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Determinants and Prevalence of Rural Poverty in West, East and Southern African Countries

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Abstract

In this paper, we determine the extent to which the variation in poverty incidence can be explained by institutional/community factors, and how the results can be used to evaluate the potential impact on poverty levels of change in factors found to have a significant influence on poverty incidence in some selected countries of East, Southern and West Africa. At the country level, the set of important variables is diverse and includes access to infrastructure (institutional dummy variables), and village resources endowment (community-based variables). The findings derived from this paper suggest that more than four-fifths of households in the study area need to be escaped from poverty. We also found that the poverty rate could be lowered by 17% to 89% in the involved countries through investment/actions leading to access to input and output markets, awareness and adoption of improved crop varieties and best-bet practices, better access to rural credit and capacity building of community-based organizations. This indicates that these variables can have powerful effects in terms of long-term poverty reduction strategies.

Keywords: Africa, Innovation Platform, *Logit*, MCA, Poverty, Welfare Index

1. Introduction

Halving world extreme poverty between 1990 and 2015 is the first Millennium Development Goal. With rural poverty accounting for some 75% of world poverty, meeting this goal requires reducing poverty in rural areas. Well-known scholars, politicians, foundations and academic groups have highlighted poverty in Africa as a priority development challenge and have dedicated considerable effort and resources toward its alleviation [1-4]. Despite this widespread attention, confusion still exists over the language and evidence used to identify poverty in Africa and this is especially true for the Sub-Saharan Africa [4].

According to [5], the burden of poverty is spread evenly among regions of the developing world, among countries within those regions and among localities within those countries. In the rural areas large differences in income and consumption exist not only along racial lines but amongst Africans between regions and within specific communities.

Evidence from poverty maps for Africa and other developing countries shows that poverty and income distribution are not homogenous and vary widely across space. Some of these differences are caused by differences in geographic and agro-climatic conditions, infrastructural access to market and public facilities, the presence and absence of natural resources such as forest and water bodies etc. [6,7]. Poverty in rural areas was associated with the crisis in the agricultural sector due to intermittent rainy seasons, persistent droughts, lack of draught power and lack of proper agricultural technology [8].

Even though these factors have been identified as major contributors to differences in the standards of living of populations in different areas, there has been little empirical work to ascertain the exact relationship between welfare level and these factors.

This study examines the determinants of poverty prevalence for households, defined in rural locations of countries within the Sub-Saharan Africa Challenge Programme (SSA-CP).

The key research questions in this study are: i) what is the poverty prevalence across rural households in the country within the Sub-Saharan Africa challenge programme? ii) what factors account for the variation in community-level poverty across rural households? iii) does the relationship between household-specific, community and institutional variables differ significantly among countries? iv) what are the potential poverty impacts of investment/changes in some of the institutional or community related factors found to influence poverty in different countries within the SSA CP?

The paper is organized as follows: the second section presents the theoretical framework and the estimation techniques within the third section we describe the sampling method and data. The fourth section contains the estimation results and discussion, with conclusion being presented in the fifth section.

2. Theoretical Framework and Estimation Techniques

2.1 Defining and Measuring Poverty in the West, Central and East Africa

According to Chambers [9], a household is characterized as poor when it has few assets, its hut, house or shelter is small and made of wood, bamboo, mud, grass, reeds, palm fronds or hides, its meager furnishings include only mats or hides for sleeping and perhaps a bed, cooking pots and a few tools, and there is no toilet. The household has no land or has land that does not assure or barely assures subsistence. It has no livestock or has only small stock (hens, ducks, goats, a pig, etc.). The household's stocks and flow of food and cash are low, unreliable, seasonal and inadequate. It is either locked into dependence on one patron for whom most work is done or continues a livelihood with a range of activities that reflect tenacious ingenuity in the face of narrow margins for survival. Returns to the family labour are low and in the slack seasons often very low if indeed there is any work at all. Poor households tend to have few buffers against contingencies; small needs are met by drawing on slender reserves of cash, by reduced consumption, by barter, or by loans from friends and relatives. These situations make the household so vulnerable that the family is especially prone to sickness and death. Chambers also uses the concept of the deprivation trap to explain poverty as a vicious circle. It is also argued that the isolation factor (lack of education, remoteness, being out of contact) sustains poverty. Services cannot reach those who are remote, and illiterates cannot read information of economic value and have difficulty obtaining loans. Evidence by [10] in their Mauritania poverty study also suggests that the isolation factor is critical in poverty issues.

As noted by [11], poverty measurement involves three steps: choosing a quantitative welfare indicator, choosing a means of discriminating between the poor and non-poor (through the use of a poverty line), and aggregating this information into a poverty measure for a particular population. Household-level analysis will be undertaken because, as noted by [10] and [11], poverty is fundamentally a household-level phenomenon and this is the level at which some micro data are available.

There are different approaches to the measurement of poverty and inequality. In essence, one can distinguish between the conventional approach to the measurement of poverty and inequality, which is money-metric and uses income and/or expenditure data, and a number of alternative approaches such as those that employ various other socioeconomic indicators to measure poverty and inequality. Of these alternatives or the so-called multi-dimensional approaches to the measurement of poverty, the welfare composite index (WCI) approach applied to data from Demographic and Health Surveys (DHS) has gained increasing popularity in recent years [12,13,5].

In the money-metric approach the poverty analysis requires the definition of poverty line below which an individual is considered as poor. Studies based on monetary welfare indicators (income or expenditure) are often characterized by different points of view concerning the choice of the poverty line [14]: an "absolute" poverty line is set so as to maintain a constant purchasing power across countries/communities, whereas a "relative" poverty line is allowed to vary with a country's/community's average income. A common practice is to set the standard poverty line of USD 1.25 per equivalent adult adjusted with the local purchasing power parity (PPP) exchange rate. For the purpose at hand, it is the absolute approach that is relevant for our analysis.

In the non-monetary framework the choice of the poverty line is somewhat less debatable for at least two reasons: the definition of the absolute poverty line is not obvious since the WCI used does not include the nutritional dimension which is helpful in determining a minimum subsistence threshold. Secondly, there is a need to determine a set of welfare indicators deemed essential for every individual to achieve a minimum level of well-being. The choice of such indicators could be arbitrary given the poor knowledge of this rural area lifestyle. To give some robustness to our analysis, we are going to define two relative poverty lines: a lower line, which corresponds to the 25th percentile of the distribu-

tion, and an upper line corresponding to the 40th percentile of the same distribution [13].

The aim of this paper is to analyze trends in poverty and their determinants in different countries within the Sub-Saharan Africa Challenge programme. One can argue that this paper is not unique, given that various estimates of the extent of poverty and inequality in these African countries have in fact been published. In the past decade, moreover, there has been a considerable expansion of our knowledge of poverty (and inequality) in Africa, following the increased availability of representative survey data on income and/or expenditure for a growing number of African countries. Our effort, however, differs from these previous studies in three important respects. Firstly, and most importantly, we use both money-metric and multidimensional approaches to assess the poverty status of households and their determinants. Secondly, in our multidimensional poverty measure approach, we employ multiple correspondence analysis (MCA) rather than principal components analysis (PCA) to construct the asset index. This methodology is more appropriate as MCA was designed for the analysis of categorical variables and, unlike PCA, which is appropriate for multivariate analysis of continuous variables, does not presume that indicator values are normally distributed [15-17]. Thirdly, our analysis that uses baseline data from within the Sub-Saharan Africa Challenge programme is not only confined to poverty alone, as do the majority of authors who have published in this field, but also analyzes their determinants.

2.1.1 The Welfare Composite Index

A prerequisite of our empirical analysis is a clear definition of what we mean by household welfare indicator. Unlike the widely used procedures that proxy households' wealth by income or expenditure, we generate an index of household ownership and housing characteristics, referred to as welfare composite index (WCI) as another proxy for household wealth.

Let us briefly present the outline of general methodology followed in constructing the WCI. A more detailed presentation can be found in [18].

Let us consider K primary indicators which reflect household living conditions, such as the ownership of some agricultural and non-agricultural goods and household conditions. The basic idea is to summarize the information provided by these qualitative indicators on a single composite index, A, which can be written by a household i by:

$$A_i = \sum_{j=1}^{K} \gamma_j I_{i,j} \quad (1)$$

where $I_{i,j}$ is a primary indicator $j\left(j = 1 \cdots K\right)$ for household $i\left(i = 1 \cdots n\right)$ and γ_j is the weight of the indicator $I_{i,j}$, to be estimated.

Many different methods have been used to estimate γ_j [13,12,19]. In this study we used the multiple correspondence analysis (MCA) suggested by [19]. This method is particularly suitable for the data available for this study which include a set of binary variables representing the different modalities taken by our primary indicators [17].

Each primary indicator $I_{i,j}$ can take J modalities, thus A_i the composite index for household i can be rewritten as:

$$A_i = \frac{\sum_{k=1}^{K} \sum_{jk=1}^{JK} w_{jk}^{k} I_{ijk}^{k}}{K} \quad (2)$$

where K is the number of primary indicators;

J_k is the number of indicators k modalities;

w_{jk}^{k} is the weight attributed to J_k modalities; and

I_{ijk}^{k} is a binary variable equal to 1 when household i has modality J_k, and 0 otherwise;

The WCI, A_i for a household i, is simply the average of the weight of the binary variables the weight to attribute to each composite index, A_i is the normalized score $\frac{w_{jk}^{k}}{\gamma_\alpha} = \frac{score}{eigen\ value\ for\ axis\ a}$ of the modality I_{ijk}^{k} obtained from the MCA.

2.1.2. Foster, Greer and Thorbecke (FGT) Poverty Measure

Several poverty index measures are proposed in the poverty literature. In this paper we use the family of the poverty measures proposed by [20], which satisfy several desirable properties, especially decomposition by subgroups. FGT measures are defined by:

$$FGT_\alpha = \frac{1}{n} \sum_{j=1}^{K} I_y \left(z - y_i\right)^\alpha \quad (3)$$

where I_y is an indicator function equal to 1 if $y_i \le z$ 0 otherwise y_i, is an individual i's welfare indicator (WCI) or the income per capita, z is the poverty line, n is the size of the population, and α a non-negative parameter. For α = 0, FGT_0 simply represents the proportion of the poor, referred to as headcount (HC) or poverty incidence (PI). For α = 1, FGT_1 represents the average poverty gap, and expresses WCI or the level of income necessary for an individual to be able to reach the poverty threshold. When α = 2, the index also reflects the distribution of poverty amongst the poor and places greater weight on those furthest from the poverty line. This is referred to as poverty severity or the squared poverty gap index. It is sensitive to inequality amongst the poor, since a higher weight is placed on those who are farthest away from the

poverty line [11]. For all of the measures, the higher the *P* is, the higher is the poverty level.

2.1.3. Poverty Decomposition

The FGT_α indices satisfy the property of decomposability by sub-group. In other words, the overall poverty index can be expressed as a weighted sum of poverty level within each sub-group. Let us consider the partition of the whole population in K exclusive sub-groups, with $\phi(k)$ the relative size of each sub-group *k*. The FGT_α can be expressed as:

$$FGT_\alpha = \frac{1}{n}\sum_{i=1}^{K}\phi(k)FGT_\alpha(z,k) \tag{4}$$

where $FGT_\alpha(z,k)$ denotes the poverty index of the sub-group *k*. *Ceteris paribus*, the improvement in the well-being of a given sub-group implies the improvement of the well-being in the entire population. Such decomposition has the advantage that it can permit the decentralization of the targeting programme in each sub-group. In the following sections we present the FGT index for α or 1 by localities and different household characteristics (Social capital, access to input market, access to output market, and use of improved varieties….).

2.2. Identifying the Main Determinants of Poverty

The approach we follow intends to explain why some population groups are non-poor or poor. In the first stage, we identify the poor and non-poor using the FGT poverty measures as described in the previous sub-section, whereas in the second stage, we examine the probability of being poor. We assumed that the probability of being in a particular poverty category is determined by an underlying response variable that captures the true economic status of an individual. In the case of binary poverty status (i.e. being poor or non-poor), let the underlying response variable y^* be defined by the regression relationship:

$$y^* = \sum x_i'\beta + u_i \tag{5}$$

where $\beta' = [\beta_1, \beta_2, \cdots, \beta_k]$ and $x_i' = [1, x_{i1}, x_{i2}, \cdots, x_{ik}]$

In Equation (5), y^* is not observable, as it is a latent variable. What is observable is an event represented by a dummy variable *y* defined by:

$$\begin{aligned} &y = 1 \text{ if } y^* > 0, \text{ and} \\ &y = 0 \text{ otherwise} \end{aligned} \tag{6}$$

From Equation (5) and (6) we can derive the following expression:

$$\begin{aligned} Prob(y_i = 1) &= Prob\left(u_i > -\sum x_i'\beta_i\right) \\ &= 1 - F\left(-\sum x_i'\beta_i\right) \end{aligned} \tag{7}$$

where F is the cumulative distribution function for u_i, and $Prob\left(y_i = 0 \middle| \beta, x_i\right) = F\left(-\sum x'\beta_i\right)$

The observed values of *y* are the realization of the binomial with probabilities given by Equation (7), which varies with x_i Thus, the likelihood function can be given by:

$$L = \prod_{y_i=0}\left[F\left(-\sum x_i'\beta_i\right)\right]\prod_{y_i=1}\left[1 - F\left(-\sum x_i'\beta_i\right)\right] \tag{8.1}$$

which can be written as:

$$L = \prod_{y_i=1}\left[F\left(-\sum x_i'\beta_i\right)\right]^{1-y_i}\left[1 - F\left(-\sum x_i'\beta_i\right)\right]^{y_i} \tag{8.2}$$

The functional form imposed on F in Equation (8)[1] depends on the assumption made about u_i in Equation (5)[2]. The cumulative normal and logistic distributions are very close to each other. Thus, using one or the other will basically lead to the same result [21]. Moreover, following [22], it is possible to derive the would-be estimates of a *probit* model once we have parameters derived from the *logit* model. Thus, the *logit* model is used in this paper.

We specified the *logit* model by assuming a logistic cumulative distribution of u_i in F (in Equation 8.1 and 8.2). The relevant logistic expressions are:

$$1 - F\left(-\sum x_i'\beta_i\right) = \frac{e^{\sum x_i'\beta}}{1 + e^{\sum x_i'\beta}} \tag{9.1}$$

$$F\left(-\sum x_i'\beta_i\right) = \frac{e^{-\sum x_i'\beta}}{1 + e^{-\sum x_i'\beta}} = \frac{1}{1 + e^{\sum x_i'\beta}} \tag{9.2}$$

As before, x_i is the characteristics of the households/individuals, communities, and β_i the coefficients for the respective variables in the *logit* regression. Having estimated Equation (8) with maximum likelihood (ML) technique, Equation (9.1) basically gives us the probability of being poor $\left[Prob(y_i = 1)\right]$ and Equation (9.2) the probability of being non-poor $\left[Prob(y_i = 0)\right]$.

2.2.1. Description of the Determinants of Poverty

Based on the above model, we argue in this paper that village; community and household characteristics cause poverty and influence the capacity to escape poverty.

Household composition

**Age of household head (LOG AGE)*: the poverty profile found little correlation between the age of the household head and poverty. In theory, households with a younger head are less likely to be prosperous than those with a working older one. Households with either older or younger household heads may be more likely to consume less than those with heads of household who are of working age ([23,24]).

[1]The log likelihood function for Equations (8.1) and (8.2) can be written as,

$$l(\beta) = \log L(\beta) = \sum_{i=0}^{K} y_i \log\left(1 - F\left(-\sum x_i'\beta_i\right)\right) + (1 - y_i)\log F\left(-\sum x_i'\beta_i\right)$$

[2]This basically forms the distinction between *logit* and *probit* models.

**Household size* (*LOG HHSIZE*2): the majority of studies have found that a larger household size is correlated with increased poverty. It has been found in Sierra Leone that, poorer households tend to be slighted larger than non-poor households [24,25] highlight the need to examine this issue more thoroughly. [26,27], and [28] used the square of household size as an explanatory variable to allow for non-linearity in the relationship between household size and living standards. Other things being equal, we expect smaller households to be less poor and, following other research, the square of household size is included as an independent variable. In addition, households with a higher share of children are likely to have fewer income-generating opportunities than those with more adults of working age. The regressions include variables for the proportion of children below the age of 16 in the household (*CHILDRAT*) and that of adults between the ages of 16 and 59 (*ADULTRA*T).

**Education*: the poverty profile showed many correlations between education levels and poverty. In examining Côte d'Ivoire, [28] found household education levels to be a key determinant of poverty in urban, but not in rural areas. [27] found that education, specifically women's education, was a key determinant of household poverty status. Similarly, [26] (2003) found that higher levels of education in Malawi resulted in welfare improvements. [29], on the other hand, using a different data set for Mozambique, found that education was not a significant factor in poverty levels, especially for rural households. The education variables used in this analysis included the level of education of the household head (*POSTSEC and POSTPEDU being a dummy variables = 1 if the household head attained post secondary or post primary education respectively and 0 otherwise*).

**Social capital*: [30] found that higher levels of social capital, as measured by involvement in associations to reflect social norms and relationships in a community, result in higher levels of welfare. [29] also found this to be the case in Mozambique. To capture possible effects of community involvement, a dummy variable for whether or not someone in the household participates in community programmes is included. These variables are specified as:

- *MEMBERSHIP* (a dummy = 1 if the household head or any other member belong to a community group);
- *EXPEXTN* (a dummy variable = 1 if the household had contact with agricultural extension agents and 0 otherwise)
- *RESEARC*H (a dummy variable = 1 indicating if the household participated in the community research demonstrations and 0 otherwise)

**Remittances*: This is the only variable for income source used, but if it can be considered an extra source of income, it is likely to improve household welfare. The variable is a simple dummy variable for whether or not the household receives remittances.

Access to infrastructure: Given that poverty was significantly higher in rural areas, access to infrastructure has also been found to be a significant variable in a number of other studies. [28] found that, in rural areas, infrastructure has substantial predictive power: households located in villages that are nearer to paved roads and public markets are better-off. A series of dummy variables have been included in the model to pick up localized effects. These are:

**Variables related to input and output market access* including:

- -Variable *RESPOND1* being a dummy variable that indicates if there is any market within the community/village;
- -Variable *RESPOND3* a dummy indicating if there is any trader or processor being linked with the community/village and;
- -*RESPOND6* a dummy variable indicating if there is any agro-dealer shop within the community/village.

**Variables related to the village resources* describing the possession of some physical amenities in the community/village. These are dummy variables defined to be equal to one each if the village/community is endowed with the following: schools (*POSSES1*), hospital, clinic or other health center (*POSSES2*), worship places (*POSSES3*), social halls or centers (*POSSES4*), boreholes or wells (*POSSES5*), cattle dips, veterinary centers (*POSSES6*), radio-reception channels (*POSSES9*), all weather roads (*POSSES11*), livestock watering points (*POSSES14*), rural micro-finance bank (*POSSES16*), government extension agriculture/livestock office (*POSSES17*) and, agricultural research site (*POSSES18*).

3. Data

The data used are based on the 2008 baseline survey carried out within the Sub-Saharan Africa Challenge programme's pilot learning sites (SSA-CP PLSs). These data were collected for the seven countries and covered nearly five thousand households. The fundamental rationale behind the choice of a household as a unit of analysis is the assumption of sharing of resources among households.

The data gathered as part of the Kano, Katsina, Maradi, Lake Kivu and Zimbabwe, Malawi and Mozambique pilot learning site (KKM, LK and ZMM PLSs) of the SSA CP provide rich information at the individual/farmer, the household, the village and the community level. The data include information on the awareness and

adoption of improved crop varieties, food production, access to inputs, capital assets, social capital, household/farmer characteristics, market and marketing, household income and expenditure, food security/insecurity, dietary, credit, agricultural practices and knowledge, amongst others. **Table 1** below provides the distribution of households by country, sub-countries and villages, while **Table 2** gives the descriptive statistics of variables used to identify the determinants of poverty.

As shown in **Table 2**, the number of households with members belonging to a farmer group or organization varies from 10% to 51% with the maximum number appearing in Uganda (51%). Throughout the countries, on average, less than 20% of the households have had contact with agricultural extension agents or participated in community research demonstrations. Moreover, very few communities in these countries possess cattle dips, veterinary centers, all weather roads livestock watering points, rural micro-finance bank, government extension agriculture/livestock office and, agricultural research site.

To construct the wealth index, we select fourteen primary indicators that can be classified into three categories: possession of agricultural equipment, ownership of durable goods and housing conditions. **Table 3** presents a detailed description of these indicators. [19] describes the calculation of a composite poverty indicator using MCA as a four-stage process. *Firstly*, one constructs an indicator matrix (of ones and zeros) that shows the asset ownership of each household. If the households are displayed as rows, each asset is represented by the inclusion of a column for each possible (mutually exclusive and exhaustive) ownership category of that asset. In other words, each categorical asset ownership variable is reduced to a set of binary indicators. In this way, every household will indicate a ''1'' in exactly one of each asset's set of columns or categories, and a ''0'' in all other columns. *Secondly*, the profiles of the households relative to the categories of asset ownership are calculated. The row profiles of a matrix are the rows of that matrix, each divided by its row sum. *Thirdly*, MCA is applied to the original indicator matrix, and provides a set of category-weights from the first dimension or factorial axis of the analysis results. *Fourthly*, these MCA category-weights are applied to the profile matrix. A household's MCA composite indicator score is calculated by adding up all of that unit's weighted responses.

The **Table 3**, which also reports the weights for each index component, shows that those components that reflect higher standards of living contribute positively to the asset index, while components that reflect lower standards of living contribute negatively to the wealth index across countries. For example, owning a bicycle, owing a draft cattle or having a house with a good quality roofing material increases a household's asset index score in some countries; while not owning a bicycle, a radio, or living in a house with poor floor quality decreases a household's asset index score, that is, measured level of welfare.

4. Results

4.1. Poverty Analysis Results

The choice of poverty line is crucial for poverty analysis using FGT measures. There is no apparent non-arbitrary level at which to set it. The poverty lines set by [13] were, compared to their earlier study [13], set at relatively high levels, where the discrimination ability of asset indices was somewhat better.

In our non-monetary poverty framework the choice of the poverty line is somewhat less debatable for two reasons. Firstly, the definition of an absolute poverty line is not obvious since the welfare composite index used here does not include the nutritional dimension which is helpful in determining a minimal subsistence threshold. Secondly, there is a need to determine a set of welfare indicators deemed essential for every individual to achieve a minimum level of well-being. Based on this second reason, we chose one higher poverty line set at the 75^{th} percentile because Africa has substantially higher level of poverty than other world regions and the asset index does not discriminate well at very low levels. **Table 4** presents the monetary-based poverty indicators of households estimated using the standard poverty line of USD 1.25 per equivalent adult adjusted with the local purchasing power parity (PPP) exchange rate, below which a household was classified as being poor and above which a household was classified as being non-poor, while **Table 5** provides a summary of the monetary and non-monetary-based poverty indicators.

The poverty measures include the headcount index, the poverty gap, and the squared poverty gap. The headcount index is the percentage of the population living in households with income *per capita* below the poverty threshold. However, the headcount index ignores the amounts by which the income of the poor falls short of the poverty threshold. Hence the poverty gap index which gives the mean distance below the poverty line as a proportion of the poverty line is also computed, the squared poverty gap index which indicates the severity of poverty is computed by weighting the individual poverty gaps by the gaps themselves, so as to reflect inequality among the poor.

From the summary in **Table 5**, it is clear that communities in the study area deal with pervasive rural poverty:

Table 1. Distribution of households by country, LGA and villages.

Country	Locality/LGA/Sub-county	Number of villages	Number of household
	Buzi	20	198
	Bweremana	6	49
	Jomba	9	102
	Kamuronza	10	97
DRC	Kituva	4	39
	Rubare	4	38
	Rugari	20	204
	Rumangabo	6	69
	Total	**79**	**796**
	Madarounfa	5	50
	Agui	5	49
	Dakoro	10	98
NIGER	Groumdji	5	49
	Mayahi	10	100
	Tessawa	10	98
	Total	**45**	**444**
	Maiadua	10	100
Nigeria Sahel	Rogo	2	20
	Zango	5	50
	Total1	**17**	**170**
	Bakori	5	46
	Dandume	5	48
	Danja	5	39
	Funtua	5	45
	Giwa	5	46
	Ikara	5	50
Nigeria NGS	Kabau	6	49
	Kudan	5	44
	Makarfi	3	26
	Sabon Gari	5	43
	Soba	5	50
	Zaria	5	46
	Total 2	**59**	**532**
	Bunkure	5	50
	Dan Musa	10	100
	Dawakin Tofa	10	100
	Ingawa	10	100
Nig Sudan	Karaye	10	99
	Musawa	5	50
	Safana	5	50
	Shanono	5	50
	Total 3	**60**	**599**
	Total Nigeria	**136**	**1,301**
	Bigogwe	20	176
	Gacaca	10	99
	Gataraga	10	99
Rwanda	Mudende	5	50
	Nyange	20	186
	Remera	6	97
	Rwerere	5	48
	Total	**79**	**755**
	Bubare	5	46
	Bufundi	10	98
	Chahi	10	103
	Hamurwa	10	95
Uganda	Itojo	10	88
	Kayonza	5	44
	Nyakabande	20	194
	Rubaya	20	190
	Total	**90**	**858**
Malawi		**-**	**483**
Mozambique		**-**	**520**

Table 2. Descriptive Statistics of the determinants of poverty.

VARIABLE	*DRC* (N = 796)		*Niger* (N = 445)		*Rwanda* (N = 755)		*Uganda* (N = 8 58)		*Nigeria Sahel* (N = 171)		*Nigeria NGS* (N = 575)		*Nigeria Sudan Savannah* (N = 599)		*Nigeria All* (N = 1349)		*Malawi* (N = 483)		*Mozambique* (N = 520)	
	Mean	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D*	*Mean*	*S.D.*
LOG AGE	3.75	0.34	3.77	0.30	3.75	0.33	3.77	0.35	3.75	0.34	3.77	0.30	3.75	0.33	3.77	0.35	3.67	0.44	3.73	0.43
LOG HHSIZE2	3.69	1.08	4.31	1.09	3.42	0.92	3.45	1.05	3.69	1.08	4.31	1.09	3.42	0.92	3.45	1.05	3.06	1.07	3.57	1.23
CHILDRAT	0.44	0.25	0.42	0.33	0.44	0.23	0.42	0.24	0.44	0.25	0.42	0.33	0.44	0.23	0.42	0.24	0.41	0.25	0.49	0.33
ADULTRAT	0.42	0.20	0.37	0.38	0.42	0.19	0.41	0.20	0.42	0.20	0.37	0.38	0.42	0.19	0.41	0.20	1.98	1.52	2.67	1.85
REMITTANCE	0.09	0.29	0.24	0.43	0.06	0.25	0.12	0.32	0.09	0.29	0.24	0.43	0.06	0.25	0.12	0.32	0.16	0.36	0.00	0.00
POSTPEDU	3.77	2.46	1.38	1.03	3.07	1.80	3.23	2.22	3.77	2.46	1.38	1.03	3.07	1.80	3.23	2.22	3.34	1.86	2.59	1.57
POSTSEC	4.65	2.73	2.65	1.92	4.37	2.06	4.78	2.62	4.65	2.73	2.65	1.92	4.37	2.06	4.78	2.62	42.45	15.77	44.90	16.44
MEMBERSHIP	0.10	0.31	0.19	0.39	0.25	3.61	0.51	0.50	0.10	0.31	0.19	0.39	0.25	3.61	0.51	0.50	0.21	0.41	0.15	0.36
EXPEXTN	0.06	0.24	0.18	0.38	0.06	0.24	0.17	0.37	0.06	0.24	0.18	0.38	0.06	0.24	0.17	0.37	0.20	0.51	0.17	0.38
RESEARCH	0.03	0.16	0.10	0.30	0.03	0.16	0.08	0.26	0.03	0.16	0.10	0.30	0.03	0.16	0.08	0.26	0.21	0.43	0.08	0.27
RESPOND1	0.26	0.44	0.18	0.38	0.18	0.38	0.18	0.38	0.26	0.44	0.18	0.38	0.18	0.38	0.18	0.38	0.31	0.46	0.55	0.50
RESPOND3	0.16	0.37	0.96	0.21	0.47	0.50	0.58	0.49	0.16	0.37	0.96	0.21	0.47	0.50	0.58	0.49	0.47	0.50	0.37	0.48
RESPOND6	0.07	0.26	0.42	0.49	0.11	0.31	0.31	0.46	0.07	0.26	0.42	0.49	0.11	0.31	0.31	0.46	0.15	0.35	0.13	0.34
POSSES1	0.47	0.50	0.85	0.36	0.39	0.49	0.50	0.50	0.47	0.50	0.85	0.36	0.39	0.49	0.50	0.50	0.43	0.50	0.78	0.41
POSSES2	0.28	0.45	0.38	0.49	0.04	0.20	0.12	0.33	0.28	0.45	0.38	0.49	0.04	0.20	0.12	0.33	0.08	0.27	0.36	0.48
POSSES3	0.67	0.47	0.87	0.34	0.58	0.49	0.73	0.44	0.67	0.47	0.87	0.34	0.58	0.49	0.73	0.44	0.88	0.33	0.96	0.21
POSSES4	0.04	0.20	0.04	0.21	0.19	0.39	0.26	0.44	0.04	0.20	0.04	0.21	0.19	0.39	0.26	0.44	0.35	0.48	0.26	0.44
POSSES5	0.07	0.26	0.98	0.15	0.09	0.29	0.41	0.49	0.07	0.26	0.98	0.15	0.09	0.29	0.41	0.49	0.79	0.41	0.46	0.50
POSSES6	0.07	0.25	0.02	0.15	0.06	0.24	0.18	0.38	0.07	0.25	0.02	0.15	0.06	0.24	0.18	0.38	0.04	0.20	0.13	0.34
POSSES9	0.28	0.45	0.98	0.15	0.54	0.50	0.50	0.50	0.28	0.45	0.98	0.15	0.54	0.50	0.50	0.50	0.85	0.36	0.95	0.22
POSSES11	0.33	0.47	0.44	0.50	0.58	0.49	0.64	0.48	0.33	0.47	0.44	0.50	0.58	0.49	0.64	0.48	0.59	0.49	0.55	0.50
POSSES14	0.11	0.32	0.69	0.46	0.11	0.31	0.37	0.48	0.11	0.32	0.69	0.46	0.11	0.31	0.37	0.48	0.32	0.47	0.51	0.50
POSSES16	0.07	0.26	0.09	0.29	0.07	0.26	0.14	0.34	0.07	0.26	0.09	0.29	0.07	0.26	0.14	0.34	0.19	0.39	0.01	0.12
POSSES17	0.08	0.27	0.18	0.38	0.09	0.29	0.06	0.23	0.08	0.27	0.18	0.38	0.09	0.29	0.06	0.23	0.02	0.14	0.06	0.24
POSSES18	0.02	0.14	0.04	0.21	-	-	0.09	0.29	0.02	0.14	0.04	0.21	-	-	0.09	0.29	*Mean*	*S.D*	*Mean*	*S.D.*

Table 3. Primary indicators.

Variables	Attribute (%)	DRC (N = 370)	Malawi (N = 483)	Mozambique (N = 520)	Niger (N = 552)	Nigeria (N = 1131)	Rwanda (N = 599)	Uganda (N = 683)
Owns a bicycle	yes	0.027	0.068	0.027	0.030	0.094	–0.014	–0.457
	no	–0.452	–0.125	–0.117	–1.371	–0.025	0.001	0.034
Owns draft cattle	yes	-	–0.008	–0.067	0.624	0.139	–0.014	–0.436
	no	-	1.939	0.003	–0.016	–0.255	8.5	0.001
Owns draft donkeys	yes	-	-	–0.002	0.860	0.060	–0.014	-
	no	-	-	0.265	–0.002	–0.472	8.5	-
Owns a mobile phone	yes	0.025	0.061	–0.246	–0.537	0.179	–0.016	0.019
	no	–0.548	–0.605	0.001	0.007	–0.215	0.001	–0.001
Owns a motorcycle	yes	0.014	0.110	0.012	–0.190	0.028	–0.032	–0.456
	no	–0.550	–0.003	–1.001	0.002	–0.047	0.000	0.009
Owns an oxcart	yes	-	–0.02	0.006	–0.010	0.074	-	-
	no	-	1.53	–1.461	1.124	–0.519	-	-
Owns an ox-plough	yes	-	-0.009	0.016	–0.019	0.164	–0.014	–0.000
	no	-	1.40	–0.896	0.635	–0.179	8.5	0.091
Owns a radio	yes	0.071	0.121	0.053	–0.094	0.007	0.024	0.050
	no	–0.139	–0.125	–0.196	0.002	–0.057	–0.02	–0.015
Owns a sewing machine	yes	0.019	0.013	0.003	–0.534	0.002	–0.016	0.192
	no	–0.518	–0.45	–0.106	0.004	–0.002	0.000	–0.001
Owns a television	yes	0.008	0.026	0.015	–0.643	0.064	–0.030	–0.411
	no	–0.760	–0.681	–1.552	0.002	-0.034	0.000	0.009
Quality of the roofing material	Good quality	0.142	0.109	0.283	–0.06	0.091	–0.021	–0.004
	Other	–0.053	–0.275	–0.041	0.008	–0.090	0.020	0.034
Quality of the floor material	Good quality	0.038	0.037	0.342	-	0.053	–0.022	0.045
	Other	–0.342	–0.258	–0.029	-	–0.090	0.002	–0.006
Quality of the walls material	Good quality	0.032	0.101	0.132	–0.005	0.100	-0.015	0.098
	Other	–0.461	–0.063	–0.031	0.002	–0.002	0.004	–0.008
Number of people per room	Less than two	–0.005	0.077	0.061	0.047	–0.021	0.005	–0.006
	More than two	0.004	–0.034	–0.019	–0.028	0.033	–0.020	0.016
Wealth index								
Lowest value		–0.01	0.00	–0.19	–1.34	–0.02	–0.08	–1.28
25th Percentile		0.07	0.12	0.00	0.00	0.24	–0.02	–0.01
Median		0.13	0.21	0.03	0.00	0.40	0.00	–0.01
Mean		0.13	0.24	0.12	0.01	0.41	0.00	–0.03
75th Percentile		0.21	0.36	0.13	0.05	0.56	0.01	0.04
Highest value		0.34	0.71	0.89	0.48	1.053	0.03	0.34

Table 4. Monetary-based poverty indicators by countries and communities.

Country	Locality/LGA/Sub-county	Head count index	Poverty gap	Severity of poverty
DRC	Buzi	98	91	85
	Bweremana	96	86	82
	Jomba	98	97	96
	Kamuronza	98	97	94
	Kituva	97	93	91
	Rubare	98	90	83
	Rugari	99	96	94
	Rumangabo	98	93	90
	Total DRC	**98**	**95**	**91**
NIGER	Madarounfa	92	78	66
	Agui	90	71	57
	Dakoro	90	69	49
	Groumdji	93	76	61
	Mayahi	92	73	56
	Tessawa	91	72	63
	Total Niger	**91**	**75**	**56**
Nigeria Sahel	Maiadua	92	81	75
	Rogo	65	47	42
	Zango	88	71	78
	Total Nigeria Sahel	**84**	**73**	**68**
Nigeria NGS	Bakori	62	44	35
	Dandume	62	40	31
	Danja	76	49	39
	Funtua	69	38	27
	Giwa	57	42	35
	Ikara	66	39	27
	Kabau	70	51	42
	Kudan	85	63	52
	Makarfi	66	37	28
	Sabon Gari	71	53	44
	Soba	76	52	43
	Zaria	83	61	48
	Total Nigeria NGS	**70**	**47**	**38**
Nig Sudan	Bunkure	92	62	47
	Dan Musa	94	76	66
	Dawakin Tofa	80	59	49
	Ingawa	88	61	49
	Karaye	81	57	51
	Musawa	70	49	39
	Safana	90	59	51
	Shanono	92	67	57
	Total Nigeria Sudan	**86**	**61**	**51**
	Total Nigeria	**80**	**59**	**50**
Rwanda	Bigogwe	96	84	76
	Gacaca	98	87	79
	Gataraga	98	89	82
	Mudende	98	91	85
	Nyange	96	77	66
	Remera	98	86	77
	Rwerere	98	92	86
	Total Rwanda	**98**	**84**	**76**
Uganda	Bubare	97	85	76
	Bufundi	98	91	85
	Chahi	98	88	80
	Hamurwa	98	88	76
	Itojo	95	82	72
	Kayonza	98	86	75
	Nyakabande	98	86	78
	Rubaya	98	89	82
	Total Uganda	**98**	**87**	**79**

Table 5. Monetary and non-monetary poverty index by country.

Country	Poverty indicators					
	Head count index		Poverty gap		Severity of poverty	
	Monetary	Non-monetary	Monetary	Non-monetary	Monetary	Non-monetary
DRC	98	81	95	39	91	28
Malawi		76		39		30
Mozambique		73		62		59
Niger	91	77	75	69	56	52
Nigeria	80	75	59	57	50	47
Rwanda	98	83	84	73	76	67
Uganda	98	84	87	65	79	54

nearly 80-98% of the rural households in DRC, Niger, Nigeria, Rwanda and Uganda are below the poverty line. Rural poverty is also unevenly spread in these countries (as reflected by a poverty-gap ratio of 91% in DRC, 75% in Niger, 59% in Nigeria, 84% in Rwanda and 87% in Uganda) and severe as reflected by a squared poverty gap ratio of 85% in DRC, 56% in Niger, 50% in Nigeria, 76% in Rwanda and 79% in Uganda.

The spread, depth and severity of rural poverty differ among countries. In terms of all measures, Nigeria ranks as the country with the least rural poverty (a headcount ratio of 80%, a poverty-gap measure of 59% and a squared poverty-gap measure of 50%). At the other extreme are the Democratic Republic of Congo (DRC), Rwanda, Uganda and Niger Republic, which rank as countries with the highest poverty (98% and 91% of their rural households are living below a poverty line). All these countries have a rural poverty incidence in excess of 60%.

Results from the non-monetary based approach, indicated in **Table 5**, seem to draw the same conclusions with small differences in the magnitude of the rural poverty index (73% - 84%).

4.2 Determinants of Poverty

In this section, we estimate the determinants of rural poverty by the *logit* Model in order to find out why some households are poor and others are not. The dependent variable is poverty incidence, which is 1 when the household is poor, and 0 if not. **Table 6** gives the marginal effect estimates for the poverty determinants equation. The estimations have been made separately for each of the countries in order to check whether the factor considered have similar impact on poverty.

From **Table 6** it can be clearly seen that in general, the factors strongly associated with poverty (household size, the proportion of children in the household and that of adults, household post secondary educational status, membership to a community group, access to agricultural extension agents, participation in community agricultural research demonstration activities, existence of a market within the village, existence of linkage between the village community and any trader or processor, existence of any agro-dealer shop within the village community, possession by the village of any school, social hall center, boreholes or wells, radio-reception channel, rural microfinance bank and, agricultural research site) are the same for most of the countries involved. However, the magnitude of the coefficients associated with these regressors varies across the countries. Moreover, the number of family members has positive and statistically significant estimates in many of these countries except in Malawi and Mozambique. The result confirms the common belief that larger number of family members is one of the most important causes of rural poverty in the study area. With very few exceptions, post-secondary education helps reduce poverty regardless of the magnitude of the coefficients. It is also clear from the comparison of its estimates in different estimations that education also matters much more to poverty defined by monetary than by non-monetary based measures.

A group of variables have been incorporated to capture the effects of community features on poverty. Undoubtedly, both the socioeconomic and geographical features of a community are important to the poverty status of the households that reside within the community. It has been found that in general, households that reside in villages where there is a market, linkage with any trader or processor, agro-dealer shop and those pos sessing any school, social hall center, boreholes or wells, radio-reception channel, rural microfinance bank and, agricultural research site, are less likely to fall into poverty.

Contact with agricultural extension agents and participation in community research demonstration activities positively improve the poverty status of households. In fact, regular contacts with agricultural extension agents and participation in community research demonstration

Table 6. Determinants of poverty-marginal effects.

Variable	*DRC* (N = 796)		*Niger* (N = 445)		*Rwanda* (N = 755)		*Uganda* (N = 858)		*Nigeria Sahel* (N = 171)		*Nigeria NGS* (N = 575)		*Nigeria Sudan Savannah* (N = 599)		*Nigeria All* (N = 1349)		*Malawi* (N = 396)		*Mozambique* (N = 346)	
	Coef.	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*	*Coef.*	*RSE*
log age	–0.003	0.003	–0.008	0.009	–0.003	0.003	–0.004	0.004	–0.008	0.009	–0.021	0.024	–0.016	0.018	–0.014	0.016	–0.042	0.051	0.041	0.058
log hhsize2	**0.008*** **	0.002	**0.024*** **	0.006	**0.008*** **	0.002	**0.011*** **	0.003	**0.021*** **	0.003	**0.036*** **	**0.005**	**0.044*** **	0.005	**0.038*** **	0.004	0.001	0.028	–0.048	0.029
childrat	**–0.008****	0.003	**–0.024****	0.008	**–0.008****	**0**.003	**–0.011****	0.005	**–0.021****	0.007	–0.025	0.015	**–0.021****	0.007	**–0.039****	0.013	–0.168	0.107	0.136	0.152
adultrat	–0.001	0.003	–0.002	0.008	–0.000	0.002	–0.000	0.004	–0.015	0.009	–0.002	0.027	–0.002	0.006	–0.002	0.012	**–0.038***	0.021	–0.008	0.013
remittance	–0.006	0.004	–0.017	0.010	–0.006	0.004	–0.008	0.005	**–0.015***	0.008	–0.015	0.018	**–0.015***	0.008	**–0.028***	0.016	–0.007	0.055	-	-
postsec	**–0.006****	0.003	**–0.020****	0.008	**–0.006****	0.002	**–0.093****	0.041	**–0.018****	0.008	–0.027	0.036	**–0.080****	0.038	**–0.034****	0.015	**–0.023****	0.011	–0.014	0.015
postpedu	–0.006	0.005	–0.022	0.018	–0.007	0.006	–0.094	0.075	–0.019	0.015	–0.011	0.022	–0.019	0.015	–0.033	0.025	-	-	-	-
membership	–0.002	0.003	0.008	0.009	0.003	0.003	0.004	0.003	–0.007	0.008	–0.001	0.002	–0.077	0.088	–0.043	0.062	**–0.127****	0.061	–0.032	0.060
expextn	**–0.06*****	0.003	**–0.191***	0.101	**–0.070***	0.042	**–0.087***	0.050	**–0.166***	0.093	–0.044	0.019	**–0.165****	0.073	**–0.131****	0.057	**–0.052****	0.026	**–0.191****	0.087
research	–0.009	0.006	**–0.030****	0.015	–0.010	0.007	**–0.038****	0.015	**–0.058****	0.026	–0.085	0.059	**–0.095****	0.042	**–0.144****	0.067	–0.010	0.058	**–0.118****	0.041
respond1	**–0.05****	0.02	**–0.141****	0.007	–0.048	0.031	**–0.064****	0.030	**–0.120****	0.050	–0.031	0.026	**–0.124****	0.063	**–0.121****	0.055	–0.059	0.059	0.105	0.071
respond3	–0.005	0.003	**–0.117****	0.056	–0.051	0.036	**–0.076***	0.040	**–0.101****	0.050	–0.024	0.019	**–0.123****	0.053	**–0.194****	0.087	**–0.140****	0.056	**–0.129****	0.049
respond6	**–0.04*****	0.003	–0.018	0.008	–0.045	0.038	–0.054	0.043	**–0.095****	0.047	**–0.18*****	0.04	**–0.121****	0.057	**–0.177****	0.083	–0.158	0.116	**–0.157****	0.076
posses1	–0.001	0.003	–0.041	0.091	0.001	0.003	0.002	0.004	0.004	0.008	**–0.058****	0.026	0.007	0.018	0.006	0.152	–0.079	0.049	**–0.127****	0.061
posses2	**–0.09****	0.04	**–0.025****	0.008	**–0.112****	0.052	**–0.014****	0.006	**–0.020****	0.007	**–0.08*****	0.014	**–0.048****	0.012	**–0.032****	0.010	**–0.191*****	0.034	–0.085	0.056
posses3	–0.045	0.027	–0.009	0.010	–0.035	0.038	–0.004	0.005	–0.008	0.008	**–0.07*****	0.017	–0.017	0.017	–0.015	0.014	**–0.179*****	0.044	**–0.145****	0.055
posses4	**–0.007****	0.003	**–0.024****	0.007	**–0.097****	0.029	**–0.014****	0.005	**–0.019****	0.058	–0.029	0.018	**–0.05*****	0.010	**–0.04*****	0.008	**–0.237*****	0.067	–0.001	0.071
posses5	**–0.075***	0.042	**–0.083****	0.057	**–0.077****	0.039	**–0.184****	0.039	**–0.119****	0.049	**–0.18*****	0.012	**–0.127****	0.041	**–0.123****	0.059	–0.058	0.066	**–0.243****	0.074
posses6	0.002	0.002	0.005	0.007	0.002	0.003	0.002	0.004	0.004	0.006	–0.004	0.018	–0.092	0.153	–0.078	0.129	**–0.126****	0.052	–0.005	0.085
posses9	**–0.071***	0.040	**–0.015****	0.007	**–0.066***	0.035	**–0.087****	0.044	**–0.013****	0.005	–0.022	0.019	**–0.034****	0.012	**–0.041****	0.019	–0.023	0.070	**–0.158*****	0.035
posses11	–0.001	0.002	–0.021	0.068	–0.001	0.002	–0.000	0.003	–0.002	0.006	**–0.054****	0.014	–0.038	0.027	–0.033	0.108	0.066	0.053	0.024	0.071
posses14	0.003	0.002	0.001	0.006	0.000	0.002	0.000	0.003	0.000	0.005	**–0.124****	0.049	–0.021	0.119	0.001	0.010	0.043	0.057	0.114*	0.063
posses16	**–0.052****	0.028	**–0.166****	0.086	**–0.16*****	0.035	**–0.176****	0.062	**–0.137****	0.064	-	-	**–0.130****	0.045	**–0.126****	0.053	**–0.163****	0.080	-	-
posses17	–0.010	0.006	–0.029	0.018	–0.014	0.006	–0.014	0.008	–0.026	0.017	-	-	–0.055	0.033	–0.048	0.029	–0.008	0.058	–0.005	0.06
posses18	**–0.045***	0.026	**–0.014***	0.008	**–0.047***	0.028	**–0.066***	0.039	**–0.012***	0.007	-	-	**–0.083***	0.046	**–0.024***	0.014	–0.143	0.091	0.000	0.086
Predicted probability	**0.98**		**0.96**		**0.98**		**0.98**		**0.97**		**0.88**		**0.93**		**0.94**		**0.81**		**0.83**	

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

activities lead to the adoption of improved technologies. The role of agricultural technology change in reducing rural poverty and fostering overall economic development has been widely documented in the economic literature. Although quite complex, the relationship between the adoption of new technology and poverty reduction has been perceived to be positive [31-34]. The effects of new agricultural technology on poverty may be direct or indirect. The direct effects of new agricultural technology on poverty reduction are the productivity benefits enjoyed by the farmers who actually adopt the technology. These benefits usually manifest themselves in the form of higher farm incomes. The indirect effects are productivity-induced benefits passed on to others by the adopters of the technology. These may comprise lower food prices, higher nonfarm employment levels or increase in the consumption of food by all farmers [35].

Having estimated the poverty determinants, we can now generate simulations to predict reductions/increases in general poverty levels that result from changes in selected community/institutional characteristics. The purpose is to illustrate how changes in levels of the determinants will alter aggregate poverty levels. These changes are such as those that may result from the implementation of the Integrated Agricultural for Development (IAR4D) approach. Our simulations involve changing the variables at the community/local level. We choose to change variables that are significant and amenable to change with the correct implementation of IAR4D approach.

First, we consider the potential impact of linkage between the village/community and trader/processor, rural micro-finance institution and then, agro-dealers. In this situation we are trying to capture improvements in partnership/interaction among different actors throughout the product value chain as a means of improving accessibility of rural communities to output market and transport, credit and inputs (chemicals and fertilizer).

The results from **Table 7** show that improving partnership/inter-action between the village/communities and traders/processors, micro-finance institution and agro-dealers within the communities could potentially lower average location-level poverty rates by 11% in DRC, 30% in Malawi, 29% in Mozambique and Niger Republic, 50% in Nigeria, 16% in Rwanda and 26% in Uganda respectively (which would imply 88; 119; 100; 129; 675; 121 and; 223 poor people escaping poverty in DRC, Malawi, Mozambique, Niger, Nigeria, Rwanda and, Uganda respectively). The poverty-effect for DRC and Rwanda is relatively small (11% and 16%). Perhaps the disappointment aspect of this simulation is that the expected reduction in poverty is very small in these countries. This result holds true in terms of poverty reduction when we look at the sign of the coefficients. However, it should be noted that the small magnitude of the coefficients are results of change in a set a variables that cannot be the panacea for the poverty problems in these specific countries due to their difficult previous situation.

We also simulate the potential combined direct effect of improving interaction with extension services and research, the establishment of a market within the village together with the entire selected variables simulated in scenario 1. In this situation we are trying to capture improvements in partnership/interaction among different actors throughout the products value-chain as a means of not only improving accessibility of rural communities to output market, transport, credit and inputs (chemicals and fertilizer), but also improving awareness and adoption of improved crop varieties, best-bet agricultural practices as well as inputs and outputs market information.

The results from **Table 8** suggest that the poverty rate for DRC, Malawi, Mozambique, Niger, Nigeria, Rwanda and, Uganda could be lowered by 17%, 57%, 60%, 65%, 89%, 16% and 45% respectively with investment/actions leading to access to input and output markets, awareness and adoption of improved crop varieties and best-bet practices, better access to rural credit and capacity building of community-based organizations.

5. Conclusions and Recommendations

Well-known scholars, politicians, foundations and academic groups have highlighted poverty in Africa as a priority development challenge and have dedicated considerable effort and resources toward its alleviation. Despite this widespread attention, confusion still exists over the language and evidence used to identify poverty in Africa and this is especially true for the Sub-Saharan Africa.

In this paper, we have sought to improve our general understanding of how (and which) institutional/community factors are related to poverty and how these factors vary across some selected countries in East, Southern and West Africa. In addition, we determine the extent to which the variation in poverty incidence can be explained by institutional/community factors, and how the results can be used to evaluate the potential impact on poverty levels of change in factors found to have a significant influence on poverty incidence. We found that:

- The communities in the study area deal with pervasive rural poverty: nearly 80% - 98% of the rural households in DRC, Niger, Nigeria, Rwanda and Uganda are below the poverty line. Rural poverty is also unevenly spread in these countries (as reflected by a poverty-gap ratio of 91% in DRC, 75% in Niger, 59% in Nigeria, 84% in Rwanda and 87% in Uganda)

Table 7. Predicting the effect of changes of some selected variables on poverty: first scenario.

Selected variable	DRC N = 796	Malawi N = 396	Mozambique N = 346	Niger Republic N = 445	Nigeria Sahel N = 171	Nigeria NGS[a] N = 575	Nigeria Sudan N = 599	Nigeria N = 1349	Rwanda N = 755	Uganda N = 858
Linkage between trader/processor	–5%	–14%	–13%	–12%	–10%		–12%	–19%		–8%
Agro-dealer shop within the village	1%		–16%		–10%	–18%	–12%	–18%		
Possession of rural micro-finance bank	–5%	–16%		–17%	–14%		–13%	–13%	–16%	–18%
Total effect	**–11%**	**–30%**	**–29%**	**–29%**	**–34%**	**–18%**	**–37%**	**–50%**	**–16%**	**–26%**

[a]Northern Guinea Savannah.

Table 8. Predicting the effect of changes of some selected variables on poverty: Second scenario.

Selected variable	DRC N = 796	Malawi N = 396	Mozambique N = 346	Niger Republic N = 445	Nigeria Sahel N = 171	Nigeria NGS[a] N = 575	Nigeria Sudan N = 599	Nigeria N = 1349	Rwanda N = 755	Uganda N = 858
Linkage between trader/processor	–5%	–14%	–13%	–12%	–10%		–12%	–19%		–8%
Agro-dealer shop within the village	1%	16%	–16%		–10%	–18%	–12%	–18%		
Possession of rural micro-finance bank	–5%	–16%		–17%	–14%		–13%	–13%	–16%	–18%
Contact with extension agent	–6%	–5%	–19%	–19%	–17%		–17%	–13%	–7%	–9%
Market within the village		–6%		–14%	–12%		–12%	–12%		–6%
Participation to community research action			12%	–3%	–6%		–10%	–14%		–4%
Total effect	**–17%**	**–57%**	**–60%**	**–65%**	**–69%**	**–18%**	**–76%**	**–89%**	**-16%**	**-45%**

and severe as reflected by a squared poverty gap ratio of 85% in DRC, 56% in Niger, 50% in Nigeria, 76% in Rwanda and 79% in Uganda;

- The results of the bivariate *logit* model demonstrate the statistical significance of certain institutional /community variables. At the country level, the set of important variables is diverse and includes household specific characteristics, access to infrastructure (institutional dummy variables), and village resources endowment (community-based variables). This suggests the presence of a poverty-institutional/community relationship and hence the impact of institutional/community factors on the welfare of the poor and on poverty reduction efforts.
- However, the strength of the institutional/community variables shows that countries in the Challenge programme are not homogenous.
- Our simulation results suggest that: firstly, improving partnership/interaction between the village/community and traders/processors, micro-finance institution and agro-dealers within the communities could potentially lower average location-level poverty rates by 11% in DRC, 30% in Malawi, 29% in Mozambique and Niger Republic, 50% in Nigeria, 16% in Rwanda and 26% in Uganda respectively (which would imply 88; 119; 100; 129; 675; 121 and; 223 poor people escaping poverty in DRC, Malawi, Mozambique, Niger, Nigeria, Rwanda and, Uganda respectively). Secondly, the poverty rate for DRC, Malawi, Mozambique, Niger, Nigeria, Rwanda and Uganda could be lowered by 17%, 57%, 60%, 65%, 89%, 16% and 45%, respectively with investment/actions leading to access to input and output markets, awareness and adoption of improved crop varieties and best-bet practices, better access to rural credit and capacity building of community-based organizations. These results indicate that these variables can have significant effects in terms of long-term reduction in poverty.

Finally, it should be noted that although this approach has helped explain the determinants of poverty, there is a need to refine and extend this analysis, including more

inclusive poverty indicators (food-consumption-based indicators) as well as incorporating information from other data sources.

Implication for IAR4D's innovation platforms (*IPs*)

The Sub-Saharan Africa challenge programme set forth a new strategy for improving agricultural innovation outcomes through the integrated agricultural research for development operational approach (IAR4D). This approach aims to demonstrate the effectiveness of innovation systems in supporting the development and adoption of market driven crop/livestock productivity-enhancing technology options. An important dimension of the livelihood improvement expected from the IAR4D approach is food security, income for rural households and then, poverty alleviation.

The findings derived from this paper suggest that more than Fourth-fifths of households in the study area need to escape from poverty. To ensure this significant result, the innovation platforms established within the framework of the challenge programme need to:

- Develop and facilitate the sustainability of a system that encourages regular interactions and information-sharing among stakeholders (e.g., farmers' associations, entrepreneurs, NGOs, CBOs, micro-finance institution, development-oriented organizations, ministries, research and extension agencies);
- Promote and facilitate awareness and adoption of productivity-enhancing agricultural innovations that can contribute to raising incomes of rural households, poverty alleviation, and food security.
- Use current and new tools to understand more thoroughly the nature of existing institutions in action villages and their roles in social and economic development. Doing so should help ensure that task-force IPs avoid weakening existing positive social capital, and identify areas where social capital needs to be strengthened.

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