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Gender perspective on the determinants of health outcomes in selected Southern African countries

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ABSTRACT

Recurring global health concerns such as the COVID-19 pandemic served as perfect examples of the "health is wealth" discussion and contributed to a growing understanding of the strong relationships between multiple risks to global socioeconomic success and poor health. Another development is the inclusion of gender-specific health goals in the SDGs which have highlighted the critical role of women's health in attaining global health and ending the cycle of poverty. This study aims at examining factors influencing women's health in two Southern African countries namely South Africa and Eswatini affected by a significant burden of disease. The regression outcomes show that female economic participation, human immunodeficiency virus (HIV), female education, teenage pregnancy, income and urbanization have varying effects on female health outcomes in both countries using gender specific socioeconomic factors within the framework of Autoregressive Distributed Lag (ARDL). This research engages policy makers and strategists in the health sector on the need to address gender disparities in formulating health policies. Moreover, policies and strategies aimed at fostering better health outcomes by solving national priority health challenges in particular the HIV/AIDS epidemic and health-risk behaviours should be prioritized.

Contribution/Originality: This study contributes to the literature on the determinants of health by considering a gender dimension in the discourse. The findings emphasize the significance of analyzing gender differences as influencers of health given the increasing awareness of women's roles in achieving sustainable development.

1. INTRODUCTION

The discussion of the "health is wealth" literature which claims that health is an essential aspect of a country's economic prosperity first focuses on the important role that health plays in macroeconomic performance (Bloom et al., 2010; Grossman, 1972). The foundation of health's importance is its relationship to inclusive growth and sustainable development which comes from its significant effects on productivity, earnings, consumption, domestic saving, investment and society's overall macroeconomic performance (Albertini, Fairise, & Terriau, 2021; Antunes & Ercolani, 2021; Bloom, Kuhn, & Prettner, 2015). The significance of maintaining good health for the advancement of a stable and functional global society has been clearly demonstrated by the recent outbreak of the COVID-19 pandemic (Goel, Saunoris, & Goel, 2021; Inegbedion, 2021; World Bank, 2020).

Health is an important subject in both national and international development plans because of growing awareness of the socioeconomic effects of health and its critical role in attaining sustainable development (World

Health Organization, 2017). Improved health is related to several other goals in addition to goal 3 of the Sustainable Development Goals (SDG 3) which is health-specific (World Health Organization, 2017). Health is a global concern with major ramifications for both established and emerging economies but in countries with high rates of poverty and inadequate healthcare systems, poor health has disastrous effects. Thus, the factors that predict better health has assumed a central role in health policy discussions in an attempt to address the widespread health issues in developing countries and promote global health. The policy and empirical research have produced substantial information that clearly highlights the significance of various factors such as income (Nwude, Ugwoke, Uruakpa, Ugwuegbe, & Nwonye, 2020; Salahuddin, Vink, Ralph, & Gow, 2020), public health spending (Orji, Ogbuabor, Mba, & Anthony-Orji, 2021), literacy (Raghupathi & Raghupathi, 2020), institutions and infrastructure (Ajide, Dauda, & Alimi, 2023) in fostering better health outcomes. We seek to contribute to this ongoing debate by considering the subject matter in the Southern African region.

Although previous research in our selected context is unknown, this study deviates from current literature by examining the gender aspect of the debate on determinants of health. In fact, the increasing literature on the factors influencing health in Sub-Saharan Africa (SSA) including its southern region has resulted from the region's dual issues of widespread poor health and inadequate health care systems (Ajide et al., 2023; Ataguba, Day, & McIntyre, 2015; Chewe & Hangoma, 2020; Eshetu & Woldesenbet, 2011). The health of women is the subject of certain literature, although maternal and reproductive wellness have received the majority of research interest (Adgoy, 2018; Rosário, Gomes, Brito, & Costa, 2019). The emphasis on gendered views in development strategies has increased in response to the increasing understanding of the roles that genders play in attaining equitable and sustainable growth (International Monetary Fund (2013); Organization for Economic Development and Cooperation (2013).

Gender disparities are becoming increasingly important in health policy and health research considering the prominent roles that women play in national economies (Bloom et al., 2015; Gazi Hassan, Cooray, & Holmes, 2017; Jemiluyi & Adebayo, 2021). Women's health constitutes a critical tool in breaking vicious cycles of poverty and inequality with multidimensional implications for household health and socioeconomic life, child health, maternal health and children's quantity and quality of education. The attainment of SDG 3 good health depends on female health while it also plays a key role in achieving SDGs 1 zero poverty and hunger, SDG 4 inclusive and quality education for all and SDG 5 gender equality and empowerment for all women and girls. With gender differences in the level of health outcomes and certain socioeconomic factors having implications for health such as literacy, employment and even the burden of diseases, it is possible that there are gender differences in the effect of health influencers. In most societies across the globe, women live longer than men even in adverse conditions of life such as famine and epidemics and the female survival advantage has been argued to be contingent on a mix of genetic, environmental and social factors (Baum, Musolino, Gesesew, & Popay, 2021).

A gendered perspective on health factors is not only necessary but also relevant in the Southern African region where gender inequality and poor health coexist. In addition to the prevalent health challenge and gender inequality in Southern Africa, an assessment of the influencers of female health in the sub-region is worth considering given certain characteristics of the sub-region that might have important consequences for health in particular female health. In addition to the significant burden of malaria, Southern Africa bears the largest share of the global burden of HIV having the highest prevalence rate of the epidemic and hence the largest number of people living with HIV/AIDS. Nine of the world top ten HIV-prevalent countries are in Southern Africa (UNAIDS, 2023). The disease has significantly impacted women's health in the sub-region (Cullinan, 2012; UNAIDS, 2023). In spite of the improvement in survival rate due to expansive anti-retroviral treatment (ART), HIV/AIDS remains a significant cause of death in the sub-region. The threat of teenage pregnancy is also severe in Southern Africa as evidenced by the high adolescent fertility rate. Kassa, Arowojolu, Odukogbe, and Yalew (2018) argued that lowering the high rate of teen pregnancy is correlated with a significant decline in maternal morbidity and death in developing countries.

Thus, an empirical investigation of overall female health beyond maternal health is worth considering in the Southern Africa region given the critical role of health and in particular female health in achieving the SDGs. The rest of the paper is structured as follows: a review of empirical literature is presented in the next section followed by methodology, findings and a conclusion.

2. LITERATURE REVIEW

Two major areas of research emerge from a review of the literature on health determinants: one focuses on socioeconomic factors such as income, literacy rate, place of employment and residence. The other focus is on health system factors such as health expenditure, number of physicians, immunization coverage and skilled birth attendants. However, this review focuses on the socioeconomic determinants strand. The socioeconomic health gradient has extensively assessed the influence of various socioeconomic variables including income, literacy, employment, status, place of residence and nutrition on a wide range of health indicators including longevity, self-reported health, the prevalence of infectious and non-communicable chronic diseases, mortalities and morbidities. Findings from the literature are mixed. A decomposition analysis by Luy et al. (2019) shows that enhancements in life expectancy in Denmark, Italy and the USA are associated with upgrade in education with a higher contribution from women's education. Shahbaz, Loganathan, Mujahid, Ali, and Nawaz (2016) examined the relationship between economic hardship and health status in Pakistan and found a significant relationship between low income and a shorter life expectancy. The results of Gilligan and Skrepnek's (2015) study indicate that in the Eastern Mediterranean region, socioeconomic factors such as income and urbanization improve health. The conclusion of Hummer and Hernandez (2015) indicates that difference in level of education account for mortality and longevity disparities among US adults with higher education correlated with better health. In an earlier study, Lin, Chen, Chien, and Chan (2012) asserted that a significant proportion of the variation in life expectancy in less developed countries is explained by socioeconomic factors including income, literacy and nutrition. The relevance of socioeconomic factors in breaking the vicious cycle of poor health has also been examined in time series and cross-sectional studies on SSA including the southern sub-region and the findings have also been mixed. Numerous recent studies assert that socioeconomic factors such as place of residence, income, employment status, nutrition and literacy level are important factors of health in sub-Saharan Africa (Abubakari, Owoob, & Nketiah-Amponsah, 2019; Adgoy, 2018; Chewe & Hangoma, 2020; Kouladoum, 2023). These stances were earlier established in Fayissa and Gutema (2005) and Eshetu and Woldesenbet (2011). In country-specific studies, Llop-Girones and Jones (2021) found that income and access to medical care do not play a significant role in health outcomes in Mozambique, place of residence is critical for health. Similarly, Omotoso and Koch (2018) found that employment status and place of residence are important predictors in health status in South Africa. In a comparative analysis of Malawi and Uganda, Le Roux-Kemp (2012) asserted that policy actions void of consideration for social, religious and cultural heritage will have a limited impact on improving health in the studied countries. Bahadoor, Toorabally, and Subratty (2016) argued that dietary quality and place of residence are important factors in child weight status in Mauritius. Akintunde, Oladipo, and Oyaromade (2019) found that income and employment are positively related to longevity while education reduces longevity in Nigeria. Fichera and Savage (2015) confirm the wealth is health view in Tanzania.

The socioeconomic factors-health gradient has continued to be studied with more recent studies such as Benos, Karkalakos, and Zotou (2019); Ehmann, Groene, Rieger, and Siegel (2020); Pothisiri, Prasitsiriphon, and Aekplakorn (2020) and Rahman and Alam (2022) supporting the health-advantage effect of socioeconomic factors in Australia, Germany, Thailand and the US respectively as well as Karma (2023); Miladinov (2020) Raghupathi and Raghupathi (2020) and Nwude et al. (2020) for panels of European, OECD and African countries respectively.

However, a considerable amount of research has also suggested that socioeconomic factors do not significantly predict health outcomes despite the wide range of evidence supporting the positive impact of socioeconomic factors on health. Shahbaz et al. (2016) found no evidence that literacy predicts health in Pakistan. Sede and Ohemeng (2015) examine how socioeconomic factors affect health in Nigeria and suggest that there is no significant relationship between per capita income, education and lifespan in the country. Larrimore (2011) found no strong evidence for the health-income gradient in the US using self-assessed health and earned income tax credits. In addition, the results obtained from the socio-economic health literature have been inconsistent due to differences in the study sample, measurement of variables and methodology.

3. METHODOLOGY

3.1. Data

In this study, the determinants of female health in Southern Africa are explored within the framework of comparative analysis between two selected Southern African countries namely Eswatini and South Africa. We take into account the level of economic development in choosing the representative countries since the study focuses on socioeconomic determinants of health apart from the consideration of peculiarities common to the region. South Africa is the largest economy in southern Africa and an upper-middle income country according to the United Nations income classification. On the other hand, Eswatini is a lower-middle income country. Both countries bear a disproportionate share of the HIV epidemic. In particular, Eswatini has the highest HIV prevalence rate in the world and hence in southern Africa. In addition, both countries have significant shares of the burden of adolescent pregnancy in the region with 72.7/100,000 in Eswatini and 67.7/100,000 in South Africa in 2020. The female rate of participation in economic activities was 45.6 in Eswatini in 2020 and 54.5 percent in South Africa in the same period. Moreover, secondary school enrolment was 82.2 percent and 106.5 percent respectively in Eswatini and South Africa. This study follows prior studies that have made notable contributions to the gender dimension of health (Bloom et al., 2015; Hassan & Cooray, 2012) and chose gender disaggregated data on life expectancy at birth (FLEX) as a measure of female health outcomes. Since the analysis is focused on determinants of female health, gender-specific socioeconomic variables which have been identified in the literature as significant predictors of health are used. Although our choice of determinants is largely informed by data availability, we take into consideration country characteristics. Data on female school enrolment (SCHF) and female labour force participation rate (FLFP) are used to represent women's literacy level and rate of participation in economic activities. Due to the disproportionate burden of the HIV scourge and teenage pregnancy in the sub-region, both factors are incorporated using data on HIV prevalence and adolescent fertility rate (ADOLFER) respectively. However, owing to the unavailability of gender specific measures at the macro level, aggregate data on Gross Domestic Product Growth rate (GDPG) and urban share of total population (URBP) are used to measure income level and the degree of urbanization respectively. All data are sourced from the World Bank's World Development Indicators (WDI) database.

The data description is presented in Table 1.

Table 1. Data description.

Variables	Definition	Unit of measurement
FLEX	Female life expectancy at birth	Years
SCHF	Female primary school enrolment rate	Percentage
FLFP	Female labour force participation rate	Percentage
HIVF	The prevalence of HIV among women	Percentage
ADOLFER	Adolescent fertility rate	Number
GDPG	Gross Domestic Product growth rate	Percentage
URBPG	Urban population growth rate	Percentage

3.2. Model Specification

To estimate a health production model, the functional form of the analytical model is represented as follows:

$$Flex = f(Flfp, Schf, HIVF, Adolfer, Gdpg, Urbpg) \qquad (1)$$

All variables are as earlier defined in the data description.

The empirical model is stated as:

$$FLEX_t = \eta_0 + \eta_1 FLFP_t + \eta_2 SCHF_t + \eta_3 HIVF_t + \eta_4 ADOLFER_t + \eta_5 GDPG_t + \eta_6 URBPG_t + \mu_t \qquad (2)$$

Equation 2 allows for the empirical testing of the marginal effect of the determining variables on the measure of health outcome.

4. EMPIRICAL FINDINGS AND DISCUSSION

4.1. Descriptive Statistics

We try to use descriptive statistics to summarize and characterise our data before estimating the models. The summary statistics for the variables are presented in Table 2. The measure of level of urbanization (URBPG) and the proxy for teenage pregnancy (ADOLFER) have the highest averages in the South African series while school enrollment (SCHF) has the lowest average. An average of 1.19 percent GDPG suggests a low level of growth in the economy. In contrast, mean values of 80.95/100,000 and 9.1 percent for adolescent fertility rate and HIV prevalence rate indicate a high burden of the menaces in South Africa. The average female life expectancy birth of 60.9 years reveals unsatisfactory level of improvement in health. Meanwhile, an average of 98.6 percent school enrolment (SCHLF) indicates significant progress in the literacy rate.

Table 2. Descriptive statistics.

Statistics	FLEX	FLFP	SCHP	ADOLFER	HIVF	GDPG	URBPG
South Africa:							
Mean	60.85	47.22	98.62	80.95	9.18	1.91	2.65
Median	61.88	48.30	102.23	71.57	11.3	2.40	2.41
Maximum	86.18	54.50	110.41	111.01	16.90	5.60	3.54
Minimum	53.98	40.00	79.00	65.75	0.50	-6.43	2.02
Std. dev.	3.51	4.71	10.19	16.05	6.26	2.53	0.51
Skewness	-0.65	-0.36	-1.14	0.79	-0.36	-0,90	0.46
Kurtosis	2.35	1.97	2.79	1.99	1.52	4.24	1.56
Jarque Berra	3.55	2.63	8.74	5.79	4.54	8.01	4.87
Probability	0.17	0.27	0.01	0.10	0.10	0.02	0.10
Eswatini:							
Mean	54.23	45.79	106.06	110.07	13.32	3.73	1.81
Median	53.99	46.04	104.98	107.64	15.6	3.10	1.43
Maximum	65.06	47.29	118.84	179.43	16.4	21.02	6.08
Minimum	43.36	43.89	91.42	72.68	0.80	0.92	-0.03
Std. dev.	7.35	1.11	8.27	29.18	4.81	3.60	1.78
Skewness	0.04	-0.37	-0.21	0.67	-1.67	3.96	1.28
Kurtosis	1.59	1.72	1.91	2.69	4.25	19.66	3.50
Jarque Berra	2.40	2.63	1.64	3.18	15.31	411.03	8.27
Probability	0.30	0.27	0.44	0.20	0.00	0.00	0.02

SCHF and ADOLFER show wider variability thereby suggesting volatility and instability of the data relative to other series in terms of the variability of the data measured by the standard deviation values. Least variability is observed in URBPG with a standard deviation value of 0.05 followed by GDPG with a value of 1.91 indicating consistency and a low degree of heterogeneity in the data. Consistent with the standard deviation values, the highest range values (maximum and minimum value) are recorded for SCHF and ADOLFER. Similarly, URBPG has the lowest range value. Moreover, the kurtosis coefficients for the series except GDPG are less than three suggesting that the series are platykurtic and less heavily concentrated about the mean.

For Eswatini, identical with South Africa, the highest and least mean values are recorded by SCHF and URBPG respectively. An average value of 13.3 percent over the study period signals the high prevalence rate of HIV in the country. The high HIV prevalence rate is similarly reflected in the low life expectancy with an average of 54.23 years for FLEX. These are all consistent with the global report that the health status in Eswatini is among the poorest in SSA and the world at large. Eswatini has a higher average rate of teenage pregnancy 110.07/100,000 than South Africa. ADOLFER has the highest maximum value whereas SCHLF has the highest minimum value. The least maximum and minimum values are recorded by URBPG. The Eswatini population is concentrated in rural areas with less than one fourth living in urban centers (United Nations, 2020).

ADOLFER shows the highest variability measured by standard deviation which is compatible with the highest range considering the spread of the data. Similarly, FLFP has the least standard deviation followed by URBPG suggesting that the data are well represented by the mean values. Moreover, the kurtosis coefficients show that the FLEX, FLFP, SCHF and ADOLFER series are platykurtic while HIVF, GDPG and URBPG are leptokurtic.

4.2. Technique of Estimation

Time series data possess certain attributes that are critical for the selection of appropriate methods of estimation. The series' autoregressive character, the integration property's order and the presence or absence of an integrating relationship between the series are significant examples of these characteristics. An adequate understanding of these characteristics is essential to making valid and sound decisions within a suitable methodological framework for a time series analysis.

4.2.1 Stationarity Test (Unit Root)

When estimating techniques are applied without a solid understanding of the stationarity qualities of the data, false regressions occur which can lead to biased results. An econometric regression is said to be spurious or false when the results indicate significant relationships while the variables are actually uncorrelated. Therefore, we use the Augmented Dickey-Fuller (ADF) unit root test to assess the stationarity qualities of the chosen variables in order to determine the best estimation technique. The ADF unit root results are presented in Table 3. According to the unit root test, the GDPG, ADOLFER and FLEX series for South Africa are stationary at level while the other series are stationary at the first difference. On the other hand, all the series for the Eswatini data apart from GDPG and ADOLFER are stationary at the first difference. In addition, for none of the series does the t-statistic or probability value of the unit root test fail to reject the null hypothesis of the presence of a unit root. Therefore, the estimated series for each country are either stationary at level or at first difference.

Table 3. Unit root test.

Variables	South Africa		Eswatini	
	At level I(0)	1st difference I(1)	At level I(0)	1st difference I(1)
FLEX	3.619**	-----	0.355	1.966**
FLFP	2.713	4.793***	0.615	6.642***
SCHL_F	0.402	5.988***	0.586	4.160***
ADOLFER	2.360**	-----	1.950**	------
HIVF	0.076	2.883***	0.065	3.487***
GDPG	2.887***		1.832*	8.860***
URBP	1.152	2.852***	1.591	6.746***

Note: ***, ** and * represent 1%, 5% land at 10% level of significance respectively. The absolute values of the t-statistics were reported for all the series

4.2.2. ARDL-ECM Bound Test Approach

Since our series consist of both I(0) and I(1) variables, it is imperative that the preferred choice of estimator be one that has the capacity to handle series of mixed order of integration. Among the single-equation cointegration estimators, the autoregressive distributed lag (ARDL) bound approach of Pesaran, Shin, and Smith (2001) is designed to handle such peculiarities. ARDL is linked to extensive applications in the literature due to its ability to extract long-run relationships from short-run dynamics (Pesaran et al., 2001; Shrestha & Bhatta, 2018). ARDL estimation is considered more optimal in models with endogenous variables having the capacity to control for second-order asymptotic cointegration effects (Harris & Sollis, 2003). Moreover, the estimator is reckoned to be flexible and efficient for a small sample sizes. Nonetheless, in spite of the benefits, ARDL is not designed to estimate models with variables whose order of integration property is order two.

The use of ARDL dictates that there must be a relationship or cointegration among the variables in addition to the stationarity requirement. This ensures the stability of the model in the long-run. In EViews 12 statistical package, the bound cointegration test is automatically estimated alongside the short- and long-run forms. Hence, we evaluate the reported bound cointegration test result in the estimated models to affirm the presence or otherwise of a sustained long-run relationship among the series. The bound test will definitely be used because our series are mixes of I(0) and (1) in addition to the seamless estimation provided by EViews 12. The method is reckoned superior to other cointegration tests such as Engle-Granger and Johansen cointegration methods which have been criticized for their complexity owing to their demand that all variables of interest be integrated of order one I(1). On the other hand, the bound test is robust and efficient in testing for cointegration among I(0) or I(1) variables and even combinations of both orders of integration.

Thus, following from Equation 2, we estimate an unrestricted error correction model of the equation:

$$FLEX_t=\partial_0+\sum_{i=1}^{m}\emptyset_i\Delta FLEX_{t-i}+\sum_{i=0}^{n}\gamma_i\,\Delta FLFP_{t-i}+\sum_{i=0}^{o}\varphi_i\,\Delta SCHLF_{t-i}+\sum_{i=0}^{p}\delta_i\,\Delta ADOLFER_{t-i}+\sum_{i=0}^{q}\psi_i\,\Delta HIVF_{t-i}+\sum_{r=0}^{r}\mu_i\,\Delta GDPG_{t-i}+\sum_{i=0}^{s}\vartheta_i\,\Delta URBP_{t-i}+\eta_1 FLEX_{t-1}+\eta_2 FLFP_{t-1}+\eta_3 SCHLF_{t-1}+\eta_4 ADOLFER_{t-1}+\eta_5 HIVF_{t-1}+\eta_6 GDPG_{t-1}+\eta_7 URBP_{t-1}+\varepsilon_t \qquad (3)$$

Equation 3 is ARDL (m, n, o, p, q, r and s). The model automatically chooses its appropriate lag length. All variables are as earlier defined. Δ represents the short run. Thus, $\emptyset_i$,γ_i , φ_i, δ_i, ψ_i, μ_i, $\vartheta_i$andϕ_i, represent the coefficients of the short-run dynamics and $\eta_1, \eta_2, \eta_3 , \eta_4, \eta_5, \eta_6\ and\ \eta_7$ account for the long-run relationships.

Based on Equation 3, the decision rule regarding the presence or otherwise of cointegration among the variables is set with the null hypothesis of no cointegration $H_0: \eta_1 = \eta_2 = \eta_3 = \eta_4 = \eta_5 = \eta_6 = \eta_7 = 0$ against the alternative hypothesis $H_0: \eta_1 \neq \eta_2 \neq \eta_3 \neq \eta_4 \neq \eta_5 \neq \eta_6 \neq \eta_7 \neq 0$ Hence, decisions on the existence of cointegration or otherwise are made by comparing the F-statistics with the two asymptotic values that is, the lower I(0) and upper I(1) critical values. At each level of significance, the null hypothesis of a no level relationship (cointegration) is accepted if the value of the F-statistic is below the lower critical bound. Otherwise, the null hypothesis is rejected in favour of the alternative if the F-statistic is above the upper critical bound. The bound cointegration test results for both models are reported in Table 4. For both models, the F-statistic is greater than the upper bound critical values for all level of significance; hence, the null hypothesis of no cointegration is rejected for both regressions.

Table 4. Bound cointegration test.

Test statistic	South Africa		Eswatini	
F-statistic	10.47		5.71	
K	6		6	
Level of significance	Lower bound I(0)	Upper bound I(1)	Lower bound I(0)	Upper bound I(1)
10%	2.12	3.23	2.12	3.23
5%	2.45	3.61	2.45	3.61
2.5%	2.75	3.99	2.75	3.99
1%	15	4.43	3.15	4.43

Once the cointegration of the variables has been verified, an error correction model (ECM) with short-term dynamics is estimated. $FLEX_t = \partial_0 + \sum_{i=1}^{m} \emptyset_i \Delta FLEX_{t-i} + \sum_{i=0}^{n} \gamma_i \, \Delta FLFP_{t-i} + \sum_{i=0}^{o} \varphi_i \, \Delta SCHLF_{t-i} + \sum_{i=0}^{p} \delta_i \, \Delta ADOLFER_{t-i} + \sum_{i=0}^{q} \psi_i \, \Delta HIVF_{t-i} + \sum_{i=0}^{r} \mu_i \, \Delta GDPG_{t-i} + \sum_{i=0}^{s} \vartheta_i \, \Delta URBP_{t-i} + \phi ECT_{t-1} + \varepsilon_t$ (4)

ECM_{t-1} is the error correction term that affirms long-run equilibrium and whose coefficient ϕ measures the speed of adjustment of the model towards equilibrium. The validity of the ECM_{t-1} demands that the coefficient be negative and statistically significant.

The results of the error-correction version of the ARDL model (3, 1, 1, 3, 3, 3 and 1) and (2, 1, 2, 1, 2, 1 and 1) for South Africa and Eswatini are presented in Table 5.

Table 5. ARDL-ECM short- and long-run results.

Variables	South Africa		Eswatini	
	Coefficient	Std. error	Coefficient	Std. error
Short-run estimates				
Δ(FLFP)	-0.090	0.059	0.028	0.044
Δ(SCHLF)	-0.021	0.021	0.157	0.160
Δ(SCHLF (-1))	-----	-----	-0.281**	0.115
Δ(ADOLFER)	-0.157	0.108	-0.252**	0.108
Δ(ADOLFER (-1))	0.337***	0.095	-----	-----
Δ(ADOLFER (-2))	-0.085	0.100	-----	-----
Δ(HIVF)	-0.015*	0.008	-0.047**	0.021
Δ(HIVF (-))	0.006	0.006	0.033	0.021
Δ(HIVF(-2)	0.036***	0.009	-----	-----
Δ(GDPG)	0.128***	0.033	-0.195	0.115
Δ(GDPG (-1))	-0.078*	0.038	-----	-----
Δ(GDPG (-2))	-0.155***	0.040	-----	-----
Δ(URBPG)	0.036***	0009	-0.004	0.004
ECT(-1)	-.0277***	0.028	-0.119***	0.017
Long-run estimate				
FLFP	-0.323	0.233	0.232	0.346
SCHLF	0.116	0.096	4.954*	2.805
ADOLFER	-0.861***	0.205	-2.115**	0.015
HIVF	-0.028***	0.004	-0.134***	0.042
GDPG	1.280***	0.212	-0.714	0.701
URPBG	0.129***	0.032	-0.034	0.026

Note: ***, **, and * represent 1, 5 and 10 percent level of significance respectively.

The negative signed coefficients of the error correction terms for both models (South Africa: -0.285; Eswatini: -0.121) are statistically significant at the 1 percent significance level confirming the rejection of the null hypothesis that there is no cointegration among the variables. The South African model will adjust to long-run equilibrium with a speed adjustment of 28.5 percent in the event of short-run divergence from shocks while the Eswatini model will periodically adjust to equilibrium with a speed adjustment of 12.1 percent.

Furthermore, the short-run coefficients of the South Africa model show that FLFP and SCHL have a non-significant negative effect on female health. These findings suggest that in the short run both variables are not significant contributors to changes in female life expectancy in the country. The coefficients of ADOLFER indicate non-significant effects at lags zero and 2 and a significant positive influence at lag 1. The sum of the coefficients is positive (0.1095) and statistically significant as suggested by the Wald test. This suggests that contrary to documented evidence of the adverse effects of teenage pregnancy on female health, ADOLFER raises female life expectancy in South Africa in the short-run. The HIV prevalence coefficient at lag zero is negative and significant while it is positive at lags 1 and 2 but the positive coefficient is only significant at lag 2. In addition, the coefficient is positive (0.057) and statistically significant based on the Wald test. This suggests that HIV has an increasing influence on female life expectancy in the short run. This finding may arise from the fact that HIV has a limited short-term negative impact on health before it develops into AIDS disease and negatively impairs the immune system and shorten life expectancy. GDPG coefficients are significant at lags 0 to 2. The coefficient is positive at lag zero and negative at lags 1 and 2. The sum of GDPG short run is negative (-0.105) implying a worsening effect of income on health in contrast to the wealth is health debate. On the other hand, urbanization has a statistically positive influence on female health in the short-run suggesting urban health advantage.

In parallel to the South Africa model, the coefficients of FLFP and SCHLF in the current period have insignificant positive influence on female health in Eswatini. However, the coefficient of SCHLF at lag 1 is negative and significant indicating that improved literacy worsens health conditions in Eswatini. This is in contrast to the emphatic advantage of the positive correlation between literacy and health (Raghupathi & Raghupathi, 2020). The proxy for teenage pregnancy (ADOLFER) shows a significant negative effect on female health in the short-run in support of the assertion that pregnancy in teenage women has damaging effects on female health (Asmamaw, Tafere, & Negash, 2023). Similarly, the coefficient of HIVF at lag zero supports the stance that HIV is deleterious to health thus reducing the expected number of years at birth. However, the coefficient at lag 1 is positive but insignificant. In addition, the short-run coefficients of HIVF show that HIVF has a negative influence on female health in the short-run in Eswatini. The coefficients of GDPG and URBPG in the current period are negative. However, only the URBG coefficient is significant. The significant negative influence of URBG implying health disadvantage in the short-run is contrary to the obtained result of health advantage for South Africa.

In the long run, FLFP has an insignificant negative influence on female health in South Africa while in Eswatini, the long-run influence of FLFP is positive but also insignificant. It is unanticipated that FLFP has a consistent, negligible effect because women's increased economic involvement is assumed to improve their financial situation and enable them to better manage their health care and other essential elements of improved health (Cuberes, Newlak, & Teigner, 2017; World Bank, 2023), (OECD/International Labour Organization (OCED/ILO), 2019). The insignificant effect of FLFP on female health aligns with the findings of Cai and Kalb (2006) who found that increase in FLFP has an insignificant effect on the health of younger female in Australia. The literacy rate represented by females school enrolment has an insignificant positive effect on female health outcomes in South Africa and a significant positive effect in Eswatini. The insignificant effect in South Africa is quite surprising given the significant increase in public spending on education which has resulted in impressive school enrolment and an improvement in literacy in the country (OECD, 2019). The significant positive effect in Eswatini corroborates the wide agreement that education fosters better health (Raghupathi & Raghupathi, 2020; Zajacova & Lawrence, 2018) .

The long run ADOLFER coefficients in both models show that adolescent pregnancy reduces female life expectancy (Asmamaw et al., 2023; Sewpaul, Crutzen, Dukhi, Sekgala, & Reddy, 2021).The results are not surprising given the high prevalence of adolescent pregnancy in both countries and the health risks associated with it. Sewpaul et al. (2021) assert that the high prevalence rate of pregnancy among adolescent girls is associated with increased rate of health risks and maternal deaths in South Africa. Similarly, the long run elasticity coefficients of HIVF show that HIV has a statistically significant and negative influence on female life expectancy in both countries. The result deviates from the emerging findings that HIV-related mortality is declining in South Africa and Eswatini due to the scaling up of antiretroviral therapy (ART) (Akullian et al., 2020; Johnson et al., 2017). In particular, highly active antiretroviral therapy (HAART) is claimed to reduce the death rate by protecting against opportunistic infections and enhancing the immune system's effectiveness. The findings nonetheless reinforce the widespread stance on the health penalty of the epidemic particularly in SSA (Nyasulu et al., 2022). Comparing the health effects of the HIV epidemic and teenage pregnancy, the deleterious impacts are higher in Eswatini with a unit increase in adolescent pregnancy reducing female life expectancy by 2.11 years in Eswatini and 0.86 years in South Africa. Similarly, a percentage increase in the HIV prevalence rate reduces the expected number of years a female child would live in Eswatini and South Africa by 0.13 years and 0.03 years respectively.

The long run coefficient elasticities of GDPG and URBG are positive and statistically significant in South Africa suggesting that income and urbanization promote better health in the country. In contrast, the coefficients of both indicators are negative and statistically insignificant in Eswatini. The South African results validate the wealth is health debate which has been earlier corroborated by Ataguba et al. (2015) and later on by Salahuddin et al. (2020). Similarly, the evidence of the health benefits of urbanization in South Africa aligns with the findings of the cross-country analysis of Tripathi and Maiti (2023) and Jemiluyi (2021) on Nigeria. The contradiction of the results to the extensive opinion in favour of the health penalty of urbanization (Brueckner, 2019) might not be unrelated to the impact of diverse transformative policies aimed at recovery from the challenges of inequality legacies of the apartheid system. The World Bank-backed Integrated Urban Development Framework (IUDF) and the Cities Support Programme (CSP) are examples of policies aimed at inclusive and sustainable urbanization that have been put into place since apartheid was abolished and the political transition that followed. These policies aim to address the issues caused by the growing demand for infrastructure. (World Bank, 2018). Although urbanization trend in Eswatini is rising, the process has been largely unplanned with significant social and environmental costs in terms of environmental degradation, pollution, unemployment, housing and infrastructure dearth (United Nations, 2020).

4.3. Post Estimation Diagnostic Tests

The ARDL-ECM models are subjected to post estimation tests to affirm the robustness and consistency of the study's outcomes. We test for serial correlation and heteroscedasticity in the models to ascertain that the models' error terms are not correlated with the regressors and to ensure the constancy of the error term variance. The test for homoscedasticity of the error term variance for both regressions fails to reject the null hypotheses using the Breusch-Godfrey heteroscedasticity test. In the same vein, the Breusch-Godfrey LM test suggests the absence of serial autocorrelation in both models. The results for the diagnostic tests are presented in Table 6.

Table 6. ARDL-ECM diagnostic.

Tests	South Africa	Eswatini
Breusch-Godfrey serial correlation LM test	41.322 (0.1217)	0.395 (0.6792)
Heteroscedasticity test: Breusch-Pagan-Godfrey	0.701 (0.7740)	1.595 (0.1688)
Ramsey RESET test	0.758 (0.4596)	0.091 (0.9291)
Jarque-Berra normality test	3.630 (0.1628)	1.260 (0.5327)

Furthermore, the absence of an econometric limitation on misspecification was affirmed by the Ramsey reset test. Lastly, we assess the stability of the estimated parameters for each model using the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ). All the models are stable as the lines are within the 5 percent critical boundaries as presented in the Appendix.

5. CONCLUSION

This study aims to analyze the socioeconomic determinants of female health outcomes in two selected Southern African countries South Africa and Eswatini using gender-specific factors. Socioeconomic factors used in this study have varying relationships with female health outcomes measured by female life expectancy. Female labour force participation has insignificant effects on female health in both countries while HIV and adolescent pregnancy have statistically significant reducing effects on female life span in both countries. On the other hand, income and urbanization positively impact female health in South Africa thereby increasing life expectancy while both measures have an insignificant negative effect on the life expectancy of female Swazis. Furthermore, improved literacy fosters better health in Eswatini and its impact on female South Africans' health is insignificant. Although the findings are mixed, they corroborate the divergent conclusions in the literature. These dynamics could have been obscured in a pooled analysis or time-series analysis based on aggregate data without consideration for gender differentials. This research engages policy makers and strategists in the health sector on the right policy mix to achieving better health outcomes. In particular, gender disparities should be addressed in policies and actions geared towards achieve health goals as outlined in the SDG framework. Moreover, policies and strategies aimed at fostering better health outcomes by solving national priority health challenges, in particular the HIV/AIDS epidemic and health-risk behaviour should be logically pursued.

Further contribution to the literature could contemplate time series analysis on other economies as well as panel analyses of pooled countries.

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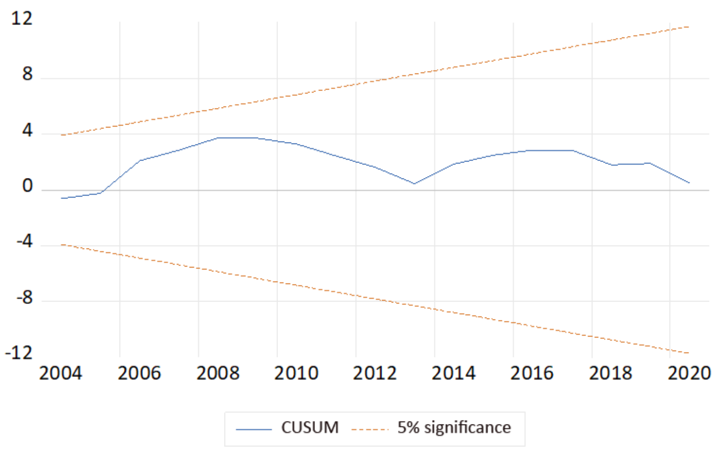
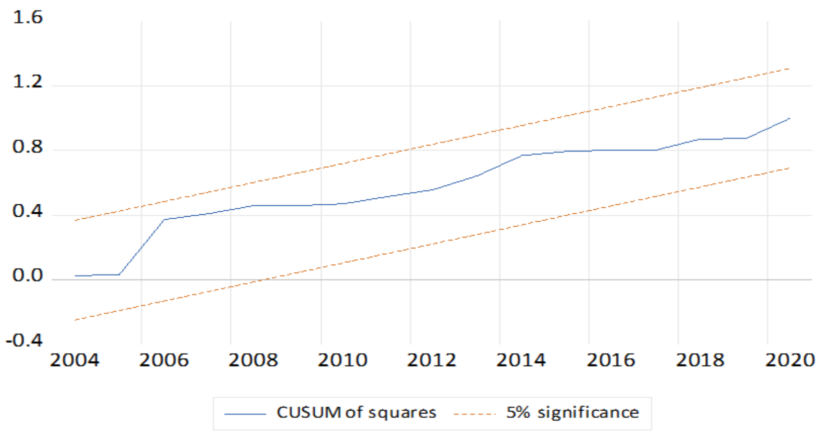
APPENDIX

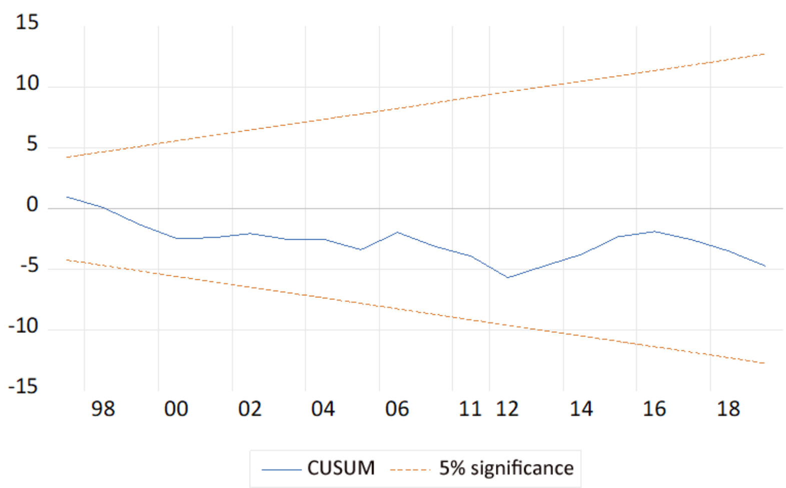
South Africa: CUSUM test.



South Africa: CUSUM of square test.



Eswatini model: CUSUM test.



Eswatini: CUSUM of square test.