

# **Agricultural and Rural Households Income Statistics in Countries in Less-Than-Ideal Conditions: an Insight Thinking to African Countries.**

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## **Abstract**

The authors would like to analyse the developments on agricultural and rural households' income statistics in countries with a limited availability of data, starting on the recent FAO-World Bank publication "Tracking results in agriculture and rural development in less-than-ideal conditions". Examples of feasible income indicators, considering ongoing data collections and estimation techniques at macroeconomic (national accounts) and microeconomic (household surveys) levels, will be presented. Possible applications to African countries will be considered in the paper.

## **Keywords**

Household Income, Africa, Monitoring and Evaluation, Agriculture and Rural Development, Poverty Indicators

## **1. Introduction**

Agricultural and rural household income indicators produced by statistical systems are considered key indicators, among the economic indicators, to monitor and evaluate the results of development policies. Technical difficulties and a limited availability of data are involved that hold back statistical offices and agencies at national and international level to supply these type of indicators. The authors would like to investigate the real data availability in African countries and address some technical difficulties, aware that in most of the countries current statistics are normally produced in less-than-ideal conditions.

## **2. Indicators and Tools to Calculate Rural Households Income Statistics**

A list of core indicators is suggested at international level for monitoring and evaluation (M&E) in agriculture and rural development (ARD) programmes in less-than-ideal conditions (FAO at al., 2008). A subset of 19 indicators is considered "priority" and thought for feeding into the international monitoring systems and for monitoring the national ARD activities. An extended menu of 86 indicators is a reference list from which indicators can be extracted to evaluate a broad range of ARD activities.

Agricultural and rural households' income-related indicators are classified among the subset of indicators suitable for M&E over a long-term period.

Income-related indicators considered in this paper, classified by sectors (A "Sector-Wide Indicators for ARD", B "Specific Indicators for Subsectors of ARD" and C "Indicators for Thematic Areas Related to ARD") and sub-sectors, are the followings (in **bold** are highlighted the priorities that belongs to the subset of 19 indicators<sup>2</sup>):

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<sup>1</sup> This paper is the result of the discussion of the two authors. Edoardo Pizzoli is the sole responsible for the results of the analysis and the methodological parts in paragraphs 3 and 4.

<sup>2</sup> The priority indicators, presented in the Sourcebook (FAO at., 2008), are a core set of standard ARD indicators,

**Table 1 – Selected Income-Related Indicators from the Extended Menu by Groups and Subgroups (FAO at al., 2008)**

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*All long-term outcomes*

A. Sector-Wide Indicators for ARD

7) Rural poor as a proportion of the total poor population

8) **Percentage change in proportion of rural population below US\$1 (Purchasing Power Parity) per day or below national poverty line**

19) Annual growth rate of household income in rural areas from agricultural activity (percentage)

20) **Annual growth rate of household income in rural areas from non-agricultural activity (percentage)**

B. Specific indicators for subsectors of ARD

B.4. Forestry (developing, caring for or cultivating forests; management of timber production)

42) Annual growth (or percentage change) in rural household income from forest-related activities

B.6. Agricultural Research and Extension

54) Change in farmer income as a result of new technologies (by gender)

C. Indicators for thematic areas related to ARD

C.4. Policies and institutions

86) Ratio of average income of the richest quintile to the poorest quintile (%) in rural areas

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Note that only indicators *directly* related to income have been selected for the previous list. In addition to these 7 indicators, a further generally used one, also considered as a “leading” indicator in the countries studies (FAO at al. 2008), is the following: Gross Domestic Product (GDP) per capita.

It is useful to reorder these income-related indicators in a logical sequence with respect to the main object to be measured: Household income and Poverty.

**Table 2 – Selected Income-Related Indicators from the Extended Menu Reclassified by Object to be Measured (*All long-term outcomes*)**

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I. Household Income:

a) GDP per capita (annual growth; %) (“leading” indicators);

b) **Household income in rural areas from *non-agricultural* activity ( annual growth; %) (A.20);**

c) Household income in rural areas from agricultural activity (annual growth; %) (A.19);

d) Rural household income from forest-related activities (annual growth; %) (B.4.42);

e) Farmer income as a result of new technologies (by gender; change; %) (B.6.54);

II. Inequality of Income and Poverty:

f) **Proportion of rural population below US\$1 (Purchasing Power Parity) per day or below national poverty line (change; %) (A.8);**

g) Rural poor as a proportion of the total poor population (%) (A.7);

h) Ratio of average income of the richest quintile to the poorest quintile in rural areas (%) (C. 4.86)

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with the recommendation that they should be regularly compiled by all countries.

Indicators can be calculated on data available making use of different methodologies.

The first four indicators (from *a* to *d*) can be estimated on a macroeconomic or a microeconomic approach. For example, the first indicator (GDP per capita) normally is calculated at aggregated level. In the first approach, the core data required are the economic aggregates estimated at national accounts' level, while, in the second approach, micro-data on income or expenditure are needed from household surveys. They are two alternatives to statistical estimation but an optimal mix of the data from the two sources can be used (Ciaccia at al., 2009).

To calculate the fifth indicator (*e*), information on agricultural households and technologies with respect to products/productions and on agricultural practices, at farm level, are necessary.

Last three indicators (from *f* to *h*) highlight poorest households in the population. To calculate these indicators is necessary to use the data estimated from households surveys or agriculture/population censuses.

### **3. Data Availability in African Countries**

Main economic variables on income, calculated in national accounts, are available for most of the countries at national level. Harmonized macro-level data can be found in the WDI database.

Only for some countries the same variables are estimated at regional level and for sub-groups in the population (agricultural, rural, minorities, etc.) or a households' survey, with income information at micro-level, was run in the past.

From the World Bank World Development Indicators (WDI) on-line data are available for 53 independent African countries. For the 3 Spanish territories (Ciudad Autónoma de Ceuta, Melilla and Canarias) data are not immediately available.

The World Bank supported several Living Standards Measurement Study (LSMS) in African countries. Data and metadata on the following 5 African countries can be downloaded from the LSMS website: Cote d'Ivoire, Ghana, Malawi, Morocco and South Africa.

In the World Bank website other indicators can be found in the Africa Development Indicators (ADI), a collection of data specific for African countries.

In FAO, data for several countries have been included in an internationally comparable database of rural household income sources: the Rural Income Generating Activities (RIGA). Data on 5 African countries are included in the database: Ghana, Kenya, Malawi, Madagascar and Nigeria.

For 3 African countries (Nigeria, Tanzania and Senegal) a deeper insight on data-availability and indicators already calculated or computable in the near future, has been reported in the M&E Sourcebook (FAO at al., 2008). These countries' studies were an integral part of the validation process for the menu of core indicators (a subset is reported in table 1).

More international sources of data are available on the web. An example is the International Food Policy Research Institute (IFPRI) that supplies datasets on some African countries and sub-population: Ethiopian rural households surveys (1989-2004); KwaZulu-Natal households survey (1993-8), integrated to South African national household survey, the Project for Statistics on Living Standards and Development (PSLSD) which was undertaken from 1993; small Farmer Survey in Benin (1993); zone Lacustre Household in Mali (1997-8); Integrated household survey in Egypt (1997-9).

Finally, data and statistics are available in the website of national institutions in African countries: national statistical offices, agencies, governments, central banks, research institutes, etc.

#### **4. Analysis of indicators calculated on available data (WDI database)**

To investigate the possibilities of analysis of household income in African countries, data in WDI database are used in this paper.

For 2000, as a common reference year<sup>3</sup>, 5 indicators have been selected from this database:

##### I. Household Income:

a) GDP per capita (\$, PPP);

##### II. Inequality of Income and Poverty:

- inequality of income (Gini coefficient, %);
- proportion of population below \$1 (PPP) per day (proxy of II.f in table 2 and A.8 in table 1);
- poverty headcount ratio at national poverty line (% of population);
- population below the poverty line (% rural) (proxy of II.g in table 2 and A.7 in table 1).

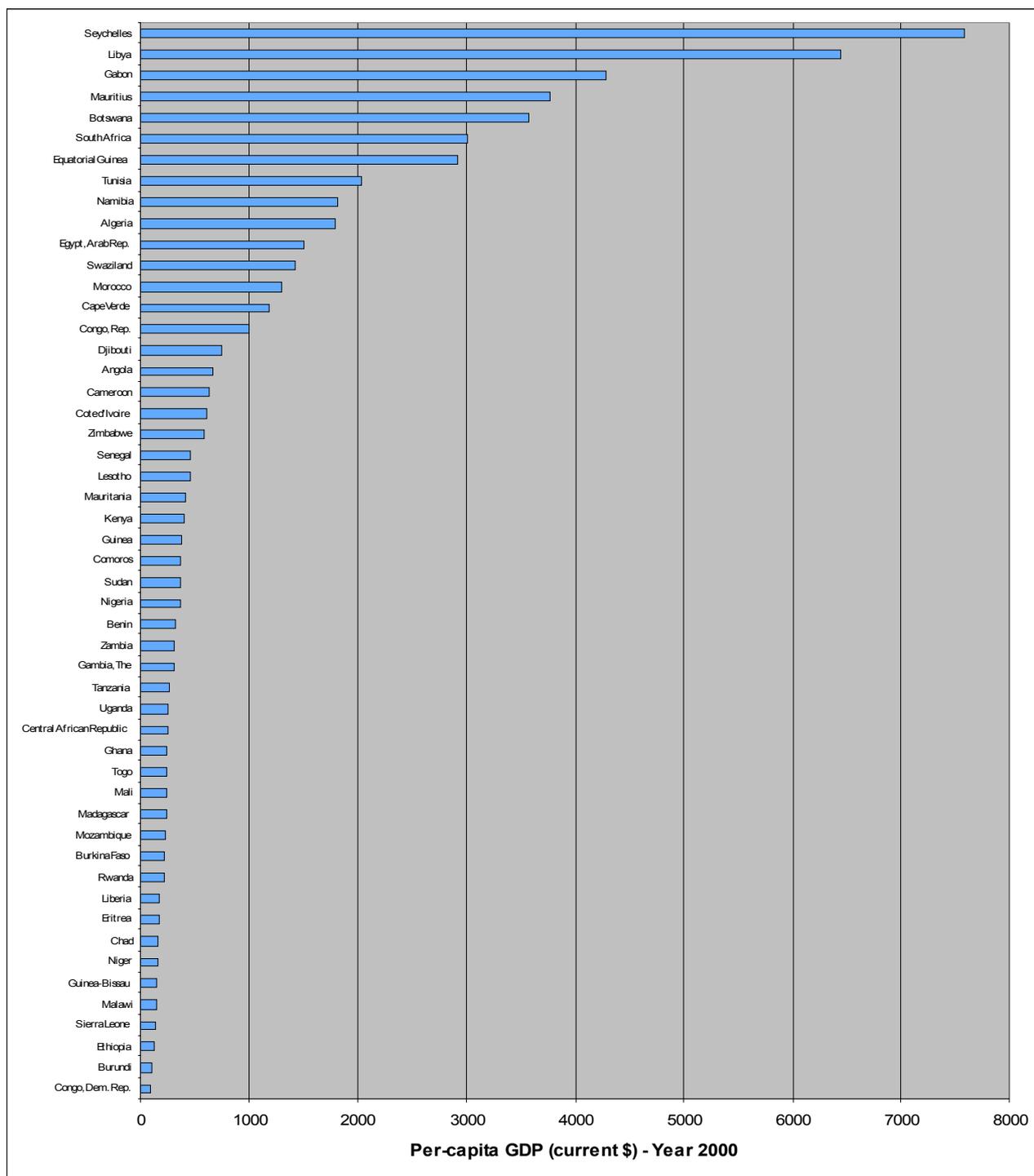
The indicators in the second group are only proxies of those reported in paragraph 2. Most of information is available on total population; only the last indicator relates to rural sub-population. If a rural – urban classification can be applied to areas and population, core suggested indicators could be calculated and the following analysis could be replicated.

In Africa, based on WDI data, per capita GDP (at current US Dollars) is equal to 720.50 \$, with a standard deviation of per capita GDP among countries of 1,590.43; while the median value, approximated with weighting population at country level, is 373.66 \$, pointing out an asymmetric distribution of income in the continent (more than 50% of the African population has an income lower than the mean). From Figure 1, it is clear the countries variability that goes from the maximum 7,578.85 \$ (Republique des Seychelles) to the minimum 84.95 \$ (République démocratique du Congo), the lowest estimated value at World level. With respect to per capita GDP at World level, the Africa mean is 86.6% lower (5,263.88 \$ World), standard deviation is 96.4% lower (10,350.34 World) and median level 79.4% lower (1,816.24 \$ World): main statistics indicate a clear lower level of per capita GDP with a lower variability calculated at countries level.

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<sup>3</sup> Data are for 2000 year. When the data is not available, the first data of the closet year is used.

**Figure 1 – Per-capita GDP in 53 African Countries – Year 2000 (Source: elaboration on WDI WB database)**



Just 5 countries, belonging to the first quartile, have a per-capita GDP equal to 3,432.09 \$, while 10 countries have about the 50% of Africa GDP and a per-capita GDP equal to 2,738.17 \$; the remaining countries have a per capita GDP of 455.74 \$ and the last quartile (31 countries, 58,5% of the total) has a value of 262.06 \$. Last figure is lower than the median value for the continent and is 92.4% less than the mean in the first quartile. Finally, about 50% of African population (400 million people) has a a per-capita GDP of 236.37 \$, 67.5% less than the average.

There are also significant regional differences: for instance, Sub-Saharan Africa countries have a per-capita DGP equal to 508.09 \$, 29.5% lower than the total continent.

It is expected that income distribution functions are generally asymmetric, with more people concentrated toward lower per-capita income and with long tails on higher income. Significant different distributions in terms of parameters (mean, median and standard deviation) are expected on different areas (rural and urban, for example) and socio-professional groups (agricultural households, etc.).

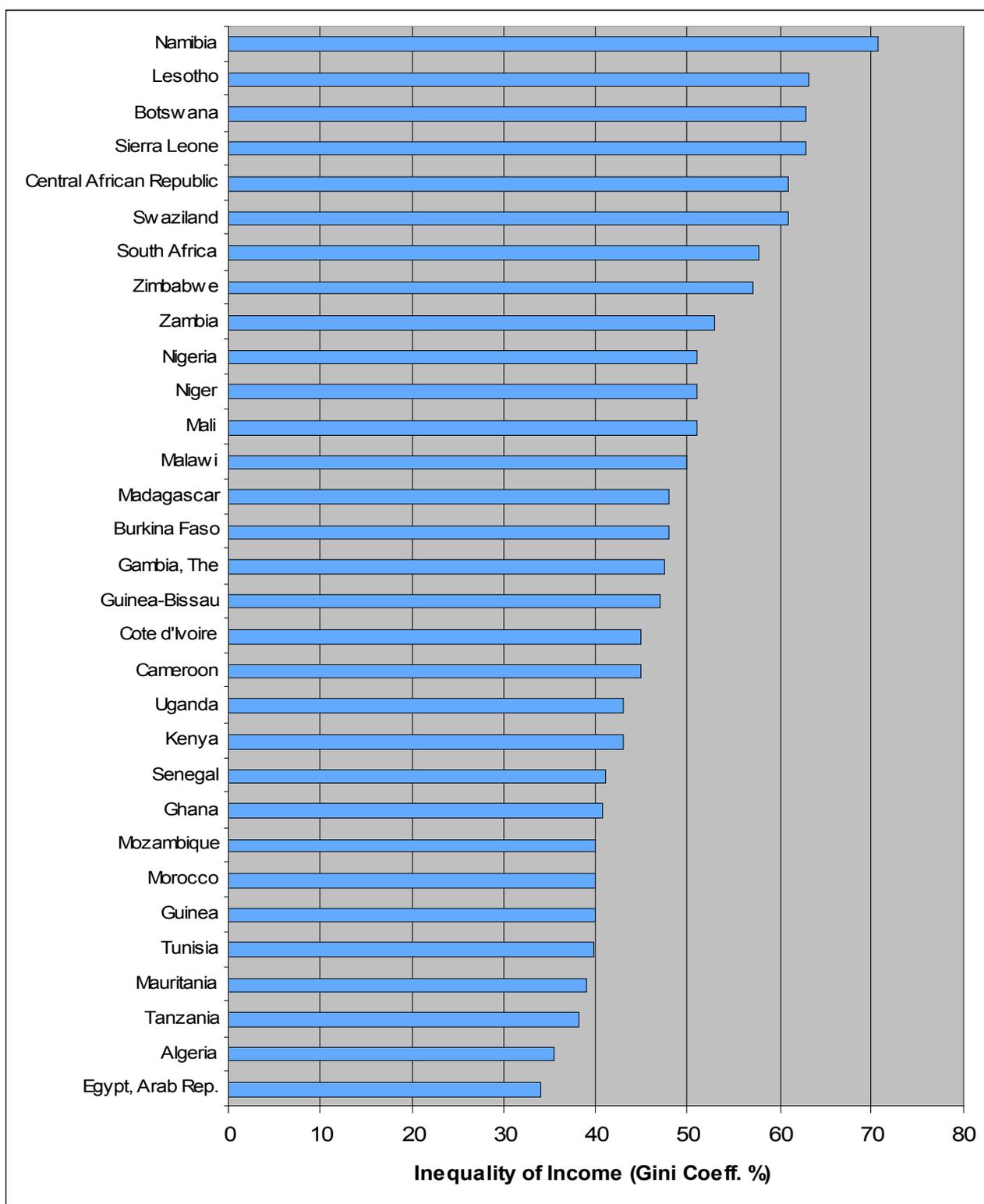
These are examples of analysis that could be done when only national aggregates from macroeconomic statistics are available. A territorial disaggregation of variables will certainly improve the precision of previous analysis.

Micro-data on small social grouping, as rural households, are necessary to understand better the differences in the dispersion and distribution of income in African population and to quantify the poverty phenomenon.

For example, the World Bank calculated the inequality of income (GINI coefficient) and several poverty indexes based on country poverty assessments and country Poverty Reduction Strategies. The obstacles are that only few countries have the necessary micro-data and they are from different quality samples and population coverage in the countries. Furthermore, differences in the definition of the underlying data might still affect intertemporal and international comparability (Deininger, 2010).

In the WDI database, estimated inequality of income is available only for 31 countries (Figure 2). This indicator changes over countries, with a maximum in Namibia (71%) and a minimum in the Arab Republic of Egypt (29%). The mean value is 47% smaller while the median value is approximately the same (46%) that suggests an almost centred mean value for the distribution of the GINI coefficient in African countries with data available. Concentration statistics of inequality in the distribution of income are over the levels of OECD countries.

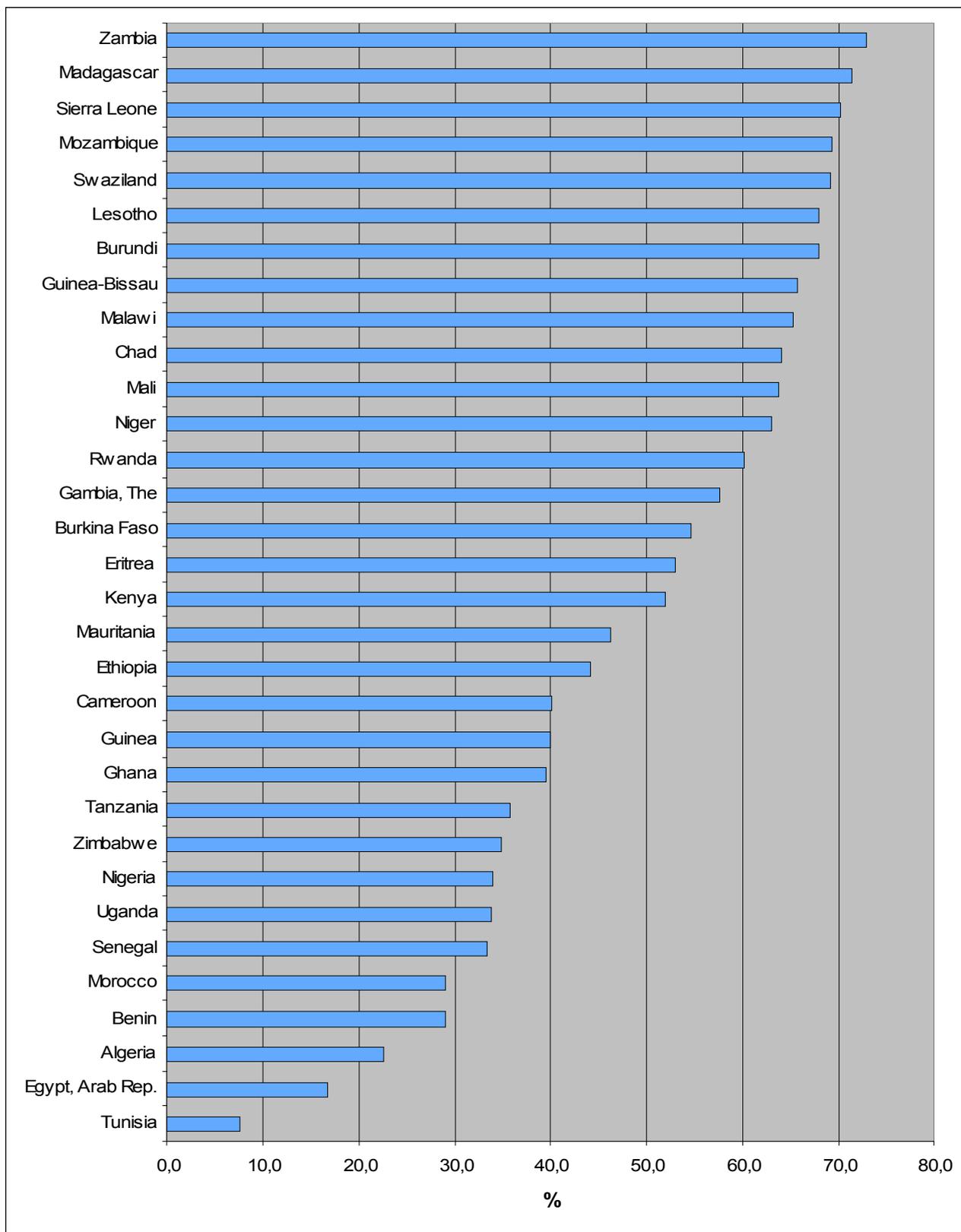
**Figure 2 – Inequality of Income in 31 African Countries – Year 2000 (Source: WDI WB database)**



Considering a poverty index (Figure 3), there are at least 17 countries with more than 50% of the population below 1\$ (PPP) per day, with 164 million poor over 492,4 million people (33.3%). In 32 countries, where the data is available, there are 247 million people below 1\$ (PPP) per day, that

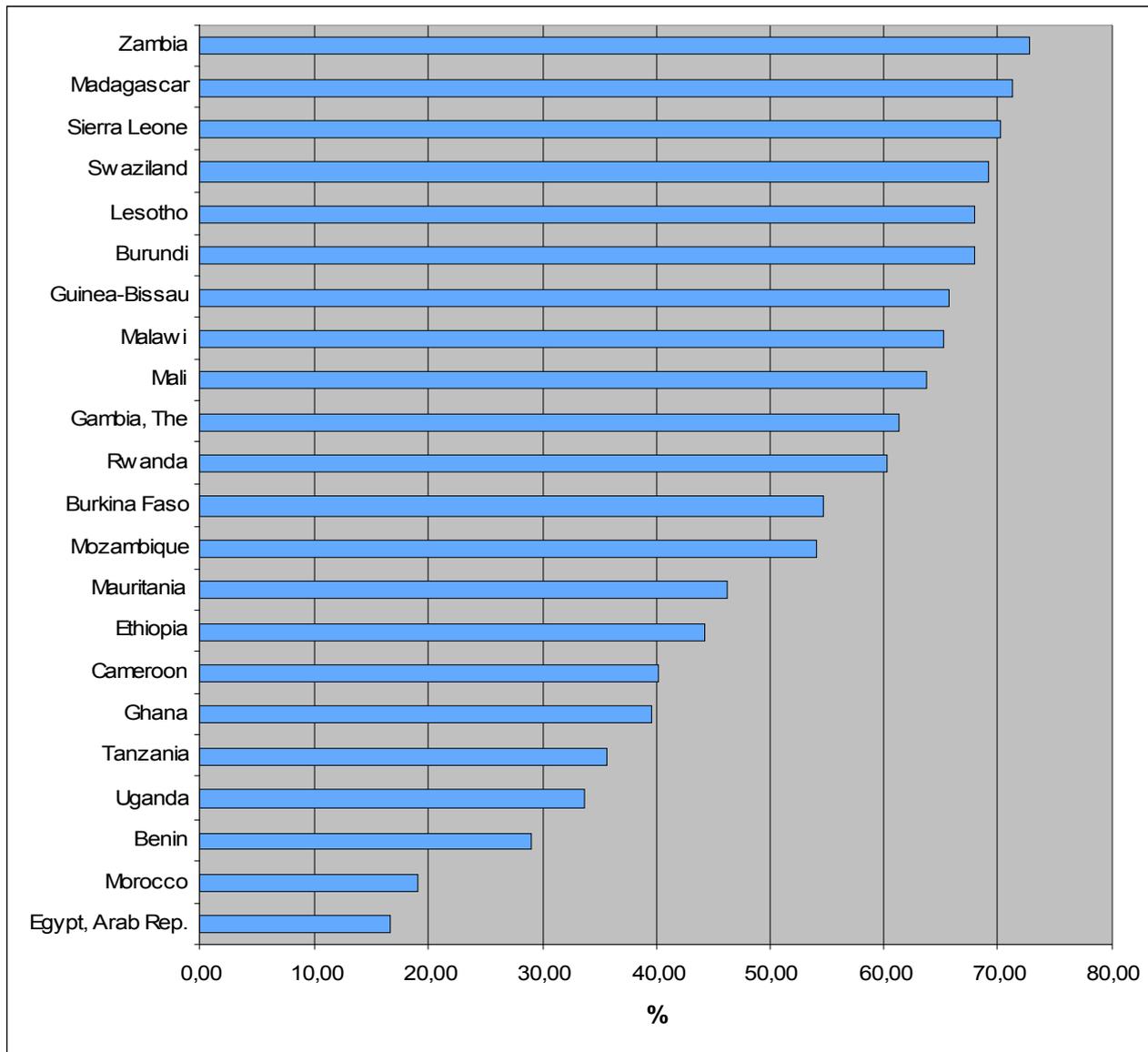
corresponds to over 619 million people (39.9%).

**Figure 3 – Population Below 1 \$ (PPP) per Day in 32 African Countries – Year 2000 (%)**  
**Source: WDI WB database)**



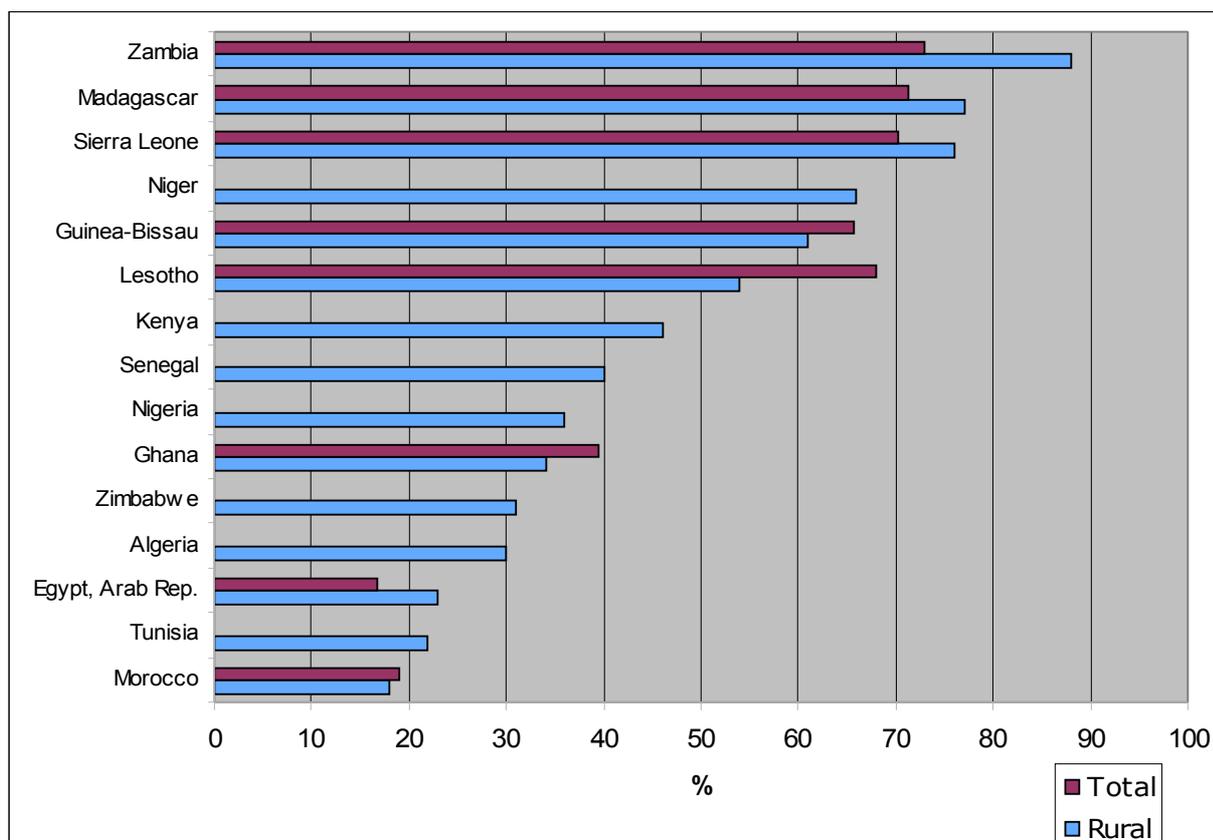
If a second poverty index is considered (Figure 4), the result is that there are at least 13 countries, 59.1% over the 22 with data available, with more than 50% of the population below the national poverty line.

**Figure 4 – Proportion of the Population Below the Nation Poverty Line in 22 African Countries – Year 2000 (%; Source: WDI WB database)**



In rural areas with respect to total, in the countries where the data is available (Figure 5), there are also significant differences: in some countries more than 50% of the rural population is below the national poverty line, with a maximum in Zambia (72.9%). In most of the countries, the percentage of poor people is higher in rural areas with respect to the total.

**Figure 5 – Proportion of the Population Below the National Poverty Line in Rural Population Compared with Total Population in 15 African Countries – Year 2000 (%; WDI WB database)**



## 5. Study Cases in M&E Sourcebook

Three African countries (Nigeria, Tanzania and Senegal) are considered among the pilot countries to validate ARD M&E indexes suggested by FAO et al., 2008.

From information available in their national reports, the World Bank database and the national statistical office's websites, the potentially measurable indicators are the following:

**Table 6 – Indicators Availability in Pilot African Countries (FAO et al., 2008)**

N. Description	Indicators	Countries		
		Nigeria	Senegal	Tanzania
<b>Whole economy and all sectors:</b>				
a	GDP per capita	x	x	x
b				
1	Household income (total)	x	x	x
a				
2	Inequality of income (Gini coefficient);	x	x	x
a				
3	Proportion of population below \$1 (PPP) per day;	x	x	x
a	Poverty headcount ratio at national poverty line (Proportion of total			
4	pop.)	NO	NO	NO
h				
1	Share of poorest quintile in national income or consumption	x	x	NO
<b>Rural areas and agricultural sector:</b>				
b				
2	Agricultural household income (total)			x
b				
3	Rural household income (total)			x
b	<b>Household income in rural areas from non-agricultural activity</b>	x	x	NO
c	Household income in rural areas from agricultural activity	NO		x
d	Rural household income from forest-related activities	NO	x	x
e	Farmer income as a result of new technologies			x
f1	<b>Proportion of rural population below US\$1 (PPP) per day</b>	x	x	x
f2	<b>Proportion of rural population below national poverty line</b>	x	x	NO
g	Rural poor as a proportion of the total poor population	NO	NO	NO
h	Ratio of average income of the richest quintile to the poorest quintile in rural areas	NO	NO	NO

National accounts and related indicators are available for the previous countries. Households surveys that include income information are also available, but the coverage of the total population and periodicity change in different surveys and countries.

In Nigeria there is an annual General Household Survey (GHS) that includes income questions and has been done in 2006 and 2008. There is also a National Integrated Surveys of Households and Infrastructure, that include the National Living Standards Survey (NLSS) and Households Expenditure Survey, the Multiple Indicators Cluster Survey (MICS) and Core Welfare Indicator Questionnaire (CWIQ). Finally, a Rural Welfare Statistical Survey is annually planned.

In Tanzania a Household Budget Survey is conducted every 5 years and a Living Standards Measurement Studies (LSMS) survey was done for 2003.

In Senegal, a periodical “Enquête Sénégalaise Auprès des Ménages“ gives information on households’ income. There is also an “Enquête de Suivi sur la Pauvreté au Senegal” that is used to produce indicators on budget/consumption.

Potentially, refining statically techniques and classifications, all suggested income indicators in table 1 could be calculated and the income distribution estimated.

## 6. Conclusions

Calculate household income indicators for statistics is a difficult task and international comparability with countries at different levels of development, as it is in Africa, is more complicate. Anyway statistical capability and data availability is growing in most African countries that, with an appropriate use of statistical tools, could regularly produce income indicators. Even if only aggregated data are available, a disaggregation at territorial level (for example regions) combined with partial micro-data at household/population level could be enough to produce concentration indicators on income.

Dispersion and poverty indicators with tendencies on a long-run prospective require mocrio-data from sample surveys on household/population. Considering the actual state of statistics in African countries, the dispersion and poverty indicators that are still missing for many countries, could be calculated in the future with the support of data from already or next available sample surveys, carried out during or after the population and agricultural censuses.

Income indicators logically come "downstream" of the implementation of policies. A periodical calculation of these indicators is necessary every few years (three/five years) to monitor progresses and evaluate results of development (agricultural, rural, ecc.) policies. It is also necessary, given the empirical distribution of income, to extend the estimation from mean to median and modal values. In practical terms, as already said, the first step when only macro-data at national level are available, is to approximated income indicators with a territorial disaggregation of data and using some occasional micro-data information. As a second step, a mapping of the population distribution with a flag on income, periodically repeated afterwards, is necessary to have a list of units to subdivide in quartiles and to extract samples. The focus of the analysis could be restrected only to the poorest quartile in the population. Full implementation of income indicators could be done with periodical households/population income surveys.

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