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Abstract

This paper aims at studying the multidimensional aspect of poverty in Guinea taking into account both the monetary and non monetary dimensions of poverty. We use data from the Full Base Survey on Poverty Assessment (FBSPA 2002-2003). The methodology relies on the fuzzy set approach of Dagum and Costa (2004) which is supplemented by the decomposition methods of Mussard and Pi Alperin (2005). The main results that emerge are: i) the identification of the key variables associated with poverty, ii) the identification of deprivation state according to selected attributes for different groups like natural regions, administrative regions, area of residence, genre, religion and household's size. The effect of attributes on the deprivation of each group and the global poverty index has been also tested.

Keywords: Fuzzy Set, Decompositions, Multidimensional Poverty
JEL Classification: I32

I.   INTRODUCTION

The Republic of Guinea has a population of 9.3 million inhabitants according to 2005 estimates and an average density of 38.6 inhabitants per square kilometer. It is divided into four natural regions (the Low Guinea, the Middle Guinea, the High Guinea and the Forest Guinea) and eight administrative regions (Conakry, Labé, Boké, Kankan, Faranah, N'Zérékoré, Kindia and Mamou). The country is essentially agricultural and pastoral with huge mining and energy potentials which are not used. Poverty in that country has become a multidimensional phenomenon which is unevenly spread among the socio-economic groups and the different regions. In spite of some improvements noticed during these last years, the different poverty indicators are still concerning. The Questionnaire of Basic Welfare Indicators (QBWI) research undertaken in 2002 on the welfare of the population revealed that 37.6% of the households believe that the state of the economy of the country has been worse during 2002 in comparison to 2001. The 2004 human development index (HDI) of the UNDP ranked Guinea 160th among 177 countries. Thus the eradication of poverty becomes compulsory for Guinea; and this is the reason why in 2002 the Government with the support of the World Bank has developed a Poverty Reduction Strategy Document which stresses out the main aspects to be considered in order to improve the welfare of the populations. There are various aspects to be considered that go beyond the monetary scope since most of analyses focus on a monetary approach. However the monetary approach of poverty is not always enough to describe the multiple phenomena which can prevent a decent and peaceful living because poverty is a multidimensional phenomenon. The limits of the one-dimensional approach have contributed to the development of multidimensional concepts of poverty. According to the capabilities approach of Sen (1985, 1987), the study of poverty should identify and analyze other attributes than monetary which directly impact the individual welfare.

 In other respects, the study on the poverty profile in Guinea which was carried out during the analysis of the data from the Full Survey on Living conditions of Households (FSLH 1994/1995) is the first attempt towards thorough country wide evaluation of poverty. All previous studies have been affected in one way or another by either a lack of data or a restriction to a given region i.e. specially the capital city. The Full Base Survey on Poverty Assessment (FBSPA 2002-2003) is the second attempt after the FSLH in Guinea.

The FBSPA of 2002 reveal that 49.2% of the guinean population is poor while 93.2% of guinean households consider themselves as poor according to another survey part of the FBSPA. Therefore it appear to be a significant difference between the level of poverty as measured in Guinea and the way it is perceived by the households. The impact of poverty as measured in Guinea is limited to the monetary dimension while the causes raised by the households are far complex. In fact, the households consider themselves as reasons oh they poverty, a lack of enough means to feed oneself, lack of revenues, lack of job, lack of means to cure themselves and housing problems.[1]

In order to bridge the gap between the limits of the monetary approach and the perception of the households about poverty in the above mentioned survey, this document will try to consider the phenomenon of poverty from a multidimensional point of view.[2] The measures of poverty would thus have to include both monetary and non monetary dimensions for a better distinction of the poor.

The specific objectives are various. Firstly, we determined a composite indicator of poverty in Guinea by identifying the variables (correlated) that contribute to composite indicator. We then identified the socio economic groups which are mostly affected, precisely those which are highly affected by poverty and contributing to a great extent to the overall poverty indicator. Finally, we measured the deprivations of households according to the main attributes defined, religion, the administrative and natural regions, and the genre in order to determine the most vulnerable groups or geographical zones. To do this the contribution of each attribute to the poverty indicator of each group and the overall poverty indicator has been defined. We followed the methodological program of Dagum and Costa (2002), based on fuzzy sets to achieve the objectives that we have fixed.

The rest of the paper is organized as follows. We do a literature review in Section II. In section III we develop the methodology for the analysis of poverty. We apply this methodology to the case of Guinea in Section IV and we conclude the work in Section V.

II.   LITERATURE REVIEW

Many measures of poverty exist in the literature as follows a theoretical approach (monetary or non-monetary) or empirical (axiomatic or non-axiomatic) is used (Ki et al., 2005, Ben

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[1] See report FBSPA 2002-2003

[2] The collection of household poverty has been taken into account in the choice of socio-economic attributes. Among the selected attributes we took the dimensions that households considered as missing.

Hassine, 2006, Bibi and El Lahga, 2006, Bourguignon and Chakravarty, 2003, Ambapour, 2006). This last approach identifies qualitative and quantitative measures of poverty.

2.1-Theoretical approaches to poverty

One can be distinguished two main trends on the theoretical ground: the monetary approach (utilitarian) and the non monetary approach (non utilitarian). The monetary approach which is also called the one-dimensional approach has been developed by Rowntree (1901) and Both (1969). This approach compares the concept of welfare with the notion of utility (Ravallion, 1994) which once satisfied can define the level of welfare. However it is not always enough to render account of multiple phenomena which can prevent any decent and peaceful life because poverty is a multidimensional phenomeno involving all the living conditions of households. The non monetary approach considers welfare from the point of view of freedoms and fulfillments. This approach proposes and facilitates targeted politics. It prefers an assessment of the situation according to certain elementary faculties like the possibility of feeding or dressing oneself in an adequate way, and can only lend a limited or even no attention to the information on the utility as such.

The non utilitarian approaches are more diverse and we have the approach by basic needs (Rowntree, 1901) and the approach by capacities Sen (1985, 1987). This school of basic needs considers that the thing missing in the lives of the poor is a small subset of goods and services specifically identified and perceived as meeting the basic property of all human beings.[3]

The school of capacities consider as poor, a person who lacks the capacity to achieve a certain subset of functions. This approach indicates that if income is instrumentally important, other measures of welfare, such as nutritional status, are intrinsically important: Martinetti (2000), Lelli (2001), Baliamoune (2004) and Ben Hassine (2006).

2.2 –Empirical approaches to multidimensional poverty measures

Measuring poverty still raises ethical problems. Researchers are faced with a multitude of questions. Should a measure of poverty reflect the situation of poor people according to all attributes simultaneously or must it take into account also the deprivation of those who do not meet the minimum required for an attribute only?

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[3] In the traditional approach of basic needs, basic amenities include: food, drinking water, sanitary facilities, housing, health services and basic education and a public transport service.

How is the information relating to the many facets of individual deprivation can be aggregated to produce an overall measure of poverty? Should we build, as a first step, several one-dimensional measures then, secondly, put them together? Should we, instead, begin by measuring multidimensional deprivation at the individual level and then aggregating across all individuals? Could we consider the attributes which are included in the pursuit of poverty assessments as complementary or substitutable?

The empirical literature has two main approaches to measuring multidimensional poverty. The first described as axiomatic, is to measure, as a first step, the individual deprivation in terms of different attributes to build a composite indicator of poverty for each individual. The aggregation of these indicators across individuals, in a second time, provides a multidimensional index of poverty for the entire population.

The second approach described as non-axiomatic, is to measure the total deprivation of society in terms of each attribute separately and then aggregate the different indices for a one-dimensional index of multidimensional poverty. Both approaches can be considered as two complementary ways of analysis of multidimensional poverty (Bibi and El Lahga, 2006).

2.2.1- Poverty indicators based on an axiomatic approach

Bourguignon and Chakravarty (2002, 2003), Chakravarty et al. (1998), and Tsui (2002) are among the principal founders of this approach. In this approach, the process of aggregation is determined explicitly in terms of desirable properties (axioms) that the multidimensional measure of poverty must comply with.[4]

The multidimensional poverty indices of Bourguignon and Chakravarty (2002, 2003), Chakravarty et al. (1998), and Tsui (2002) are adapted to the multidimensional context of certain classes of poverty indices proposed in the context of one-dimensional poverty (Bibi and El Lahga, 2006). This will be based on an axiomatic approach of the required properties of the composite index of poverty and a composite measure of poverty with reference to a poverty threshold for each primary indicator (Asselin, 2002). Chakravarty et al. (1998) use measures of poverty based on the union of the various attributes of poverty.

2.2.2- Poverty indicators from a non axiomatic point of view

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[4] For an explanation of the different axioms see Bibi (2002) or Bibi and El Lahga (2006)

In the non-axiomatic approach, we identify the non axiomatic measures based on the individual data, which are currently used in most countries in the developing countries: the fuzzy sets and approaches of entropy and inertia (Ambapour , 2006).

- Composite indicators of entropy and inertia

In the case of the composite indicator of poverty among the methodological approaches of aggregation revealed by the literature, we have the approaches of entropy and inertia. The main limitations of this approach lie in the choice of parameters and weights used in the functional form of the composite indicator. If this approach is important because of the optimization criterion, the problem of determining the weight in a non-arbitrary way remains to be solved.

The approach of inertia is mainly based on multidimensional analysis techniques also called factor analysis. A full description of these techniques are provided in Meulman (1992), Bry (1996), Volle (1993) and Escofier and Pages (1990). Among other major factor analysis techniques used we have the principal component analysis (PCA), the generalized canonical analysis (GCA) and multiple correspondences analysis (MCA).

- The fuzzy sets approach

The fuzzy approach of multidimensional poverty is based on the theory of fuzzy subsets for the construction of an index including the different dimensions (attributes) of poverty (Cerioli and Zani in 1990, Cheli and al. 1994, Martineti 1994, Cheli and Lemmi 1995, Miceli 1998, Dagum 2002). In this approach, the poverty of a person is identified by its degree of belonging to the fuzzy sets, and this respectively to each of the attributes of poverty (Costa, 2002). The degree of belonging is determined by the degree of possession of the attribute, which may take the value one, zero or values belonging to the interval [0, 1]. This approach allows us to identify the dominant dimensions of poverty and provides the necessary elements for the development of socio-economic policies aimed at reducing this situation.

Cerioli and Zani (1990) propose a first multidimensional approach based on the theory of fuzzy sets which allow the elaboration of an index comprising the attributes of poverty. This method was further developed by Dagum (2002) in his "Program of Methodological Research". Dagum and Costa (2004) have then introduced the one-dimensional indicators to measure the state of deprivation of each attribute for the whole population, which will help to

measure the contribution of each dimension to overall poverty. Mussard and Pi Alperin (2005) have later proposed a synthetic decomposition that combines the role of groups of a population and the dimensions of poverty in the explanation of overall poverty.

Chakravarty (2006) made a careful analysis of the axioms that a fuzzy multidimensional poverty index must meet. He showed that the multidimensional poverty indices recently proposed by Chakravarty et al. (1998), Bourguignon and Chakravarty (2003), Tsui (2002) could be reformulated in a fuzzy environment. Chakravarty (2006) also showed that fuzzy indices of multidimensional poverty derived from the decomposability into sub group that meet a number of axioms such as continuity, symmetry or anonymity, principle of population, monotonicity and in some cases, the axioms of invariance of scale and the principles of transfer.

Fuzzy indices of poverty are in accordance with the decomposability by attribute contrary to the indexes of Tsui (2002). However the two kinds of measurement are all based on the union of the different dimensions of poverty. The process of indices aggregation by Chakravarty et al. (1998), Bourguignon and Chakravarty (1999, 2003) and Tsui (2002) requires the specification of a threshold for each dimension of poverty contrary to the fuzzy indices of poverty. This is debatable from ethical and empirical viewpoints.

Here we will adopt the methodology developed by Dagum and Costa (2004), supplemented with the decomposition methods of Mussard and Pi Alperin (2005) which is an alternative for measuring poverty in Guinea for the years 2002-2003.

III. METHODOLOGICAL APPROACH

3.1 Theoretical base of the fuzzy sets

By summarizing the main concepts related to the multidimensional analysis of poverty based on the theory of fuzzy sets, and especially as per the work of Dagum and Costa (2004), we find that the method requires the definition of two concepts: i) economic entities or all households (a_i) in an economic area $A = \{a_1,..., a_i ,..., a_n\}$; and (*ii*) a vector of order *m* of socio-economic attributes $X = \{X_1,..., X_j ,..., X_m\}$ including economic, social, cultural or family attributs represented by qualitative or quantitative variables.

The choice of the set of socioeconomic attributes compared with the state of poverty, for each gender and each area, will consist in a selection of socio-economic groups which absence or partial ownership contributes to the state of poverty of households. For the choice of socio-economic attributes we will take into account the concern of households regarding their state

of poverty; that is to say, we will take among other attributes some dimensions that households name as the causes of their poverty (lack of income, housing problems etc). The attributes are given by a vector X of order m: $X = (X_1,..., X_j,..., X_m)$, X includes economic, social, cultural and family attributes which are represented by quantitative variables (discrete and continuous) and / or qualitative variables.

Let's call *B* a subset of *A* such that each $a_i \in B$ provides a degree of deprivation in at least one of *m* attributes included in *X*. The function of belonging to the fuzzy subset *B* of the *i*-th household (*i* = 1,…, *n*) in comparison to *j*-th attribute (*j* = 1,…, *m*) is defined by x_{ij}. The determination of x_{ij} is one of the main difficulties with this approach as well as the weight associated with the different attributes. For the determination of the x_{ij} several proposals were made in the literature including those developed by Cerioli and Zani (1990), Cheli and Lemmi (1995). In this study we use the proposal of Cheli and Lemmi (1995) which gives a more consistent consideration of the suitability of the complex nature of poverty and the measurement tool, namely the fuzzy sets (Fusco, 2005).

Cheli and Lemmi (1995) describe their approach as Totally Fuzzy and Relative (TFR). It is totally fuzzy because, unlike Cerioli and Zani (1990), it avoids the specification of lower and higher critical thresholds. Completely relative, because the degree of deprivation of each individual on a given attribute depends on its place in the distribution of the attribute as opposed to the method of Cerioli Zani that determines a linear function of belonging. The determination of membership functions depends on whether the variables are dichotomous type (possession or non-possession of lasting goods), categorical or ordinal (level of education) and continuous or quantitative (expenses).

In the case of dichotomous variables, such as the possession or non possession of a good or the participation or non participation in an activity, Chelli and Lemmi (1995) use the same principle as Cerioli and Zani (1990). We have x_{ij}=1 for the modality indicating a disadvantage (non-possession, non-participation) and x_{ij}=0 for those indicating a lack of disadvantage (possession, participation).

Furthermore, regarding the quantitative and categorical variables for each attribute, these terms are arranged in ascending order of deprivation where each is associated with a modality P_{ij} equivalent to his position in the rank. Thus, for an attribute with k terms, we will designate by P_{ij}=1 the modality which has the lowest risk of poverty, P_{ij}=2 the next and so on

until the modality which has the highest risk of poverty represented by $P_{ij}=k$. In fact, we associate to the modality of a variable that indicates the lower risk of poverty (respectively the higher) the corresponding lowest level of deprivation (P_{ij}) (respectively the highest). By naming P_j^q the $q=1,2,...,k$ modalities that P_j can take, we have the relation $P_j^q=q$; with P_j^1 the modality with the lowest risk of poverty. For categorical and quantitative variables, Chelli and Lemmi propose a membership function of the form:

$$x_{ij} = 0 \qquad \text{if} \qquad P_{ij} = P_j^1$$

$$x_{ij}^q = x_{ij}^{q-1} + \frac{F_j\left(P_j^q\right) - F_j\left(P_j^{q-1}\right)}{1 - F_j\left(P_j^1\right)} \qquad \text{if} \qquad P_{ij} = P_j^q \qquad (1)$$

where F_j is the cumulative distribution function of the attribute j.

P_{ij} the degree of deprivation of the individual i with respect to the attribute j; P_j^1 the modality with the lower risk of poverty, P_j^q the modality with the highest risk of poverty if $q=k$, and x_{ij}^{q-1} is the membership function related to the modality j. In that case:

$x_{ij} = 1$ if the i-th household does not have the j-th attribute;

$x_{ij} = 0$ if the i-th household has the j-th attribute;

$0 < x_{ij} < 1$, if the i-th household has the j-th attribute of an intensity comprised between 0 and 1. The membership function of the i-th household to the fuzzy subset B can be defined as the average weight of x_{ij} :

$$\mu_B\left(a_i\right) = \sum_{j=1}^m x_{ij}\, w_j \Big/ \sum_{j=1}^m w_j \qquad \text{[weighted} \quad x_{ij}]$$

(2)

The equation $\mu_B\left(a_i\right)$ measures the ratio of poverty of the i-th household, where w_j is the weight linked to the j-th attribute, and where:

$0 \leq \mu_B\left(a_i\right) \leq 1$.

The behavior of the membership function is as follows:
- ✓ $\mu_B\left(a_i\right) = 0$, if a_i possesses the m attributes ;

- ✓ $\mu_B\left(a_i\right) = 1$, if a_i is totally deprived of the m attributes ;

✓ $0 < \mu_B(a_i) < 1$, if a_i is partially or totally deprived of some attributes but not completely missing all the attributes.

The weight w_j represents the intensity of deprivation linked to the attribute J. It is an inverse function of the degree of deprivation of this attribute for the population of household. The smaller is the number of private households for the attribute X_j, and the more the weight w_j will be high. Cerioli and Zani (1990) define a function of intensity of deprivation given by the following relation:

$$w_j = \log\left[\sum_{i=1}^{n} g(a_i) \Big/ \sum_{i=1}^{n} x_{ij} g(a_i)\right] \quad \text{[weight for the attribute j]} \tag{3}$$

where $g(a_i)$ is the frequency (weight) associated with the observation of the a_i household of the population. The fuzzy poverty index of the set A is a weighted average of $\mu_B(a_i)$ which can be given by the relationship:

$$P_\alpha = \mu_A = \sum_{i=1}^{n} \mu_B(a_i)^\alpha g(a_i) \Big/ \sum_{i=1}^{n} g(a_i), \quad \text{[poverty index]} \tag{4}$$

for alphas equal to 0, 1 and 2

where $g(a_i) \Big/ \sum_{i=1}^{n} g(a_i)$ is the relative frequency associated with the observation a_i of the sample. As the index defined in (4) is not additively decomposable for alpha equal 0 and 2, we assume that in what follows alpha is equal to 1 in order to perform decompositions.

Parallel to the determination of the multidimensional poverty index of the i-th household and that of the overall population, the use of the fuzzy sets theory allows the calculation of a one-dimensional index for each of considered j attributes:

$$\mu(X_j) = \sum_{i=1}^{n} x_{ij} g(a_i) \Big/ \sum_{i=1}^{n} g(a_i), j=1,2,\ldots,m \quad \text{[Poverty in the attribute j]} \tag{5}$$

$\mu(X_j)$ defines the degree of deprivation of the j-th attribute for the population of n households. The overall fuzzy index of poverty can also be defined as a weighted average of one-dimensional indexes for each attribute: the weighting is done for alpha equal to 1 in order to perform the decompositions.

$$P = \mu_A = \sum_{j=1}^{m} \mu(X_j) w_j \Big/ \sum_{j=1}^{m} w_j \quad \text{[}\alpha \text{ equal to 1 for this relation]} \tag{6}$$

The analysis of the results in (5) enables to identify the correlates of poverty and intervene structurally to reduce it. The decomposition methods that follow will give more precision on the state of social exclusion.

3.2- Decomposition of the multidimensional index of poverty

We used the methods of decomposition of the fuzzy index of multidimensional poverty that have been introduced and developed in the work of Mussard and Pi Alperin (2005). We have considered the problem of non-separability that affects decomposition processes in the calculation of the contributions of groups and attributes the poverty index.

3.2.1- Decomposition by groups

Another way to assess the pattern of poverty is to decompose the population into groups Mussard and Pi Alperin (2005). By dividing the in total economic surface into R groups, S_r of size $n_r (r = 1,...,R)$, the intensity of poverty of the *i*-th household of S_r is given by:

$$\mu_B\left(a_i^r\right) = \sum_{j=1}^{m} x_{ij}^r w_j \bigg/ \sum_{j=1}^{m} w_j, \qquad \text{[weighted } x_{ij}^r\text{]} \tag{7}$$

where x_{ij}^r is the function of belonging to the B fuzzy subset of the i-th household

$(i = 1,...,n)$ of S_r in relation with the j-th attribute $(j = 1,...,m.)$

The multidimensional index of poverty associated with the group S_r is then defined as follows

$$\mu^r = \sum_{i=1}^{n_r} \mu_B\left(a_i^r\right) g\left(a_i^r\right) \bigg/ \sum_{i=1}^{n_r} g\left(a_i^r\right), \qquad \text{[weighted } \mu_B\left(a_i^r\right) \text{ for } \alpha = 1\text{]} \tag{8}$$

The contribution of a group to total poverty is obtained by taking the difference between the overall poverty index P - equation (4) for $\alpha = 1$ or (6) - and the poverty rate calculated when the terms of all attributes of this group of individuals are equal to 0:

$$C_r = P - P_r, \qquad \text{[contribution of r to the poverty index]} \tag{9}$$

Where P_r is the poverty index calculated when we assume that the group S_r is poorer compared to all attributes. This decomposition allows to identify the most affected groups (regions, religion, gender, etc), and specifically the groups that contribute to an increase of the state of social exclusion.

3.2.2- Decomposition by attributes

Dagum and Costa (2004) introduced the decomposition by attribute by showing that it is possible to calculate the contribution of the j-th attribute to the overall poverty index. From the equations for the one-dimensional indices of poverty (5) and the weights associated with each attribute (3), the authors obtain the contribution (absolute) of the *j*-th attribute to the multidimensional poverty index. In this work, to take into account the problem of non-separability of calculating poverty through people we have calculated the contribution of an attribute to global poverty as the difference between the overall poverty index P given by equation (4) for $\alpha = 1$ or (6) and the poverty rate calculated when we assume that people are not poor from the attribute:

$$C_j = P - P_j \qquad \text{[contribution of j to the poverty index]} \qquad (10)$$

Where P_j is the poverty index calculated when the terms of the attribute j is equal to 0 that is to say when people are not poor from the attribute j.

The unidimensional poverty index of the j-th attribute for the r-th group is given by the following equation:

$$\mu\left(X_j^r\right) = \sum_{i=1}^{n_r} x_{ij}^r g\left(a_i^r\right) \bigg/ \sum_{i=1}^{n_r} g\left(a_i^r\right). \qquad (11)$$

To address the issue of non-separability of calculating poverty across individuals, the contribution of an attribute to the poverty of a group will be the difference between the poverty of the group given by equation (8) and the poverty group recalculated if one assumes that group members are not poor compared to that attribute.

The contribution (absolute) of the j-th attribute to the r-th group is:

$$C_j^r = \mu^r - \mu_j^r, \qquad \text{[contribution of j to the poverty index of r]} \qquad (12)$$

Where μ_j^r is the poverty index calculated from the group when the terms of the attribute is null and μ^r is the poverty index of the group given by equation (8).

Unlike the decomposition by group, this second type of decomposition allows decision makers to obtain more information on the different dimensions of poverty, thereby allowing greater precision in the implementation of appropriate socio-economic policies in order to reduce the state of poverty. Her we used the equation (12) for the contribution of the j-th attribute of the group r the index of overall poverty. The simultaneous decomposition (Mussard and Pi Alperin, 2005) gives all combinations (attribute/group) that contribute to the

poverty of the economic area. Ultimately, we find all the information necessary to reduce the intensity of poverty.

IV. EMPIRICAL ANALYSIS OF POVERTY CHARACTERISTICS IN GUINEA

In this section, will be treated the nature of the data used and the choice of socio-economic attributes in a first part and the analysis of the results in a second part.

4.1 Data source and choice of socioeconomic attributes

We used the methodology of Dagum and Costa (2004) while introducing a synthetic decomposition analysis which describes specific dimensions- related to housing, level of instruction and annual expenses by households-, and the groups - gender, regions, religion, place of residence- all of which contribute to an increase of the amount of overall poverty.

4.1.1 Data source

To achieve the objectives of our study we used data from the full base survey on poverty assessment which provides basic indicators of well-being. We have a representative sample of the population of 7095 households.

The Full Base Survey on Poverty Assessment (FBSPA) is the second survey conducted in guinea after the Full Budget-Consumption Survey (FBCS). Carried out over a period of 12 months (23 October 2002-22 October 2003) and on a national sample of 7612 households[5], this survey is part of a planned series of studies related to the monitoring and evaluation of the Implementation of Poverty Reduction Strategy (PRS) and the Millennium Development Goals (MDGs). It was conducted at the same time as the survey on the Questionnaire of Basic Welfare Indicators (QBWI) and covering the same sample. The objective of these surveys is to monitor the implementation of these initiatives and assess their impact on the living conditions of households and poverty.

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5 It should be noted that 7095 households have responded to the questionnaire of the survey.

The Full Base Survey on Poverty Assessment (FBSPA) is a survey aimed at depicting the level reached for all the indicators of living standards of households and poverty, during the year 2002 which is considered as the starting year of the implementation of the Poverty Reduction Strategy (PRS). The survey includes a questionnaire for household in order to collect detailed information on household composition, migration, education, health, employment, economic and agricultural as well as non agricultural activities of the household members aged 5 years and over, housing, transfers, income, social capital and the perceptions of households of poverty. It also includes a community questionnaire that addresses the availability and accessibility of basic services to the populations of the localities included in the sample. This survey unlike the FBCS (1995) includes the administrative regions of the country.

4.1.2 Choice of socio-economic attributes

The choice of all socio-economic attributes the most significant in determining the condition of poverty is based on the literature on multidimensional poverty and the contents of the database of EIBEP. Each attribute is chosen as an indicator of social exclusion and deprivation of every household.[6] The questionnaire EIBEP we can select the following attributes:[7]

    1- Level of Education (X_1)

    2- Nature of the Roof (X_2)

    3- Materials for exterior walls (X_3)

    4- Type of toilet (X_4)

    5- Index of settlement (X_5)

    6- Annual expenditure per household (X_6)

    7- Type of Housing (X_7)

    8- Housing Ownership (X_8)

    9- Water supply (X_9)

    10- Fuel for cooking (X_{10})

    11- Lighting mode (X_{11})

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[6] The household is defined as a group of people, related or not, who usually live together and share some or all of their resources to meet their basic needs such as food and housing. These people recognize the authority of a single person as the head of the household (FBSPA 2002-2003).
[7] In the Appendix we find the levels of belonging of each socio-economic attribute selected for the purpose of this analysis.

12- Lasting goods (X_{12})

The base does not allow us to choose an attribute related to health. In fact, over 7095 households questioned about the time it takes to reach a health facility, only 4000 responded. Therefore we are giving the main results of the multidimensional method of measuring poverty, as well as those of the methods of decomposition.

4.2 Analysis of the results
4.2.1 The variables related to poverty

The index of multidimensional poverty is measured in Guinea is 0.5448. In other words, the 54.48% of the households are structurally poor in guinea. From the fuzzy one-dimensional indices of poverty we have identified the dimensions that indicate the most important degree of deprivation of poor households. Of the different attributes selected like the fuel for cooking (83.59% of Guinean households are poor according to that attribute), the nature of the roof (81.39), the level of education (80.38), the lighting mode (77.86%), the materials of outer walls (76.48%), the lasting goods (75.92%), the type of toilet (72.86%) and the index of settlement (67.68%) among others, are the major correlates of poverty in Guinea. By considering only the dimensions like fuel for cooking and nature of the roof, only two out of ten people escape from poverty, which remark also applies to the level of education. According to the lighting mode and settlement index, seven out of ten people are considered poor.

These major correlates are followed by the attribute of type of housing (63.97), water supply (63.05%) and the attribute of annual expenditure per household (54.09%) which indicate that only a little more than half of the population cannot escape from poverty (See Table 1).

The analysis in terms of relative contributions reveals that the dimensions such as lasting goods (17.56%) and annual expenditure (10.52%) contribute to a great extent to the overall poverty index. Indeed, the relative contribution is obtained by taking the ratio between the absolute contribution (equation 10) and the sum of all absolute contributions which is the index of overall poverty (0.5448). The absolute contribution of each attribute was calculated as the difference between the index of overall poverty and the poverty index obtained when the terms of this attribute are zero for all individuals. The removal order of attributes in the calculation of contributions is done according to their order of presentation in Table 1. The

absolute contribution of attributes durable goods and annual expenditure is higher compared to others. The absolute contribution of attributes goods durable and annual expenditures is higher compared to others. That explains by the Fact that the indices of poverty that one obtains after supposing that the households are not poor in comparison with these dimensions are weak.

In Table 1 the attribute Housing ownership (X8) shows the largest weight, $w_j = 29,62\%$. That explains by the fact that the number of private household of this attribute is small (on 7095 households, 5054 are not deprived of this attribute). Applying the formula of equation (4) for alpha equal to 0 we have a poverty incidence of 100%. This simply means that no Guinea is rich in both all the attributes. For alpha equal to 2 we have an index of severity of poverty 0.3127. Table 1 is completed for alpha equal to 1 that is to say that the intensity of poverty is 54.48%. Because of the diverse socio-economic behaviours of the subgroups of the population, it can also be noticed that the influence of the attributes in determining the extent of poverty varies according to the selected group.

Table 1: **One-dimensional Indexes of poverty, absolute and relative contributions and weight of attributes**

Attributes	$\mu_B(X_j)^*$	absolute Contribution	relative Contribution	Weight of attributes wj/total wj
Level of Education (X1)	**0.8038**	0.0303	5.56%	3,77%
Nature of the Roof (X2)	**0.8139**	0.0289	5.30%	3,55%
Materials for exterior walls (X3)	**0.7648**	0.0354	6.49%	4,62%
Type of toilet (X4)	**0.7286**	0.0398	7.30%	5,46%
Index of settlement (X5)	0.6768	0.0455	8.36%	6,73%
Annual expenditure per household (X6)	0.5409	**0.0573**	**10.52%**	10,59%
Type of housing (X7)	0.6397	**0.0493**	**9.04%**	7,70%
Housing ownership (X8)	0.1794	**0.0531**	**9.75%**	29,62%
Water supply (X9)	0.6305	**0.0501**	**9.20%**	7,95%
Fuel for cooking (X10)	**0.8359**	0.0258	4.74%	3,09%
Lighting mode (X11)	**0.7786**	0.0336	6.17%	4,31%
Lasting goods (X12)	**0.7592**	**0.0957**	**17.56%**	12,60%
Total	**0.5448**	**0.5448**	100%	100%

* $\mu_B(X_j)$ one-dimensional index of poverty as per the j attribute. Source: calculation of the writer

Though these results provide the information needed to identify the correlates of poverty, the decomposition methods provide more accuracy in determining the multidimensional phenomenon of overall poverty. As such the most affected socio-economic groups will be identified.

4.2.2 Decompositions by groups

The decompositions have been carried out on the basis of the following groups: (i) religion of the household, (ii) administrative region (iii) natural area, (iv) gender of household head (v) place of residence, and finally, (vi) the size of the household. Table 2 presents the multidimensional poverty indices for each group after decomposition and the absolute and relative contributions for each group to global poverty.

a- By religion and regions

Regarding the decomposition by religion, we discover that the households which are ruled by Heads of household who are neither Muslims nor Christians are the most vulnerable with 58.58% of structural poor. The households whose head is Muslim or Christian have respectively 54.08% and 55.40% of poor. In terms of contribution, households whose head is Muslim contribute up to 83.69% in the overall poverty. This is explained by the fact that Muslims account for 84.3% of the total population. Table 7.A in Appendix shows that there is a significant difference between the three indices in pairs to 5%.

Considering the administrative regions, the poorest regions (vulnerable) are N'Zérékoré (57.97%), Faranah (57.45%) and Labé (57.11%) then followed by the regions of Kankan (55.87%), Mamou (55.20%) and Kindia (54.45%). Table 8.A in Appendix tells us that there is no significant difference between the indices of regions N'Zérékoré, Faranah and Labé. So we can say that these three regions have the same level of poverty with a 5% risk of being wrong. Kankan, Mamou and Kindia have the same level of poverty and we can say that these three regions are less poor than those of Labé, Faranah and Nzérékore. There is a significant difference between the poverty indices of the capital Conakry and Boké with all other regions.

The region of Boke after Conakry (46.64%) purports to be the least poor with 52.07% of poor This is not too surprising since in Guinea, among the administrative regions, Conakry excepted, the region of Boké is the most urbanized, with nearly one out of four households leaving in the urban centres. More because of an important natural endowment in mineral resources, the region of Boké welcomes large mining companies. It also has many attractions, including the National Park of Badiar and possesses large openings onto Conakry, Labe, and countries bordering the Guinea whose Senegal and Guinea Bissau. In terms of school enrollment, the region has the highest gross enrollment rate for girls compared to the other regions.

With regard to the access to drinking water, we note the existence of water supplies in all the urban centers except in one of the prefectures of the region of Gaoual and the construction of drilling in rural areas. Here, the region records a rate significantly higher than those in the other areas apart from Conakry. In terms of electricity, there is no balance between the Northern region (where the situation is precarious) and the Southern region (where the situation is relatively good).

Table2 : Multidimensional poverty indices for each decomposition, absolute and relative contributions for α =1

Decomposition		Multidimensional Index of Poverty as per the group k : $\mu_{\beta k}$	Absolute contribution	
Religion	Muslim	0.5408	0.4560	
	Christian	0.5540	0.0534	
	Other	**0.5858**	0.0354	
Administrative Regions	Boké	0.5207	0.0498	
	Conakry	0.4664	0.0742	
	Faranah	**0.5745**	0.0517	
	Kankan	**0.5587**	0.0621	
	Kindia	0.5455	0.0770	
	Labé	**0.5711**	0.0685	
	Mamou	0.5520	0.0508	
	N'Zérékoré	**0.5797**	0.1108	
Natural Regions	Conakry	0.4664	0.0742	
	Lower Guinea	**0.5285**	0.1069	
	Middle Guinea	0.5647	0.1391	
	High Guinea	0.5665	0.0969	
	Forest Guinea	**0.5772**	0.1276	
Gender of the head of the household	Male	0,5437	0.4456	
	Female	**0,5496**	0.0992	
Place of Residence	Conakry	0,4664	0.0742	
	Other urban	0,5017	0.0651	
	Rural	**0,5702**	0.4055	
Size of the Household	1 person	0,5250	0.0208	
	2 persons	0,5397	0.0362	
	3 persons	0,5612	0.0722	
	4 persons	**0,5663**	0.0647	
	5 persons	**0,5395**	0.3509	

Source: calculation of the writer

The situation of the region of N'Zérékoré can be justified by the fact that in spite of its high mining potentials (iron, diamond) these are largely under-exploited. In addition, access to drinking water and electricity is a persistent problem in the region. Here, wood is the most used cooking fuel. These realities are valid for most areas except Conakry but with varying intensities (PRSP 2002). In terms of contribution, these are the regions N'Zérékoré Kindia and Conakry that contribute most to global poverty (see Table 2). The poverty multidimensional

of administrative regions is similar to that observed in monetary terms.[8] But it should be noted that with the region of Kankan in the case multidimensional, is counted among the moderately poor regions contrary to the monetary aspect where it is counted among the poorest.

In natural regions, it is clear that the poorest region is the Guinea Forest where is located N'Zérékoré with 57.72% of poor, then come the areas of Upper and Middle Guinea where are Faranah, Kankan and Labe with respectively 57.45%, 56.65% and 56.47% of poor.

The less poor natural area is the special zone of Conakry (57.81) then followed by the Lower Guinea where the region Boké is located with 52.85% of the poor. The poverty index of the Boke region is significantly different from Conakry and the other regions. The poverty index in Conakry is also significantly different of other indices then that we can say that there is no significant difference between the indices of the regions of middle and Upper Guinea (see Table 9.A in the Appendix).

The analysis in terms of contribution shows that regions of the middle and Upper Guinea are those that contribute most to the national poverty index. A comparison with the results of the monetary approach shows the same trend with an increase in poverty in the region of the Guinea forest plan multidimensional.

b- By gender, place of residence and size

The decomposition by gender shows that households whose head is a woman has an index of 54.96% while those headed by a man has an index of 54.37%. Referring to Table 10.A in Appendix we can say that there is no significant difference between the two indices, so women and men have the same level of poverty with a 5% risk of being wrong. In monetary terms we note that households headed by women have a lower poverty rate than those headed by men.

By studying the contributions, we find that these are households headed by men who have the most important contribution to explain the state of poverty with 81.79%.

The decomposition by area of residence like Conakry, other urban center and rural areas shows that the rural area is the most poor with 57.02%. The Table 11.A in Appendix shows that there is a significant difference between the index of rural area and the other indices, so we can say that poverty is a rural phenomenon in Guinea. This is not very surprising because of the striking disparities between urban and rural in terms of education,

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[8] The results of the monetary approach come from the report of the EIBEP 2002-2003

the possession of lasting goods, mode of lighting and fuel. The rural area has also the biggest contribution with an explanation of the country's poverty level to 74%. At this level it should be noted that for the concepts of monetary and multidimensional poverty, the rural areas remains the most affected compared to the urban area.

Depending on the size of the household, we can notice that the households who have five or more persons have an index of 53.95%, we have 56.63% for households of 04 persons against 56.12% for those containing 3 persons and 53.97% for those with 02 persons. The households with one person have the lowest index of 52.50%. The Table 12.A in Appendix tells us that there is no significant difference between the indices for households of size 2 and 1, 1 and 5 and finally, 4 and 3. In monetary terms, poverty increases with household size unlike the multidimensional plan.

4.2.3 Decomposition by attribute and group

Unlike the method of decomposition by group described earlier, the decomposition method we are presenting here will give us more indication on the deprivation of the different groups according to the dimensions of poverty. By considering the combination of groups and attributes, we can obtain the one-dimensional indices of poverty by attribute and by group. An analysis of the relative contributions of the one-dimensional indices of poverty in comparison with the different groups would also provide a clear picture of exclusion of each group with regard to the different attributes.

The values of one-dimensional indices of poverty reflect the degree of deprivation of each attribute for the population of each group. We notice that the intensity of poverty is not the same in each population group; and according to the selected dimension because the values of the indexes vary from one group to another. Thus one can see that the variable consumption expenditure does not always reflect the state of poverty of the Guinean population. The dimensions like: the level of education (X_1), the nature of the roof (X_2), the materials of the exterior walls (X_3), the index of settlement (X_5), fuel for cooking (X_{10}) the mode of lighting (X_{11}), the supply of drinking water (X_9) and the lasting goods (X_{12}) are dominant dimensions of the poverty phenomenon within the different groups.

Table 3: One-dimensional Indexes of poverty by attributes and by religion

Religion	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12

	X₁	X₂	X₃	X₄	X₅	X₆	X₇	X₈	X₉	X₁₀	X₁₁	X₁₂
Muslims	**0.8231**	**0.8268**	**0.7383**	**0.7124**	0.6821	0.5323	0.6715	0.1786	0.6147	**0.8227**	**0.7672**	**0.8610**
Christians	0.6206	**0.7279**	**0.8643**	**0.7751**	0.6443	0.5279	0.4649	0.2212	0.6889	**0.8647**	**0.8143**	**0.9108**
Others	**0.8266**	**0.7710**	**0.9756**	**0.8816**	0.6544	0.6827	0.4747	0.1245	**0.7568**	**0.9735**	**0.8807**	**0.9713**

Source: calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

The respective dimensions like possession of lasting goods, nature of the roof, fuel for cooking, level of education, mode of lighting, materials of the walls, Type of toilet, and index of settlement are the main variables in relation to poverty within the Muslim group. However for the Christians, the dimensions are respectively, lasting goods, fuel for cooking, materials of the walls, the mode of lighting, Type of toilet, Nature of the roof, drinking water supply which appear to be the main variables related to poverty within that group. For the others who are neither Muslims nor Christians, the main correlates of poverty are the materials of the walls, fuel for cooking, lasting goods, Type of toilet, mode of lighting, the level of education, Nature of the Roof and drinking water supply. We can notice that education is crucial for Muslims but not Christians. This can be explained by the fact that while Muslims emphasize on the study of the Koran, Christians prefer the study of the French language.

If we compare levels of deprivation, we can notice that for the dimensions of the nature of the roof, types of toilet, index of settlement and type of housing, the Muslims have the highest deprivation. The households whose head is neither Muslim nor Christian show the higher degree of deprivation with regard to the dimensions like: level of education, materials of the walls, yearly expenses, drinking water supply, fuel for cooking, the mode of lighting and lasting goods.

By analyzing the contributions from Table 1 of the appendix which deals with the contributions, we have noticed that Muslim households have the largest contribution to the state of poverty mainly in terms of type of housing (9.56%), settlement index (8.49%), level of education (5.73%) and nature oh the roof (5.31%). We can conclude here that these dimensions contribute on the one hand to an increase in the state of exclusion within the group of Muslims and on the other hand to the overall poverty index.

 Regarding the dimensions like lasting goods (19.01%), materials of the walls (7.21%), housing ownership (11.83%), type of toilet (7.64%), Christians have the most important contribution comparatively to Muslims. In view of the highest contributions, we can say that the dimensions, housing ownership, lasting goods, annual expenditure and drinking water supply contribute to the growing of the state of exclusion of Christians and also an increase of the overall poverty index.

Table 4: One-dimensional Indexes of poverty by attributes and by administrative region

Regions	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Boké	**0.8080**	**0.8132**	**0.7753**	**0.7592**	0.6640	0.5039	0.6240	0.1235	0.6453	**0.8846**	**0.7954**	**0.8573**
Conakry	0.5638	**0.6859**	0.3184	0.3958	**0.7723**	0.1825	**0.5489**	**0.5139**	0.1844	0.3640	0.3646	**0.6746**
Faranah	**0.8412**	**0.8984**	**0.9171**	**0.8184**	0.6898	0.6597	**0.7553**	0.1053	0.6272	**0.9118**	**0.8847**	**0.9254**
Kankan	**0.8967**	**0.9216**	**0.9030**	**0.6996**	0.5978	0.6754	**0.8068**	0.0752	0.6407	**0.9466**	**0.9043**	**0.9147**
Kindia	**0.8649**	**0.8129**	**0.8037**	**0.7694**	0.6183	0.5141	0.6272	0.1393	**0.7664**	**0.9209**	**0.7881**	**0.8867**
Labé	**0.8080**	**0.8132**	**0.7753**	**0.7592**	0.6640	0.5039	0.6240	0.1235	0.6453	**0.8846**	**0.7954**	**0.8573**
Mamou	0.5638	**0.6859**	0.3184	0.3958	**0.7723**	0.1825	**0.5489**	**0.5139**	0.1844	0.3640	0.3646	**0.6746**
N'Zérékoré	**0.8412**	**0.8984**	**0.9171**	**0.8184**	0.6898	0.6597	**0.7553**	0.1053	0.6272	**0.9118**	**0.8847**	**0.9254**

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

With the administrative regions, the dominant dimensions or in other words the main correlates of poverty by region are:

- **Boké** : fuel for cooking, lasting goods, nature of the roof, level of education, mode of lighting, materials of the walls, and type of toilet;
- **Conakry** : index of settlement, possession of lasting goods, nature of the roof, type of housing, and housing ownership;
- **Faranah** : lasting goods, materials of the walls, fuel for cooking, nature of the roof, mode of lighting, level of education, type of toilet and type of housing;
- **Kankan :** fuel for cooking, nature of the roof, mode of lighting, materials of the walls, level of education, type of housing and the type of toilet;
- **Kindia** : fuel for cooking, lasting goods, level of education, nature of the roof, materials of the walls, mode of lighting, type of toilet and water supply ;
- **Labé** : fuel for cooking, lasting goods, level of education, mode of lighting, nature of the roof, type of the roof, materials of the walls, water supply, type of housing and annual expenditures;
- **Mamou** : fuel for cooking, level of education, lasting goods, mode of lighting, nature of the roof, water supply, type of the roof and materials of the walls;
- **N'Zérékoré :** lasting goods, materials of the walls, fuel for cooking, mode of lighting, type of toilet, level of education, nature of the roof and water supply;

It should be noted that apart from Conakry, the dimensions like water supply, mode of lighting, fuel for cooking, level of education, material of the walls, and nature of the roof are the main variables associated with poverty within the groups.

Compared to the other regions, Conakry records the highest degree of deprivation in relation with the dimensions associated with housing (index of settlement, type of housing and housing ownership). This result is not surprising since Conakry is the capital city and the terms of purchase and rental of houses are expensive. N'Zérékoré has the highest indices as far as the dimensions like material of the walls and lasting goods are concerned. The degree of deprivation in terms of index of settlement, type of housing, level of education and water supply are higher in the region of Mamou. For the dimensions annual expenditure, fuel for cooking and type of toilet, the region of Labé has the highest degree of deprivation. Regarding the region of Kankan, it reveals the highest levels of deprivation in relation to the dimensions such as the nature of the roof, mode of lighting and type of housing.

An analysis of contributions to the overall poverty index shows that the dimensions lasting goods, annual expenditures, watter supply and type of housing significantly increase the amount of overall poverty and the state of social exclusion in the region of Labé. The dimensions like housing ownership, index of settlement and lasting goods greatly increase the state of social exclusion in the capital Conakry and thus contribute greatly to the overall poverty index. The mode of lighting also increases greatly the state of exclusion in the regions of N'Zérékoré and Kankan; while the water supply is the highest contributor in the regions of Kindia, Labé, N'Zérékoré and Mamou (Table 2.A in the appendix).

Table 5: One-dimensional Indexes of poverty by attributes and by natural region

Regions	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Conakry	0.5638	**0.6859**	0.3184	0.3958	**0.7723**	0.1825	**0.5489**	**0.5139**	0.1844	0.3640	0.3646	**0.6746**
Lower Guinea	**0.8361**	**0.7943**	**0.7750**	**0.7401**	0.6297	0.4972	0.5933	0.1412	**0.7220**	**0.8940**	**0.7720**	**0.8659**
Middle Guinea	**0.9077**	**0.8722**	**0.8018**	**0.8400**	0.6873	0.6416	**0.7297**	0.0676	**0.7632**	**0.9587**	**0.8791**	**0.9102**
High Guinea	**0.9013**	**0.9346**	**0.9104**	**0.7432**	0.6366	**0.6973**	**0.8229**	0.0660	**0.6449**	**0.9456**	**0.8988**	**0.9161**
Forest Guinea	**0.7558**	**0.7654**	**0.9230**	**0.8222**	0.6707	0.6058	0.5055	0.1862	**0.7086**	**0.9005**	**0.8777**	**0.9453**

Source: Calculation of the writer. X_1=level of education, X_2=Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Within the natural regions, the main characteristics of poverty except in Conakry are the level of education, material of the walls, nature of the roof, water supply, fuel for cooking, mode of lighting and lasting goods which also vary from one region to another. In the capital city Conakry, we can notice that the dimensions such as the index of settlement, type of

housing, nature of the roof and lasting goods are the main characteristics of poverty. Then comes the type of housing and the housing ownership for which slightly more than a half the population escaped from poverty in the capital (see table 5).

If we compare the degrees of deprivation of the regions according to the attributes, we can notice that Conakry has the most important degree of deprivation with regard to the dimensions such as index of settlement and housing ownership. The middle Guinea records the highest levels of deprivation in the dimensions like level of education, water supply, type of the roof and fuel for cooking. The high Guinea supersedes the other regions regarding the dimensions nature of the roof, mode of lighting, type of housing and annual expenditure per household. Forest Guinea on her side records the highest indices for the dimensions such as material of the walls and lasting goods.

In terms of contributions (Table 3.A in the appendix) we remark that within the region of middle guinea, the lasting goods, annual expenditure, water supply, level of education, and fuel for cooking contribute to a great extent to the state of social exclusion in the region. In the High Guinea, the mode of lighting, annual expenditure per household, the type of housing and nature of the roof are the most concerning dimensions comparatively to the other regions.

Table 6: One-dimensional Indexes of poverty by attributes and by gender of the head of household

Gender	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Men	**0.7795**	**0.8132**	**0.7639**	**0.7210**	**0.6908**	0.5432	0.6396	0.1886	**0.6260**	**0.8295**	**0.7730**	**0.8637**
Women	**0.9139**	**0.8169**	**0.7692**	**0.7633**	**0.6134**	0.5308	0.6401	0.1379	**0.6506**	**0.8649**	**0.8039**	**0.9125**

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

With regard to gender (Table 6), the intensity of poverty is higher among women than among men. In fact, nine of the attributes out of twelve indicates that women have the highest index. The dimensions level of education, possession of lasting goods, fuel for cooking, mode of lighting, nature of the roof and the material of the walls; are the main characteristics of poverty that affect both male and female genders but with greater intensity on women. As a result, women appear to be vulnerable regardless of the dimensions being considered.

The households led by a man have the highest degree of deprivation in terms of the dimensions index of settlement, annual expenditures, and housing ownership whereas those led by women indicate the highest deprivation of the other dimensions. In terms of contribution related to the dimensions level of education, water supply, fuel for cooking, mode of lighting, nature of the roof, type of toilet and lasting goods women have a state of

exclusion higher than men. Thus women for this dimension have a great contribution to the amount of overall poverty (see Table 4.A in the appendix).

Regarding the place of residence, fuel for cooking, lasting goods, material of walls, mode of lighting, level of education, nature of the roof, the type of toilet, water supply and the type of housing are the main dimensions of the phenomenon of poverty in rural area.

Table 7: One-dimensional Indexes of poverty by attributes and by Place of Residence

Place of residence	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
							Attributes					
Conakry	0.5638	**0.6859**	0.3184	0.3958	**0.7723**	0.1825	0.5489	0.5139	0.1844	0.3640	0.3646	**0.6746**
Other urban	**0.6561**	0.7282	**0.6009**	0.5927	**0.6785**	0.3533	0.4970	0.3405	0.4534	**0.7043**	**0.6810**	**0.7962**
Rural	**0.8844**	**0.8581**	**0.8946**	**0.8279**	**0.6551**	**0.6554**	**0.6860**	0.0752	**0.7625**	**0.9655**	**0.8890**	**0.9307**

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

In urban areas except Conakry, durable goods, the nature of the roof, fuel for cooking, lighting mode, the index of settlement, level of education and the materials for exterior walls are the dominant dimensions. In the capital Conakry on record the same dimensions as in the case of natural and administrative regions.

When we compare the areas of residence two by two against the attributes we notice that the rural areas present the highest degree of deprivation for the dimensions such as fuel for 8cooking, mode of lighting, material of the walls, level of instruction, nature of the roof, type of toilet, water supply, type of housing, lasting goods and annual expenditures. In terms of contributions, the dimensions like level of education, nature of the roof, type of toilet, water supply, fuel for cooking, mode of lighting, annual expenditure, Materials for exterior walls and lasting good are those mostly contributing to the state of exclusion in rural areas comparatively to Conakry and the other urban areas as per (Table 5.A in the appendix).

Table 8: One-dimensional Indexes of poverty by attributes and by size of the household

Size	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
							Attributes					
1 person	0.6391	**0.7726**	**0.6540**	**0.6642**	0.2722	0.1101	0.6334	0.4659	0.5166	**0.6847**	**0.7006**	**0.8798**
2persons	**0.8584**	**0.8256**	**0.7671**	**0.7517**	0.3284	0.3129	**0.6836**	0.2598	**0.6193**	0.8096	**0.7956**	**0.9177**
3persons	**0.8333**	**0.8295**	**0.7876**	**0.7655**	0.6090	0.4135	**0.6746**	0.2360	**0.6579**	0.8587	**0.7956**	**0.9073**

4persons	0.8110	0.8294	0.7988	0.7583	0.5815	0.4999	0.6756	0.2293	0.6457	0.8229	0.7934	0.9114
5persons	0.8019	0.8225	0.7789	0.7482	0.7017	0.5481	0.6506	0.1893	0.6483	0.8526	0.7969	0.8924

Source: Calculation of the writer. X_1=level of education, X_2=Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

The main correlates of poverty at the level of households with one person are the possession of lasting goods (87.98%), nature of the roof (77.26%), fuel for cooking (68.47%), type of toilet (66.42%), material of the walls (65.40%) and the mode of lighting (70.06%). We found the similar correlates for households of different sizes (see Table 13) only it should be noted that these dimensions are complemented by the index settlement and the supply of water for households with 3 persons and more.

A comparison of households according to their size in relation with the degree of deprivation for the different dimensions is pointing out that households with two persons show the highest index for the dimension level of education, type of housing and lasting good. Dimensions like the nature of the roof, material of the walls and index of settlement are typical to households with three, four and five persons and who have the highest degree of deprivation. Households with five or more persons also show the higher degree of deprivation associated with dimensions such as annual expenditure and lighting mode.

An analysis in terms of relative contributions shows that the index of settlement and the annual expenditure per household contribute strongly to the state of exclusion of households consisting of five or more persons. For households with one person, it is the housing ownership and for those with two persons it is the level of education (Table 6.A in Appendix).

The pattern of distribution of poverty within the groups is not the same on monetary and multidimensional poverty. In other words, the level of poverty varies from one group to another not only in monetary terms but also in the multidimensional.

V. CONCLUSION AND IMPLICATIONS FOR ECONOMIC POLICY

The approach of Dagum and Costa (2004) supplemented with the decompositions introduced by Mussard and Pi Alperin (2005) allowed us to measure the poverty index for each attribute and for the total population. These indices enabled us to identify the main variables in relation with poverty and which help understand the state of deprivation of the different groups. Thus more than half the population of Guinea is structurally poor. Of the

different attributes selected like fuel for cooking, type of roof, level of education, mode of lighting, material of the wall, lasting goods, type of toilet and the index of settlement emerged as the key correlates of poverty. These dimensions are followed by the drinking water supply, type of housing and annual expenditure per household.

After the group decompositions it was found that households whose head of household is neither Muslim nor Christian are the most vulnerable. From administrative regions point of view, we found that the most vulnerable regions are N'Zérékoré, Faranah, Labé, Kankan and Mamou as Conakry and Boké appear to be the less poor. If we take a look at natural regions, Forest guinea, the High and the Middle Guinea seem to be the poorest. The decomposition by place of residence shows that poverty is a rural phenomenon in Guinea. Depending on the gender we have found that there was no significant difference between the indices of households headed by women and those headed by men.

The combination of attributes and groups show that dimensions like level of education, nature of the roof, material of walls, index of settlement, fuel for cooking, mode of lighting, water supply as well as lasting goods are the dominant dimensions of poverty within different groups as a whole. In the capital Conakry it is the dimensions like: index of settlement, type of housing and housing ownership that are the most concerning. Middle Guinea records the most important degrees of deprivation in line with the dimensions level of education, water supply and fuel for cooking. High guinea ranks first comparatively to the other regions for the dimensions like the nature of the roof, type of toilet and annual expenditure per household. Forest Guinea has recorded the highest indices in the dimensions of material of walls, mode of lighting and lasting goods.

The decomposition attributes and the area of residence show that the rural areas recorded the largest degree of deprivation for the dimensions like fuel for cooking, mode of lighting, material of the wall, level of education, nature of the roof, water supply and annual expenditure per household. Regarding gender, the intensity of poverty is higher among women than men. In other words, women are the most affected by the phenomenon of poverty.

Some policy implications aimed at strengthening to reduce poverty in Guinea can be put forward, despite the fact that we must keep in mind that the results of this study provide a necessary but not sufficient conditions to intervention.

Firstly in order to increase the standards of living of the people they must implement policies that take into account the mode of lighting, fuel for cooking, the quality of constructions, drinking water supply and level of education mainly the regions of Faranah, Kankan

N'Zérékoré, Labé, Kindia, Mamou and Boké. For the region of Conakry, it is necessary to introduce social policies of habitat including the construction of Habitat for Moderate Rental (HLM). For the natural regions, policies for access to education and better housing conditions are to be considered especially for the regions of Middle, Forest and Upper Guinea where the improvement of the quality of buildings is paramount. Secondly, regarding gender, literacy, access to better housing conditions for women are all priorities which the authorities should not overlook. In the end, raising the living standards of rural households while promoting education, access to potable water, electricity, resources, durable and best fuel for cooking would be measures that could alleviate poverty in rural areas.

Finally it should be noted that this work has enabled us to static results, however, a dynamic study will better analyze the phenomenon of poverty in Guinea.

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APPENDIX

Appendix A. Recapitulative Tables on the Absolute and Relative contributions of the attributes to the poverty indexes of the groups and to the overall poverty index.

Table 1.A: Absolute and relative Contributions to the overall poverty index of the One-dimensional Indexes of poverty by attributes and religion

Religions	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Muslims	0.0310	0.0294	0.0341	0.0389	0.0459	0.0564	0.0517	0.0529	0.0489	0.0254	0.0331	0.0931
	5.73	5.43	6.31	7.19	8.49	10.43	9.56	9.78	9.04	4.70	6.12	17.22
Christians	0.0234	0.0258	0.0400	0.0423	0.0434	0.0559	0.0358	0.0655	0.0548	0.0267	0.0351	0.1053
	4.22	4.67	7.21	7.64	7.83	10.09	6.46	11.83	9.89	4.82	6.34	19.01
Others	0.0311	0.0274	0.0451	0.0481	0.0440	0.0723	0.0366	0.0369	0.0602	0.0301	0.0380	0.1161
	5.31	4.67	7.70	8.21	7.52	12.35	6.24	6.29	10.27	5.14	6.49	19.82

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Table 2.A: Absolute and relative contributions to the overall poverty index of the One-dimensional Indexes of poverty by attributes and administrative regions

Regions	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Boké	0.0304	0.0289	0.0358	0.0414	0.0447	0.0534	0.0481	0.0366	0.0513	0.0273	0.0343	0.0885
	5.84	5.55	6.88	7.96	8.58	10.25	9.23	7.03	9.86	5.25	6.59	16.99
Conakry	0.0212	0.0244	0.0147	0.0216	0.0520	0.0193	0.0423	0.1522	0.0147	0.0112	0.0157	0.0770
	4.55	5.22	3.16	4.63	11.14	4.14	9.06	32.64	3.14	2.41	3.37	16.52
Faranah	0.0317	0.0319	0.0424	0.0447	0.0464	0.0699	0.0582	0.0312	0.0499	0.0282	0.0382	0.1019

Region	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
	5.51	5.55	7.38	7.78	8.08	12.16	10.13	5.43	8.68	4.91	6.64	17.75
Kankan	0.0338	0.0327	0.0417	0.0382	0.0402	0.0715	0.0621	0.0223	0.0510	0.0293	0.0390	0.0969
	6.04	5.86	7.47	6.83	7.20	12.81	11.12	3.98	9.12	5.24	6.98	17.35
Kindia	0.0326	0.0289	0.0371	0.0420	0.0416	0.0545	0.0483	0.0413	0.0610	0.0285	0.0340	0.0958
	5.97	5.29	6.81	7.70	7.63	9.98	8.86	7.56	11.17	5.22	6.23	17.57
Labé	0.0339	0.0312	0.0377	0.0474	0.0469	0.0748	0.0580	0.0155	0.0608	0.0297	0.0382	0.0969
	5.94	5.46	6.61	8.30	8.21	13.09	10.16	2.71	10.66	5.20	6.69	16.97
Mamou	0.0349	0.0300	0.0346	0.0423	0.0457	0.0613	0.0513	0.0241	0.0627	0.0293	0.0372	0.0986
	6.33	5.44	6.27	7.67	8.28	11.11	9.29	4.36	11.35	5.31	6.73	17.86
N'Zérékoré	0.0288	0.0271	0.0428	0.0450	0.0453	0.0659	0.0383	0.0537	0.0580	0.0281	0.0379	0.1089
	4.96	4.68	7.38	7.76	7.82	11.36	6.60	9.26	10.01	4.84	6.53	18.78

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Tableau 3.A: Absolute and relative contributions to the overall poverty index of the One-dimensional Indexes of poverty by attributes and natural regions

Regions	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Conakry	0.0212	0.0244	0.0147	0.0216	0.0520	0.0193	0.0423	0.1522	0.0147	0.0112	0.0157	0.0770
	4.55	5.22	3.16	4.63	11.14	4.14	9.06	32.64	3.14	2.41	3.37	16.52
Lower Guinea	0.0315	0.0282	0.0358	0.0404	0.0424	0.0527	0.0457	0.0418	0.0574	0.0276	0.0333	0.0917
	5.96	5.34	6.78	7.64	8.02	9.97	8.65	7.91	10.86	5.23	6.30	17.35
Middle Guinea	0.0342	0.0310	0.0371	0.0458	0.0463	0.0680	0.0562	0.0200	0.0607	0.0296	0.0379	0.0980
	6.05	5.48	6.56	8.12	8.19	12.04	9.95	3.54	10.75	5.25	6.72	17.35
High Guinea	0.0339	0.0332	0.0421	0.0406	0.0428	0.0739	0.0634	0.0195	0.0513	0.0292	0.0388	0.0978
	5.99	5.86	7.43	7.16	7.56	13.04	11.19	3.45	9.05	5.16	6.84	17.27
Forest Guinea	0.0285	0.0272	0.0427	0.0449	0.0451	0.0642	0.0389	0.0551	0.0564	0.0278	0.0379	0.1086
	4.93	4.71	7.39	7.77	7.82	11.12	6.74	9.55	9.76	4.82	6.56	18.81

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Table 4.A: Absolute and relative Contributions to the overall poverty index of the One-dimensional Indexes of poverty by attributes and by the gender of the household

Gender	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Men	0.0294	0.0289	0.0353	0.0394	0.0465	0.0575	0.0493	0.0559	0.0498	0.0256	0.0333	0.0929
	5.40	5.31	6.49	7.24	8.55	10.58	9.06	10.27	9.16	4.71	6.13	17.09
Women	0.0344	0.0290	0.0356	0.0417	0.0413	0.0562	0.0493	0.0408	0.0517	0.0267	0.0347	0.1082
	6.26	5.28	6.47	7.58	7.51	10.23	8.97	7.43	9.41	4.86	6.31	19.68

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Table 4.A: Absolute and relative Contributions to the overall poverty index of the One-dimensional Indexes of poverty by attributes and by place of residence

Place of residence	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
Conakry	0.0212	0.0244	0.0147	0.0216	0.0520	0.0193	0.0423	0.1522	0.0147	0.0112	0.0157	0.0770
	4.55	5.22	3.16	4.63	11.14	4.14	9.06	32.64	3.14	2.41	3.37	16.52
Other urbans	0.0247	0.0259	0.0278	0.0324	0.0457	0.0374	0.0383	0.1009	0.0361	0.0218	0.0294	0.0816
	4.92	5.15	5.54	6.45	9.10	7.46	7.63	20.11	7.19	4.34	5.86	16.26
Rural	0.0333	0.0305	0.0414	0.0452	0.0441	0.0694	0.0528	0.0223	0.0606	0.0298	0.0384	0.1024
	5.84	5.34	7.25	7.92	7.73	12.17	9.27	3.91	10.64	5.23	6.73	17.96

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Table 6.A: Absolute and relative Contributions to the overall poverty index of the One-dimensional Indexes of poverty by attributes and by the size of the household

Size	Attributes											
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
1 person	0,0241	0,0274	0,0302	0,0363	0,0183	0,0117	0,0488	0,1380	0,0411	0,0212	0,0302	0,0978
	4,58	5,23	5,76	6,91	3,49	2,22	9,29	(26,28	7,83	4,03	5,76	18,63
2persons	0,0323	0,0293	0,0355	0,0410	0,0221	0,0331	0,0527	0,0769	0,0493	0,0250	0,0343	0,1081
	5,99	5,43	6,57	7,60	4,10	6,14	9,76	14,26	9,13	4,64	6,36	20,04
3persons	0,0314	0,0295	0,0364	0,0418	0,0410	0,0438	0,0520	0,0699	0,0523	0,0265	0,0343	0,1024
	5,59	5,25	6,49	7,44	7,30	7,80	9,26	12,45	9,32	4,73	6,12	18,24
4persons	0,0305	0,0295	0,0369	0,0414	0,0391	0,0530	0,0520	0,0679	0,0513	0,0254	0,0342	0,1049
	5,39	5,20	6,52	7,31	6,91	9,35	9,19	11,99	9,07	4,49	6,04	18,53
5persons	0,0302	0,0287	0,0352	0,0392	0,0516	0,0660	0,0479	0,0396	0,0501	0,0261	0,0335	0,0913
	5,59	5,33	6,52	7,26	9,57	12,23	8,88	7,35	9,29	4,84	6,20	16,93

Source: Calculation of the writer. X_1=level of education, X_2 =Nature of the roof, X_3 = Materials for exterior walls, X_4 =Type of toilet, X_5 =index of settlement, X_6 =annuals expenditure, X_7 =type of housing, X_8 = Housing ownership, X_9 = water supply, X_{10} = fuel for cooking, X_{11} = mode of lighting, X_{12} = lasting goods.

Table 7.A: Multidimensional indexes and test of difference for the group religion

Religions	Indexes	Probability (P>|t|)		
		Muslims	Chritians	Others
Muslims	0.5408	-	0.047	0.000
Christians	0.5540	0.047	-	0.001
Others	**0.5858**	0.000	0.001	-

Source: calculation of the writer.

Test comparison of two means

Tests of difference between the indices in Table 2 were made from a test comparing the average of two independent samples. Indeed, when we take two samples for example Muslims and Christians or the region of Conakry and the Boke or men and women, we will have two samples of size n_1 of X_1 and n_2 of X_2.

We note respectively $m_{X_1}, m_{X_2}, \sigma_{X_1}, \sigma_{X_2}$ averages and standard deviations theoretical of X_1 and X_2 by $\overline{X_1}, \overline{X_2}, S_X, S_Y$ empirical characteristics corresponding.

As the sample sizes (ni) are large, we have $\sqrt{n_i} \dfrac{\overline{X_i} - mX_i}{\sigma_{Xi}} \approx N(0,1)$ i=1,2

We tested $H_0 : m_{X_1} = m_{X_2}$ versus $H_1 : m_{X_1} \neq m_{X_2}$

Under the assumption of equality of means we have $\dfrac{\overline{X_1} - \overline{X_2}}{\sqrt{\left(\dfrac{\sigma_{X_1}^2}{n_1} + \dfrac{\sigma_{X_2}^2}{n_2} \right)}} \rightarrow N(0,1)$

Moreover, as $\sqrt{\dfrac{\dfrac{\sigma_{X_1}^2}{n_1} + \dfrac{\sigma_{X_2}^2}{n_2}}{\dfrac{S_{X_1}^2}{n_1} + \dfrac{S_{X_2}^2}{n_2}}} \rightarrow 1,$ then $t_{obs} = \dfrac{\overline{X_1} - \overline{X_2}}{\sqrt{\left(\dfrac{S_{X_1}^2}{n_1} + \dfrac{S_{X_2}^2}{n_2} \right)}} \rightarrow \zeta(n_1, n_2 - 2)$

Decision rule : if $t_{obs} > t_{lu}$ at α, we reject H_0.

By comparing the values of probabilities (p-value) the decision rule is as follows:

if p-value < α , we reject H_0, therefore we conclude that there is a significant difference between the averages in this instance the two indices.

The test was performed with STATA using the command "LINCOM" which takes into account the weightings in the calculation of averages and standard deviations.

Tableau 8.A: Multidimensional indexes and test of difference for the group administrative region

Regions	Indexes	Probability (P>|t|)							
		Boké	Conakry	Faranah	kankan	kindia	Labé	Mamou	N'Zérékoré
Boké	0.5207	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Conakry	0.4664	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000
Faranah	0.5745	0.000	0.000	-	0.008	0.000	0.576	0.001	0.388
Kankan	0.5587	0.000	0.000	0.008	-	0.032	0.029	0.293	0.000

	Indexes								
Kindia	0.5455	0.000	0.000	0.000	**0.032**	-	0.000	**0.354**	0.000
Labé	**0.5711**	0.000	0.000	**0.576**	**0.029**	0.000	-	**0.004**	**0.135**
Mamou	0.5520	0.000	0.000	**0.001**	**0.293**	**0.354**	**0.004**	-	0.000
N'Zérékoré	**0.5797**	0.000	0.000	**0.388**	0.000	0.000	**0.135**	0.000	-

Source: calculation of the writer.

Tableau 9.A: Multidimensional indexes and test of difference for the group natural region

Natural regions	Indexes	Probability (P>|t|)				
		Conakry	Basse Guinée	Middle Guinée	Haute Guinée	Guinée Forestière
Conakry	0.4664	-	0.000	0.000	0.000	0.000
Lower Guinea	**0.5285**	0.000	-	0.000	0.000	0.000
Middle Guinea	0.5647	0.000	0.000	-	**0.672**	**0.010**
High Guinea	0.5665	0.000	0.000	**0.672**	-	**0.026**
Forest Guinea	**0.5772**	0.000	0.000	**0.010**	**0.026**	-

Source: calculation of the writer.

Tableau10.A: Multidimensional indexes and test of difference for the group gender

Gender	Indexes	Probability (P>|t|)	
		Hommes	Femmes
Men	0,5437	-	0.206
Women	**0,5496**	0.206	-

Source: calculation of the writer.

Tableau 11.A: Multidimensional indexes and test of difference for the group place of de residence

Place of residence	Indexes	Probability (P>|t|)		
		Conakry	Autres urbains	rural
Conakry	0,4664	-	0.000	0.000
Others urbans	0,5017	0.000	-	0.000
Rural	**0,5702**	0.000	0.000	-

Source: calculation of the writer.

Tableau 12.A: Multidimensional indexes and test of difference for the group size

Taille	Indexes	Probability (P>|t|)				
		1	2	3	4	5 et plus
1 person	0,5250	-	0.195	0.001	0.000	0.118
2 persons	0,5397	0.195	-	0.017	0.002	0.979
3 persons	0,5612	0.001	0.017	-	0.524	0.001
4 persons	**0,5663**	0.000	0.002	0.524	-	0.000
5 persons and more	**0,5395**	0.118	0.979	0.001	0.000	-

Source: calculation of the writer.

Appendix B. Functions of belonging for the socio-economic attributes selected

Education level

Levels		Function of Belonging	
		Fj	Xij
1-University	1	0.0569	0
2-Vocational	2	0.1068	0.0529
3-High School	3	0.2054	0.1574
4-Primairy	4	0.2956	0.2530
5-Without Education	5	1	1

Source: calculation of the writer.

Nature of the Roof

Modalities		Function of Belonging	
		Fj	Xij
1-Concrete/Cement	1	0.0079	0
2-Slates/tiles	2	0.0124	0.0057
3-Iron sheet	3	0.7044	0.7021
4-Thatch/straw	4	1	1

Source: calculation of the writer.

Material of external walls

Elements		Function of Belonging	
		Fj	Xij
Stone bricks	1	0.0021	0
Cement bricks	2	0.2781	0.2766
Steady clay bricks	3	0.4342	0.4331
Baked bricks	4	0.4654	0.4643
Clay/clay brick	5	0.9903	0.9903
Bamboo/Wood	6	1	1

Source: calculation of the writer.

Type of toilet

Elements		Function of Belonging	
		Fij	Xij
Ventilated and improved Latrines	1	0.0066	0
Flush	2	0.0400	0.0336
Bowl/bucket	3	0.0468	0.0404
Covered latrines	4	0.3346	0.3302

Non covered Latrines	5	0.8004	0.7991
None	6	1	1

Source: calculation of the writer.

Index of Settlement

Elements		Function of Belonging	
		Fj	Xij
Under populated	1	0.0569	0
Normal	2	0.4457	0.4122
Over populated	3	1	1

Source: calculation of the writer.

Annual expenditures by household

Elements		Function of Belonging	
		Fj	Xij
5th Quintile	1	0.2000	0
4th Quintile	2	0.4000	0.2500
3rd Quintile	3	0.6000	0.5000
2nd Quintile	4	0.8000	0.7500
1st Quintile	5	1	1

Source: calculation of the writer.

Type of housing

Elements		Function of Belonging	
		Fj	Xij
Several houses	1	0.0871	0
Personal house	2	0.4633	0.4121
Flat	3	0.6661	0.6342
Room/Apartment	4	0.7137	0.6864
Hut and house	5	0.7745	0.7530
Hut/other	6	1	1

Source: calculation of the writer.

Housing ownership

Elements		Function of Belonging	
		Fj	Xij
Owner	1	0.7123	0
Office housing	2	0.7307	0.0637
Tenant	3	0.9216	0.7276
Payment free housing/other	4	1	1

Source: calculation of the writer.

Mode of lighting

Modalities		Function of Belonging	
		Fj	Xij
1-Power generator	1	0.0079	0
2- Gas Lamp	2	0.0140	0.0061
3- Electricity from Sogel	3	0.2813	0.2756
4-Oil Lamp	4	0.8746	0.8736
5-Fire wood / candle / other	5	1	1

Source: calculation of the writer.

Possession of lasting goods

Elements		Function of Belonging Xij
Refrigerator	yes	0
	No	1
Car	yes	0
	No	1
Television	yes	0
	No	1
Radio	yes	0
	No	1
Iron	yes	0
	No	1

Source: calculation of the writer.

Drinking Water supply

Modalities		Function of Belonging	
		Fj	Xij
1-Water Tap in-house	1	0.1235	0
2-Public water Tap	2	0.2061	0.0942
3-Neighbour water tap	3	0.3476	0.2557
4-Drilling	4	0.6062	0.5507
5-Developed Source	4	0.6781	0.6327
6-Natural Source/other		1	1

Source: calculation of the writer.

Fuel for cooking

		Function of Belonging	
Modalities		Fj	Xij
1-Gas	1	0.0016	0
2-Electricity	2	0.0093	0.0078
3- Kerosene	3	0.0137	0.0121
4-Charcoal	4	0.3037	0.3027
5-Wood /Other	4	1	1

Source: calculation of the writer.

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