Measuring and analyzing the non-monetary approach of multidimensional poverty by the basic needs in Togo

By: Yawo Agbényégan NOGLO

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Yawo Agbényégan NOGLO

Paris-West University Nanterre La Défense (France)

Email: noglohonore@hotmail.fr

Dr. Yawo Agbényégan NOGLO holds a PHD in Economics at the University of Paris-West Nanterre La Défense (France). His researches focus on poverty and inequality and the effectiveness of targeting policies. As a teaching fellow, he teaches Macroeconomics, Statistics and Econometrics (University of Paris-West Nanterre La Défense) and Microeconomics at the University of East Paris Créteil Val de Marne (France).

Abstract:

This paper aims at measuring and analyzing the non-monetary aspect of multidimensional poverty by the basic needs according to the characteristics of household head. This is the first study in this matter in Togo and using the Multidimensional Correspondence Analysis (MCA) techniques to construct a Composite Poverty Indicator (CPI). Moreover, we use the most recent data from the country survey QUIBB 2006. The results of the incidence of multidimensional poverty by two approaches (MCA and FGT) suggest that the households with larger size, living in rural area, whose head is male, aged between 51 and 99, less educated are the poorest. The findings are the same as those found in the monetary approach at the poverty line, leading to a conclusion that there is a positive correlation between monetary and non-monetary poverty. Finally, we propose some recommendations in terms of socioeconomic policies for alleviating multidimensional poverty.

Introduction

Togo is one of the least developed countries (LDCs). According to the United Nations Development Programme (UNDP) report 2011, with a gross national income per capita estimated at $798 (PPP constant 2005) and a Human Development Index (HDI) of 0.435, Togo is ranked 162nd of 183 countries in the world. After the political crisis of the 1990s, which had serious economic consequences, Togo began to record an increase in its real growth rate in 2006 and this reached 3.4 per cent in 2010 (ADF and AfDB report, 2011). This performance is linked to efforts in terms of investment, control of inflation and debt reduction. However, this positive growth is insufficient to have had a serious impact on the multifaceted problems of poverty in the country. Thus, of the eight Millennium Development Goals (MDGs) for 2015, Togo is expected to achieve goals 2 and 6: universal primary education and the fight against HIV/AIDS (International Monetary Fund Report No. 10/33, 2010).

Poverty is deprivation of basic needs: income, food, access to basic social services and so on. With regard to the monetary aspect, the first study on the poverty profile of Togo was made by the World Bank in 1998 based on updated data from the 1989 Consumer Budget surveys. This study revealed that 35.3 per cent of the population lived in poverty in 1998 as against 32.3 per cent in 1989 (UNDP, 2004). This deplorable situation is explained by the negative consequences of the sociopolitical crisis, in particular the suspension of international cooperation with the country from 1993. The most recent report about that dimension of poverty is the one based on the QUIBB 2006 survey. According to that study, 61.7 per cent of the population was poor and the poverty levels were particularly high in the Savannah (90.5 per cent), Central (77.7 per cent) and Kara (75 per cent) regions (Directorate General of Statistics and National Accounts of Togo (DGSCN, 2007)).

Concerning the non-monetary dimension of poverty, Lawson Body and al. (2007) showed that between 1988 and 1998 the variation in the relative contribution of habitat (7.89 per cent) and communication (1.88 per cent) contributed much to households' well-being. With regard to studies carried out by Djoke and Agbodji (2009) on child poverty in four countries of the West African Economic and Monetary Union (WAEMU), breast-feeding, access to vitamin and micronutrients helped to reduce poverty and disease occurrence (diarrhoea, fever, difficulty breathing). As for Noglo (2014), from QUIBB 2006 data constructed a composite index based on seven housing conditions. After setting five conditions as non-monetary poverty threshold, the author showed that large families did not have a normal life in the house.

Our research is interesting because, no study has been conducted yet in Togo linking several dimensions of poverty (infrastructural and condition of existence) to the characteristics of the head of household whereas studies exist such as that of Ki and al. (2005). Thus the purpose of this article is the measurement and analysis of the non-monetary approach of multidimensional poverty by the characteristics of household head. We precisely try to respond to the following question: what is the link between the characteristics of household head and the household multidimensional poverty? We intend to fill the gap in the literature by addressing that poverty issue and make some recommendations in terms of socioeconomics policies.

The paper is presented as follows: the first section is devoted to the concepts, methods and data. Then in the next section, we discuss our empirical results and finally conclude with recommendations of policies.

I Concepts, methods and data

Two major meanings exist in the literature to define the concept of well-being. The monetary approach that likens the welfare to financial resources such as expenditure or income. Then, the non-monetary aspect that takes into account some attributes, such as access to basic social services (drinking water, sanitation facilities, health services, basic education and transport services).

The monetary dimension translates a narrow conception of well-being (Lachaud, 1998; Deaton, 2003) and does not take into account certain factors that have utility but which are not quantifiable as non-market goods and non-material dimensions of the human condition (Ravallion, 1996). Indeed, the non-monetary attributes above-mentioned and many others that may exist are the dimensions of well-being, thus their inclusion provides relevant information which are not always considered in the one-dimensional monetary approach. Hence, the consideration of the non-monetary dimension provides a broader view of policy implementation. Given that income can not be considered as the only targeting means because it reduces the effectiveness of policies (Ponty, 1998), a multidimensional approach of well-being is necessary.

The use of this natural alternative in the purpose to construct a well-being indicator permits to study non-monetary poverty. The above-mentioned non-monetary variables will intervene in the determination of the indicator. This method is inspired from various works in PEP (Poverty and Economic Policy), among others, those of Ki and al. (2005), Booysen and al. (2007), Lawson Body and al. (2007)...

I.1 Composite Poverty Indicator (CPI)

The basic non-monetary welfare main dimensions used for the CPI are basic infrastructure, energy, housing and sanitation. Several methods allow to construct a CPI and they mainly include the entropy approach, the logic of fuzzy sets and the method of inertia.

The entropy and inertia approaches originate from the field of dynamic mechanics and static mechanics respectively. The entropy method has been the keystone of Massoumi (1986), who, using a measure of divergence between two distributions, has designed an optimal composite indicator. This minimizes a weighted sum of pairwise divergences.

Cerioli and Zani (1990) for measuring multidimensional poverty developed multivariate method based on the theory of fuzzy sets. This method allows a construction of indices comprising the different dimensions of poverty. Then, Dagnum and Costa (2004), introduced a one-dimensional aspect through one-dimensional indices. This synthetic decomposition consists in measuring the state of deprivation of each attribute and evaluating their contributions to the overall level of poverty. Thus, the poverty of a person is identified by its membership degree in fuzzy sets and this, to each of the attributes of poverty respectively. The state of poverty by groups (region, level of education, religion, household size...) can also be studied by dividing the economic surface into k groups (S_k) of size n_k $(k = 1,...,s)$ (Mussard and Pi Alperin, 2005). The criticism that can be formulated against these two methods is the arbitrariness behind the choice of weights for each attribute.

The best solutions to this problem are provided by the approach of inertia. This latter is based on factor analysis techniques developed by Meulman (1992), Bry (1996), Volle (1993) and Escofier and Pagès (1990). These tools include the Multiple Correspondence Analysis (MCA) allowing to determine a CPI with the least possible arbitrary. The MCA technique suggested by Asselin (2002) is better suited for data that include a set of primary variables representing different categories that can take primary dimensions reflecting the living conditions of households. Thus, it allows to account accurately for the aspects of living conditions considered relevant. Measuring non-monetary poverty will be based on the indicator generated by the MCA. According to Asselin (2002), the technique leading to the construction of the CPI is as follows: Let us consider K primary indicators representing the living conditions of household such as the type of ground or floor in housing for example. The basic idea is to summarize the information provided by these qualitative indicators into a single composite index that we call C_i. The composite indicator is written in the general form as follows:

$$C_i = \sum_{j=1}^{K} \gamma_i I_{ij} \qquad (1)$$

with I_{ij} the primary indicator j (1……K) for a household i (i = 1…..n). γ_i is the weight assigned to the indicator j in the calculation of the composite index C_i of household i

Thus, the CPI can be written again in the following functional form:

$$C_i = \frac{\sum_{k=1}^{K} \sum_{j_k=1}^{J_k} W_{j_k}^{k} I_{j_k}^{K}}{K}, \tag{2}$$

With i the indice of a household and C_i its value for the CPI, K the number of categorical indicators ; J_k the number of categories for indicator k ; W_{jk}^{k} the weight ($\frac{score}{\sqrt{\lambda_1}}$) (normalized first axis score) of category J_k ; λ_1 the first eigenvalue and I_{jk}^{K} the binary variable 0/1 taking the value 1 when the unit of household has the category J_k. The weights provided by the MCA correspond to the normalized first axis scores on the first factorial axis. The mean of normalized scores of categorical variables represents the value of the CPI for any household m.

Although the method of inertia is an excellent method for constructing a CPI by eliminating the maximum arbitrary, it nevertheless has weaknesses. Indeed, this method only takes into account property and monetary resources in the calculation of the CPI, however, according to Sen (1999), people have the freedom to choose the lifestyle they have good reason to enjoy. In addition, the MCA neither allows to simultaneously analyze multiple tables nor makes concomitant description of links within and between tables. Thus, in terms of inertia, this method could give little weights to certain relevant variables for the analysis of well-being. Finally, the MCA approach does not consider the possible interactions between the variables.

1.2 The Ascending Hierarchical Classification (AHC)

The Ascending Hierarchical Classification (AHC) also called the cluster analysis technique is a method of classification of households by the level of well-being. Its objective is to create disjoint classes of households as homogeneous as possible. In other words, among all possible partitions, the one chosen is which provides the maximum between class variance (or the minimum within-class variance).

The characterization of classes implies knowing the meaning of percentages of classes in the modality (CLA / MOD) and the percentage of modality within the class (MOD / CLA). The first indicates the number of individuals with the modality in the class divided by the total number of individuals with the modality. In other words, it is the percentage of people who have the modality and belonging to the class. For example CLA / MOD = 100% means that if a person has the modality then it belongs to the class. Note that the CLA / MOD reflects the incidence of multidimensional poverty by the AHC method. As for MOD / CLA, it is the number of individuals with the modality in the class divided by the total number of people of the class. For example MOD / CLA = 100% means that all individuals in the class have the modality.

I.3 Poverty index

The CPI per household obtained from the final MCA can be positive, indicating non-monetary wealth or negative reflecting poverty. To address these issues of negative values in the calculation of poverty level, the composite indices are translated by adding to each original CPI of household i, the absolute value of the minimum value of the set of indicators.

Following Duclos and Araar (2006), the translated CPI (CPI_i^*) which is positive for each household i is expressed as follows:

$$CPI_i^* = CPI_i - \min(CPI_i), \tag{3}$$

Where $-\min(CPI_i) = 1,05$ is the absolute value of the smallest value from the original CPI. The CPI^* generated will all be positive by construction but the level of welfare of households remains ordered similarly between the first and the translated CPI.

Note that, the translation of the CPI will affect the mean of the distribution and thus the results of poverty measures (Sahn and Stifel, 2003). Indeed, except the incidence of poverty, this transformation will influence the poverty gap and the severity of poverty

Several poverty indices exist in the literature. However, for this study, we apply for the non-monetary dimension of poverty the FGT class of decomposable indices developed by Foster, Greer and Thorbecke (1984), because they are popular for their decomposition properties of poverty into subgroups. The general formula of these indices is the following:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{q} \left(\frac{z - CPI_i^*}{z} \right)^\alpha \tag{4}$$

N is the number of households in the population, z is the multidimensional poverty line, CPI_i^* is the translated CPI, q the number of poor, $\alpha \geq 0$ is the poverty aversion parameter. If $\alpha = 0$, the index P_0 (also called the headcount ratio) assesses the incidence of multidimensional poverty that is, the share of households living below the multidimensional poverty threshold.

I.4. Data

The data are from the most recent survey (QUIBB 2006) on the issue of poverty in Togo. The collation QUIBB was carried out by the General Directorate of Statistics and National Accounts (DGSCN) in cooperation with the World Bank, the UNDP, the United Nations Population Fund (UNFP) and the United Nations Children's Fund (UNICEF). These international institutions funded the survey, which took place from July 4 to August 11, 2006. It is an areolar survey stratified into two stages. At the first stage, 300 Zone of Counting (ZC) were drawn with proportionate probabilities to the size of ZC. The second stage has allowed to have 7500 households from the ZC (25 households per ZC) with respectively 2600 and 4900 in urban and rural areas.

II. The results

II.1 Correspondence analysis of multiple dimensions of non-monetary welfare: Final MCA on the CPI variables

First, a first MCA was carried out and it aims to visualize the various aspects of non-monetary welfare. It was done on the basis of 18 variables representing the non-monetary dimensions of well-being. Then comes a second MCA whose purpose is to select the relevant

variables for the construction of the CPI. The main criterion considered is the first axis ordering consistency (FAOC). This principle is a necessary condition for the CPI to order households according to their welfare situation. This means that the coordinates (scores) of modalities of a primary indicator on the first axis must respect the ordinal structure of the well-being indicator.

After applying this procedure, the final MCA takes into account 15 variables with all FAOC property and 31 modalities. The variables definitely selected and their modalities are presented in Table 1.

Table 1- Final list of 15 variables and 31 modalities for the calculation of the Composite Poverty Indicator

Variables	Modalities
Education	
Access to primary school	Less than 30mn/Over 30mn
Access to secondary school	Less than 30mn/Over 30mn
Health	
Access to a health center	Less than 30mn /Over 30mn
Water source	
Access to a water source	Less than 30mn /Over 30mn
Nutrition	
Access to food market	Less than 30mn / Over 30mn
Often food problems	Yes/No
Public transports	
Access to public transport	Less than 30mn /Over 30mn
Housing and sanitation	
Roof materials	Durable /Non-durable
Wall materials	Durable / Non-durable
Floor materials	Durable /Non-durable
Disposal of household garbage	Collection service / In the nature, Burial, Incineration, Landfill
Disposal of wastewater	Wastewater disposal system / In the nature, On the road.
Energy	
Mode of lighting	Modern / Non-modern /Others
Electricity in the house	Yes / No
Combustible for cooking	Modern / Non-modern

This table excludes three variables with non-FAOC property such as access to toilet, the supply of drinking water, the housing occupancy status[1].

The fact of reducing variables has increased the explanatory power of the first factorial axis which has increased from 26,47% to 31,66% and that of second axis from 9,01% to 12,13% (see the histograms of eigenvalues in annex 1). The first axis with higher explanatory power is the basis to explain the non-monetary welfare and for this reason, it is also named the poverty-wealth axis (or well-being axis). This latter makes a clear separation between rich and poor. The observation of Figure 1 illustrating the results of the final MCA shows that on the first axis the modalities with a positive score increases the well-being while, those with a negative score decreases it. The MCA is the basis for constructing the CPI which will be used in the rest of the study.

Overall, figure 1 highlights two forms of non-monetary poverty and wealth. First, there is the infrastructural poverty which appears through poor access (over 30 min) to basic infrastructures (education, health, water source, food market). This type of poverty is beyond the capabilities of households. It is rather closely related to the ability of the government to provide the country with basic infrastructures in view of improving the living conditions of populations.

Then, the vulnerability of human existence. This is the most noticeable because it is related to housing characteristics: non-resistant walls (bamboo, wood, cardboard, sheet metal and clay brick), non-resistant roof (mud brick, clay, straw, tree branches), non-resistant floor (clay and sand). This vulnerability can also be seen by food insecurity, the lack of electricity in the house, the use of archaic means (kerosene lamp, gas lamp, hurricane lamp, candle, firewood) for lighting, the use of non-modern combustible (firewood, charcoal, plant residues) in the kitchen, the disposal of household garbage in the nature and the discharge of wastewater on the road and in the nature given the lack of wastewater disposal system (sewers, sumps...).

As for what is linked to wealth, both dimensions are the opposite aspects of poverty discussed. Indeed, households have easy access to basic infrastructures and are not victim of the vulnerability of human existence.

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[1] See in brackets the modalities of these three variables: access to toilet (modern toilet, non-modern toilet, no access to toilet), the supply of drinking water (water tanker truck, untreated water, yard tap, water tap in the home, other water sources), the housing occupancy status (family home, homeowner, tenant of dwelling).

Figure 1- First plan of the final MCA
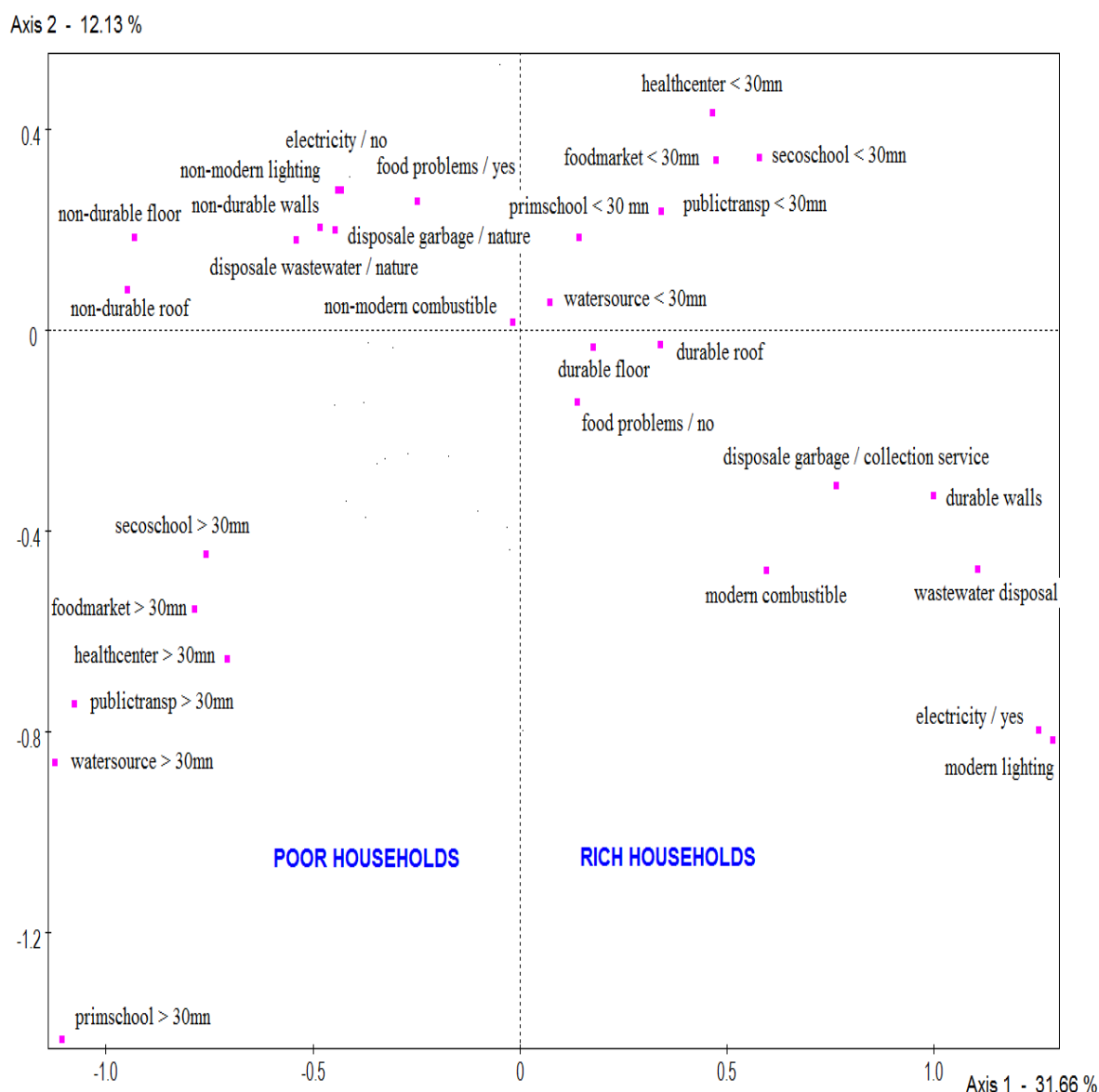
Source: Author's calculation using QUIBB 2006.

Legend:

primschool : time taken to reach the nearest primary school ; **secoschool** : time taken to reach the nearest secondary school ; **health center** : time taken to reach the nearest health center ; **water source** : time taken to reach the nearest water source ; **food market** : time taken to reach the nearest food market ; **public transp** : time taken to reach the nearest public transport.

Table 2 below provides the standardized scores of CPI. Let's recall that the weights are standardized scores on the first factorial axis. The most positive scores correspond to modalities such as: the disposal wastewater, the modern lighting mode, the possession of the electricity in the house, the durable wall materials, the collection service for household garbage, and access to secondary school. The most negative scores are linked to low access to infrastructure (primary and secondary school, health center, water source, food markets and

public transports), non-durable roof and floor materials of housing. As one can see the weights provided by the MCA give to this latter an interesting property: separate at best, poor and rich. Thus the logic of this approach is clear: a modality has a much greater weight when it is increasingly rare. Thus the MCA gives significant weights to scarce and luxurious goods and services that increase the well -being, and high weights to goods and services which are more accessible in reducing welfare. This logic gears a better identification of the poor. Indeed, a household will be all the more poor because it does not have access to basic goods which are accessible to the majority of the population. On the flip side, the household which has access to several luxury goods will tend to have a high standard of living. These situations reflect the reality.

Table 2 also gives the contributions of variables for the construction of the first axis. They describe the share of each variable in the total inertia of the axis. The most contributory variables are firstly: mode of lighting, electricity in housing, wall materials, disposal of wastewater, access to secondary school. Then come secondly: access to food market, public transport, disposal of household garbage and the wall materials. The less contributory modalities are: access to primary school and water source, combustible used for cooking, the floor materials and the food problems.

The cosine-square indicate the quality of the representation of modalities on the first axis: the more the cosine-squared is great, the more the modality is correlated with the axis and therefore well represented on this axis. Thus, the modalities which are best represented on the first factorial axis are those whose variables have the greater contribution. Thus the strong contribution of these variables translates the quality of the linkage between their modalities and the well-being axis.

Finally, the distance to the center is simply the square of the distance of $\chi 2$ from the origin.

Table 2- Scores, contributions and cosine-squared of the final MCA of Togo

Variables/Modalities	Scores on the first axis	Contributions	Cosine squared	Distance to the center	Frequencies
Access to primary school		**3,4**			
Less than 30 mn	0,14	0,4	0,16	0,13	5,90
Over 30 mn	-1,11	3,0	0,16	7,68	0,77
Access to secondary school		**9,2**			
Less than 30 mn	0,58	4,0	0,44	0,76	3,78
Over 30 mn	-0,76	5,2	0,44	1,31	2,88
Access to a health center		**6,9**			
Less than 30 mn	0,46	2,7	0,33	0,66	4,02
Over 30 mn	-0,71	4,2	0,33	1,52	2,65
Access to a water source		**1,7**			
Less than 30 mn	0,07	0,1	0,08	0,06	6,27

Over 30 mn	-1,13	1,6	0,08	15,67	0,40
Access to food market		7,8			
Less than 30 mn	0,48	3,0	0,37	0,61	4,15
Over 30 mn	-0,78	4,9	0,37	1,65	2,51
Access to public transports		7,7			
Less than 30 mn	0 ,34	1,8	0,36	0,32	5,06
Over 30 mn	-1,07	5,8	0,36	3,16	1,60
Combustible for cooking		0,2			
Modern	0,54	0,2	0,01	31,19	0,207
Non -modern	-0,02	0,0	0,01	0,03	6,46
Disposal of household garbage		7,6			
In the nature	-0,48	3,0	0,36	0,64	4,06
Collection service	0,75	4,7	0,36	1,56	2,60
Floor materials		3,4			
Durable	0,18	0,6	0,16	0,19	5,59
Non -durable	-0 ,92	2,9	0,16	5,22	1,07
Wall materials		11,3			
Durable	1,00	7,4	0,54	1,84	2,34
Non -durable	-0,54	4,0	0,54	0,54	4,32
Roof materials		6,7			
Durable	0,34	1,8	0,32	0,36	4,91
Non -durable	-0,95	5,0	0,32	2,80	1,75
Electricity		11,6			
Yes	1,25	8,6	0,55	0,35	4,93
No	-0,44	3,0	0,55	2,85	1,73
Often food problems		0,7			
Yes	-0,25	0,5	0,03	0,56	4,26
No	0,14	0,3	0,03	1,77	2,41
Mode of lighting		11,6			
Modern	1,27	8,6	0,55	2,95	1,69
Non -modern	-0,43	2,9	0,55	0,34	4,98
Disposal of wastewater		10,1			
Nature, Road	-0,44	2,9	0,48	0,41	4,74
Wastewater disposal system	1,09	7,2	0,48	2,46	1,92

Source: Author's calculation from QUIBB 2006

Note that economists have not yet reached a consensus on the dimensions of well-being that matter, because they rarely justify their choices (Alkire (2006). Thus the attributes selected for our study are those revealed by QUIBB 2006. We would like to include the dimension related

to the possession of property (motorcycle, car, TV, telephone, fridge...), but these assets do not exist in the database. Finally, as above-mentioned, the translation made in order to have positive CPI influences the mean of the distribution and make the poverty measurements depending on the transformation, and consequently determines the outcome of poverty levels. However, the important thing is not the elaboration of a perfect indicator of well-being but a measure to provide decision makers with results on which will be based policies for alleviating non-monetary poverty.

II.2 Incidence of multidimensional poverty

II.2.1 Cluster analysis techniques: characteristics of classes

By performing cluster analysis techniques, we distinguish 2 classes of households: the rich class and the poor class whose weights are 34,53 % and 65,47 % respectively

Nationally, Table 3 characterizing the rich class indicates that among the overrepresented modalities[2], rich households have satisfactory access to basic needs. Indeed, wealthy families have no energy problems (use of modern lighting and electricity in the house), have a comfortable home (durable walls, roof and floor) and live in a sanitized environment (wastewater disposal system, collection service for household garbage). For example, if in the sample households using modern lighting and electricity are 25,04 % and 25,96% respectively, in the rich class the percentages are 70.54 % and 71,85 %. This class also includes the majority of families which have easy access to basic infrastructures (access to primary and secondary school, public transport, food market, health center, and a source of drinking water) and rarely food problems.

This households live in majority (87,34%) in urban area, they are headed by a woman and are small size. These families are in large proportion managed by a head aged between 31 and 50. The educational levels of these household heads are complete primary and secondary schools; and professional school.

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[2] A modality is overrepresented if it appears in the class with a percentage significantly superior to the average rate it represents in the sample. Hence, the Test-Value is positive and superior to 2 at usual significant level of 5%.

Table 3 Characteristics of the rich class

Number of households : 2590 - Percentage : 34,53%

Variables	Modalities	Test-Values	% of class in the modality (CLA/MOD)	% of the modality in the class (MOD/CLA)	Overall frequency in the modality
Active variables					
Mode of lighting	Modern	68,76	97,28	70,54	25,04
Electricity in the house	Yes	68,11	95,58	71,85	25,96
Wall materials	Durable	65,39	82,06	83,36	35,08
Disposal of wastewater	Disposal System	62,44	88,36	72,12	28,19
Disposal of household garbage	Collection service	50,78	69,29	77,26	38,51
Roof materials	Durable	42,33	46,50	99,15	73,64
Access to secondary school	Less than 30 mn	40,40	53,11	86,95	56,53
Access to public transport	Less than 30 mn	34,22	44,08	96,60	75,68
Access to food market	Less than 30 mn	33,81	48,35	87,03	62,16
Floor materials	Durable	28,15	40,47	98,26	83,84
Access to a health center	Less than 30 mn	27,31	46,41	80,77	60,11
Access to a water source	Less than 30 mn	16,09	36,52	99,31	93,89
Access to primary school	Less than 30 mn	15,63	37,42	95,87	88,48
Often food problems	No	12,35	39,58	73,24	63,91
Combustible used for cooking	Modern	5,46	52,51	4,44	2,92
Illustrative variables					
Area of residence	Urban area	72,43	87	87,34	34,67
Educational level of household head	Comp. Prim. Scho.	3,86	40,71	12,86	10,91
Educational level of household head	Incomp. Sec. Scho.	24,56	58,40	42,12	24,91
Educational level of household head	Comp. Sec. Scho.	11,86	71,67	6,64	3,20
Educational level of household head	Profession. Scho.	23,09	91,98	12,39	4,65
Size of household	1-2 people	12,34	49,47	25,33	17,68
Size of household	3-4 people	2,03	36,23	32,20	30,69
Sex of household head	Female	8,06	43,29	26,14	20,85
Age of household head	15 - 30 years	4,65	40,75	17,53	14,85
Age of household head	31 - 50 years	5,72	37,43	58,69	54,15

Source: Author's calculation from QUIBB 2006

Table 4 characterizes the Togolese poor class. We note that the most overrepresented modalities are: energy (lack of electricity in the home and non-modern lighting), the lack of comfort in the house (non-durable walls, roof and floor), sanitation (garbage disposal in the nature, wastewater disposal on the road and in the nature), difficult access to basic infrastructures (secondary school, food market and health center). If, for example in the sample, households with no electricity in the house and no modern lighting source are 73,93 % and 74,49 % respectively, in the poor class, these rates reach for each of the respective modalities the level of 98,13 % and 98,39 %.

In this poor class, households live mostly in rural areas (93,12%) and are typical of large size families (5-6 people and 7 people or more). The household heads are men in large proportion, they are in the between 51 and 99 age group. Also, the chiefs of households are not educated or they have incomplete primary school level.

Table 4- Characteristics of the poor class

Number of households : 4910   -   Percentage : 65,47%

Variables	Modalities	Test-Values	% of class in the modality (CLA/MOD)	% of the modality in the class (MOD/CLA)	Overall frequency of the modality
Active variables					
Electricity in the house	No	67,91	86,89	98,13	73,93
Mode of lighting	Non -modern	67,64	86,47	98,39	74,49
Wall materials	Non-durable	65,31	91,19	90,24	64,79
Disposal of wastewater	Road, nature	61,69	87,10	93,67	70,40
Disposal of household garbage	On the road	50,11	87,43	80,59	60,35
Roof materials	Non-durable	42,44	98,98	39,71	26,27
Access to secondary school	Over 30 mn	40,27	89,74	58,98	43,03
Access to public transport	Over 30 mn	34,22	95,47	34,77	23,84
Access to food market	Over 30 mn	33,72	88,24	50,57	37,52
Floor materials	Non-durable	28,60	96,82	23,58	15,95
Access to a health center	Over 30 mn	27,17	83,37	50,43	39,60
Access to a water source	Over 30 mn	16,32	96,21	8,80	5,99
Access to primary school	Over 30 mn	15,63	87,62	15,42	11,52
Often food problems	Yes	12,35	74,40	41,02	36,09
Combustible used for cooking	Non-modern	4,86	65,98	97,41	96,65
Illustrative variables					
Area of residence	Rural area	72,43	93,31	93,12	65,33
Age of household head	51 - 99 years	9,91	73,51	34,81	31
Educational level of household head	Non-educated	34,16	87,09	54,56	41,01
Educational level of household head	Incomp. Prim. Scho	8,39	76,09	17,76	15,28
Sex of household head	Male	8,06	67,77	81,93	79,15
Size of household	5 - 6 people	5,35	70,12	30,49	28,47
Size of household	More than equal to 7 people	8,03	73,40	25,97	23,16

Source: Author's calculation using QUIBB 2006

II.2.2 Monetary and multidimensional poverty by the characteristics of household head

To determine the threshold of non-monetary poverty, the CPI are ranked from smallest to largest value. The positive and negative CPI corresponds to wealth and poverty respectively. The non-monetary poverty line is the value of CPI between the wealthiest among poor households and the poorest among rich households. After making the CPI translation of vector 1.05 in view of having positive (CPI_i^*) values which are necessary to use the non-monetary FGT index, Table 5 gives the following values:

Table 5 -Proportion of households classes according the translated CPI (CPI*).

The classes of households	Translated Composite Poverty Indicator (CPI*)		Proportions of classes of households (%)
	Minimum	Maximum	
Poor class	0	**1,2322**	65,47%
Rich class	**1,2327**	2,1714	34,53%
Total	0	2,1714	100%

Source: Author's calculation based on QUIBB 2006

Thus, the formula of multidimensional poverty threshold is:

Multidimensional threshold (Z) = $[\max CPI_i^* (\text{poor class}) + \min CPI_i^* (\text{rich class})]/2$ (5)

The calculation is equal to: $Z = \left(\dfrac{1{,}2322 + 1{,}2327}{2}\right) = 1{,}2324$

The value of the multidimensional line is estimated at 1,2324

In order to estimate the monetary level of poverty, the well-being indicator considered is the annual real expenditure which is transformed into annual real expenditure per adult equivalent by implementing the Oxford equivalence score because it's the more popular. The Oxford equivalence scale assigns a value of 1 for the first adult, then 0.7 for all further adults and 0.5 or children aged between 0 and 14. To define the monetary poverty line, we used the World Bank absolute threshold which is equal to \$1 per head and per day therefore \$365 in 2006 since this year has 365 days. With an exchange rate equivalent on average to 524,4 CFA for \$ 1 in 2006 (www.usherbrooke.ca/perspective-monde, 2011), this threshold for 2006 is 191406 CFA.

Table 6 reveals that the incidence of multidimensional poverty using the cluster corresponds to the weight of the poor class (65,47%). This poverty rate is similar to that of the FGT approach while on the monetary level, this ratio stands at 51,78%.

At both monetary and non-monetary levels, poverty is higher among households whose head is male, aged between 51 and 99 and less educated. This scourge for both concepts is also more prevalent in households whose size is increasingly higher and in families living in rural areas. Thus, the situation of multidimensional poverty according to the characteristics of household head is similar to that observed at monetary level.

Table 6-Monetary and multidimensional poverty by the characteristics of household head

Characteristics of household head	Multidimensional poverty incidence (%) /Cluster (1)	Multidimensional poverty incidence (%) /FGT approach (2)	Monetary poverty incidence (%) (3)	Gaps (1)-(3)	Gaps (2)-(3)
Sex of household head					
Male	67,77	67,93	55,72	12,05	12,21
Female	56,71	56,21	36,85	19,86	19,36
Age of household head					
15-30 years	59,25	61,32	37,01	22,24	24,31
31-50 years	62,57	62,43	52,73	9,84	9,7
5 1-99 years	73,51	72,97	59,45	14,06	13,52
Educational level of household head					
Non educated	87,09	86,63	69,85	17,24	16,78

Incomplete prim. school	76,09	75,98	54,34	21,75	21,64
Complete prim. school	59,29	60,22	47,50	11,79	12,72
Incomplete sec. School	41,6	41,90	34,66	6,94	7,24
Complete sec. school	28,33	28,75	19,58	8,75	9,17
Professional school	8,02	8,05	7,76	0,26	0,29
Size of household					
1-2 people	50,53	49,92	10,49	40,04	39,43
3-4 people	63,77	63,67	41,83	21,94	21,84
5-6 people	70,12	70,18	63,65	6,47	6,53
More than equal to 7 people	73,40	73,96	81,91	- 8,51	-7,95
Area					
Urban	13	13,53	19,74	-6,74	-6,21
Rural	93,31	93,00	68,79	24,52	24,21
Overall	**65,47**	**65,48**	**51,78**	**-**	

Source: Author's calculation from QUIBB 2006

Figure 2 consists in verifying generally the correlation between monetary and non-monetary poverty of households. The link between the translated Composite Poverty Indicators (CPI*) and expenditure per capita shows a positive correlation between both indicators. The correlation coefficient is 0.61 and translates therefore a strong positive relationship between monetary poverty and multidimensional poverty. Hence, living in monetary deprivation leads consequently to non-monetary poverty.

Figure 2-The translated composite indicators (CPI*) (translation of 1,05) by expenditure per adult equivalent
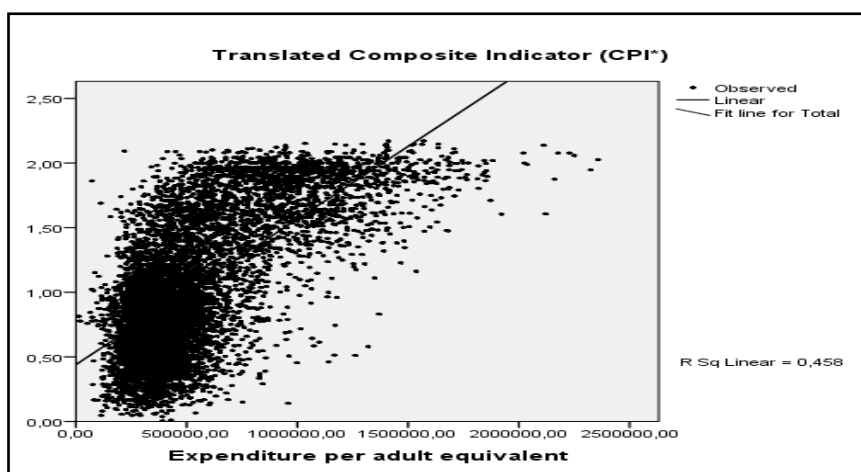
Source: Author's calculation using QUIBB 2006

Conclusion and implications of socioeconomic policies

Because of the multidimensional nature of well-being, it is recognized that the monetary approach is no longer sufficient to account for the multiple phenomena that create poverty within a population. Applied to the case of Togo, the purpose of this paper is the measurement and analysis of non- monetary approach of multidimensional poverty. The data come from the QUIBB 2006 survey which provides non-monetary variables used to construct a CPI.

The results of the incidence of multidimensional poverty according to the cluster analysis techniques and the FGT index reveal that both national poverty rates are similar. The observation of the incidence of poverty among households according to the characteristics of household heads for the two approaches shows that it is higher among households whose head is male, aged between 51 and 99 years, less educated. The multidimensional poverty rate is also higher in households with larger size and for families living in rural areas. The calculation of the incidence of monetary poverty follows the same trend as that of the non-monetary approach.

In terms of recommendations, we formulate some possible policies for socio-economic development:

- **Promote people's access to drinking water sources**

Indeed, actions have been taken by the State, NGOs and local communities to provide rural areas of drinking water sources, but the results have never met the needs to be covered. Ambitious plan is now necessary to expand protected wells and water pumps. The water pumps should be simple and installed by poor household or group of households linked. Communities must be trained for maintenance operations and to intervene in case of damage. This implies a regular contribution in a village bank.

- **Promote access to basic infrastructure**

The State must also develop infrastructures such as roads, markets, health centers and schools to bring them closer to rural populations.

The Togolese poor living in rural area have difficulties accessing clinics equipped with qualified personnel[3], given the remoteness of these health centers. A healthy population is more productive in their various income generating activities. Rural people also have difficulties to sell their crops because the markets are not close. This population needs proper roads to replace the dirt roads in order to facilitate travels.

A higher level of education of future household heads is a guarantee of access to better jobs and therefore income, which reflects positively on the level of non-monetary conditions in housing. The government has for this purpose to build more schools and make them free to provide education to people especially girls. Given that the education system in Togo does not necessarily meet the requirements of improving living conditions and reducing poverty, it is important to redirect educational policy objectives consistent with the realities and therefore contributive to job creation.

---

[3] They often consult traditional healers who do not have the skills to diagnose serious illness

- **Promote a policy of housing and sanitation**

Rural houses built with non-resistant materials and often non-electrified are less comfortable than urban habitats. It is well known that the first savings of Togolese are devoted mostly to the purchase of land and construction materials. A policy that would develop the housing sector will inevitably have a positive impact on poverty alleviation. This could also be a solution against unemployment by creating jobs through the activation of related sectors such as masonry, carpentry, scrap merchant, plumbing, electricity, water... The development policy of the housing sector will inevitably have a positive influence on the reduction of poverty. The sanitation problem is a drama in rural and urban Togo with a severity for the rural area. Government actions should consist inter alia in educating, informing households to evacuate household garbage and sewage, developing landfill sites, rehabilitating health services for the improvement of safety and pollution conditions.

- **Awareness campaign and targeting age-classes in more worrying situation**

To reduce poverty in the largest male-headed households, it is important to conduct awareness campaigns aimed at changing mentalities. Indeed, one of the causes of monetary poverty resulting in great vulnerability of existence of households headed by men is polygamy, a practice rooted in the custom and resulting in the emergence of large family size.

Poverty is also higher in the households whose heads are in the age range of 51 to 99. Indeed, the majority of these household heads are elderly and retired people. Hence, to tackle the vulnerability of the existence of these people, safety nets must be implemented to help them. However, the other strata should not be neglected in the struggle against the poverty of human existence. Thus, poverty-alleviation policies amongst other microfinance can be focused on the age range of 31 to 50 since they are more active and carry the burden of the entire family. Moreover young unemployment must be addressed seriously by job creation policies.

These measures to reduce non-monetary poverty depend on a genuine desire of policy makers to maximize populations' social well-being.

These few policy proposals made in this study complement those of Body Lawson and al. (2007). Indeed, these authors did not study poverty by the characteristics of the household head. They conducted a breakdown by asset in order to explain their contribution to non-monetary poverty. If the recommendations on education and habitat are present in the study of Body Lawson and al. (2007), those concerning the sex and age of the household head are not included. In addition, it is difficult to compare this study to others carried out in some African countries. Indeed, the CPI constructed aggregates the non monetary dimensions of well-being revealed in the survey we have used. To find studies from other countries with exactly the same multiple dimensions of well-being is difficult as the content of queries varies according to the context of each country.

The data from QUIBB 2006 do not necessarily reflect the situation of the years that followed. Indeed, the exogenous shocks notably the increase in food prices by 8,4% in average in 2008 (IMF Report no. 10/33, 2010) and the floods of 2007 and 2008 likely worsened poverty and inequality. Moreover, according to AfDB, the Organisation for Economic Cooperation and Development (OECD), UNDP and the Economic Commission for Africa (ECA) (2012), the growth rate of real GDP in 2012 is 4.2% and the inflation rate stood at 2.6%.We do not currently know the combined impact of this inflation control and the growth rate on

households standard of living. So even though this paper provides an additional contribution to the issue of inequality, the extrapolation of the findings in the following years in order to formulate policies for socio- economic development must be done with great caution.

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Annexes

Annex 1.

The eigen values for the first ten axes of the preliminary MCA

```
+--------+------------+-------------+-------------+----------------------------------------------------------------------
| AXES   |  EIGEN     | PERCENTAGE  | CUMULATIVE  |
|        |  VALUE     |             | PERCENTAGE  |
+--------+------------+-------------+-------------+----------------------------------------------------------------------
|   1    |  0.3235    |   26.47     |   26.47     |
****************************************************************************************** |
|   2    |  0.1101    |    9.01     |   35.48     | ****************************
|   3    |  0.0735    |    6.01     |   41.49     | ********************
|   4    |  0.0640    |    5.24     |   46.73     | ****************
|   5    |  0.0596    |    4.87     |   51.60     | ***************
|   6    |  0.0562    |    4.60     |   56.20     | **************
|   7    |  0.0532    |    4.36     |   60.56     | **************
|   8    |  0.0507    |    4.15     |   64.71     | *************
|   9    |  0.0490    |    4.01     |   68.72     | *************
|  10    |  0.0447    |    3.66     |   72.38     | ************
```

Source: Author's calculation using QUIBB 2006

The eigen values for the first ten axes of the final MCA

```
+--------+------------+-------------+-------------+----------------------------------------------------------------------
| AXES   |  EIGEN     | PERCENTAGE  | CUMULATIVE  |
|        |  VALUE     |             | PERCENTAGE  |
+--------+------------+-------------+-------------+----------------------------------------------------------------------
|   1    |  0.3166    |   31.66     |   31.66     |
****************************************************************************************** |
|   2    |  0.1213    |   12.13     |   43.79     | ******************************
|   3    |  0.0754    |    7.54     |   51.33     | ********************
|   4    |  0.0690    |    6.90     |   58.23     | ******************
|   5    |  0.0612    |    6.12     |   64.35     | ****************
|   6    |  0.0598    |    5.98     |   70.33     | ****************
|   7    |  0.0505    |    5.05     |   75.38     | *************
|   8    |  0.0484    |    4.84     |   80.23     | *************
|   9    |  0.0419    |    4.19     |   84.41     | ***********
|  10    |  0.0387    |    3.87     |   88.28     | **********
+--------+------------+-------------+-------------+----------------------------------------------------------------------
```
Source: Author's calculation using QUIBB 2006

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