# Are households in Kagera region in Tanzania vulnerable to poverty?

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## ABSTRACT

*This paper uses the six wave Kagera Health and Demographic Survey (KHDS) panel data to examine whether or not households in Kagera Region were vulnerable to poverty in the period 1991 - 2010. Using the Kagera poverty lines for 1991 and 2010, the paper examines the extent to which variability in households' incomes and consumption engendered the risks (as a measure of vulnerability) to poverty. The results show that risk to poverty was relatively low for the 1991 poverty line and high for the 2010 poverty line. This difference indicates that the risk of households falling into poverty tends to increase over time. However, when households in rural Kagera are analyzed separately, the results do not show variation between the two poverty lines, which implies that in the long run, stabilization of consumption is advantageous to poverty reduction. Thus, the government should strategically earmark resources for consumption stabilization and emphasize interventions that promote pro-poor farming.*

***Key words**: Households, Kagera Region, Vulnerable, Poverty.*

## INTRODUCTION

This paper examines the extent of households' vulnerability to poverty in Kagera Region and how they move into or out of poverty. According to Christiansen and Subbarao (2005), vulnerability of a person (household) is conceived as the potential a person (household) has now of being poor in the future, i.e. the potential of becoming poor if currently not poor, or the potential of continuing to be poor if currently poor. Vulnerability to poverty sets in when transitory shocks that affect negatively household incomes remain unaddressed. In theory, it is assumed that when incomes are affected by transitory shocks, agents' consumption should not change, since it will be smoothened through savings or borrowings to adjust for the shortfall. However, in the rural settings of the Less Developed Countries (LDCs), such as in Kagera Region, lack of savings and borrowing constraints limit the possibility of smoothing consumption, which exposes a household to poverty vulnerability. Any shock affecting a household, even a transitory one, ends up affecting the household's consumption negatively, which would tend to influence the poverty dynamics.

This paper focuses on Kagera Region because the region has since 1970s suffered shocks that have not affected other regions of Tanzania. These shocks include the following: The Kagera War, the high rate of HIV/AIDS spread in the 1980's, the fall in major cash crop prices, the loss of land fertility and different kinds of crop diseases, which affected both cash and food crops. Moreover, as recently as 11th September, 2016, the region was struck by an earthquake of the magnitude of 5.7 on a Richter scale, which left thousands of people homeless and hundreds of people injured or dead. These persistent shocks are perceived to have rendered household incomes in Kagera region highly uncertain from one year to another, thereby causing consumption variability. Due to this variability in incomes, households were over time highly exposed to the risk of falling into poverty.

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The implications of these shocks to households' poverty status in Kagera region have been analysed in a number of studies. Pietrelli and Scaramozzino (2016) analyzed the influence of internal migration on vulnerability to poverty. De Weerdt (2010) analyzed the implications through triangulation of regression and life history approaches. Obara (2009) tested the consumption-smoothing hypothesis using different shapes of utility functions that consider insurance. Some studies differed only in terms of the approaches they used (Beegle et al., 2008 using panel Ordinary Least Square; whereas Dercon *et al.*, 2006 by life-history approaches; and De Weerdt and Dercon, 2006 by Instrumental Variable regression). However, to the best of my knowledge, none of the studies on Kagera region and Tanzania in general has empirically examined the risks to poverty posed by variability and instability of household's income and consumption. Thus, following Ravallion (1988), this paper examines vulnerability to poverty to bring to light implications to poverty changes of the fully stabilized income against actual consumption.

The paper is organized into the following sections; the next section discusses the risk and vulnerability correlates in the region, followed by the conceptual and methodological issues on vulnerability. The last two sections present the results and discussion and the conclusion.

## RISK AND VULNERABILITY CORRELATES IN KAGERA REGION

Kagera Region ranks fifth in terms of population distribution by regions in Tanzania, with the household size of 4.7 - which is a bit lower than the national average of 4.8 per household. The regional annual inter-censal rate (2002-2012) at 3.2 (ranked 6$^{th}$ out of 30 regions), was higher than the national average rate of 2.7 (URT, 2006; URT, 2014). In 2012, the Kagera region had a population density of 97, relative to the national average of 51. This high population density, coupled with decreasing soil fertility, creates land pressure within the region. In turn, the land pressure reduces the productive capacity of households, thereby resulting in increased poverty, if the affected households do not engage in non-farm activities or in producing alternative high value crops.

Kagera Region has witnessed the positive and negative sides of migration, most of them being a result of the location of the region (Gould, 1995; Ongpin, 2008; Baez, 2008). The region is affected by migration of people from neighboring countries, especially Rwanda and Burundi. Migration of the population, both internal and cross-border, could be triggered by various factors, which includes search for new farm land, better pasture and water for livestock, conflicts in the original areas of residency and search for better life through better employment opportunities elsewhere (Mabogunje,1970; Hoddinot, 1994; de Haas, 2007; Beegle et al., 2011). For Kagera Region, the witnessed migration was associated with almost all of the above factors. However, the most notable factor was the conflicts in Rwanda and Burundi, hence the search for new farmlands and better employment opportunities elsewhere (Beegle et al. 2011, Twinomukama, 2014).

The economic activities in Kagera Region include farming, fishing, and small-scale mining and service-related activities. The non-farm activities are not as vibrant as they should be as to allow for diversification out of farming. For instance, over time, industrial development in the region has been poor (URT, 2013). Moreover, the contribution of fisheries and livestock has remained low (URT, 1998; URT, 2013), with the fisheries sub-sector being dominated by small-scale fishermen who use traditional fishing gear, with only a few using outboard engines. The use of poor

technology in fishing negatively affects the level of incomes earned through fishing and the advancement of the fisheries industry. As for the minerals, the region has economic potential for such minerals as gold, cobalt, glass, tin and nickel. However, the region is yet to exploit fully the potential, and thereby reap the benefits from these minerals.

Agriculture in Kagera Region has not succeeded over the years to emancipate most of the households economically, which has spiraled the response in terms of occupational shift within the region. Thus, the proportion of the population employed in agriculture in the region has been declining over time; from 88.2 percent in 1978, it declined to 70.7 percent in 1988 and declined further still to about 70 percent in 2013 (see URT, 1998; URT, 2013). Occupational shift has been instrumental for poverty reduction initiatives, particularly in geographical areas where agricultural productivity has been falling, as is the situation in Kagera Region.

In terms of crops, the major crops are bananas, beans, coffee and tea. The region has the largest planted area for coffee and the second largest planted area for paddy and sorghum than any other region in Tanzania (URT, 2013). Crop husbandry has been poor over time, which has resulted in declining real production (URT, 2013; Katega et al., 2014). Moreover, based on the 1991/92 producer prices, prices were better between the mid-1970s and the early 1980s than in the latter years (URT, 2013). The price situation worsened in the early years after liberalization, specifically, from 1989 to 1990 (Baffes, 2003).

Low agricultural productivity is accounted mainly to subsistence farming and adverse soil conditions due to declining soil fertility, coupled with little use of both organic and inorganic fertilizers. As well, agricultural productivity has been affected by crop diseases (URT, 1998; Katega et al., 2014).

With regard to human capital, the HIV/AIDS pandemic significantly affected the well-being of many households. The first HIV/AIDS patient in Tanzania was diagnosed and reported in 1983 from Kagera Region (Tibaijuka, 1997). Kagera was the region where the HIV/AIDS epidemic had the largest damaging effects from the late 1980s up to the early 1990s. The existence of orphans, neglected homestead, neglected banana and coffee farms is common, mainly because HIV/AIDS decimated the number of economically active age group. A majority of those who were falling ill and dying of HIV/AIDS in Kagera Region were producers, reproducers, and providers of their households (Rugalema, 1998). However, during the past two decades HIV/AIDS prevalence in the region has declined tremendously (Frumence et al., 2014); decreasing from 100 percent in 1983, to 24 percent in 1987 to 4.8 in 2009. The implication of HIV/AIDS and other diseases involves understanding the pecuniary costs incurred and time used in taking care of the sick, the lost labour force due to illness and the lost income that could have funded daily expenditure and education of children (Rugalema, 1988).

Lastly, on literacy rate, although the literacy rate in Kagera Region has been rising over time, the ranking of the region in literacy has been on the declining trend. The region had a literacy rate of 52.4 (ranking 9$^{th}$) in 1978, 59.5 (ranking 11$^{th}$) in 1988, 66.9 (ranking 14$^{th}$) in 2002 and 76.8 in 2012. Tibaijuka (1997) attributes the declining ranking in literacy trend to a number of issues. These include, deliberate (and now discredited) national policies pursued after independence to decelerate the development of the relatively well-off districts and regions to enable the backward

ones to "catch-up", and nationalization of secondary schools in the area and a policy of reserving almost half the places in such schools for students from outside the region. These issues led to declining economic and schooling opportunities, thereby prompting young men to travel frequently between home, towns and border areas in search of wage employment or to engage in petty trade in essential commodities, which were always scarce in this border region (Tibaijuka, 1997).

## METHODOLOGY: CONCEPTUAL ISSUES AND EMPIRICAL MODEL

The poverty status of a household is explained by a combination of factors, of which risk is one of them (Hoogeveen et al., 2005). In the literature, risk issues are linked to poverty status and poverty dynamics through households' decisions to smooth income and survive the difficult periods in income generation processes. Vulnerability is the degree of exposure to risk, and the capacity of households or individuals to prevent, mitigate or cope with risks (Ludi and Bird, 2007). Vulnerability in rural areas is composed of (i) rural risks, i.e. any event that could make the household income or crop output fall below a minimum disaster level, including climatic factors, price fluctuations, access to markets and food, etc., and (ii) seasonal stress.

While for a long time the concern of establishing who are the poor and the underlying causes of poverty have not been relinquished (for example with regard to their low levels of income, consumption or capabilities), increased attention has been put to the possibility of experiencing a decline in these levels. This makes poverty to be seen as the probability (actual or perceived) that a household will suddenly (but perhaps also gradually) reach a position in which it is unable to cope with its status, leading to a catastrophe (Hulme et al., 2001). This lack of assurance of the state in which a household expects to be over time is what is known as vulnerability to poverty.

In the study area, poverty was perceived to be widely spread, with the incomes of households being highly uncertain from one year to another, thereby causing consumption variability. Due to this variability, households were over time exposed to the high risk of falling into poverty. This risk was attributed to lack of income-smoothing solutions. Thus, this paper sought to examine the vulnerability to poverty by examining the extent to which income/consumption variability increases or decreases the risk of being poor. Kamanou and Morduch (2002) explain vulnerability of a population to be linked to the following three elements: (i) *the pattern of possible 'shocks'*. These may be losses due, for example, to losing a job, experiencing a bad harvest, increases in needs due to illness, child birth or costly occasions, among others; (ii) *the strength of coping mechanism*. This is the degree to which provisions are not in place to fully address the shock; and (iii) *structural and behavioral ramifications of consumption declines*. That is, whether they are apt to lead to a temporary shortfall or to lead to poverty traps.

This paper examines whether there are possibilities of consumption decline among households over time and its implication to the risks of becoming poor. The paper adopts for estimation the Ravallion (1988) approach, which gives a more accurate measure of contribution of poverty to variability. To measure Poverty, Foster, Greer and Thorbeke (1984) (FGT) propose a class of decomposable poverty indices that vary with a "poverty aversion" parameter. The (FGT) poverty index, used in this study, has been the mostly widely used in the recent years, as it meets most of the desirable properties/axioms of poverty measurements. In particular, the FGT index meets the "decomposability" or "sub-group consistency" property.

This FGT index is defined as

$$P(z,y)=\frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^{\alpha} \quad (1),$$

where $\alpha \geq 0$, $\alpha$ is a poverty aversion parameter and shows the weight assigned to the poorest of the poor. If $\alpha = 0$, then $P(z,y)$ reduces to Headcount, whereas if $\alpha = 1$, $P(z,y)$ reduces to the average income gap. A higher value of $\alpha$ indicates increased concern for the poorest. The Headcount measures the prevalence of poverty, whereas the Income Gap measures its intensity. An index with $\alpha = 2$, for example, indicates poverty severity.

According to Ravallion (1988), for any value of $\alpha$ (in FGT), the contribution of poverty to variability can be obtained by comparing mean poverty over the study period, $\overline{P}_{\alpha}$, to the level of poverty at stabilized income.

The mean poverty over the period under study is given as,

$$\overline{P_{\alpha}}=\frac{\sum P_{\alpha t}}{T} \quad (2),$$

and the level of poverty at stabilized income is given as,

$$P_{\alpha}^{*}=\frac{\sum_{t=1}^{m^{*}}\left(\frac{z-\bar{y}_i}{z}\right)^{\alpha}}{n} \quad (3)$$

where $\bar{y}_i$ is the average income/consumption over time of the $i^{th}$ household, $m^{*}$ is the household for whom that income is below the poverty line. Thus $\overline{P}_{\alpha} - P_{\alpha}^{*}$ is an increase in expected poverty attributable to variability in $y$.

A convenient money metric of the cost of variability due to poverty is obtained by calculating the number $\tau$ such that:

$$\overline{P_{\alpha}}=\frac{\sum_{t=1}^{m^{*}}\left(\frac{z-\overline{y_i}-\tau}{z}\right)^{\alpha}}{n} \quad (4),$$

where $\tau$ is the amount by which the mean income of all poor households (i.e. all $i$ with $\bar{y}_i < z$) would have to be reduced to achieve the actual mean level of poverty over the study period. Hence, the difference between $\overline{P}_{\alpha}$ and $P_{\alpha}^{*}$ indicates the extent to which income variability increases or decreases the risk of being poor.

Vulnerability refers not to the status of a household with respect to a given poverty line, but rather to the risk or probability that a household could be poor in some future period (McCulloch and Calandrino, 2003). This definition provides what would result from estimating Equation 4.

The above measure of vulnerability has the following advantages: (i) It is based on long-term average welfare rather than from a single period; (ii) It takes into account the ability of households at all consumption levels to smooth their consumption over time. Thus, if a household is above the poverty line and can smoothen consumption across time very well. It is correctly deemed to be less vulnerable to poverty than a non-poor household with highly vulnerable consumption.

*Data*

This paper has used the Kagera Health and Development Survey (KHDS) panel dataset. The dataset is rich, with some data related to long-run consumption and wealth of households in Kagera Region, whereby a follow-up was made of those who migrated from the region. According to World Bank (2004), the KHDS 91-94 household sample was drawn in two stages, with stratification based on geography in the first stage and mortality risk in both stages. The 550 primary sampling units (PSUs)[i] in Kagera Region were classified in the first stage according to eight strata, defined over four agronomic zones and, within each zone, the level of adult mortality (high and low). Enumeration areas of households from the PSUs in each stratum were drawn using a random probability of selection, proportional to the size of the PSU. The ward was assigned in the "high" mortality category if its adult mortality rate was at the 90th percentile or higher of the ward adult mortality rates within a given agronomic zone, an approach that led into the selection of 51 communities as PSUs (also referred to as clusters).

The second stage (within enumeration areas) used a stratified random sample, in which, households expected to experience an adult death due to either living in communities suffering from an HIV epidemic, or having a history of prior adult death or illness in a household were over-sampled. After the two stages, a total of 816 households in 51 enumeration areas were drawn. People who were household members in any wave of the KHDS 91-94 were re-interviewed for the KHDS 2004 and KHDS 2010 surveys. The household questionnaire was administered to the households in which these previous household members (PHHMs) lived. The information for the household member who was alive during the last interview in 1991-1994, but found deceased by the time of the fieldwork in 2004 and 2010 was collected in the mortality Questionnaire. The longevity of the KHDS panel makes it difficult to define a household, yet attempts were made to consider re-contact rates in terms of households. Excluding households in which all previous members are deceased (17 households and 27 respondents), the KHDS 2004 re-contacted 93 percent of the baseline households, whereas the KHDS 2010 re-contacted 92 percent of the households. The details of the data set are provided in World Bank (2004) and De Weerdt et al., (2010).

## RESULTS AND DISCUSSION

The paper has examined vulnerability following Ravallion's (1988) approach. This approach filters out poverty due to current consumption and poverty due to stabilized income or consumption. The results constitute three sets of estimates: (i) mean poverty ;( ii) Poverty when consumption is stabilized at its mean; and (iii) Increase or decrease in expected poverty attributable to variability in consumption and percentage increase in poverty.

The results are presented in Tables 1 and 2, based on the absolute poverty line for 1991 (wave 1) and the poverty line for 2010 (wave 6). Whereas the results in Table 1 are based on all of Kagera Region households in the dataset, those in Table 2 are based on Kagera Region rural households. As shown in both tables, the estimates are for the Headcount and Poverty Gap Ratio.

Based on the 1991 poverty line for all Kagera Region households (Table 1) and Kagera rural households (Table 2), the results show that both the headcount and poverty gap ratio declined and

are very low in magnitude. These results indicate that risk may not have increased the mean number of poor households. The decline was 99 percent of the mean poverty index. The results imply that stabilization of consumption is advantageous to poverty reduction initiatives.

**Table 1: Estimated Effects on Poverty of Consumption Variability for all Kagera Region Households**

| **Welfare Indicator** | **Poverty Measure** | | |
|---|---|---|---|
| | **Headcount** | **Poverty Gap Ratio** | |
| **Consumption** | | | |
| (i) Mean Poverty $\overline{P}_{\alpha}$ | 45.24 | 18.57 | |
| At fully stabilized consumption $P^{*}_{\alpha 1991 pline}$ | 0.031 | 0.006 | |
| (ii) $\uparrow$ in expected poverty attributable to variability in $y$ | 45.22 | 18.57 | YR 1991 |
| (iii) % increase in poverty (( $P^{*}_{\alpha 1991 pline} - \overline{P}_{\alpha}$ )/ $\overline{P}_{\alpha}$ )*100 | 99 | 99 | |
| At fully stabilized consumption $P^{*}_{\alpha 2010 pline}$ | 86.52 | 39.33 | |
| (ii) $\uparrow$ in expected poverty attributable to variability in $y$ | -41.28 | -20.76 | YR 2010 |
| (iii) % increase in poverty (( $P^{*}_{\alpha 2010 pline} - \overline{P}_{\alpha}$ )/ $\overline{P}_{\alpha}$ )*100 | 91 | 112 | |

**Source:** Authors' computations

Note: $\uparrow$ means increase

When basing on the poverty line for 2010, the estimated results differ from those based on 1991 poverty line. The expected poverty attributable to variability in consumption is found to have increased. Ward (2016) found similar results for rural China in which vulnerability was increasing due to income variability. For all Kagera Region households (Table 1) and Kagera rural households (Table 2), the increase is 91 percent and 87 percent, respectively, for headcount; and it is 112 percent and 110 percent, respectively, for the poverty gap ratio index. Thus, when urban households are not filtered out in the estimation processes, they tend to make pronounced the expected poverty due to variability in consumption. Moreover, consumption stabilization is found to have increased the incidence of poverty over time, which indicates that the risks of households falling into poverty tend to increase over time. Hence, households that are only occasionally poor prior to stabilization may become persistently poor as a result of stabilization.

**Table 2: Estimated Effects on Poverty of Consumption Variability for Kagera Region Rural Households**

| Welfare Indicator | Poverty Measure: Headcount | Poverty Gap Ratio | |
|---|---|---|---|
| **Consumption** | | | |
| (i) Mean Poverty $\overline{P}_\alpha$ | 47.91 | 20.27 | |
| At fully stabilized consumption $P^*_{\alpha 1991 pline}$ | 0.038 | 0.007 | |
| (ii) ↑ in expected poverty attributable to variability in $y$ | 47.87 | 20.26 | YR 1991 |
| (iii) % increase in poverty (( $P^*_{\alpha 1991 pline}$ - $\overline{P}_\alpha$ )/ $\overline{P}_\alpha$ )*100 | 99 | 99 | |
| At fully stabilized consumption $P^*_{\alpha 2010 pline}$ | 89.51 | 42.66 | |
| (ii) ↑ in expected poverty attributable to variability in $y$ | -41.60 | -22.39 | YR 2010 |
| (iii) % increase in poverty (( $P^*_{\alpha 2010 pline}$ - $\overline{P}_\alpha$ )/ $\overline{P}_\alpha$ )*100 | 87 | 110 | |

**Source:** Authors' computations;

**Note:** ↑ means increase

In general, the findings imply that long-run factors may be more important in explaining current poverty. The intuition for the results based on the 2010 poverty line is explained in several earlier studies. Mkenda et al., (2004) pointed out that Kagera Region is among the regions with slow growth, faring poorly in regional poverty ranking. Da Corta and Price (2009) and Higgins (2013) show that poverty in Tanzania is still very high. Looking at various government reports, they point to a decline in production in the region, with the prices of most of the major crops in the region having declined, particularly after liberalization, which made income stabilization difficult. According to URT (2013) and BoT (2000) the position of Kagera Region in terms of per capita income compared to other regions has continued to plummet because over time the economic conditions in Kagera Region have continued to worsen more than in many of the other regions. For instance, the region ranked 12th in 1994 out the 21 regions in Tanzania, falling to 18th in 2005 and to 19th in 2009 out of 21 regions. It fell in the category of four poorly performing regions, which include also Dodoma, Kigoma and Singida. These regions, however, are not well endowed with natural resources as Kagera Region is.

## CONCLUSION

The paper has examined the risks (as a measure of vulnerability) to poverty posed by variability and instability of household's income and consumption. The paper uses a six wave Kagera Health and Demographic Survey panel data collected between 1991 and 2010. Using 1991 and 2010 poverty lines and adopting Ravallion (1988) approach, risks and vulnerability were examined by comparing stabilized consumption with mean consumption. The results are dependent on the invoked poverty line. For all Kagera households in the sample and for rural Kagera households

separately, the risk to poverty posed by variability and instability of household's income and consumption varies; it increases when the 2010 poverty line is considered and declines for the 1991 poverty line. Moreover, vulnerability analysis shows that any existing and current income stabilization strategies lead to increased incidence of poverty. The results are intuitive, based on some previous studies, including Mkenda *et al.* (2004), Da Corta and Price (2009) and Higgins (2013). Thus, consumption stabilization strategies are not likely to be a panacea, since they could turn previous occasionally poor households to being chronically poor. In terms of policy, the findings imply that the earmarking government resources for consumption stabilization should be carefully considered or else emphasize interventions that promote pro-poor farming. More work on the role of consumption stabilization strategies is proposed.

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