

Why is inequality high in Africa?

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Paper presented at the 10<sup>th</sup> African Economic Conference

November 2, 2015

Kinshasa

DRC

## Abstract

We compute asset-based inequality for 44 African countries in multiple waves using over a million household histories and decompose within country inequality into spatial components and those attributed to household specific characteristics such as education, occupation and experience. Our results suggest that close to 40% of asset inequality are spatial with significant difference across countries. Political governance and ethnic fractionalization explain 25% of spatial inequality while level of development is uncorrelated with it. In addition, spatial inequality is strongly correlated with child and maternal mortality and other measures of human opportunity. The between country inequality is lower in countries with relatively high proportion of households completed tertiary education. Countries with high remittance flows also had lower inequality. Finally, goods or asset market distortions play an important role in driving inequality in Africa.

## 1. Introduction

Available evidence suggests that Africa is the second most unequal continent in the world next to Latin America (e.g. Ravallion and Chen, 2012). High inequality also seems to have persisted for overtime with no visible sign of declining (Bigsten, 2014; Milanovic, 2003). Paucity of data at the household level in repeated waves for many countries prevented any systematic analysis on the underlying determinants of inequality in Africa. Previous attempts based on cross-country panel data indicate ethnic fractionalization as a robust determinant of income inequality in Africa (Milanovic, 2003). While there may be enough justifiable political economy reasons for ethnically fragmented countries to experience high inequality, it is also possible that the ethnicity variable may be picking up other unobserved factors relevant for policy. In addition, the main challenge researchers commonly face while working on inequality data for African countries is its quality and availability in reasonably sufficient waves. Household income and consumption surveys, the source of most income inequality data are collected infrequently and in irregular time intervals in many cases making contemporaneous comparisons difficult (Deverajan, 2012).

This study utilizes unit record data from Demographic and Health Surveys (DHS) for 44 countries in 102 waves covering the period 1989-2011 and approximately over a million households to analyze the drivers of wealth/asset inequality in Africa. This approach, besides having the advantage of utilizing household level information, it allows for consistent comparison of inequality across countries and time. The focus is mainly to understand the roles of inequality in opportunities that appeal to public policy such as those that operate through interventions in labor markets, particularly skill acquisitions and migration, and price distortions affecting asset markets.

We undertook the analysis at two levels: inequality within countries and between countries. The 'within' country inequality analysis decomposes the Gini-coefficient for assets into spatial and individual/household specific components using household level unit record data. Our finding indicates that spatial inequality on the average contributes close to 35%-40% of overall asset inequality with significant variation across countries. The findings from 'between' countries analysis suggest that conditional on other important covariates, such as initial per capita GDP, size of government, etc., asset or wealth inequality is negatively

correlated with higher proportion of the labor force with tertiary education, size of remittances as a share of GDP and price distortions in the market for key assets. Some of the key drivers of inequality considered in the paper are potentially endogenous. For example, migrants tend to send out more remittances in places where household assets are scarce or expensive so that owning them is valuable to recipients implying that high asset inequality may lead to higher remittances. We use ethnic fractionalization as instrument on the assumption that it affects asset inequality only through its effect on remittances. Statistical tests performed suggest ethnicity to be a valid instrument. Policy implications of the key drivers of inequality are discussed in light of the current debate on industrial policy and structural change.

## 2. Analytical framework and data

### 2.1. Analytical framework

Development economics has tackled and understood inequality from two different perspectives. The personal or size distribution of income, which maps a given population with income earned or asset owned. This is often statistical summary that provides information on how equitable a society or a country is at a point in time. The focus of this paper and many others in the development economics discipline is mainly on this aspect of inequality. The other dimension examines the factors of production, such as labor, capital, land and other resources and provides a theory for determination of their returns, such as wages, profit, rent and other forms of payments. This aspect of inequality, commonly called the functional distribution of income has been the basis of most economic theories on inequality which dates as far back as the classical economists such as Adam Smith, David Ricardo, François Quesnay, Karl Marx, and others who postulated inherent conflict among the 'classes' because of unfair appropriation in the sharing of the national pie. The advent of the marginalists in the 1990s 'justified' inequality as an outcome of the functioning of market forces where the earning of economic agents is commensurate with its (marginal) productivity. It follows that wage, rents, profits are reflections of their marginal productivity in production when markets operate freely and unencumbered (e.g. Knut Wicksell). In pursuit of perfect competition, the issue of income inequality has been relegated to the background until development economics in the late 20<sup>th</sup> century reintroduced it into the realm of public policy.

The early literature in development economics, including that of Lewis (1954) and Kaldor (1956) viewed income inequality from the prism of economic growth where they argued that the rich, because they tend to have higher marginal saving rate than the poor, could spur growth arguing that initial inequality may be good for growth. Recent work based on the new growth theory (e.g. Galor and Zeira, 1993) showed indeed that high initial inequality could be bad for growth. The stylized fact documented by Kuznets where inequality tends to rise with per capita GDP at initial stage of development and later tends to decline (better known as Kuznets' curve) attracted enormous attention in the empirical literature regarding the link between inequality and growth. This literature is vast and no attempt will be made here to review the evidence. For our purposes we rely on the some of the hypothesis put forward in previous literature on the mechanisms in which inequality persist or increases over time to understand within and between inequality patterns. Particularly, of importance are such as initial distribution of endowments (education, etc. ), political economy factors (elite capture)/institutions and redistributive policies (e.g. Acemoglu, et al, 2001; Easterly, 2007).

A particularly useful way to understand better issues of inequality in African is to think of the role of different processes that shape its pattern over time and across regions, such as structural factors and market forces (e.g. Easterly, 2007). It is plausible to think that in most African countries where markets are nascent forces and have not taken deep roots in resource allocation, the role of structural factors tend to be strong. Some of the structural factors include the legacies of slavery, colonialism in large swath of Africa and that of apartheid in South Africa have left deep marks in the distribution of land, political power and other related processes that impact directly inequality. The inequalities induced by market forces have also differential impact on households, firms, regions, etc. This distinction is useful both for public policy as well as identifying long term correlates or drivers of inequality. A related but powerful development in the recent literature is the decomposing of inequality induced by circumstances beyond the control of the individual (called inequality of opportunities) and that within the bounds of his/her choices, such as effort. This literature is important in that it makes a clear distinction between inequalities that are 'unacceptable' both on grounds of morality and efficiency. Inequality arising from circumstances beyond one's control include that arises because one belongs to a particular

race, gender, ethnicity, religion or other group, hence earned lower for the same level of effort and ability. While the empirical distinction between inequality of opportunities and that of effort is challenging due to the data requirements, some estimates have provided interesting insights that could be invoked to understand some of our results.

## 2.2. Data and methods of estimation

The data we used for this study is based on unit record data from the DHS for 44 African countries in multiple waves for at least 30 countries covering the period 1990-2013 (see Appendix Table 1). For ease of analysis, we grouped the periods into pre1995, 1996-2000, 2001-2005, 2006-2013. The data consists of histories of over a million households over these periods. The data covers a wide range of variables including demographic characteristics, asset ownership; access to utilities and basic social services, education and occupation of head, a wide range of health outcomes (stunting, wasting, diseases burden) and it is nationally representative. Since the survey instruments and methods are generally standardized, it they are comparable spatially and temporally. To construct our measure of asset inequality, we resorted ten items for which data is available in all waves for all countries. These are, type of housing (number of rooms, floor material-perke, cement, ceramic, earth-, roof material-bricks, tin, grass, earth, etc.);), sources of access to water (tap, water kiosk, well, etc), access to electricity, and ownership of durable household assets such as radio, TV, refrigerator and car. The challenge is to generate a single asset index that would allow us to compute the Gini coefficient for assets.

Following Shimeles and Ncube (2015), we defined a welfare measure for each household  $W_j$ , over individual constituents  $c_{ij}$  such that:

$$W_j = \sum_{i=1}^k a_i c_{ij} \quad (1)$$

Where the 'i' represents the k assets that individual 'j' possesses to achieve a welfare level  $W_j$ , which could be cardinal or unit free (ordinal) depending on how the components enter the welfare measure. The linearity in (1) assumes that the welfare is additive over the constituents (in our case the individual assets) allowing a possibility for a perfect substitution across the individual assets. If  $c_{ij}$  were consumption items, then  $W_j$  would be total consumption expenditure with a price vector  $a_i$ , where prices served as relative

weights for unit commodity. Here welfare is assumed to rise with total expenditure a feature shared by utility based welfare functions too well known in economics. In the case of assets ownership since there are no price information to aggregate the total value of asset or wealth owned,  $a_i$  would have to be generated from the data with some assumptions. The easiest assumption would be to value each asset equally as important to the household. In that case,  $a_i = \frac{1}{k}$ , so that mean asset ownership value would be generated with  $c_{ij}$  as a binary variable (whether or not a household owns the asset). This assumption comes at great cost where each asset would contribute equally to the wellbeing of the household both in value and utility. For instance, owning a radio is considered as valuable as owning a car, etc which essentially distorts significantly the inequity underlying ownership of assets of different value and utility. The common approach in the empirical literature is to use data reduction methods to generate the individual weights as well as a single index that has the potential to reflect the intrinsic value of each of the assets and the difficulty of owning them. In this study, we use Multiple Correspondence Analysis (MCA) which is closely related with factor analysis or principal components analysis. The only difference is that the MCA is suitable for categorical variables (for example, Booyseen, et al, 2008).<sup>1</sup> Formally, if we denote  $a_j$  the weight of category  $j$  and  $R_{ij}$  the answer of household  $i$  to category  $j$ , then the asset index score of household  $i$  is :

$$MCA_i = \sum_{j=1}^J a_j R_{ij} \quad (2)$$

This index can then be normalized between 0 and 1 to allow for inter-temporal and cross country comparisons by the following formula

$$normalized\_MCA_i = \frac{MCA_i - \min(MCA)}{\max(MCA) - \min(MCA)} \quad (3)$$

### 3. Results and discussion

How unequal is Africa? This is a point we take up briefly before we present our results from the DHS data. Figure 1 shows the level of Gini coefficient based on household surveys as

reported in World Bank's *povcalnet* data for the period 1982-2011. The figure compares the Gini coefficient for Africa and Other Developing regions (Latin America and Asia).

<Figure 1 here>

What emerges is that despite the level of 'development' as captured by per capita incomes, African countries generally tend to exhibit higher inequality than the rest of the developing world. The result remains unchanged even after we removed from the African sample the top ten most unequal countries to reduce their influence in driving the rest of the continent's inequality pattern. Given that the Other Developing countries are made up of mainly Latin America, highly unequal continent, and Asia (with the relatively low income inequality) the result may not be surprising. To see the effect of merging these two continents, we also plotted the same graph for the three regions (Latin America, Asia and Africa). Still the picture we got (not reported) is that while Latin America tend to have the highest Gini for higher level of per capita GDP, at the lower end, it is African countries who exhibited the highest inequality of all regions. Figure 2 below plots the trend in the Gini coefficient for African countries which indicated a steady raise in the 1980s and 1990s. It levelled off in the 2000 decade. Still the average Gini coefficient is in the range of 40% that implies the top 20% own almost 60% of income. Thus, it begs a question that why do we see so high inequality in Africa? The next section attempts to tackle these issues.

<Figure 2 here>

### 3.1. Inequality within countries

The use of micro-data that covers over a million observation offer a unique opportunity to construct a pattern that could shade insight into the evolution of inequality in Africa. In decomposing the components, we appealed as indicated in section 2 of the paper the recent literature that attributes the sources of inequality to structural and market factors as in Easterly (2007) or inequality of opportunities and effort as in (xxx). This helps to organize the thinking in lining up the relevant variables. As such therefore, we grouped household specific variables, such as education, occupation, age (proxy for experience) as representing types of inequality that could be attributed to market forces or effort. The structural barriers are represented by gender, but also geography. Here the latter is a bit controversial



as markets also create wedge in incomes or asset ownership between regions. However, one could argue that the nascent nature of market forces in most African countries and the pattern of settlements that often follow ethnic or religious identity, the geographic or spatial component has the potential to capture mainly elements of inequality driven by factors beyond the control of individuals (political economy factors, history, linguistic barriers, ethnicity, etc).

Table 1 below reports the asset-based Gini coefficient for 44 African countries that cover at least 65% of Africa's population in each period. As indicated above, not all 44 African countries were surveyed in all periods. But, in any one of the periods, the number of countries covered was more than 25 allowing for reasonable estimate of asset-based inequality for Africa. The key message is that asset-based inequality has been high in Africa in the range between 40-45%. This is a significantly high number. It could easily imply that the top 1% owned 35 to 40% of the household asset and amenities in a country. The other aspect is that it has been persistently high over two decades, no sign of declining. This is indeed also quite worrisome. An interesting, no so much surprising, aspect of the asset-based inequality is that the contribution of spatial inequality is quite significant, hovering around 35% in all periods, while that of household education, occupation or age (proxy for experience) explain only close to 10% of the overall inequality, the rest by other factors (unobserved factors).

<Table 1>

When we look closer at the spatial dimension of inequality, we also note that there is a wide difference across countries ranging from a high of around 61% in places like Madagascar, Angola or Niger and lowest ranging around 10% in small countries like Comoros, or well developed places like Egypt. The spatial component of asset inequality strongly has all the marks of what we identified as structural inequality or one that caused by circumstances beyond the control of individuals as in moral philosophy of Romer (xx). Figure 3 for instance suggests that there is a strong correlation between governance (aggregate Moi-Ibrahim index) and ethnic fractionalization (not reported), yet no systematic correlation with per capita GDP. Table 3 illustrates the relationship. Close to 25% of the variation in spatial inequality is due to economic governance and ethnic fractionalization. In

the former, higher values or better governance was correlated with lower spatial inequality and ethnically diverse or fractionalized countries exhibited high spatial inequality. This suggests that this portion of inequality echo Easterly's (2007) structural inequality or the inequality of opportunity discussed in preceding paragraphs. Another interesting finding we present is that spatial inequality is highly correlated with incidence of child and maternal mortality as well as other indicators of human opportunity. This is quite a useful insight into the seriousness of spatial inequality in affecting living standards as well independently of per capita income.

### 3.2. Inequality between countries

The long term relationship between inequality and a set of other policy relevant factors could be inferred through cross-country comparisons. Table 2 provides the descriptive statistics pertaining to our attempt to establish some level of correlation between inequality and other conditioning variables such as initial per capita GDP (a proxy for initial endowments), size of government, education particularly tertiary education, market distortions both for asset and commodities. An important dimension that has also become increasingly relevant when discussing inequality is interpersonal income transfers such as remittances in the absence of redistributive policies and practices in the African context.

Table (4) reports a set of regression results (all corrected for heteroscedasticity) for the pooled data using the asset based inequality from the DHS. The results are enlightening. Tertiary education turns out to be an important predictor of lower inequality with large coefficient. Countries with one standard deviation higher proportion of households with tertiary education experienced a decline in asset inequality of about 17%. Similarly, we found remittances to be an important part of the story in reducing inequality. Given the strong emphasis in previous literature on ethnic fractionalization as important driver of inequality, we examined the possibility that ethnicity may be picking up the effects of remittances. First, remittances and ethnic fractionalization are highly correlated. Barring spurious correlation, the mechanism could be through migration. Ethnically homogenous societies tend to have stronger networks which facilitates mobility within and outside of a country. The first stage regression we reported in Table 4 attests to this possibility. Furthermore, the ethnicity variable with all its problems of measurement is hardly an

endogenous variable that varies with characteristics of countries, particularly those that potentially affect both remittances and ethnicity at the same time. With these assumptions, we found that remittances affect inequality significantly. As a robustness test we ran similar regressions for consumption based inequality generated from a completely different data set. Still remittances bear the right sign and significance as the asset based inequality (Table 5). In both cases the test of exogeneity also suggests ethnicity to be a valid instrument for remittances. We also note in Table 5 that market distortions particularly with respect to consumption inequality play an important role. The higher the distortion from the world market, the higher the level of income inequality.

#### 4. Conclusions

We documented that Africa has had high inequality in the last two decades that has persisted over time. In this paper attempt was made to give some insight on the possible drivers of inequality using a consistently constructed asset based inequality from the DHS data set using unit record data of over a million households.

We approached inequality from the perspective of its two main sources emphasized in the recent literature: structural and market driven which may also be viewed from the perspective of inequality of opportunities and individual effort. The inequality decomposition that emerged showed that spatial inequality to have a stronger role in driving overall asset inequality in Africa, which in turn is driven mainly by governance conditions and ethnic fractionalization. Interestingly, the spatial dimension of inequality was uncorrelated with per capita income. In addition, spatial inequality seem to have an independent effect on infant and maternal mortality, disease burden as well as human opportunity. This is an interesting finding that needs to be further studied. High spatial inequality is a fetter to high standard of living and essentially unaffected by how high the average level of development of a country is.

Our study also identified important correlates of inequality useful for policy. This include tertiary education and remittances as important factors that may lower inequality be it of asset or income. Of particular importance to income inequality is also price distortion which generally captures the relative scarcity of consumption goods in comparison to the

world market. All these suggest that specific and well implemented policies are required to advance inclusive growth in Africa where the barriers seem to stem largely from poor governance and fragmentation along ethnic and linguistic lines.

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**Table 1. Inequality levels in 44 African countries**

Period	Average Gini coefficient for assets	Component due to spatial inequality	Component due to inequality of opportunities <sup>1</sup>	Component due to other factors
Before 1995	0.42	0.37	0.11	0.52
1996-2000	0.43	0.34	0.13	0.53
2001-2005	0.38	0.32	0.13	0.54
2006-2009	0.40	0.34	0.14	0.51
2010-2013	0.44	0.39	0.13	0.47

**Table 2: Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Asset Gini	109	0.461	0.136	0.081	0.758
Moi-Ibrahim Governance index	93	49.622	9.826	28.800	71.500
Ethnic-fractionalization	92	0.664	0.229	0.000	0.930
Plural	93	0.434	0.233	0.120	0.910
higher education coefficient	92	0.892	0.428	0.123	2.418
Higher education coefficient from pooled sample index	89	0.745	0.268	0.066	1.383
Trade openness	102	0.482	0.735	0.096	4.539
Mean year of Schooling	82	4.037	1.952	0.700	10.800
remittances ( ratio of GDP)	84	0.025	0.028	0.000	0.105
Asset price distortion	97	0.115	0.671	-0.735	3.134
Government expenditure in 1995 (% GDP)	98	24.93	8.571	14.54	56.34
log of 1985 GDP	98	7.116	0.699	5.742	9.712
Bank Credit to Private sector (% of GDP)	93	18.19	16.180	2.414	118.15
Urbanization	102	34.99	11.689	11.72	66.060

<sup>1</sup> Component of the inequality due to household head education level, occupation and age

Table 3: spatial inequality, ethnicity and governance (heteroscedasticity corrected regression)

Dependent variable: spatial inequality	
Ethnic fractionalization	0.191** (0.058)
Moi-Ibrahim governance index	-0.00355* (0.00153)
Log per capita GDP in 2000 prices	0.00354 -0.0174
Constant	0.379** (0.136)
N	51
R2	0.26

Standard errors in parentheses \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Table 4: correlates of asset inequality (regression corrected for heteroscedasticity)

Dependent variable: Gini coefficient for asset	OLS	OLS	IV
Ethnic fractionalization	0.187*** (0.000)	0.0847 (0.139)	
Skill gap (tertiary education)	0.141*** (0.000)	0.165*** (0.000)	0.159*** (0.000)
Asset price distortion	0.0411** (0.005)	0.0295 (0.129)	0.0289 (0.122)
Size of government	-0.00111 (0.564)	-0.00397 (0.11)	-0.0070** (0.003)
Initial per capita GDP	-0.0559* (0.015)	-0.0443 (0.057)	-0.0458** (0.006)
Remittances		-1.008 (0.054)	-2.377** (0.003)
Time dummies	Yes	Yes	Yes
Tests of Exogeneity			
Durbin (score) chi2(1)		2.62689	(p = 0.105)
Wu-Hausman F(1,52)		2.19002	(p = 0.145)
F-value First Stage Regression			15.46
N	78	65	65

P-values in parenthesis. \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

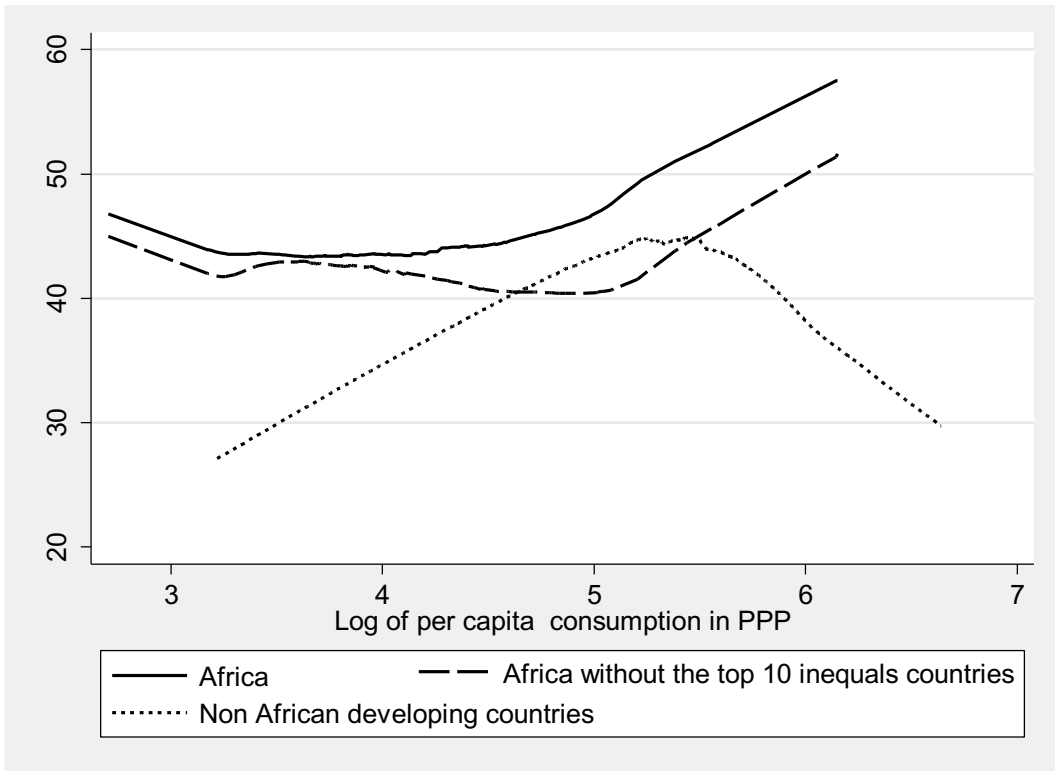


Table 5: correlates of consumption based Gini

	OLS	OLS	OLS	IV
<b>Ethnic fractionalization</b>	0.368*** (0.0709)	0.382*** (0.0790)		
<b>Higher education enrollment</b>	-0.00367 (0.00229)	-0.00350 (0.00234)	-0.0111*** (0.00217)	-0.00828*** (0.00239)
<b>Household cons price level<sup>2</sup></b>	0.107*** (0.0341)	0.1000*** (0.0357)	0.181*** (0.0413)	0.206*** (0.0483)
<b>Size of government</b>	0.0252 (0.0197)	0.0262 (0.0206)	0.0451** (0.0204)	0.0650** (0.0279)
<b>Agriculture value added(%GDP)</b>	-0.00339** (0.00154)	-0.00359** (0.00166)	-0.00345** (0.00170)	-0.000751 (0.00305)
<b>Urbanization rate</b>	0.00702*** (0.00165)	0.00719*** (0.00173)	0.00705*** (0.00198)	0.00832** (0.00379)
<b>Remittances</b>		0.000278 (0.0104)	-0.00955 (0.0116)	-0.0850*** (0.0218)
<b>_cons</b>	2.988*** (0.407)	2.945*** (0.415)	2.938*** (0.452)	2.454*** (0.713)
<b>R-sq</b>	0.673	0.690	0.564	0.345
<b>N</b>	107	95	100	95
Tests of Exogeneity				
Durbin (score) chi2(1)			0.632125	(p = 0.2897)
Wu-Hausman F(1,60)			0.611246	(p = 0.3164)
F-value (1,87) First Stage Regression			13.7933	(p=0.0000)

Figure 1 : Inequality in Africa & Other Developing regions at different level of development (1980-2011)

<sup>2</sup> The price level of household consumption is the price level of the share of output-based GDP (the household consumption part) relative to the US one.



**Figure 2: Income inequality trends in Africa**

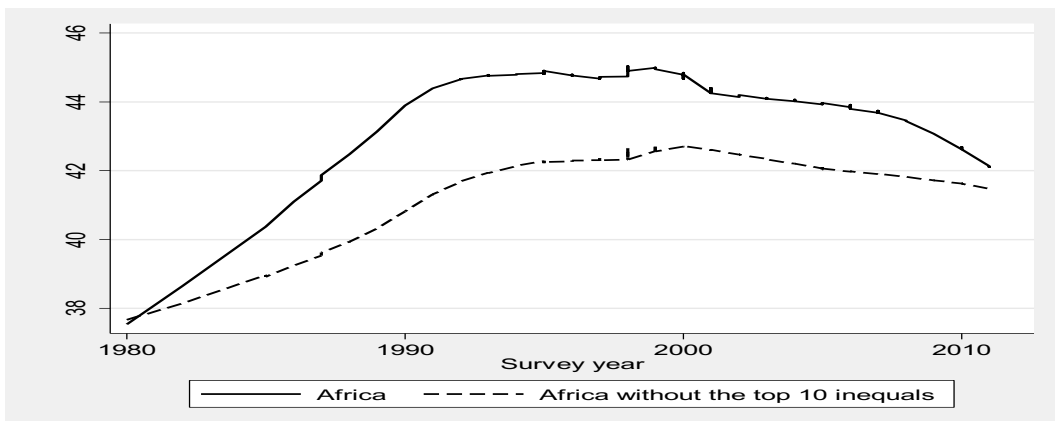


Figure 3: spatial inequality and governance

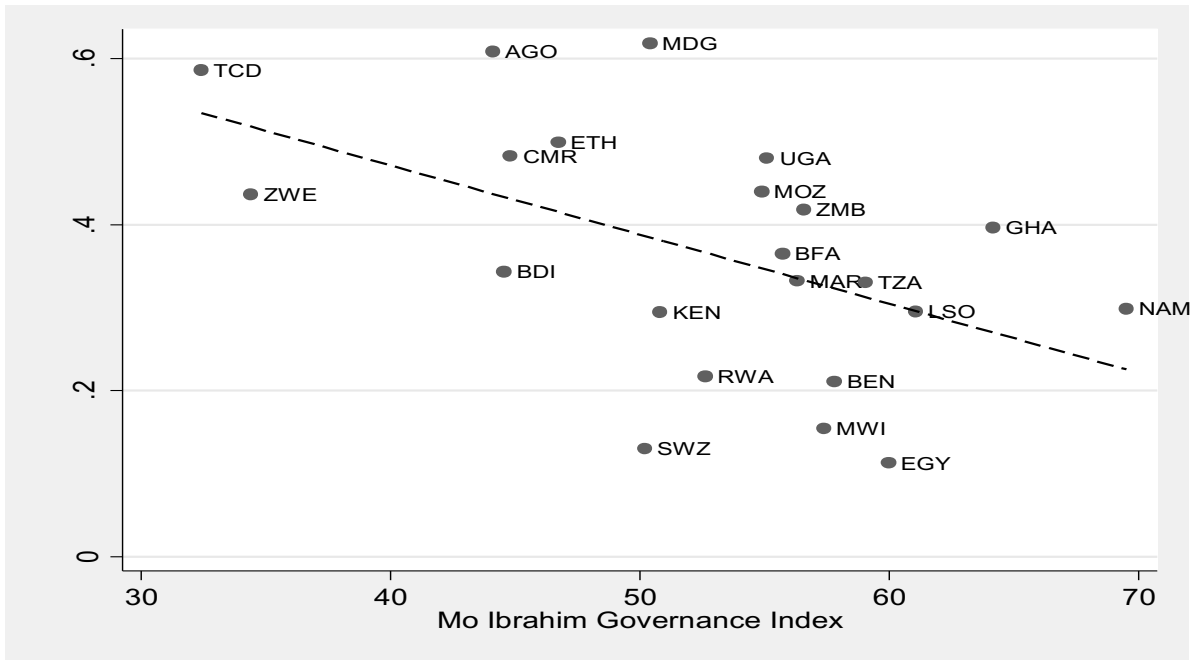


Figure 4: spatial inequality and access to improved water

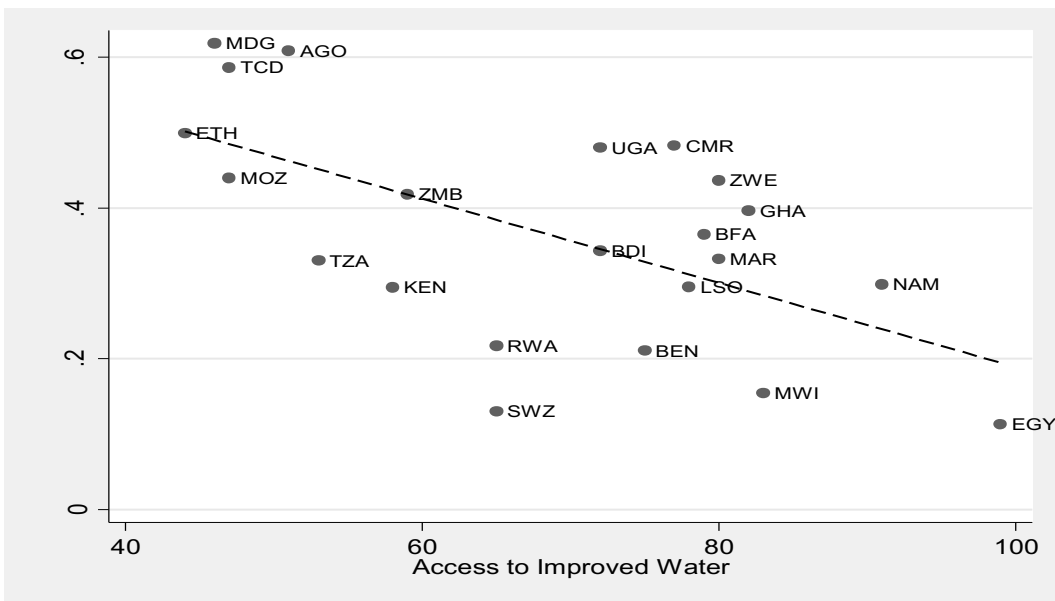


Figure 5a-5b : Spatial inequality and disease burden (mortality, tuberculosis, etc)

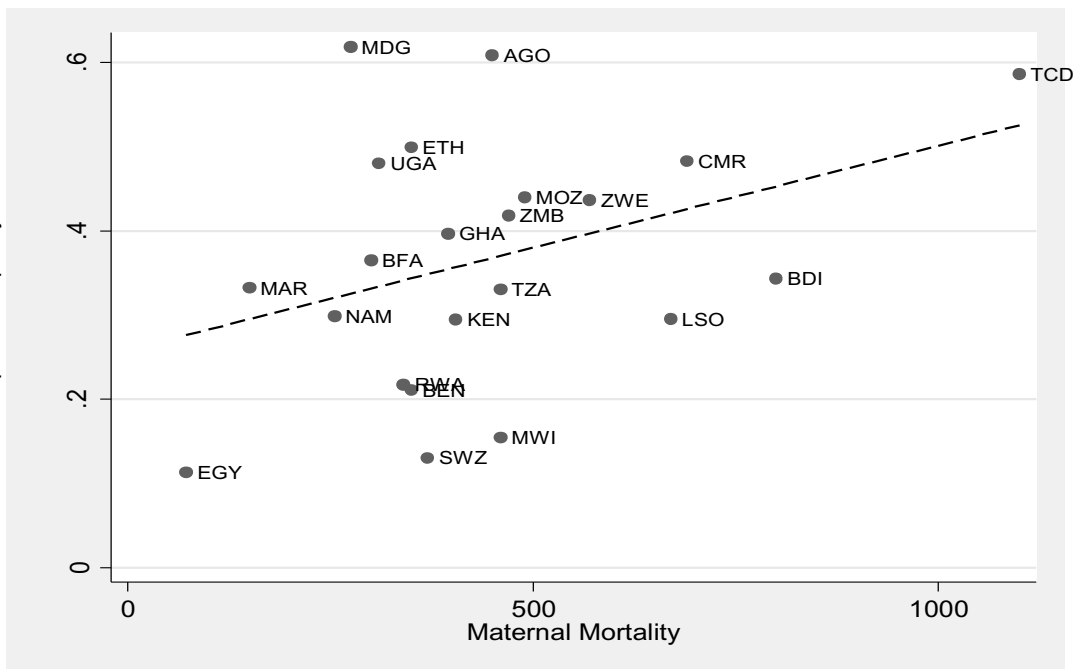
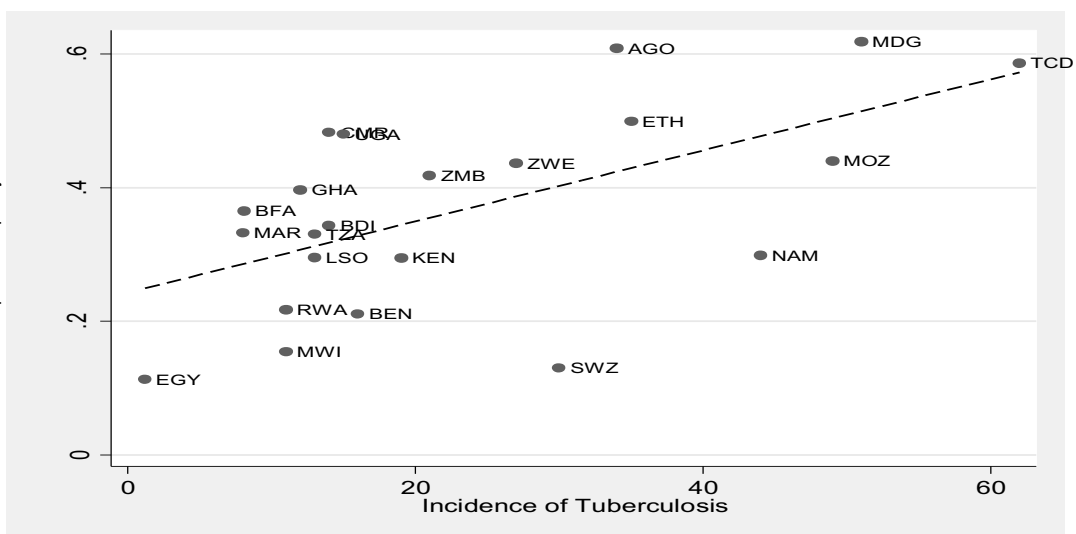


Figure 5b



Appendix Table 1

Country	Number of households
Angola	9,950
Benin	27,257
Burkina Faso	32,925
Burundi	8,596
Cameroon	31,615
Central African Republic	5,485
Chad	11,556
Comoros	2,066
Comoros	4,482
Congo	11,767
Congo Brazzavil	11,632
Congo DRC	18,171
Cote d'Ivoire	9,686
Côte d'Ivoire	10,606
Dem. Rep. of the Congo	8,728
Egypt	81,218
Ethiopia	43,761
GABON	9,755
Gabon	5,882
Ghana	28,144
Guinea	17,907
Kenya	24,556
Lesotho	17,562
Liberia	24,003
Madagascar	38,020
Malawi	55,327
Mali	41,651
Morocco	32,065
Mozambique	19,819
Namibia	18,371
Niger	24,580
Nigeria	86,078
Rwanda	36,569
Senegal	30,748
Senegal	4,175
Sierra Leone	19,639
South Africa	11,708
Sudan	5,125
Swaziland	4,602
Tanzania	34,624
Togo	7,072
Uganda	35,743
Zambia	26,617
Zimbabwe	29,419
Total	1,019,262

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<sup>i</sup> See Sahn and Stifel (2000) for application of factor analysis to asset poverty in selected African countries.