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Female Representation and Human Development in Africa: The Role of Institutional Quality

Gifty Ewurama Enchill*

University of Stellenbosch Business School, South Africa

* Corresponding Author: dd1enchill@yahoo.com

Abstract

Despite policy efforts to increase women's representation across all sectors, inequality gaps remain in Africa. However, a growing body of evidence shows that placing women at the center of the development agenda can have positive effects. In this study, we examine the impact of female representation on human development in Africa. Applying the generalized method of moments (GMM) and Fixed Effects techniques, we show that human development in Africa is significantly driven by women's representation and institutional quality. The relationship is inverted U-shaped and for proper interpretation, the marginal effect was computed. The study recommends that there should be tailored compliance policies to support the quota system to boost female representation levels in Africa.

Keywords: Female Representation, Women in Parliament, Women Ministers, Human Development, Africa

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1. Introduction

Research on female representation is gradually receiving empirical and policy interest at country and cross-country levels (Jetter & Parmeter, 2018; Kenny & Verge, 2016; Dreher Gehring & Klasen, 2015). Women's participation at all decision-making levels is a human right and a significant social requirement for attaining equality, peace and democracy, sustainable development, and inclusive growth (Mlambo et al., 2019; Bouchama et al., 2018). Even though about half of the world's population is women, only 26.1% of seats in parliament are held by women globally and 25% in Africa (IPU, 2021). This is attributable to the marginalization of women from the political sphere, often resulting from discriminatory laws and practices (see The Customary Law of Dahomey Article 27; Gabon 1972 Civil Code), attitudes, gender stereotypes, illiteracy, lack of access to healthcare, and the disproportionate effect of poverty on women (UN, 2011).

There is reason to suggest that female political representation makes a distinctive difference to society at large. For example, human capital development and policy discussions are enhanced when gender diversity exists at a high decision-making level. This is because creative thinking is stimulated as females tend to stress different political agendas which give rise to inclusive ideas when policy decisions are being taken as compared to homogenous groups (Duflo 2012; Saeed et al., 2019). The

evidence in the extant literature indicates a positive link between female representation and inclusive gains. For example, Beaman et al's (2006) study on India indicated that relative to men, women who were locally empowered politically provided better access to drinking water and invested more in water facilities. Further, Brollo and Troiano (2016) indicate that when women are included in the decision-making process, they tend to pay greater attention to the provision of social services for the population. Also, countries with higher proportions of women in parliament are more likely to support policies that may result in a reduction in child and mother mortality and children's school dropout (Homan, 2017).

Societies characterized by increased gender equality and greater involvement of women in peace initiatives typically experience higher levels of peace and stability. For instance, The Council on Foreign Relations (2023) provides evidence indicating that the engagement of women in activities related to conflict prevention and resolution contributes positively to security objectives. The report highlights that when peace negotiations extensively involve women and civil society organizations, the resulting agreements exhibit a significantly reduced likelihood of failure, amounting to a 64 percent decrease in failure rates.

In a similar vein, female representation and gender equality are essential to sustainable development. Gender equality is recognized as a separate target (target 5) in the Sustainable Development Goals (SDGs) of the United Nations since it is crucial to achieving the other SDGs. The inclusion, equity, and sustainability of development programs are ensured through the empowerment of women through representation.

Given the above, it is glaring that when women are given representation opportunities, they are likely to work in the interest of society (inclusivity), to overcome marginalization in society. Thus, segmenting and investigating the impact of female representation on human development has significant empirical merits.

As can be understood from the theory of Critical mass, women through a combination of numerical strength and enabling political environments can raise critical questions in mainstream environments (African Barometer, 2021). Inferentially, a higher proportion of females with high-quality institutions are therefore likely to produce beneficial outcomes from policy discussions.

Chen (2013) investigated the possible effects of female representation in parliament on the level of corruption in governance. It was discovered that increasing female representation in parliament could mitigate decadent activities (e.g., corruption) that impede development, thereby, leading to positive effects on human development. This suggests that the question of how female representation in good institutions impacts human development must be explored further.

While there are several benefits and substantial empirical evidence supporting it, there exist valid counterarguments and limitations that warrant discussion. By addressing these opposing views and potential challenges, we can provide a more balanced perspective on the topic. A significant counterargument frequently expressed against more female representation is the fear that it may lead to tokenism or the selection of individuals entirely on the basis of their gender, rather than merit or qualifications, thus undermining the efficacy of institutions (Singh, 2021). Moreover, there are those who express doubts, contending that an exclusive emphasis on gender diversity might diminish the significance of other critical facets of diversity, including factors like race, ethnicity, socioeconomic status, and sexual orientation (Potter et al., 2019; Kurup & Underwood, 2021). To ensure a more comprehensive approach to diversity and inclusion, it is critical to consider these overlapping identities and create an environment that promotes multidimensional representation in institutions.

Notwithstanding the value-enhancing role of women in promoting human development, women's political involvement in public policy decision-making still lags behind men in most African countries. Although some 9% to 25% progress has been made in recent years as far as women's political representation in policy-making positions is concerned, a lot more needs to be done

to enhance women's inclusiveness (African Barometer, 2021). On a global scale, the representation of women in politics has improved. In 2021 for instance, the Inter-Parliamentary Union (IPU) reported that there were 25.5% women on average in national parliaments globally. Some nations, including Rwanda and the Nordic countries like Iceland and Sweden, have attained significant levels of gender parity in politics. Rwanda is often cited as a leader, with over 60% of its parliamentary seats held by women. The IPU's Women in Parliament 2022 report (2023) reveals that six nations have achieved gender balance, with women holding an equal or higher proportion of seats compared to men in their lower or single chambers. These countries include Cuba, Mexico, Nicaragua, Rwanda, the United Arab Emirates, and New Zealand.

It is on the basis of the foregoing discussion that this study examines the relative influence of increased female representation in national parliaments and cabinets in Africa on human development. Thus, this nexus to the best of the researchers' knowledge has not been investigated in the literature. The paper, therefore, fills a significant lacuna in the literature on the determinants of human development. It also provides empirical evidence on how institutional quality and female representation interactively influence human development by computing the unconditional marginal effects. This is worth examining given the role institutions play in shaping the overall economic systems of countries.

During the exploration of the literature, it was observed that there is no single theory that holistically describes the relationship between female representation and human development. For this reason, this study combines two theoretical concepts (Presence theory and Critical mass theory) in discussing the relationship between the two variables (Human Development and Female representation and their interactive variable—institutional quality). The rest of the paper is structured as follows. Section 2 reviews relevant theoretical and empirical literature. Section 3 looks at the methodology of the study. While Section 4 presents the empirical results, Section 5 concludes the study with some policy recommendations.

2. LITERATURE REVIEW

2.1 Theoretical Underpinning

This section discusses the presence theory and the critical mass theory as theoretical underpinnings for the study. They appropriately form the basis for establishing a link between the two variables—human development and female representation—and their interactive variable (institutional quality).

2.1.1 Presence Theory

The presence theory targets the roles that the representatives (mostly women) play in advocating for women's inclusion or women's affairs during policy and decision-making processes. This theory is premised on the idea that because women share life experiences and interests, women legislators will have sufficient common interests to make parliament's policy output more women-focused (Philips, 1995). This viewpoint argues that the most important reason for advancing women's inclusion in parliament is that women are needed to speak for other women in those policy areas where women have different experiences and interests from men (Lovenduski & Norris, 2003). This theory supports the influence of the life experiences and interests of female leaders in parliament on human development. Wängnerud (2000) provided empirical support for the presence theory with evidence that female politicians more effectively represent the interests of women than male politicians. Mirziyoyeva and Salahodjaev (2023) revealed that female participation in parliament has enhanced economic growth. Asiedu et al. (2018) found that developing nations where a greater proportion of parliamentarians are women have an increased tendency to enact comprehensive legislation addressing issues such as sexual harassment, rape, divorce, and domestic violence. Critics of the Presence Theory argue that the mere inclusion of women in positions of power can be symbolic and tokenistic, lacking genuine influence over policy decisions. It may not necessarily lead

to substantial policy changes and can overlook the diverse experiences of women based on factors like race, ethnicity, class, and sexual orientation (Stamarski & Son Hing, 2015). This underscores the need for a more nuanced approach that considers the quality of women's representation and their ability to advocate for gender-responsive policies.

Contextualizing this theory in the current study, it is expected that, since women share common experiences and interests, if more women are elected into the legislature and executive chambers, they will have sufficient influence to make parliaments and cabinets' policy output more women-focused (see Phillips 1995; and Lovenduski & Norris, 2003).

2.1.2 *Critical Mass Theory*

The 'critical mass theory' is a benchmark theory that explains the potential links between the increase in the number of women legislators and their impact on women's interests. It is understood as the point at which women, through a combination of numerical strength and enabling political environments feel able to raise critical questions in mainstream environments (African Barometer, 2021). The theory highlights the importance of having an adequate number of women legislators, estimated at 30% as a condition for the change of women's status (Dahlerup, 2006; Norris & Lovenduski, 1989). Gender and politics scholars and activists argue that women are not likely to have a major impact on legislative outcomes until they grow from a few token individuals into a considerable minority of all legislators (Childs & Krook, 2008). These scholars believe that it is only when their numbers increase that women will be able to work more effectively together to promote women-friendly policy change and to influence their male colleagues to accept and approve legislation aimed at promoting women's concerns. Empirically, while Raban et al. (2010) tested and provided strong support for the critical mass theory, Broome et al. (2010) documented that the critical mass theory holds little significance in the boardroom.

Reviewing the theory in the context of the current study, it can be seen as a central concept since the study is on women's political representation and how it impacts human development. As the study seeks to empirically establish whether increases in the share of female representation have any direct impact on human development, the critical mass theory is ideal to use as a benchmark in investigating whether the 30% threshold holds for Africa and if not, what percentage holds in the African context that female representatives will begin to make an impact on legislative outcomes.

The critical mass theory faces criticism for its lack of precision in defining what constitutes a "critical mass" of women in decision-making bodies (Grey et al., 2006). The theory's suggested threshold for significant influence is often left unspecified and can vary by context, making it challenging to implement as a concrete policy goal. Critics also argue that the theory overly emphasizes numerical representation, neglecting the importance of other factors such as institutional structures and political dynamics in shaping policy outcomes.

By way of summary, it has been observed from studies conducted over the years that women, who form an integral part of the human capital, have been marginalized especially in politics thereby having adverse effects on the general development of the human capital and by extension various economies. This marginalization has led to the emergence of various theoretical concepts that seek to advocate for inclusive representation in policy and decision making especially in parliaments and cabinets. The benefits of diversity are laid bare through these theories.

2.2 *Empirical Review*

Several studies have been conducted on human development and female representation and their relationship with some socio-economic factors globally. This section reviews some of these studies. To begin with, Swiss et al., (2012) investigated the effect of women's representation in parliament on child health across 102 developing countries from 1980 to 2005. Applying the random-effects panel regression, they discovered a positive effect of women's representation in parliament on child

health. Thus, an increase in women's representation in parliament improves child health in socially and economically disadvantaged countries. This effect provides evidence in support of the theory of critical mass which focuses on the effect of representation on policy outcomes.

Further, Behboudi and Moosavi (2014), employing a panel data method, estimated a Modified Environmental Kuznets Curve in Middle East countries from 1996 to 2010. An inverse NShaped relation between human development and the non-sustainability of resources in the presence of institutional quality was reported. This indicates that there could be a positive impact of institutional quality on the sustainability of resources if institutions are playing an active role in designating policy actions aimed toward sustainable development.

Several studies such as Jayasuriya & Burke (2013) and Khorsheed (2019) have examined whether female political representation affects economic growth. In analyzing data from 119 countries from 1970–1972 and 2006–2008 using fixed effects and GMM techniques, Jayasuriya and Burke (2013) report a positive effect of female political representation on economic growth. This study suggested therefore that countries with higher shares of women in parliament had faster-growing economies.

Khorsheed (2019) on the other hand, using advanced machine learning tools such as the nonlinear regression model, explored the relationship between the proportion of women parliamentarians and the economic growth of 20 high-income countries from 2006 to 2014. The study reported a positive relationship between the proportion of women candidates in national parliaments and economic growth.

The similarity between the above-reviewed studies is that they all investigate the relationship between women parliamentarians and economic growth. This makes them relevant to this study since the current study has economic growth as an independent variable and also examines the effect that female representation has on development. The difference between the reviewed studies and the current one is that the current study examines the relationship between women parliamentarians, women ministers, and human development which is much broader than economic growth. Also, the reviewed studies were either conducted in high-income countries or a single country but the current study is conducted across 45 African countries.

Relatedly, some scholars have also explored the relationship between economic growth and human development. Some of these studies include Elistia and Syahzuni (2018); Aydin (2019); Chikalipah & Makina (2019). Using data from 10 ASEAN member countries, Elistia and Syahzuni (2018) noted that, economic growth significantly leads to higher human development.

Aydin (2019) on the other hand, investigated the relationship between human development and economic growth in Turkey from 1990 to 2017 using the Hacker and Hatemi-J Bootstrap causality test, ARDL co-integration, and DOLS & FMOLS methods. A bi-directional causality relationship between human development and economic growth was reported.

In addition, using Co-integration and Vector Error Correction model techniques over the period 1970 to 2015, Chikalipah & Makina (2019) explored the relationship between economic growth and human development in Zambia. A long-run causality relationship between economic growth and human development was identified but no significant impact was identified in the short run.

The similarity between these three reviewed studies is that they all examine the relationship between economic growth and human development. Causality tests are conducted on two of them and a bi-directional causality relationship between human development and economic growth is reported.

These reviewed studies are relevant to the current study because they examine the relationship between economic growth and human development. Moreover, the current study investigates the relationship between human development and female representation but has economic growth as one of its explanatory variables. Unlike this study which targets 45 countries, two of the reviewed studies are country specific while one is on 10 countries which makes them less representative.

Moreover, there are studies in the literature that have also examined the relationship between

human development and institutional quality variables. For instance, Becherair and Tahtane (2017) investigated the relationship between corruption and human development based on the notion of causality in the context of panel data in the MENA countries from 1996 to 2012. A negative correlation between corruption and human development was identified. The impact was intensified in 2012 which indicated the deterioration in the status of governance compared to 1996 and an increase in the impact of corruption on human development in the MENA world. This suggests that corruption causes low human development when there is political instability but human development causes a reduction in corruption through political stability in MENA countries.

Emara (2020) on the other hand, investigated the impact of corruption on human development in Egypt in both the short and long-run between 1995 and 2018 using the Autoregressive Distributed Lag Model (ARDL). A negative and significant effect of corruption on human development in both short and long run is reported; meaning increased corruption weakens human development.

Using data from more than 5,000 municipalities in Brazil, Funk and Phillips (2019) show that greater representation of women in legislation is related to greater efforts to reduce poverty and inequality. The study finds out that women mayors are more likely to allocate greater resources for social assistance and education, which has profound effects on development outcomes in societies. This study is related to the current study in the sense that it looks at female political representation and its impact on social welfare. However, the study is on a single country while the current study looks at female representation at a much higher level in many countries and its impact on human development which is also much broader than social assistance.

More recently, Mirziyoyeva & Salahodjaev (2021) assessed the relationship between women's parliamentary representation and sustainable development goals from 2015 to 2019. The study used regression analysis and found that there is a positive relationship between women in parliament and sustainable development goals. This current study examines the impact of female representation on HDI whose indicators form individual goals under the SDGs and hence makes the reviewed study relevant to the current.

From the appraisal of the empirical works above, some gaps have been identified that need to be further examined. There have been some exploratory works done on the influence higher proportions of female representation have on policy discussions and decision-making in the legislature (O'Brien and Piscopo, 2019). Although these studies report that female representatives diversify legislative agendas, these studies do not empirically explore the diversification female representatives can have on cabinet agendas.

Further, from the above empirical review, there have not yet been studies that have investigated the threshold effects of female representation on human development. Some studies have investigated the direct effect of female representation in parliament and not in the cabinet on an indicator of human development but not on all the indicators. Although a positive impact is reported by Swiss et al. (2012), it would have been more beneficial if the threshold effect of both female representations in parliament and cabinet on all the human development variables were examined.

Finally, a number of the reviewed studies above have investigated the direct relationship between economic growth as the variable of interest and human development without controlling for economic growth (Chikalipah & Makina, 2019; Aydin, 2019; Khorsheed 2019; Elistia & Syahzuni 2018).

It is worth noting that there are several weaknesses and research gaps in the existing literature. First, some studies lack precision in defining and quantifying a "critical mass" of female representation, making it difficult to determine the threshold at which women's influence becomes significant. Second, while some studies explore the impact of female representation on economic growth or specific development indicators, few investigate the threshold effects of female representation on human development comprehensively, considering all its indicators. Third, there is a lack of studies that examine the diversification of cabinet agendas by female representatives. Finally, many studies do not control for economic growth when assessing the relationship between female representation and

human development, overlooking the broader aspects of development beyond economic indicators. The current study aims to address some of these research gaps by examining the impact of female representation, both in parliament and the cabinet, on various human development indicators in 45 African countries while controlling for economic growth and exploring threshold effects. This research extends the existing literature and offers a more comprehensive analysis of the role of female representation in human development within an African context.

3. METHODOLOGY

3.1 Data

The data used to analyze the impact of female representation on human development are sourced from the World Bank databases; the World Development Indicators, World Governance Indicators, and Gender Statistics. We include 45 African countries for the period 2000–2020. The selection of these countries was made based on specific criteria and considerations that are essential for the integrity of our research. First and foremost, the choice of these 45 African countries was guided by data availability. To conduct a comprehensive and meaningful analysis, it is crucial to have access to reliable and consistent data over the selected period, which in our case spans from 2000 to 2020. These countries were selected because they offer complete and consistent data for our main variables of interest, namely, female representation and human development index, over the specified timeframe. Also, we aimed to achieve regional representation in our study. Africa is a continent of immense diversity, encompassing a wide range of economic, social, and political contexts. Our selection of countries from various regions within Africa ensures that our findings can be more broadly applicable and representative of the continent's diversity. This regional diversity enhances the generalizability of our results and allows for a more comprehensive understanding of the relationship between female representation and human development across different African contexts. In the following subsection, we discuss the variables included in the empirical analyses.

3.2 Description of Variables

The dependent variable is human development which is an index of longevity, educational attainment, and standard of living. Given the objective of the study, women in parliament and women ministers are the primary explanatory variables while their impact is moderated using institutional quality. The study controls for the effect of economic growth, female life expectancy, and urbanization. Institutional quality is included as a moderator because it is pivotal in shaping policy outcomes and can modify the impact of female representation on human development. We aim to reveal how the quality of institutions may interact with female representation to influence development outcomes. Additionally, economic growth, female life expectancy, and urbanization are integrated as control factors to isolate the unique contribution of female representation to human development. Economic growth is a fundamental dimension of development, while female life expectancy reflects women's well-being, and urbanization captures societal shifts. These control factors help us disentangle the specific influence of female representation on human development, accounting for potential effects from other critical determinants. Detailed definitions of the variables and their data sources are provided in Table 1.

3.3 Model Specifications

Given that the objective of this research is to investigate the impact of female representation on human development, the baseline model is specified where human development is dependent on female representation, institutional quality, and control factors. Based on the composition of female representation, the baseline model is disentangled into different sub-models. The study also considers the interactive effect of female representation and institutional quality on human development. In this

case, the researcher initially examined the direct effect of female representation on human development in the presence of institutional quality, and then the interactive effect of female representation and institutional quality on human development.

Following the work of Agbloyor (2019), the basic empirical model on the direct effect of female representation on human development is specified as follows:

$$HDI_{it} = \alpha_0 + \beta_1 WIP_{it} + \beta_2 INSQ_{it} + \beta_3 ECG_{it} + \beta_4 LEXP_{it} + \beta_5 URB_{it} + \epsilon_{it} \quad (1)$$

$$HDI_{it} = \alpha_0 + \beta_1 WM_{it} + \beta_2 INSQ_{it} + \beta_3 ECG_{it} + \beta_4 LEXP_{it} + \beta_5 URB_{it} + \epsilon_{it} \quad (2)$$

For the interactive effect of female representation and institutional quality on human development, the following models are considered:

$$HDI_{it} = \alpha_0 + \beta_1 WIP_{it} + \beta_2 INSQ_{it} + \beta_3 WIP^*INSQ_{it} + \beta_4 ECG_{it} + \beta_5 LEXP_{it} + \beta_6 URB_{it} + \epsilon_{it} \quad (3)$$

$$HDI_{it} = \alpha_0 + \beta_1 WM_{it} + \beta_2 INSQ_{it} + \beta_3 WM^*INSQ_{it} + \beta_4 ECG_{it} + \beta_5 LEXP_{it} + \beta_6 URB_{it} + \epsilon_{it} \quad (4)$$

From the equations, the variables HDI, WIP, WM, ECG, LEXP, INSQ, and URB are defined in Table 1. The constant is denoted by α . The vector coefficients are connoted by β and ϵ is the error term. All variables are transformed into natural logarithm form to lessen the problem of heteroscedasticity.

For proper interpretation of the interactions, the study computes the marginal effects of Women in Parliament (WIP) and Women Ministers (WM) on human development when interacting with institutional quality (see equations 3 and 4). Consistent with Brambor et al. (2006) on the pitfalls surrounding interactive regressions, the respective impacts of women in parliament and women ministers are interpreted as a conditional marginal impact. This can be expressed as follows:

From equation (3):

Marginal Effect =

$$\frac{\partial HDI_{i,t}}{\partial WIP_{it}} = \beta_1 + \beta_3 INSQ_{i,t}$$

From equation (4):

Marginal Effect =

$$\frac{\partial HDI_{i,t}}{\partial WM_{it}} = \beta_1 + \beta_3 INSQ_{i,t}$$

In addition, to examine the threshold effects of female representation, a square term of women in parliament and women ministers are introduced into the equations (1) and (2) as depicted below:

$$HDI_{it} = \alpha_0 + \beta_1 WIP_{it} + \sigma_1 WIP_{it}^2 + \beta_2 INSQ_{it} + \beta_3 ECG_{it} + \beta_4 LEXP_{it} + \beta_5 URB_{it} + \epsilon_{it} \quad (5)$$

$$HDI_{it} = \alpha_0 + \beta_1 WM_{it} + \sigma_1 WM_{it}^2 + \beta_2 INSQ_{it} + \beta_3 ECG_{it} + \beta_4 LEXP_{it} + \beta_5 URB_{it} + \epsilon_{it} \quad (6)$$

The nature of the threshold is established using the signs of β_1 and σ_1 . Specifically, if $\beta_1 < 0$ and $\sigma_1 > 0$, the female representation and human development relationship is U-shaped. However, if

$\beta_1 > 0$ and $\sigma_1 < 0$, then the link between female representation and human development is inverted U-shaped.

The study computes the inflexion (threshold) point at which the impact of WIP and WM on human development changes.

From equation 5, differentiating from the first principle:

$$\begin{aligned}\frac{\partial HDI_{it}}{\partial WIP_{it}} &= \beta_1 + 2\beta_2 WIP_{it} = 0 \\ \Rightarrow WIP &= \frac{\beta_1}{2\beta_2}\end{aligned}\quad (7)$$

From equation 6, differentiating from the first principle:

$$\begin{aligned}\frac{\partial HDI_{it}}{\partial WM_{it}} &= \beta_1 + 2\beta_2 WM_{it} = 0 \\ \Rightarrow WM &= \frac{\beta_1}{2\beta_2}\end{aligned}\quad (8)$$

3.4 Estimation Technique

In panel estimation, the traditional panel estimation technique such as the ordinary least squares (OLS) method is commonly employed given its optimal properties and ease of estimation. However, introducing the lagged term shows a possible correlation between the explanatory variables and the random term, and therefore, using the OLS approach will lead to biased estimates (Nickell, 1981). Additionally, considering the nature of our independent variables, there is the possibility of endogeneity, particularly with institutional quality and economic growth which are treated as endogenous variables. To deal with these problems, the study uses the system generalized method of moments (GMM) technique by Arellano and Bond (1991) and Blundell and Bond (1998). The system GMM method addresses the endogeneity issue by employing a combination of first-differenced and instrumented variables, making it suitable for modeling dynamic panel data with endogeneity. Aside from addressing the issue of endogeneity in panel estimation, the GMM technique provides estimates that are heteroskedasticity and autocorrelation consistent (Roodman, 2009). Besides, our study involves a substantial sample size encompassing 45 African countries over a two-decade period, which results in a large and complex dataset. The system GMM technique is well-suited for handling such large and unbalanced panel datasets, ensuring efficiency and robustness in our analysis.

The fixed effects technique is also employed to check whether the results of the GMM are robust to an alternative technique. The fixed effects technique is a valuable alternative estimation method in our study for several compelling reasons. Notably, it allows us to control for unobservable time-invariant factors that may be driving our dependent variable, human development and might be correlated with our key explanatory variable, female representation. By including fixed effects, we effectively account for country-specific characteristics that remain constant over time, providing a more precise estimation of the relationship between female representation and human development.

4. EMPIRICAL RESULTS AND DISCUSSION

4.1 Descriptive Statistics and Multicollinearity Analysis

From the descriptive statistics presented in Table 2, the human development index (HDI) has a mean of 0.4853 with minimum and maximum values of 0.2620 and 0.8040 respectively. The average HDI value suggests a low level of human development in the sampled countries. Women representatives in parliament on average are 16.51 percent with a maximum representation of 63.75 percent. In terms of standard deviation, HDI has a standard deviation of 0.0983. Similarly, for WIP and WM,

the corresponding standard deviations of 12.1260 and 12.3785 illustrate the variability in female representation across the countries studied. These standard deviations highlight that some countries have substantially higher or lower female representation than the mean, emphasizing the diversity within the dataset.

The Regional averages recorded by the Inter-Parliamentary Union (2022) in comparison to the African average are as follows: America's percentage average is 34.7, Europe records 31.0 percent, Asia is 20.9 percent and the Pacific region is 22.8 percent. At the same time, the proportion of women serving in the various ministerial positions on average is 9.40 percent with a maximum of 54.84 percent.

The Global average of cabinet ministers as of 2021 according to the Global Gender Gap Report (2021) was 22.6 percent. Given the average minimum and maximum values of the institutional variables (control of corruption, regulatory quality, rule of law, and voice and accountability), it can be inferred that most of the countries in Africa have weak institutional structures. The lower average value of GDP per capita epitomizes the low-income levels of the African economies. Female life expectancy at birth on average is 56 years.

The results of the correlation analysis are summarized in Table 3. Kennedy (2003) argues that variables are highly correlated when the correlation coefficient exceeds 0.80. However, the independent variables in this study are weakly correlated given the benchmark coefficient by Kennedy (2003). To test if there is multicollinearity, the variance inflation factor (VIF) analysis is used. Generally, multicollinearity is evidenced by a VIF greater than 10 and a tolerance ($1/\text{VIF}$) value less than 0.1 (Gujarati, 2003). From the analysis, it can be inferred that there is no multicollinearity issue given that the VIF values for the independent variables (including $\ln\text{WIP}$ ($\text{VIF} = 1.45$), $\ln\text{WM}$ ($\text{VIF} = 1.33$), $\ln\text{INSQ}$ ($\text{VIF} = 1.57$), $\ln\text{ECG}$ ($\text{VIF} = 1.73$), $\ln\text{LEXP}$ ($\text{VIF} = 1.42$), and $\ln\text{URB}$ ($\text{VIF} = 1.14$)), are low and the tolerances are within acceptable limits.

4.2 Regression Estimates

We report the results of testing the equations (1) . . . (6) in this section. This section analyzes the results of the study based on the system GMM and fixed effects techniques. The regression estimates are presented in Table 4 and Table 5. While Table 4 shows the impact of women in parliament on human development, the results of the effect of women ministers on human development are reported in Table 5.

Before the discussion of the main findings, the diagnostic tests in Tables 4 and 5 are briefly highlighted. First, the tests of over-identifying restrictions via the Hansen J test show the validity of the instruments. Also, in the second order ($\text{AR}(2)$), there is no evidence of serial correlation in the study for all the specified models.

4.2.1 The Impact of Women in Parliament on Human Development

The regression estimates on the impact of women in parliament are presented in Table 4. From the System GMM, the lag of the human development index (HDI) is positive and significant. This suggests that human development has a self-reinforcing effect (see models 1, 3, and 5). That is, the current HDI is significantly influenced by the previous index.

From the estimates in Model 1, the direct effect of women in parliament on human development is examined in the presence of institutional quality. The findings show that HDI is significantly and positively driven by women's participation in parliament (model 1). This implies that increasing the proportion of women in the respective parliaments in Africa will positively help influence decision-making; thus, boosting human development. The mechanism behind this effect could be attributed to the diversified perspectives and priorities that women bring to the decision-making process. Women, often underrepresented historically, may advocate for policies that address gender disparities in education, healthcare, and economic opportunities. Moreover, increased female representation may

foster a more inclusive and equitable political environment, leading to policies and legislation that prioritize social welfare, education, and healthcare, ultimately enhancing human development in African nations. These findings highlight the importance of promoting gender diversity in political leadership as a means to advance comprehensive and sustainable development in the region. The finding is also in line with the critical mass theory, which posits that a sufficient presence of women in decision-making positions is essential for advancing gender-responsive policies and addressing gender disparities.

The finding suggests that stronger institutions lead to enhanced longevity, educational attainment, and living standards. Given the dimensions of institutional quality in this study (see model 1), it can be concluded that control of corruption, regulatory quality, rule of law, and voice and accountability are imperative for human development in Africa. That is, robust institutions facilitate an environment where resources are allocated efficiently, corruption is minimized, legal frameworks protect citizens, and citizen participation is encouraged. These factors collectively contribute to the improved quality of life, greater access to education, and increased life expectancy, all of which are integral components of human development.

Interactive Effect

In Model 3, the interactive effect of women in parliament and institutional quality is examined. The results presented indicate that the unconditional effect of women in parliament on human development is positive and significant while institutional quality is insignificant (see model 3). The coefficient of the interaction term between women in parliament and institutional quality (denoted by $INSQ \times WIP$) is negative and significant. For proper interpretation, the marginal effect is $0.00435 [0.00435 + (-0.01589 \times INSTQ)]$, when the average institutional quality is 0.0001079. From the marginal plot, it can be observed that the positive effect of women in parliament on human development increases when the levels of institutional quality increase (see Figure 1). The value of institutional quality ranges between -2.5 (weak institutional quality) and 2.5 (strong institutional quality). Therefore, women in parliament promote human development when institutional quality increases.

The implication is that female representation together with strong institutions is likely to contribute to boosting human development in Africa. Economic growth, female life expectancy, and urbanization exert a positive significant impact on human development. In model 5, the researchers examine the possible threshold effect of women in parliament on human development. From the estimates, the coefficient of women in parliament retains its positive and significant effect impact which is in line with the evidence presented in Model 1. However, the coefficient of the square term of women in parliament is negative; suggesting that there is a threshold effect of women in parliament on human development, and the relationship is inverted U-shaped. Thus, initial levels of women in parliament increased human development to a certain threshold level; however, additional numbers of women in parliament (i.e. beyond that threshold) does not have any beneficial effect on human development.

Based on the GMM result, the study computes the threshold point of women in parliament to be 1.56 ($0.0156/2[0.0050]$) (see model 5) in Table 4. This shows a threshold which accounts for approximately 40 percent of the total population in parliament. This means that women in parliament increase human development to a threshold of 1.56 and beyond this point, women in parliament alone do not boost human development. This threshold has economic relevance and makes economic sense because it falls within the range of 0 to 63.75 for women in parliament provided in the summary statistics. The implication is that human development is enhanced when the proportion of women in parliament is at a moderate level and backed by a country's strong institutional quality as deduced from the marginal plot in Figure 1. This result holds for the fixed effects estimates.

4.2.2 *The Impact of Women Ministers on Human Development*

Table 5 shows the results of the effect of women ministers on human development. Similar to the results of women's presence in parliament, the estimates in Model 7 indicate that women ministers positively and significantly influence human development, resonating strongly with the critical mass theory. This highlights the crucial role women play in ministerial positions in advocating for policies that enhance the quality of life, particularly in the realms of female healthcare and inclusive education. Women in ministerial roles can champion gender-sensitive policies and address disparities in access to healthcare and education, thereby contributing to improved human development outcomes. Moreover, institutional quality also significantly enhances human development, reaffirming the vital importance of transparent, efficient, and accountable institutions in fostering an environment conducive to human development. These findings collectively emphasize the multifaceted nature of women's influence in government and the importance of strong institutions in advancing comprehensive development across African nations.

Interactive effect

In Model 9, the marginal effect of women ministers is $0.0023 [0.0023 + (-0.000275 \cdot \text{INSQ})]$ when institutional quality has an average of 0.0001079. From the marginal plot, it can be deduced that the positive impact of women ministers on human development is enhanced when the level of institutional quality increases. Thus, women ministers further increase human development when a country's institutional quality is strong. The implication is that engaging more women in the various ministerial positions and strengthening the institutional structures will simultaneously boost human development in Africa.

In contrast, the interactive impact of women ministers and institutional quality on human development for the fixed effects is positive and significant. Institutional quality impact on human development is negatively significant. From Model 11, the results show that there is a threshold effect of women ministers on human development. Similar to the effect of women in parliament, the threshold relationship between women ministers and human development is inverted U-shaped. Thus, initial levels of women ministers increase human development to a certain threshold level, however, an additional level of women ministers (i.e. beyond that threshold) no longer enhances human development.

The study computes the threshold point of women ministers to be 1.343 ($0.0156/[2 \cdot 0.005]$) (see model 11). This is a threshold that lies between 0 and 54.84 as provided in the summary statistics which is 23 percent of the total population of cabinet ministers. This means that women in ministerial positions increase human development to a threshold of 1.343 and beyond this point; the women ministers alone have no positive impact on human development. However, the women ministers after the threshold level can further increase human development when a country's institutional quality is very strong as deduced from the marginal plot in Figure 2.

In terms of controls, economic growth, female life expectancy, and urbanization have a positive effect on human development. However, the impact of urbanization is insignificant in Model 3 while the impact of economic growth is insignificant in Model 9.

5. CONCLUSION AND POLICY IMPLICATION

This study delved into the impact of female representation on human development in Africa. The study employs annual data covering reports from 2000 to 2020 for 45 African countries. Female representation is disentangled into women's representation in parliament and women ministers. Aside from examining the direct effect of female representation on human development, the researchers also investigate how female representation and institutional quality interactively affect human development and whether there is any threshold effect of the female representation variables on human development.

Applying the GMM technique with the fixed effect method as an alternative technique, the findings show that human development in Africa is significantly and positively driven by women's participation in parliament and cabinet; suggesting that female representation is critical to promoting human development in Africa. The finding is in line with the critical mass theory. Institutional quality is also evidenced to directly affect human development. Nonetheless, the relationship between female representation and human development is inverted U-shaped, suggesting that as the number of women in parliament and women ministers increases, so does human development, but only up to a point, after which an increase in any of these variables has no beneficial effect on human development.

The analysis is extended to establish a policy threshold at which increasing WIP and WM crowds out the unconditional positive effect of WIP and WM on human development. From this, the threshold points of WIP and WM are computed with 40% and 23% levels reached. This means beyond these levels reached, WIP and WM will only continue to enhance human development when backed by countries' strong institutional quality as identified in the marginal plots.

The interactive effect of WIP, WM, and institutional quality was also examined. For proper interpretation, the marginal effect was computed and from the marginal plots, it was observed that the positive impact of WIP and WM on human development is enhanced when the level of institutional quality increases (see Figures 1 & 2). The implication is that engaging more women in parliament and the various ministerial positions as well as strengthening institutional structures is likely to simultaneously boost human development in Africa.

The results highlighted present some key implications for policymaking. For instance, women need to be encouraged to partake in politics to help increase human development in Africa. Additionally, this study recommends tailored compliance strategies to enforce the quota systems for gender parity in parliaments and cabinets backed by the constitution as an addendum to the existing AU Declaration on Gender Equality ratified by 51 out of the 54 African countries. Further, there should be an AU recognition award to all countries who comply with the compliance strategies to encourage mass compliance to boost female representation levels in Africa. Threshold points should however be taken into consideration since beyond these points proportions of female representation alone cannot make a meaningful impact on human development. Once such turning points are reached then other groups such as Civil Society, Minority Caucus groups, Affirmative Action Associations, and a host of other minority associations could be encouraged to join the female representatives to advocate for gender-friendly policies to boost human development. It is imperative that electoral processes are inclusive and free from discrimination or harassment, promote gender-sensitive election campaigns and encourage political parties to actively recruit and support female candidates.

Secondly, the judiciary arm of governments in Africa should be encouraged to review discriminatory laws and practices against women, girls, and other minority groups. Thus, by ending all discriminatory practices against women and girls which is a basic human right, would promote empowerment which would accelerate sustainable development in Africa. The implication is that a sustainable future would be assured which would have a multiplier effect across all other developmental areas.

Also, to empower more women to enter politics, governments and civil society organizations should establish training and mentorship programs tailored to women interested in pursuing political careers. These programs can provide the necessary skills, knowledge, and support to overcome barriers to entry and excel in the political arena. Adequate resources, both financial and logistical, should be allocated to support gender equality initiatives and promote women's participation in politics. This includes funding for awareness campaigns, training programs, and efforts to combat discrimination.

While promoting female representation is crucial, policymakers may face challenges such as resistance from entrenched political elites, opposition from conservative groups, and limited financial

resources for gender equality initiatives. To overcome these challenges, policymakers should engage in dialogue with various stakeholders to build support for gender parity measures. They should also work to change societal attitudes through awareness campaigns and education. Additionally, international partnerships and funding sources can be explored to bolster gender equality initiatives in the face of limited domestic resources.

Biographical Notes

Gifty Ewurama Enchill is a PhD Candidate at the University of Stellenbosch Business School. She has been part and also conducted a number of research projects including; 'Incentive / Reward Scheme for Literacy facilitators' (NFED/World Bank Research Project), 'The Stock Exchange in Ghana' (University of Leicester MBA Research), 'Corporate Governance, Gender Diversity and Firm Performance' (University of Ghana MPhil Thesis research) and 'Women on Boards in Ghana' (University of Ghana Business School and International Finance Corporation Research Project). She has also co-authored a number of professional and academic publications including 'Contemporary Issues in Human Resource Studies', 'Gender Diversity, Corporate Governance and Firm Performance' in a book "Gender Education and Development Issues and Concerns for Action", 'Gender HIV and AIDS Stigmatization and Discrimination: (A Case Study)', 'Gender Literacy HIV and AIDS and Empowerment: Some Lessons from Ghana' in a Pan-African Book 'Literacy for Development in Africa'.

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APPENDICES

Table 1. Description of Variables

Variables	Acronym	Definition	Source
<i>Dependent Variables</i>			
Human Development Index	HDI	It is measured by three dimensions, longevity, educational attainment, and standard of living. Longevity is measured by life expectancy at birth; educational attainment is proxied by a weighted average of adult literacy and school enrolment rates, and standard of living is measured by gross national income per capita (adjusted for purchasing power). It is an index between 0 and 1.	World Development Indicators
<i>Independent Variables</i>			
Women in Parliament	WIP	The proportion of seats held by women in national parliaments. It captures the political empowerment of women within a country.	Gender Statistics
Women Ministers	WM	The proportion of women serving in ministerial positions.	Gender Statistics
<i>Interacting Variable</i>			
Institutional Quality Index	INSQ	An index of control of corruption, regulatory quality, rule of law, and voice and accountability. These sub-indices of institutional quality are scored in ranges from approximately -2.5 (weak) to 2.5 (strong)	World Governance Indicators (WGI)
<i>Control Variables</i>			
Economic Growth	GDPGR	Gross Domestic Product per capita, PPP (constant 2005 international dollar).	World Development Indicators (WDI)
Female	LEXP	Female life expectancy at birth (in years)	World Development Indicators (WDI)
Urbanization	URB	The number of urban residents peryear (in million)	World Development Indicators (WDI)

Source: World Development Indicators, World Governance Indicators, Gender Statistics.

Table 2. Descriptive Statistics

	HDI	WIP	WM	COC	RQ	ROL	VA	INSQ	ECG	LEXP	URB
Mean	0.4853	16.5100	9.3969	-0.6560	-0.6791	-0.7031	-0.5451	1.52E-16	4286.3530	56.2760	7.1339
Maximum	0.8040	63.7500	54.8387	1.2167	1.1273	1.077	0.9825	4.605157	41249.4900	77.8900	107.1060
Minimum	0.2620	0.0000	0.0000	-2.4273	-2.6450	-2.6064	-2.1968	-4.887954	0.0000	0.0000	0.0760
Std. Dev.	0.0983	12.1260	12.3785	0.6312	0.6281	0.6684	0.7246	1.877420	5449.4910	14.2754	12.2654
Skewness	0.4869	1.1514	1.1862	0.5607	-0.0601	0.1193	0.0446	0.164885	3.1690	-2.7503	4.4059
Kurtosis	3.2831	4.3434	3.7023	2.8785	3.4098	2.9253	2.2043	2.787436	15.5960	11.7617	27.4455
Jarque-Bera	39.6378	279.8702	241.0302	49.6146	7.1262	2.4319	24.8675	5.945610	7828.9650	4214.0220	26587.1800
Probability	0.0000	0.0000	0.0000	0.0000	0.0284	0.2964	0.0000	0.051160	0.0000	0.0000	0.0000
Observations	925	945	945	936	938	934	931	927	945	945	945

Table 3. Correlation and Multicollinearity Analysis

	ln WLIP ₂	ln WM	lnINSO	ln ECO ₂	lnLEXP	lnURB	VIF	Tolerance (1/VIF)
lnWIP	1.0000						1.45	0.6913
lnWM	0.4798	1.0000					1.33	0.7540
ln CASQ	0.1913	0.0483	1.0000				1.57	0.6381
ln ECG	-0.0148	-0.0320	0.5485	1.0000			1.73	0.5773
lnLEXP	0.1524	-0.0115	0.3315	0.4737	1.0000		1.42	0.7054
ln URB	0.1221	0.1656	-0.2026	-0.1546	-0.2530	1.0000	1.14	0.8747
Mean VIF							1.44	

Table 4. The Impact of Women in Parliament (WIP) on HDI Variables

	Direct Effect		Interactive Effect		Threshold Effect	
	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
lnHDI _{t-1}	0.6832*** (0.0181)		0.7239*** (0.0367)		0.6062*** (0.0240)	
lnWIP	0.0041*** (0.0012)	0.0088** (0.0035)	0.00435*** (0.00026)	0.0070 (0.0087)	0.0156*** (0.0040)	0.0498*** (0.0105)
lnWIP ²					-0.0050* (0.0028)	-0.0234*** (0.0057)
lnINSQ	0.0035** (0.0014)	0.0014 (0.0019)	-0.0002 (0.9755)	0.0081 (0.0110)	0.0016* (0.0009)	0.0017*** (0.0018)
lnINSQ*WIP			-0.015989*** (0.0030432)	-0.0065 (0.0109)		
lnECG	0.0301*** (0.0061)	0.1131*** (0.0144)	0.0279** (0.0114)	0.1200*** (0.0441)	0.0293** (0.0125)	0.1256*** (0.0144)
lnLEXP	0.1628*** (0.0392)	0.3321*** (0.0340)	0.1654*** (0.0167)	0.3237*** (0.0754)	0.2201*** (0.0253)	0.3330*** (0.0333)
lnURB	0.0433** (0.0169)	0.1920*** (0.0122)	0.0211 (0.0211)	0.1909*** (0.0388)	0.0450*** (0.0163)	0.1931*** (0.0120)
C		-2.5386*** (0.0369)		-2.5388*** (0.1404)		-2.6053*** (0.0395)
Thresholds					1.56***	1.064***
Marginal Effect			0.00435***			
Diagnostics						
R2		0.9897		0.9908		0.9911
AR(1)	0.9945		0.0974		0.9974	
AR(2)	0.9996		0.8333		0.9998	
Hansen J p-value	0.5935		0.3127		0.491367	
Number of countries	45		45		45	

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

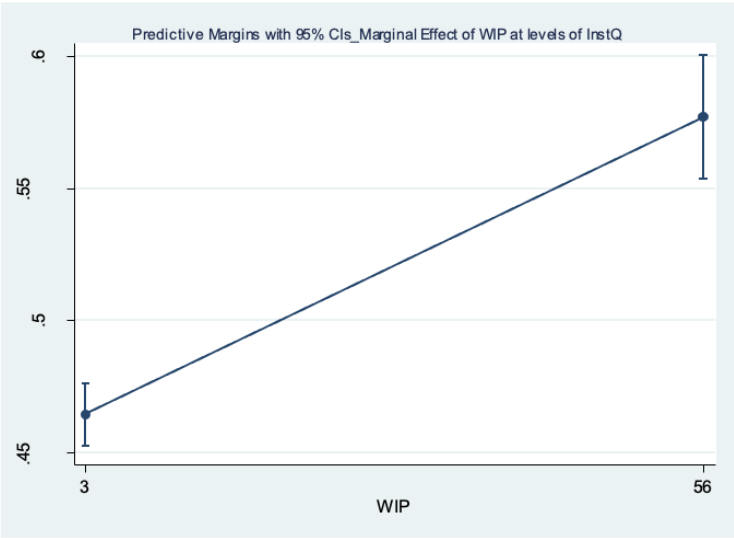


Figure 1. Marginal Effect of WIP on HDI at increasing levels of institutional quality

Table 5. The Impact of Women Ministers (WM) on HDI Variables

	Direct Effect		Interactive Effect		Threshold Effect	
	System GMM	Fixed Effects	System GMM	Fixed Effects	System GMM	Fixed Effects
	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
lnHDI _{t-1}	0.7274*** (0.0249)		0.7024*** (0.0303)		0.7644*** (0.0299)	
lnWIP	0.0029*** (0.0009)	-0.0103** (0.0047)	0.0023*** (0.00017)	-0.0073 (0.0065)	0.0674*** (0.0245)	-0.0270 (0.0454)
lnWIP ²					-0.0251*** (0.0090)	0.0064 (0.0174)
lnINSQ	0.0057*** (0.0007)	0.0019 (0.0023)	-0.01613*** (0.00255)	-0.0457* (0.0260)	0.0055*** (0.0012)	0.0018 (0.0024)
lnINSQ*WIP			-0.000275*** (0.000095)	0.0364* (0.0197)		
lnECG	0.0140 (0.0275)	0.1547*** (0.0228)	0.0339 (0.0220)	0.1451*** (0.0397)	0.0271*** (0.0185)	0.1552*** (0.0229)
lnLEXP	0.0966*** (0.0231)	0.3598*** (0.0507)	0.1231*** (0.0314)	0.3876*** (0.0898)	0.0938*** (0.027092)	0.3580*** (0.0510)
lnURB	0.0711*** (0.0188)	0.1757*** (0.0173)	0.0601*** (0.0159)	0.1762*** (0.0383)	0.0466*** (0.0162)	0.1756*** (0.0174)
C		-2.6082*** (0.0527)		-2.6313*** (0.1460)		-2.5954*** (0.0632)
Thresholds					1.343***	
Marginal Effect			0.0023***			
<i>Diagnostics</i>						
R2		0.9930		0.9936		0.9931
AR(1)	0.0000		0.2531		0.7683	
AR(2)	0.0504		0.3183		0.5604	
Hansen J p-value	0.3724		0.3829		0.2111	
Number of countries	45		45		45	

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

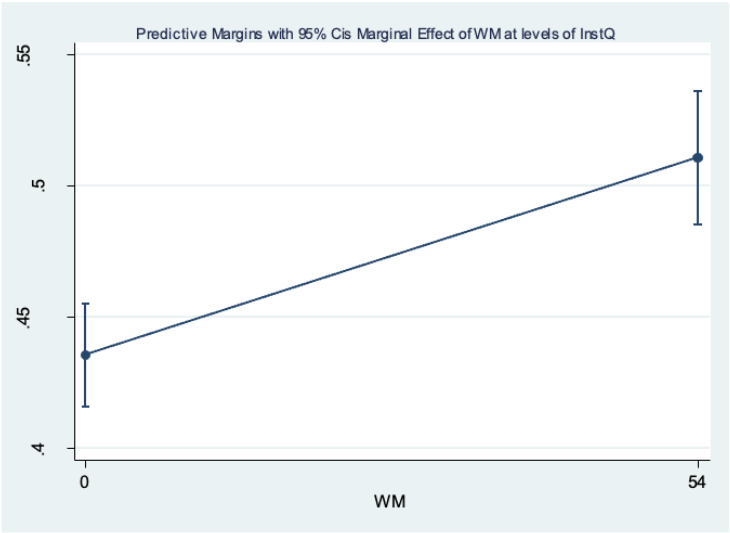


Figure 2. Marginal Effect of WM on HDI at increasing levels of institutional quality y