

Chapter 2

Child Poverty and Household Poverty in Cameroon: A Multidimensional Approach

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Abstract This study investigates child multidimensional poverty in Cameroon. It finds out its determinants and its relationship with household multidimensional poverty by considering children aged less than five years. The study uses from the Third Multiple Indicators Clusters Survey. Five dimensions are taken into consideration in child multidimensional poverty: nutrition, accessibility to potable water, health, education, and lodgings. For households, the following dimensions are combined: accessibility to potable water, hygiene, patrimony, lodging, and the level of education of the head of the household. Multiple components analysis (MCA) and hierarchical classification methods are applied to appreciate both child and household poverty. The results show that 73 % children aged less than five years lived with multidimensional poverty line with 25 % being affected by extreme poverty. On the other hand, 61 % of Cameroonian households were poor. Multidimensional poverty significantly varied with household size, the milieu of the residence and the level of education of the head of the household. The results also reveal that the key determinants of child multidimensional poverty are the poverty status of the household, the level of education and the age of the child's mother/caretaker, and the presence of the mother in the household. The study recommends the implementation of specific policies in favor of children and young girls and the implementation of a family code.

Keywords Child poverty • Multidimensional poverty • Composite indicator • Multiple components analysis • Hierarchical classification

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1 Introduction

The struggle against poverty has been at the center of economic policies in developing countries. On the eve of the twenty-first century, international and national organizations believed in economic growth's ability to fight poverty and inequality. Thus, after the economic crisis of the late 1980s and early 1990s, which was characterized by an aggravation of poverty and inequality in numerous countries, many specialists had hoped that the resumption of economic activities would contribute to reducing poverty in the world. Contrary to their expectations, the resumption of growth did not succeed in significantly reducing absolute poverty in developing countries (Ravallion and Chen 2000). In fact, the number of people living under the absolute poverty line remained constant during the decade of 1990–2000.

This situation led to the mobilization of the scientific community to research into new approaches to understand the complexity of the concept of poverty in order to develop appropriate strategies to overcome it. With these efforts what came to light is that poverty is a global phenomenon which extends far beyond the merely economic or monetary spheres. That is why developing countries were brought into define a Poverty Reduction Strategy Paper (PRSP) endeavoring to deal with poverty not only under its monetary aspects but also by including living conditions.

In the search of more appropriate strategies to fight poverty, the situation of children is not sufficiently taken into account (Heidel 2004). Yet, statistics show that children account for a large proportion of the poor in the world (nearly half). In developing countries, one child out of two is poor (Minujin 1999; UNICEF 2000). Poverty starts with childhood and it carries the seed of its own reproduction or long term self-maintenance. Many international organizations are aware of this and finance studies on individual data on children in order to assess the different forms of deprivations that affect children so as to eradicate the root of the evil.

The theory of endogenous growth suggests that we cannot pretend to fight poverty if we neglect the formation and accumulation of human capital. Poverty starts with childhood; it is at this level that the fight should begin. Many empiric studies show that poverty mortgages the future of affected children and condemns them to relieve it in their adulthood. In addition, from a normative point of view, society too has an obligation to correct the inequalities that affect children who cannot be held responsible for the poverty that they inherit (Cerc Association 2004).

With the collection of individual data on children in Cameroon, notably through Democratic and Health Surveys (DHS) and the Multiple Indicators Cluster Survey (MICS), a poverty analysis focusing on children following a nonmonetary approach are possible. Moreover, empirical studies have shown that although a relationship may exist between child poverty and household poverty, the two phenomena can be studied independently. Indeed, children have some needs that are specific to them and the forms of deprivation which affect them may also be different from those affecting adults (Bastos 2001).

This study strives to raise the veil on the phenomenon of poverty among less than five-year-old children in Cameroon. It also intends to participate in the debate on inherited poverty. Its main objective is to measure the extent of child poverty in Cameroon by following a multidimensional approach. The paper also explores explanatory factors of child multidimensional poverty and establishes its relation with household poverty.

The rest of the document is structured as follows. Section 2 focuses on main empirical studies related to child and household poverty in Cameroon. Section 3 outlines some poverty concepts and Sect. 4 gives details of the methodology used to construct the poverty composite index and the choice of variables. Section 5 analyses the results of household and child multidimensional poverty. This section also searches for links that may exist between child poverty and inherited poverty. The last section gives a conclusion.

2 Main Empirical Studies on Poverty in Cameroon

2.1 *At the Household Level*

The reference to monetary poverty in Cameroon is the second Cameroon Household Survey (CHS 2) done in 2001 by the National Institute of Statistics. This survey established the poverty profile with reference to Cameroon while describing the living conditions of Cameroonians. The study concluded that monetary poverty affected 40.2 % of the total population; it mostly affected households which were dependent on agriculture (57 %). Poverty is especially a rural phenomenon which is influenced by some characteristics of the head of the household like the level of education, gender, and matrimonial status (INS 2002). Looking at the dynamics of poverty, the results of CHS 2 indicate a decrease of 13 points in poverty between 1996 and 2001. In their study based on consumption per capita Dubois and Amin (2000) describe poverty and inequalities between 1978 and 1996 and note an aggravation in poverty between 1983 and 1996.

Analyzing poverty and income distribution in 1996 Fambon et al. (2001) showed that poverty affected more than 50 % of the rural households. According to the authors, the main determinants of poverty were the sociodemographic structure of the households (size, type of household, and number of children), the socio-economic group, the level of education of the head of the household, and the status of occupation of the lodging.

Recent studies on poverty in Cameroon have followed the multidimensional approach. Ningaye et al. (2007) and Foko et al. (2007) constructed a composite index of multidimensional poverty. These two studies, based on CHS 2 data, are unanimous that multidimensional poverty is more pronounced than monetary poverty. According to Foko et al. multidimensional poverty affected 68.5 % of the households against 30.1 % for monetary poverty (INS 2002). They also reveal a face of poverty in Cameroon that integrates four dimensions: accessibility to basic

public infrastructure, conditions of existence, accumulation of human capital, and vulnerability.

According to Dubois and Amin (2000), indicators of access to basic services have improved. Access to water increased from 32 % in 1970 to 44 % in 1997, death rate decreased (but less than infant mortality) and global school coverage improved till 1994. The Gini Index went down from 0.49 to 0.42 indicating a decrease in inequalities. For these authors, the economic crisis period (1985–1994) contributed to transform poverty into a rural phenomenon.

2.2 At the Child Level

Works by Townsend (2004, 2005), Gordon et al. (2003), and Minujin (1999) express apprehensions about the welfare of children. With regard to child poverty seen from a multidimensional angle, the literature in Cameroon is very poor. The main data sources of one-dimensional indicators specific to the child situation are MICS and DHS. The following gives a brief description of children's well-being in Cameroon.

2.2.1 Breastfeeding

Breast milk is the first food for a child and it is irreplaceable in many respects for the newborn. Breast milk's properties (rich in antibodies and essential nourishing elements) prevent malnutrition and infectious diseases, especially diarrhea. It also contributes to child immunity. The 2004 DHS report indicates that only 24 % of the children were being breastfed until the age of six months. In 2006, this proportion was 20 %. This practice presents disparities according to sex, region, the milieu of the residence, the level of education of the mother, and the standard of living of the household. At the age of 6–9 months, 64 % of the children got breast milk, solid, and semisolid foods. In the 12–15 months age bracket, 79 % of the children continued to be breastfed; and at 20–23 months, only 21 % were still being breastfed.

2.2.2 Nutritional Status

The nutritional status of a child gives an overview of his or her general health status. When a child gets good nutrition, he/she is not exposed to recurrent illnesses, he/she is well protected and reaches growth potential and is considered to be well fed.

The MICS (2006) report reveals that 39 % of the Cameroonian children of less than five years were malnourished, 20 % were underweight, and 6 % were emaciated. Children living in the north and the far north regions are the most affected by

nutrition. The nutritional status of children in Cameroon might be deteriorating; in fact, according to the Demographic and Health Survey of 2004, malnutrition rate was estimated at 32 % and underweight rate was 18 %. These figures of 2004 indicate a better situation as compared to that of 2006.

2.2.3 Vaccination

In order to immunize children against major illnesses, the Expanded Program on Immunization (EPI) organizes regular vaccination campaigns for children under five years. In accordance with WHO recommendations which are followed by EPI, a child is fully immunized when he/she receives BCG (protection against tuberculosis), vaccination against measles, three doses of a vaccine against polio, and three doses of DTP (against diphtheria, tetanus and pertussis, or whooping cough). Besides, in recent years, the first dose of the vaccine against poliomyelitis (polio 0) is given at birth. According to the immunization schedule, all these vaccines should be administered before a newborn is one year old.

2006 data indicate that more than half (56 %) of the children of 12–23 months received all the doses of the EPI vaccinations. This percentage was 90 % for BCG, 73 % for the third dose of DTP, 68 % for the third dose of polio, and 78 % for measles. This is an improvement over 2004 when the rate of complete immunization was only 48 %. However, whatever the data source, the northern regions and especially the north and the far north had a critical situation as complete immunization rates were well below the national average in these regions.

2.2.4 Need for a Study on Child Poverty

An analysis of poverty in Cameroon does not sufficiently take into account the situation of the children. However, data (DHS or MICS) suggest an aggregation of one-dimensional indicators in a synthetic index reflecting the well-being of children. Furthermore, some studies have shown that poor children do not necessarily live in (monetary) poor households. According to Gordon et al. (2003) distribution of incomes among members of a household is not always fair and does not always obey the controversial principle of equivalence scales.

These authors have proven the existence of an inverse relationship between the well-being of parents and that of their children. In some households classified as poor, parents are often forced to devote a large proportion of family incomes to meet the needs of their children (school, health, nutrition, etc.) to the extent that they also sacrifice their own needs. On the other hand, in some wealthy households the income spent on children is below the estimates made from equivalence scales. Hence, what is required is arresting child poverty and bringing it in relation to indirect poverty inherited by the households in which they live.

3 Conceptual Framework for Analysis and Measurement of Poverty

3.1 Conceptual Setting: Poverty Is Multidimensional

The concept of poverty is complex and ambiguous. Attempts to define it vary according to space and time (Ravallion 1996; Roach and Roach 1972). An assessment of the welfare of an individual depends on a range of factors. According to Asselin and Dauphin (2000) there are three major conceptual approaches to measuring poverty.

3.1.1 Welfare Approach

According to this approach, economic welfare is derived from the microeconomic concept of the utility. The ranking of preferences is represented by a function of utility that is supposed to statistically summarize individual welfare. This approach has greatly inspired the strong use of the monetary approach for analyzing poverty. But, the abstraction inherent in the concept of utility has driven the holders of this approach to use income (or consumption) as a measurement of welfare. In other words, according to Marniesse (1999), if individuals share the same preferences, they have the same non-observable utility; and if they face the same system of prices, their classification using income will be the same as that of utilities through a preorder relation. The welfare school underlines the importance of increasing revenue through productivity as a strategy against poverty. However, considering income as the only variable for targeting the poor reduces the efficiency of poverty reduction strategies notably when information is asymmetrical (Ayadi et al. 2007; Ponty 1998). Hence, there is a need to take into account other dimensions.

3.1.2 Basic Needs Approach

According to Asselin and Dauphin (2000), this approach to poverty is inspired by a humanist vision which goes beyond the economic sphere. For the proponents of this approach, the poor are people deprived of a subset of goods and services specifically identified and seen as universally common to man, including nutrition, health, education, and lodging.

One of the major problems with this approach is in determining basic needs because they are very often exogenous irrespective of the perceptions of the people. This approach emphasizes policies oriented toward the satisfaction of basic needs in the struggle against poverty and suggests rethinking the structural adjustment programs (SAPs) so as to incorporate a social dimension to ensure some basic needs (such as education and health) to populations.

3.1.3 Capacities Approach

This approach was developed by Sen (1985) and is based on social justice, equality, and inequality. Under this approach, the suitable index is neither utility nor the satisfaction of essential needs, but human skills or capacities. The three components of this approach are, ‘commodities,’ ‘operations,’ and ‘capacities’.

The commodities approach corresponds to a set of goods and services and has the characteristic to make possible ‘operations’. Operations take into account achievements of individuals—what they ‘are’ and what they ‘do’—with their resources. The capacities approach corresponds to a set of opportunities that are accessible to an individual from among which he can choose. These are the various combinations of functioning that an individual can achieve. Thus, this approach allows arresting poverty while considering it as a result of an inability to seize opportunities because of a lack of capacities resulting from deficient health, or an insufficient education or unbalanced nutrition, etc. Poverty reduction strategies based on this approach focus on human capacity building.

3.2 *Measuring Multidimensional Poverty*

Every poverty approach describes a feature of this complex phenomenon. Many studies (Ayadi et al. 2007; Foko et al. 2007; Sahn and Stiefel 2003) have highlighted a correlation between welfare indicators. When we consider these, we get poor individuals according to all features of poverty. This is why some studies have used welfare indicators integrating several approaches (Foko et al. 2007). The two major problems of synthetic indicators are that they rely on how to choose relevant one-dimensional indicators and the definition of the aggregation method.

To overcome these difficulties, economists refer to other areas of science where they have to use tools such as Zadeh’s (1965) fuzzy sets and Shannon’s entropy (1948). Economic literature on the choice of the aggregation method of basic indicators as a composite index is based on the work of Maasoumi (1999), Asselin (2002), and Bibi (2002). We distinguish two broad approaches: the axiomatic approach and the non-axiomatic approach.

3.2.1 Axiomatic Approach

This approach is propagated by Bourguignon and Chakravarty (2002) and it consists of adapting properties of one-dimensional indicators to multidimensional poverty. The first step in the methodology is considering a one-dimensional poverty index noted $P(I_k, S_k)$ for every primary feature I_k , S_k is the poverty line. The second

step is the aggregation of the measurement of all one-dimensional poverty indices in a synthetic index with the following functional form:

$$P(I, S) = \prod_{k=1}^K P(I_k, S_k) \quad (1)$$

The criticism of this approach is two-fold. First, it ignores the correlation that may exist between the components of this indicator. Second, the weights of different one-dimensional poverty indices are determined arbitrarily. It was to overcome these insufficiencies that the non-axiomatic approach developed.

3.2.2 Non-axiomatic Approach

Contrary to the axiomatic approach, the non-axiomatic approach consists of building a multidimensional measure for every individual from a composite poverty index (CPI) $\mu(I_k, S_k)$. Then, we aggregate individual multidimensional indicators to derive a poverty multidimensional index for the entire population:

$$P(I, S) = f(\mu_1(I, S); \mu_2(I, S); \dots \mu_N(I, S)) \quad (2)$$

with: $\mu : R_+^K \rightarrow R_+$ et $f : R_+^N \rightarrow R_+$

The particularity of the non-axiomatic approach (the entropy approach and the fuzzy analysis approach) comes from the fact that it allows the structure of the data to suggest the functional shape of the aggregation function and the weighting system. The two non-axiomatic approaches distinguish themselves on how the function f is constructed.

In this study the entropy approach is used to construct composite poverty indicators for both children and households.

4 Methodology

4.1 Construction Method of the Composite Poverty Index

Let K be the primary indicators reflecting the welfare of a household or a child. The idea is to summarize c. When taking Asselin's (2002) notations, the CPI of each individual (i) is:

$$CPI_i = \frac{1}{K} \sum_{k=1}^K \sum_{j_k=1}^{J_k} W_{j_k}^k I_{i,j_k}^k \quad (3)$$

where

$$\begin{cases} I_{ijk}^k & \text{a binary variable that takes 1 if the individual } i \text{ possess modality } j_k \text{ and 0 otherwise} \\ K & \text{number of primary indicators} \\ W_{jk}^k & \text{normalised weight of modality } j_k \\ J_K & \text{number of modalities of indicator } I_k \end{cases}$$

The weights associated to the indicators are determined by a multiple components analysis (MCA) like it is done by authors such as Asselin (2002), Ki et al. (2005) and Foko et al. (2007). First, all the variables are returned categorical and the modalities of every categorical variable are transformed into binary indicators taking one if the individual has the considered modality and zero otherwise. Subsequently, a MCA is performed on all the primary indicators created. The first factorial axis of this analysis permits highlighting the phenomenon of poverty and determining the variables to be kept for the construction of the CPI. The choice of these variables is determined using the property of first axis ordering consistency (FAOC). This property requires that for a given indicator, the welfare decreases (or increases) when one moves along the first factorial axis. Finally the variables which do not verify the FAOC property are removed and a new MCA is conducted only with those indicators that verify the FAOC property. The reduction in the number of primary indicators improves the explanatory power of the first factorial axis. Weights W_{jk}^k are derived by dividing the factorial scores by the first engine value.

The disadvantage of this composite index is that it can take non-positive values. However, we can make them positive by a translation operation using the procedure established by Asselin (2002). This operation consists of adding a fix value CPI_{\min} , to the CPI_i :

$$CPI_{\min} = \left| \frac{1}{K} \sum_{k=1}^K W_{\min}^k \right| \quad (4)$$

CPI_{\min} is the absolute value of the average of the minimum weights of the modalities. We can then use the following composite index:

$$CPI_i^* = CPI_i + CPI_{\min} \quad (5)$$

With this new index, we can compute, as is the case with the monetary approach, the FGT indices (Foster et al. 1984) both for children and for households. We can also compute inequality indices (Gini, Atkinson, Theil, etc.).

4.2 Determining the Poverty Line

For determining the poverty line, we used the hierarchical classification method to derive homogeneous groups according to the criterion of inertia (Ambapour 2006;

Luzzi et al. 2005). The idea is that from the criterion of inertia we can find a threshold that maximizes interclass inertia and minimizes intraclass inertia. This line should also classify individuals so that a maximal homogeneity exists within a group and a maximal heterogeneity exists between groups. By adopting the same notations as Ambapour (2006), we define a partition Q in 2 class q_1 and q_2 of the set A (set of the individuals): the poor and nonpoor such that

$$\text{For } i \in \{1, 2\}, q_i \in Q : q_i \subset A; q_1 \cap q_2 = \emptyset \text{ et } A = q_1 \cup q_2 \quad (6)$$

We then determine for each constructed class the intraclass inertia which is equal to $\Gamma_n(q_i) = \sum_{j \in q_i} m_{q_i} d^2(j, g_i)$ with g_i being the center of gravity of the class q_i and m_{q_i} the weight associated to this class. After this, we determine the interclass inertia from the center of gravity g of the cloud of points $\Gamma_n(q) = \sum_{j \in q} m_q d^2(g_i, g)$. Based on the fact that the total inertia $\Gamma_n(g) = \Gamma_n(q_i) + \Gamma_n(q)$ is constant, the poverty line (S) is determined so as to minimize intraclass inertia and to maximize interclass inertia:

$$S = \max C_i^{q_1} m_i^{q_1} + \min C_i^{q_2} m_i^{q_2} \quad (7)$$

$C_i^{q_j}$. is the value of the CPI in the class q_j

4.3 Data and Selection of Primary Indicators

4.3.1 Data

The data used in the construction of the composite poverty indicators are those of the multiple indicators clusters survey (MICS) collected in 2006 by the National Institute of the Statistics of Cameroon (INS 2006). This survey is part of the third generation of MICS surveys done by the United Nations Children's Fund (UNICEF). Its aim is to produce indicators for monitoring and follow-up of child programs and the millennium development goals (MDGs). MICS data are well suited to analyze various forms of deprivations undergone by children (Gordon et al. 2003).

MICS 3's sample plan identified 12 regions—the ten administrative regions and the two big metropolises (Douala and Yaoundé). This sample was stratified according to the region and the area of residence (urban and rural). In the first level, enumeration areas were drawn proportionally to their size in the population and at the second level households were selected with equal probabilities. The final sample consisted of 9856 households with 9408 women aged 15–49 years and 6495 children of less than five years old.

4.3.2 Choice of Dimensions and Primary Indicators

The choice of dimensions and the primary indicators is the most important step in building a composite indicator. The variables (indicators) that are retained must tie with poverty as defined by one of the three classic approaches. The correlation between the primary indicator and the welfare index has to be tested. To emphasize the importance of this step, let us consider, for example, that in an analysis of poverty, one takes ‘the possession of a health notebook’ among the primary indicators. This attribute may well meet all the statistical criteria for the selection of indicators to include in the construction of CPI; yet, the possession or not of a health notebook cannot in itself influence the well-being of a child. The selection of variables is generally based on existing literature, also taking into account the realities of the studied society and the availability of data.

Children Less Than 5 Years Old

In empiric studies on child poverty, authors are inclined to choose variables in the field of lodging, health, education and social inclusion (Bastos 2001). Gordon et al. (2003) have used the following eight forms of deprivation that they consider as being the key to child poverty: nutrition, drinking water, availability of sanitary facilities, health status, protection, education, and access to information. These dimensions keep the theoretical indicators on children’s rights and the operational indicators set forth in the World Summit on Children (Quenum et al. 2007). However, the dimension’s access to information does not directly concern children less than five years. Table 1 shows the dimensions and the variables selected for this study.

Table 1 Forms of deprivations and indicators retained for the construction of the CPI of children less than five years

Forms of deprivation	Primary indicators	MICS modules
Nutrition	Is the child nursed with breast milk? Sources of complementary food	BF
Water	Sources of drinking water; is the water potable? Distance to fetch water	WS
Health	Is the child vaccinated against all EPI illnesses? Takes vitamins; sleeping under a mosquito net; type of antimalaria drugs used in case of illness; do parents often go a health center when the child is ill?	VA, ML, IM, YEW,
Development of the child	Types of toys; availability of books (or illustrated books); attending a preschool education program; child having education activities in the household	EC, BR,
Dwelling	Setting of habitat; environment of the habitat; situation of the habitat; density of population; number of bedrooms	HC

Source Questionnaire MICS (Cameroon 2006)

Table 2 Forms of deprivations and indicators retained for the construction of household CPI

Forms of deprivation	Primary indicators	MICS modules
Water	Source of drink water; use of purification means; means of purification	WS
Health	Prevention against malaria; care against malaria; iodation of salt; level of the health expenses	ML, TN, YEW,
Instruction	Level of education of the head of the household	ED
Setting of life	Type of toilets; nature of the wall; nature of the soil; nature of the roof; density of population in the lodging; number of bedrooms; source of energy for lighting; cooking fuel; Home owner or rental	WS, HC,
Inheritance	Means of locomotion; telephone; source of information; element of comfort; arable earth possession; possession of herds	HC

Source Questionnaire MICS (Cameroon 2006)

Case of Households

The choice of forms of deprivations and the primary indicators is inspired by the works of Ki et al. (2005) and Foko et al. (2007). Table 2 presents the indicators that were selected and indicates the modules of the household questionnaire.

5 Results

This section presents the results of the findings concerning household poverty, child poverty and the links between the two.

5.1 *An Analysis of Household Poverty*

5.1.1 Construction of the Household Poverty Composite Index CPI_H

A first MCA was conducted using 31 primary indicators for 67 modalities. It allowed the identification of 24 relevant indicators (with 50 modalities). These indicators are those verifying the FAOC and thus making a meaningful contribution to the formation of this axis. A second MCA was conducted with the selected indicators; the factorial coordinates of the modalities are presented in Appendix 1. We note that the first factorial plan of this second MCA explains 32 % of the total inertia with 25 % for the first axis and 7 % for the second.

The configuration of the first factorial plan given in Appendix 1 confirms that the first axis is the axis of poverty. Indeed, welfare increases along this axis. Moreover, one can note that two forms of poverty emerge here: the precariousness of life and the poverty of comfort.

Table 3 Distribution of modalities in the first factorial plan

Poverty of comfort	Acceptable life setting
no stove; no fridge; no vehicle; no television; no telephone; no generator; no air conditioner; other fuels; no motorcycle; no computer; drinking water fetch at the well/river; no mosquito net; non harnessed latrines	Less than two people per room; source of water mineral water or faucet; well situated habitat; non-ruined habitat; has electricity; possess a radio; possess a clock; wall in hard material; roof in finished material; have a motorcycle
<i>Increasing welfare axis</i>	
No clock; no motorcycle; more than two people per room; main material of the soil archaic; material of the wall is rudimentary; roof in rudimentary material; ruined habitat; badly situated habitat; without electricity; no radio; non-protected water source; no toilets Precariousness in life setting	Possess a telephone; possess mosquito nets; have a generator; drinking water treated; have a stove; use fuel like gas/courant/kerosene; modern toilets which are purified; computer; air conditioner; water tap; fridge; have a vehicle Ease in comfort

Source MICS-2006 data, authors’ calculations

Precariousness of life is linked to characteristics of the habitat, clean surroundings of the habitat and its situation. Poor people have habitations built with rudimentary or dilapidated materials. Their homes are situated in precarious regions and do not have modern toilet facilities. These households live without electricity, without drinking water and more than two individuals sleep in a single room.

The poverty of comfort is due to lack of communication and most current information (no television, no radio, no telephone, etc.). Households affected by this form of poverty are deprived of material goods such as a refrigerator, a vehicle and a stove. Firewood is the main source of energy used for cooking (Table 3).

5.1.2 The CPI_H and Some Household Characteristics

To test the validity and the sensitivity of the well-being index constructed, we put it in relation with some household characteristics. We must verify that this index orders households following a certain level of welfare.

Area of Residence

The analysis according to the area of residence shows that the rural regions are the poorest while the more urbanized cities had a higher well-being level. Yaoundé and Douala appear to be islets of welfare in an ocean of poverty. This result is confirmed by all studies on poverty in Cameroon whether they follow the monetary or the nonmonetary approach. The results permit us to establish a classification in two classes of regions according to CPI_H. The first class consists of the regions where the indicator’s average value is positive: Yaoundé, Douala, South West and

Littoral. The second class includes regions where the CPI_H is negative. Among these are regions like east ($CPI_H = -0.48$), north ($CPI_H = -0.76$), and the far north ($CPI_H = -0.82$).

Sex of the Household Head

Regardless of the sex of the head of the household, we note that CPI is greater in households headed by men ($CPI_H = 0.02$) than in those headed by women ($CPI_H = -0.08$). Therefore, households headed by women are in general poorer than those headed by men. This can be due to the fact that many women are still victims of marginalization and discrimination in Cameroon especially in the labor market.

Level of Education of the Household Head

Multidimensional poverty declines with the level of education. The axis of welfare directly associates the households whose heads have no education ($CPI_H = -0.67$) and those whose heads have primary level education ($CPI_H = -0.23$). This result may reflect the fact that in Cameroon the level of education of the head of the household determines his socioeconomic situation. In fact, Ningaye et al. (2007) argue that the more the household head is educated, the easier it is for him to find a job as a civil servant through examinations. Individuals with poor levels of education are almost condemned to live in poverty.

Size of the Household and Number of Children Less Than 5 Years in the Household

Unlike monetary poverty that increases with the number of people living in a household there is no linear relationship between the CPI and household size. The relation between multidimensional poverty and household size is not linear. This evidence has also been highlighted by Foko et al. (2007). However, the welfare of the household decreases with the number of children who are less than five years old.

5.1.3 Multidimensional Poverty Line

The multidimensional poverty line is determined by the hierarchical classification method. It aims to bring together individuals according to their similarities and is based on the principle of intraclass homogeneity and interclass heterogeneity. It provides a nonarbitrary classification of individuals. The optimal number of classes is determined by the regularity of the bar histogram. If there is a marked discontinuity between two successive bars of the histogram, for example between $(p - 1)$ th and the p th, then the population in the survey can be partitioned in p classes.

Table 4 Household multidimensional poverty and characteristics of the household

	P0	P1	Gini index*
	<i>Milieu of residence</i>		
Yaoundé/Douala	8.0	1.6	16.0
Other towns	40.6	15.6	27.1
Milieu rural	87.5	52.0	40.4
	<i>Sex of the head of the household</i>		
Male	59.1	32.2	39.6
Female	65.2	35.2	40.3
	<i>Number of children less than 5 years in the household</i>		
Household without a child	58.1	31	38.8
Household with one child	61.2	33.4	40
Household with 2–3 children	66.9	38.3	42.5
Household with 3–5 children	78.1	42.3	39.7
Household with more than 5 children	66.7	33.5	30.9
	<i>Level of education of the head of the household</i>		
No education	89.5	57.1	43.8
Primary	70.6	36.7	37.1
Secondary and above	30.8	12.5	26.4

Source MICS-2006 data, authors’ calculations
Note *Before calculating the Gini index we used Eqs. (4) and (5)

The application of this method led us to retain a partition of the households into two classes (see Fig. 1 in Appendix 1). In addition, the convergence of the algorithm after the ninth iteration reveals a certain stability of the classes thus gotten. The first class has 5858 households out of 9667 (60.6 %). The households in this class were affected by deprivations like lack of electricity, the rudimentary nature of the materials used to build the dwellings, an unhealthy environment and difficult access. In this class, the minimal value of CPI_H was -1.41 and its maximal value was 0.16 . This classification analysis shows that the multidimensional poverty threshold is 0.16 and six households out of ten (60.6 %) are affected (Table 4).

5.2 Child Poverty

5.2.1 Construction of the Poverty Composite Index for Children Less Than 5 Years: CPIC

From the indicators presented in Table 1, we conducted a MCA. The factorial scores and the FAOC property permitted us to keep 43 indicators with 91 modalities for the construction of CPI_C . The coordinates of the modalities are presented in Appendix 2.

The results of the final MCA indicate that the first factorial plan accounted for almost 27.3 % of the total inertia axial with 17 % for the first axis and 10.3 % for the second axis. The first factorial axis appears as an axis of well-being. We also note that the second axis separates the types of endowments in two groups and that health status had great importance in child well-being. Thus, contrary to the households, a child's well-being to a minor extent depends on the comfort of the household to which he/she belongs or on the characteristics of the habitat. It is especially linked to his/her health status; to the elements which are indispensable to his/her development and his/her framing (preschool education, possession of modern toys, child never left alone, child receiving maternal, or paternal affection, etc.).

This result is similar to that obtained by Djoke et al. (2007) who conducted a similar study on four countries in the West African Economic and Monetary Union (WAEMU). Based on their analysis on child welfare indicators, they concluded that poor children in these countries were those who had not been vaccinated against the minimum packet of childhood illnesses. Health is one of the most important elements in the constitution of human capital.

5.2.2 Some Characteristics of Child Poverty

It is important to investigate the possible links between certain factors and the welfare of children. These factors concern some household characteristics and some characteristics of the person directly responsible for the child. We now examine the properties of the child poverty composite index vis-à-vis these characteristics.

As in the case of households, the well-being of children depends on the area of residence, the household size, the number of children in the household, religion and sex, and the level of education of the household head. The distribution of CPI_C (in Appendix 2) shows that poor children generally lived in rural environment, in large households (with a lot of child) and were Moslem, animist or without religion.

We also notice that the size of the household, especially the number of children living in the household, was negatively correlated to child welfare. In fact child well-being declined when these variables increased. For example, the average value of CPI_C was 0.15 in a household having one child; it went down to -0.4 for a household with 2-4 or 3 children and fell to -0.62 for households with more than 4 children. On the other hand, the average value of $CPI_C = 0.02$ in households with less than four persons, declined to -0.12 for households with more than ten persons. We can explain this result by the fact that more the children in a household, more it reduces the attention to be given to each child. In addition, the more the number of children in a family the more the parents will find it difficult to properly take care of them because of the limitations of available resources. Furthermore, children less than five years do not participate in generating household incomes.

We also noted that when the biological mother of a child resides in the household, the child's needs are better taken care of. Also, the characteristics of the mother or the caretaker greatly contribute to the well-being of children. An educated mother takes better care of her child than a less or non-educated mother

(average CPI_C is equal to -0.65 when the mother has no education, it is 0.07 for primary education and it is 0.74 for secondary education and above). The mother/caretaker is important for the welfare of the child. This observation from CPI_C shows that children whose mothers are aged between 25 and 39 years are less poor in comparison to those whose mothers are younger (less than 25 years) or older (40 years and above).

5.2.3 Child Multidimensional Poverty

We did a classification analysis to determine the poverty line. The bar histogram (see Appendix 2) shows an important gap between the first and the second bar; and also between the second and the third bar. This result leads us to believe that a partition of the sample into three classes will provide more relevant information. We first tested a partition in two classes; but it was unsteady. It did not take into account the health dimension since we found children enjoying good health and those having fragile health also in the two classes. Normally vaccinated children and those who had not been normally vaccinated were also together. We also noticed that the algorithm did not converge after the tenth iteration.

The partition of the sample in three classes was then adopted. It permitted us to define an extreme multidimensional poverty line and a poverty line. The first class that can be qualified as extreme poverty consists of children living in poor households, in unhealthy living conditions. They live in overcrowded households; they have never had any toys and are often left alone by their parents. For these children, conditions for good physiological and psychological development are neglected. This group of children represented 25.4 % of the sample.

The second class that qualified as a class of poverty was made up of children living in poor households but benefiting from some basics needs concerning health; also conditions for good development were somewhat taken into account. One child out of two was connected with this form of poverty (48.0 %). The last class, the one of nonpoor children, consisted of children living in households which had all conditions for good development and good health—it had 26.6 % of the children (Table 5).

In total, 73.4 % children in Cameroon were affected by multidimensional poverty with 25.4 % who were extremely poor. Only 7.5 % of the children living in rural areas were nonpoor. There was no gender effect in child poverty; boys and girls were equally affected. The Gini Index of child well-being was estimated at 25 % and was bigger in rural areas than in cities.

5.3 Link Between Child Poverty and Inherited Poverty

In this section, we test the relationship between the poverty status of children and poverty of the households in which they live. We classified children in two groups: the poor and the nonpoor.

Table 5 Child multidimensional poverty and characteristics

Variables	Modalities	P0	P1	Gini index*
Milieu of residence	Yaoundé/Douala	22.0	4.8	12.6
	Other towns	55.6	15.7	18.4
	Rural	92.5	36.6	24.2
Level of education of the Child mother/care taker	No education	94.6	44.2	27.9
	Primary	80.2	26.4	21.2
	Secondary and above	42.0	9.9	16.1
Sex of the child	Male	73.1	26.3	24.3
	Female	73.4	27.2	24.9
Quintile of household welfare index	First	100.0	50.9	25.3
	Second	99.4	36.0	18.5
	Third	90.6	23.8	15.5
	Fourth	41.8	8.6	10.6
	Fifth	12.5	2.6	9.2
Cameroon		73.4	27.3	24.6

Source MICS-2006 data, authors' calculations

Note *Before calculating the Gini index we used Eqs. (4) and (5)

Table 6 shows that among the 1738 children less than five years classified as nonpoor by the direct measurement of welfare, 92.6 % were from nonpoor households. Among the 4757 children classified as poor 87 % lived in poor households. We also noticed that only 3 % of the children living in poor households were non-poor. Thus, although child poverty has its specificities it cannot be dissociated from the household context. A child who is born in a poor household inherits some conditions which are not favorable for his normal development and he/she will have little chances to escape from poverty in the future.

The relationship between child poverty and household poverty was confirmed by Spearman and Kendall tests. These tests are nonparametric and they indicate a correlation of 74.3 % between these two phenomena. But, despite this strong link, we should not forget that 27.6 % of the children living in nonpoor households were also affected by child poverty. Also, there were many nonpoor parents who did not

Table 6 Relationship between child poverty and inherited poverty

		Inherited poverty		
		Non-poor	Poor	Total
Direct poverty	Non-poor	1609	129	1738
	Poor	614	4143	4757
	Total	2223	4272	6495
Pearson χ^2 (1)		3589.097***		
Kendall		0.7434***		
Spearman		0.7434***		

Source MICS-2006 data, authors' calculations

***p = 5 %; **p = 1 %

pay sufficient attention to their children's well-being. This indicates that child poverty has its specificities. Thus, targeting child poverty implies having specific policies.

6 Conclusion

The main objective of this study was to measure the extent of child and household poverty in Cameroon following a multidimensional approach and to identify some of the explanatory factors for these phenomena.

The main results show that 61 % of Cameroonian households were affected by multidimensional poverty; their living conditions were very poor and they lacked some basic household equipment. The study also showed that the child poverty rate was estimated at 73.4 %. Also, one child out of four faced extreme poverty characterized by very poor sanitation conditions (lack of potable water, households not having dwellings, etc.) and a poor psychological environment.

An analysis of poverty according to the area of residence revealed that whether household or child poverty, Yaoundé and Douala constituted a relative welfare island. The situation in the east, north, and far north provinces was the worst where about 75 % of the children and households were poor. Household multidimensional poverty was more pronounced than monetary poverty and it did not depend on household size. On the contrary, this variable affected child multidimensional poverty. The number of children living in the household also affected their well-being: the more the children in a household the more difficult it was for parents to meet their developmental needs. Some characteristics (level of education, age) of the child's mother or caretaker also influenced his/her well-being; an educated mother of 25–39 years took better care of her child.

An analysis of the link between child and household poverty shows that the poverty status of households plays negatively on the formation of human capital of children through health and living conditions variables. Both factors lead to what is described in the literature as the 'poverty trap'. The weakness of the human capital of these children compromises their chances of getting a good education and later getting better-paying jobs in the labor market which is becoming increasingly demanding in terms of qualifications. Thus, a majority of them will go to the informal sector and will later on create poor households. The correlation between child poverty and household poverty was very strong and 27.6 % of the children living in nonpoor households were also affected by child poverty.

On the basis of our results, we recommend to the Cameroon government that it should focus its poverty reduction programs on children and provide them with safety nets. More attention should be paid to children living in rural areas, particularly those in the far north, the north, and the east. In addition, the EPI must be intensified and extended to other diseases. Moreover, young girls' education policy should be reinforced as the level of education of the mother determines her child's well-being. The family code has to be finalized to strengthen legal protection for mothers and children.

Appendix 1: Household Poverty

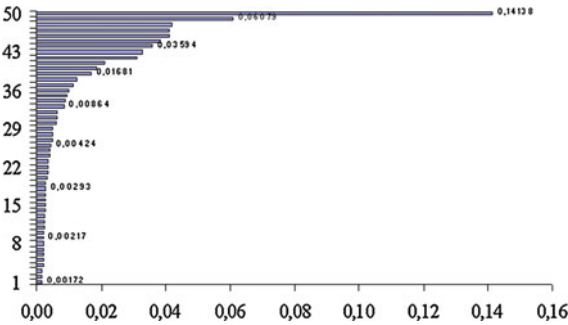
See Table 7, Fig. 1.

Table 7 Descriptive statistics table of the CPI_H following some household characteristics

Variables	Modalities	Weight	Average	Min	Max
Milieu of residence	Yaoundé/Douala	1578	1.22	−3.20	0.85
	Other towns	2871	0.39	−3.11	1.38
	Rural	5218	−0.59	−2.85	1.41
Sex of the head of the household	Male	7251	0.03	−3.20	1.41
	Female	2416	−0.08	−3.09	1.41
Level of education of the head of the household	Secondary and more	3599	0.69	−3.20	1.40
	Primary	3505	−0.23	−3.00	1.41
	None	2520	−0.67	−2.87	1.41
Religion of education of the head of the household	Catholic	3659	0.18	−3.20	1.40
	Protestant	2865	−0.01	−3.16	1.41
	Moslem	1640	−0.23	−2.79	1.41
	Other Christian/Moslem	608	0.08	−3.20	1.40
	Animists/No religion	867	−0.36	−2.63	1.41
Size of the household	1 persons	1846	0.03	−3.20	1.39
	2–3 persons	2523	−0.05	−3.20	1.41
	4–7 persons	3897	0.01	−3.20	1.41
	8–10 persons	1005	0.05	−3.16	1.41
	More than 10 persons	396	−0.03	−2.41	1.40

Source MICS-2006 data, authors’ calculations

Fig. 1 Bar histogram (household poverty)



Appendix 2: Child Poverty

See Tables 8 and 9, Fig. 2.

Table 8 Child poverty index following according to some household characteristics

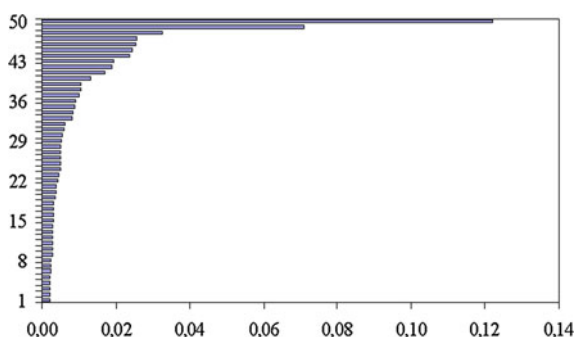
Variables	Modalities	Weight	Mean	Min	Max
Milieu of residence	Yaoundé/Douala	854	1.11	-1.45	2.80
	Other towns	1760	0.41	-2.03	2.95
	Rural	3881	-0.43	-2.13	2.21
Mother living in the household	Yes	6421	0.00	-2.13	2.95
	No	73	-0.37	-2.00	1.86
Religion of the head of the household	Catholic	2299	0.22	-2.10	2.95
	Protestant	1822	0.05	-2.13	2.45
	Moslem	1384	-0.27	-2.12	2.44
	Other Christian/Moslem	385	0.03	-1.95	2.80
	Animists/No religion	592	-0.39	-2.12	2.01
Number of children living in the household	1 child	2224	0.15	-2.13	2.95
	2-3 children	3730	-0.04	-2.12	2.80
	4 children	483	-0.34	-2.10	1.63
	5children and +	58	-0.62	-1.97	0.91
Size of the household	2-3 persons	515	0.02	-2.13	2.22
	4-7 persons	3610	0.05	-2.12	2.95
	8-10 persons	1428	-0.05	-2.10	2.72
	More than 10 persons	942	-0.12	-2.12	2.37
Level of education of the mother/care taker	No education	1868	-0.65	-2.13	2.19
	Primary	2735	-0.07	-2.10	2.44
	Secondary and +	1887	0.74	-1.93	2.95
Age of the mother/care taker	15-19 years	529	-0.26	-2.13	2.29
	20-24 years	1545	-0.01	-2.08	2.61
	25-29 years	1611	0.11	-2.12	2.66
	30-34 years	1190	0.04	-2.07	2.95
	35-39 years	793	0.05	-2.01	2.74
	40-44 years	385	-0.03	-1.99	2.30
	45-49 years	186	-0.14	-1.95	2.35

Source MICS-2006 data, authors' calculations

Table 9 Classification of children in three classes

Class	Poverty composite indicator		Class weight (in %)
	Minimum	Maximum	
Extreme poor	0.01	1.68	25.4
Poor	1.69	2.93	48.0
Non poor	2.93	5.25	26.6
Total	0.01	5.25	100.0

Source MICS-2006 data, authors' calculations

Fig. 2 Bar histogram (child poverty)

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