



MONTENEGRO
STATISTICAL OFFICE
RELEASE
No: 50
Podgorica, 03. 07. 2009

Name the source when using the data

THE POVERTY ANALYSIS IN MONTENEGRO IN 2007

Podgorica, july 2009

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1. Introduction

Statistical Office of Montenegro – MONSTAT has published for the first time in 2008 results of the poverty analysis for 2005 and 2006 in cooperation with World Bank and with support of Ministry of Health, Labor and Social Welfare. In this publication there are presented results of poverty analysis in Montenegro for 2007 with presentation of basic trends for period 2005-2007¹, based as a continuation of the study already done.

Poverty estimations are based on national absolute poverty line which was made according to the methodology recommended by World Bank. In the period 2005-2007 for estimations the same methods and procedures are used that provides good comparison of results over the time and observation of the main poverty trends.

Main data source for estimation of poverty in the observed period is Household Budget Survey which is regularly done on annual basis by MONSTAT. As a main indicator of living standard it was selected consumption of household. In order to have better comparison of standards by household it was done correction for differences in household size by using of modified OECD scale and correction for regional differences in price level.

2. Poverty in Montenegro 2005-2007

Absolute poverty line for Montenegro in 2007 was €150.76 per equivalent adult, which is approximately €6 more than in 2006. It is estimated that means contained in this poverty line are enough for acquisition of basic food provision including food according nutritionist standard.

Table 1: Poverty Estimation for Montenegro, 2007 (%)

	2005	2006	2007	Change 2006-2007
National absolute poverty line (u €, monthly, per adult equivalent)	140.47	144.68	150.76	6.08
Poverty rate (%)	11.2	11.3	8.0	-3.3
Poverty gap (%)	2.1	1.9	1.4	-0.5
Poverty severity (%)	0.7	0.6	0.4	-0.1

Source: Team estimates using the 2005-2007HBS data

Poverty rate in Montenegro is significantly reduced in 2007. Thus, portion of persons in the poverty was reduced from 11.3% in 2006 to 8.0% in 2007 (Table 1), thanks to, first of all, economic growth and household consumption².

Parallel with reducing of poverty rate, poverty depth and severity were also reduced. In this way poverty gap as indicator of poverty depth decreased from 1.9% in 2006 to 1.4% in 2007. Poverty gap indicates an average deviation of consumption of the poor from poverty line and its reducing means that consumption of the poor people in average became closer to poverty line and, thus the poverty depth is less³. Data on poverty gap from 1.4% in 2007 says that for escaping from poverty of all the poor society should provide means amounting 1.4% from

¹ Detailed analytical review of poverty in Montenegro in 2007 is given in the World Bank report „A Growth-Induced Poverty Reduction: Poverty in Montenegro in 2007”.

² In 2007 real GDP increased 10.7%, while average real wages increased for 15.0%. Average real household consumption is according to the HBS data and with the living costs index as deflator, increased 18.6%.

³ For short description of poverty measures and their interpretation see annexes at the end of the study.

poverty line per each citizen and afterwards that sum to allocate to the every poor in the exact amount which is needed so that their total consumption reach poverty line. Poverty severity is also decreasing, and it amounted 0.4% in 2007. Poverty severity also has relative deviation of the consumption of the poor from poverty line but it takes into consideration inequality among the poor because bigger weight in calculation is given to the poorest people, i.e. to those whose consumption is further than poverty line. Because of this, it could be said that the poorest in 2007 were in average slightly “less poor” than in 2006.

In 2007 poverty decreased in urban and rural areas, respectively. Observing urban areas, poverty rate was 5.5 % in 2007, while in 2006 it was 7.4%, in other words the rate was reduced for 1.9 percentage points (Table 2). In rural areas the highest poverty rate was in 2006 (17.6%), while slightly less was in 2005 (16.5%). In 2007 compared to 2006 poverty rate in rural areas decreased for 5.6 percentage points and it was 12.0%.

Although the situation was improved, rural population has much higher poverty risk in comparison with urban population. Poverty rate is more than double higher in rural areas. Depth and severity of poverty is also higher in rural areas, although for 2007 there was significant improvement in that sense.

Table 2: Poverty According to Location, 2005-2007 (%)

	Poverty rate			Poverty gap			Poverty severity		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Urban areas	8.1	7.4	5.5	1.4	1.3	1.2	0.5	0.4	0.4
Rural areas	16.5	17.6	12.0	3.2	2.9	1.8	0.9	0.8	0.5

Source: Team estimates using the 2005-2007 HBS data

Reduction of poverty in 2007 was followed by increase of inequality in consumption distribution. Between 2006 and 2007 it was decreased a share of 20% of the poorest population in total consumption from 5.1 % on 4.6 % (Table 3). On the opposite, 20% of the richest increased their share in the total consumption distribution, from 17.3% to 17.8%. In 2007, 20% of the richest people had consumption which was for 3.8 times bigger than consumption of 20% of the poorest citizens. Gini coefficient confirms increase of inequality in Montenegro in 2007. The coefficient increased from 24.4% to 26.4%.

Table 3: Indices of Inequality, 2005-2007

	2005	2006	2007
Share in total consumption of the poorest 20% (S20)	4.9%	5.1%	4.6%
Share in total consumption of the richest 20% (S80)	18.0%	17.3%	17.8%
Relation of quintal shares (S80/S20)	3.7	3.4	3.8
Gini coefficient	25.9%	24.4%	26.4%

Note: Inequality indices are calculated for equivalent consumption with using of modified OECD scale. Observation unit is person.

Source: Team estimates using the 2005-2007 HBS data.

Gini coefficient shows that in rural areas came to significant increase of inequality in 2007 (Table 4), thus Gini coefficient increased from 22.4% to 25.3%. In 2007 there was also an increase of inequality in urban areas, but it was slightly less, Gini coefficient increased

from 23.9% to 24.8%. Contrary to 2005 and 2006, Gini coefficient in 2007 was higher in rural than in urban areas which shows once again accelerated increase of inequality in rural part of Montenegro.

Table 4: Gini Coefficient in Urban and Rural Areas, 2005-2007

	2005	2006	2007
Urban areas	26.3%	23.9%	24.8%
Rural areas	23.4%	22.4%	25.3%

Note: Gini coefficient is calculated for equivalent consumption using OECD modified scale. Observation unit is person.

Source: Team estimates using the 2005-2007 HBS data

3. Poverty Profile in 2007

Poverty is unequally distributed by regions. Table 5 shows that the poverty rate in North region is significantly higher comparing to central and Southern region. Poverty rate in North region was 14.0% in 2007. In that region there is 32.5% of population of Montenegro and also more than a half of the poor in Montenegro (exactly 56.5%). Poverty rate in Central region is 6.3%, and in Southern 2.2%.

Table 5: Poverty Estimations by Geographic Areas, 2007 (%)

Regions	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
North	14.0	1.74	56.5	32.5
Center	6.3	0.79	38.4	49.0
South	2.2	0.27	5.1	18.6

Note: Relative poverty risk is calculated as poverty rate of sub-group divided by national poverty rate.

Source: Team estimates using the 2007 HBS data

Poverty risk in rural areas of Montenegro is 1.5 % bigger than average, while in urban areas risk for approximately 30% less than average (Table 6). In urban areas poverty rate in 2007 was 5.5%, and it was less than in rural areas where it was 12.0%. In Montenegro in rural areas live approximately 58.1% of poor persons, while in urban areas there is 41.9%.

Table 6: Poverty Risk by Location, 2007

	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Urban areas	5.5%	0.69	41.9%	61.0%
Rural areas	12.0%	1.50	58.1%	39.0%

Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimation using the 2007 HBS data

Following division of urban areas to Podgorica and other urban areas, table 7 shows that poverty rate is higher in Podgorica (7.8%), than in other urban areas (4.1%). In urban areas without Podgorica poverty risk is half less than average for Montenegro. In rural areas there is 39.0% of total population but 58.1% of the poor. It shows that poverty risk in rural areas is higher than average for 1.5 times.

Table 7: Poverty Risk by Location and Region, 2007

	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Podgorica	7.8%	0.98	22.5%	23.3%
Other urban areas	4.1%	0.51	19.4%	37.7%
Rural areas	12.0%	1.50	58.1%	39.0%

Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimation using the 2007 HBS data

Poverty is strongly connected with labor market status. Inactive and unemployed persons have the highest poverty risk. On the basis of table 8 it can be seen that among unemployed persons there is the highest poverty rate, 15.6%, while for children up to 15 years it is 11.0%, and among other inactive persons (apart from pensioners) poverty rate is 10.0%. One fourth of the poor in Montenegro is unemployed persons (exactly 25.7%). The lowest poverty rate is among employed persons, 2.3% and for them poverty risk is for 70% less than national average. Poverty risk for pensioners is below average, approximately 20% less than average for Montenegro.

Table 8: Poverty According to Activity Status, 2007

	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Less than 15	11.0%	1.38	22.2%	16.2%
Employed person	2.3%	0.29	7.7%	26.7%
Own business	7.5%	0.94	4.3%	4.6%
Unemployed person	15.6%	1.95	25.7%	13.3%
Retired persons	6.5%	0.81	16.0%	19.8%
Other inactive persons	10.0%	1.25	24.1%	19.4%

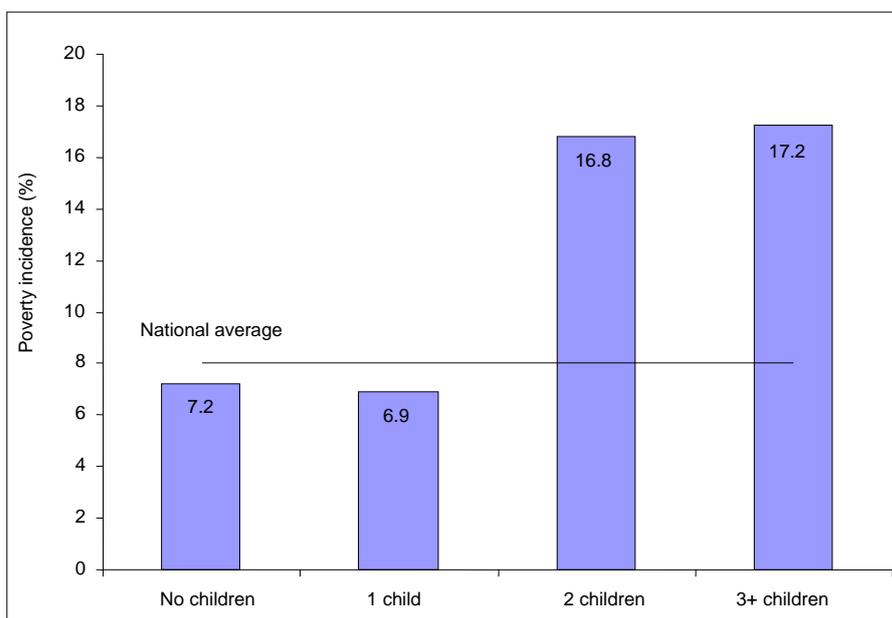
Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimates using the 2007 HBS data

Special attention should be given to the fact that children have higher poverty rate than the average. To have up to 15 years means facing with poverty rate which is for 40% approximately higher than average. Similar conclusion can be made from Figure 1, where it is

shown that households with two or three little children (up to 6 years old) have a double higher poverty risk than the average.

Figure 1: Poverty Rate According to Number of Children (0-6 years) in Household, 2007



Source: Team estimates using 2007 HBS data

Apart from the activity status of the very household members, status of household holder has significant influence on poverty, too. Thus, the highest poverty risk has those household members whose holders are unemployed. They have poverty risk 3 times higher than average (Table 9), and poverty rate was 24.2% in 2007. It is similar for household members whose holders are “other inactive persons” having risk 2.5 times higher than average. Household holders who are employed or have own business to significant extent provide pretty good material standard for all household members. That is why poverty risk for members of such households is close to half less than national average.

Table 9: Poverty According to Activity Status of Household Holder, 2007

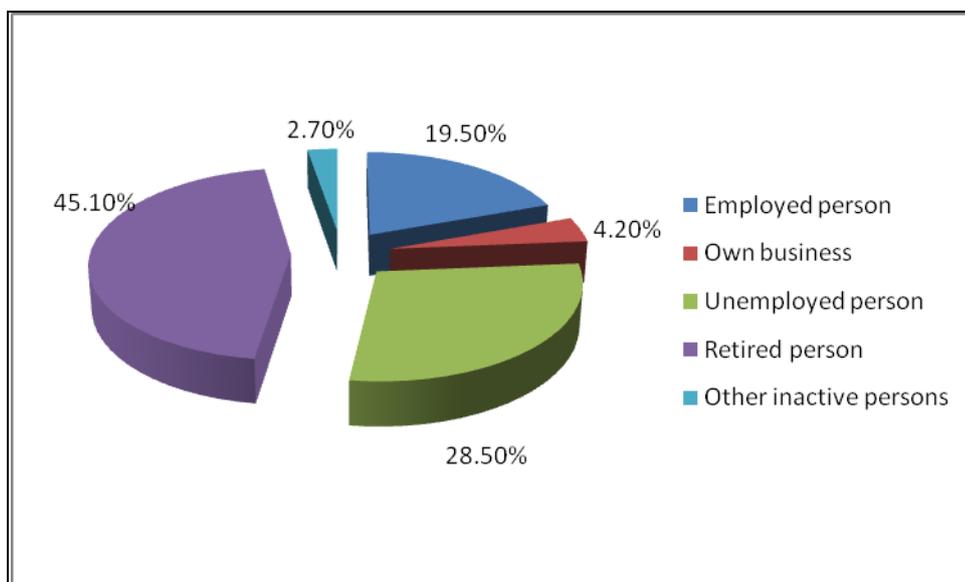
	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Employed person	4.1%	0.51	19.5%	38.4%
Own business	4.7%	0.59	4.2%	7.2%
Unemployed person	24.2%	3.03	28.5%	9.5%
Retired person	8.3%	1.04	45.1%	43.8%
Other inactive persons	19.7%	2.46	2.7%	1.1%

Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimates using the 2007 HBS data

Significance of the activity status of household holder is confirmed by structure of the poor observed according to this criterion (Figure 2). In 2007, 45.1% of the poor lived in households whose holder was pensioner and 28.5% lived in households whose holder was unemployed person. If we add to them the poor coming from the households whose holders are other inactive persons, it comes out that more than three fourth of the poor come from households whose holder is inactive or unemployed person.

Figure 2: Structure of Poverty by Status of Household Holder, 2007



Source: Team estimates using the 2007 HBS data

Level of education has also strong influence on the poverty status. Having higher level of education, the poverty risk is less (Table 10). The highest poverty risk have persons with incomplete primary school (75% above average) so poverty rate in this group of citizens was 14.0% in 2007. In slightly better situation are persons with finished primary school whose poverty rate is 13.0% and poverty risk is 63% higher than the average. The lowest poverty rate is for persons with post-secondary or higher education, just 0.2%, so it can be said that high education in Montenegro represents practically safe protection from poverty.

Table 10: Poverty According to Education 2007

	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Incomplete primary school	14.0%	1.75	41.2%	23.7%
Primary school	13.0%	1.63	28.5%	17.6%
Secondary school (1-3 years)	7.5%	0.94	16.7%	17.9%
Secondary school(4 year) and grammar school	3.5%	0.44	13.3%	30.3%
Higher and high education	0.2%	0.03	0.3%	10.5%

Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimates using the 2007 HBS data

Education of the household holder is important for material status of all members of household. Among individuals living in households whose holder have primary school or less poverty rate is approximately 18%, that means that they have more than double chance to be poor than it is case with average citizen of Montenegro (Table 11). Although less than one third of population lives in such households their members make almost two thirds of the poor (Figure 3). Persons living in households whose holder completed at least three years of secondary school have poverty risk below the average. Persons living in households whose holder is person with higher or high education have very low, practically negligible poverty risk (below 1/10 of national average).

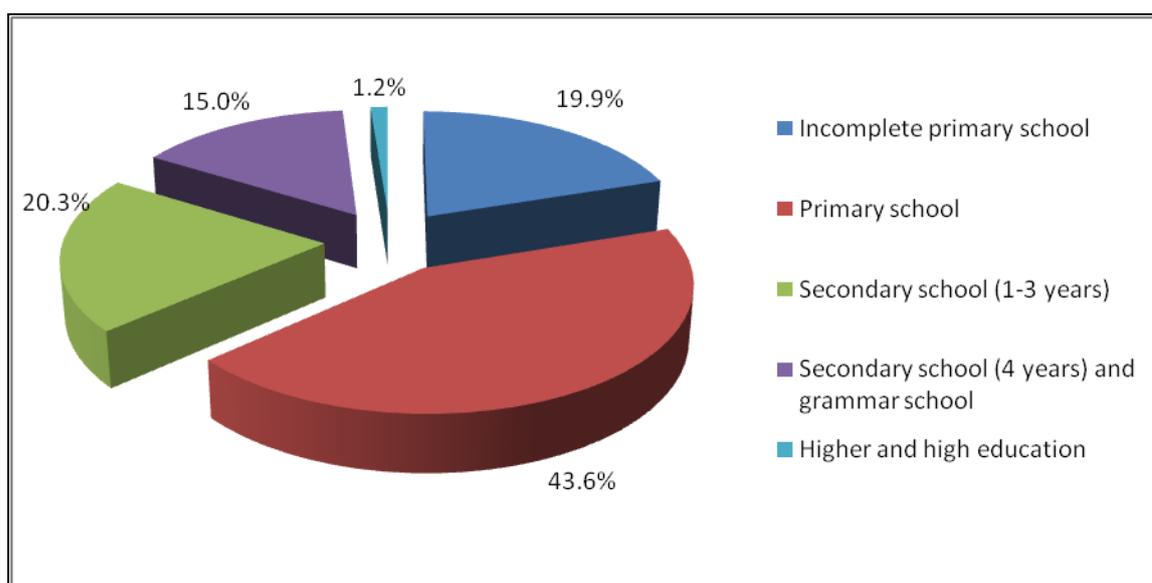
Table 11: Poverty According to Education of Household Holder, 2007

	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Incomplete primary school	17.8%	2.23	19.9%	9,0%
Primary school	18.5%	2.31	43.6%	19%
Secondary school (1-3 years)	6.2%	0.78	20.3%	26.5%
Secondary school(4 year) and grammar school	3.8%	0.48	15%	31.3%
Higher and high education	0.7%	0.09	1.2%	14.2%

Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimates using the 2007 HBS data

Figure 3: Poverty Structure According to Education of Household Holder, 2007



Source: Team estimation using of HBS data for 2007

The size of the household influences the poverty, too. Table 12 shows that the highest poverty rate in 2007 had households with seven and more members, 24.2%.

Those households have three times higher poverty risk comparing to the average. Less than 10% of population lives in households with seven and more members, but almost every fourth poor comes from such households. Poverty rate above national average have households with four members (8.7%). The least poverty risk has households with two or three members (less than 50% of the average). One member households have poverty risk below average.

Table 12: Poverty Risk According to Size of Household, 2007

Household size	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
One person	6.5%	0.81	4.6%	5.8%
Two persons	3.4%	0.43	5.1%	12.3%
Three persons	3.8%	0.48	6.2%	13.2%
Four persons	8.7%	1.09	26.5%	24.5%
Five persons	7.0%	0.88	19.4%	22.4%
Six persons	7.1%	0.89	11.4%	13.0%
Seven and more	24.2%	3.03	26.7%	8.9%

Note: Relative poverty risk is calculated as poverty rate of sub-group divided with national poverty rate.

Source: Team estimates using the 2007 HBS data

The main source of household income defines poverty risk to a large extent. The highest poverty risk have households whose main sources of income are “transfers and other”, actually households who lean to social benefits or to some occasional receiving.

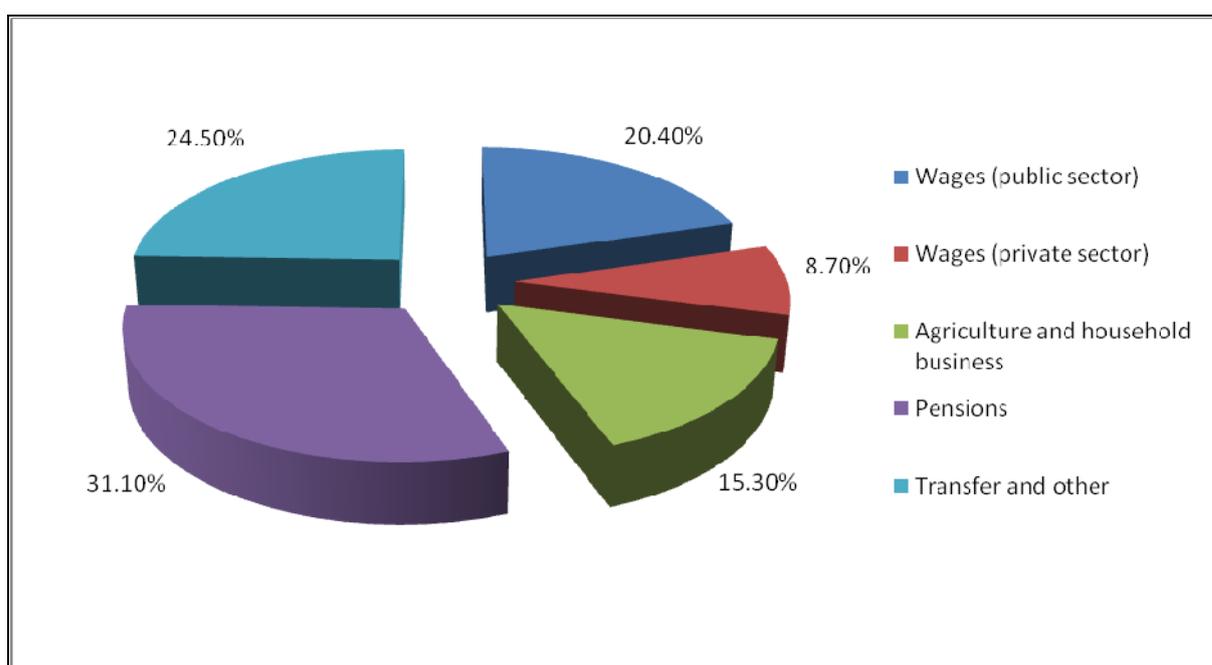
In 2007 the poor was every second member of the household where “transfers and other “are main source of incomes. Although it is relatively small group of citizens (less than 4% of population), they make one fourth of all the poor (Figure 4). The lowest poverty rate was in households whose main source of income are wages from private sector (2.3%), and slightly higher is in households whose main source of income are wages from public sector. Regular wages obviously provide relatively solid material standards, actually low risk from poverty. If pensions and incomes from agriculture and household business are main source of income of household, than it can be expected that household would have risk of poverty above the average. In the households whose main source of incomes are pensions live approximately 24% of population, while members of such households make approximately 31% of the poor.

Table 13: Poverty Risk by Main Household Income, 2007

	Poverty rate	Relative poverty risk	Share of the poor	Share of total population
Wages (public sector)	5.1%	0.63	20.4%	32.2%
Wages (private sector)	2.3%	0.29	8.7%	30.0%
Agriculture and household business	12.9%	1.61	15.3%	9.5%
Pensions	10.2%	1.27	31.1%	24.4%
Transfer and other	51.4%	6.40	24.5%	3.8%

Source: Team estimates using the 2007 HBS.

Figure 4: Structure of the Poor by the Main Household Income Source, 2007



Source: Team estimates using the 2007 HBS.

4. Results review

Poverty analysis presented in this study led to following main results.

Main trends in poverty issue are favorable although there are still visible regional differences in poverty distribution. Poverty rate is significantly reduced as well as depth and severity of poverty in 2007 under the influence of economic recovery of country. Poverty was reduced in rural and urban areas respectively, but there is still a large gap between them in regards with the poverty distribution. Poverty rate in rural areas is more than two times higher than in urban areas. Similarly, there are large regional disparities in poverty distribution where north region is especially exposed to poverty risk.

Reducing of poverty happened along with increase of inequality. Gini coefficient has increased two percentage points, from 24.4% in 2006 to 26.4% in 2007. If there was no inequality growth, increase of population consumption would have resulted with more significant poverty reduction.

Poverty profile presented in the third part of the study identified the following characteristics of the poor in Montenegro:

- Majority of the poor lives in rural areas and at the North of country, poverty risk of population from these parts is higher than average
- The poor usually lives in large households. Individual person from households with 7 and more members are likely to be poor four times than an average inhabitant.
- Children face relatively high poverty risk. Poverty incidence for children up to 15 years is approximately 50% higher than the average.
- Education significantly reduces poverty risk. Poverty risk is extremely low for persons with post-secondary and higher education, as well as for all household members headed by person with the higher education level.
- Households headed by unemployed or inactive persons (except retired persons) face with poverty risk three times higher than average.
- Wages, whether from private or public sector, provide in most cases enough resources for households so that their members can avoid absolute poverty.

ANNEX 1: METHODOLOGY OF POVERTY ESTIMATION IN MONTENEGRO

Poverty estimation in Montenegro presented in this study is based on the absolute poverty line constructed using key parts of the World Bank methodology described in Ravallion (1994).⁴ Absolute poverty line was calculated in details by Statistical Office of Montenegro (MONSTAT) based on Household Budget Survey (HBS) data for 2006. Poverty line for 2006 was estimated at €144.68 per equivalent adult. This poverty line serves as “anchor” to which the poverty line estimations and all poverty indicators are connected in the entire period 2005-2007. For purpose of poverty estimation for 2005 and 2007 absolute poverty line from 2006 is modified for inflation rate, i.e. with average annual price that is shown by living costs index.

Main data for poverty analysis is taken from HBS. It is nationally representative survey carried out regularly by MONSTAT since 2005 and harmonized with international standards and EUROSTAT recommendations. The data on income and expenditures of households, supply with permanent consumer goods, demographic and socio-economic characteristics of households and other are collected by the HBS questionnaire filled in by every selected household.

Methodology for providing absolute poverty line for 2006 is consisted of four main steps: (i) calculation of total consumption from HBS data, (ii) adjustment to differences in the household size and structure, (iii) adjustment to differences in regional prices; (iv) constructing of absolute poverty line for 2006.

(i) The consumption is used as the main indicator for living standards estimation in Montenegro. It was taken into account that within mutual comparison higher consumption value indicates higher living standard for certain households. For this reason the first step in poverty estimation was construction of consumption indicators compliant with this request. Consumption is estimated based on HBS with certain modifications in relation to standard calculation of household consumption. The aggregate of household consumption needed for poverty estimation includes the following categories:

- Food, alcohol and tobacco: expenses related to purchase of food products are included together with estimated consumption value from own production and estimated value of gift. Only consumption for personal use of household is taken into account, while products purchased for business or agriculture are excluded. Also, expenses from giving gifts are excluded.
- Non-food products: there are included expenses of (a) clothes and footwear, (b) housing, water, electricity, gas, and other fuels, (c) small household appliances and regular maintenance of dwelling, (d) health, (e) transport, (f) communication, (g) leisure and culture, (h) education, (i) restaurants, café bars and hotels, and (j) other goods and services.

It should be said that expenses from purchase of large permanent goods in this study are not included in total household consumption because they happened occasionally and in large amounts, and because of this they are not connected consistently with household financial state. Namely, large expense in one month for purchase of certain permanent consumption product (for ex. refrigerator) does not need to mean that this household has high living standard.

(ii) For purpose of better comparison of living standards between households of different number of members and their age, total consumption calculated at the household level is

⁴See at Ravallion, M. 1994. *Poverty Comparisons*, Fundamentals of Pure and Applied Economics 56. Chur, Switzerland: Harwood Academic Press.

adapted to these differences by using of modified OECD scale. Modified OECD scale has been selected because of its simplicity and harmonization with current Eurostat practice. The same scale is prevailing in most of studies on living standards across Europe.

Accordingly, equivalent household size is firstly calculated as a weighted sum of number of household members, where first adult in household is calculated as 1, second adult as 0,5, and each child up to 14 years as 0,3. Total consumption in household is divided with equivalent household size so that consumption by adult equivalent (or equivalent consumption) can be received. This consumption measure is used for all comparisons of living standards by households. The higher equivalent consumption of certain household is, it is considered that household has higher living standard. It is considered that all members within one household has the same living standards.

(iii) Consumption of households is adapted to price differences between regions. For this purpose there are constructed special indices for three main regions in Montenegro (North, Central, and South region) in this study on the basis of price information collected by HBS. Regional price indices indicate that price level in the South region is, for example, higher than price level in the North region. Total consumption of each household is divided by regional price index, and that index has average prices in Montenegro as a basis (Montenegro=100). In this way it is possible that certain amount of consumption (for ex. €100) gives possibility purchasing of equal goods and services quantity no matter in which part of Montenegro a household is situated.

(iv) Absolute poverty line has been constructed in compliance with the method „expenses for basic living needs“ and it is consisted of main components: (a) poverty line for food (i.e. expenses of minimal consumption basket) and (b) appropriate expenses for purchase of basic non-food products. Both components summed up together give total absolute poverty line. Minimal food basket was selected to satisfy basic nutrition needs of population in this part of the world (2288 kcal/daily per person) under FAO proposal (Food and Agriculture Organization). Composition of minimal food basket reflects population nutrition of lower material welfare. Expenses of minimal food basket are calculated by multiplying quantities from minimal food basket with appropriate prices. Expenses of minimal food basket are the basis for total poverty line calculation. The idea is that those households spending on food exactly as expenses of minimal food basket are, actually they spend on all other products as much as minimum of basic needs is. Linear regression model was used for practical estimation in the study so that minimal expenses for other products can be estimated on the basis of expenses of minimal food basket, and in this way to calculate total poverty line as a sum of minimal expenses for food and minimal expenses for other products. Regression method was used in estimation of absolute poverty line and in other countries in the region.

Appliance of methodological steps (i)-(iv) on the data from HBS for 2006 gave the poverty line of €144.68 by equivalent adult per month (see Monstat and World Bank, 2008). Thus relatively complicated method for absolute poverty line estimation is not repeated every year, and the poverty line for 2006 can be used for other years too, but it has to be adapted for inflation compared to base 2006. As inflation measure there should be taken total price changes of goods and services for personal consumption. Appropriate measure in Montenegro for now is average annual change of living costs index (in the future consumer price index). Poverty line for 2006 has been increased with living costs of 4.2% in 2007 so that the absolute poverty line for 2007 can be calculated amounted now €150.76 per equivalent adult.

When comparing poverty in the period 2005-2007 Monstat ensured that (i) the same method for calculation of consumption aggregate is applied, (ii) the same equivalence scale and comparable regional price indices are applied, and that (iii) data sources that are used (HBS) as well as all estimation procedures are comparable during the years observed.

Absolute poverty line used by Monstat for poverty analysis is nationally specific line and cannot be used for international comparisons, only for monitoring of state and change of poverty in Montenegro.

ANNEX 2: MEASURES INEQUALITY AND POVERTY INEQUALITY

Poverty measures

Indicators (or measures) of poverty are statistical functions that convert the relation between consumption and poverty line for observed households and persons into one number representing perceived poverty status.

Nowadays, three poverty measures from so called FGT measure group (Foster, Greer and Thorbecke, 1984)⁵ are used for purpose of absolute poverty researches, and these are poverty rate $P(0)$, poverty gap $P(1)$, and squared poverty gap $P(2)$.

Poverty Rate – $P(0)$

Poverty rate (poverty index, poverty incidence) is the simplest and the most often used measure calculated as a share (percentage) in total population of persons with equivalent consumption less than poverty line:

$$P(0) = \frac{q}{n}, \quad (1)$$

q is number of the poor, in other words, persons living in households with equivalent consumption c less than poverty line z . Thus, $P(0)$ simply measures proportion of population (persons) living in the poverty.

Basic information on poverty is provided by the poverty rate, but are the poor equally poor or are some extremely poor, and are other very close to poverty line is information not provided by the poverty rate. Because of this, also other indicators are used in the poverty analysis.

Poverty gap – $P(1)$

Poverty gap is a measure which takes into consideration how much the consumption of the poor is in average less than poverty line. Poverty gap is calculated using formula:

$$P(1) = \frac{1}{n} \sum_{i=1}^q \frac{z - c_i}{z}, \quad (2)$$

z is poverty line, c_i is equivalent consumption of persons i , q is number of poor persons, and n is total number of person in population. Measure $P(1)$ is sum of relative difference between equivalent consumption and poverty line and that difference is counted only for poor persons and it is divided with total population ,actually it is shown “ per citizen” and “ comparing to poverty line “. For measure $P(1)$ is often said that it indicates **poverty depth**.

⁵ See in Foster, James, Joel Greer and Erik Thorbecke (1984) “A Class of Decomposable Poverty Measures,” *Econometrics*, 52(3), p. 761-766.

Poverty gap is a useful indicator for estimation of resources needed to deliver the poor from poverty by means of money transfers perfectly directed to the poor with unchanged other conditions. For example, poverty gap of 0.10 (or 10%) means that money transfers in the amount of 10% are needed for delivering of all persons, in average per inhabitant, from poverty.

Poverty severity – P(2)

Measure under name poverty severity is received as squared poverty gap:

$$P(2) = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - c_i}{z} \right]^2, \quad (3)$$

By squaring of relative deviation from poverty line, higher weight is given to the poorest persons, in other words, to those whose consumption is more distant from poverty line. In this way also inequality among the poor is taken into account.

Inequality measures

Share in consumption of x% is simple direct measure of inequality, useful when attention is to be directed only to the poorest, for example the poorest, 10% or 20%. When share of the poorest in distribution of total consumption decreases we can say that inequality in society increase observed from position of the poorest citizens.

Ratio of quintal shares (s80/s20) is relation of average consumption of 20% the richest and 20% the poorest citizens. Bigger ratio is the differences are bigger among rich and poor, actually bigger is inequality in society.

Gini coefficient is the most popular measure of inequality. Comparing to the measures based on the shares in consumption of the poorest and the richest citizens, Gini coefficient takes into consideration all elements of distribution, actually consumption of all persons in society. Coefficient takes value between 0 and 1. Bigger coefficient indicates bigger inequality. Value 0 indicates situation of complete equality (all persons have equal consumption or income), while value 1 indicates situation of complete inequality (one person has entire income or consumption in the society, all others have nothing).

There is number of mathematics expressions for calculation Gini coefficient. One of the most practical is:

$$G = \frac{2}{n^2 \mu} \sum_{i=1}^n i c_i - \left(\frac{n+1}{n} \right), \quad (4)$$

all persons are marked with index i in compliance with order in non-decreasing series of their equivalent consumption $c_1 \leq c_2 \leq \dots \leq c_i \leq \dots \leq c_n$ (in other words i is ordinal number of place ordered by consumption size), average consumption is marked μ , and n is number of persons in population.

ANNEX 3: SENSIBILITY OF ESTIMATION OF POVERTY ON ELECTION OF POVERTY LINE

Estimation of poverty are always connected with possibility that poverty line is not completely defined that has influence on results. Thus, it is useful to show main results with presumption that poverty line is slightly bigger, i.e. slightly less than line that was used in order to see whether results significantly change.

Sensitivity of poverty rate on poverty line is shown in table P1. If poverty line would be bigger for 5% than those used in this study, then poverty rate in 2007 would be 9.4% instead of 8.0%. It is possible to come to such deviation because of error in measure of the price change rate that the poorest are faced with. However, this results shows that even the increase of prices underestimated for 5 % it would not significantly changed main conclusion of study -poverty rate in 2007 would be under 10% and it would be less than in 2006. In the case that poverty line in 2007 was underestimated for 10 % or 20% it would have significant influence on results. If poverty line was consistently underestimated for 20% than we will have higher poverty rate in all years, 22.9% in 2005, 21.0% in 2006 and 14.9% in 2007, but conclusion on significant decrease of poverty rate in the last year still will be relevant. In the case that poverty rate is lower than one used in this study, poverty rates would be significantly less. In case that poverty line is less for 5% than the one used in a study, poverty rate in Montenegro will be 15.5 % instead of recorded 8.0%.

Table P1: Sensibility of Poverty Rate on Poverty Line, 2005, 2006, 2007 (%)

	Poverty rate		
	2005	2006	2007
Estimated poverty rate	11.3	11.3	8.0
+ 5%	13.6	13.6	9.4
+ 10%	15.4	16.0	12.1
+ 20%	22.9	21.0	14.9
- 5%	8.8	8.9	5.5
- 10%	7.5	7.0	4.6
- 20%	3.9	3.9	3.2

Published by : Statistical Office of Montenegro

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