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Financial Inclusion, Institutional Efficiency and Undernourishment in Sub-Sahara Africa

[1]Andy Titus Okwu, [2]Jerry Kwarbai & [3]Gregory Ehidiamen Oamen
[1]*Department of Economics, Babcock University, Ilishan-Remo, Nigeria*
[2]*Department of Accounting, Babcock University, Ilishan-Remo, Nigeria.*
[3]*Department of Finance, Babcock University, Ilishan Remo, Ogun State, Nigeria*

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Abstract

The governments of Sub-Saharan African (SSA) countries and international organizations have undertaken a variety of undernourishment-targeting initiatives, such as financial inclusion, humanitarian interventions, social reengineering and institutional changes, in line with the United Nations' top priority of eradicating undernourishment as articulated in the Sustainable Development Goals (SDGs). We have investigated the crucial role that institutional quality plays in diminishing the prevalence of undernourishment through financial inclusion in sub-Saharan Africa. With a time, scope of 18 years and a cross-sectional scope of 29 SSA nations, we used the system generalized Methods of Moments (system-GMM) in a panel data setting for our analysis. For the linear system-GMM, we discovered a strong positive self-replicating effect of prevalence of undernourishment, diverse effects of financial inclusion, and an unremarkable role of institutions. However, in the context of a nonlinear system-GMM method, the role of institutions strengthens the impact of financial inclusion. Therefore, we stressed the need for relevant authorities to develop informed policy alternatives that are based on instantaneous surveillance of changes in prevalence of undernourishment in the SSA region.

Keywords: *Financial inclusion, Institutions, Poverty reduction, Undernourishment, Sys-GMM.*

Corresponding Author: **Andy Titus Okwu**

Background to the Study

Although, undernourishment is a worldwide issue, sub-Saharan Africa and other developing countries of the world are mostly plagued by undernourishment. The Sustainable Development Goals (SDGs), which aim to dramatically reduce undernourishment in the nearest future, considers undernourishment as a top priority in view of its multidimensionality and detrimental consequences on people and economies. Therefore, a significant problem for nations and international organizations is narrowing the gap of undernourishment among the population. In response to this, governments in SSA and international organizations have implemented a variety of undernourishment-targeting measures including financial inclusion, institutional changes, social reengineering, and humanitarian interventions. Despite these initiatives, policy changes, and interventions, undernourishment is still a serious issue in developing nations in general and in Sub-Saharan Africa (SSA) in particular.

The number of undernourished people in sub-Saharan Africa rose from 181 million in 2010 to almost 222 million in 2016 (World Health Organization, 2021). In similar terms, the World Bank (2020), indicates that prevalence of undernourishment in Sub-Saharan Africa which stood at 26% in 2001 decline to 17% in 2013 and persistently increased thereafter to 21% in 2020. In 2020, there were 9.9% more people who were undernourished than there were in 2019. In Africa, 21.0% of the population suffers from hunger, compared to 9.0% in Asia and 9.1% in Latin America and the Caribbean (United Nations, 2020). The United Nations (2020) report on ending hunger, achieving food security, improving nutrition and promotion of sustainable agriculture indicates that more than one-third of the world's undernourished people (282 million) live in Africa. Given that the landscape of undernourishment seems to have no hope for the SSA region due to a succession of economic shocks including the COVID-19 pandemic, climate change, and the Russia-Ukraine war, this becomes increasingly difficult and worrisome. The burden of undernourishment is prevalent in Sub-Sahara Africa often because of the increasing consumption of foods that are low in nutrient quality. Overpopulation, which is more prevalent in poorer nations, such as Sub-Saharan Africa can lower food sufficiency, causing undernourishment which can lead to poverty, which further impedes economic and social growth. Poverty, undernourishment, food insecurity, and hunger are as old as time in Sub-Saharan Africa, likely to prevail in the future with no visible end in the nearest foreseeable future. These situations co-exist in SSA which is the home to the world's poorest countries in the midst of conflicts, wars, climate changes, corruption, leaders' ineptitude, and human greediness. After Asia with 381 million undernourished people, Sub-Saharan Africa is the region with the highest prevalence of undernourishment (250 million), thereby questioning the national and regional capacities for eradicating hunger and undernourishment (World Health Organization, 2020). Poverty and undernourishment prevail in Sub-Saharan Africa, because of economies and not scarcity (Bonuedi et al, 2020).

The eradication of prevalence of undernourishment as well as the acceleration of economic growth and development through financial inclusion have recently been explored by both developed and developing nations. In addition, the literature supports it as a real tool for inclusive economic growth via employment, reduction in resource and income inequality, and

reduction in poverty (Jalilian & Kirkpatrick, 2005; Triki & Faye; 2013, Nanziri, 2016; Ibrahim & Olasunkanmi; 2019).

As a crucial element of a nation's financial structure, financial inclusion denotes a conscious effort on the part of relevant decision-makers to expand the range of financial services and products available to previously underserved populations at reasonable prices. Demirguc-Kunt *et al* (2017) remark that opening savings or deposit accounts with banks, insurance companies, or other financial service providers is the first step toward achieving financial inclusion. However, it appears that the issue of financial exclusion is particularly acute among disadvantaged groups, such as low-income earners, residents of rural areas, and owners of small companies. By implication, access to financial services is skewed toward the more privileged population, hence expanding access to the poor and socially disadvantage socioeconomic strata is still a top objective globally in the fight against poverty (Matsebula & Yu, 2020).

The drive for this study is premised on the extant literature, suggesting a strong link between financial inclusion and reduction in prevalence of undernourishment (Triki & Faye, 2013; Fadun, 2014; Nkwede, 2015; Park & Mercado, 2015; Boukhatem, 2016; Demirgüç-Kunt et al., 2017; Mohammed et al., 2017; Umaru & Chibuzor, 2018; Churchill & Vijaya, 2020; Omar & Inaba, 2020; Eze & Alugbuo, 2021).

The SSA continues to be the epicenter of undernourishment and the high prevalence of undernourished people, despite the fact that financial inclusion has recently gained major importance in the region as evidenced by the constantly expanding number of banks' product lines. This is partially due to the fact that earlier research downplayed the significance of several elements in the connection between financial inclusion and undernourishment in the SSA region. Additionally, none of the research compared more than two different methodologies. In this study, we propose that improving financial inclusion programs through institutional efficiency is essential to lowering the prevalence of undernourishment and the number of undernourished individuals. As a result, our primary contributions to the empirical literature on SSA include (i) an examination of the role institutional efficiency plays as a catalyst in the relationship between financial inclusion and the reduction of prevalence of undernourishment in the SSA region, and (ii) a comparison of estimates from linear and nonlinear estimation procedures in order to draw conclusions and make recommendations.

Theoretical Framework and Literature Review

The analytical foundation for this study is based on the neoliberal viewpoint on poverty that is driven by new Keynesians, North's (1990) theory of institutional framework, and Ozili's (2020) theory of financial inclusion. According to the neoliberal viewpoint, pervasive underdevelopment also leads to poverty in addition to market inefficiencies. According to the theory, unemployment is the primary cause of poverty and undernourishment, and it therefore promotes income redistribution through monetary and fiscal policy. Sachs (2005) identifies unemployment as one of the key symptoms and causes of poverty, along with ineffective institutions, lack of business capital, poor human health, lack of education and the

necessary skills, and lack of socioeconomic infrastructure. Institutional framework, on the other hand, places emphasis on a country's capacity to bring about a successful economic change by addressing social and economic issues like poverty through effective institutions. Similar to this, the financial inclusion theory calls for an open spectrum of financial inclusion for every member of society without any exclusivity. The core tenet of these theories is that by promoting financial inclusion and allowing effective institutions to play certain moderating roles, prevalence of undernourishment, poverty, unemployment, income inequality, and other social and economic issues can be reduced.

Using various econometrics methodological approaches, the relationship between financial inclusion and prevalence of undernourishment/poverty has been examined in a number of earlier research. For instance, Chemli (2014), observed reduced prevalence of undernourishment and poverty among the poor in the Middle East and North Africa (MENA) through loans and greater access to financial services within the autoregressive distributed lag model (ARDL) framework. Through several methodological techniques, Bakari et al. (2015) and Ayensu et al. (2017) discovered that the ratio of credit to private GDP, access to banking services like ATMs, access to information technology, and government spending all help to reduce prevalence of undernourishment/poverty. The moderating role of microfinance banks in the relationship between financial inclusion and prevalence of undernourishment & poverty in Kebbi State, Nigeria, was examined by Hussaini and Chibuzor (2018) in a related study. The results provide compelling evidence that micro lending promotes the financial inclusion that can reduce prevalence of undernourishment. Similar results were found in a study by Calderon et al. (2018) for 57 countries between 2005 and 2008. The results of some other investigations (Muritala and Fasanya (2013) Boukhatem, 2016; Zahonogo; 2017; Fadun; 2014; Aribaba et al., 2020) further support these conclusions.

The review clearly shows that there is a consensus among the studies. It also shows that the role of microfinance, a minor element of any nation's financial industry, was not taken into account by many research. The inference is that they have historically ignored the economies' primary financial infrastructure. Therefore, this essay contends that in their examination of reduction of prevalence of undernourishment and poverty, the studies understated the crucial importance of financial inclusion.

Methodology

Within the framework of panel data setting, we used the Generalize Method of Moments (GMM). This analytic approach is appropriate because our dataset includes both cross-sectional and time dimensions. Additionally, when the cross-sectional scope is greater than the time scope (N > T), the GMM estimator is the right choice. Cross-sectional dependence and probable endogeneity bias are also problems that the estimator helps to address (Roodman, 2009). The GMM procedures are the differenced-GMM (Holtz-Eakin, Newey & Rosen, 1988; Arellano & Bond, 1991; Blundell & Bond, 1998) and system-GMM (Arellano & Bover, 1995). Using the *xtabond2* and *xtdpdgmm* Stata commands, we utilize the linear and nonlinear system-GMM procedures in this study. The steps are based on two special strengths: the first is to deliver robust results regardless of the divergence of the enlisted panel series from

normal distributions; the second is to provide unique insights that were lacking in earlier studies, thereby extending the trajectory of knowledge. Due to the technique's effectiveness, some have used it in the past (Boukhatem, 2016; Bolarinwa et al., 2021). Our analysis spans a cross-section of 29 SSA nations over a period of 18 years (2004–2021).

In view of the above, predictive models were constructed which quantify the response of prevalence of undernourishment (ML) to financial inclusion (FI) before and after interactions with the proxies of institutional efficiency (IE). For FI, we identify these indicators: (i) Commercial bank deposits (DCB); (ii) Commercial bank loans (LCB); and (iii) The total number of commercial banks (NCBB). While LCB approximates the strengths of banks in providing credit facilities to the desired population for a variety of objectives, DCP gauges the deposit capacity of the banked population. NCBB measures how widely the banks' financial services outlets are available to the general public. On the other side, we create a composite index of the six IE indicators using principal component analysis (PCA). This makes it possible for us to work with the many institutional efficiency dimensions without significantly losing information. The model takes the form (see Acheampong *et al.*, 2021; Kouadio & Gakpa, 2022).

$$ln\, ML_{i,t} = \beta 0 + \beta 1\, lnDCB_{i,t} + \beta 2\, lnLCB_{i,t} + \beta 3\, lnNCBB_{i,t} + \mu t \ldots\ldots\ldots\ldots\ldots\ldots \text{Model 1}$$

$$ln\, ML_{i,t} = \theta_0 + \theta 1 ln(IE{*}DCB)_{i,t} + \theta 2 ln(IE{*}LCB)_{i,t} + \theta_3 ln(IE{*}NCBB)_{i,t} + \varepsilon_t \ldots. \text{Model 2}$$

where ML, DCB, LCB, and NCBB have the same meanings as before. The interactions of institutional effectiveness with the corresponding financial inclusion indicators are denoted by the symbols IE*DCB, IE*LCB, and IE*NCBB. The models' intercepts, $_0$ and $_0$, each represent prevalence of undernourishment in the absence of financial inclusion*, i* and *t* are the cross-sectional and regular time frequency identifiers, respectively, and is the zero mean idiosyncratic error term. $_k$ *(k = 1, 2, 3)* is the vector coefficients of the predictor series, each capturing the nature and magnitude of the effect of a given change in the associated predictor series on the predicted series.

To account for variations in measurement units, the variables on the right-hand side of the equations are translated to their natural logarithms (ln). We calculated and analyzed model 1 and model 2 parameters. The nature, magnitudes, and statistical significance of the models' effects on prevalence of undernourishment in the SSA region were then considered in comparing the coefficients of the models. Through post-estimation testing, we also confirm the reliability of the coefficient estimations.

Results and Discussion

The results of the analyses are presented tables 1, 2a qnd 2b, interpreted and subsequently discussed.

Table 1: Descriptive Statistics

Series	*ln*ML	*ln*OD	*ln*OL	*ln*NB	IE
Mean	2.561	12.755	11.973	1.403	-0.495
Median	2.785	13.315	12.685	1.398	-0.574
Maximum	4.072	28.842	21.421	4.008	0.875
Minimum	0.000	3.281	-0.798	-1.028	-1.724
Std. Dev.	0.955	2.564	3.391	1.032	0.624
Skewness	-1.192	0.050	-1.424	0.213	0.405
Kurtosis	4.101	5.105	6.408	3.087	2.367
JB	149.9	96.627	429.23	4.127	22.975
JB Prob.	0.000	0.000	0.000	0.126	0.000
Obs.	522	522	522	522	522

Note: *Std. Dev., JB and Obs denote standard deviation, Jarque-Bera statistic and number of observations, respectively.*
Source: Author's computations

Table 1 highlights the summary of descriptive statistics of the data on the indicators of financial inclusion and institutional efficiency. Following the results, the mean of logged prevalence of undernourishment is 2.561, while the standard deviation is 0.955 which indicates that the pattern of prevalence of undernourishment was devoid of volatile fluctuations during the period under review. The values of the standard deviation of the financial inclusion metrics reveal that loans from commercial banks were more dispersed (std. = 3.391) than deposit with commercial banks (std. = 2.564). Number of commercial banks' branches (NCBB) was the least dispersed (Std. = 1.032). The mean of 1.403, with the standard deviation of 1.032, shows that number of banks' branches exhibited no dispersion during the period. The mean value of -0.495 and standard deviation of 0.624 indicate that institutional efficiency of the SSA region was widely dispersed. The result also shows that the mean of all the series lie between their maximum and minimum values, implying that the series converged to the cross-sectional average (Opuala, Omoke & Uche, 2022).

In addition, ML and LCB exhibited negative skews, while DCB, NCBB and IE exhibited positive skews. Furthermore, the Jarque-Bera statistics suggests that all the series, except NCBB, deviate from normal distribution. Instructively, the application of a dynamic model like the system GMM procedures are formidable to circumvent the potential challenges of such deviations from normality (Devangi & Lee, 2013).

Partial Correlation Coefficients
The partial correlation coefficients are presented in Table 2a and 2b.

Table 2a: Pairwise correlation estimates – Model 1

Series	*ln*ML	*ln*OD	*ln*OL	*ln*NB
*ln*ML	1.000			
*ln*OD	0.041	1.000		
*ln*OL	-0.101**	0.641***	1.000	
*ln*NB	-0.493***	-0.245***	0.021	1.000

***Note**: ***, ** and * denote significant relationships at 1%, 5% and 10% significance levels, respectively.*
Source: Author's computations

Table 2b: Pairwise correlation estimates – Model 2

Series	*ln*ML	*ln*OD*IE	*ln*OL*IE	*ln*NB*IE
*ln*ML	1.000			
*ln*OD*INSQ	-0.226***	1.000		
*ln*OL*INSQ	-0.133***	0.675***	1.000	
*ln*NB*INSQ	-0.055	0.661***	0.762	1.000

***Note**: ***, ** and * denote significant relationships at 1%, 5% and 10% significance levels, respectively.*
Source: Researcher's computations

The coefficients indicate that *DCB* is a potential positive predictor of prevalence of undernourishment, while LCB, *NCCB* and *lE* are potential significant negative predictors of prevalence of undernourishment. It is evident from the results that with the moderating influence of institutional efficiency, all financial inclusion series were likely negative predictors of prevalence of undernourishment in SSA. In addition, despite that multicollinearity does not sufficiently influence the accuracy of regression models, the coefficients in Table 2a and Table 2b, possible challenge of multicollinearity among the predictor series in this study is ruled out in both, given that the values of the correlation coefficients are below the eighty percent tolerable limit. (Baltalgi, 2009).

Regression Analysis Results

Table 3: Estimates of two-step System GMM (*xtabond2* linear process)

Model 1 - ln $ML_{i,t} = \beta 0 + \beta 1\ lnDCB_{i,t} + \beta 2\ lnLCB_{i,t} + \beta 3\ lnNCBB_{i,t} + \mu t$			
Series	*Coeff.*	*z-stat*	*Prob.*
lnML(L1)	0.023***	57.663	0.000
lnDCB	0.003***	6.51	0.000
lnLCB	-0.002**	-5.16	0.000
lnNCBB	0.005	0.72	0.474
Constant	0.017	0.32	0.748
$ln\ ML_{i,t} = \theta_0 + \theta 1 ln(IE*DCB)_{i,t} + \theta 2 ln(IE*LCB)_{i,t} + \theta_3 ln(IE*NCBB)_{i,t} + \varepsilon$			
lnML(L1)	0.037***	61.89	0.000
*IE*DCB*	-0.004***	3.20	0.001
*IE*LCB*	-0.002***	-6.61	0.000
*IE*NCBB*	0.006	0.65	0.518
Constant	0.126***	3.04	0.002

*Note: *** and ** denote significant at 1% and 5% levels of significance, respectively.*
Source: Authors' computations (2023).

Summaries of the estimates are presented in Table 3. Essentially, the results show a significant positive self-reinforcing attribute of prevalence of undernourishment in SSA. Interestingly, the self-reinforcing attribute is consistent when one-period lagged prevalence of undernourishment is considered (Model 1). Specifically, prevalence of undernourishment increases significantly by approximately 2.3% given a one percent change in prevalence of undernourishment in the previous year. In addition, prevalence of undernourishment continued its autoregressive effects even when the moderating influence of institutional efficiency (IE) is factored into the relationship (Model 2). Specifically, it is realized that the self-reinforcing effects of prevalence of undernourishment stood at 3.7% when the moderating effect of IE was considered alongside the financial inclusion series. This implies that IE enhanced the autoregressive effect of prevalence of undernourishment by 1.4%. These findings are consistent with Churchill and Marisetty (2020) and implies that prevalence of undernourishment is naturally persistent in SSA.

In line with theoretical postulations, LCB demonstrated significant negative effects on prevalence of undernourishment. *($_2$ = -0.002, p-value = 0.000)*. On the other hand, prevalence of undernourishment increases by 0.3 percent and 0.5 percent in response to 1 percent increase in DCB and NCBB per 100, 000 adults respectively. By implication, the effect of DCB and NCBB negates theoretical postulations. While the effect of DCB is significant, that of NCBB per 100, 000 adults is insignificant. Thus, the DCB and NCBB per 100, 000 adults in SSA are unconnected with prevalence of undernourishment drive of the region. Overall, the estimates suggest lackluster and unimpressive positive influence of financial inclusions series in the quest for the reduction of prevalence of undernourishment in the SSA region.

Remarkably, coefficients of the interactions provided evidence that institutional efficiency boosted only the effect of deposits with commercial banks (DCB) to reduce poverty rate by -0.4 percent from a significant positive effect of 0.3 percent in the SSA region during the period under consideration. Institutional efficiency worsened prevalence of undernourishment in the region. The estimates show that for 1 percent increase in the interactions IE*LCB and IE*NCBB, prevalence of undernourishment decreased by 0.2 percent and increased by 0.6 percent, respectively. The implication is that, largely, the institutions are effectively consistent with the drive initiatives (except NCBB) to reduce prevalence of undernourishment in the SSA region. This finding is consistent with some previous studies (Cepparulo *et al.*, 2019; Aracil et al., 2022).

Table 4: Estimates of two-step System GMM (*xtdpdgmm* nonlinear process)

Model 1 - ln $ML_{i,t} = \beta 0 + \beta 1\ lnDCB_{i,t} +_{,} \beta 2\ lnLCB_{i,t} + \beta 3\ lnNCBB_{i,t} +_{\mu t}$			
Series	*Coeff.*	*z-stat*	*Prob.*
lnML(L1)	0.022***	14.43	0.000
lnDCB	-0.005	-0.41	0.684
lnLCB	-0.016	-0.88	0.378
lnNCBB	0.044	0.99	0.323
Constant	0.574**	2.46	0.014
Model 2 - ln $ML_{i,t} = \theta_0 + \theta 1 ln(IE*DCB)_{i,t} + \theta 2 ln(IE*LCB)_{i,t} + \theta_3 ln(IE*NCBB)_{i,t} + \varepsilon$			
lnML(L1)	0.031***	13.20	0.000
*DCB*INST*	-0.007**	-2.15	0.032
*LCB*INST*	-0.001***	-4.30	0.001
*NCBB*INST*	0.070	1.95	0.051
Constant	0.350**	1.99	0,046

***Note**: *** and ** denote significant at 1% and 5% levels of significance, respectively*
Source: Authors' computations (2023)

The results of the alternative estimation procedure presented in Table 4 confirm the self-reinforcing significant positive effect of prevalence of undernourishment in SSA. It is imperative that the significant positive self-reinforcing effects of prevalence of undernourishment is notable in all the models, even when the institutional efficiency series are interacted with the financial inclusion series. In addition, the estimates provide evidence that while DCB and LCB were negatively insignificant in reducing prevalence of undernourishment without efficiency of the institutions, interactions of institutional efficiency with the financial inclusion series except NCBB were significant in reducing poverty in the SSA region ($_1$ = -0.007; p-value = 0.032; $_2$ = -0.001; p-value = 0.001). These suggest that prevalence of undernourishment in SSA declined by approximately 0.7 percent and 0.1 percent for 1 percent increase in DCB and LCB respectively. This shows that the coefficients of the interacted series in the model conformed to theoretical prescriptions except NCBB which has insignificant positive effect on prevalence of undernourishment. From the foregoing, efficient institutions are critical in initiatives aimed at reducing prevalence of undernourishment through financial inclusion.

Comparatively, these findings demonstrate that the nonlinear system GMM technique enhances the appealing impacts of institutional efficiency. In contrast to the linear system GMM technique, the nonlinear system GMM procedure places a greater emphasis on the effectiveness of institutions. One of the key contributions of this study is the comparable results of the linear system GMM and the nonlinear system GMM procedures. Such insights are obviously absent from earlier investigations. They are therefore absolutely essential for policy modifications that aim to end the threat of prevalence of undernourishment in the sub-region.

Post-Estimation Test Results
Results of the post-estimation tests are presented in tables 6 to 8.

Serial Correlation Test

Table 5: Summary of serial correlation tests

lnML = f(lnDCM, lnOL, lnNB)		
Series	*z-stat*	*Prob.*
	(*xtabond2* linear process)	
AR1	2.46**	0.038
AR2	0.61	0.545
lnML = f(lnOD IE, lnOL* IE, lnNB* IE)*		
AR1	-1.63**	0.026
AR2	0.64	0.523
	(*xtdpdgmm* nonlinear process)	
lnML = f(lnOD, lnOL, lnNB)		
Series	*z-stat*	*Prob.*
AR1	3.917**	0.018
AR2	1.235	0.216
lnML = f(lnOD IE, lnOL* IE, lnNB* IE)*		
AR1	-2.827***	0.004
AR2	2.565	0.090

***Note**: ** denotes significant at 5% level.*

Source: Author's computations

The results in the above table show that the probability values of all the lower-order (AR1) Arrelano-Bond serial correlation tests are less-than five percent (prob. < 5%), while that of all the higher-order serial (AR2) are higher-than five percent (prob. > 5%). Since these are consistent with the linear and nonlinear GMM procedures in this study, there is no evidence of serial correlation problem in the models.

Instruments Validity Test

Table 6: Summary of Instruments Validity Tests

(*xtabond2* linear process)		
lnML = f(lnOD, lnOL, lnNB)		
Series	Chi^2	Prob.
Sargan test	52.32	0.800
Hansen test	24.10	0.997
*lnML = f(OD*IE, OL*IE, NB*IE,)*		
Sargan test	14.78	0.400
Hansen test	22.26	0.999
(*xtdpdgmm* nonlinear process)		
Sargan-Hansen test	Chi^2	Prob.
lnPV = f(lnOD, lnOL, lnNB)		
2-step moment functions, 2-step weighting matrix	23.729	0.164
*LNPV = f(OD*IE, OL*IE, NB*IE,)*		
2-step moment functions, 2-step weighting matrix	23.470	0.959

Source: Authors' computations (2023)

It is evident from the results presented in table 6 that the effects of instruments over-identification are ruled out. This is because the probability values of both the Sargan and Hansen test statistics, for the linear system GMM and the Sargen-Hansen statistics for the nonlinear system GMM procedures are eloquent justification of the validity of the instruments.

Conclusion and Policy Recommendations

We draw conclusion that prevalence of undernourishment has a propensity to duplicate its impacts in the current year from its effect in the previous year on the basis of the significant and positive influence of the one-period lagged value of prevalence of undernourishment. Additionally, there were various degrees of effects on prevalence of undernourishment from financial inclusion indices. Although their effects were largely unimpressive, it is important to note that the crucial role of powerful institutions is relevant, given the fact that, through the nonlinear system GMM procedure, they improved the effect of financial inclusion series in lowering poverty in the sub-Saharan African region.

The results of this study call for the immediate implementation of well-informed policy solutions to reduce the threat of prevalence of undernourishment in the SSA region. Given that prevalence of undernourishment has a propensity to repeat itself, we advised that governments in the SSA region keep track of prevalence of undernourishment at all times, recognize when it increases, and implement measures to lessen its impact on poor people. In essence, the availability of such statistics will enable the various governments in the region to develop more flexible policy directives for combating undernourishment. More clearly defined policies that are aimed at the unique characteristics of each indicator are needed in the light of the inconsistent and underwhelming effects of financial inclusion indicators in the reduction of prevalence of undernourishment. By implementing policies that eliminate credit and information restrictions through broad-based financial inclusion, the effects of these indicators may become more desirable. The creation and adoption of more effective pro-poor financial solutions geared toward the disadvantaged members of the society could significantly contribute to the achievement of the 2030 goal of eradicating prevalence of undernourishment. Additionally, expanding social networks and the number of commercial bank branches could result in a notable decline in prevalence of undernourishment in the sub-Saharan African region. If strong and effective institutions are not in place to support the reduction of undernourishment, the goal of reducing prevalence of undernourishment to its absolute minimum will remain unattainable. In this regard, policies that could improve currently existing institutions are crucial if the goal of eradicating prevalence of undernourishment is to be achieved in accordance with the top priority Sustainable Development Goal One (SDG) 1.

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