UNIVERSITÀ DI SIENA 1240

**QUADERNI DEL DIPARTIMENTO**
**DI ECONOMIA POLITICA E STATISTICA**


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**n. 745 – Gennaio 2017**


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Abstract

This paper presents the results of the latest poverty mapping update using the most recent LSMS survey of 2012 and the most recent Census 2011. This poverty map still builds on the methodology outlined in Elbers *et al.* (2003), but also innovates by including a number of new methodological developments, the most important described by Elbers and Van der Weide (2014). The results presented here can be a powerful tool for policymakers, as they allow better understanding and addressing spatial inequalities in welfare across Albania; this is particularly needed since in the last decade the internal movements led to large-scale urbanization in some areas and drastic depopulation in others. While internal movements are multifaceted, it is apparent that the large majority of internal migration flows is in the direction of Tirana.

**Keywords**: Poverty Mapping; LSMS; Census; Albania

**JEL Classification**: I32, C21, R58

## 1. Introduction

The World Bank, in collaboration with the Department for International Development (DfID), assisted the Government of Albania in 2001 in the establishment of a permanent poverty monitoring and policy evaluation system in Albania. That project aimed at creating a reliable and sustainable system of household surveys for the timely production of reliable and relevant statistical information so to assist policy-makers in the design, implementation and evaluation of economic, social and environmental programs. Since 2002, Albania has relied on the Living Standard Measurement Survey (LSMS) to measure poverty, inequality and other development outcomes. Today, four rounds of LSMS have been carried out: 2002, 2005, 2008 and 2012. The LSMS collected rich information on household expenditure, income, employment, housing, education, health, and other socioeconomic indicators.

To better understand the spatial dimension of welfare in Albania, the activities envisaged under that initial project included a poverty and inequality mapping analysis at a much lower level of geographical disaggregation than what the LSMS sample allowed (Betti *et al.*, 2003; Neri *et al.*, 2005). This mapping exercise was based on the methodology fully described in Elbers, Lanjouw and Lanjouw (2003): this method combines census and survey information to produce finely disaggregated maps which describe the spatial distribution of poverty and inequality in the country. The 2002 LSMS and the 2001 Census were used for this work. Over time, the poverty maps were updated using the 2005 LSMS (Dabalen and Ferrè, 2008) and the 2008 LSMS (Betti and Neri, 2010; Betti *et al.,* 2013) both still relying on the 2001 Census. The contribution of such works relied on a reweighting scheme: specifically, the proposed method, which took inspiration from Lemieux (2002), constructs a counterfactual consumption distribution for the old household survey, in our case the Albania LSMS 2002, using the information contained in the latest surveys, Albania LSMS 2005 or 2008. The method projects what the consumption distribution for the 2002 LSMS (which was conducted about the time the 2001 Census was done) would look like if the parameters (the coefficients of a consumption model) and distribution of the characteristics of the sample, and therefore population, were as reported in the 2005 or 2008 surveys. The derived counterfactual distribution together with the Census, were then used to obtain an updated poverty map of the country, using the methodology proposed by Elbers *et al.* (2003) and used in the original poverty and inequality mapping by Betti *et al.* (2003). Another attempt to measure poverty in Albania without consumption data - but still based on a sample survey - is found in Azzari *et al.* (2006).

This paper is motivated by three main reasons; i) first of all, the availability of the most recent LSMS survey of 2012 and the most recent Census undertaken in 2011, ii) then since the previous poverty mapping exercises, Albania has faced a revision of the spatial administrative structure launched in June 2015: the 61 reformed second-level municipalities have also been derived by aggregating the old 373 municipalities. The aggregation may not correspond precisely to the current administrative divisions because the old second-level districts are now defunct, and the former rural municipalities or communes have been abolished and are now counted as third-level units, that is, neighborhoods (*lagje*) or villages (*fshat*), within the new municipalities. These new results may nonetheless be more relevant for policy making today because they more closely mirror the administrative units on which policy making and poverty initiatives will become focused henceforward; iii) thirdly, compared to the last 2001 Census, the 2011 Census recorded a number of notable demographic changes, reflecting a period of large changes. For instance, the population fell with 269 thousand people (8.8%), the average age of the population increased from 30.6 years in 2001 to 35.3 years in 2011, the number of children under 15 years of age, sharply declined from 898 thousand in 2001 to only 579 thousand in 2011, while the number of elderly people of 65 years and over increased from 231 thousand to 318 thousand in the same period.

This poverty map still builds on the methodology outlined in Elbers *et al.* (2003), but also innovates by including a number of new methodological developments, the most important described by Elbers and Van der Weide (2014). The results presented here can be a powerful tool for policymakers, as they allow better understanding and addressing spatial inequalities in welfare across Albania.

Moreover, we present the poverty maps revised according to the new local administrative units established through the territorial reform launched in June 2015 to demonstrate that poverty maps can be adapted and made useful within an altered geographical area administrative structure (Dávalos and Thomo, 2016).

This paper is made up of five sections. After this introduction, Section 2 presents the methodology and data, Section 3 documents how the method has been applied to the Albanian data, while Section 4 presents outcomes and results for the whole of Albania and disaggregated at prefectures and municipalities/communes levels. Concluding remarks end the paper in Section 5.

## 2. Methodology and data

### 2.1 Methodology

Poverty is most often (and arguable best) measured on the basis of consumption data from a sample survey as LSMS, in which household per capita expenditures (or per adult equivalent) are compared against a poverty line. Given the complexity and cost of undertaking such measurement, it is only feasible to collect this information from a sample of households in a survey. Poverty measures based on surveys have sampling errors and these rise rapidly as the target area gets smaller. This precludes analysis of poverty at the local levels.

The statistical technique of Small Area Estimation (for which the core reference is Rao, 2003) provides tools for improving survey estimates at small levels of aggregation, by combining the survey data with information obtained from other sources, most often a population census. A research team at the World Bank has developed a methodology for the small-area estimation of poverty measures, the econometric method known as ELL (Elbers, Lanjouw and Lanjouw, 2003) has gained wide popularity amongst development practitioners around the world. Since 2003 ELL has been used to produce more than 100 Poverty Maps worldwide and its estimates have been the base for the allocation of many sources for fighting poverty.

There have been several recent methodological developments within the SAE literature that have been included in the PovMap software. The methodological new improvements include estimation via Empirical Best, an estimation method proposed in Molina and Rao (2010) that utilize existing information in the household survey more efficiently and have a particular advantage when surveys cover a large number of PSUs. Further improvements also include the option of utilizing Empirical Best based on an approximated empirical distribution (approach known as Normal Mixtures) instead of an assumed distribution (Elbers and Van der Weide, 2014).

The ELL method has been applied performing the usual three stages. First, a set of variables deemed to have similar distributions in the survey and the Census are identified.

Second, a model of log per capita consumption expenditure ($\ln y_{ch}$) is estimated in the survey data based on the identified variables:

$$\ln y_{ch} = X_{ch}{}'\beta + Z{}'\gamma + u_{ch} \qquad (1)$$

where $X_{ch}{}'$ is the vector of explanatory variables for household $h$ in cluster $c$, ß is the vector of regression coefficients, $z'$ is the vector of location specific variables, $\gamma$ is the vector of coefficients, and $u_{ch}$ is the error term due to the discrepancy between the predicted household consumption and the actual value. $X_{ch}{}'$ is household level variables that have similar distributions in both survey and census, while $z'$ include location specific averages of variables found in census, and potentially other external variables available at local levels for the entire country, as for instance GIS based variables. The error term of the model is decomposed into two independent components: $u_{ch} = \eta_c + \varepsilon_{ch}$, where $\eta_c$ is a cluster-specific effect and $\varepsilon_{ch}$ a household-specific effect. This error structure allows for both a location effect – common to all households in the same area - and heteroskedasticity in the household-specific errors, although in many applications, the estimated location level variance component has been negligible. Details of the heterosckedasticity model and variance components can be found in Haslett (2013).

In the third part of the analysis, poverty estimates and their standard errors are computed. There are two sources of errors involved in the estimation process: errors in the estimated regression coefficients ($\hat{\beta}$ ,$\hat{\gamma}$) and the disturbance terms, both of which affect poverty estimates and the level of their accuracy. ELL propose a way to properly calculate poverty estimates as well as their standard errors, taking into account these sources of bias. A simulated value of expenditure for each census household is calculated with predicted log expenditure $X_{ch}^{'}\hat{\beta}+Z^{'}\hat{\gamma}$ and random draws from the estimated distributions of the disturbance terms, $\eta_c$ and $\varepsilon_{ch}$. In the case of Albania, these simulations are repeated 200 times. For any given location (such as a district or a commune), the mean across the 200 simulations of a poverty statistic provides a point estimate of the statistic, and the standard deviation provides an estimate of the standard error.

**2.1.1 Standard Errors**

A major advantage of the ELL based approach is that in addition to estimating key indicators as poverty, depth of poverty and a range of inequality measures, it also estimates standard errors of these indicators. The importance of standard error becomes a critical aspect when gauging how much trust to have in the predictions. A prediction, of say 15 % of an area being poor, is not so valuable if it comes with a 95 percent confidence interval of say 0% to 30%. As illustration of standard errors that are more useful, the 95 percent confidence interval for the national poverty estimate of the 2012 LSMS survey is 12.5 to 16.1 percent poor.

A number of factors influence the standard errors of poverty estimates. These include sampling and measurement errors in the survey, which are beyond control of construction of the poverty map. Other aspects can be under control (at least partially) such as: the precision of the consumption model, the spatial level at which cluster effects are estimated, and the number of households in each spatial area.

Tarozzi and Deaton (2009) highlighted some concerns with the ELL methodology. Notably, they show that, under certain circumstances, the ELL method can result in an overly optimistic assessment of the standard errors of the local poverty estimates. The specific concerns rose by Tarozzi and Deaton (2009) can be summarized as follows. First, differences in consumption patterns not captured in the model can bias both poverty estimates and the standard errors. The ELL method estimates a consumption model that is assumed to apply to all households within each model. The implicit assumption is that the relationship between household expenditures and its correlates is the same for all households, and that all remaining differences are due to non structural factors. This is not a minor assumption and is explicitly acknowledged as such in ELL. However, Elbers *et al.* (2008) provide evidence that the concern does not have large practical implications. Second, Tarozzi and Deaton (2009) caution that the misspecification in the error structure can lead to underestimation of standard errors. They show that under some conditions, ignoring the spatial correlation can cause a bias in standard errors of poverty estimates. This concern is addressed below. Finally, Betti and

Ballini (2008) propose a modified JRR method for estimating poverty measures standard errors at prefecture level on 2005 LSMS in Albania.

**2.2 Data**

The two primary data sources utilized for the Albanian Poverty Map are the LSMS 2012 and the Census 2011. The method takes advantage of the strengths of both the surveys and the Census. In the case of the LSMS data its strength is the measurement of consumption which is the direct underpinning for measuring poverty, while the strength of the Census data is its coverage of all households.

The last Population and Housing Census from October 1 2011 recorded 2.8 million residents in Albania (INSTAT, 2012). The Census includes a large number of variables that can be matched to the LSMS survey (see more on this below). As noted in the Introduction, compared to the last Census the Census 2011 recorded a number of notable changes, reflecting a period of large changes. During this decade the internal movements in particular led to large-scale urbanization in some areas and drastic depopulation in others. While internal movements are multifaceted, it is apparent that the large majority of internal migration flows is in the direction of Tirana. In fact, it is mainly the areas surrounding the city of Tirana that attract most of the internal migrants. More generally, it can be observed that migration flows in direction of a particular city, be this Tirana or Durrës, are diverted to nearby destinations and the reason is that the desired destination is usually very difficult to enter as attractive as it is. Between 2001 and 2011, 228,952 persons living in Albania have changed their prefecture of usual residence: these migrants account for 8 per cent of the resident population in 2011. For inter-town or village moves during the same period the recorded figure is

280,863 individuals. Nearly half of these internal migrants have relocated to the Tirana prefecture.

The Albanian Institute of Statistics (INSTAT) conducted the Living Standards Measurement Survey (LSMS) in 2002, 2005 and 2008, in order to study various socioeconomic characteristics of the population, including consumption and poverty.

The methodology of the 2012 LSMS (INSTAT, 2013) has been kept similar with the surveys conducted in the previous years. Also, the geographic representative sampling domains have been expanded to include the 12 prefectures of Albania, by urban and rural strata, compared to four geographic regions (Central, Coastal, Mountain and Tirana) by urban and rural strata defined previously as domains for the survey. This required a considerable increase in the sample size from 3,600 to 6,671 households making possible to calculate indicators of living condition for 24 strata and even for the four main areas of the country in order to compare the regional results to those from the 2002, 2005 and 2008 surveys and study the regional trends for various indicators.

In designing the sample for the 2012 LSMS, it was important to review the sample design and results from the 2008 LSMS. The data from the 2008 LSMS were used for a simulation study to calculate the approximate level of precision that would have been expected for the 2012 LSMS estimates of key indicators based on the proposed sample size and distribution (World Bank, 2012).

## 3. Construction of the Albanian poverty mapping

The definition of poverty in the poverty maps follows the official poverty methodology, same as the one defined in the LSMS survey, and the national poverty line of 4,890 in 2002 leks is applied to all results.

### 3.1 The Consumption Models

The Albanian Poverty Mapping is based on four regional consumption models (Central, Coastal, Mountain, and Tirana)[1]. Splitting the LSMS sample into different domains have the advantage of better capturing local circumstances, while the lower number of observations limit the number of variables that can be included in the model. The implicit assumption is that the parameter estimates on the regressors are the same for households in the chosen domain. In other words, a national model assumes that the relationship between household expenditure and household characteristics are uniform throughout the country. This may not be a tenable assumption. Fitting separate models by domains that are more homogenous allows the relationship between expenditure and the explanatory variables to vary and it reduces the standard error of poverty prediction due to the error in modelling. However, if domains are too small they might become prone to overfitting and the predictions can become overly influenced by idiosyncrasies in the LSMS sample. Hence, a model need to find a balance between allowing

[1] This poverty mapping diverges from previous poverty mapping (Betti *et al.*, 2003) in that it estimate one model for coastal and one model for central domains. Earlier version relied on coastal urban, coastal rural, central rural, and central urban models. Some communes/municipalities have both urban and rural observations, and for those areas the estimated headcounts in (Betti *et al.*, 2003) rely on two different prediction models. In this case, the estimated standard errors of the FTG and inequality measures are only correct under the assumption the two estimation models are uncorrelated. This assumption does not seem to likely be true, so joint models were preferred over split models.

heterogeneity across the country, while as the same time not be over fitted to a small sample of LSMS. The four domains seem to fulfill both assumptions, as the models replicate poverty as measured in LSMS well, without having relative large variation in the cluster effect (see Table 1 below) and are based on relative parsimonious models with high R-squares (appendix tables A1). The following subsections, elaborate on each of these different aspects below.

**3.2 Alignment of Explanatory Variables in Census 2011 and LSMS 2012**

As laid out above, in a poverty mapping only variables that have similar distributions in LSMS and the Census are eligible as explanatory variables in the regressions models. The Albanian poverty mapping, in this regard, is nearly a perfect setting, as the census includes many variables highly correlated with consumption, including:

- **Demographic characteristics:** gender, age, marital status, household size, number of children, adults, and elderly in the household.
- **Education:** highest education level completed of the household head, highest education level completed by any household member.
- **Occupation**: employment status, occupation, sector of employment
- **Housing characteristics:** type of housing unit, age of building, presence of lift and toilet, source of water, number of rooms and size of dwelling, ownership and occupancy status of dwelling
- **Durable and productive assets:** ownership of boiler, refrigerator, freezer, television, tv decoder, washing machine, dishwasher, microwave, fixed telephone, mobile phone, computer, internet, solar panel, air conditioner, car, and agricultural land and livestock.

Further, the survey and Census are very close in time (one year), limiting variation in variables due to changes over time. Only variables common to census and survey, presenting same definition and similar distribution in both databases can be considered in the analysis. Appendix table A1 shows the survey and Census mean for variables included in the final models.

### 3.3 Stability and Accuracy of Consumption Models

A good prediction model needs to balance several objectives. It should have a high correlation between consumption and household characteristics. This can be gauged in the adjusted r-square of the consumption regression (1). However, only maximizing R-square can easily lead to other weaknesses. One such potential weakness is too high reliance on the specific survey sample. To avoid such issues, models were designed to not be too specific to the selected sample in LSMS. This was done by excluding variables with skewed distributions (variation relying on relative few observations) and by testing different models and comparing final predictions. These different models gave very similar results. Further, the variables found to have the highest importance score in Random Forrest predictions were considered as a first set of explanatory variables.[2]

As laid out above, the census estimates come with some uncertainties captured in standard errors, and as highlighted by Tarozzi and Deaton (2009) our estimated standard errors are only correct if there is a minimal amount of spatial correlation

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[2] Random Forrest is a prediction algorithm that both selects variables and predicts consumption. The method is known to produce more robust predictions, as it in our application relies on 500 different models, and variables that were consistently included are seen as more robust predictors. See Sohnesen and Stender (2016) for an evaluation of the prediction method for poverty prediction.

above the cluster level. Following the previous poverty maps in Albania (Betti *et al.*, 2003), the level of spatial correlation is assessed by:

$$\rho_I^{\,2}(Y \mid X) = \frac{\hat{\sigma}_\eta^{\,2}}{\hat{\sigma}_\eta^{\,2} + \mathrm{var}(e_{c\bullet})} \qquad (2)$$

Where $\sigma_\eta^2$ is the variance of the cluster component and $\mathrm{var}(e_{c\bullet})$ the variance at household level. Table 1 shows that in all four prediction models, the variation at the cluster level is minimal.

**Table 1. Intra cluster error as share of total error**

| | Coastal | Central | Mountain | Tirana |
|---|---|---|---|---|
| $\hat{\sigma}_\eta^{\,2}$ | 0.031 | 0.039 | 0.018 | 0.030 |
| $\mathrm{var}(e_{c\bullet})$ | 5.835 | 5.192 | 5.021 | 5.046 |
| $E[\hat{u}_{c\bullet}^{\,2}]$ | 5.865 | 5.231 | 5.040 | 5.076 |
| $\rho_I^{\,2}(Y \mid X)$ | 0.005 | 0.007 | 0.004 | 0.006 |

Source: Authors calculations following Betti *et al.* (2003)

### 3.4. Spatial structure

At the time of the data collected used for the mapping exercises in 2002–04 and 2012, Albania was spatially divided into 12 prefectures (first-level local administrative units), 373 municipalities (second-level local administrative units), and cities, villages (together, the third-level local administrative units). The municipalities were of two types, either urban or rural. The rural municipalities were also known as communes. Because the Census 2001 and the Census 2011 were both carried out based around the older system, including the 36 districts that were a second-level local administrative unit before 2000, the core results of the poverty mapping exercises in 2002–04 and 2012 reflect this system.

Nonetheless, the standard errors of the poverty estimators increase as the population of the estimate area decreases. This is illustrated in Figure 1, where the standard errors of the poverty headcount decline as the number of households in the area increases. The average standard errors in the poverty estimates for municipalities and communes are 0.04. In comparison, the LSMS domain (regional) standard errors range in 0.01 to 0.03. As expected, the municipal poverty estimates are thus associated with greater standard errors relative to the domain estimates based on the LSMS data, particularly in those areas with fewer than 3,000 inhabitants (log 8 in Figure 1). Among the old municipalities, 130 have fewer than 3,000 inhabitants each, while only one of the new municipalities and none of the old districts have fewer than 3,000 inhabitants. Substantial standard errors are therefore associated with the poverty estimates for a number of communes and municipalities.

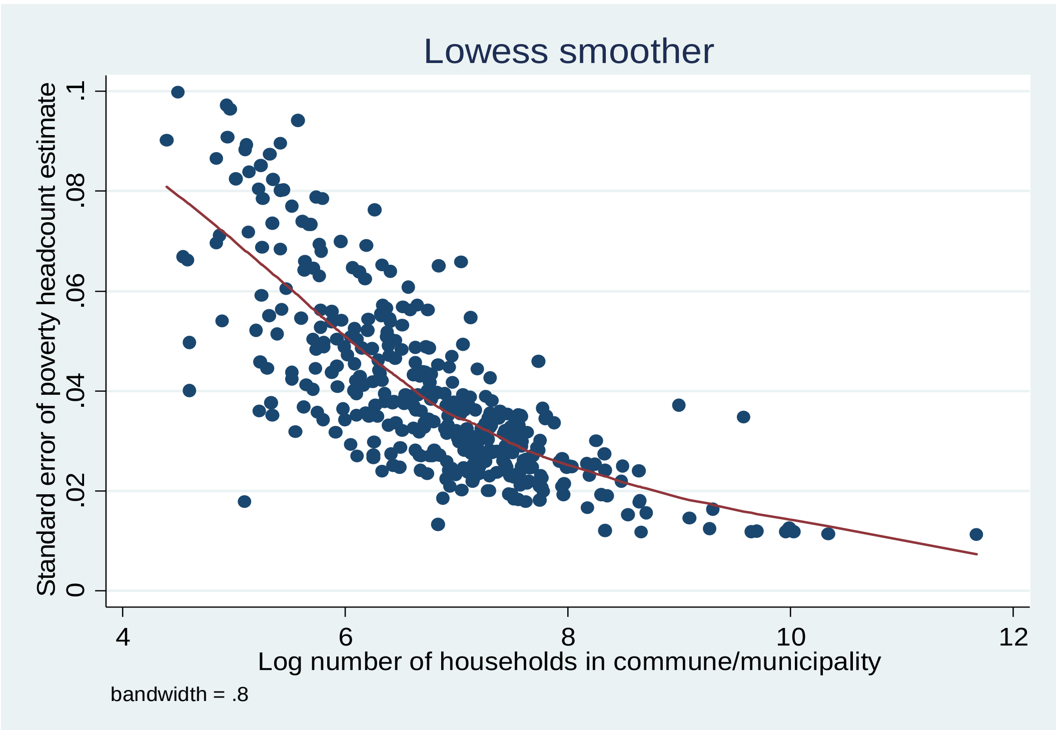
## 4. Poverty and inequality maps

One of the great advantages of the ELL small area estimation methodology applied for the Albanian Poverty Mapping is that it estimates the entire distribution of consumption for each small area. A standard output from the PovMap program, therefore include among other measures, the following indicators: 1) FGT 0 - the poverty rate or head count, 2) FGT 1 - the depth of poverty, 3) FGT 2 - the squared depth of poverty – severity of poverty, 4) The Gini coefficient, 5) The General

Entropy measures of inequality (1, 2 and 3), 6) The Atkinson measures of inequality (1 and 2).

All these indicators can easily be mapped, and overlaid with spatial data as roads, elevation, health and educational facilities etc. Hence, maps can illustrate and analyze new aspects. Moreover, to check the robustness of the method, the poverty measures computed on the Census data, can be compared with the interval estimates– the range that with large certainty can say that the true poverty measure is within – computed on the survey data, at the area level for which these estimates are significant.

**Figure 1. Log number of households in area and standard errors of poverty estimates, communes and municipalities**




Source: Authors' calculation of poverty headcount standard errors for communes and municipalities

### 4.1 Description of Results

This section summarizes the main results of the poverty mapping exercise (see Table 2). The poverty rate (headcount) in Albania was estimated at 14.3 percent in 2012, the same to the national poverty rate estimated through the LSMS 2012.

**Table 2. Poverty headcounts in measured LSMS survey and estimated with census**

| Domain | LSMS | 95 CI of LSMS | | Census estimate |
|---|---|---|---|---|
| Central | 12.6% | 10.1% | 15.0% | 13.1% |
| Coastal | 17.7% | 14.7% | 20.8% | 15.5% |
| Mountain | 15.1% | 10.9% | 19.4% | 20.6% |
| Tirana | 12.1% | 6.7% | 17.5% | 11.7% |
| National | 14.3% | 12.5% | 16.1% | 14.3% |

A robustness check of the Poverty Mapping, the predictions of poverty from the models are compared to the LSMS level of poverty at a level in which the LSMS is representative; as you would expect these to line up with similar results. Table 2 reports the measured levels of poverty, the 95 percent confidence interval, and the predicted level from the census. In all domains, a part from Mountain domain, the predicted level of poverty computed on the census data applying the Poverty mapping procedure, are within the corresponding 95 percent confidence interval of the LSMS survey.

Analyzing results disaggregated at Prefecture level, the highest poverty rate was in Kukës Prefecture (around 22.0 percent), and the lowest rate was in Gjirokastër Prefecture (around 8.0 percent). There were 398,131 poor individuals in the country. The number was higher in the central region (153,968 poor individuals), and the lowest number was in the mountain region (53,337 poor individuals). Tirana Prefecture had the highest number of poor people (94,101), Gjirokastër Prefecture had the lowest number (5,988). Average per capita monthly consumption in the country in 2012 was 8,477 ALL. Prefectures with the highest average level of consumption were Gjirokastër (10,190 ALL), Korçë (9,260 ALL), and Berat (8,785 ALL), while the prefectures with the lowest level of consumption were Kukës (7,126 ALL), Dibër (7,551 ALL) and Elbasan (8,192 ALL). Poverty rates varied across communes, from 2.6 percent in the commune of Zagori in Gjirokastër Prefecture to 38.5 percent in the commune of Kalis in Kukës Prefecture. The highest poverty rates were in the communes and districts in the northeast of the country, where the darker red color is more expansive in Figure 2. In the south and southeast of the country, poverty rates were substantially lower. The poverty rates were higher in the communes and districts of the mountain region (20.6 percent), and the lowest rates were in the Tirana region (11.7 percent).

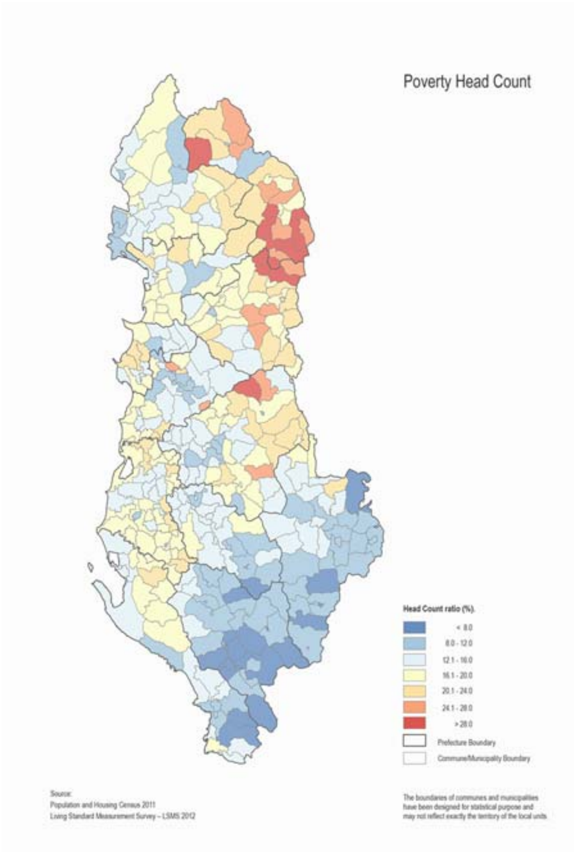
The prefectures of Durrës, Kukës, and Tirana showed large differences in the poverty rates across municipalities and communes. In the prefecture of Durrës, poverty rates ranged from 9.0 percent in the commune of Bubq to 21.0 percent in the municipality of Sukth. In the prefecture of Kukës, the lowest poverty rate was in Bajram Curri Municipality (10.0 percent), and the highest rate was in Kalis

Commune (38.5 percent), which is also the poorest commune in the country. In the prefecture of Tirana, poverty rates varied from 9.2 percent in the municipality of Tirana to 25.2 percent in the municipality of Kamëz.

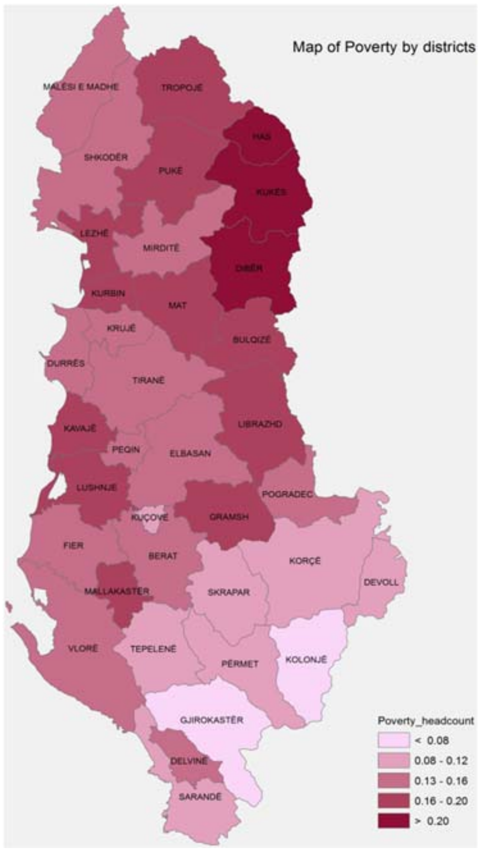
The prefectures with the largest gap between the lowest and highest poverty rates were Dibër, Elbasan, and Kukës. In the prefecture of Kukës, the lowest poverty rate was in Bajram Curri Municipality (10.0 percent), and the highest rate was in Kalis Commune (38.5 percent), the poorest commune in the country.

**Figure 2. Poverty Maps, Communes and Districts, Albania, 2012**

**a. Poverty rates, communes**




**b. Poverty rates, districts**



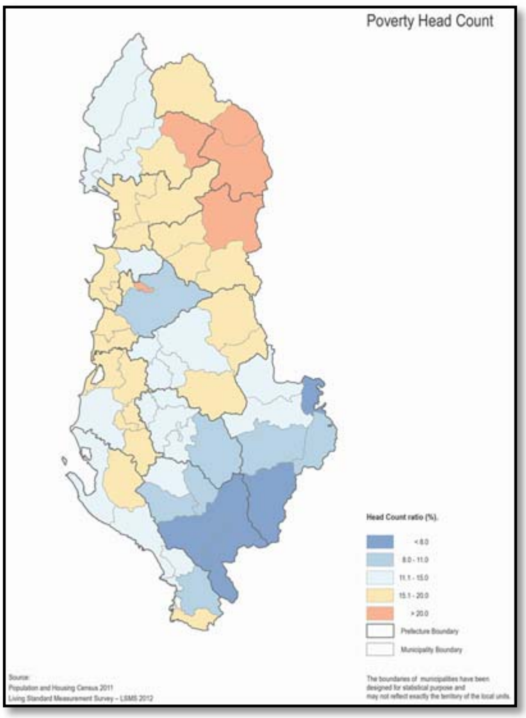
The lowest poverty rate in Elbasan Prefecture was in Librazhd Municipality (8.7 percent), and the highest was in Orenjë Commune (30.4 percent). In Dibër Prefecture, the lowest poverty rate was in the municipality of Burrel (11.2 percent), and the highest rate was in Sllovë Commune (29.4 percent).

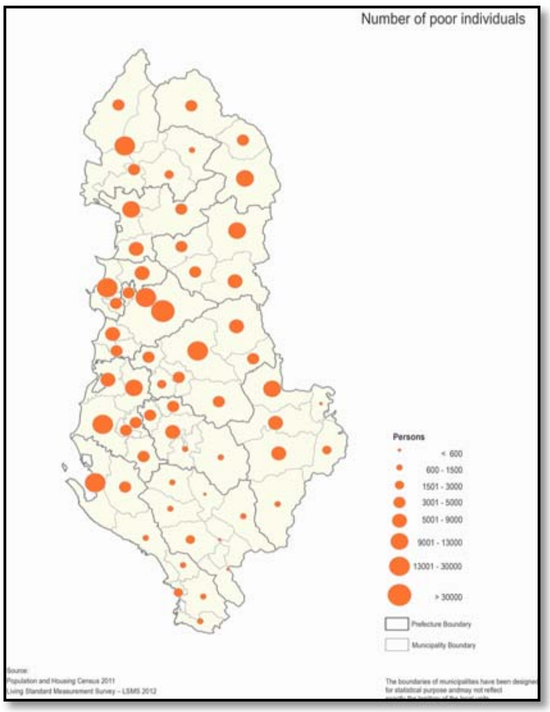
The new territorial division of Albania divides the country into 61 municipalities. The highest level of poverty is in the municipality Kamëz (about 24 percent), followed by municipality of Has (23.3 percent) and the municipality of Kukës (23.2 percent). The lowest level of poverty is recorded in the municipalities of Pustec (5 percent), Libohovë (6.7 percent) and Gjirokastër (6.8 percent).

Figure 3 reports the head count ratio and total number of poor people, by new municipalities.

**Figure 3. Poverty Rate and Number of the poor, New Municipalities**

**a. Poverty rate (headcount)** **b. Number of the poor**



## 5. Concluding remarks

Poverty mapping may be applied in policy making in three key ways: (1) as a benchmark against existing resource allocation criteria, for example, whether the allocation of social-assistance block grants according to previously established criteria correlate with an appropriate allocation based on current poverty rates; (2) as a tool in targeting public spending; and (3) for the provision of data to monitor the progress toward achieving particular government welfare goals (World Bank, 2015).

Nongovernmental organizations and international bilateral and multilateral institutions also rely on poverty maps in supplying advisory services to local governments and donor agencies and in designing joint intervention strategies.

This paper presents results for the new poverty mapping in Albania using 2012 LSMS and 2011 census data and incorporating improvements to the poverty mapping technique.

In conclusion, the paper illustrates how the results of the poverty mapping exercise in Albania can be useful for policy making also in case of "unstable local administrative units" in fact, it presents the poverty maps revised according to the new local administrative units established through the territorial reform launched in June 2015, to demonstrate that poverty maps can be adapted and made useful within an altered geographical area administrative structure.

## References


Azzari C., Carletto G., Davis B., Zezza A. (2006), Monitoring Poverty Without Consumption Data: An Application Using the Albania Panel Survey, *Eastern European Economics*, **1**, pp. 59-82.

Betti G., Ballini F. (2008), Variance estimates of poverty and inequality measures in Albania, *Eastern European Economics*, **46(6)**, pp. 87-101.

Betti G., Ballini F., Neri L. (2003), Poverty and Inequality Mapping in Albania, Report to the World Bank.

Betti G., Dabalen A., Ferré C., Neri L. (2013), Updating Poverty Maps Between Censuses: A Case Study of Albania, in Laderchi C.R., Savastano S. (eds.), *Poverty and Exclusion in the Western Balkans*, Economic Studies in Inequality, Social Exclusion and Well-Being 8, Springer Science+Business Media, New York, pp. 55-70.

Betti G., Neri L. (2010), Further Updating Poverty and Inequality Mapping in Albania, Report to the World Bank.

Dabalen A., Ferrè C. (2008), Updating Poverty Maps: A Case Study of Albania, mimeo, The World Bank: Washington, D.C.

Dávalos M.E.; Thomo, L. (2016), Portraits of poverty and inequality in Albania. Washington, D.C.: World Bank Group.

Elbers C., Lanjouw J.O., Lanjouw P. (2003), Micro-level Estimation of Poverty and Inequality. *Econometrica*, **71(1)**, pp. 355-364.

Elbers C., Lanjouw P., Mistiaen J., Özler B. (2008), Reinterpreting between-group inequality, *Journal of Economic Inequality,* **6(3)**, pp. 231-245.

Elbers C., Van der Weide R. (2014), Estimation of Normal Mixtures in a Nested Error Model with an Application to Small Area Estimation of Poverty and Inequality, World Bank Policy Research Working Paper No. 6962, The World Bank: Washington, D.C.

Haslett S. (2013), Small area estimation of poverty using the ELL/PovMap method, and its alternatives, Chapter 12 in *Poverty and Social Exclusion: New Methods of Analysis*, ed. Betti G., Lemmi A., Routledge.

INSTAT (2012), Population and Housing Census in Albania, 2012.

INSTAT (2013), Albania, trend in poverty, 2002-2005-2008-2012, September 2013.

Lemieux T. (2002), Decomposing changes in wage distributions: a unified approach, *Canadian Journal of Economics*, **35(4)**, pp.646-688.

Molina I., Rao J.N.K. (2010), Small area estimation of poverty indicators, *Canadian Journal of Statistics*, **38(3)**, pp. 369–385.

Neri L., Ballini F., Betti G. (2005), Poverty and inequality mapping in transition countries, *Statistics in Transition*, **7(1)**, pp. 135-157.

Rao J.N.K. (2003), *Small area estimation*. New York: John Wiley & Sons.

Sohnesen T.P., Stender N. (2016), Is Random Forest a Superior Methodology for Predicting Poverty?: An Empirical Assessment, *World Bank Policy Research Working Paper* No. 7612, The World Bank: Washington DC. Forthcoming in Poverty and Public Policy.

Tarozzi A., Deaton A. (2009), Using Census and Survey Data to Estimate Poverty and Inequality for Small Areas, *Review of Economics and Statistics*, **91(4)**, pp. 773–92.

World Bank (2012), Recommendations for the Sample Design and Estimation Procedures for 2012 Albania LSMS.

World Bank (2015), Pinpointing Poverty on Maps of Europe. mimeo (July 13), The World Bank: Washington, DC.

Zhao Q. (2006) User Manual for PovMap, The World Bank. http://siteresources.worldbank.org/INTPGI/Resources/342674-1092157888460/Zhao ManualPovMap.pdf

Zhao, Q., Lanjouw P. (2009), PovMap2: A User's Guide, The World Bank. http://go.worldbank.org/QG9L6V7P20

# Appendix

**Table A1. regression models with mean of variables in survey and census**

| **Central Domain** | Coef | p value | mean census | mean survey |
|---|---|---|---|---|
| _intercept_ | 9.80 | 0.00 | | |
| CHILD5_0 | 0.06 | 0.01 | 0.78 | 0.79 |
| CHILD6_14_0 | 0.07 | 0.00 | 0.65 | 0.65 |
| COMPUTER_1 | 0.18 | 0.00 | 0.16 | 0.18 |
| DECODER_TV_1 | 0.09 | 0.00 | 0.15 | 0.13 |
| HHSIZE | -0.20 | 0.00 | 3.89 | 3.85 |
| HHSIZE2 | 0.01 | 0.00 | 18.09 | 17.55 |
| HH_EDU_H_1 | 0.16 | 0.00 | 0.09 | 0.10 |
| HH_EDU_M_1 | 0.05 | 0.01 | 0.33 | 0.32 |
| NO_HEATING_1 | -0.24 | 0.00 | 0.03 | 0.04 |
| ROOMSPP | 0.09 | 0.00 | 0.98 | 0.97 |
| SOLAR_1 | 0.12 | 0.00 | 0.03 | 0.04 |
| SP_EMPLOYEE_1 | 0.10 | 0.00 | 0.10 | 0.11 |
| **PSU means** | | | | |
| MANIMALS | 0.16 | 0.00 | 0.51 | 0.49 |
| MCAR | 0.29 | 0.00 | 0.22 | 0.22 |
| MCHILD6_14 | -0.27 | 0.00 | 0.54 | 0.54 |
| MHH_MUSLIM | -0.08 | 0.00 | 0.56 | 0.57 |
| MHIGH_EDU1 | -5.71 | 0.00 | 0.00 | 0.00 |
| MHIGH_EDU10 | 1.18 | 0.00 | 0.01 | 0.01 |
| MHIGH_EDU11 | -2.61 | 0.00 | 0.00 | 0.00 |
| MHIGH_EDU2 | -1.16 | 0.00 | 0.05 | 0.05 |
| MHIGH_EDU6 | 0.21 | 0.01 | 0.13 | 0.12 |
| MICROWAVE_1 | 0.08 | 0.00 | 0.13 | 0.13 |
| MSURF2 | 0.17 | 0.00 | 0.15 | 0.15 |
| MTIME4560 | -0.21 | 0.01 | 0.06 | 0.06 |
| MWASH | -0.28 | 0.00 | 0.78 | 0.78 |
| URBAN_1 | -0.05 | 0.09 | 0.41 | 0.38 |
| Obs | | 2757 | | |
| R-square | | 0.51 | | |
| adj R-square | | 0.50 | | |
| R-square alpha model | | 0.01 | | |

| Coastal Domain | Coef | p value | mean census | mean survey |
|---|---|---|---|---|
| _intercept_ | 9.82 | 0.00 | | |
| CHILD6_14_2 | -0.11 | 0.00 | 0.12 | 0.11 |
| COMPUTER_1 | 0.27 | 0.00 | 0.15 | 0.17 |
| HHSIZE | -0.34 | 0.00 | 3.75 | 3.75 |
| HHSIZE2 | 0.02 | 0.00 | 16.82 | 16.65 |
| HH_EDU_L_1 | -0.10 | 0.00 | 0.57 | 0.57 |
| SOLAR_1 | 0.22 | 0.00 | 0.04 | 0.04 |
| SP_EMPLOYEE_1 | 0.12 | 0.00 | 0.10 | 0.11 |
| MICROWAVE_1 | 0.25 | 0.00 | 0.15 | 0.16 |
| **PSU means** | | | | |
| MHIGH_EDU6 | 0.48 | 0.00 | 0.13 | 0.13 |
| MHIGH_EDU7 | 0.52 | 0.00 | 0.05 | 0.06 |
| MHIGH_EDU_L | 0.29 | 0.00 | 0.39 | 0.37 |
| MREFRIGERATOR | -0.38 | 0.01 | 0.94 | 0.93 |
| MSP_AGE | 0.01 | 0.00 | 40.34 | 40.38 |
| MSP_SELF_EMPLOYED | -1.13 | 0.00 | 0.01 | 0.01 |
| MSURF3 | 0.28 | 0.00 | 0.08 | 0.08 |
| MTIME4560 | -0.20 | 0.06 | 0.05 | 0.05 |
| | | | | |
| DISTRICT_19 | 0.30 | 0.00 | 0.07 | 0.07 |
| DISTRICT_36 | 0.09 | 0.00 | 0.16 | 0.16 |
| Obs | | 1837 | | |
| R-square | | 0.52 | | |
| adj R-square | | 0.51 | | |
| R-square alpha model | | 0.02 | | |

| **Mountain Domain** | Coef | p value | mean census | mean survey |
|---|---|---|---|---|
| _intercept_ | 8.72 | 0.00 | | |
| CAR_1 | 0.23 | 0.00 | 0.15 | 0.13 |
| CHILD6_14_0 | 0.14 | 0.00 | 0.53 | 0.55 |
| CHILD6_14_1 | 0.09 | 0.02 | 0.23 | 0.26 |
| HHSIZE_01 | 1.17 | 0.00 | 0.03 | 0.02 |
| HHSIZE_02 | 0.76 | 0.00 | 0.10 | 0.11 |
| HHSIZE_03 | 0.49 | 0.00 | 0.13 | 0.12 |
| HHSIZE_04 | 0.29 | 0.00 | 0.21 | 0.21 |
| HHSIZE_05 | 0.15 | 0.00 | 0.22 | 0.24 |
| HH_WORK_1 | 0.08 | 0.00 | 0.41 | 0.45 |
| INTERNET_1 | 0.15 | 0.00 | 0.05 | 0.07 |
| **PSU means** | | | | |
| MCAR | 0.40 | 0.00 | 0.15 | 0.17 |
| MHIGH_EDU4 | 2.00 | 0.00 | 0.01 | 0.01 |
| MTV | -0.32 | 0.01 | 0.91 | 0.91 |
| | | | | |
| DISTRICT_02 | 0.14 | 0.00 | 0.12 | 0.12 |
| DISTRICT_09 | -0.19 | 0.00 | 0.11 | 0.11 |
| Obs | | 1128 | | |
| R-square | | 0.56 | | |
| adj R-square | | 0.56 | | |
| R-square alpha model | | 0.03 | | |

| **Tirana Domain** | Coef | p value | | census mean | survey mean |
|---|---|---|---|---|---|
| _intercept_ | 10.69 | 0.00 | | | |
| CHILD6_14_0 | -0.07 | 0.07 | | 0.70 | 0.68 |
| DWELL2_1 | -0.15 | 0.00 | | 0.11 | 0.10 |
| HHSIZE | -0.41 | 0.00 | | 3.62 | 3.79 |
| HHSIZE2 | 0.02 | 0.00 | | 15.68 | 17.15 |
| HIGH_EDU_H_1 | 0.18 | 0.00 | | 0.45 | 0.44 |
| HIGH_EDU_L_1 | -0.13 | 0.00 | | 0.16 | 0.15 |
| ROOMS_1 | -0.27 | 0.00 | | 0.04 | 0.03 |
| ROOMS_2 | -0.27 | 0.00 | | 0.32 | 0.34 |
| ROOMS_3 | -0.14 | 0.00 | | 0.44 | 0.47 |
| SP_EMPLOYEE_1 | 0.14 | 0.00 | | 0.23 | 0.22 |
| TIME4560_1 | -0.19 | 0.01 | | 0.05 | 0.04 |
| **PSU means** | | | | | |
| MSURF1 | -0.33 | 0.00 | | 0.66 | 0.66 |
| MTIME6180 | 0.31 | 0.00 | | 0.17 | 0.17 |
| Obs | | 648 | | | |
| R-square | | 0.57 | | | |
| adj R-square | | 0.56 | | | |
| R-square alpha model | | 0.03 | | | |