POVERTY AND MALNUTRITION IN CAMEROON

SAMUEL FAMBON

Senior Lecturer, Faculty of Economic and Management University of Yaounde II, P. O. Box 1365 Yaounde-Cameroon. E-mail: sfambon@yahoo.fr
Tel: (237) 22 57 53 (Home) ; (237) 87 43 10 (cel).

ABSTRACT

Over the past decades, child malnutrition has persisted at high rates in many developing countries including Cameroon. This research attempts to evaluate the levels and characteristics of the malnutrition affecting children and their mothers in Cameroon by using the anthropometric data gathered during the 1998 Demographic Health Survey (DHS) in the country. The research will also use the 1998 DHS to highlight the main factors affecting child malnutrition, by estimating a reduced-form nutritional status function which includes among others children’s characteristics, those of their mothers, and the environment as independent variables. Child malnutrition is expressed in terms of Z-score height-for-age, and the Z-score weight-for-age. Some policy implications will be derived from the results of the study.

I. Introduction

Under all its forms, malnutrition exacts a heavy tribute all around. More than 7 millions children each year die of the direct and indirect effects of malnutrition in developing countries, and millions of others suffer from serious developmental problems.

Poverty and malnutrition also figure among the major determinants of health. Malnutrition is especially deadly when it is associated with infectious diseases such as pneumonia, malaria, measles and diarrhoeal diseases which already cause the most deaths among children. Moreover, in the world as a whole, and more specifically in Sub-Saharan African countries, numerous children die of malnutrition indirectly.

In 1997, it was estimated that 160 millions children were suffering from moderate or serious malnutrition, and that a quarter of the world’s population lived in poverty—with more than a billion people surviving on an income of less than one US dollar per day. Even in industrialized countries, 100 millions people are classified as living below the poverty line.

Malnutrition is all the more serious because it has deserved a sustained attention in numerous international meetings.

In effect, during the Conference on world food production and consumption which took place in Rome in 1974, participating governments concluded the
meeting with the following solemn statement: “Every man, woman and child has the inalienable right to be free of hunger and malnutrition in order to fully develop his or her physical and mental capacities”. Twenty- two years later, governments with membership in the FAO, also meeting in Rome in 1996, reaffirmed their commitment to eliminate world hunger and, in particular, to reduce the number of human beings suffering from malnutrition.

At the World Summit on children held in New-York in 1990, an Action Plan in favor of the survival, development, and protection of children was adopted, and included the following objectives:
- the fight against children diseases;
- the reduction by half of child malnutrition;
- the reduction by a third of the death rate of children five years old or less;
- the reduction by half of the mothers’ death rate;
- the provision of drinking water;
- sanitation systems for all communities;
- Family planning sessions;
- Basic education for all children.

In 1992, the Declaration of Dakar largely confirmed the orientations of New-York. Cameroon has subscribed to this Declaration and to the Action Plan aimed at ensuring the protection and development of children in general, and of children who find themselves in difficult situations in particular. Despite the efforts made by different organizations to fight against malnutrition in developing countries, the number of individuals suffering from malnutrition keeps on increasing. In effect, according to the FAO, more than 800 million people in developing countries today are still under-nourished.

II - Objectives and Hypotheses of the Study
The general objective of this research is to study poverty in Cameroon using the anthropometric data gathered during the 1998 Demographic and Health Survey (DHS) in the country. The study will be concerned with absolute poverty which is defined as the inability of a family to ensure all the consumptions necessary to ensure an adequate health status and normal growth for its children, with the result that the later suffer from serious malnutrition. The specific objectives of the study are the following:

1. to evaluate the levels and characteristics of the malnutrition affecting children and their mothers in Cameroon. The idea is to identify the types of malnutrition that exist in Cameroonian society, and to detect the most prevalent malnutrition in the country. In particular, we shall attempt to find the correlations between the demographic and socio-economic status of women (e.g. their educational level, type of occupation, place of residence, age, matrimonial status, etc...), and the health status of children in Cameroon. Moreover, we shall attempt to establish the relationships between the
nutritional status and the incidence of infectious diseases (diarrhoea, cough, fever etc...) among children less than five years old.

2. To highlight the determinants of the children’s in Cameroon.

3. To identify the measures likely to be effective in the fight against malnutrition in Cameroon.

The following hypotheses will be tested:

1. the risk of malnutrition is the same for poor urban and rural households.
2. Household characteristics, such as household demographics, mother education levels, household resources and the availability of sanitation and sewerage facilities, etc...; community and environmental characteristics, are the most important factors affecting child nutrition in Cameroon.
3. the place of residence has a significant effect on children’s health in Cameroon;

III- Brief Review of the Literature

In Cameroon, studies devoted to malnutrition are rather scarce. In fact, besides the survey results presented in different reports (EBC 1984, DHS 1991, DHS 1998, ECAM 1996), there exists no detailed studies on the nutritional status and its determinants in Cameroon. Existing studies deal much more with ten or so African countries and several other developing countries in Latin America and Asia. Therefore it seems useful for us to review a few of the previous studies carried out in those countries in order to find the hypotheses and methodology to be used in our research.

Studies by Horton (1986) analyse malnutrition in the Philippines by making a distinction between households and children. To show the link between the nutritional status of children in a household and the size of that household, the author first considers individuals in Philippino households, and using Ordinary Least Squares (OLS), he estimated two functions for each household: a quantitative function represented by the number of children born in each household, and a qualitative function represented by the average of the Z-scores for each child of the household (by definition, the Z-score for the child’s height is equal to the ratio:

\[
\text{The child’s height - The median height in the Population of reference} / \text{The standard deviation of the population of reference}
\]

Next, the author considers each child as an individual, and runs a linear regression where the independent variable is the Z-score of height – for -age.

Strauss (1990) studies malnutrition in rural Côte-d’Ivoire by estimating with OLS, a function of health with as dependent variable the logarithm of the ratio of the child’s height to the median height, at the same age, of the sample of reference. Several variables are introduced in the equation, notably, human capital variables.
(such as the parents’ education), variables synthesizing the family’s nonhuman wealth, and variables related to the community in which the child lives (e.g. land ownership, distance to health care professionals,...).

As concerns Brazil, Thomas, Strauss, and Henriques (1990) carry out a study on malnutrition and mortality in several rural and urban regions of the country. The method used is similar to that used by Strauss (1990). Two years later, Thomas and Strauss (1992) use the same method to analyse the impact of infrastructures (access to electricity, drinking water,...) and foodstuff prices on malnutrition in Brazil.

In 1994, Thomas again publishes a comparative study on the U.S., Brazil, and Ghana, in which he analyses the incidence of the characteristics of both parents on the nutritional status of children of the same sex.

Sahn (1994) studies malnutrition in Côte-d’Ivoire based on the 1986 LMS survey. In the context of this study, the author uses the Z-score of height - for - age as a dependent variable in his linear regressions, he introduces the expenditures of individual members of the household as explanatory variables, and carries out distinct estimations for rural and urban areas.

For Morocco, Glewwe (1997) realizes a study on the effects of the mothers’ education on the health of children in that country. In his study, the author uses the results of a test given to the children’s mothers to evaluate their educational level (reading, arithmetic, general knowledge...) on the children’s health.

As to Jamaica, Handa (1999) has studied malnutrition in that country by estimating a function of the nutritional status by running a linear regression with the Z-score of height - for-age as a dependent variable without a distinction between urban and rural areas.

As concerns India, Pal (1999) studies malnutrition in that country by using a methodology different from that mentioned above. In his study, the author compares the height of each child (and this as a function of age) to a bound measuring the severity of malnutrition. These bounds are known as the “Havard Standards”. By considering the dependent variable as a qualitative variable which assigns a degree of malnutrition to each child, the author uses a multinomial Probit model to determine the probability of belonging to a malnutritional status.

Lastly, a 1999 “Working Paper” presents studies by Stifel, Shan and Younger on nine African countries. This study is similar to that of Morrisson and Linskens (2000) to the extent that it uses a linear regression (dependent variables: height-for-age and weight — for —age Z-scores) which can be applied to several countries. Actually,
the regressions are run on nine different countries, with each country having two databases. These authors readily agreed to use a standardized approach to analyse the effects of different variables on the children’s height and weight.

**IV - Conceptual framework**
We start by presenting a general conceptual framework which provide us with information on malnutrition, survival, disease, socio-economic factors, etc... and their interaction. This presentation will be completed by a causative conceptual framework which is ultimately used in this study.

1- General Conceptual Framework and Mosley Conceptual Framework.

The child’s survival is mainly conditioned by the social and economic status of his family expressed by two indicators: maternal education, and some indices of the household’s economic circumstances (Mosley, W. H., 1985).

On the other hand, Gubhaju (1987) has observed that the father’s level of literacy exerts but little influence on the child’s survival, whereas his mother’s literacy has a substantial impact on the child’s survival. This result is not surprising since women, more than men, are much more involved in the protection of children.

Several studies have confirmed the fact that chronic malnutrition is linked to high rates of infectious diseases and child mortality. According to Martorell and Habitch (1986), among less than five years old children, differences in nutritional status are due to external circumstances, and not to ethnic differences (Valvarde, 1981), and regional or seasonal variations (Brow et al., 1982). According to Chen (1983), recurrent episodes of infectious diseases in conjunction with deficient diets, are the basic factors causing lags in children’s growth and development.

Infant and child deaths are the direct result of disease and malnutrition, which themselves derive from inadequate access to food, shelter, health care, safe water, sanitation and education. The resources available and their distribution, in turn, determine the access which people have to these basic services. Since death is the end result of a cumulative series of pathological processes, the biological status of surviving children reflects their position along a spectrum from good health to life threatening disability. The simplest indicator of this growth faltering and body wasting can be measured by relating height and weight to age (Mosley, 1985). In most developing countries, diarrhoeal diseases are the leading cause of the death of infants and young children, along with respiratory diseases and malnutrition. A study of the relationship between protein-energy malnutrition and infectious diseases is fundamental for an understanding of the epidemiology of malnutrition (Scrimshaw, Taylor and Gordon, 1971).
Among the conceptual models that have been proposed for the study of child malnutrition and child survival in developing countries are the Kibet (1982), and Mosley and Chen (1984) frameworks. The key element of the conceptual model presented by Kibet (1982) is that of social synergy: that is, how a single social determinant, such as women’s education, can influence infant/child morbidity and subsequent mortality through several intermediate determinants simultaneously. The combined effect is greater than the simple sum of the impacts of each of the intermediate variables.

Mosley and Chen (1984) developed a refined analytical framework for the study of child malnutrition and child survival in developing countries. The framework shows that socioeconomic determinants of mortality operate through biological mechanisms or proximate determinants to influence morbidity and mortality. The key concept in the Mosley and Chen framework involves a redefinition of “cause of death”. Most biomedical and social scientists identify conditions such as infectious diseases and malnutrition as the main “causes” of high infant and child mortality. Although biologically this is correct, Mosley (1984) points out that this observation is not much more useful than to say that pregnancies are a “cause” of the birth rate. A useful approach would be to define and measure biosocial interactions leading to morbidity. The conceptual framework adopted in this study is derived from the Mosley and Chen analytical framework.

The conceptual hypothesis derived from the model presented in figure 1 is that socioeconomic and cultural factors act through a range of proximate determinants to influence child malnutrition and then, child survival. The socio-economic and cultural factors may be grouped into three broad categories of variables that are commonly followed in the social science literature. These include: individual level variables, household level variables and community level variables.

Individual level variables include the individual productivity of parents as well as traditions, norms and attitudes. Three elements that determine the productivity of household members are skills (typically measured by educational level), health and time.

For mothers, skills, time, and health impact directly on the proximate determinants. A mother’s education level can affect the child’s survival by influencing her choices and increasing her skill in healthcare practices related to contraception, nutrition, hygiene, preventive care, and disease treatment. In fact, so many proximate determinants may be directly influenced by a mother’s education to radically alter chances of child survival – social synergy (Motley, 1983). Finally, the production of a healthy baby also requires a mother’s time for child care. In traditional societies the characteristic of many developing countries, child care time often competes with time needed for income generating work. For poor families, a mother’s outside work may result in child neglect or care by a less skilled sibling, while a wealthy family may hire a skilled and caring nursemaid.
Grouped under traditions /norms /attitudes are factors that shape and modify the economic choices and health related practices of individuals according to the cultural traditions and norms of the society. The important cultural determinants of child survival include: power relationships within the household, value of children, beliefs about disease causation, and food preferences.

Figure 1: conceptual framework of determinants of infant and child survival

Household level variables include a variety of goods, services and assets at the household level which impact on child survival through proximate determinants. These include: sufficient food and water supply, appropriate clothing/bedding, appropriate housing, adequate supply of fuel/energy, transportation network, hygiene/preventive and sickness care and a suitable information network. Community level variables on the other hand include ecological setting, political economy, and health system variables.

According to Mosley and Chen (1984), all social and economic determinants must impact through intermediate variables to affect malnutrition, and then, child survival. Proximate determinants are grouped into five categories, namely: maternal factors including age, parity and birth interval; environmental contamination through air, food/water/fingers, skin/soil/inanimate objects or insect vectors; nutrient deficiency in relation to calories, protein and micronutrient; accidental or intentional injury, and personal illness control including personal preventive measures and medical treatment.
2 - Conceptualizing the malnutrition problem: Causality Analysis

Although the nutrition problem is complex, its causes can be reduced to manageable clusters to reflect the most important factors in a given situation. In this research, we will use the causative conceptual framework developed by UNICEF (1990) to examine the determinants of nutritional status of children (Figure 2). This framework breaks the determinants of malnutrition into three levels of causality, namely, intermediate determinants, underlying determinants and basics determinants.

Intermediate determinants
Malnutrition is implicated in the deaths of many young children and is a manifestation of problems occurring at different levels. As depicted in the conceptual framework, at the intermediate level both inadequate food intake and disease, often working synergistically have an immediate effect on nutrition status (which we measure through the use of different indicators). Malnutrition in the form of growth failure usually occurs as a combination of protein energy malnutrition and micronutrient deficiencies. As shown in the Figure 2 below, these factors are independent, and, are in turn influenced by underlying determinants.

Underlying determinants: Food, Health and Care constitute the underlying causes of malnutrition. All these determinants manifest themselves at the household level. Food here refers to food security at the household level. Sustainable access to safe food of adequate quality and quantity, paying attention to energy, protein and micronutrients being important. Household food security depends on having financial, physical and social access as distinct from mere availability.
Health includes access to health services as well as a hygienic and sanitary environment and access to water. An essential element of good health is access to curative and preventive health services by all community members.
Care refers to a process taking place between a caregiver and the receiver of care. It has several clusters of caring practices including: Care for women, breastfeeding and complementary feeding, home health practices, hygiene practices, psycho-social care, food preparation.

Basic Causes
What determines adequate household food security, care and health? This brings us to the next level of causality, that of basic causes. This is a group of factors that relate to resources, their control and use. Resources include human, economic, and organisational resource. Embedded in human resources are skills, motivation and knowledge, which is also influenced by education. Basic causes also include patterns of relationships and the ability to solve problems, the potential resources...
of the community and other levels of society which may be brought to bear in addressing the problem.

**Figure 2:** conceptual framework of Nutrition  
**Source:** adaptation of UNCEF (1990)
V – Methodology

1- Child anthropometric indicators

The evaluation of the nutritional status of the young is one of the basic objectives of demographic policy.

The nutritional status results both from the nutritional history of the child and from the diseases or infections that he has had. Moreover, this status exerts an influence on the probability that the child has to come into contact with diseases. In effect, an undernourished child experiences physical weakness which favors infections, which in turn may cause death. The nutritional status of children will be evaluated using anthropometric indices based on the child’s age, height and weight gathered during the survey.

Nutritional status is usually expressed in terms of the Z-score of the indicator concerned.

The weight and height of children of a given age group usually are normally distributed. The Z-score of height-for-age (ZHA) compares the height of a child of a given age to the median height of a baseline population of that age group. Similarly, the Z-score of weight-for-age (ZWA) compares the weight of a child of a given age to the median weight of a population of reference of that height group. However, the Z-score of weight-for-height (ZWH) compares the weight of a child of a given height to the baseline median weight for a child with the same height.

Since each index is expressed in terms of the number of standard deviations relative to the median of the NCHS/CDC/OMS international population of reference, children suffer from malnutrition, if they are below minus two standard deviations from the population of reference.

2- Adults Anthropometric Indicators.

With adults, age does not play the big role it does with children. An adult’s height and weight are weakly influenced by his age. A basic difference between the anthropometric measurements of adults and those of children lies in the fact that the height of an adult and hence his weight are largely determined by his genotype.

In the literature, several measurements have been used to express the nutritional status of a child. Since the early 1980’s, nutritionists have discovered that height and weight constitute the most pertinent anthropometric measures for children (Waterlow, 1984 and Tayne 1992. Most of the recent empirical studies realized in...
Sub-Saharan Africa and other countries therefore used height and weight as measures. According to Waterlow’s classification (1972, 1976), the most specific indicators used to estimate children’s malnutrition are of three types: height-for-age (log in growth), weight-for-height, and weight - for-age. These three indicators attempt to capture the different aspects of malnutrition.

In general, the nutritional status of adults is measured by the body mass index (BMI) which is an anthropometric measure of adult malnutrition. This index corresponds to the ratio of an individual’s weight in kilograms to his height expressed in square meters.

Scientists however do not agree on the BMI level which should be considered adequate for good health. James, Ferro-Luzzi and Waterlow (1998) have suggested three thresholds for the body mass index. In effect, a BMI lower than 16 translates into a third degree chronic energy deficiency. BMI values of between 16 and 16.9 indicate a second degree energy deficiency; when the BMI falls between 17.0 and 17.4, this implies a first degree chronic energy deficiency, whereas as BMI values equal to or greater than 18.5 are considered normal.

Dugdale (1985) holds that a BMI threshold of 19 is normal, while Payene (1986) suggest that when the body mass index is lower than 18.0, the adult suffer from malnutrition. In a study of the nutritional status of adults in Kenya, the Philippines, Pakistan and in Ghana, Gracia and Kennedy (1993) found that a threshold of 18.5 in the body mass index was not correlated to the morbidity status, thus indicating that the threshold suggested was significant only for certain populations.

Despite this divergence in views, we shall assume in this study that a BMI lower than 18.0 for a woman implies that the mother suffer from malnutrition.

3-. Anthropometric calculations

To make comparisons between relevant Cameroonian population age group and the reference standards, we shall use a computer software called EPI-INFO 2002 for windows developed by the Centers for Disease Control and Prevention (CDC) in Atlanta Georgia, USA.

This software will enable us to transform the raw anthropometric DHS survey data into the indices and scores described in the previous section.

Three main steps will be followed to compute our anthropometric measures. We will first enter our database into the computer. Second, the program should combine the raw data of the variables (age, sex, height, weight) to compute a nutritional status index, such as weight-for-age, height-for-age or weight-for-
height. Third, the program should transform these data into Z-scores so that the prevalence of nutritional conditions, such as being underweight and stunted can be calculated.

Once we finish calculating our anthropometric indices, we will present them in simple tables using specified cut-offs points and age categories consistent with that has been presented.

For further statistical evaluation, we will used SPSS or STATA, by exporting our data to those soft wares.

5 - Modelling the Determinants of Malnutrition

In general, what determines children’s nutritional status? Such causal analysis is much more difficult and requires a clear analytical framework to avoid drawing false inferences from the data.

The starting point for thinking about the determinants of a child’s nutritional status is a health production function, since nutritional status is a major component of child health.

So, in general, to highlight the determinants of the malnutrition of children and parents in Cameroon, we shall use a model derived from BECKERIAN’s standard model of household utility in which utility is simultaneously derived from purchased goods, and goods produced by the households, including health and foodstuffs.

Under these conditions, model specification starts with a household utility function and the health production function of children. In this framework, we assume a utility function of the household of the form:

$$U = U(C, L, H, T, IC, HC, CC, \varepsilon)$$  \hspace{1cm} (1)

Equation (1) shows that household utility depends on the labor supply (L), Health status (H), and the consumption of purchased goods (C). Welfare also depends on observed characteristics (such as Individual Characteristics), (IC), Household characteristics, (HC), Time, (T), Community and environmental factors (CC), and unobserved characteristics, $\varepsilon$.

We also suppose a health production function given by the following equation:

$$H = H(NI, C, HS, IC, HC, CC, \mu)$$  \hspace{1cm} (2)
Equation (2) shows that the health outcome is a function of nutritional intake and consumption. It is conditioned on the household size (HS), and household and community characteristics that improve health.

In addition, and guided by the underlying economic determinants of nutritional status in figure (2), we suppose that nutrition is related to consumption, education, as well as individual and household characteristics. This is given by the following equation:

$$\text{Ni} = N(\text{Ci}, \text{E}, \text{IC}, \text{HC})$$  \hspace{1cm} (3)

To the previous equations, we add a wage equation and a time constraint equation. The wage equation is given by the following form:

$$w = w(H, N, E, IC, HC, Ci, ew)$$  \hspace{1cm} (4)

This equation reveals that wage is determined by the health and nutritional levels of the individual, Education (E), individual Characteristics (IC), Household Characteristics (HC), as well as unobserved factors and random fluctuations in wages (ew).

The time constraint equation is expressed as:

$$T = T_h + T_w + T_1 + T_E$$  \hspace{1cm} (5)

$$T_h$$ time allocated to health;

$$T_w$$ = time allocated to labor;

$$T_1$$ = time allocated to leisure;

$$T_E$$ = time allocated to education.

Consequently, the utility function is maximised subject to the health and nutrition production functions, the time constraint equation, the wage equation and the budget constraint, which is given by the following equation:

$$P_C C + P_h H = wL + y$$  \hspace{1cm} (6)

In this equation, P is the price of non-health consumption, and P_h is the price of health consumption. Y is non-wage income, while wL is Labour income. The maximisation of the problem yields a set of reduced form equations including the equation below, which is of interest to this study.

$$H_i = h(\text{IC}, \text{HC}, \text{CC}, \mu)$$  \hspace{1cm} (7)
In this equation, which represents the reduced form demand function for the health input $i$, IC are child characteristics such as age, sex, etc., HC are household characteristics, such as household demographics, parental educational levels, household resources and the availability of sanitation and sewerage facilities; CC are community characteristics such as the accessibility and quality of health services. $\mu$ is a random error term that represents the unobservable individual, family and community characteristics that affect the child’s nutritional outcomes.

As we can see, the above equation is a reduced-form health production function which depends solely on exogenous variables such as:
- the characteristics of the child, the parents and the community;
- and a variable, which by assumption is independent from the above, i.e., the specific and non-observable characteristics of the individual or family members which can influence health.

The above considerations imply the estimation of the following equations:

**Z-score height - for - age $f$ (the characteristics of the child, the mothers, and the environment).**

(8)

With:

$$\text{Z-score height-for-age} = \frac{\text{the child's height} - \text{Median height in the population of reference}}{\text{Standard deviation in the population of reference}}$$

The child’s characteristics are: age, age squared, sex, the number of months between the child’s birth and that of the preceding child, the number of children born before the child considered, the feeding of the child, and whether the child is a twin.

The parent’s characteristics are the mother’s education, her health measured in terms of body mass index (BMI), her matrimonial status (single, polygamous or monogamy family), access to the medias, occupation, wealth etc.

Environmental health characteristics are: health care (the child’s vaccination, assistance provided to mother during pregnancy), and infrastructure (access to drinking water, electricity, toilets, floor materials (cement, tiles,...), etc...

**Z-score of weight-for-age $= f$(characteristics of child, of the parents, and of the environment) **

(9)

With:

$$\text{Z-score of weight-for-age} = \frac{\text{the child weight} - \text{median weight in the population of reference}}{\text{Standard Deviation on the population of reference}}$$
The characteristics of the child, of his mothers, and the environment are the same as in equation (8).

Regressions will first be run using the national sample, and then a distinction will be made between rural and urban areas to the extent that the environment varies across regions.

7- Econometric Considerations
To estimate the nutritional status equation, ordinary-least-squares (OLS) estimates will only be unbiased if we can rule out correlation between the error term and all explanatory variables. For the nutritional status regression, such a correlation is likely to exist. In effect, some unobserved factors, could influence household income, and so, the explanatory variable (income) would be correlated with the error term.

In this respect, to estimate the reduced-form models (8) and (9) consistently, some researchers such as Strauss (1990), and Haddad and Hoddinot (1994) employ the fixed-effects model, and the Instrumental Variable (IV) methods used by such researchers as Shan and Alderman (1997).

In carrying out our empirical analysis, two models will be estimated separately for weight for height and height for age. The first will examine the effects of household characteristics on the health status without taking into consideration household-level heterogeneity. The second will be a fixed model, which is designed to control the unobserved household-level heterogeneity.

8 - Database
The data we shall use in this study will be taken from the second Demographic and Health Survey (DHSII, 1998) conducted by the Central Census and Population Studies Office (BUCREP) with the technical assistance of Macro-International INC.

The survey was carried out through poils and covered Yaounde/Douala (the largest cities of the country), other cities and rural areas. Its objective was to provide detailed information on fertility, family planning, the health of the mother and child, the nutritional status of children less than three years old, infant and youth mortality and the death rate of mothers.

The data was collected from February to June 1998 on 4697 households, 5501 women of child-bearing age (14-49) and 2562 men between 15 and 59 years old. The DHS consisted of three kinds of questionnaires:

a. The Household Questionnaire which helped to establish the list of all household’s members, and to gather from them information concerning the name, family relationship with the head of the household, place of residence,
sex, age and level of education. This questionnaire also helped to collect some housing characteristics which enabled the evaluation of the socioeconomic and environmental conditions under which the men and women polled lived.

b. The individual Woman’s Questionnaire consisted of eleven sections which helped to gather information on several areas, and in particular:
   - socio-demographic features (place and duration of residence, age and date of birth, education, literacy, access to medias, etc...);
   - Height and weight of mothers and children;
   - Reproduction;
   - Contraception;
   - Pregnancy and feeding of the child;
   - Vaccination and health;
   - Marriage;
   - Maternal mortality etc..

VI- The Expected Consequences of the Study

The result of this study will help policymakers, international organizations as well as the donors countries concerned with poverty in Africa to improve the policies aimed at the fight against poverty in these countries through the design of adequate nutritional programs. Moreover, the result of the study will also help in the acquisition of general knowledge on the behaviour of Cameroonian households.

VII- Brief References


**Bureau Central des Recensements et des Etudes de Population (BUCREP) et Macro International (1999),** Cameroun: Enquête Démographique et de Sante 1998, Calverton, Maryland USA.


Waterlow, J. C., (1972), Classification and Definition of Protein-Calorie Malnutrition, British Medical Journal N°3.

Waterlow, J. C., (1976), Classification and Definition of Protein-Calorie Malnutrition, in G. H. Beaton and J. M. Bengoa (eds), Nutrition in Preventive Medicine, Geneva, WHO.

World Bank, Tears: Education Enrollment in India”, document de travail, World Bank, Washington, D.C.


VIII - Plan of the Study
Nous pensons que cette proposition de recherche s’effectuera sur une période d’environ 12 mois. On peut distinguer trois principales phases au cours de cette recherche telles que présentées dans le tableaux ci-après:
<table>
<thead>
<tr>
<th>Phases</th>
<th>Activités</th>
<th>Calendrier</th>
</tr>
</thead>
</table>
| 1ère phase | a) Acquisition et étude des documents de politiques gouvernementales relatives à la nutrition et la santé  
b) Intensification de la revue de littérature;  
c) Organisation et collecte de données | 2 mois     |
| 2ème phase | a) Collecte de données  
b) Estimation du modèle et modification eventuelles | 3 mois     |
| 3ème phase | a) Collecte supplémentaire de données  
b) Réestimation finale du modèle  
c) Rédaction du rapport final | 7 mois     |