

A spatial analysis of monetary and non-monetary poverty in Cameroon between 2001 and 2014

**TIOMELA YEMEDJEU Alexis^{1*}; NGASSA NYA Yves Daniel¹;
NKEMGHA ZEUFACK Guivis²**

¹⁾ Faculty of Economics and Management, University of Maroua, Cameroon

²⁾ Faculty of Economics and Management, University of Dschang, Cameroon

**To whom correspondence should be addressed. Email: tiomelay@yahoo.fr*

DOI: 10.22437/ppd.v8i4.9929	Received: 13.07.2020	Revised: 15.09.2020	Accepted: 03.11.2020	Published: 07.11.2020
--------------------------------	-------------------------	------------------------	-------------------------	--------------------------

Abstract

The objective of this study is to analyze the spatial distribution of monetary and non-monetary poverty in Cameroon. The identification of poor households by the monetary dimension is done using the thresholds defined by national institute of statistics. While in the non-monetary, dimension we use multiple correspondence analysis to construct composite indicators of well-being. After calculating the composite indicators, we use the formula developed by Ki et al. (2005) to calculate the poverty line. The data used in this study is from the second, third and fourth Cameroon household surveys. The results show that the incidence of monetary poverty declined from 40.2% in 2001 to 39.9% in 2007 to reach 37.5% in 2014. Non-monetary poverty stagnated between 2001 and 2007, with the incidence going from 60.65% to 61%. In 2014, the incidence declined to 53.84%. The proportion of individuals affected by both monetary and non-monetary poverty increased from 34.34% in 2001 to 35.59% in 2007, and stood at 33.49% in 2014. The rural areas are the most affected by monetary and non-monetary poverty. The region of the country most affected by monetary and non-monetary poverty is the Far North. Taking into account these results, poverty reduction policies in Cameroon should give priority to rural areas. Thus specific measures should be taken to improve access to basic infrastructures in rural areas. The Cameroonian government can also reduce taxes on construction materials.

Keywords: *Cameroon, Composite indicator, Monetary poverty, Non-monetary poverty*

JEL Classification: I31, I32

INTRODUCTION

Since the end of the 1980s, the search for solutions to the problem of poverty has become more and more active in developing countries in general and in Sub-Saharan African countries in particular. Sub-Saharan Africa is the region most affected by poverty. In fact, according to the World Bank report (2015), the incidence of poverty in Sub-Saharan Africa decreased from 57% to 41% between 1990 and 2015. In South Asia during the same period the incidence increased from 52% to 17%. Although the incidence of

poverty in Sub-Saharan Africa fell from 49% in 1981 to 41% in 2015, the number of poor continues to increase, from 229 million in 1981 to 278 million in 1990 and 413 million in 2015. For the United Nations Development Program (UNDP, 2001), Sub-Saharan Africa lags behind other regions not only because monetary and human poverty remains considerable in this region, but also because the adult literacy rate is still very low (60%) and life expectancy at birth is stands at only 48.8 years. The fight against poverty thus occupies an important place on the agenda of the presidents of African countries. Since developing countries are called upon to adopt economic policies which enable the achievement of a certain level of growth which benefits everyone.

Today, this fight against poverty is more and more perceived as a main condition for development for at least three reasons: (i) poverty is associated with malnutrition, infant mortality, under-education, difficulties in access to health care and low productivity. These have as effect, the perpetuation of poverty (Klopper, 2007). (ii) Poverty forces people to abuse natural resources for short-run survival without any concern for protecting the environment. Which is incompatible with sustainable development (Asadi et al. 2008) and (iii) poverty is associated with conflicts and dysfunctioning in resource allocation systems, which leads to corruption in many countries (Omotola, 2008).

Before the mid 80s, Cameroon witnessed economic prosperity with impressive rates of economic growth. In fact, from 1965 to 1985, Cameroon experienced sustained growth driven by the continued development of agricultural production and exports and by the exploitation of oil resources from the second half of the 1970s. Cameroon thus recorded average real growth rates of about 7% for over a decade (Government of Cameroon, 2003). Following the fall in the prices of rent generating agricultural products and the deterioration of the terms of trade, the macroeconomic indicators gradually worsened beginning in the 1985/1986 financial year. In order to better the economic situation and promote the wellbeing of the populations, Cameroon adopted structural adjustment programs (SAPs) in September 1988. However, the measures applied under the SAPs resulted in a worsening aggravation of poverty and an increase in inequality. In view of correcting these poor results, Cameroon adopted an economic and social program based on a participative approach (Government of Cameroon, 2003). These joint efforts led to the admission of Cameroon to the decision point by the IMF and World Bank within the framework of the Highly Indebted Poor Countries Initiative (HIPC). It is in this wise that Cameroon in April 2003 drafted a Poverty Reduction Strategy Document (PRSD) which had as ultimate objective to improve in a durable and efficient manner the living conditions of the populations by combating the main causes of poverty.

The implementation of the PRSD in line with the Millennium Development Goals (MDGs) led to the admission of the country in April 2006 to the completion point of the HIPC initiative. A close examination of these strategies and policies implemented by Cameroon shows that poverty did not fall considerably. In fact, according to harmonized data of the first, second, third, and fourth Cameroonian Household Surveys, monetary poverty stood at 53 % in 1996, 40,2% in 2001, 39,9% in 2007 and 37.5% in 2014 (INS, 2015). These results are unsatisfactory for Cameroon which seeks to become an emerging country by 2035. In order to address the many obstacles which slow down the reduction of poverty, the government prepared the Growth and Employment Strategy Document (GESD) for a long-term vision (2035) for the economy. In the GESD, Cameroon has taken on the challenge of accelerating growth, creating formal jobs and reducing poverty.

Regarding poverty, Cameroon seeks to reduce the monetary poverty rate from 39.9 % in 2007 to 28.7% in 2020. Despite all the efforts made by Cameroon, monetary poverty has not decreased considerably. Poverty therefore remains a crucial problem in Cameroon. Diagne et al., (2005) state that when a policy maker wants to take action to fight against poverty, he is faced with two practical questions which are: who is poor and in why is he poor? To these two questions are added other questions which are: Where do the poor live? What do they do ? To answer these questions, several approaches have been developed.

The monetary approach measures poverty from the level of well-being achieved by an individual or a household using his consumption or indirectly his income. In Cameroon, several authors have used this approach to measure poverty (see, Dubois and Amin 2000 ; Fambon et al. 2001 ; INS 2002, 2007, 2015). The monetary approach is criticized because it reduces the dimensions of poverty. In fact, the level of income available to an individual or a household is not explicit enough to account for the equally fundamental dimension in well-being such as health, access to basic infrastructure and education. Authors such as Lollivier and Verger (1999) have indicated that it is unreasonable to reduce the totality of resources to only the availability of money, neglecting both the consumption of free public goods and the services of owned capital. This criticism led to the development of the non-monetary approach to poverty.

The non-monetary approach is multidimensional in the sense that the sole focus on income is abandoned in favor of a broader vision of well-being which takes into account a multitude of components (Bertin, 2006). The non-monetary approach is also known by the term "poverty in conditions of existence" and is subdivided into two approaches: the capabilities approach, which has as main proponent economist Armatyay Sen, and the basic needs approach. The basic needs approach analyzes well-being in terms of achievements or results. Unlike the utilitarian approach where the only accomplishment is utility, the scope of the achievements is multidimensional in the basic needs approach. Well-being is considered to be a set of elements deemed essential for leading a decent life. These elements are defined according to the characteristics of each society. They include: adequate food, good health, basic education, adequate housing, sanitation and good clothing. The approach based on capabilities holds that poverty can't be reduced to the question of the satisfaction of basic needs (being) and, utility (well-being), but also to the skills and human capabilities. According to this approach, capabilities are defined as being a functional combination of being and know-how that each person can reach

Given that poverty is recognized internationally as a multidimensional phenomenon, several authors have conducted their studies on the multidimensional approach to poverty (see, Ningaye and Ndjanyou 2006 ; Foko et al., 2007; Njong 2008 ; Feubi et al. 2011). Among these studies, very few have analyzed the spatial distribution of poverty in Cameroon between 2001 and 2014.

The main objective of this study is thus to analyze the spatial distribution of monetary and non-monetary poverty in Cameroon between 2001 and 2014. More specifically, we seek to: (i) to identify the profile of the poor households according to monetary dimension in 2001, 2007 and 2014; (ii) to identify the profile of the poor households according to the non-monetary dimension in 2001, 2007 and 2014.

Such a study is essential to better understand the phenomenon of poverty and better articulate policies intended to relieve the living conditions of most vulnerable Cameroonians.

LITERATURE REVIEW

In Cameroon, the analysis of poverty has been the subject of many studies. These studies focused for a long time on the monetary approach. We can distinguish the studies of the World Bank (2001; 2005a), Dubois and Amin (2000), Fambon et al. (2001) and INS (2002a, 2007, 2015). The main findings of these studies are that: income inequalities are higher in rural areas than in urban areas; and that poverty is mainly a rural phenomenon but is unequally distributed in the different regions.

However, it is increasingly accepted that poverty is not reduced to insufficient income alone. It also integrates non economic considerations (access to infrastructures and social services, the quality of housing, the possession of durable goods). Many authors therefore carried out studies on the multidimensional approach to poverty.

Ningaye et al., (2005) analyzed the impact of cultural aspects in the description of poverty in Cameroon, Ndongo et al., (2006) analyzed the effects of religion and social capital on poverty reduction. The studies by these authors show that certain cultural traits and norms can perpetuate or attenuate the transmission of poverty in the society, and that religious variables positively impact household poverty in the city of Yaoundé.

Ningaye and Ndjanyou (2006) focus their study on the approach of inertia in which after having built the composite indicator of well-being (ICBE) for each household, they obtain an incidence of multidimensional-poverty of 64%. Foko et al (2007) identify a profile of non-monetary poverty and compare it to that of monetary poverty in Cameroon. They find that the poverty of living conditions translates into the exclusion of households from the use of certain basic amenities due to their non availability or their poor accessibility. Njong (2008) in his Ph.D. thesis applies the theory of Fuzzy Sets to identify the sources of multidimensional- poverty and its variations in space and time in Cameroonian households between 1996 and 2001. He arrives at the conclusion that the incidence of multidimensional- poverty increased from 42.08 to 50.39 %. Ningaye et al., (2011) in their study use a structural equations model (SEM) to study five dimensions of poverty (living conditions, education, infrastructures, health and monetary) and calculate the scores of each individual on each dimension. They conclude that one can be poor on certain dimensions and be less poor in others.

Several studies on poverty in Cameroon reveal significant efforts in diagnosing the phenomenon. However, in spite of progress in the field, the answer to the question of knowing who is poor remains diversified. The groups identified as poor can vary from one indicator to another and an effective strategy to fight against poverty depends on a good targeting of the populations concerned. A bad targeting could have as consequence a diversion of the resources of the strategy towards the less disfavored populations. The analysis of the spatial distribution of monetary and non-monetary poverty enables us to know the evolution of the living conditions of the most deprived individuals.

To our knowledge, very few studies have looked at the analysis of the spatial distribution of non-monetary poverty in Cameroon between 2001 and 2014. Feubi et al (2011) have shown the dynamics of poverty in Cameroon between 2001 and 2007, their results show that at the national level non-monetary poverty between 2001 and 2007 witnessed an increase for the most disadvantaged households initially in 2001, households classified as wealthy in 2001 experienced a strong entry into non-monetary poverty in 2007. The middle-class households have witnessed a marked improvement in their situation.

RESEARCH METHODOLOGY

In this section, we present the data used, the method of analysis and the variables of interest.

Presentation of data

In this study we use secondary data from the second, third and fourth Cameroon household surveys (ECAM 2, ECAM 3, ECAM4) conducted by the National Institute of Statistics of Cameroon. The ECAM 2 survey was undertaken from September to December 2001. This household survey was carried out to remedy mistakes made in the first household survey and ameliorate information concerning the poverty profiles. The ECAM 3 survey is carried out between September and December 2007. Its principal goals are, on the one hand, to put together a profile of poverty and the various indicators of household living conditions that were established in 2001. The ECAM 4 is designed to enable the Government and its development partners to assess progress in improving people's living conditions. The ECAM 4 survey is carried out between September and December 2014. The sampling plan for the three surveys identifies twelve survey areas which are the two major metropolises of Douala and Yaoundé, Adamawa, Center, East, Far Nord, Littoral, Nord, Nord West, West, South, and South West regions. In each region, a distinction is made between urban, semi-urban and rural stratum. The statistical unit is the ordinary household. The database of ECAM 2 contains data on 10992 households, that of ECAM 3 on 11391 households and that of ECAM 4 on 10303 households.

Method of analysis

In this section, we present the method of identifying the poor according to the monetary and non-monetary approaches.

Monetary dimension

To identify poor households according to the monetary dimension, we use the poverty thresholds defined by the National Institute of Statistics of Cameroon which is 232547 FCFA per adult equivalent per annum in 2001, 269443 FCFA in 2007 and 339715 FCFA in 2014 (NIS, 2015) to classify the households according to their level of expenditure. We select the years 2001, 2007 and 2014 because these are the recent years in which the National Institute of Statistics carried out the Cameroon household surveys.

Non-Monetary dimension

It is mainly derived from the study by Townsend (1979). In fact, the basic idea is that income is certainly an explanatory factor of poverty but that it is not the only factor. This author thus suggests to also measure poverty using an index of deprivation based on the observation of a certain number of consumption activities and participation in social life. We also take into account household wealth indicators. Lollivier and Verger (1997) define the wealth as the accumulated assets allowing a person or a household to have future resources

The idea of wealth is related to the concept of capital. We can identify four main classes in the wealth of an individual or a household: physical capital, financial capital, human capital and social capital. These fundamental elements explain the intrinsic capacity of individuals and households to reach a certain level of income, hence, welfare and face the shocks that affect their living conditions.

The construction of the composite indicator is based on the approach of inertia and consists in defining a composite indicator of welfare for each individual of a given population.

To construct the composite welfare indicator, we use MCA (multiple correspondence analysis). This choice is justified by the fact that the figures used in the coding of ordinal variables are only codes and do not have metric properties. The variables of non-monetary poverty analysed using MCA in order to identify the indicators describing a real poverty situation and thus adapted for the construction of a composite welfare index. The rationale of the choice of the variables is the property of Ordinal Consistency on the First Axis (COPA). According to this property, the methods of the indicators describing a situation of poverty must have increasing scores on the first factorial axis which is the axis of poverty (Asselin, 2009).

After identifying the variables to be use, we used the following formula to calculate the composite indicator of well-being for non-monetary poverty.

$$C_i = \frac{\sum_{k=1}^K \sum_{h_k=1}^{H_k} W_{h_k}^k J_{h_k}^k}{K} \dots\dots\dots (1)$$

Where K is the number of categorical indicators, H_k is the number of categories of the indicator K, $W_{h_k}^k$ is the weighting coefficient (normalized score on the first factorial axis,

$\frac{score}{\sqrt{V_1}}$) of the category h_k , V_1 is the eigenvalue of the first factor, $J_{h_k}^k$ is the binary

variable taking the value 1 when the individual i has the category h_k and 0 if not (Asselin, 2009).

The weighting coefficients obtained by the MCA correspond to the scores standardized on the first factorial axis.

After calculating the composite poverty index for each individual, we use the ascending hierarchical classification to subdivide the population into two homogeneous classes (poor class and non-poor class). Then poverty lines are determined from the following formula:

$$z = \max IC^p * m^p + \min IC^{np} * m^{np} \dots\dots\dots (2)$$

(Ki et al., 2005), where z is the poverty threshold, $\max IC^p$ is the maximum value of the composite index in the poor class, $\min IC^{np}$ is the minimum value of the composite index in the non poor class, m^p the weight of the poor class and m^{np} the weight of the non-poor class.

Description of variables

Monetary indicator

The variable used in the monetary dimension is the total household expenditure. In fact, the income of a household does not always represent its consumption. It is generally largely underestimated, and constitutes a poor approximation of well-being (Fambon, 2004).

Non-monetary indicators

In our study, the preselected variables for the non-monetary dimension are listed in the Table 1.

Table 1. Presentation of the preselected variables for the construction of the composite indicator of well-being

Dimension	Attributes
Accessibility to basic infrastructures	Distance between the nearest public primary school and the house, distance between the nearest private primary school and the house, distance between the nearest foodstuffs market and the house, distance between the nearest tarred road and the house, distance between the nearest public access point of drinking water supply drinking and the house, distance between the nearest refuse dump can and the house.
Situation of the house	Type of access road to the residence of the household, nature of the relief where the residence of the household is built.
Habitat	Status of occupation of the residence of the household, type of housing, nature of the floor, nature of the roof, nature of the walls
Energy	Means of lighting, main source of energy used in the kitchen.
Sanitation	Mode of evacuation of the household refuse, mode of disposal of used water, type of toilet.
Drinking water	Type of drinking water supply.
Possession of durable goods	Possession of a television, possession of a landline telephone, possession of a mobile telephone, possession of a vehicle
Land assets	Possession of at least an exploited piece of land, possession of at least an unexploited piece of land, possession of at least a house.
Social capital	Membership of an association.
Human capital	Know how to read or write a simple sentence in French, the highest diploma of the head of household, attending a school, health status of the household head, the sector of consultation in the event of disease, the person having been consulted in the event of disease, the sector of consultation, reason for the choice of the sector of consultation., the duration of the last consultation.
Economic and financial assets	Possession of assets, title deeds or bonds, possession of savings by a member of the household.

Source : the authors using the data and of questionnaires of ECAM 2, ECAM 3 and ECAM 4

After preselecting these variables, they are subjected to MCA to retain the variables to be used for the construction of the composite indicators. Variables are selected according to the COPA criterion.

RESULTS ANS DISCUSSION

Before presenting the spatial distribution of poverty, we give the dimensional scores of the variables used for the non-monetary approach.

Table 2. Dimensional scores of composite welfare indicator

Variables	Terms	Dimension on the first axis.		
		2001	2007	2014
QUALITY OF HOUSING AND ACCESSIBILITY TO BASIC INFRASTRUCTURES				
Housing type	- villa / Consession / Sarret	1.791	0.250	1.069
	- apartment/house with several dwellings	0.423	0.022	0.139
	- detached house	- 0.330	-0.007	- 0.185
Method of drinking water supply	- tap / drilling	0.511	0.511	0.381
	- river / backwater / well / other	- 0.777	- 0.815	- 0.825
Garbage disposal	- truck / garbage collection	1.099	1.112	0.883
	- buried / recycled / other	- 0.289	- 0.314	- 0.500
Light source	- AES	0.661	0.641	0.531
	- fuel	- 0.905	-1.011	- 1.194
Source of energy for cooking	- gas	1.313	1.174	0.841
	- purchased wood	0.258	0.348	0.199
	- collected wood	- 0.851	- 0.869	- 0.866
Type of toilet	- modern latrine	0.601	0.795	0.425
	- pit latrine	- 0.696	- 0.583	- 1.015
Main wall material	- concrete / concrete block / baked bricks / cut stone	0.806	0.740	0.639
	- board /mats/thatch/sheet/ other	- 0.494	- 0.582	- 0.650
Main floor material	- cement / sheet metal / tile	0.207	0.219	0.221
	- mats / thatch / leaf / other	- 1.369	- 1.433	- 1.576
Main ground material	- cement / tiles	0.600	0.600	0.551
	- wood / earth / other	- 0.942	- 0.993	- 1.123
Distance from nearest public primary school to accommodation	- less than 1 Km	0.202	0.081	0.023
	- 1Km and more	- 0.137	- 0.062	- 0.67
Distance from nearest private primary school to accommodation	- less than 1 Km	0.563	0.631	0.600
	- 1Km and more	- 0.193	- 0.399	- 0.479
Distance from nearest food market to housing	- less than 1 Km	0.349	0.381	0.288
	- 1Km and more	- 0.216	- 0.194	- 0.279
Distance between the nearest tarmac road and the accommodation	- less than 1 Km	0.695	0.589	0.549
	- 1Km and more	- 0.609	- 0.603	- 0.828
Distance from nearest garbage bin to housing	- less than 1 Km	0.858	0.837	0.444
	- 1Km and more	- 0.351	- 0.440	- 0.715
ACCESSIBILITY OF DURABLE GOODS				
Mobile phone	- yes	1.574	0.657	0.104
	- no	- 0.167	- 0.817	- 0.561
Radio station	- yes	0.382	0.263	0.112
	- no	- 0.627	- 0.314	- 0.083
TV	- yes	1.122	0.885	0.316
	- no	- 0.380	- 0.578	- 0.404
Phone	- yes	1.899	0.057	0.672
	- no	- 0.063	- 0.008	- 0.023
Vehicle	- yes	1.630	1.368	0.524
	- no	- 0.093	- 0.057	- 0.042
HUMAN CAPITAL				
Person consulted in case of illness	- health personnel	0.100	0.013	0.391
	- traditional healer / rescuer	- 0.570	- 0.018	- 0.293
Reason for choosing the consultation sector	- service quality	0.221	0.011	0.504
	- acceptable cost	- 0.120	- 0.011	- 0.151
Duration of last consultation	- less than a year	0.140	0.008	0.306
	- one year and more	- 0.246	- 0.019	- 0.306
Highest degree	- BTS/Licence/Maitrise/Master/Doctorate	1.525	1.266	1.008
	- CEPE / BEPC / Probatory/ BAC	0.403	0.362	0.310
	- without diploma	- 0.627	- 0.463	- 0.552
WEALTH				
Ownership of at least one dwelling by household members	- yes	0.406	0.357	0.516
	- no	- 0.083	- 0.058	- 0.066
Membership of a household member in an association	- yes	0.238	0.262	0.237
	- no	- 0.328	- 0.245	- 0.212
Possession of savings by one of the members of the household	- yes	0.485	0.466	0.470
	- no	- 0.317	- 0.210	- 0.204
Ownership of stocks / securities / bonds	- yes	1.329	0.937	0.682
	- no	- 0.030	- 0.016	- 0.023
First eigenvalues		0.244	0.240	0.216

Source : Authors

Monetary poverty

Calculations for the monetary indicator show that 40.2% of the individuals were poor in 2001, 39.9% in 2007 and 37.5% in 2014. Although the incidence decreased from 2001 to 2014, the number of poor people increased, in 2001 the number of poor people was 6217059, from 2007 to 2014 the number of poor went from 713,0901 to 8,088,876. This increase can be explained by the high population growth estimated at 2, 6% per year (NIS, 2015).

According to the spatial dimension, Table 3 show that during the period from 2001 to 2014, monetary poverty increased in rural areas, the incidence of poverty rising from 55.1% in 2001 to 55% in 2007 to reach 61. 2% in 2014. This trend shows that monetary poverty is a rural phenomenon. In the semi-urban area, the incidence of poverty has been almost stable, it increased from 30.8% in 2001 to 32.3% in 2007 to settle at 29.2% in 2014. However, the incidence of poverty in urban areas has dropped considerably, from 17.9% in 2001 to 12.2% in 2007, and 8.9% in 2014. These disparities can be explained by the fact that there are unequal opportunities for access to income in areas of residence. The people of the rural area are mostly farmers, pastoralists, and small traders. Their activities do not generate as much income as those in the urban area. An analysis of the results obtained in the regions show that the two major cities Douala and Yaoundé recorded low poverty rates from 2001 to 2014. The regions with the highest poverty rates are the Far North, the North, the North-west and Adamawa. From 2001 to 2014, among these four regions, the Far North region has the highest poverty rate, 56.3% in 2001, 65.9% in 2007 and 74.3 % in 2014. In 2001, the regions with a poverty rate above the threshold are the Center, East and West. In 2007 the regions with a poverty rate above the threshold are the Center and East. In 2014, the Center, East, Littoral, West, South and South-West regions have a poverty rate below the threshold.

In terms of gender, from 2001 to 2014 female-headed households have a lower incidence of poverty than male-headed households. This situation, which is contrary to theory, can be explained by the small size of the households headed by women, by agricultural activities and small trade which they are used to doing.

With regard to the educational level, the table below shows that from 2001 to 2014 monetary poverty increased among people without education. In 2001, 2007 and 2014 the incidence of poverty was 56.6%, 64% and 66.3% respectively. However, for individuals who stopped their studies in higher education, the incidence of poverty is very low and stands at, 6.2%, 4.2% and 3.3% respectively. We notice that from 2001 to 2014 the incidence of poverty decreases when the level of education increases. It therefore appears that the higher the level of education is, the more the individual is able to seize opportunities to have a higher income.

With regards to age, the incidence of poverty is lower in households where the head is less than 30 years old (31.4% in 2001, 28.1% in 2007 and 27.1 in 2014), it increases steadily with age. For example, for households with a head age of 50 years or more, the incidence is 47.2% in 2001, 46.9% in 2007 and 44.3% in 2014. In fact, households with a retired head face many difficulties. These include the large household size and the lack of resources. This result is contrary to that of Delhause (2002), who finds that the least aged (under 25) are the most exposed to monetary poverty.

Theoretically, the incidence of poverty increases steadily with the size of households. Table 3 shows that there is a positive relationship between household size

and monetary poverty. In fact, the increase in the size of the household leads to a decrease in per capita income and therefore an increase in the proportion of the poor.

Similarly, according to marital status, households with polygamous married heads have the highest incidence of poverty of 49.7% in 2001, 59.1% in 2007 and 59.8% in 2014. This can be justified by the large size of the household headed by polygamists. In these households, heads of households find it very difficult to provide for the needs of the household, especially when the head of household has a limited income. This result corroborates with that of Ouarme et al. (2009).

Table 3. Monetary poverty map as percentage

Characteristics of individuals	Incidence			Characteristics of individuals	Incidence		
	2001	2007	2014		2001	2007	2014
National	40.2	39.9	37.5	Age range			
Sex				Under 30 years	31.4	28.1	27.1
Male	40.9	41.6	38.9	30-39 years	33.3	34.8	32.1
Female	36.8	33.3	32.8	40-49 years	40.5	42.5	38.0
Residence stratum				50 years and more	47.2	46.9	44.3
Urban stratum	17.9	12.2	8.9	Size of the household			
Semi-urban stratum	30.8	32.3	29.2	1 and 2 persons	10.3	10.8	9.6
Rural stratum	55.1	55.0	61.2	3 and 4 persons	26.2	25.4	22.7
Regions				5 and 6 persons	37.8	39.5	35.3
Douala	10.9	5.5	4.2	More than 6 persons	51.0	54.6	51.8
Yaoundé	13.3	5.9	5.4	Marital status			
Adamawa	48.4	53.0	47.1	Single	21.3	14.1	17.4
Center	48.2	41.2	30.3	Monogamous	39.4	39.6	38.0
East	44.0	50.4	30.0	Polygamous	49.7	59.1	59.8
Far Nord	56.3	65.9	74.3	Widower widow	40.9	40.7	35.5
Littoral	35.5	31.1	19.5	Divorced / separated	34.7	32.6	33.0
Nord	50.1	63.7	67.9	Free union	30.2	23.7	14.4
Nord West	52.5	51.0	55.3	Activity area			
West	40.3	28.9	21.7	Primary sector	56.5	64.0	61.8
South	31.5	29.3	34.1	Industry	21.3	24.8	26.0
South West	33.8	27.5	18.2	Trade	25.7	19.9	16.4
Educational level				Services	22.8	15.8	13.7
Without level	56.6	64.0	66.3	Institutional sector of the head of household			
Primary	45.5	42.3	40.9	Public administration	11.7	10.3	11.9
Secondary	22.0	19.4	19.3	Public company	33.5	9.0	14.7
Tertiary	6.2	4.2	3.3	Formal private enterprise	14.1	9.9	9
Informality situation of the employment sector				Non-agricultural informal enterprise	31.7	23.0	21.6
Formal	15.4	9.8	11.2	Informal agricultural enterprise	56.9	59.6	62.8
Informal	50.0	46.9	43.4				

Source : Calculations made by the authors using data from ECAM 2, ECAM 3 and ECAM 4.

According to business sector, monetary poverty affects people working in the primary sector more. The proportion of the poor in this sector is 56.5% in 2001, 64% in 2007 and 61.8% in 2014. The results also show that households whose head works in the informal sector are the most affected by poverty. The incidence of poverty in this sector is 50% in 2001, 46.9% in 2007 and 43.4 in 2014. Concerning households whose head works in the formal sector, the proportions are 15.4%, 9.8% and 11.2% respectively. With regard to the institutional sector of the head of the household, the results show that monetary poverty affects households more when, the head works in informal agricultural

enterprises. The proportion of the poor for these households is 56.9% in 2001, 59.6% in 2007 and 62.8% in 2014.

Non-monetary dimension

The process of identifying the poor through the non-monetary approach using MCA requires performing a preliminary MCA on the preselected variables. This MCA includes several variables (see Table 1). After this phase, the variables which did not meet the COPA criterion are grouped into variables of less than four classes and, at the end of this phase, the variables which don't reflect the COPA criterion are simply removed. We finally retain 27 variables for the MCA. After this stage, we use the typology according to the dynamic cloud algorithm to classify households into two classes (poor and non-poor). To calculate the poverty threshold, we use the formula of Ki et al. (2005) which gives us a thresholds :

$$Z = 5437/10992*(-0,45) + 5555/10992*(0,40) = - 0,0204 \text{ in } 2001 ;$$

$$Z = 5183/11391*(-0,41) + 6208 /11391*(0,33) = - 0,0067 \text{ in } 2007 ;$$

$$Z = 3817/10303*(-0,53) + 6486 /10303*(0,31) = - 0,0012 \text{ in } 2014.$$

It is based on these thresholds that we classify the households in 2001, 2007 and 2014. The results are shown in Table 4. From this table, we note that non-monetary poverty increased from 60.65% in 2001 to 61% in 2007 to reach 53.84% in 2014 at the national level. According to the spatial dimension, Figure 2 below shows that during the period from 2001 to 2014, non-monetary poverty is very high in rural areas, the incidence of poverty increased from 92.54% in 2001 to 93.16% in 2007 to reach 90.45% in 2014. This evolution shows that non-monetary poverty also affects people in rural areas more and, this result corroborates that of Feubi et al (2011).

This is explained by the fact that in rural areas accessibility to basic social infrastructure is very low, the quality of housing is precarious, and access to drinking water and electricity is very low. The proportion of households that do not use electricity as a source of lighting is still very high: 75.14% in 2001, 71.60% in 2007 and 72.5% in 2014. The majority of households drink water from wells, rivers and springs (74.40% in 2001, 73.29% in 2007 and 59.4% in 2014). In the semi-urban areas the incidence of poverty has been almost stable, increasing from 43.16% in 2001 to 45.95% in 2007 to reach 45.83% in 2014. However, in urban areas, the incidence of poverty is low going from 12.47% in 2001 to 12.87% in 2007 to settle at 8.72% in 2014.

An analysis of the results obtained in the regions show that the two major cities of Douala and Yaoundé recorded low poverty rates from 2001 to 2014. The regions with the highest poverty rates are the Far North, the North and the East between 2001 and 2014, among the three regions, the Far North region has the highest poverty rate 91.6% in 2001, 90.18% in 2007 and 89.49% in 2014. In 2001 and 2014, the regions with a poverty rate above the threshold are Adamawa, Center, North-West, West and South. In 2007, the regions with a poverty rate above the threshold are Adamawa, Center, North-West, West, South and South-West regions.

Regarding gender, households headed by men are the most affected by non-monetary poverty than those headed by in 2001, 2007 and 2014.

With regard to household size, we note that non-monetary poverty hit households made up of one and two persons much more in 2001. In 2007, households made up of 5 and 6 persons were the most affected. In 2014, households made up of more than 6

persons were the most affected. Relative to the sector of activity of the household head, from 2001 to 2014, non-monetary poverty affects much more the individuals who work in the primary sector with a rate of 90.81% in 2001, 90.66% in 2007 and 87.71 % in 2014. According to the marital status of the head of household, non-monetary poverty affects households whose heads are polygamous more in 2001 (71.90%), in 2007 (81.14%) and in 2014 (77, 58%). As in the case of monetary poverty, non-monetary poverty reduces with an increase in the level of education of the head of household. The incidence is 88.58% in 2001, 89.96% in 2007 and 84.16 % in 2014. With regard to the age of the head of household, the table shows that people aged 50 and above are the most affected by this form of poverty, i.e 69.17% in 2001, 68.99% in 2007 and 60.24% in 2014. This result corroborates that of Ouarme et al. (2009).

Non-monetary poverty affects people who work in the informal sector more, with an incidence of 78.3% in 2001, 71.15% in 2007 and 63.26% in 2014. Those who work in informal agricultural enterprises are the most affected with a rate of 92.78% in 2001, 91.35% in 2007 and 89.29% in 2014.

Table 4. Multidimensional poverty map as percentage

Characteristics of individuals	Incidence			Characteristics of individuals	Incidence		
	2001	2007	2014		2001	2007	2014
National	60.65	61.00	53.84	Age range			
Sex				Under 30 years	61.10	59.76	45.86
Male	61.39	61.79	55.62	30-39 years	52.08	55.63	49.02
Female	57.37	57.99	48.08	40-49 years	56.03	56.70	53.19
Residence Stratum				50 years and more	69.17	68.99	60.24
Urban stratum	12.47	12.84	8.72	Size of the household			
Semi-urban stratum	43.16	45.95	45.83	1 et 2 persons	62.83	57.74	39.32
Rural stratum	92.54	93.16	90.45	3 et 4 persons	61.56	59.95	48.85
Regions				5 et 6 persons	62.59	62.03	52.98
Douala	6.08	1.66	2.10	More than 6 persons	59.09	61.66	59.90
Yaoundé	2.27	1.67	5.85	Marital status			
Adamawa	78.34	72.55	66.12	Single	39.60	37.39	29.20
Center	80.19	68.60	65.27	Monogamous	58.33	58.92	54.23
East	82.86	79.07	77.17	Polygamous	71.90	81.14	77.58
Far Nord	91.60	90.18	89.49	Widower widow	66.73	66.63	57.17
Littoral	44.50	35.23	43.20	Divorced / separated	60.54	62.31	54.49
Nord	81.76	85.31	84.63	Free union	47.01	41.57	25.07
Nord West	71.49	76.49	61.76	Activity area			
West	66.62	65.16	58.31	Primary sector	90.81	90.66	87.71
South	63.95	64.26	59.73	Industry	30.96	69.67	36.42
South West	43.01	70.18	41.75	Trade	35.42	28.68	30.72
Level of education				services	26.35	23.77	22.41
Without level	88.58	89.96	84.16	Institutional sector of the head of household			
Primary	66.44	68.08	61.70	Public administration	15.20	20.86	24.79
secondary	33.64	34.02	33.47	Public compagny	23.97	19.01	19.48
Tertiary	4.72	7.13	5.88	Private formal compagny	22.58	17.81	9.68
Informality situation in the employment sector				Non-informal agricultural enterprise	40.08	33.39	33.96
Formal	20.07	19.53	18.31	Informal agricultural enterprise	92.78	91.35	89.29
Informal	78.30	71.15	63.26				

Source : Calculations made by the authors using data from ECAM 2, ECAM 3 and ECAM 4.

Evolution of double poverty at the national level and in residential areas.

The Table 5 shows that the proportion of poor individuals according to the monetary and non-monetary dimensions increased between 2001 and 2007, the incidence rose from 34.34% in 2001 to 35.59% in 2007. In 2014 the incidence decreased to 33.49%. The distinction according to the stratum of residence allows us to note that in urban areas the proportion of poor individuals according to the monetary dimension and the non-monetary dimension decreased from 2001 to 2014 while in rural areas, the incidence increased during the same period. These results show that the rural area is the most affected by double poverty.

Table 5. Evolution of double poverty at national level and in areas of residence

Characteristics of individuals	Incidence		
	2001	2007	2014
National	34.34 %	35.59%	33.49%
Residence stratum			
Urban stratum	6.42 %	5.18 %	2.61 %
Semi-urban stratum	20.36 %	23.45 %	21.29 %
Rural stratum	53.36 %	56.38 %	59.62 %

Source : Calculations made by the authors using data from ECAM 2, ECAM 3 and ECAM 4.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

This study seeks to perform the spatial analysis of monetary and non-monetary poverty in Cameroon between 2001 and 2014. To identify poor households according to the monetary dimension, we use the poverty thresholds defined by the National Institute of Statistics of Cameroon in 2015 which is 232547 FCFA per adult equivalent per annum in 2001, 269443 FCFA in 2007 and 339715 FCFA in 2014. With regard to the non-monetary approach, a multiple correspondence analysis (MCA) is performed on the variables selected for the construction of the composite indicator. After the construction of the composite indicators, we use the formula of Ki et al (2005) to calculate the poverty thresholds. Regarding the magnitude of poverty in Cameroon, this study has highlighted the importance of its spatial dimension, but also the importance of the socioeconomic characteristics of individuals.

The main results are as follows: In 2001, 40.2% of individuals lack the means to meet immediate needs, between 2007 and 2014, the incidence of monetary poverty decreased from 39.9% to 37.5%. Non-monetary poverty stagnated between 2001 and 2007, the incidence rising from 60.65% to 61%. In 2014, the incidence dropped to 53.84%. In 2001, 34.34% of people were affected by monetary poverty and non-monetary poverty, between 2007 and 2014, the incidence fell from 35.59% to 33.49%. Monetary and non-monetary poverty hits people in rural areas much more. The region most affected by monetary and non-monetary poverty is the Far North region.

The analysis of monetary and non-monetary poverty shows that poverty is not only due to a lack of monetary resources but that it is above all due to a lack of capacities and opportunities to develop themselves. This situation mainly affects vulnerable groups, especially large households, individuals who have never been to school, the elderly,

people who work in the primary sector, people living in rural areas, people who work in informal agricultural enterprises, and polygamous individuals.

Recommendations

Given that the incidence of poverty is higher in rural areas, poverty reduction in Cameroon requires a priority of national policies towards rural areas, because the results have shown that non-monetary poverty affects more than 9/10 of rural individuals, i.e 92.54% in 2001, 93.16% in 2007 and 90.45% in 2014. The incidence of poverty is very high in these areas due to the inaccessibility of road infrastructure, inaccessibility to basic needs (health, education, drinking water, electricity) and restricted access to markets to sell their products. Infrastructures generally amplify and create economic activities. The state can strengthen policies to combat poverty among the elderly by reviewing the policies put in place for their retirement conditions. The state can also improve the living conditions of individuals working in the primary sector. Governments can also reduce taxes on building materials because the high price of these materials condemns the poor to live in precarious housing. The state should also reduce the amount of taxes on income-generating activities for small traders, small artisans and small farmers.

REFERENCES

- Asadi, A., Morteza, A., Hossain, S., Fami., Hoshang, I., Farahnaz, R., & Abolhasan, S. (2008). Poverty Alleviation and Sustainable Development: The Role of Social Capital. *Journal of Social Sciences*, 4(3), 202-215.
- Asselin, L. M. (2009). *Analysis of Multidimensional Poverty theory and case studies*. New York: Springer-Verlag.
- Banque Mondiale. (2001). *Combattre la pauvreté, Rapport sur le développement dans le monde*, N°2001-01, Paris, ESKA, XIV-381p.
- Banque Mondiale. (2005). *Investing in poor people and Empowering them to participate in Development, World Bank Annual Report 2005*. New York: World Bank
- Bertin, A. (2006). *Quelle perspective pour l'approche par les capacités. Document de travail n ° 92*, Centre d'économie du développement (IFREDE-GRES), Université de Montesquieu-Bordeau IV.
- Delhousse, B. (2002). Le noyau dur de pauvreté en wallonie: une actualisation. *reflets et perspectives de la vie économique*, Tome XLI, 55-63.
- Diagne, O. D., Faye, O., & Faye, S. (2005). *Le noyau dur de la pauvreté au Sénégal*, cahier de recherche PMMA - PEP, Dakar,
- Dubois, J. L., & Amin, A. (2000). *L'évolution de la pauvreté au Cameroun: Où en sommes-nous ?*. Available at: <http://kerbabel.c3ed.uvsq.fr/Documents/>
- Fambon, S., Amin, A. A., Baye, M. F., Noumba, I., Tamba, I., & Tawah, R. (2001). *Réformes économiques et pauvreté au Cameroun durant les années 1990*. Rapport final projet collaboratif sur la pauvreté AERC, Nairobi, Kenya, May.
- Fambon, S. (2004). *Pauvreté et malnutrition au Cameroun*. Rapport intérimaire Consortium pour la Recherche Economique en Afrique
- Feubi, P. E. P., Gankou, J. M., & Emini, A. C. (2010). *Dynamique de la pauvreté non monétaire au Cameroun entre 2001 et 2007: analyse en correspondances multiples et tests de dominance stochastique*. Munich Personal REPEC Archive (MPRA)

- Foko, T. B. A., Ndem, F., & Tchakoté, R. (2007). *Pauvreté et inégalités des conditions de vie au Cameroun : Une approche micro multidimensionnelle*. Working papers PMMA.
- Gouvernement du Cameroun. (2003). *Document de Stratégie de Réduction de la Pauvreté*, Avril, Yaoundé
- Gouvernement du Cameroun. (2009). *Document de stratégie pour la croissance et l'emploi*
- Institut National de la Statistique. (2002a). *Evolution de la pauvreté au Cameroun entre 1996 et 2001*. Yaoundé : Institut National de la Statistique du Cameroun
- Institut National de la Statistique. (2007). *Tendance, Profil et Déterminant de la pauvreté au Cameroun*. Yaoundé : Institut National de la Statistique du Cameroun
- Institut National de la Statistique. (2015). *Tendance, Profil et Déterminant de la pauvreté au Cameroun 2001-2014*. Yaoundé : Institut National de la Statistique du Cameroun
- KI, J. B., Faye, B., & Faye, S. (2005). *Pauvreté Multidimensionnelle au Sénégal : une approche non Monétaire fondée sur les besoins de base*. PEP cahier de recherche PMMA, N°2005-05, Octobre.
- Klopper, H. C. (2007). Poverty and development: Pulling forces and the challenges for nursing in Africa. *Nursing and Health Sciences*, 9, 295–303.
- Lollivier, S., & Verger, D. (1997). Pauvreté d'existence, monétaire ou subjective sont distinctes. *Economie et Statistique*, N°308-309-310, Paris, INSEE, 113-142.
- Lollivier, S., & Verger, D. (1999). Pauvretés d'existence, monétaire et subjective. Facteurs de persistance et corrélations sur données de panel. *Revue économique*, 50(3), 431-450.
- Ndongo, O.Y. EBENE, A., & Tegnerowicz, J. (2006). *Religion, capital social et réduction de la pauvreté au Cameroun : le cas de la ville de Yaoundé*. halshs-00109126
- Ningaye, P., & Ndjanjou, L. (2006). *La pauvreté multidimensionnelle au Cameroun : sa répartition spatiale, ses déterminants*. Rapport finale soumis à African Economic Research Consortium (AERC). Nairobi, Kenya
- Ningaye, P., Tiomela, Y. A., & Takoutio, F. V. (2011). *Une Alternative aux Indicateurs et Indices composites : Le ciblage de la Multi-pauvreté par les Scores Dimensionnels avec application aux données Camerounaises*. Cahier de recherche PPMA-PEP
- Njong, M. A. (2008). *Spatial and Inter-Temporal Sources of Multidimensional Poverty Trends in Cameroon, 1996-2001*. [Doctoral Disertation], University of Dschang Cameroon.
- ONU. (2015). *Objectifs du Millénaire pour le développement*. Rapport 2015
- Ouarne, A., Oouli, I., & Basse, A. M. (2009). *Pauvreté au Burkina Faso, à la recherche d'un indicateur du noyau dur de la pauvreté*. Journées de Méthodologie Statistique 2009, Paris, 23-25 Mars 2009.
- Omotola, S. J. (2008). Combating Poverty for Sustainable Human Development in Nigeria: The Continuing Struggle. *Journal of Poverty*, 12(4), 496-517.

- PNUD. (2001). *Rapport mondial sur le développement humain 2001. Mettre les nouvelles technologies au service du développement humain*. Paris, Bruxelles: De Boeck Université,
- PNUD. (2018). *Indices et indicateurs de développement humain*. New York: UNDP
- Sen, A. K. (1983). Poor, Relatively Speaking. *Oxford Economic Papers*, 35(2), 153-169.
- Towsend, P. (1979). *Poverty in the United Kingdom*. London: Harmondsworth: Penguin Books.



© 2020 by the authors. Licensee JPPD, Indonesia. This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).