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Child Poverty, Status of Rural Women and Education in Sub Saharan Africa

Abstract

Africa's disadvantaged children are rural, malnourished, out of school, child brides or child labourers and have illiterate mothers who were denied access to productive resources. Our objective is to analyse factors affecting child poverty. Endogenous variables are under five mortality rate, primary school enrolment and child underweight. Endogeneity led to the use of Three Stages Least Squares simultaneous equations and fixed effects methods. The estimated elasticities indicate that female employment in agriculture has the greatest effect on under five mortality rates, while crop production index has the greatest effect on primary school enrolment and child underweight. Elasticity ranking shows that what is at issue is not the effect of education on reducing child poverty or the effect of child poverty on reducing education, but the improvement of women's status particularly in agricultural sector. Policies for long lasting solutions should highlight institutional quality as a prerequisite in child poverty reduction, it presents children and women with equal opportunities to access basic needs and productive resources.

Keywords: Sub Saharan Africa; Child poverty; Rural women; Under-five mortality rate; Primary school enrolment; Child underweight; Institutions; Simultaneous equations model.

1 Introduction

There is no uniform approach for defining, identifying or measuring child poverty. The notion of poverty to some implies lack of income, while to some in addition to lack of income, poverty means the lack of the basic needs of life. Sen (1999:87) sees poverty "*as the deprivation of basic capabilities rather than merely as lowness of income, which is the standard criterion of identification of poverty*". Our definition of child poverty echoes Sen's definition of poverty as a deprivation of capabilities, we have also considered child rights principles and the concepts of deprivation approach in identifying and measuring child poverty. We thus define children living in poverty as those children who are deprived of interrelated material and sociocultural resources which are economic, political, social, cultural, physical and environmental in nature and are generally known to be very vital for child development.

Child malnutrition is declining both in percentages and in numbers at global level, for instance stunting fell from 32.5% in 2000 to 21.9% in 2018, in numbers it fell from 198.2millions to 149millions. Whereas in Sub Saharan Africa (Africa) stunting fell from 42.8% in 2000 to 33.6% in 2018, but rose in numbers

from 49.7 to 58.4millions (UNICEF/WHO/World Bank Group 2019). The rate of decline in stunting has not kept pace with population increases, resulting in a high number of stunted children overall.

This report among others indicate that Sub Saharan Africa (Africa) is the only region known to have rising child malnutrition, which accounts for a large percentage of child deaths. Hunger, poverty and disease are interlinked with each contributing to the presence and persistence of the other two (UNICEF 2013). The World Health Organisation (WHO 2019) reports that globally, significant progress has been made in reducing levels of mortality among children under five years of age (U5MR). Although Africa's U5MR has declined, child mortality rates are reported to be the highest across the globe. U5MR is highest in rural areas, since an average child living in a rural area is isolated from basic health services and adequate sanitation (Doherty 2008; UNICEF 2009). Early child deaths are preventable with interventions including immunization, adequate nutrition, safe water and food. In Africa, 29% male and 35% female children, adolescents, youths of primary and secondary age are out of school. Progress towards gender equality in primary education has been of mixed results (UNESCO 2018).

Why focus on child poverty? Firstly, over 50% of Africa's population are children under 18 years of age (UN World Population Prospects 2015). Secondly, the incidence of poverty among children is higher than the incidence of poverty amongst the population as a whole in Africa (Batana et. al 2013). Finally, poverty causes lifelong damage to children's minds and bodies, leading them into adulthood poverty and it thereby perpetuates a vicious cycle of poverty through generational transmission (Vorster and Kruger 2007). Why status of rural women? The wellbeing of children cannot be divorced from that of their mother. A mother suffers the consequences of her children's poverty while at the same time transmits her poverty to them. Most of Africa's population is rural and thus there is a high concentration of poverty in rural areas (Alkire et.al 2014).

The objective of this paper is to analyse the factors affecting child poverty by finding answers to the following research questions (i) Does lack of access to education cause child poverty or does child poverty cause lack of access to education? Or both and to what extent? (ii) To what extent can the low status of rural women be considered as a contributing factor to child poverty?

The present study is of great importance to Africa, to the policymakers and to the organisations working towards child poverty alleviation. The point to be focused on is not just poverty in general, but child poverty with highlights on primary school enrolment, out-of-school children (OOSC), child underweight,

rural women and institutions. A combination of the analysis of child education and health, with rural women's lack of access to productive resources and the role of institutions is most likely to improve on findings of previous studies on child poverty.

Maternal nutrition is intimately intertwined with infant health and survival right from the foetal stage through infancy. The kind of prenatal care a mother receives, the birthing care as well as the neonatal care for both the baby and mother mostly depends on the financial status of the mother and yet the link between mother's poverty and child poverty has not been given the due importance in the precedent studies. Previous studies on child poverty (UNICEF 2007; Gunes 2013; Fuchs et al. 2009) have advocated for mothers' education and health as key factors in reducing child poverty with minimal attention given to their availability and accessibility. Only good functioning of respective institutions determines the availability and accessibility of education and health.

We add to the precedent findings by emphasising that it is not enough to highlight economic policies in favour of mothers' education and health. To ensure their success there is need for them to be backed up by social norms which are expected to be receptive to gender equality in employment opportunities and wages, in accessing credit, in accessing productive inputs and information. It is not sufficient to enact laws and policies; their enforcement is also of utmost importance, and political institutions have to see to it that these laws are enforced to effect the positive changes. Thus, this study goes a step further than the previous studies by incorporating the key role of good quality institutions in explaining child poverty.

There is need to expand the literature on child poverty and make up for the missing parts. The consequences of low birth weight children such as underdeveloped cognitive ability are mostly irreversible and negatively affects child's health leading to poor performance at school and may carry on into adulthood and in the process affect his/her income earning prospects consequently creating vicious cycle of transgenerational poverty. This study revisits child poverty by giving education its rightful position as a solution to most of the other child deprivation indicators. It takes up this point further through econometric analysis to show that it is not just education but that the multidimensional nature of child poverty calls for the analysis of factors that interact with education in child poverty issues.

Section 2 of this paper is literature review which examines factors affecting child poverty using multidimensional deprivation approaches such as Bristol approach, Young Live Project and Children's Perspective approach. Women's status and the role of institutions in child poverty issues are examined.

Section 3 discusses data, model and presents results from the estimations of simultaneous equations using 3SLS and fixed effects panel data methods. Section 4 is the conclusion on the major findings and their implications.

2 Literature review of factors affecting child poverty

Children's needs are multifaceted and therefore require multidimensional measures and since child poverty has to do with deprivation of basic capabilities, this study uses selected readings that focus on child poverty (child deprivation) with insights of basic capabilities. Based on Brown and Madge (1982) and Townsend (1987), deprivation is defined as a state of being disadvantaged relative to the local community, or the wider society or nation to which an individual, family or group belong. According to Gordon et al. (2003) deprivation indices are broader measures, for this reason they are more inclusive and reflect different aspects of living standards including personal, physical and mental conditions, local and environmental facilities, and social activities and customs. Deprivation approach is one of the measures that is specific to children's needs. Under deprivation approach we are reviewing three approaches: Bristol approach, Young Lives Project and Child's perspective approach.

Bristol measures of child poverty are based on child rights, it analyses child poverty by measuring deprivation indicators such as education, health, food, information, safe drinking water, sanitation and shelter (Gordon et al., 2003). A child is said to live in absolute poverty if he/she is deprived of two or more deprivations. The Bristol group with the help of data from household survey conducted an empirical study on how children fare with respect to the seven deprivation indicators in all developing countries. Their findings report that 56% of children in low and middle income countries suffered from one or more forms of deprivation. South Asia and Africa had deprivation rates of more than 80%. Rural children in these two regions suffered deprivation rates of more than 90% (Gordon et al. 2003). The report indicates that poor shelter and sanitation take the lead in deprivations experienced by children.

The Young Lives project focuses on filling in the gap of lack of information on the changes in children's well-being overtime. It does this by putting under observation about 12,000 children and their families for over 15 years in Ethiopia, Peru, Vietnam and India (Camfield et al. 2008). The project aims to examine all aspects of children's lives. Empirical regressions on the chosen children are done every three years, results of the first attempt revealed that in all the four countries, children experienced high levels

of deprivation from basic needs such as clean water, quality education, electricity and proper shelter (UNDP 2004:5, REF. UNICEF 2006). Young Lives project covers areas that are crucial to children's wellbeing that have not featured in the Bristol study such as childcare, child work and childrearing. The study is in a position to determine any changes in the causes and consequences of child poverty since it follows a set of children for a specified period.

Child's perspective deprivation approach is founded on children's views on living in poverty gathered from them during interviews. Witter and Bukokhe (2004), carried out interviews on children's perceptions of poverty, participation and local governance in Uganda. The findings from children's response indicates that children stressed the fact that, it is crucial to deal with child poverty issues separately from general poverty. Children's World Congress on Child Labor (CWCCCL) hosted in Florence Italy in May 2004 invited around 200 children mostly between the age group 14-17 years from different regions, countries and organisations as main speakers. Most of the child delegates were former child labourers and activists, implying that they understood better than adults children's wishes on how a child's life should be. The mission of child delegates was to express their opinions and to identify their capabilities. Their responses to the three most relevant capabilities in a child's life ranked education first with 75% scores, followed by health with 36% scores, leisure with 25% scores, social relations takes the fourth position, information the fifth and shelter the sixth (Biggeri et al. (2005).

Bristol approach and Young Lives Project analyse child poverty by measuring deprivation indicators that cover children's multifaceted needs, but these studies have not included status of rural women as well as roles of institutions a determinant factor in children's and women's access to basic needs and productive resources. Women's lack of access to productive resources due to social cultural norms that discriminate against women not only exacerbates their low status but also affects the wellbeing of their children. Smith et al. (2003) defines women's status as "*women's power relative to men*". Women with low status are generally known to have both less access to and control over productive resources, tighter time constraints, poorer mental and physical health and lower self-esteem. How does rural women's low status contribute to child poverty? Women play three significant roles in the lives of children: (i) as mothers (ii) as main carers of children and (iii) the traditional domestic division of Labor leaves the management of poverty as women's responsibility (Lister 2005). In Africa women produce a large percentage of the continent's food, including both subsistence and market food, on small land holdings with very limited

150 access to productive resources, land inclusive (SOFA Team and Doss 2011). Duties of rural women
151 connotes that they play a major role in both child wellbeing and agricultural productivity.

152 Mo Ibrahim Foundation (2016) defines governance as the provision of the political, social and economic
153 goods that any citizen has the right to expect from his or her state and that any state has the responsibility
154 to deliver to its citizens. The definition of governance in terms of child poverty implies that institutional
155 actors and agencies have distinct roles, responsibilities and capacities that govern both policies of
156 resource allocation as well as provision of basic needs and services. Institutional fulfilment of their
157 commitments to child rights facilitates the achievement of the multifaceted needs of children.

158 Institutions depend on economic growth as a source of sufficient revenue to execute budget allocation
159 which enables public expenditure to be directed towards priority sectors that enhance child wellbeing
160 (Dzator and Chen, 2015; Easterlin and Angelescu, 2007). Studies have in the past questioned if there was
161 any systematic relationship between economic growth and the income share of the bottom quintile. These
162 studies concluded that the share tended to decline in the early stages of development, but increased in the
163 long-run (Lopez, 2004; Kraay, 2004). Akobeng (2016) points out that increasing economic growth does
164 not automatically translate into child poverty reduction.

165 Poor people can only benefit from economic growth if institutions frame pro-poor growth policies which
166 in the process reduce inequality levels. Diao et al. (2010) found that poverty growth elasticity is
167 consistently larger when growth is driven by agricultural growth than non-agricultural growth.
168 Alongside economic growth, government strategies have to turn to social protection programs directed
169 to areas which positively impacts children's capabilities. Public expenditure has been limited in most
170 African countries because of poor budgetary procedures and corruption (Delavallade, 2006; Wilhelm et
171 al. 2005).

172 **3. Data, model, results**

173 *3.1 Data*

174 In measuring factors affecting child poverty we have incorporated deprivation indicators from both
175 Bristol School and Young Lives deprivation approaches, we have extended on these approaches by
176 including low status of women and institutional quality. The econometric analysis on child poverty
177 equations have been estimated with a sample of 30 countries (between 1990-2010) out of the 46 sub
178 Saharan African countries, the criteria of the choice of countries has entirely been based on the

179 availability of data of our interest. A sample of 30 countries which although constrained by the
180 availability of data, is broadly representative.

181

182 Variable names' abbreviations, unit of measurements and descriptive statistics are presented in Table 1.

183 **Table 1 Descriptive statistics of factors affecting child poverty in Sub Saharan Africa.**

Variable	Units of measurement	Mean	Standard deviation	Minimum	Maximum	Abbreviation
Under five mortality rate	% proportion of live births	13.48	5.1	1.51	30.79	U5MR
Gender parity index	%	84.45	16.04	40.93	124.21	GPI
Out of school children	%	31.37	18.51	1.17	81.00	OOSC
Female employment in agri.	% propotion of FE employment Agri.	60.75	23.03	4.14	96.65	FAG
Mobile phone subscribers	%	33.34	32.49	0.00	100.00	MPH
Rural sanitation	% of rural population	25.00	21.24	0.00	88.00	RS
Primary school enrolment	%	68.84	18.34	22.28	98.83	PSE
Ibrahim Index African Governance	%	50.66	12.23	24.24	81.57	IAG
Female primary Sch. Teacher	% of total teachers	38.69	19.02	5.89	81.85	FPST
Orphans 0-17yrs currently living	%	1.87	3.76	0.01	25.00	ORP
Ratio female to male labor force participation rate	Pop. Ages +15 in %	80.14	18.39	10.23	108.08	RFM
Underweight children	%	23.70	8.62	3.30	49.60	CU
Crop production index	%	9.01	2.18	0.60	18.05	CPI
Wood fuel	%	11.27	15.61	0.01	76.60	WF
Child labor	%	15.66	16.96	0.59	93.82	CL
Health expenditure per capita	% of GDP	5.51	2.95	2.09	11.8	HE
Ethno linguistic fractionalisation	% total population	64.84	24.39	4.00	90.00	ELF
Girls out of school	%	4.53	8.15	2.09	54.88	GOS
Persistence to the last grade primary	Total % of cohort	55.03	18.95	16.16	98.45	PLG
Married women can open bank account	Dummy	0.73	0.44	0.00	1.00	MWBA
Paved Roads	% of total roads	22.01	22.37	1.00	100.00	PRD
Female enrol sec. vocational	%	38.35	11.04	8.65	86.22	FSV
Agricultural value added	% of GDP	4.52	12.66	-33.07	59.75	AGV
Regional dummy Eastern Africa	Dummy	0.30	0.46	0.00	1.00	EA
Regional dummy Southern Africa	Dummy	0.09	0.30	0.00	1.00	SA

Regional dummy Western Africa	Dummy	0.40	0.49	0.00	1.00	WA
Child marriage	% of total	21.16	2.33	17.60	28.00	CM

The major source of the data is the World Bank's African Development Indicators 2012. Other sources have been United Nations Educational Scientific and Cultural Organisations database (UNESCO) 2011, Economic Commission for Africa (ECA) 2011, United Nations Children's Fund (UNICEF) 2011, Demographic Health Surveys (DHS). These organisations have used household survey methods to collect the data, World Bank compiles international datasets, which are generally based on data generated by national statistical systems.

3.2 Model

Econometrically, we employ Simultaneous Three Stage Least Squares (3SLS) and fixed effects model with the help of panel data methods to run the econometric regressions of the three equations simultaneously. Data on child poverty in Africa are scarce and this has given rise to unbalanced panel data. Why simultaneous equations? Reverse causality creates endogeneity in the measurement of child poverty using U5MR as a dependent variable and independent variables of primary school enrolment rates and child underweight. High primary enrolment rates are assumed to reduce child poverty because of the benefits of education. While high percentages of OOSC are assumed to increase child poverty because of lack of education. However, there is the probability of reverse causality. High levels of poverty may cause children from poor families not to be enrolled in school because of a lack of funds to meet schooling costs, thereby leading to low primary school enrolment rates and increasing numbers of OOSC.

Children from poor families tend to suffer from malnutrition (child underweight) because of their lack of access to adequate nutritious food, thus child poverty contributes to child underweight. While child underweight contributes to child poverty because malnourished children generally have poor health that affects school attendance, concentration while at school which leads to poor performance and in the long run, affects earning potential in adult life. Simultaneous causality bias takes place when causality runs both from X (primary school enrolment) to (U5MR) Y and from Y to X. The coefficients of primary school enrolment and child underweight are the endogenous variables suspected to be correlated to the

error term. We have solved the endogeneity issue by running simultaneous equations model consisting of three equations U5MR, primary school enrolment (PSE) and child underweight (CU) with the help of the 3SLS.

U5MR is the probability expressed as a rate per 1,000 live births, a new born baby will die before reaching age five, if subject to current age specific mortality rates. Under-five mortality rates have been converted into percentages. U5MR is chosen by UNICEF as its single most important indicator of the state of a nation's children and human development. U5MR as an accurate measure of children's wellbeing is used by UNICEF to rank the nations of the world not in ascending order of their per capita GNP, but in descending order of their U5MR (UNICEF 2002 and 2008).

The econometric model is described by a simultaneous system of three equations which is given below

$$(a) \ U5MR_t = \alpha_0 + \alpha_1 * PSE_t + \alpha_2 * CU_{t-1} + \alpha_3 * GPI_t + \alpha_4 * FAG_t + \alpha_5 * AGV_t + \alpha_6 * HE_t + \alpha_7 * RS_t + \alpha_8 * ELF_t + \alpha_9 * GOS_t + \alpha_{10} * WA_t + \varepsilon_{1t} \quad (1.1a)$$

$$(b) \ PSE_t = \beta_0 + \beta_1 * U5MR_t + \beta_2 * CU_t + \beta_3 * GPI_t + \beta_4 * CPI_t + \beta_5 * PRD_t + \beta_6 * PLG_t + \beta_7 * CL_t + \beta_8 * GOS_t + \beta_9 * IIAG_t + \beta_{10} * ORP_t + \beta_{11} * FPST_t + \beta_{12} * MPH_t + \beta_{13} * SA_t + \beta_{14} * WA_t + \varepsilon_{2t} \quad (1.1b)$$

$$(c) \ CU_t = \gamma_0 + \gamma_1 * CU_{t-1} + \gamma_2 * U5MR_t + \gamma_3 * PSE_t + \gamma_4 * GPI_t + \gamma_5 * CPI_t + \gamma_6 * CPI_{t-1} + \gamma_7 * FSV_t + \gamma_8 * WF_t + \gamma_9 * MA_t + \gamma_{10} * OOSC_t + \gamma_{11} * MWBA_t + \gamma_{12} * IIAG_t + \gamma_{13} * MPH_t + \gamma_{14} * SA_t + \gamma_{15} * WA_t + \varepsilon_{3t} \quad (1.1c)$$

Where: α_0 to α_{10} correspond to the estimated coefficients of the U5MR equation

β_0 to β_{14} correspond to the estimated coefficients of PSE (primary school enrolment) equation

γ_0 to γ_{15} correspond to the estimated coefficients of CU (child underweight)

ε_{1t} , ε_{2t} and ε_{3t} are error terms corresponding to each one of the equations

Reverse causality creates endogeneity in the measurement of child poverty using U5MR as a dependent variable in equation (1.1a) and as an independent variable in equations (1.1b) and (1.1c) Similar problems

are created by using variables PSE and CU as endogenous variables in equations (1.1b) and (1.1c) and as exogenous in equations (1.1a) and (1.1b), respectively.

The explanatory variables for under-five mortality rate (child poverty) are- PSE, CU_1 (child underweight with 1 year lag), GPI (gender parity index), FAG (female employment in agriculture), AGV (agriculture value added), HE (health expenditure), RS (rural sanitation), ELF (ethnolinguistic fractionalization), GOS (girls out of school) and WA (West Africa).

The explanatory variables for primary school enrolment are- U5MR, CU, GPI, GOS, CPI (crop production index), PRD (paved roads), PLG (persistence to the last grade), CL (child labour), IIAG (Ibrahim's Index, African Governance), ORP (orphans), FPST (female primary school teacher), MPH (mobile phone subscribers), SA (South Africa) and WA (West Africa).

The explanatory variables for child health are- CU_1, U5MR, PSE, GPI, CPI, CPI_1 (crop production index with 1 year lag), FSV (female secondary vocational enrolment), WF (wood fuel), MA (age at first marriage), OOSC (out of school children), MWBA (married women can open a bank account), IIAG, ELF, MPH, WA and SA.

3.3 Results

Table 2- Estimates of factors affecting child poverty- here

The econometric model of Eq (1a)-Eq (1c) is estimated using 3SLS estimation techniques and the results are presented in Table 2. The estimated coefficients have the expected signs and most of them are statistically significant. In equation 1, the benefits of education in reducing child poverty (under-five mortality rate) are evident through the estimate of primary school enrolment which has a negative and statistically significant (1% level) effect on under five mortality rate. Furthermore, the estimated elasticity indicates that 1% increase in primary school enrolment will decrease under-five mortality rate by 0.46%. Gender parity index is used as a proxy for the status of rural women. In the present context the low status of women connotes not having equal access to education as compared to men. Regression results reveal that gender parity index is positive (0.09) and statistically significant at the 1% level of significance. Furthermore, the estimated elasticity indicates that 1% decrease in the number of girls enrolled in primary school as compared to the number of boys will increase child poverty by 0.56%. The benefits of girls' education in terms of reducing child poverty are for instance educated women are known

265 to have good health practices such as controlling fertility rates, good nutrition and good hygiene practices
 266 that boosts children's wellbeing and performance at school which translates into better future prospects
 267 in adult-life thereby minimising intergenerational child poverty.

268

269 **Table 2 ESTIMATES OF FACTORS AFFECTING CHILD POVERTY**

EQUATION 1: DEPENDENT VARIABLE-UNDER FIVE MORTALITY RATE 1990-2010					
VARIABLE	COEFFICIENT	STD ERROR	T-STAT	P-VALUE	ELASTICITY
Constant	76.0533***	13.4750	5.64	0.0000	
Primary school enrolment (PSE)	-0.0896***	0.0164	-5.44	0.0000	-0.46
Child underweight _1 (CU _1)	0.7604***	0.0433	17.56	0.0000	1.35
Gender parity index (GPI)	0.0948***	0.0214	4.42	0.0000	0.56
Female employment in agriculture (FAG)	-0.5489***	0.1265	-4.34	0.0000	-2.48
Agricultural value added (AGV)	-0.0004***	0.0001	-3.83	0.0001	
Health expenditure per capita (HE)	-0.1306***	0.0369	-3.53	0.0004	-0.05
Rural sanitation (RS)	-0.2146***	0.0596	-3.60	0.0003	-0.39
Ethnolinguistic fractionalization (ELF)	-0.4178***	0.0648	-6.44	0.0000	-2.02
Girls out of school (GOS)	0.0310	0.0191	1.62	0.1054	0.10
Country dummy-West Africa (WA)	-0.0680**	0.0300	-2.27	0.0234	
Number of observations	630	Durbin - Watson test		2.325	
EQUATION 2: DEPENDENT VARIABLE- PRIMARY SCHOOL ENROLMENT					
Constant	183.653**	87.9421	2.09	0.0368	
Under five mortality rate (U5MR)	-2.6917***	0.3710	-7.25	0.0000	-0.53
Child underweight (CU)	-6.4803**	3.3039	-1.96	0.0498	-2.23
Gender parity index (GPI)	0.3678***	0.1067	3.45	0.0006	0.45
Crop production index _1 (CPI _1)	1.9541***	0.3034	6.44	0.0000	2.49
Roads, paved (PRD)	0.2822***	0.0461	6.12	0.0000	0.09
Persistence to last grade of primary (PLG)	0.3550***	0.0746	4.76	0.0000	0.29
Ratio of female to male labor F.P. rate (RFM)	-1.0215***	0.2022	-5.05	0.0000	-1.19
Children in employment (CL)	-0.0003***	0.6912	-4.31	0.0000	
Girls out of school (GOS)	-0.2161***	0.0729	-2.96	0.0030	-0.14
Ibrahim’s Index of African Governance (IIAG)	-1.1841**	0.5397	-2.19	0.0282	-0.87
Orphans (ORP)	-0.0016*	0.8487	-1.84	0.0660	
Female teacher primary school (FPST)	0.1793*	0.1029	1.74	0.0814	0.11
Mobile phone subscribers (MPH)	1.0197*	0.5271	1.93	0.0530	0.52
Country dummy-Southern Africa (SA)	-0.3326***	0.0816	-4.07	0.0000	
Country dummy-West Africa (WA)	-0.3582***	0.1230	-2.91	0.0030	
Number of observations	630	Durbin Watson test		2.149	
EQUATION 3: DEPENDENT VARIABLE CHILD UNDERWEIGHT					
Constant	24.8681***	3.7269	6.67	0.0000	
Child underweight _1 (CU _1)	0.4841***	0.0691	7.01	0.0000	0.48
Under five mortality rate (U5MR)	0.0332***	0.0119	2.79	0.0053	0.02
Primary school enrolment (PSE)	-0.0840***	0.0277	-3.02	0.0025	-0.23
Gender parity index (GPI)	0.0059***	0.0016	3.68	0.0002	0.04
Crop production index (CPI)	0.3309***	0.0611	5.41	0.0000	1.25
Crop production index _1 (CPI _1)	-0.4375***	0.0668	-6.54	0.0000	-1.63

Enrolment in sec. vocational, female (FSV)	-0.7144***	0.1880	-3.80	0.0001	-1.15
Wood fuel (WF)	0.6085***	0.1668	3.65	0.0003	0.29
Child marriage (CM)	0.0039***	0.0013	2.83	0.0047	0.04
Out of school children (OOSC)	0.0829***	0.0285	2.91	0.0036	0.11
Married women open bank acc. (MWBA)	-0.0021**	0.0009	-2.27	0.0233	
Ibrahim's Index of African Governance (IIAG)	-0.0207**	0.0109	-2.06	0.0394	-0.04
Ethnolinguistic fractionalization (ELF)	-0.0109**	0.0051	-2.13	0.0334	-0.03
Mobile phone subscribers (MPH)	0.0186*	0.0098	1.09	0.0576	0.03
Regional dummies, West Africa (WA)	-0.0046**	0.0019	-2.37	0.0177	
Regional dummies, Southern Africa (SA)	-0.0024	0.0016	-1.56	0.1191	
Number of observations	630	Durbin Watson test		2.037	

The numbers in parentheses below the estimated coefficients are absolute values of the "t" ratios. Three asterisks, two asterisks and one asterisk besides. The estimated coefficients denote statistical significance at 0.01, 0.05 and 0.10 levels respectively valued at two-sided test. All the variables are in percentages, with the exception of regional dummies and married women with access to bank account which is a dummy variable.

The findings of this study on the impact of primary school enrolment on child poverty are similar to those of Barro and Lee (2010) who found that African countries do not invest heavily in primary school education and therefore have few average years of primary schooling which consequently leads to high losses in GDP per capita. While Burnett et al. (2013) found that the foregone income due to lack of completing primary school, losses of wage premium to primary education and direct costs as a percentage of GDP per capita weigh heavily on African economies. UNESCO (2012) reports that education makes people more skilled and employable at the same time provides an escape route from poverty, an additional year of education adds about 10% increase to a person's income on average. Psacharopoulos and Patrinos (2002) found that social and private returns from primary education are much higher, than those from secondary education particularly in low income countries as compared to high income countries.

However, our findings are contrary to those of Faux and Ntembe (2013) who investigated the impact of primary education attainment on poverty in Cameroon, and found that primary education had no impact on poverty reduction, but added that as education level rises, it negatively affects poverty. Appleton (2000) review on 9 African studies concluded that the estimated effects of education were typically insignificant. He found that a mean increase in self-employment income associated with an extra year of education is 7% at primary level and 12% at the secondary level.

Results from equation 1 in Table 2 show that female employment in agriculture has a statistically significant negative (-0.55) effect on child poverty. Furthermore, the estimated elasticity shows that 1% increase in the number of female employed in agriculture will decrease child poverty by 2.48%.

295 In equation 1, child underweight has a positive and statistically significant effect on under five mortality
296 rates (0.76). The estimated elasticity indicates that 1% increase in child underweight will increase under
297 five mortality rates by 1.35%. Klasen (2007) suggests that 60% of childhood deaths are directly or
298 indirectly attributed to moderate or severe under-nutrition. Most micro-level empirical evidence suggests
299 some negative effects of moderate under-nutrition and clearly identifies high morbidity and mortality
300 risks to severe under-nutrition.

301 Ethnolinguistic fractionalisation (ELF) is a proxy for the quality of institutions in equation 1, nations
302 with high percentages of linguistic diversity are prone to ethnic conflicts that negatively affects the
303 quality of institutions. The estimate ELF is negative (-0.42) and statistically significant at the 1% level
304 of significance. Moreover, the estimated elasticity indicates that 1% decrease in ethnic diversity (ELF)
305 would reduce child poverty by 2.02%

306 Equation 1 attempted to answer the question that are children poor because they cannot access education,
307 Equation 2 attempts to answer the reversed question that do children lack access to education because
308 they are poor? This question suggests that the causality between child poverty and lack of education is
309 bi-directional. In the light of this understanding, equation 2 uses primary school enrolment as a dependent
310 variable, while under five mortality rate is used as an explanatory variable to gauge its negative impact
311 on education and at the same time to demonstrate that since causes of child poverty are interrelated,
312 factors that positively affect child poverty negatively impact children's education and vice versa. The
313 measurement of education using primary school enrolment is not exhaustive given that it does not
314 account for factors affecting quality of education including teachers' absenteeism, large size of
315 classrooms, and lack of access to textbooks. However, as pointed out in section 3.2 data on child poverty
316 in Africa are scarce, therefore we are limited by the available data sets- this comment was made by
317 Reviewer 3.

318 It should be noted that in equation 1 primary school enrolment is negative (-0.08) and statistically
319 significant, at the 1% level. The estimated elasticity indicates that 1% increase in primary school
320 enrolment reduces under-five mortality rate by 0.46%. Whereas in equation 2 the estimate of under five
321 mortality rate is negative (-2.69) and statistically significant, at the 1% level. The estimated elasticity
322 indicates that 1% increase in under-five mortality rate reduces primary school enrolment by 0.53%.

323 The results in equation 2 reveal that child underweight is negative (-6.48) and statistically significant at
324 0.05 level. A child who is underweight is most likely to be either absent from school due to poor health

325 or if he/she attends school may end up performing poorly probably because he/she suffers from
326 underdeveloped cognitive skills. The estimated elasticity indicates that 1% increase in underweight
327 children will decrease primary school enrolment by 2.23%, these results suggest that of all the
328 determinants of primary school enrolment, great attention should be given to children's nutritional status
329 because it shows the highest effect on primary school enrolment.

330 Child malnourishment is attributed to several factors such as child's health, mother's health and
331 education status, family income, availability of food supply and the accessibility of food which largely
332 depends on its affordability. Children from poor families who barely have subsistence income, tend to
333 suffer from malnutrition because their families are unable to make food purchases. Therefore it is
334 assumed in equation 2 that an increase in crop production may reduce food prices, and in the process
335 enable poor families to access food. Crop production index is a proxy for food supply, the estimated
336 coefficient of crop production index is positive (1.95) and statistically significant at the 1% level. A
337 mother with the possibility to access food has more probability to maintain good health and give birth to
338 healthy children, who can be enrolled in school and be retained in school. The estimated elasticity shows
339 that 1% increase in crop production index will increase primary school enrolment by 2.49%.

340 In equation 2, results show that the estimate ratio of female to male labour force participation is negative
341 (-1.02) and is statistically significant at the 1% level. In circumstances where low household income
342 constrains parents to limit the number of children they send to school, sociocultural factors tend to favour
343 sons over daughters, thus lack of income acts as a strong case against girls being sent to school.
344 Subsequently, girls denied education grow up into illiterate adults which adds up to the already existing
345 barriers in the labour market. With the widening of the gap between the ratio of female to male labour
346 force participation rate, the estimated elasticity indicates that a 1% decrease in the ratio of female to male
347 participation in the labour market will reduce primary school enrolment by 1.19%.

348 Rural Sub Saharan Africa is largely characterised by poverty, the effects of poverty are not only felt in
349 families but also in schools, therefore the burden of developing schools particularly in poverty stricken
350 areas is mostly borne by the African governments. In equation 2 the estimated coefficient of Ibrahim's
351 Index of African Governance is negative (-1.18) and statistically significant at the 5% level. If the low
352 proportion of education funds allocated to rural schools and poverty stricken areas in general diminishes,
353 the estimated elasticity shows that 1% decrease in Ibrahim's Index of African governance will decrease

primary school enrolment by 0.87%. The negative effect of African governance could be partly because there is a tendency to spend more in the tertiary sector as compared to the primary sector.

In equation 3 the dependent variable is child underweight, women's status in this equation are represented by gender parity index and female enrolment in secondary vocational. The effect of female enrolment in secondary vocational on child underweight is negative (-0.71) and statistically significant at the 1% level. Smith et al. (2003) found that women's status and children's nutritional status are linked. The study noted that if men and women enjoyed equal status, child malnutrition in Sub Saharan Africa would decrease by nearly 3 percentage points—a reduction of 1.7 million malnourished children under three. Mahgoub, S.E.O. et al. (2006) study on factors affecting prevalence of malnutrition among children under three years of age in Botswana found that the higher the level of mother's education the lower the level of child underweight.

Child poverty limits the ability of children to access and obtain sufficient nutritious food, thereby their poverty state exacerbates their undernutrition status. In equation 3, the effect of under five mortality rate is positive (0.03) and statistically significant at the 1% level. The estimated elasticity indicates that 1% increase in child poverty, increases underweight children by 0.02%.

Primary school enrolment can reduce child underweight indirectly through the pathway of the benefits of education. In equation 3, the effect of primary school enrolment on child underweight is negative (-0.08) and statistically significant at 1% level. The estimated elasticity indicates that 1% increase in primary school enrolment will decrease child underweight by 0.23%.

Primary school enrolment can directly reduce child underweight through school feeding programs which enables poor children to access nutritious food which they would otherwise never have accessed if they were not enrolled in school. Out of school children are largely characterised by malnutrition, school feeding programs may act as an incentive for children to enrol and remain in school. In equation 3, the effect of out of school children on child underweight is positive (0.08) and statistically significant at the 1% level. Furthermore the estimated elasticity shows that 1% increase in out of school children will increase child underweight by 0.11%.

Furthermore the effect of Ibrahim index of African governance on child underweight is negative (-0.02), and statistically significant at the 5% level. Conversely Ibrahim index of African governance had a negative effect on primary school enrolment in equation 2. This turn of events does not necessarily imply

that resources channelled to health sector positively promotes children's wellbeing. The case as with the public expenditure on education applies to healthcare as well resources are mostly channelled to tertiary healthcare which largely benefits rich people at the expense of primary healthcare which mostly benefits poor people. The negative impact of Ibrahim index of African governance on child underweight could be probably because of child vaccines such as DPT_3 which are easily accessible by poor families and greatly prevent children from certain diseases that could have otherwise tampered with their health status and in the process increased the percentage of underweight children. It is notable that the explanatory variable in equation 3 with the greatest potency on child underweight is crop production index, child underweight decreases by 1.63% for 1% increase in crop production index.

4 Conclusion

Attempts to answer the question: "are children poor because they cannot access education or do children lack access to education because they are poor" using econometric model suggests that the causality between child poverty and lack of access to education is bi-directional. Although education plays a crucial role in the pathway out of poverty, the order of elasticity ranking shows that female employment in agriculture, ethnolinguistic fractionalization (quality of institutions) and child underweight are more potent in explaining child poverty than primary school enrolment (education). As much as child poverty (under five mortality rates) affects children's access to education, elasticity ranking indicates that the impact of child poverty on primary school enrolment is not as potent as that of crop production index, child underweight, ratio of female to male labor force participation rate and Ibrahim Index African Governance. However, all these factors are mostly influenced by child poverty, suggesting that the indirect impact of child poverty on primary school enrolment is stronger than the direct impact. For instance, child underweight is generally associated with children from poor families. The results suggest that the effect of child poverty on education is negative and is statistically significant in explaining lack of access to education.

Crop production index (CPI) elasticity of child underweight takes the first position an increase in CPI corresponds to a decrease in child underweight. Low status of women (gender parity index) and education (primary school enrolment) are significant in explaining child underweight. Our findings indicate that both access to education and women's access to productive resources are crucial factors in explaining child poverty.

412 Based on the results of econometric analysis, the answer to the second research question (To what extent
413 can the low status of rural women be considered as a contributing factor to child poverty?) is that the low
414 status of women affects child poverty to a large extent. Rural women's access to productive resources
415 takes pre-eminence by laying a sound foundation for education boosting factors to create a virtuous cycle
416 of growth. Our findings suggest that child poverty (under five mortality rates) can be reduced largely
417 through improved status of women in agriculture, while increased crop production leads to increases in
418 primary school enrolment and reductions in underweight children. The elasticity of under five mortality
419 rates with respect to women in agriculture and the elasticity of primary school enrolment with respect to
420 crop production taking the lead in elasticity ranking implies that strategies to reduce child poverty and to
421 increase education should focus on creating an enabling environment for women in agriculture which in
422 the process will increase agricultural output which positively affects education. Elasticity ranking shows
423 that what is at issue is not the impact of education on reducing child poverty or the impact of child poverty
424 on reducing education but the improvement of women's status particularly in the agricultural sector.

425 The contributions of the study can be explained in the following way for instance we expand on the
426 previous research by adding the need to improve on the quality of institutions particularly those
427 concerned with budget allocation, to shift high investments away from tertiary sectors to primary sectors
428 which tend to serve the needs of a large proportion of poor children and their families.

429 Previous studies on child poverty have mostly focused on the conventional multidimensional child
430 deprivation indicators such as food, water, education, sanitation, shelter, information and health in
431 general. We have added to the conventional multidimensional indicators child specific indicators – out
432 of school children, child marriage, orphans and children in employment; and general indicators including
433 women's status and institutional quality in describing children's plight.

434 We have contributed to the precedent studies on child poverty by bringing on board agricultural
435 productivity. A combination of results and theory suggests that agricultural production which is a labour
436 intensive sector is the password for child poverty reduction particularly in rural Africa. Africa's poor
437 being mainly rural and their livelihood being mainly subsistence farming, agriculture is their lifeline.
438 Increased agricultural productivity acts both as a source of increased food availability and incomes of
439 the farmers. It enables farmers to increase their household consumption expenditure which consequently
440 improves children's nutritional status and subsequently augments school enrolment rates thereby
441 reducing out of school children and subsequently in the long run reduces child poverty and adult poverty.

442

443 In sum this study has given a new interpretation of child poverty by applying the established theory of
444 child deprivations in a new setting to add on the existing studies of child poverty. We have done this by
445 showing the effect of women's limited access to productive resources such as education and labor market
446 on under five mortality rates, primary school enrolment and child underweight. We have stretched the
447 body of knowledge of child poverty, particularly in Africa where the numbers of out of school children
448 are on the rise and social cultural institutions still override the constitution of equality and there is
449 declining percentages of women in agriculture.

450

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452 **(1) FUNDING- this study did not receive any form of grants.**

453 **(2) CONFLICT OF INTEREST- We as the authors of this paper declare that we have no**
454 **conflicts of interest.**

455 **(3) The manuscript entitled “Child Poverty, Status of Rural Women and Education in Sub**
456 **Saharan Africa” is based on an academic dissertation submitted at the link**
457 **<https://helda.helsinki.fi/bitstream/handle/10138/219416/FACTORSA.pdf>**

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