REVIEW:

Rural illiteracy and poverty in Sierra Leone and Sub-Saharan Africa

Sheka Bangura [1]

Abstract

Despite heightened global efforts, effective solutions to rural poverty in Sub-Saharan Africa have remained evasive. In this region, endemic poverty is correlated with inadequate rural education. Sierra Leone, located on the West African Atlantic coast has witnessed persistently high rates of illiteracy and poverty. The key objective of this paper is to identify key predictors of educational outcomes to help suggest effective policies for poverty alleviation in rural Sierra Leon. An empirical analysis of the Sierra Leone 'integrated household surveys' 2003/04 and 2011 suggest the following predictors as significantly correlated with the level of education in rural Sierra Leone: expansion of farm acreage, adoption of improved technology, provision of credit facilities, and an equitable distribution of socio-economic services. Lessons are also drawn through a review of other countries' experiences in the promotion of rural education. Key lessons from the review include: improved incentives for rural teachers, and the development of customized models for rural education.

Keywords: Illiteracy, Poverty, Rural education, Sierra Leone, Sub-Saharan Africa

Introduction

The progress of Sub-Saharan Africa (SSA) has been held back by a lack of the capacity to transform rural economies which explains the continuous documentation of endemic and chronic poverty in this region. About 50% of the region's population is poor if a daily expenditure benchmark of US$1.25 is taken as the borderline. The prevalence of poverty at the benchmark of US$2 per day would be about 70%. It is also noted that 32 out of the 48 poorest countries in the world are located in SSA (Chen and Ravallion, 2008).

Rural areas in the region hold most of the poverty which is not surprising as about 70% of the poor at the global level lives in rural areas. In terms of absolute numbers, the prevalence of SSA's rural poverty grew from 268 to 306 million people during 2000 ~ 2010, and those in extreme poverty, estimated at 62%, decreased only by 3 points during the same period (IFAD, 2010). This retrogression has taken place in a period of renewed international commitment to fighting global poverty; the 21st century was ushered in with various development pacts including the Millennium Development Charter and Goals, a series of Aid Effectiveness Agendas, and elegantly articulated national poverty reduction strategies advised by donor communities through the IMF and the World Bank.

Yet appropriate solutions to addressing poverty appear to have remained evasive and Sub-Saharan Africa has not made much progress on the Millennium Development Goals, and the number of the poor has doubled since 1981. This lack of progress is in sharp contradiction to the endowment with huge natural resources in many SSA countries. Recent institutional efforts at rethinking poverty for Africa include the staging of a conference in Nairobi, August 2012 to provide an anthropological explanation for the region's underperformance in the MDGs, a need that Booth et al. (1999) had heralded.

Sierra Leone has followed the poverty outlook of SSA amidst abundant natural resources and relatively high per capita 'official development assistance' (ODA). Located on the West African Atlantic coast, the country had a relatively promising beginning after independence in the 1960s with a GDP per capita in 1965

[1]Graduate School of Asia Pacific Studies, Ritsumeikan Asian Pacific University (APU), Beppu City, Oita, Japan
e-mail: shekabangs@yahoo.co.uk

of US$151 which exceeded that of Indonesia (US$55), Thailand (US$138), China (US$97), and South Korea (US$106), according to the World Bank data. But Sierra Leone has retrogressed since the 1970s; its GDP growth rate slipped constantly from 3.8% during 1961 ~ 1969, to 2.7, 1.1 and - 4.2 percent in the decades that followed until the end of the civil war (1991 ~ 2001), while the Asian economies emerged and maintained growth at far more impressive levels. While Indonesia and Thailand both reduced their impoverished population from 60% in 1965 to 8.0 and 9.0 percent currently, and China from 30.7% in 1978 to less than 2.0% now, Sierra Leone's prevalence of poverty remains at 54%, with the rural areas remaining the most impoverished at 70%. Sierra Leone's national illiteracy rate sticks at 59%, life expectancy at about 40 years, under-five mortality rate at 262 per thousand (2007), and malnutrition among children under 5 at 23%; all these measures are higher in rural areas (UNDP data).

Although Sierra Leone is endowed with abundant mineral resources, its socio-economic performance has been falling behind other nations with far less natural resources; one could argue that a key predictor of this outcome is an inadequate investment in education and knowledge, especially in the rural areas which hold the vast majority of the population as well as the impoverished. Inadequate rural education has been identified as the main driver of poverty in many parts of the developing world, explained by a number of factors including inappropriate policies, weak institutions, and cultural factors. It has been argued that sustainable development cannot come by without adequately resolving rural poverty with education at the fore (Acker and Gasperini 2003).

The need for education and knowledge-driven development strategies for transformation of the 'Third World' has long been emphasized (Romer 1992, 1993, Solow 1956, Dalton 1971) and continues to be underscored in contemporary poverty scholarship including growing arguments about the need to focus on increasing human capability and functioning for poverty reduction (Udaye 2010, Sen 1993). Otsuka and others argue with an empirical demonstration using rural poverty data that SSA has lagged behind Asia because of the huge human capital differentials between the two regions, especially among the rural households (Estudillo et al. 2009, Ostuka et al. 2009, Takahashi and Otsuka 2009, Cherdchuchai et al. 2009, Hossain et al. 2009, Kajisa and Palanichamy 2009, Matsumoto et al. 2009, Cunguara and Kajisa 2009).

The criticality of human capital formation (as a function of schooling) for rural poverty reduction is captured in five hypotheses put forward by Otsuka et al. (2009: 201-209) in discussing farm versus nonfarm income in the transformation of rural sub-Saharan Africa compared to rural Asia. They acknowledge and call for the recognition of the critical role of the farm sector at the initial stage of development, as in Dalton's (1971: 88-92) analysis of primitive and peasant economies; that naturally societies start from a rural status with farm incomes as the mainstay for progress. These incomes initially finance child schooling because the vast majority of those interested in educating their kids are earning most of their incomes from farming; later, schooling would provide the inlet for the creation and stimulation of nonfarm jobs with higher returns to human capital than returns produced by farming; the nonfarm sector will then become more critical in reducing rural poverty and achieving sustainable development.

It is noted in light of the development of rural Philippines, Thailand, Bangladesh and Tamil Nadu in India that:

> "…the development of the nonfarm sector and increased access of households to nonfarm labor markets are clearly the major driving force behind the reduction in poverty in rural villages in Asia….economic development in Asia is clearly pro-poor and returns to labor have increased relative to the returns to land." (ibid).

A similar commentary runs about the South Korean approach to rural transformation in Mengistu (2009). Also a 'Green Revolution' is projected to be indispensable for reducing widespread poverty in SSA. Otsuka and others are mindful of the regional environmental differential that may pose a challenge for the adoption of 'productive and profitable technologies' in Sub-Saharan Africa, but they argue that there has been a "…remarkable advancement of molecular biology and genomics [that] has opened up new scientific possibilities for developing appropriate technologies for sub-Saharan Africa" (Otsuka et al. 2009). However a 'Green Revolution' would not have the intended impact if it were not accompanied by educational programs in rural areas (Dowling and Valenzuela 2010). Education is therefore critical at every stage in the development process.

The key objective of this paper is to identify key predictors to promote rural education in Sierra Leone, and in the process, it explores the experiences of other countries in promoting rural education to learn policy lessons for poverty reduction in Sierra Leone.

Methodology

This paper includes a review of other papers as well as an analysis of secondary empirical data. The review aspect entails a survey of other countries' experiences and lessons in promotion of educational opportunities in rural areas in the developing world. Lessons have been drawn from Latin America, Africa and Asia.

The empirical section undertakes a recursive model with structural path equation estimation to determine the direct and indirect effects of rural educational investment. This is an improvement on related studies analyzing rural poverty and income dynamics, which have conducted a single equation estimation of schooling investment function without tracing path effects as done in this paper (see Estudillo et al. 2009, Ostuka et al. 2009, Takahashi and Otsuka 2009, Cherdchuchai et al. 2009, Hossain et al. 2009, Kajisa and Palanichamy 2009, Matsumoto et al. 2009, Cunguara and Kajisa 2009 on modeling rural schooling investment in Asia and Sub-Saharan Africa, and World Bank 2008 on modeling schooling investment at national level in Sierra Leone).

Structural Path Equations:

The recursive model estimate is specified as follows:

(1) $$HIncome_{it} = \Delta_{it} + \alpha_{it} HEdL_{it} + \beta_{it} HSize_{it} + \theta_{it} LaSize_{it} + \emptyset_{it} LoSize_{it} + \pi_{it} ATech_{it} + \rho_{it} OffFEm_{it} + \mu_{it} HLoc_{it} + \varepsilon_{it}$$

(2) $$SInvest_{it} = \nabla_{it} + \partial_{it} HIncome_{it} + \alpha_{it} HEdL_{it} + \beta_{it} HSize_{it} + \theta_{it} LaSize_{it} + \emptyset_{it} LoSize_{it} + \pi_{it} ATech_{it} + \rho_{it} OffFEm_{it} + \mu_{it} HLoc_{it} + \epsilon_{it}$$

Notes: The variable HIncome is an intermediate endogenous variable denoting the income of the household head that is predicted by purely exogenous variables on the right side of equation 1. The variable HEdL is the household educational level, and expected to positively impact on income. HSize is the household size expected to negatively affect income; investible resources are expected to decline with increased consumption spending from expanded families in line with the quantity-quality family models (Black et al. 2005, Bongaarts 2001, Becker and Lewis 1973, Becker 1960). LaSize is the size of the land owned by the household, expected to positively impact on income through expansion of farm acreage and other uses. LoSize is size of loans granted to rural households, and expected to positively affect income. ATech is an agricultural technology factor, a composite/index variable gauging effects of access to fertilizers, other

chemical inputs, machinery, irrigation and hired labor; the higher the factor value the more income expected. OffFEm denotes an off-farm employment factor as an index for gauging differential effects between farm and off-farm returns and is expected to have a positive effect on income (Otsuka et al. 2009). HLoc is an index factor variable denoting the effects of household residential location on income, gauging income differentials among households located in regions with better socio-economic services and those in regions with less services; it is expected to have a positive coefficient. The variable SInvest is the target endogenous variable in the study; it is the level of spending on child schooling in the path analysis predicted by both the intermediate endogenous variable, income, and all pure exogenous variables just explained, and is expected to affect schooling directly or indirectly (through income) based on the same a-priori grounds as in the intermediate income model. The logic of these equations is more clearly captured in Figure 1.

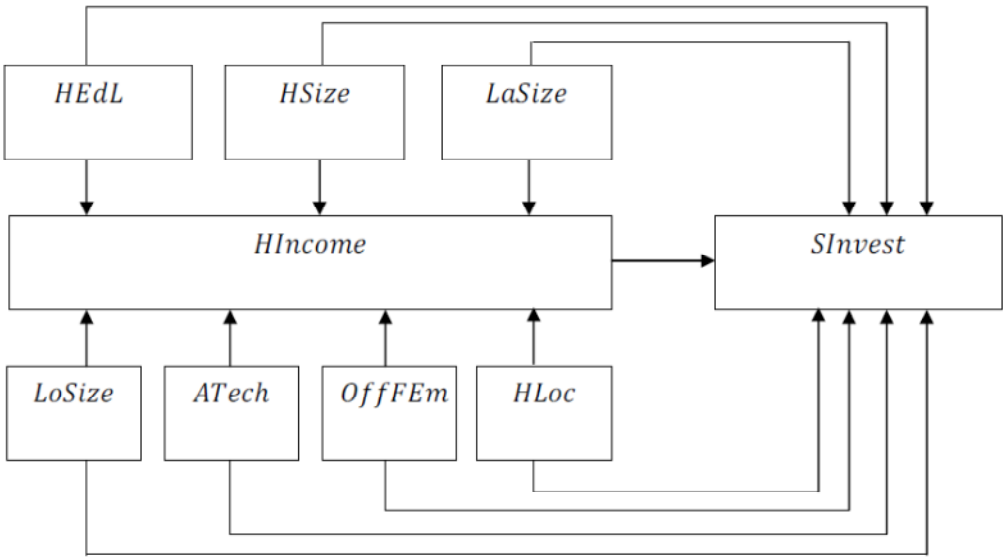

Figure 1: Structural path diagram; the model is estimated based on two data sets: the Sierra Leone Integrated Household Survey 2003/04 (SLIHS2003/04) and SLIHS survey 2011. Results of the two surveys are compared and some dynamics are tracked to help predict the rural educational situation (see text for abbreviations).

Findings and Discussion

Review of the experiences of other countries in the promotion of rural education:

The unproductive rural-urban migration witnessed in the 'Third World' is a derivative of un-employability associated with the low level of skills and education of migrants. In response, the Chinese introduced a strategy to industrialize the rural areas and established compulsory rural education systems (Binglong et al. 2009). As a result, migration to big cities produced multiple positive effects, eased labor pressure on land, and significantly contributed to rural productivity and incomes.

A challenge that poor countries have faced in their effort to support rural education is the deployment of teachers in remote areas. The generally poor socioeconomic conditions in the rural areas have been the key obstacles to attracting teachers. Those already employed frequently seek for transfers to urban centers. This has caused huge differentials in teacher supply both in quantity and quality between rural and urban areas. Mulkeen (2005) has commented on efforts to address teacher shortages in Mozambique, Lesotho, Malawi, Uganda, Tanzania, South Africa and Ghana. Uganda and Mozambique considered posting teachers with health problems to schools near to medical facilities.

Mozambique ensured that recruitment and deployment of teachers would be done at the regional level with each region recruiting its own teachers. In Lesotho, given the poor infrastructure and the mountainous and diverse climatic conditions, recruitment of teachers was decentralized to the community level, through the school management committee (SMC). However, the disadvantage was that preference would often be shown for a 'local' applicant who was less qualified than a more qualified outsider interested in moving to the community in question. Malawi recruited untrained temporary teachers who were later trained.

Some countries provided monetary and non-monetary incentives to attract teachers, ranging from provision of hardship and travel allowances to household subsidies, special study leave, and better training opportunities. However, incentives were not substantial enough to outstrip the socioeconomic costs associated with deployment in rural areas, and a transparent and accountable system didn't exist for classifying and determining the schools as having top priority. Some countries, such as South Africa, attempted a forced deployment of teachers in rural areas but this was not successful, even though it saved financial resources for the government. A sustainable model in other cases was to require teachers to serve in a remote community only for an agreed period of time in exchange for promotion and career development opportunities later. Ghana adopted a policy of posting newly qualified teachers in pairs so that one could draw strength from the other.

Distance has been a great impediment to rural school enrolment. Mulkeen (2005) and Moulton (2001) discuss lessons to address this: Mozambique maintained a reasonable school size of 100 to 200 in rural settlements to increase chances of educational engagement, but this strategy was associated with some economic inefficiency in the utilization of teacher capital, especially where dropout rates were high. Lesotho had a policy of making more qualified teachers teach lower grades so as to lower dropout rates and even-out pupil teacher ratios across all grades. In Ethiopia, growth in rural educational enrolment was partly attributed to home visits by teachers, while for communities dominated by nomads and pastoralists, such as in Kenya and Uganda, specific strategies were employed to educate children since building schools was not economically efficient. In the Karamoja region in Uganda, for instance, a mobile educational system was introduced by the government of Uganda, with teachers following children wherever they took their animals to graze; classes were conducted under the trees.

It has been suggested that the most successful rural school models can be designed with gradual modifications to the national school system in order to suit specific rural situations and to ensure sustainability. Globally celebrated initiatives along these lines are the Escuela Nueva in Rural Columbia, and the Bangladesh Rural Advancement Committee (BRAC). Established in the early 1980s, the Escuela Nueva program has been the best known example for conducting multi-grade schooling, and pupils who were unable to attend school are taught at home. Homework was aided by student study groups; teachers benefited from on-the-job training and learned from practical examples through the supplied material rather than depending only on pre-service lectures; networks of rural community teachers were established to ensure interaction among teachers and to discuss pedagogical and other pertinent materials and to cross-fertilize experiences. Also parents worked closely with teachers, integrating the former's cultural and other concerns into the curriculum to ensure that schooling was culturally sensitive and sustainable. Soon after the inception of this model in Columbia, the number of rural schools expanded to 22,000.

The BRAC schools in rural Bangladesh targeted mainly girls, and capitalized on already successful rural development projects like credit support and healthcare programs. The initiative started in 1985 with each school catering for 30 children within a few kilometers, and renting a room in houses to conduct classes.

Teachers are picked from the communities, intensively trained for 15 days, provided with retraining at least once a month, and paid modest wages. To enhance sustainability, simple materials were used for school; no fees were paid and parents attended school meetings. The government permitted BRAC school leavers to enter the fourth grade in government schools. By 1998, about 34,000 BRAC schools were servicing not less than 1.2 million children that would otherwise have been left out of schools.

In West Africa, various countries adopted the community school models including Mali, Ivory Coast, Mauritania, Nigeria, Togo and Burkina Faso. They are especially critical in countries emerging from civil wars, and have been extensively supported by NGOs. In the formerly crisis ridden country of El Salvador, a Community Education Association was formed and contracted by the government to coordinate community educational needs and operations. In Cambodia, following the end of the war, with 85% of the population sparsely distributed in rural areas, a cluster community schooling system was introduced in which schools were clustered together to share resources.

The educational situation of rural Sierra Leone before, during and in the immediate post-conflict period: Sierra Leone has had the vision to establish a robust educational system for all, starting with the 1991 constitution which amongst other things had recognized 'inadequate education' as the root cause of bad governance and poverty; these evils were squarely blamed for causing the civil war (1991 ~ 2001). The prevalence of poverty (those living on less than a dollar par day) was measured at more than 80% before the outbreak of the war in 1991. The post-conflict phase was met with an institutional re-engineering to back the Constitution. An Education Act was passed in 2004, with a focus on strengthening primary and junior secondary schooling and a special emphasis on girls' education.

A Local Government Act was enacted to resuscitate Local Councils with a responsibility to facilitate development at the community level. The Government's Interim Poverty Reduction Strategy (IPRSP, 2001 ~ 2004) and the first comprehensive PRSP (2005 ~ 2007) were developed to provide an overall national development framework with education as a key pillar. The sector remained a priority in the subsequent PRSPs. Compelling these efforts was a poignant educational outlook for the country, especially for rural areas and the female population (Table 1). Statistics are not available on illiteracy for the rural sector and other relevant strata until 2004 as the Table indicates.

At the national level, an illiteracy rate of 87% was recorded in 1985, split between males and females at 83 and 91 percent respectively; it only dropped to 70% in 2000, split between males and females at about 60 and 80 percent respectively, widening the gender gap further. In 2004, the rural illiteracy rate was estimated at 63% against the national rate of 61% and the urban rate of 38%. The male-female gap narrowed but the split remained wide at 52 and 67 percent, respectively. It was worrying that in 2004, illiteracy among the rural youth (aged 15-35) was estimated at 74%, against 39% in the urban areas and 60% at the national level.

Table 1: Illiteracy rate 1985 ~ 2004 (before, during and the immediate post-conflict phase)

Gender	*1985 Census*	*1995 Estimates*	*2000 MICS*	*2004 Census*
National Average	87%	79%	70%	61%
Male	83%	69%	60%	52%
Female	91%	89%	80%	67%
Rural Areas	-	-	-	63%
Urban Areas	-	-	-	38%
15-35 Years (Rural)	-	-	-	74%
15-35 Years (Urban)	-	-	-	39%
15-35 Years (National)	-	-	-	60%

We examined whether the implementation of comprehensive PRSPs since 2005, including the first and second generation PRSPs (2005 ~ 2007 and 2008 ~ 2012) has directed rural education towards a better outlook, using 2003/04 as the baseline. Since rural farm incomes have been hypothetically perceived as highly critical in the promotion of rural education in countries at their early stage of development, we first looked at changes in the structure of the rural economy comparing SLIHS Surveys 2003/04 and 2011. Table 2 shows that the vast majority of rural household members were employed in farming in 2003/04, irrespective of age (92% of the less than 35 year olds and 93% of the 35 and more year olds). In 2011, the share of the less than 35 markedly declined from 92% to 53%, mostly due to engaging a larger number of children in labor, while among older persons (35 years and above) it only declined from 93% to 76%**.**

The structural shift in sex was similar to age employment during the same period; male-female shares drastically declined from 92-93 percent in 2003/04 to 48-50 percent, respectively, in 2011 with females slightly surpassing males. Although mining plays a key role in the macro-economy as the main export revenue for the state, rural households generally depend less on this sector for their livelihood. SLIHS2011 depicts the same outlook, although it indicates that in the long run a structural shift could be expected from farm to nonfarm activities in general, given the huge reduction of the farming share from 92.65 to 48.67 percent between the two surveys, and a huge increase in nonfarm share from 7.35 to 51.33 percent, although, again, the increase in the nonfarm may be due to the high rate of child labor employment in 2011.

Table 2: Share of all employed household members by main occupation, comparing 2003/04 and 2011

a. SLIHS2003/04

Activity	Overall		Age						Sex			
			<15		15 to 34		>=35		Male		Female	
	Obs	%	Obs	%	Obs	%	Obs	%	Obs	%	Obs	%
Farming	6614	92.65	2753	92.41	2006	92.44	1855	93.22	3076	92.37	3538	92.89
Rice	4876	68.30	2061	69.18	1472	67.83	1343	67.49	2306	69.25	2570	67.47
Other Crops	1738	24.35	692	23.23	534	24.61	512	25.73	770	23.12	968	25.41
Nonfarming	525	7.35	226	7.59	164	7.56	135	6.78	254	7.63	271	7.11
Mining	54	0.76	20	0.67	19	0.88	15	0.75	36	1.08	18	0.47
Others	471	6.60	206	6.92	145	6.68	120	6.03	218	6.55	253	6.64
Total	**7139**	**100.00**	**2979**	**100.00**	**2170**	**100.00**	**1990**	**100.00**	**3330**	**100.00**	**3809**	**100.00**

b. SLIHS2011

Activity	Overall		Age						Sex			
			<15		15 to 34		>=35		Male		Female	
	Obs	%	Obs	%	Obs.	%	Obs	%	Obs	%	Obs	%
Farming	10054	48.67	960	13.90	3926	56.68	5168	75.73	4871	48.21	5183	49.11
Subsistence	6847	33.15	649	9.40	2656	38.34	3542	51.91	3299	32.65	3548	33.62
Other Crops	3207	15.53	311	4.50	1270	18.33	1626	23.83	1572	15.56	1635	15.49
Nonfarming	10602	51.33	5945	86.10	3001	43.32	1656	24.27	5232	51.79	5370	50.89
Mining	89	0.43	2	0.03	50	0.72	37	0.54	74	0.73	15	0.14
Others	10513	50.90	5943	86.07	2951	42.60	1619	23.73	5158	51.05	5355	50.74
Total	**20656**	**100.00**	**6905**	**100.00**	**6927**	**100.00**	**6824**	**100.00**	**10103**	**100.00**	**10553**	**100.00**

As for the changes in rural educational ratios, Table 3 examines whether there was a significant change in the number of school age children who were out of school between 2003/04 and 2011 for ages less than 22 years. A person is expected to have attained a university degree at age 21. More than 60% of all respondents were found as not in school in both surveys, in fact increasing from 61% in 2003/04 to 65% in 2011. About 32% of those below 15 years of age were not in school in 2003/04, increasing to 46% in 2011.

This population should have been in elementary school (kindergarten, primary) or junior secondary school. The not in school proportion was the highest for the 15 to 21 year olds at 59% in 2003/04, but decreased to about 42% in 2011.

Table 3: Share of school going children not in school and those in school comparing 2003/04 and 2011 (Obs for 'number of observations')

	SLIHS2003/04						SLIHS2011					
	Total		School age children				Total		School age children			
			Less than 15 yrs		From 15 to 21 yrs				Less than 15 yrs		From 15 to 21 yrs	
	Obs	%	Obs	%	Obs	%	Obs.	%	Obs	%	Obs	%
Formal school	4297	33.6	2540	53.8	583	40.8	8464	34.0	4860	54.4	1435	57.4
Informal	685	5.4	656	13.9	6	0.4	342	1.4	5	0.1	4	0.2
Not in school	7808	61.0	1529	32.4	840	58.8	16114	64.7	4074	45.6	1059	42.4
Total	12790	100.0	4725	100.0	1429	100.0	24920	100.0	8939	100.0	2498	100.0

Table 4 looks at education by economic activity. Farming (rice and non-rice) contributed to the uneducated more than non-farming. About 84% of the rice farmers never went to school in both surveys compared to 77% and 78% for non-rice farmers in the two surveys, respectively. The ratio of the uneducated in mining was also high at 71% and 80% in the two surveys; the observations were very small however. The nonfarm sector generally had more educated individuals than the farm sector; the uneducated in this category decreased from 47% to 42% between the two surveys. Informal education, where literacy training was offered mostly to adults that did not go to school before, constituted 5.4% and 1.4% of the total number of respondents in the two surveys, respectively.

Table 4: Share of household members that never went to school and those who did by economic activity, comparing 2003/04 and 2011(Ob for 'number of observations')

	SLIHS2003/04								SLIHS2011							
	Types of economic activity								Types of economic activity							
	Rice farming		Other farming activity		Mining		Other non-farming		Rice farming		Other farming activity		Mining		Other non-farming	
	Ob	%	Ob	%	Ob	%	Ob	%	Ob	%	Ob	%	Ob	%	Ob	%
Formal school	265	15.5	76	22.4	5	16.7	105	52.2	1124	16.4	518	14.9	22	23.4	6086	57.9
Informal	9	0.5	1	0.3	1	3.3	1	0.5	0	0.0	264	7.6	5	5.3	4	0.0
Never went to school	1435	84.0	263	77.4	24	80.0	95	47.3	5722	83.6	2689	77.5	67	71.3	4424	42.1
Total	1709	100.0	340	100.0	30	100.0	201	100.0	6846	100.0	3471	100.0	94	100.0	10514	100.0

Table 5: Highest educational level attained comparing 2003/04 and 2011

School Grade	SLIHS2003/04		SLIHS2011	
	Obs	%	Obs	%
Informal	685	13.8	342	4.1
Nursery	-	-	441	5.2
Primary	3501	70.5	5308	63.1
Junior Secondary School (JSS) 1-3	411	8.3	1608	19.1
Senior Secondary School (SSS) 1-3	232	4.7	571	6.8
Technical and Vocational	51	1.0	58	0.7
Nursing (Medical)	5	0.1	64	0.8
University	10	0.2	7	0.1
Religious education	74	1.5	12	0.1
Total	**4969**	**100.0**	**8411**	**100.0**

We examined the highest educational level attained among those who went to school. Table 5 shows that about 71 and 63 percent of the respondents attained only primary education in 2003/04 and 2011, respectively. Those attaining secondary education (JSS and SSS) were estimated at 13 and 26 percent in the two surveys. There was insignificant attainment of tertiary education in terms of those able to obtain certificates from technical and vocational institutions, teacher training colleges, nursing, university, and religious studies.

Regression results:

Table 6 and Figure 2 report the recursive path structural regression output, determining the direct and indirect effects of the predictors of school investment in rural Sierra Leone. All eight predictors investigated were found to be significant in at least one path situation in 2004 and 2011 surveys. Standardized beta (slope) coefficients are reported (Table 6).

The effect of the intermediate endogenous predictor (income variable) on school investment turned out to be positive; increasing school investment spending by 2.5% was associated with a 10% increase in the income of the household head. Among the purely exogenous predictors, only household size was found to have a significant effect both indirectly (through household income) and directly on school investment. Its indirect effect is negative at - 0.073; that is, a percentage increase in household size transmits an effect to reduce school investment by 0.073%, associated with a reduction of income by 0.29%. However, the positive direct effect of household size at 0.20 outweighs the negative indirect effects, leaving a net positive effect of 0.13% increase in school investment for every percentage increase in household size.

The school grade level attained by the household head had only a direct positive effect at 0.45; the size of the land owned had a positive indirect effect at 0.03; the size of loan to the household also had a positive indirect effect at 0.04. The effect of improved input factors was significant but unexpectedly negative at 0.03 (indirect effect); off-farm employment had a positive indirect effect at 0.013; and household location had a directly significant but negative effect at 0.14.

Table 6: Path regression results for household income and school investment

Predictors	2004				2011			
	Hs.hld income		School investment		Hs.hld income		School investment	
	Beta	P-Value	Beta	P-Value	Beta	P-	Beta	P-Value
Log of Household Income	-	-	0.25	0.00	-	-	0.02	0.57
School grade attained (HEdL)	0.03	0.49	0.45	0.00	-0.05	0.18	0.48	0.00
Log of Household Size (HSize)	-0.29	0.00	0.20	0.00	0.19	0.00	0.26	0.00
Log of Land Size (LaSize)	0.12	0.00	-0.05	0.11	-0.03	0.40	0.05	0.14
Log of Loan size (LoSize)	0.16	0.00	-0.04	0.19	0.18	0.00	0.07	0.04
Agric Technology (ATech)	-0.12	0.00	0.04	0.20	0.01	0.75	-0.02	0.58
Off Farm Employment (OffFEm)	0.18	0.00	0.03	0.39	0.04	0.29	-0.09	0.01
Household Location (HLoc)	0.05	0.14	-0.14	0.00	-0.12	0.00	-0.14	0.00
	N=652; R^2=144		N=652; R^2=139		N=659; R^2=106		N=659; R^2=378	

In 2011, the effect of income as an endogenous predictor was not significant. The exogenous predictors of land size and loan were significant directly and indirectly with expected positive effects. The location factor is also significant directly and indirectly but again, with an unexpected negative effect, leaving a net effect of - 0.26 in disfavor of rural people who were assumed to be located in better serviced regions. Two predictors had only significant direct effects: the school grade level attained, with a positive coefficient of 0.48, and off-farm employment with a negative coefficient of 0.09.

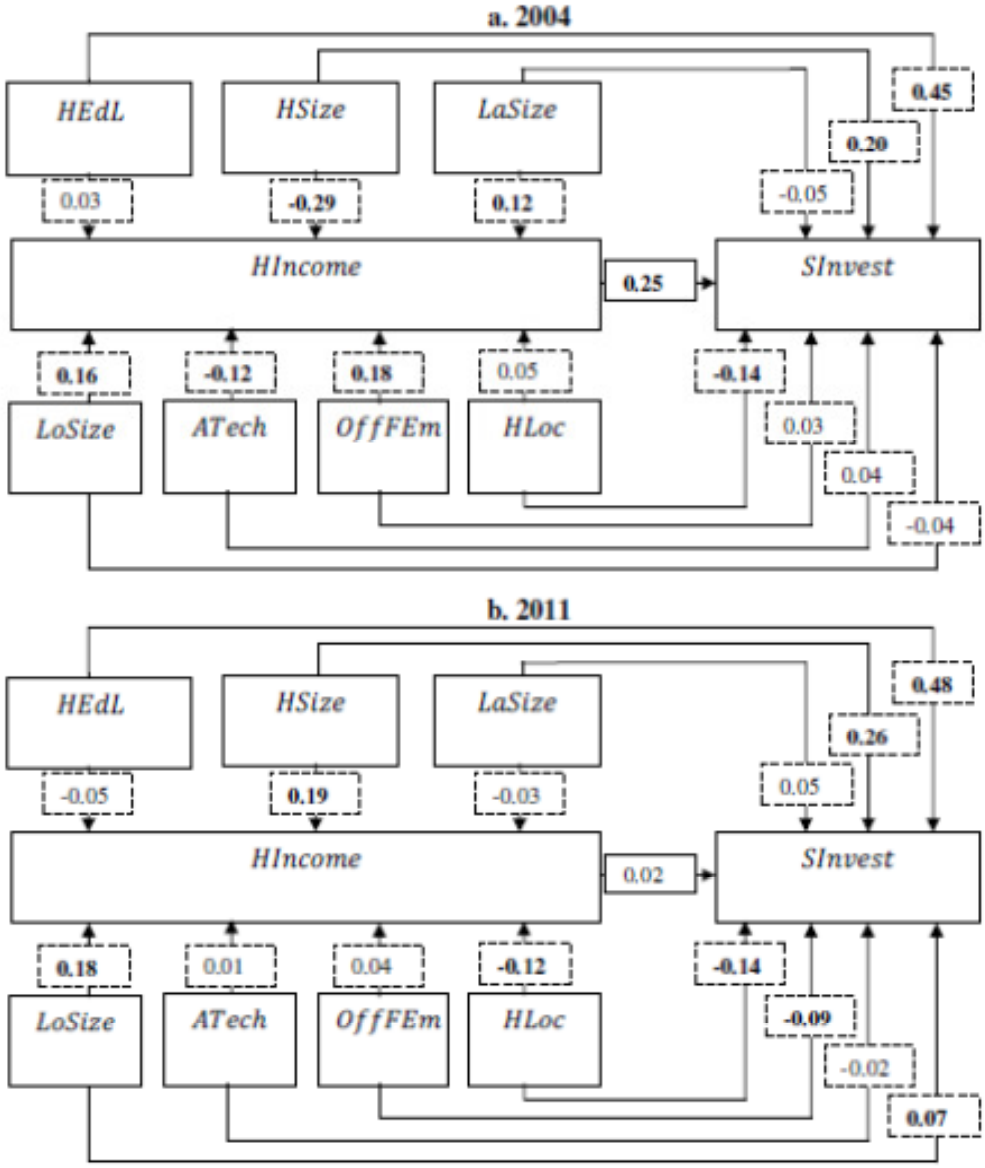

Figure 2: Path regression coefficients for household income and school investment

Conclusion

The descriptive statistics indicate that Sierra Leone is in the early stage of development consistent with the hypothesis offered by Otsuka et al. (2009) and related literature (Dalton 1971, Rostow 1960). The vast majority of the economically active rural inhabitants were engaged in farming for the period under review, from 2003 to 2011, with generally little or no educational achievement. Confirming some of these early development theories, the regression results suggest that household income had positively impacted on school investment in 2003/04 although the association was not significant in 2011.

While not significant in generating income, the level of educational attainment of the head of the household has had direct effects on child school investment since 2003/04. This implies the value of increased spending on child education in rural areas could be associated with awareness raising and knowledge that may not necessarily translate to increased farm or household income.

The low utilization rate of improved agricultural technology in descriptive statistics is corroborated by the regression results. The argument that in the early stage of development, farm employment could be more significant for child schooling than off-farm employment (because those in favor of financing school are engaged in farming) seems to have been supported by the regression results for 2011 by a higher factor than the reverse effect shown for 2003/04. Revealing better returns from farming in some instances is not surprising since the rural inhabitants that engaged in non-farm activities might have a generally low level of education (GoSL 2012).

While the location of a particular household theoretically matters in terms of regional differentials in access to social services, households located near big cities or within regions with better social services did not appear better in school spending, suggesting a welfare negation in rural-urban migration. The results also suggest that owning land in large size matters at the initial stage for supporting schooling through improved incomes, with access to credit becoming critical in the procurement of inputs. The results generally indicate that having a larger household size is critical to supporting child schooling, though this appears counterintuitive according to quantity-quality models and other perspectives that call for minimized family sizes in the development process (Black et al. 2005, Bongaarts 2001, Becker and Lewis 1975, Becker 1960). Nevertheless, the limited means to hire labor for rural farming in the early stage of development as in Sierra Leone, may explain the positive effect of household size (for general arguments, see Bongaarts 2001, Lin 2003, Becker 1991, Kuznets 1978, and Dalton 1971).

The results of this study suggest the need to support farmers to expand acreage and adopt improved technology, and to provide more credit facilities to rural inhabitant as a means to increase incomes and investment in schooling. They also suggest a need to increase rural awareness over the long term rewards of schooling and support literacy programs for adults that never went to school. The review of other country lessons over the promotion of rural education also suggests the need to support customized rural educational programs to fit the context of rural communities.

There is a need to devise policies to attract teachers in the rural areas, and improve infrastructural and general environment to attract non-state actors in the provision of educational services. With careful policy and development planning, education can be enhanced in remote rural areas. There is also a need for concerted efforts from state and non-state spheres in the provision of educational services for the rural people. Opportunities can be leveraged to bring back to school those who were not in school during their school age, as Ghani and Lockart (2008) suggest that education is turning into a life-long process.

The predictors that were especially significant in promoting rural education in the current stage of the country's development include an expansion of farm acreage, adoption of improved technology, provision of credit facilities, and ensuring an equitable distribution of socio-economic services. Key factors coming out of other country reviews include better incentives for rural teachers, and development of customized models for rural education.

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