

# IDENTIFYING HOUSEHOLD LEVEL DETERMINANTS OF POVERTY IN ALBANIA USING LOGISTIC REGRESSION MODEL

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**Abstract:** The general goal of this paper is to analyze poverty in household per capita consumption as a monetary measurement and based in the data from Albania trying to identify probable determinants that influence in falling in a trap of poverty. Current literature suggests several ways of modeling the determinants of poverty. Usually the regression analysis is used to check in the same time the influence of the different factors. In this paper, binary logistic regression was estimated with economic status (poor-non poor) as dependent variable and a set of characteristics of individual and household as independents variables. The logistic model used shows that probability of being poor is found to be influenced mainly by education and status of employment of household head, the household composition and geographic divisions.

**Keywords:** Poverty, determinants, logistic regression.

## INTRODUCTION

Poverty as a multidimensional concept includes monetary and non monetary characteristics. As a result of this multidimensional nature there are used different measures which vary from one county to another. Even between people in a country perception for poverty change within regions and social and economic groups depending on their sources of income and determinants of well-being. There are many types of poverty and deprivations. People live in poverty when they are deprived of incomes and other life resources, such as goods, commodities, housing conditions and sanitation, services that can permit them to have a role and build their own social life. In developing countries poverty is very wide spread and is characterized by hunger, lack of living resources, unemployment, illiteracy, epidemics, lack of health services and lack of water. In developed countries poverty is characterized by social exclusions, unemployment growth and low salaries. Poverty measures are based on consumption and income. The consumption is considered as a

better measure for several reasons: is directly related to wellbeing, consumption is easier to be measured than the income because a large part of income can not be monetarised if households consumption their products or exchange them with other products, consumption may better reflect the living standard of the household and also the ability for fulfilling basic needs, because consumption expenditures reflect not only the goods and services that can be bought with the current income, but also if the household can save when the current income is low or negative (World Bank, 2005).

Poverty also have non monetary dimensions, accompanied not only with an insufficiency of the income or consumption but also with an insufficiency of health, nutrition, literacy and also insufficiency in social relations, insecurity.

Poverty in Albania is calculated with the measurement based on the consumption. It is difficult to measure the income as under reporting, sezonalitly and informality.

A lot of arguments for measuring welfare indicators (consumption or income) are discussed in the Hentschel and Lanjouw (1996) and Coudouel *et al.* (2002) literature.

Current literature suggests several ways of modeling the determinants of poverty. Thus, there is no consensus for the selection of a model. The best analyzes to identify the factors that influence the probability of being poor is the regression analyses when we can check in the same time the influence of the different factors.

In the section 2 of the paper are discussed poverty monetary and non monetary measures. In this section is explained methodology used for the Albanian LSMS 2002 and 2008, also based in household consumption per family and per capita as a monetary measurement analyzed trends of poverty for 2002 and 2008. Section 3 includes model specification and explains variables set that will be used in the regression analyze. There are considered a set of

socio-demographic characteristics the household and the head of the household, that could be influence the probability of being poor. Our paper in section 4 gives the results of logistic regression model used for possible poverty contributing factors in Albania based on LSMS 2002, 2008 and at the end of the paper are some concluding remarks.

#### THE ALBANIAN LIVING STANDARD MEASUREMENTS SURVEYS METHODOLOGY AND DATA

Poverty is expressed in monetary terms and nonmonetary indicators. **Monetary poverty:** An individual is considered poor if his level of per capita consumption expenditure falls below a minimum level necessary to meet the basic food and non food needs, this minimum is considered as absolute poverty line. The method used for the poverty line can affect the structure of poverty (who is considered poor). Once the poverty lines are defined, can be calculated the number and percentage of people who could not meet basic minimum needs. These are the calculations in terms of incidence, gap and severity of poverty. *The Head-count index*, is estimated as a ratio of the number of persons that are below the poverty line compared to the total number of persons in the population of a country. If there are M people below the poverty line and N people in the total population, then the head-count ratio is simply M/N. This indicator has a simple and clear method, and it is the most commonly calculated poverty measure, but that is poses two problems: firstly, a reduction in the level of expenditures of the poor people does not show how badly the poor people are; secondly, this indicator does not describe the distribution of income between the poor. *The Poverty gap index*, measures how far the income or the consumption from an individual are from the poverty line. This is a measure that shows how "bad" the poor are. This index is better than the percentage of poverty, but it also has its own disadvantages, as it is insensitive by the number of persons under the poverty line and also by the way income is transferred to the poor. Poverty gap index is another measure which captures poverty magnitude by considering also the number of poor people and even how poor they are. *Poverty Severity index*, measures the severity of poverty by putting the gap in square and making it average between the income of the poor and the poverty line. This index is of a primary importance as it considers inequality between the poor. The poverty severity index gives more weight to very poor than to less poor. While this measure has clear advantages for some purposes, such as comparing policies which are aiming to reach the poorest, it is not easy to interpret. For poverty comparisons, however, the key point is that a ranking of dates, places, or policies in terms of this index

should reflect well their ranking in terms of the severity of poverty. *Relative poverty* is measured usually as people that are under 60% of the median national consumption.

Poverty also have non monetary dimensions, accompanied not only with an insufficiency of the income or consumption but also with an insufficiency of health, nutrition, literacy and also insufficiency in social relations, insecurity. **Non monetary poverty:** In terms of non monetary poverty the poverty is measured by: *Subjective poverty* that is calculated by their perception about household life, 0 are considered very poor and 10 are the richest and *unmet basic needs* for education, dwelling condition, water and sanitation.

Several different data gathering methods and survey techniques can be used to collect data which can be used for Living Standards Measurement Survey, LSMS. The LSMS collect information on such factors as: 1) household expenditures and income, 2) health, 3) education, 4) employment, 5) agriculture, 6) ownership of assets such as housing or land, and 7) access to services and social programs, etc This coverage of additional topics is achieved by reducing the commodity detail required in the consumption module. Multi-topic surveys enable the analyst to measure and understand poverty and its different dimensions. Such surveys are also useful for assessing broad trends and the long-term changes in poverty.

In 2002 was the first Living Standard Measurement Survey. The 2002 Albania Living Standard Measurement Survey (LSMS) provides individual and household level socio-economic data from 3,600 households drawn from urban and rural areas in Albania. The sample was designed to be representative of Albania as a whole, Tirana, other urban/rural locations, and the three main agro-ecological areas (Coastal, Central, and Mountain). The survey was carried out by the Albanian Institute of Statistics (INSTAT) with the technical and financial assistance of the World Bank. The information for the LSMS survey was collected using four questionnaires (Household questionnaire, the diary questionnaire, the community questionnaire and the price questionnaire).

The sample design was a two-stage cluster, with 450 Primary Sampling Units (PSU) selected in the first stage and 8 households (plus four reserve units) selected in the second one.

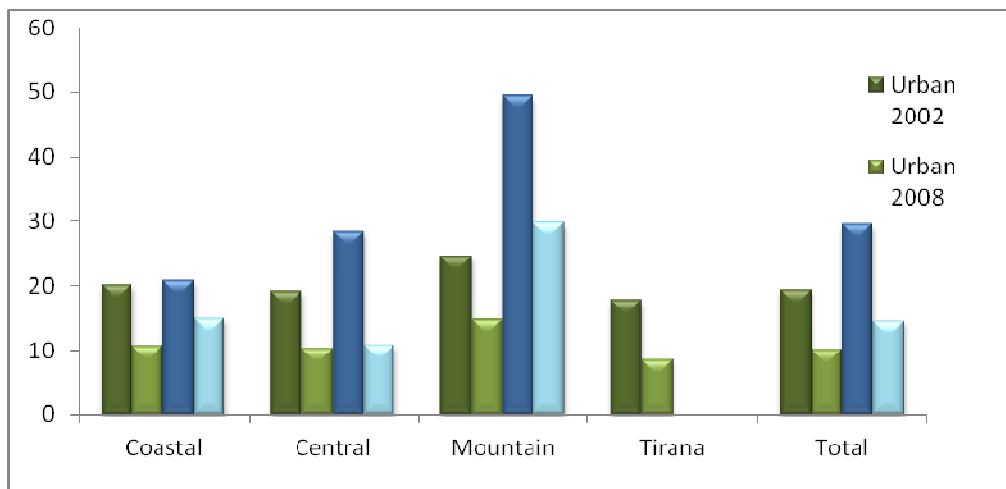
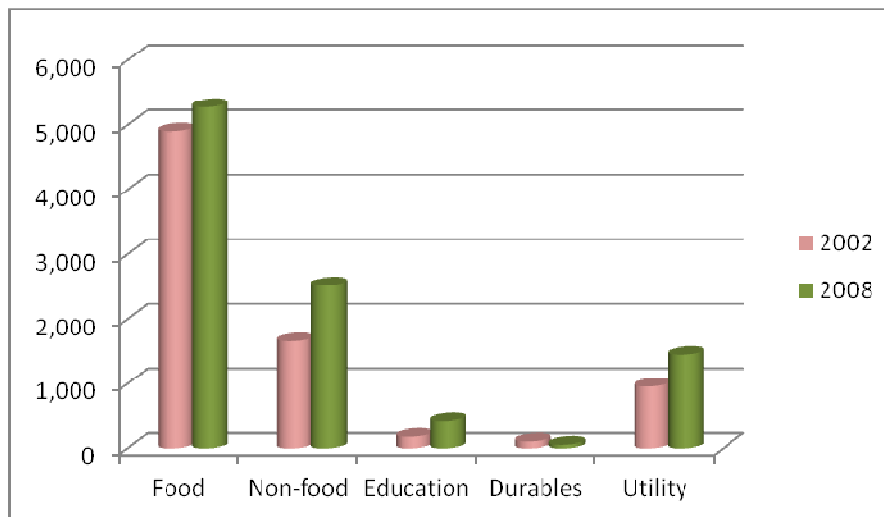
In 2005 and 2008 were respectively the second and the third survey. The sampling design chosen for the 2005 and 2008 LSMS is similar to the one used in

**Table 1: Poverty and Inequality in Albania**

Indicators	2002		2008	
	Poor	Extreme Poor	Poor	Extreme Poor
Headcount	25.4	4.7	12.4	1.2
Depth	5.7	0.8	2.3	0.2
Severity	1.9	0.2	0.5	0.0
Gini coefficient	28.2		34.5*	

Source: Living Standard Measurement Survey, 2002, 2008

\*World Bank calculation

**Figure 1: Trends in poverty by region and area** (Source: Living Standard Measurement Survey 2002, 2008)**Figure 2: Per capita real consumption** (Source: Living Standard Measurement Survey 2002, 2008)

2002. The sizes of the first and second stage samples are essentially the same as those for the 2002 survey. In this paper are used data from the Albanian Living Standard Measurement Survey (LSMS) 2002 and 2008.

From the data processed for LSMS in the year 2002, the absolute poverty line was estimated equal to 4891 leks per capita per month; the food poverty line has been 3047 leks per capita per month. In 2008 is used the same absolute poverty line and the food poverty line as in 2002.

The percentage of population in Albania, the real consumption per capita per month of which it is under the poverty line, fell from 25.4% in the year 2002 in 12.4% in 2008 (Table 1).

The substantial reduction in poverty across the board was accompanied by a faster decline of rural poverty rates. Despite the significant reduction of poverty in the rural areas, the poor are still concentrated in the rural Mountain areas. Other measures of poverty in the rural areas have also experienced a larger decline. For the period from 2002 to 2008 show that the percentage of poverty was reduced with 50.6% in rural areas, and with 49.5% for urban areas. The higher per capita consumption is for the region of the Tirana and the lowest one is for the mountain region for 2002 and 2008. Per capita real consumption of food for period 2002-2008 was increased with 7.62% (Figure 2).

The population with the highest percentage of poor people is concentrated more in the mountain regions (Figure 1). An important point of poverty trends is the share of poor comparing with the share of the population. The result shows that for Coastal the total of poor of 13% in 2008 reflects an important improvement from 21% of poor people in this region in 2002. The higher improvement of situation of the household is visible also in the other regions. For the Mountain that presents a decrease of poverty, but still there are highest populations that still live in poverty in this region. These could happen because they have fall in the trap of poverty.

Education shares of real per capita consumption have the largest increase. Education expenditures and shares in 2008 have increased by about 144% from 2002.

The increase in the education expenditures and shares of real per capita consumption in 2008 and the decrease in food shares of real per capita

consumption indicate a higher quality of life in Albania.

Once certain satisfactory levels of consumption are reached, food shares of the per capita consumption are expected to decline, since once food requirements are satisfied, individuals will use the extra income for other activities. In 2008, this seems to be going towards higher investments in education. Indeed, between 2005 and 2008, the number of students has known a significant increase in addition of a large number of private schools in the country, and an increase in the number of students studying abroad. These factors comply with the increase of education expenditures and education shares of the real per capita consumption.

### MODEL SPECIFICATIONS AND VARIABLE EXPLANATION

Current literature suggests several ways of modeling the determinants of poverty. Thus, there is no consensus on the selection of a model. The first method is the regression of per capita consumption against a set of independent variables (Malik, 1996). It is often encountered in studies, the transformation of this variable in a logarithmic form. In linear regression analysis total power of forecasting is indexed by determination coefficient, whose statistical significance determined by the value of Fisher. A second method is the use of probit or logit regression, where the dependent variable is a binary variable (poor- not poor) (Goaed and Ghazouani, 2001). Second method, known as probit or logit model estimates the probability that a household is poor or not poor when family characteristics and other variables make its socio-economic environment. In the case of logistic model coefficient of determination considered pseudo  $R^2$  and not have the same weight in the model as in the case of the linear model.

Researchers have also developed multinomial logit models to assess the probability of being extremely poor, poor and non-poor, or the division into several categories Geda *et al.* (2001), such as based on quartile.

Binary logistic model is less limited than the linear assumptions, so this model is seen as the appropriate method when it comes to a variable which can be expressed in dichotomous form. Since the logit model calculates the logarithm of possibilities there are no limitations to the upper or lower.

The model takes form (Gujarati dhe Porter, 2009):  $\Pr(Y=1 | X) = \frac{e^z}{1 + e^z} = P_i$

$$z_i = \alpha + \beta_1 x_i + \beta_2 x_2 + \dots + \beta_i x_i + \varepsilon_i$$

Where  $P_i$  denotes probability,  $\alpha$  the constant term,  $\beta_k$  parameters that will be estimated,  $x_i$  is a vector of independent (explanatory) variables,  $\varepsilon$  error term  $M$ .

In terms of odds model can be written as:

$$\text{Odds ratio} = \frac{P_i}{1 - P_i} \text{ and } \log(\text{odds}) = \ln\left(\frac{P_i}{1 - P_i}\right) = z_i$$

In the paper are considered a set of variables that could be influence the probability of being poor. The binary logistic regression shows how these independent variables affect the increase of poverty or the chance of being poor from 2002 to 2008. So as a dependent variable is considered variable poor taken value "1" if is poor and "0" if it is not poor. As independent variable are considered: mean year of school (Yearsch), age (age in years of the household head), age squared, natural logarithm of household size (Lnhsiz), region (Coastal, Mountain, Central, dummy variables 1 if household lives in respective region), area (Rural, dummy variable 1 if household lives in rural area), opinion for life (life opinion), illiteracy (illiteracy), gender of head (Femhead, dummy variable, 1 if the head is female), head with lower education (headlowedu), head with higher education (headHedu), head unemployed (headunemp), work force (workf), own the dwelling (dummy variable), distance from school, distance from bus, number of children, dwelling area (dwellarea) and dwelling ownership (dwellown), room per person, year (1=2008 and 0=2002)

## MODEL RESULTS

As we mention earlier the best analyzes to identify the factors that influence the probability of being poor is the regression analyses when we can check in the same time the influence of the different factors. Table 2 shows the results of the logistic model used for possible poverty contributing factors in Albania. The education of persons or the head is directly related with poverty, this because as higher is the education of the individuals, higher is the access that he have in basic needs and more possibility have to earn income and to fulfill the needs and to buy food and non-food products. Increase years of education decrease the chance of being poor. The illiteracy increases the chance of being poor with 12% but is

not significant this influence, these because more than 95 percent of the population of the school age know how to read and write.

The statuses of employment of the head also influence the poverty. A head unemployed, with lower education have more chances to be poor. The head that is unemployed increase with 35% percent the probability of being poor (p-value < 10%). Also the head with lower education compared with the other categories have 20% more chances to be poor. The household with female head is higher the probability of being poor but not statistically significant.

The household compositions as number of adults, number of children, household size, and age of the persons have a significant influence in the poverty. This demographic indicators influence the indirectly the per capita monthly consumption. So as higher is the household size the possibility of being poor is higher. The household that have two children decrease the possibility of being poor but one more dependent children increase the chance to be poor. Increase with one person the number of adults in the household, male or female, decrease the possibility of being poor and is statistically significant at p=0.1%. The geographic divisions influence the quality of life, the access that this household could have to the schools, hospitals or other public services. The population that live in the rural area compared with the urban areas have 15% more chances to be poor (p < 1%). Also the population that lives in the mountain regions compared with the reference category Tirana have more possibility to be poor. A household that lives in the coastal areas and the central have less chance to be poor than non being poor.

**Table 2: Regression of poverty status by socio-demographic characteristics**

<b>Factors</b>	<b>Odds ratio</b>
Yearsch	0.933***
Lnhsiz	35.922***
Age	1.037***
Age square	1.000***
Illiteracy	1.122
Coastal	0.647***
Central	0.683***
Mountain	1.027
Rural	1.154**
Lifeopinion	0.444***
Children2	0.834**
Children3	1.033
Femhead	1.103
Headunemp	1.347+
Headlowedu	1.202**
HeadHedu	0.359***
Femadultsum	0.784***
Maleadultsum	0.715***
Roompers	0.24***
Workf	0.902*
Workown	0.512***
Childrensum	0.945
Dwellown	0.715***
Dwellarea	1.381***
Lnincomneed	0.69***
Lndibus	1.157***
Distanwater	1.064
Satissituat	0.403***
Year	1.34**
Costant	0.549
<b>Chi-square</b>	<b>8,261.249</b>

a) Binary logistic regression 1=poor, 0= as a reference category non poor

b) ^ Chi-square test was performed to examine whether or not method use significantly varies between categories of each factor. +p<0.10; \*p<0.05; \*\*p<0.01; and \*\*\*p<0.001.

**Table 3: Household size by regions**

<b>Regions</b>	<b>2002</b>	<b>2008</b>
Coastal	4.2	3.6
Center	4.3	4.0
Mountain	5.1	4.7
Tirana	3.8	3.5
<b>Total</b>	4.3	3.8

Source: Living Standard Measurement Survey, 2002, 2008

The higher difference of the poor by geographic divisions is related also with the possibility of finding a job, to have more access in the basic needs, to have better education, and also by characteristics of their household compositions.

The mountain regions have the largest household size (Table 3), more children and less access in basic needs.

The poverty is also influenced by dwelling condition as is dwelling area, ownership of the dwelling or room per persons that influence quality of the life. Also the distance from the bus, from the water are factors that show how deprived are these households compared with other households.

### CONCLUSIONS

Poverty indicators have a special importance. Monetary measurements are based on monetary and in non monetary dimensions, accompanied not only with an insufficiency of the income or consumption but also with an insufficiency of health, nutrition, literacy and also insufficiency in social relations, insecurity. Differences in poverty rates across broadly defined regions have narrowed substantially compared to what they were in 2002 and 2008.

Current literature suggests several ways of modeling the determinants of poverty. The best analyze to identify the factors that influence the probability of being poor is the regression analyses when we can check in the same time the influence of the different factors. In our paper binary logistic regression analyze is used for poverty contributing factors in Albania. Households with lower education of the head, head unemployed, live in the mountain and rural areas, with more children and larger household size, less access in the public resources, bad dwelling conditions as less space at home or do not own the dwelling, have more chances to be poor.

Analyze developed in this study showed that the variables that are positively correlated with the probability of being poor are: size of the household, age of household head, living in rural areas, head low

educated and unemployed, illiteracy (not significantly). All the education variables included in the analysis were significant, indicating the importance of education in the reduction of poverty; household size was also identified as an important factor to explain poverty. Based on this analyze policies aimed at the reduction of poverty should be concentrating on increasing the education and employment levels of the population, improving infrastructure.

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