severe when women hold a larger share of parliamentary seats and senior positions in the government bureaucracy. On the other hand, a high level of corruption reduces investments in health (Mauro, 1998; Factor and Kang, 2015). Similarly, greater women political empowerment contributes to the improvement of democracy (Wyndow et al., 2013). As Datta (2019) suggests, democracy, through greater political competition, encourages the elected government to spend more on health care in order to increase its chances of winning the next election. Each component of women's political empowerment can also support investments in health. Indeed, civil society has an important function in the process of democratization and the promotion of good governance (Kaldor, 2003). Thus, greater participation of

[3] These are Liberia (19.1%), Malawi (17.8%), Rwanda (24%), Swaziland (18.1%), Togo (15.4%), and Zambia (16.4%) (WHO, 2014).
[4] However, the exogeneity of gender quotas as a tool for parliaments is questionable, as their introduction is likely to be a consequence of the state of women's representation.

women in civil society can encourage civil society actions in improving the quality of institutions, which will encourage the allocation of more resources to health care. Similarly, Jha and Sarangi (2018) find that greater political representation of women improves the quality of institutions by reducing corruption. This reduction in corruption in turn increases health spending. Wand et al. (2017) suggest that women's civil liberties are critical to successful transitions to democracy. However, Kotera and Okada (2017) show that while democratization does not have a significant impact on total spending, it does increases health spending. Thus, women's political empowerment increases health spending through the reduction of corruption and democracy.

This study contributes to the literature on four points. **First**, to our knowledge, this is the first study analyzing the effect of women's political empowerment measured by the recent global index of women's political empowerment developed by Sundström et al. (2017) on public health expenditure. This study therefore fills a knowledge gap in the literature. Unlike Mavisakalyan (2014) which uses data from the year 2000, we use panel data covering the period 2000 to 2017. This allows us to have observations over 18 years and to estimate the effect of women's political empowerment over a longer period covering the MDG period. **Second**, we also examine the effect of the different components of women's political empowerment on public health expenditure. Women's political empowerment index has three dimensions: (i) The women's civil liberties index, (ii) The women's civil society participation index and, (iii) the women's political participation index. Using these indicators has three advantages. First, it provides information on a fairly large panel of countries, particularly those in Africa. Second, the time horizon for calculating the index extends over the long term (1900-2017). Finally, the indicators selected are multidimensional. To our knowledge, we also propose the first study to examine the effect of these different measures of women's political empowerment on public health expenditure. **Third**, as a robustness check, we analyze the effect of the number of seats held by women in national parliaments on public spending on health. This approach also provides additional information on the role of women parliamentarians in the allocation of health care budgets in Africa. To our knowledge, no macroeconomic study has done this in African context. **Four**, from a methodological point of view, we use the two-step System Generalized Moments of Method (GMM) proposed by Arellano and Bover (1995) and Blundell and Bond (1998). This robust estimation method has the advantage of considering unobservable factors and even the heterogeneity of monetary policies, which can affect health spending. It also makes it possible to control for the potential endogeneity of all explanatory variables using internal instruments. To sum up, we show that women's political empowerment increases public health spending in Africa.

The rest of the paper is structured as follows. Section 2 describes the data and methodology. Section 3 presents and discuss the results and Section 4 concludes.

2. Data and methodology

2.1Data

This study uses data from 48 African countries over the period 2000 to 2017. Table 1 provides summary statistics and data sources. The main dependent variable in this study is domestic general government health expenditure to GDP (GHE/GDP) from the World Development Indicators (WDI). Public health expenditure includes recurrent and capital expenditures from public budgets, external borrowing, subsidies, and social insurance funds. For robustness, we use one alternative measure, namely public health expenditure as a percentage of government expenditure (GHE/GE).

Our main independent variable is the women's political empowerment index (WPE) defined as a process of increasing capacity for women, leading to greater choice, agency, and participation in societal decision-making. This index is among the most comprehensive measures of women's empowerment available[5]. The data come from the Varieties of Democracy (V-Dem) dataset Version 10. For a better understanding of the role of women's political empowerment, we also use the three sub-measures of the global index, namely, women's civil liberty index (WCL), women's participation of civil society (WCS) and women's political participation (WPP)[6]. For robustness purposes we use as an alternative measure of women's political empowerment, the number of seats held by women in national parliaments. Figure 1 depicts a positive correlation between women's political empowerment and public spending on health. In other words, greater political empowerment of women increases

[5] See Sundström et al. (2017) for the methodology of construction of this index.

[6] Women's civil liberties combine four elements identified by the related literature, including the freedom of movement index, the freedom from forced labor index, and women's access to justice. The women's civil society participation index also combines three elements: women's freedom of discussion, participation in civil society organizations, and representation in the ranks of journalists. The women's political participation index combines women's legislative attendance and the distribution of political power by gender.

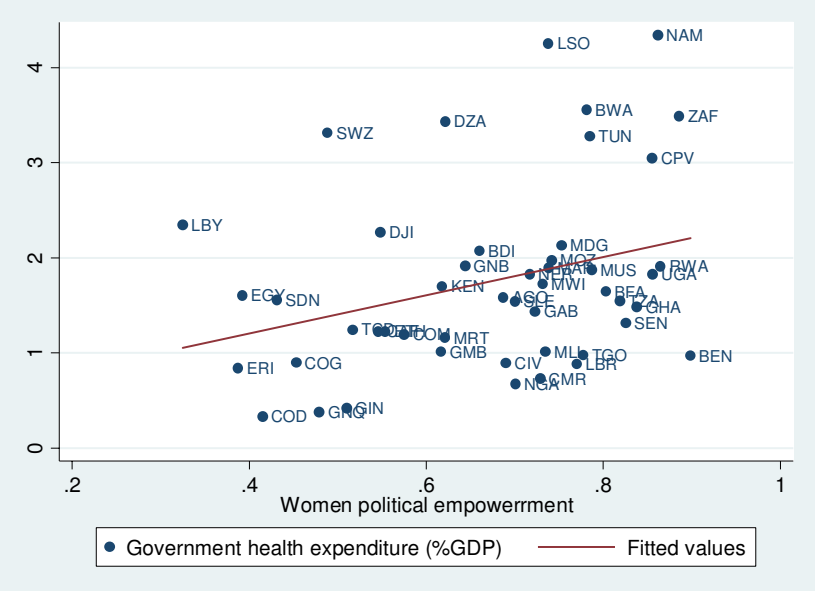
investments in health. However, this correlation is only a stylized fact. We will present strong evidence to support this assertion in Section 3.

We also use four main controls variables, namely (i) the natural logarithm of GDP per capita, (ii) trade openness, (iii) the share of the population over 65 years of age and, (iv) total natural resources rent. Consistent with the literature on the determinants of health expenditure, we expect a positive effect of GDP per capita, trade openness, and aging population on public health expenditure (Liang and Mirelman, 2014; Murthy and Okunade, 2016; Rana, 2020). According to the resources curse literature, we expect a negative effect of natural resources (Cockx and Francken, 2014). For robustness, we also use four additional control variables, including foreign aid, financial development, ethnic fractionalization, and remittances.

Table 1: Summary statistics and data sources

Variables	Obs	Mean	Std. Dev.	Min	Max	Sources
GHE (%GDP)	920	1.807	1.116	0.062	6.048	WDI
GHE (%GE)	920	7.095	3.572	0.653	31.908	WDI
WPE	864	0.671	0.16	0.207	0.919	V-DEM
WCL	864	0.603	0.226	0.026	0.935	V-DEM
WCS	864	0.639	0.179	0.081	0.92	V-DEM
WPP	864	0.784	0.195	0.184	1	V-DEM
Women parliaments	882	16.702	11.184	0	63.75	WDI
GDP per cap. (ln)	912	7.215	1.057	5.272	9.93	WDI
Trade openness	876	74.475	40.548	19.101	347.997	WDI
Pop. > 65 years old	930	3.489	1.332	1.871	10.952	WDI
Natural resources	925	12.803	12.901	0.001	84.229	WDI
Foreign aid	909	8.189	9.203	-0.251	92.141	WDI
Financial development	845	21.66	25.227	0.403	160.125	WDI
Remittances	791	18.618	2.182	9.348	23.932	WDI
Ethnic fractionalization	918	0.627	0.248	0	0.93	Alesina et al. (2003)

Figure 1: Relationship between women's political empowerment and public health expenditure



2.2Methodology

To investigate the effect of women's political empowerment (WPE) on public health expenditure, we estimates the following dynamic model:

$$GHE/GDP_{i,t} = \alpha + \beta_1 GHE/GDP_{i,t-1} + \beta_2 WPE_{i,t} + \beta_3 X_{i,t} + \mu_i + \nu_t + \varepsilon_{it} \quad (1)$$

Where $GHE/GDP_{i,t}$ is public health expenditure in country i for year t. $\mathrm{WPE}_{i,t}$ represents women's political empowerment. $X_{i,t}$ is the vector of control variables. μ_i is an unobserved country-specific effect, ν_t is time specific effect, and ε_{it} is the error term.

We begin by following Mavisakalyan (2014) in implementing a simple Pooled OLS model to estimate Equation (1). However, when the OLS technique is used to estimate this model, the estimated coefficients are inconsistent and likely to be biased, since the lagged dependent variable is positively correlated with the omitted fixed effects. The presence of the lagged value of public health expenditure places our model inside the context of dynamic panel model. We then estimate Equation (1) by using the Generalized Method of Moments (GMM) proposed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). Several points motivating the choice of this estimation method: First, this estimation strategy has the advantage of dealing with simultaneity (with the instrumentation process) bias that may emerge from the existence of endogenous explanatory variables. Second, it makes it possible to obtain, in the presence of lagged variables, unbiased, convergent, and effective estimators. Third, GMM estimator also considers the biases that appear due to country-specific effects.

Arellano and Bond (1991) suggest a GMM procedure to estimate this dynamic panel model by using lagged values of the endogenous explanatory variables as instruments. Arellano and Bover (1995) and Blundell and Bond (1998) develop a unifying GMM framework for considering efficient instrumental variable estimators. They propose the well-known system GMM estimator that combines the regressions in differences and in levels in a system of equations using the lagged differences instruments for the level series, and the lagged levels of instruments for the differenced series[7]. Thus, we employ the Blundell and Bond (1998) system GMM incorporating Windmeijer's (2005) finite-sample correction for standard errors to estimate Equation (1), which produces more efficient estimators.

The consistency of the GMM estimator depends on whether lagged values of the explanatory variables are valid instruments. We consider the following specification tests of the validity of the identifying assumptions to address this issue: Arellano and Bond's (1991) AR(1) and AR(2) tests of the serial correlation properties, and Hansen J-test of over-identifying restrictions. To prevent instrument proliferation, we followed the rule that the number of instruments does not exceed the number of groups (Roodman, 2009).

3. Results

3.1Baseline results

This sub-section presents the baseline results of the effects of WPE on public health expenditure. The econometric models are estimated using OLS and system GMM. All the results support our hypothesis that WPE increases public health expenditure in Africa.

3.1.1. Pooled OLS estimates

As a starting exercise, we estimate the impact of women's political empowerment (WPE) on health expenditure by Ordinary Least Squares (OLS). To provide the most data on our dependent variable, we use the largest possible sample of African countries by taking a panel of 48 countries. The baseline OLS results are presented in columns (1) to (3) in Table 2. Column (1) presents the bivariate regression in which WPE is considered as the only determinant of health expenditure. Consistent with Figure 1, the coefficient on WPE is positive and statistically significant at the 1% level, with a magnitude suggesting that a 1 unit increase in WPE leads to an increase of public health expenditure by 1.981 unit. When the control variable are included in the model (columns (2) – (3)), the coefficients on WPE remain positive and statistically significant at the 1% level, suggesting that women's political empowerment is positively correlated to public health expenditure in African. This result suggests that as women become more politically empowered, they will gain access to political decision-making bodies and thus be able to influence public spending in the health sector. This is possible because it has been empirically demonstrated that the presence of women in parliaments is inversely correlated with the level of corruption and positively related to democracy, all of which promote better resource allocation. These results are similar to Mavisakalyan (2014), showing that women in cabinets increase public spending on health.

[7] The lags are considered from t-2.

3.1.2. Endogeneity issue: System GMM estimates

Although the results obtained with the OLS technique is quite informative, it still does not take into account some unobserved differences that can bias the estimation of parameters. Beyond the issues of unobserved heterogeneity and the possibility of estimating factors that are invariable over time, the fact remains that OLS does not control for potential endogeneity issues that may arise from at least three sources: reverse causality; measurement errors, and variables omission bias. The common way in the literature to address such endogeneity issue is to use either instrumental variable approach (IV-2SLS)[8] or a dynamic GMM. In this paper, we address endogeneity concerns by estimating Equation (1) using the two-step system GMM estimator, and the results are summarized in columns (4) - (6) of Table 2. The different diagnostic tests are respected. All the models passed the AR (2) tests for second order serial correlation as indicated by p-value. Too many instruments can severely weaken and bias the Hansen over identifying restriction test and therefore, the rule of thumb is that the number of instruments should be less than the number of countries (Roodman, 2009). The system GMM estimates generate a maximum of 43 instruments which are lower than the number of countries (48 countries), hence regression results are free from instruments proliferation. The estimates result using the system GMM technique in columns (4) – (6) reinforces the OLS estimates reported in columns (1) – (3). The coefficients associated with WPE are found to be highly positively significant at the 1% level. This result confirms that improving women's political empowerment in African countries can be an effective way to increase public expenditure in health sector.

Table 2: Results of the baseline estimations

	Dependent variable: GHE (%GDP)					
	Pooled OLS			System GMM		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged GHE (%GDP)				0.893***	0.632***	0.763***
				(0.0464)	(0.0786)	(0.0340)
WPE	1.981***	1.952***	1.234***	0.399***	0.907***	0.341***
	(0.233)	(0.202)	(0.204)	(0.132)	(0.295)	(0.0973)
GDP per cap. (ln)		0.364***	0.262***		0.252*	0.131***
		(0.0433)	(0.0482)		(0.151)	(0.0457)
Trade		0.00147	0.00316**		-0.000977	0.0000237
		(0.00140)	(0.00155)		(0.00122)	(0.000254)
Pop. > 65 years old			0.161***			0.0276
			(0.0382)			(0.0298)
Natural resources			-0.0177***			-0.00353***
			(0.00345)			(0.00116)
Constant	0.413***	-2.307***	-1.521***	-0.0878	-1.730*	-0.832**
	(0.154)	(0.296)	(0.295)	(0.0690)	(1.002)	(0.337)
Observations	858	811	811	762	676	764
R-squared	0.085	0.214	0.289			
Number of countries				48	47	47
Instruments				16	43	34
AR(1)				0.0000	0.0000	0.0000
AR(2)				0.523	0.518	0.792
Hansen OIR				0.231	0.525	0.422

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parentheses. In columns (4) and (6), the coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation.

[8] However, one of the limitations of this approach is the difficulty of finding a purely exogenous external instrument that varies from country to country and over time, and therefore this method tends to ignore the endogeneity of other regressors (Feeny et al., 2014)

3.2Robustness checks

To test the robustness of our main results, we conduct in this sub section sensitivity analyses along several dimensions: using additional control variables, using alternative measures of the key variables, that is, public health expenditure, and women's political empowerment, alternative data structure and, alternative method. Overall, in all robustness checks, we find results from the specifications equivalent to those in Tables 2.

First, we estimate our model by introducing four additional control variables, namely: foreign aid measured by official development assistance received (%GNI), remittances, financial development measured by domestic credit, and ethnic fractionalization. The results of the estimates summarized in the first two columns of Table 3 show that women's political empowerment has a positive and significant effect on public health expenditure.

Second, we test the robustness of our results by using an alternative dependent variable, namely public health expenditure as a percentage of government expenditure. The results summarized in columns (3) and (4) in Table 3 show once again that women's political empowerment has a positive and significant effect on health expenditure. Thus, our hypothesis that women's political empowerment increases health expenditure is robust to the use of an alternative measure of WPE.

Third, a close look at Figure 1 shows that there are countries representing outliers in our sample and these are likely to influence our results[9]. We therefore exclude these countries in our regressions for robustness. The results summarized in columns (5) and (6) confirm that the positive effect of women's political empowerment on health expenditure is statistically significant. Our results are therefore not influenced by outliers.

In previous estimates, annual data have been used, and the results got may be affected by the effects of the business cycle. To filter out the influences of the business cycle, a common practice is to use 3-5 years, or 10-year averages. **Four**, we estimate our model using data averaged over a 3-year interval to eliminate the effects of the business cycle[10]. The estimation results are presented in columns (7) and (8) in Table 3. These results are consistent with those got previously. We also examine the robustness of our results across income levels. Indeed, our sample of African countries is composed of 27 middle-income countries (MIC) and 21 low-income countries (LIC) according to the World Bank (2021) classification. It is therefore important to understand whether there is heterogeneity in the effect of women's political empowerment across these income levels. The estimation results summarized in columns (9) and (10) of Table 3, for MIC and LIC respectively, show that women's political empowerment increases public health expenditure in both income groups.

Five, Table 4 shows the results of the estimation using an alternative measures of women's political empowerment on public health expenditures. In the first three columns, we used the three sub-indices of women's political empowerment, namely women's participation in civil society, women's civil liberty, and women's political participation. We find that these different measures of women's political empowerment have a positive and statistically significant effect on health expenditures. In columns (7) to (8), we estimate the effect of women parliamentarians on public health expenditure. We find that the coefficient associated with women parliamentarians is positive and statistically significant. Thus, an increase in the number of seats held by women in national parliament increases public spending on health.

The last robustness test consists of using an alternative estimation method. Indeed, the WPE index and its components are almost invariant variables. Since GMM estimators for panel data explicitly model individual effects, parameter estimates tend to be inflated because of the high degree of collinearity between time-invariant variables and fixed effects. We address this concern by using the Sequential Linear Panel Dynamic Model (SELPDM) implemented by Kripfganz and Schwarz (2019). We first estimate the coefficients of the time-varying regressors (first stage) and then regress the residuals from the first step on the time-invariant regressors (second stage)[11]. The results of the estimation by the sequential method are summarized in Table A1 in Appendix. From these results, we find that the coefficient associated with the WPE index remains positive and statistically significant. We also show that women's political participation and women's participation in civil society increase health expenditures. This confirms the robustness of our results to the use of an alternative estimation method.

[9] These include Lesotho, Namibia, South Africa, Cabo-verde, Tunisia, Botswana, Swaziland and Algeria.
[10] We get the averages over six 3-year periods, namely 2000-2002, 2003-2005, 2006-2008, 2009-2011, 2012-2014 and 2015-2017.
[11] See Kripfganz and Schwarz (2019) for more details.

Table 3: Results of different robustness checks.

	Additional controls		Alternative dependent		Outliers		3-years data average		MIC	LIC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Lagged dependent	0.807***	0.940***	0.875***	0.712***	0.841***	0.796***	0.853***	0.833***	0.855***	0.787***
	(0.0228)	(0.0148)	(0.0404)	(0.0349)	(0.0512)	(0.0277)	(0.0296)	(0.0329)	(0.0355)	(0.0307)
WPE	0.175***	0.337***	1.602***	1.831***	0.251***	0.221***	0.690***	0.327***	0.238***	0.535**
	(0.0541)	(0.0652)	(0.397)	(0.465)	(0.0926)	(0.0649)	(0.181)	(0.114)	(0.0699)	(0.257)
GDP per cap	0.191***	-0.0379		0.343**		0.0779***		0.143***	0.0882	0.211**
	(0.0373)	(0.0261)		(0.161)		(0.0301)		(0.0223)	(0.0693)	(0.0976)
Trade	0.000731***	-0.000254		-0.00187		-0.000616		0.0107***	-0.000148	0.0195***
	(0.000208)	(0.000320)		(0.00319)		(0.000595)		(0.00186)	(0.00809)	(0.00368)
Pop. > 65	-0.0125	0.00699		0.0663		0.00862		0.121***	0.0739**	-0.0175
	(0.0173)	(0.0198)		(0.0780)		(0.0134)		(0.0297)	(0.0333)	(0.154)
Natural resources	-0.00585***	0.00595***		-0.0149***		-0.000690		-0.00147*	-0.00148	0.00119
	(0.000742)	(0.00105)		(0.00570)		(0.00123)		(0.000814)	(0.00126)	(0.00232)
Foreign Aid	0.00488***	0.00245**								
	(0.000536)	(0.00117)								
Domestic credit	-0.000522	0.00132								
	(0.000508)	(0.000815)								
Remittances		-0.00151								
		(0.00618)								
Ethnic fractionalization		-0.566***								
		(0.129)								
Constant	-1.108***	0.420	-0.200	-1.628	0.0423	-0.394**	-0.186	-1.389***	-0.767	-1.597***
	(0.219)	(0.397)	(0.238)	(1.012)	(0.1000)	(0.158)	(0.120)	(0.179)	(0.525)	(0.533)
Observations	679	556	762	766	634	635	238	272	152	120
Number of countries	46	42	48	47	40	39	48	48	27	21
Instruments	44	43	16	27	20	28	9	44	27	21
AR(1)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0068	0.0012	0.0343	0.0105
AR(2)	0.686	0.640	0.934	0.936	0.432	0.674	0.210	0.139	0.635	0.150
Hansen OIR	0.440	0.705	0.458	0.326	0.441	0.375	0.340	0.342	0.273	0.334

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parentheses. the coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation.
The first two columns present results with additional control variables, while columns (3) and (4) show the robustness following the use of an alternative dependent variable. In columns (5) and (6) we exclude outliers, while in the last two columns we change the structure of the data. Columns (9) and (10) show the results for middle-income countries (MIC) and low-income countries (LIC) respectively.

Table 4: Alternative measures of women political empowerment

	Dependent variable: GHE (%GDP)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged GHE (%GDP)	0.805***	0.539***	0.778***	0.751***	0.865***	0.846***	0.760***	0.765***
	(0.0472)	(0.0917)	(0.0501)	(0.0212)	(0.0329)	(0.0424)	(0.0796)	(0.0604)
WCL	0.279*	1.147**						
	(0.146)	(0.503)						
WCS			0.510***	0.419***				
			(0.165)	(0.0647)				
WPP					0.191***	0.316***		
					(0.0682)	(0.0819)		
Women parliaments							0.00816***	0.00685***
							(0.00296)	(0.00218)
GDP per cap. (ln)		0.384**		0.169***		-0.0110		0.0748
		(0.177)		(0.0441)		(0.0297)		(0.0694)
Trade		0.00232		0.000706*		-0.000164		0.00118
		(0.00202)		(0.000419)		(0.000654)		(0.000908)
Pop. > 65 years old		0.0317		0.00241		0.111***		0.0158
		(0.134)		(0.0324)		(0.0342)		(0.0448)
Natural resources		0.00124		-0.00435***		0.00146		-0.00520**
		(0.00587)		(0.000788)		(0.00141)		(0.00208)
Constant	0.158**	-2.961***	0.0497	-1.053***	0.0772	-0.272	0.266**	-0.311
	(0.0806)	(1.012)	(0.0780)	(0.313)	(0.0650)	(0.215)	(0.111)	(0.467)
Observations	810	767	810	766	810	766	734	690
Number of countries	48	47	48	47	48	47	48	47
Instruments	12	45	18	39	20	33	14	40
AR(1)	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
AR(2)	0.597	0.886	0.602	0.758	0.632	0.804	0.749	0.918
Hansen OIR	0.501	0.348	0.208	0.575	0.115	0.481	0.415	0.828

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels, respectively. Robust standard errors reported in parentheses. the coefficients are based on the two-step GMM system estimation, using the finite sample correction of Windmeijer (2005). All explanatory variables are treated as potentially endogenous. The lags of the explanatory variables are taken as an instrument for the difference equation, while the first differences of the explanatory variables are taken as an instrument for the level equation.

4. Conclusion

The aim of this study was to analyze the effect of women's political empowerment on public health expenditure. Using data from 48 African countries over the period 2000 to 2017 and three estimation methods, we provide robust evidence of a positive and significant effect of women's political empowerment on health expenditure. In addition, we find that alternative measures of women's political empowerment, including women's participation in civil society, women's civil liberty and women's political participation also have positive effects on public health expenditure. We also find that the number of seats held by women in parliament increases health expenditure. Base of these results, we encourage governments to redouble their efforts to increase the political participation of African women and the number of seats held by women in national parliaments.

References

Alesina, A., Devleeschauwer, A., Easterly, W., Kurlat, S., & Wacziarg, R. (2003). Fractionalization. *Journal of Economic growth*, *8*(2), 155-194.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.

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

Bernet, P. M., Gumus, G., & Vishwasrao, S. (2018). Effectiveness of public health spending on infant mortality in Florida, 2001–2014. *Social Science & Medicine*, *211*, 31-38.

Besnier, E. (2019). Women political empowerment and child health: an empirical analysis, 1990-2016. *European Journal of Public Health*, *29*(Supplement_4), ckz186-096.

Bhalotra, S., & Clots-Figueras, I. (2014). Health and the political agency of women. *American Economic Journal: Economic Policy*, *6*(2), 164-97.

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

Chen, L. J. (2010). Do gender quotas influence women's representation and policies?. *The European Journal of Comparative Economics*, *7*(1), 13-60.

Chen, L. J. (2021). Female policymakers and educational expenditures: cross-country evidence. *European Journal of Law and Economics*, *51*(1), 129-155.

Cockx, L., & Francken, N. (2014). Extending the concept of the resource curse: Natural resources and public spending on health. *Ecological Economics*, *108*, 136-149.

Datta, S. (2020). Political competition and public healthcare expenditure: evidence from Indian states. *Social Science & Medicine*, *244*, 112429.

Dollar, D., Fisman, R., & Gatti, R. (2001). Are women really the "fairer" sex? Corruption and women in government. *Journal of Economic Behavior & Organization*, *46*(4), 423-429.

Duflo, E. (2012). Women empowerment and economic development. *Journal of Economic literature*, *50*(4), 1051-79.

Factor, R., & Kang, M. (2015). Corruption and population health outcomes: an analysis of data from 133 countries using structural equation modeling. *International journal of public health*, *60*(6), 633-641.

Feeny, S., Iamsiraroj, S., & McGillivray, M. (2014). Remittances and economic growth: larger impacts in smaller countries?. *The journal of development studies*, *50*(8), 1055-1066.

Gupta, S., Verhoeven, M., & Tiongson, E. R. (2003). Public spending on health care and the poor. *Health economics*, *12*(8), 685-696.

Jayasuriya, D. S., & Burke, P. J. (2013). Female parliamentarians and economic growth: Evidence from a large panel. *Applied Economics Letters*, *20*(3), 304-307.

Jha, C. K., & Sarangi, S. (2018). Women and corruption: What positions must they hold to make a difference?. *Journal of Economic Behavior & Organization*, *151*, 219-233.

Kaldor, M. (2003). Civil society and accountability. *Journal of Human development*, *4*(1), 5-27.

Khan, M. A., & Husnain, M. I. U. (2019). Is health care a luxury or necessity good? Evidence from Asian countries. *International journal of health economics and management*, *19*(2), 213-233.

Kotera, G., & Okada, K. (2017). How does democratization affect the composition of government expenditure?. *Journal of Economic Behavior & Organization*, *137*, 145-159.

Kripfganz, S., & Schwarz, C. (2019). Estimation of linear dynamic panel data models with time-invariant regressors. *Journal of Applied Econometrics*, *34*(4), 526-546.

Liang, L. L., & Mirelman, A. J. (2014). Why do some countries spend more for health? An assessment of sociopolitical determinants and international aid for government health expenditures. *Social Science & Medicine*, *114*, 161-168.

Macmillan, R., Shofia, N., & Sigle, W. (2018). Gender and the politics of death: female representation, political and developmental context, and population health in a cross-national panel. *Demography*, *55*(5), 1905-1934.

Malah, Y. F. K. (2021). Is happiness in the hands of women?. *Economics Bulletin*, *41*(2), 573-587.

Mauro, P. (1998). Corruption and the composition of government expenditure. *Journal of Public economics*, *69*(2), 263-279.

Mavisakalyan, A. (2014). Women in cabinet and public health spending: Evidence across countries. *Economics of Governance*, *15*(3), 281-304.

Mavisakalyan, A., & Tarverdi, Y. (2019). Gender and climate change: Do female parliamentarians make difference?. *European Journal of Political Economy*, *56*, 151-164.

Mirziyoyeva, Z., & Salahodjaev, R. (2021). Women's Parliamentary Representation and Sustainable Development Goals: a Cross-Country Evidence. *Applied Research in Quality of Life*, 1-13.

Murthy, V. N., & Okunade, A. A. (2016). Determinants of US health expenditure: Evidence from autoregressive distributed lag (ARDL) approach to cointegration. *Economic Modelling*, *59*, 67-73.

Piabuo, S. M., & Tieguhong, J. 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*(1), 23.

Rana, R. H., Alam, K., & Gow, J. (2020). Financial development and health expenditure nexus: A global perspective. *International Journal of Finance & Economics*.
Rehavi, M. M. (2007). Sex and politics: Do female legislators affect state spending. mimeo. Berkeley 78.
Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, *9*(1), 86-136.
Sundström, A., Paxton, P., Wang, Y. T., & Lindberg, S. I. (2017). Women's political empowerment: A new global index, 1900–2012. *World Development*, *94*, 321-335.
Svaleryd, H. (2009). Women's representation and public spending. *European Journal of Political Economy, 25*(2), 186-198.
Swamy, A., Knack, S., Lee, Y., & Azfar, O. (2001). Gender and corruption. *Journal of development economics*, *64*(1), 25-55.
Wang, Y. T., Lindenfors, P., Sundström, A., Jansson, F., Paxton, P., & Lindberg, S. I. (2017). Women's rights in democratic transitions: A global sequence analysis, 1900–2012. *European Journal of Political Research*, *56*(4), 735-756.
WHO (2014). World Health Statistics 2014. https://apps.who.int/iris/bitstream/handle/10665/112738/9789240692671_eng.pdf
WHO (2017). *New perspectives on global health spending for universal health coverage.* World Health Organization.
Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of econometrics*, *126*(1), 25-51.
World Bank (2021). World development indicators. Available at https://databank.worldbank.org/source/world-development-indicators.
Wyndow, P., Li, J., & Mattes, E. (2013). Female empowerment as a core driver of democratic development: A dynamic panel model from 1980 to 2005. *World Development*, *52*, 34-54.

Appendix

Table A1: Estimation with the Sequential Linear Panel Dynamic Model (SELPDM)

	Dependent variable : GHE(%GDP)			
Panel A: Time-variant/first stage				
	(1)	(3)	(5)	(7)
GDP per cap. (ln)	0.265	0.265	0.265	0.265
	(0.170)	(0.170)	(0.170)	(0.170)
Trade	0.00421	0.00421	0.00421	0.00421
	(0.00439)	(0.00439)	(0.00439)	(0.00439)
Pop. > 65 years old	0.152	0.152	0.152	0.152
	(0.135)	(0.135)	(0.135)	(0.135)
Natural resources	-0.0250**	-0.0250**	-0.0250**	-0.0250**
	(0.0107)	(0.0107)	(0.0107)	(0.0107)
Panel B: Time-invariant/Second stage				
WPE	0.994**			
	(0.500)			
WCL		0.111		
		(0.353)		
WCS			1.129**	
			(0.564)	
WPP				0.954**
				(0.396)
Constant	-0.676**	-0.0681	-0.741**	-0.749**
	(0.343)	(0.217)	(0.373)	(0.316)
Observations	811	811	811	811
Number of countries	47	47	47	47

Notes: *, **, *** denote statistical significance at the 10%, 5% and 1% levels respectively. Kripfganz and Schwarz (2019) robust standard errors reported in parenthesis. Standard errors adjusted for clustering on countries.

Table A2: Data description

Variables	Descriptions	Sources
GHE (%GDP)	Public expenditure on health from domestic sources as a share of GDP.	WDI
GHE (%GE)	Public expenditure on health from domestic sources as a share of total public expenditure.	WDI
WPE	The index for women political empowerment	V-DEM
WCL	Women's civil liberty index "choice" refers to women's ability to make meaningful decisions in critical areas of their daily lives, including freedom of domestic movement, freedom from forced labor, property rights and access to justice	V-DEM
WCS	Measures women's ability to freely engage in public debate as members of civil society organizations or journalists	V-DEM
WPP	Measures the quantitative representativeness of women in official political positions, which encompasses the legislative presence (which is not the result of experts' evaluation) of women and the gender distribution of the political power.	V-DEM
Women parliaments	Percentage of parliamentary seats in a single or lower chamber held by women.	WDI
GDP per cap. (ln)	Gross domestic product divided by midyear population.	WDI
Trade openness	Sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI
Pop. > 65 years old	Population ages 65 and above as a percentage of the total population.	WDI
Natural resources	Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	WDI
Foreign aid	Foreign direct investment are the net inflows of investment to acquire a lasting management interest in an enterprise operating in an economy other than that of the investor.	WDI
Domestic credit	Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net.	WDI
Remittances	Personal remittances comprise personal transfers and compensation of employees.	WDI
Ethnic fractionalization	The probability that two randomly selected individuals are from the same ethnic group	Alesina et al. (2003)