TECHNICAL REPORT FOR SERBIA LSMS 2007

Republican Statistical Office of Serbia,
Department for International Development and World Bank

1.1 FIELDWORK

Approximately 90% of the LSMS questionnaire was based on the 2002 and 2003 LSMS questionnaire, carrying forward core measures in order to measure trends over time. The survey incorporated two methods of interviewing - one involving the interviewer (*face to face*) and the other was a self-completion diary. All modules, with the exception of the consumption diary, were filled by the interviewer with the respondent. The diary was left in the household and filled in by the household member in charge of daily purchases.

Fieldwork consisted of three phases. The first phase involved identification of the household and filling of certain modules, after which the household was instructed how to keep the diary of consumption. In the second phase each household kept the diary, while the interviewers were obliged to visit the household and help them in fill the diary where needed. In the third phase the interviewer visited the household again, examined the diary to see whether it had been correctly filled, and conducted the interview for the remaining modules. Distribution of modules according to phases is presented in the following table.

Table 1: Organization of modules by phases of data collection

1. Demography and migration		**1.phase:**
2. Durable goods		
3. Social programs		
4. Health		
Household consumption		**2.phase**
5.1	**Daily consumption**	
5.2	**Monthly consumption**	**3.phase**
6. Education		
7. Employment		
8. Agriculture		
8. Water and sanitation		

Although the majority of questions were identical between LSMS 2002, 2003 and 2007, two new modules were added to LSMS 2007:

1. United Nations High Commission for Refugees: Survey of IDPs
UNHCR, with support from UNDP were planning to undertake a survey of Internally Displaced People (IDPs) in the early part of 2007. The aim of the survey was to examine the living standards and poverty profile of IDPs. UNHCR, having heard of a likely upcoming LSMS in 2007, approached DFID to identify if the two surveys could be complimentary.

The IDP survey took place at the same time as the national sample. The sample size was 2,000 households (of which 250 are Roma households) and the sample frame was the UNHCR database of IDPs. **The questionnaire was identical for both samples.** A migration module, with some items specific to the IDP population (in both samples) was added to the LSMS questionnaire.

2. World Bank: Water and Sanitation Services Module (WSS).
The WSS module (number 9) was administered to half of the national sample (all serial numbers ending with an even number). Therefore the sample size for this module is 2744 households.

In order to gather inputs from key users of data the questionnaire was widely circulated, with support from the PRS unit. A pilot of 80 households took place from 19-28 March. A debriefing session was held and a few revisions made to the questionnaire. Final versions of the questionnaire were produced in the following languages:

- Serbian
- English
- Albanian
- Romany

As part of LSMS two further questionnaires have been created and administered:

- Enumeration District questionnaire, - 510 completed.
- Rental questionnaire – in which the market value of various property types has been collected.

Other fieldwork documents produced by RSO in the period from March to May include:

- Interviewer and supervisor instructions
- Control form
- Advance letter and leaflet
- A gift - coffee and biscuits, were given to each household interviewed.

In May 2007 a lot of effort was put into advertising the LSMS prior to fieldwork (in order to maximise response). The following activities were undertaken:

- Press conference (Sava Media Centre, Belgrade, 8th May 2007) with six teams for Television, two for Radio and fifteen journalists.
- A leaflet for potential respondents distributed to approximately 1,300 home addresses in Belgrade, in cooperation with INFOSTAN (Secretariat for Utilities and Housing services);
- A leaflet with basic information on LSMS was distributed in Belgrade and municipalities that are covered by the regional offices;
- Posters, announcing the survey were distributed in municipalities throughout Serbia;
- Business portals (E-gate, Vibilia);
- Visits to some electronic media in Belgrade and to the HQs regional offices (informative and other sorts of broadcasts);
- Visits to Index radio, Belgrade and to some local radio stations;
- Information and a short animation regarding the LSMS were presented on the RSO website.

Two TV stations (TV Fox and RTS 1) filmed an interview taking place within a household. During fieldwork, after an early analysis of the response rate (based on progress chasing) contact with potential respondents was intensified, primarily via television presentations, urging them to co-operate in the survey.

The RSO PR dept continuously provided information relating to LSMS to all interested institutions, journalists and individuals. In total LSMS was shown on twenty six television reports. Plus there were twenty four reports in the Press, eleven on Radio and two via business portals. Due to this intensive and innovative PR strategy the final response rate achieved for the survey was particularly good (80.6%).

Interviewer and supervisor briefings took place from 10-19 May. Briefing sessions were conducted at the regional offices. All field staff were provided with Instructions which contained the basic information needed for survey administration, each session was conducted semi-formally, with opportunities for questions and answers as well as for further explanation. UNHCR and WB representatives participated in briefings in Belgrade, Sremska Mitrovica, Valjevo, Pančevo, Smederevo and Novi Sad.

During each briefing session, the sample addresses were distributed to each interviewer and discussed with them in detail. Ample time was allowed for a clear understanding of the materials, quantity of work expected from each interviewer and the procedures to be followed in conducting the work. Prior to leaving the briefing session each interviewer thus had: an assignment, field administration forms and a supply of survey questionnaires.

Each viewer was allocated, on average, 28 households. The main data collection period was scheduled for six weeks (the second half of May and all of June). In June controls on interviewers work were undertaken by supervisors. In addition 160 households were checked by WB, UNHCR and UNDP representatives – very few anomalies were found. Fieldwork ended on July 6 2007.

Instructions for editing were provided created at RSO by the person responsible for each module in the questionnaire. Questionnaires were edited at the central office and then given for data entry. Visual basic was the chosen data entry software. The program consisted of two main features intended to reduce the number of keying errors and to reduce the number of errors generated by the computer consistency check undertaken following data entry:

- Data entry screens that included all skip patterns.
- Range checks for each question

The DE program was tested by those responsible for development of each module in the questionnaire. Data entry training was undertaken in June. DE staff was instructed to clear all anomalies with SIG fieldwork members. Data entry and the coding of three open-ended items (occupation, industry, highest level of education) were completed in August.

1.2 DATA PRODUCTION

Data files are available in SPSS. The data is fully documented and available from the World Bank website. (www.worldbank.org/lsms).

Identifiers The key variables for linking the files are

1. Opstina (municipality)
2. PopKrug (enumeration district)
3. Dom (household number within ED)
4. Lice (person number within the household)

Structure of SPSS files

HOUSEHOLD LEVEL

Name of file	Description	Number of cases
Household	date of visit, length of time of interview etc. migration data for IDPs from Kosovo and Metohija Durable goods owned by the household Housing, Social benefits, Household subjective financial status, Agricultural holding, water and sanitation supply and expenditure, weights	5557

INDIVIDUAL LEVEL

Name of file	Description	Number of cases
Individual	Basic demographic details of all household members Migration questions Take up and non-take up of Child Allowance Health status of all Preschool, school and university education Employment, using LFS definitions to all adults aged 15+	17,375

OTHER

Name of file	Description	Number of cases
Durables	Ownership of durables in the household	48.060
Diary	One week diary completed by household on expenditure on food and drink	196.702
Nonfoodconsumption	Expenditure on non food items	248.064
Data_for_imputting_rents	Data on housing value and size for various types of accommodation	689
EnumerationDistrict	Questions on infrastructure and services for each ED in the sample	510
ED_section3	Section of the Enumeration District questionnaire that gathers data on projects to improve the infrastructure that have been completed in the last few years in each ED	465

1.3 SAMPLING

1.3.1 Sample description

The population for LSMS consists of Republic of Serbia residents, excluding Kosovo and Metohija. The sampling frame for the LSMS was based on the Enumeration Districts (ED) delineated for the 2002 Serbia Census, excluding those with less than 20 households. It is estimated that the households in the excluded EDs only represent about 1 percent of the population of Serbia.

The sampling frame also excludes the population living in group quarters, institutions and temporary housing units, as well as the homeless population; these groups also represent less than 1 percent of the population, so the sampling frame should cover at least 98 percent of the Serbian population.

Stratification was done in the same way as for the previous LSMSs. Enumeration Districts were stratified according to:

- Region in 6 strata (Vojvodina, Belgrade, West Serbia, Sumadija and Pomoravlje, East Serbia and South East Serbia).
- Type of settlement (urban and other).

The allocation of EDs according to region and type of settlement was proportional to the number of occupied dwellings, adjusted to provide sufficient precision of estimates at the regional level. To provide optimal sample sizes in each region we decided that the minimum number of allocated EDs to each stratum should be 60. The result of this procedure was a slight deviation from strictly proportional allocation.

The sample size for LSMS 2007 was 7140 households from 510 selected EDs. Within each ED 14 occupied dwellings were selected. From each selected occupied dwellings one household was selected (using a Kish Grid). The sample size was determined according with the aim of achieving 5,000 household interviews with an expected non-response rate of around 30%. The final response rate was 78%, producing a sample size of 5,557 households.

A three stage stratified sample was used.

1st stage – Enumeration District selection

EDs were selected systematically with probability proportional to size (PPS) within each stratum (region and settlement type) from the list of EDs. The size of each EDs was the number of occupied dwellings according to Census 2002. EDs were sorted within each stratum according to the serial numbers. Using systematic selection on the sorted list a high level of implicit geographical stratification and effective sample distribution was achieved.

2nd stage – Occupied Dwelling selection – including an update of dwellings in selected EDs

Occupied dwellings were selected from each selected ED (selected in the first stage) from updated dwelling lists systematically with equal probabilities.

Update of EDs

Although time was short and funds were not yet available it was agreed that it was important to update the selected EDs before specific dwellings were selected. The update took place from 5-15 April 2007 with data entry completed two weeks later.

The observation unit for updating was each dwelling (household) in an ED. From 2002 Census 510 EDs were selected (114 Belgrade and 396 in other parts of the country). Enumerators were given a map showing the borders of the ED and a list of dwellings. The map and the description of the ED were compared to the actual situation. If a street title was changed, the new address was written onto the list of dwellings. If a new street or dwelling had been constructed, the street name and the house number were added to the list and coded. If a dwelling no longer exists it was crossed out and coded. All dwellings were included even if inhabited by persons were not owners (tenants) and if there was any doubt as to whether a dwelling was occupied or not, it was included.

3rd stage – Households within occupied dwellings

The majority of occupied dwellings consist of one household. If the selected dwelling was occupied by one household then that household was automatically selected. In cases where a selected dwelling was occupied by more than one household the interviewer randomly choose one household using a Kish Grid.

The overall probability of selection of a sample household can be expressed as follows:

$$p_{hij} = \frac{n_h \times M_{hi}}{M_h} \times \frac{m_{hi}}{M'_{hi}} \times \frac{1}{k_{hij}},$$

where:

p_{hij} = overall probability of selection for a sample household in the j-th sample dwelling unit selected in the i-th sample ED in stratum h

n_h = number of sample EDs selected in stratum h

M_{hi} = number of occupied dwelling units from the 2002 Serbia Census frame for the i-th sample ED in stratum h

M_h = total number of occupied dwelling units in the 2002 Census frame (cumulated measure of size) for stratum h

m_{hi} = 14 = number of occupied dwelling units selected for the LSMS from the updated listing in the i-th sample ED in stratum h

M'_{hi} = number of currently occupied dwelling units the i-th sample ED in stratum h from the updated listing

k_{hij} = number of households in the j-th sample dwelling unit selected in the i-th sample ED in stratum h

The three components of this probability correspond to the three sampling stages. Most of the occupied dwelling units (almost 98 percent) only have one household, in which case the last

component of this probability would be equal to 1. Table 2 shows the number of interviewed sample households by the number of households in their dwelling unit (k_{hij}).

Table 2. Distribution of 2007 LSMS Sample Households by Number of Households in Dwelling Unit

No. Households in Dwelling Unit	No. Sample Households	Percent
1	5,443	97.9
2	97	1.7
3	16	0.3
4	1	0.0
Total	5,557	100.0

1.4 WEIGHTING

The basic sampling weight is calculated as the inverse of this probability, which can be expressed as follows:

$$W_{hij} = \frac{M_h \times M'_{hi} \times k_{hij}}{n_h \times M_{hi} \times m_{hi}},$$

where:

W_{hij} = basic sampling weight for a sample household in the j-th sample dwelling unit in the i-th sample ED in stratum h

After the LSMS data collection, this basic weight was adjusted for non-interviews as follows:

$$W'_{hij} = W_{hij} \times \frac{m'_{hi}}{m''_{hi}},$$

where:

W'_{hij} = adjusted weight for the j-th sample dwelling unit in the i-th sample ED in stratum h

m'_{hi} = number of valid sample occupied dwelling units in the i-th sample ED in stratum h, excluding any dwelling units found to be vacant or demolished

m''_{hi} = number of selected dwelling units with a completed LSMS questionnaire (that is, number of completed household interviews) in the i-th sample ED in stratum h

The following categories were used to identify the final interview status of each sample household (or dwelling unit):

    (1)   Interviewed
    (2)   Temporarily absent

     (3)   Refusal
     (4)   Illness
     (5)   Language problem
     (6)   Empty, derelict

The number of valid sample occupied dwelling units (m'_{hi}) is based on interview status categories (1) through (5), and the number of completed interviews (m''_{hi}) was based on category (1). Table 3 shows the distribution of the sample occupied dwelling units by interview status. The dwelling units classified as category (6) were considered out of scope, since no persons lived there. There were a total of 246 household records with interview status category (6). One reason this number is relatively high is that dwelling units for which the occupancy status was unknown at the time of the listing were included in the second stage sampling frame to ensure that any households in these dwelling units were included in the frame; some of these dwelling units were found to be unoccupied at the time of the LSMS interview. Excluding the sample dwelling units in category (6), the unweighted unit response rate for the 2007 LSMS is 80.6 percent.

It can be seen that the main reason for noninterviews was (3) Refusal. Although this response rate is considered reasonable compared to that for other household surveys, the characteristics of the 19.4 percent of sample households that did not respond may be somewhat different from those of the responding sample households, resulting in a corresponding bias in the survey results.

Table 3. Distribution of 2007 LSMS Sample Households by Interview Status

Code	Interview Status	No. Sample Households	Percent
1	Interviewed	5,557	77.8
2	Temporarily absent	236	3.3
3	Refusal	1,020	14.3
4	Illness	61	0.9
5	Language problem	20	0.3
6	Empty, derelict	246	3.4
Total		7,140	100.0

The first two components of the weight and the non-interview adjustment factor were calculated at the level of the sample ED, and were attached to the data record for each household in the ED. This dwelling unit weight was then multiplied by the number of households in the sample dwelling unit (k_{hij}) for each household record. The final weights based on these specifications were generated by Mira Ogrizovic, RSO using the SAS software, and independently verified by the consultant David Megill.

The weights specified above are based on the sample design. It is important to examine the weighted estimates of the total number of households and population by stratum (region, urban and rural) in order to compare these results to the population distribution from the 2002 Census and other sources. This enables evaluation of the implementation of the sample design and identifies potential biases in the sampling frame.

1.4.1 Comparing number of households in LSMS 2007 and Census 2002
The units of analysis for the 2007 LSMS are individual households and the persons in those households. Since the weights were calculated at the level of the household, the first comparison with the 2002 Serbia Census results was based on the weighted total number of households. Table 4 shows the weighted total number of households by region, urban and rural strata from the 2007 LSMS data, using the final adjusted weights, and the corresponding number of households

in the 2002 Census frame for each stratum. The number of households from the Census frame excludes the households in EDs with less than 20 households, so it should be directly comparable to weighted estimates from the LSMS.

Table 4. Comparison of Weighted Total Number of Households from 2007 LSMS and Corresponding Number from the 2002 Census Frame, by Region, Urban and Rural

	Total			Urban			Rural		
Region	2007 LSMS	2002 Census	% Diff.	2007 LSMS	2002 Census	% Diff.	2007 LSMS	2002 Census	% Diff.
Belgrade	512,992	555,588	-7.7%	434,404	464,291	-6.4%	78,588	91,297	-13.9%
West Serbia	228,297	260,278	-12.3%	94,822	105,641	-10.2%	133,475	154,637	-13.7%
Šumadija	365,292	402,793	-9.3%	185,852	207,292	-10.3%	179,440	195,501	-8.2%
East Serbia	188,403	220,097	-14.4%	90,818	110,032	-17.5%	97,585	110,065	-11.3%
SE Serbia	273,406	329,073	-16.9%	143,286	164,726	-13.0%	130,120	164,347	-20.8%
Vojvodina	650,578	699,799	-7.0%	382,507	406,553	-5.9%	268,071	293,246	-8.6%
Total Serbia	**2,218,968**	**2,467,628**	**-10.1%**	1,331,689	1,458,535	-8.7%	887,279	1,009,093	-12.1%

It can be seen in Table 4 that the overall estimated total number of households from the 2007 LSMS based on the final weights is about 10 percent lower than the corresponding figure from the 2002 Census frame. The difference is larger for the rural strata (12.1 percent) than the urban strata (8.7 percent). These differences probably include an actual decline in the number of households in some strata and may also reflect the quality of the updating of the listing of occupied dwelling units in sample EDs.

1.4.2 Evaluation of Update of EDs
During the update operation dwelling units were coded as "occupied" when the occupancy status was unclear, to ensure that all households had a chance of being selected; this is taken into account in the weighting procedures. However, it is still possible that some enumerators did not completely cover the ED boundaries during the update operation. In order to examine this possibility, the number of occupied dwelling units from the updated frame in each sample ED was compared to the corresponding number from the 2002 Census frame used as the measure of size for the first stage sample selection with PPS.

The differences varied by sample ED. Overall the unweighted number of occupied dwelling units identified in the updated listing for the 510 sample EDs was 5.7 percent lower than the corresponding number from the 2002 Census frame for these EDs. The difference was higher for the rural EDs (8.7 percent) compared to the urban EDs (4.0 percent); this is consistent with the understanding that there is more emigration from the rural areas (both international and to urban areas).

1.4.3 Definition of a household in LSMS 2007 and Census 2002
It is possible that the concept of household may have been applied slightly differently during Census 2002 and LSMS 2007. For example, when two or more families were living in a housing unit, some Census enumerators may have been tempted to consider each one a separate

household, regardless of the financial or eating arrangements, since they were paid based on the number of questionnaires completed.

The average number of households per occupied dwelling unit for the 2002 Census was 1.036, compared to 1.024 for the 2007 LSMS, so the difference is relatively small. The average number of persons per household in the 2007 LSMS was 3.10, compared to 2.97 in the 2002 Census, so these figures are also relatively close. Therefore it seems a differing concept of "households" does not explain the reduction of households between 2002 and 2007.

1.4.4 RSO population projection of 2006

It is also important to compare the 2007 LSMS weighted estimates of total population by region to corresponding estimates from other sources such as the population projections based on demographic analysis.

Table 5 shows the weighted population estimates by region from the survey data and the corresponding RSO population projections for 2006. It can be seen in Table 5 that the 2007 LSMS weighted estimates of total population are 7.0 percent lower than the corresponding projections for 2006. The 2006 projections were compared to those for 2005, indicating a small annual decrease of about 0.4 percent. Therefore it is expected that the population projections for 2007 may show a similar slight decline in the population.

In reviewing Table 5 it is also necessary to take into account the population excluded from the sampling frame for the LSMS (such as the population living in EDs with less than 20 households, those living in institutions or group quarters, and persons who are homeless or living in temporary houses). It is estimated that the LSMS sampling frame excludes less than 2 percent of the population of Serbia.

The 95 percent confidence interval for the 2007 LSMS estimate of the total population is 6,714,557 to 7,064,104, so the difference between the LSMS estimate and the population projection is statistically significant and cannot be explained by sampling error alone. It should also be pointed out that the 2006 population projections are based on vital statistics (birth and death rate) and do not take into account the population that has emigrated internationally; this probably accounts for part of the difference.

Table 5. Comparison of Weighted Total Population from 2007 LSMS and Corresponding Projected 2006 Population, by Region

Region	2007 LSMS	2006 Projection	% Diff.
Belgrade	1,524,150	1,602,861	-4.9%
West Serbia	720,351	811,108	-11.2%
Šumadija	1,160,963	1,283,780	-9.6%
East Serbia	610,775	671,186	-9.0%
South East Serbia	933,902	1,040,036	-10.2%
Vojvodina	1,939,191	2,002,598	-3.2%
Total Serbia	6,889,332	7,411,569	-7.0%

Due to the update of occupied dwelling units in sample EDs the LSMS 07 weights should reflect a more recent distribution of the population by region, urban and rural strata. Most of the estimates from the 2007 Serbia LSMS survey data will be in the form of relative indicators, such as averages and proportions, so even if there were deficiencies in the Update for some sample EDs, they should not have a significant effect on the accuracy of the survey results.

1.4. 5 Adjustment of 2007 LSMS Weights Based on Projected Population

In order to make the weighted estimate of the total population from the 2007 LSMS data more consistent with the projected total population for Serbia based on the vital registration data and demographic analysis, the RSO decided to adjust the weights by a constant factor of 7,411,000/6,889,332, where the denominator of this ratio is the preliminary weighted total population from the LSMS data presented in Table 5. Although this adjustment will increase the survey weighted estimate of the total population to 7,411,000, the relative distribution of the population by region, urban/rural and other characteristics will remain the same. As a result, the survey estimates of relative indicators, such as averages, proportions and other ratios will be the same as those using the previous weights. Table 6 shows the new 2007 LSMS estimates of the total population by region, urban and rural domains based on the adjusted weights. The slight difference from the total projected population at the national level is due to an insignificant rounding error.

Table 6. New Estimates of Total Population by Region, Urban and Rural from the 2007 LSMS Data, based on the Adjusted Weights

Region	New 2007 LSMS Weighted Estimates		
	Urban	Rural	Total
Belgrade	1,350,629	288,932	1,639,561
West Serbia	312,764	462,133	774,897
Šumadija	631,358	617,513	1,248,871
East Serbia	304,936	352,088	657,024
South East Serbia	530,705	473,912	1,004,617
Vojvodina	1,192,840	893,188	2,086,028
Total Serbia	4,323,232	3,087,766	7,410,998

1.5 POVERTY MEASUREMENT METHODOLOGY

Monitoring poverty trends over the period 2002-2007 was made possible by using a virtually identical data source, LSMS, and a comparable methodology for measuring poverty. Applying a comparable approach to the design and implementation of the LSMS (sample, questionnaire, etc.) enabled the use of a comparable methodology for measuring poverty. For both years, the three elements required for measuring poverty, which are household consumption aggregate, poverty line and adult equivalent units were based on comparable methodology. The slightly amended method used in 2007, was also applied for measuring poverty in Serbia in 2002.

Particular elements of the method used for measuring poverty in this study were improved compared to the method applied in 2002-2003 (Krstić, 2007). In order to compare results for 2007 with the 2002 estimates, it was necessary to recalculate the poverty indicators for 2002 using the same methodology as for 2007.

1.5.1. Consumption aggregate

As in previous poverty research, household consumption was used as the best approximation of living standards, i.e. household well-being in Serbia. It is assumed that household consumption is

better declared in LSMS than income and that it is less sensitive to short-term fluctuations, as in other transitional countries.[1]

The household consumption aggregate was estimated using LSMS data. Its two basic components, which include goods purchased, goods produced by the household and gifts received, are: a) the value of food expenditure and b) the value of non-food expenditure.

In order to enable a comparison of living standards and poverty over time, the same definition for household consumption used in 2002 was applied in 2007.[2]

Household consumption was estimated according to the COICOP classification and includes the following expenditure categories: 1) food and non-alcoholic beverages; 2) alcoholic beverages and tobacco; 3) clothing and footwear; 4) housing; 5) furnishings, household equipment and maintenance; 6) health; 7) transport; 8) communication; 9) recreation and culture; 10) education; 11) restaurants and hotels; 12) miscellaneous goods and services.

In additional to regular expenditure (public utilities, electricity, gas and other fuels, telephone and regular maintenance), housing expenditure included the actual rent paid by tenants of apartments/houses and the *imputed rent* for apartment/home owners. Estimates of imputed rent for apartment/house owners were only collected for the primary dwelling, while the actual rent paid by tenants included both primary and secondary dwellings. The method used for imputing rent is explained in part 1.1.1. Unpaid electricity and utility bills, as well as socially-targeted electricity and utility subsidies, were treated as in-kind component of housing expenditure and were included in the total value of rent.

Household consumption included *amortisation for durable goods*. Consumption components which encompass amortisation for durable goods, depending on the durable good, are: a) expenditure for furnishings, household equipment and maintenance; b) expenditure for transport; and c) expenditure for recreation and culture. Thus, for example, amortisation for vehicles is included in COICOP category 7 – transport expenditure, while amortisation for household appliances is included in category 5 – expenditure for furnishings, household equipment and maintenance, etc.

Health expenditure includes all costs incurred for out-patient, hospital and dental care: formal payments for medical examinations, medication, laboratory tests and medical aids, as well as informal payments and gifts for medical staff. Treatment received abroad, self-medication and alternative medical services were also included.

Education expenditure includes costs of pre-school, primary, secondary and tertiary education, as well as expenditure for additional educational programmes/private lessons.

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[1] For basic advantages of using household consumption for poverty measurement over income, see Bogićević, Krstić, Milanović and Mijatović: "Siromaštvo i reforma državne pomoći siromašnima" (Poverty and Reform of Country Assistance for the Poor), CLDS, Belgrade, 2003, (p.9).
[2] In 2007, consumption was calculated for members present in the household (members who lived in the household for at least one month during the previous 12 months and who did not work abroad). In 2002, it was not possible to calculate consumption only for those members who were present in the household. Consumption was calculated for all household members, since respondents who selected "0" for the number of months of presence in the household were treated as members who refused to respond.

Extreme expenditure values (outliers) were excluded at the aggregate level. They were defined as all values lower than 1% of the average consumption per adult equivalent (lower limit) or greater than the median consumption multiplied by 10 (upper limit). All outliers were replaced with the lower or upper limit values (1% of average consumption per adult equivalent or 10*median consumption/adult equivalent) depending on whether consumption per adult equivalent was lower than the lower limit or greater than the upper limit.

Thus defined, consumption was deflated using the regional price index, so that higher expenditure in some regions would exclusively be the result of higher consumption or consumption of better quality goods, rather than a result of higher prices.

1.5.2 Imputed rent

Rent for dwellings occupied by owners was estimated using a separate survey of the real property market, which included 41 municipalities. Information on the market prices and area (in m²) of dwellings were provided by estate agents, law firms etc. according to the following characteristics:

1. Type of dwelling (one-room, two-room, three-room apartment or house in the city, suburb or house in rural area up to 20 years old, 21-40 years old, over 40 years old)
2. Location (city centre, city – wider centre, suburb, rural area)
3. Method of heating used (central heating, other)[3].

Average prices per square meter, according to the specified property characteristics, were calculated using this data for each of the 41 surveyed areas. To enable data comparability with LSMS 2002 the data was gathered same towns and cities as 2002 (plus the new addition of Surčin).

Town/city	Town/city	Municipalities of Belgrade
Šabac	Požarevac	Barajevo
Zaječar	Užice	Voždovac
Leskovac	Prijepolje	Vračar
Vranje	Kragujevac	Grocka
Kraljevo	Jagodina	Zvezdara
Kruševac	Aranđelovac	Zemun
Novi Pazar	Zrenjanin	Lazarevac
Čačak	Novi Sad	Mladenovac
Niš	Pančevo	Novi Beograd
Pirot	S. Mitrovca	Obrenovac
Valjevo	Subotica	Palilula
Smederevo	Sombor	Rakovica
		Savski Venac
		Sopot
		Stari grad
		Čukarica
		Surčin

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[3] Central heating means the heating of dwelling/house through thermal plants, while other means all other types of heating.

The average prices per square meter were imputed for those LSMS households owning property, with the specified characteristics, in the regions/municipalities where the additional survey was carried out. For households in municipalities that were not included in the property survey, the average price per square meter of the regions where those municipalities belong were used according to the property characteristics (location, type of dwelling, heating method). In regions where there were no properties with one of the specified characteristics, for example, central heating in rural areas, the average price per square meter in that region, by location and property type, was used, regardless of the heating method. Finally, if the property survey did not provide data on the dwelling price for a specific property type (e.g. house in the centre in Western Serbia), the average price per square meter by location for the region in question, was used, regardless of the property type.

Based on data on property areas (m²) and the estimated price per square meter, the value of the property owned by the household was calculated. It was assumed that the imputed rent for each dwelling was 1 percent of the value of the property occupied by owners. The same amortisation rate was used for the 2002 survey. For rented properties, the actual rent paid by the tenants was used. Imputed rent for secondary dwellings was not calculated. The average rent for all households (tenant-occupied and otherwise) more than doubled in 2007 compared to 2002.

The second method for estimating rent for properties occupied by owners was based on the hedonic rental regression estimate, where the dependent variable is the logarithm of the actual rent paid by tenants and the independent variables are the property characteristics: the logarithm of the property area (m²), number of rooms, additional rooms, property type, type of fittings (heating, water supply, sewerage, telephone, intercom, etc.), problems linked to individual parts of the property (damp, leaking roof, ruined walls, etc.), location and region. The goodness of fit of this regression model was high, $R^2=0.70$, and the property characteristics had the expected sign. The resulting parameters from this regression were used to calculate rent for the part of the population living in their own properties and for whom rent data is unavailable. This rent estimation method has its shortcomings, such as the relatively undeveloped rental market in Serbia – the number of observations in this regression model is small (156 observations) – as well as the fact that a systematic difference can exist between the characteristics of tenants and owners[4]. Regardless of these shortcomings, the results of this method served to compare with results obtained through the separate survey on dwelling values.

A comparison of results obtained by applying these two methods indicates that the amortisation rate of 2% per annum would provide results that are closer to the second method. Using the first method, in 2007, the average estimated rent for households living in their own dwellings was 2,381 dinars per month (1% amortisation rate), while the second method results in 7,514 dinars per month. However, bearing in mind the shortcomings of the second method, and in order to enable comparisons of the results with 2002, the amortisation rate of 1% per annum was retained in 2007 and applied to the estimated property values using the first method.

1.5.3 Imputed value of flow of services from durables
Instead of the expenditure for the purchase of durable goods, the household consumption aggregate includes the value of services which the household acquires through their use. In order to calculate the cost of use of durable goods, the depreciation rate for each durable good must be calculated. The depreciation rate for each durable good can be expressed as follows:

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[4] Heckman's (1979) two-stage method is frequently used to estimate hedonic rental regression.

$$\delta - \pi = 1- (p_t/p_{t-T})^{1/T} \tag{1.1}$$

where δ is the depreciation rate, π is the actual interest rate, p_t is the current value of the durable good, p_{t-T} is the value of the durable good at the time of purchase and T is the age of the durable good.

By taking the logarithm and sorting the equation (1.1), the following is obtained:

$$ln(p_t)=ln(p_{t-T}) - T \; ln(1- \delta + \pi) \tag{1.2}$$

Since the LSMS only collects data on the current value and age of the durable good, $\delta - \pi$ can be estimated using equation (1.2) by regressing the logarithm of the current value of the durable good to the constant and age, assuming that the current value of the new durable good is a constant. This regression is estimated for each durable good aged up to 30 years[5], previously removing the outliers. Parameters resulting from this regression are used for calculating current values of durable goods for the segment of the population which was unable to estimate the current value of the durable good or whose value was an outlier, as follows:

p_t = (estimated current value)$_{i,k}$=$\exp(\delta_k \; T_{i,k})$

where δ_k is the estimated depreciation rate of the durable good k.

Table7 shows the estimated deprecation rates of durable goods in 2002 and 2007.

Table 7. Estimated depreciation rates of durable goods, 2002-2007

	2002	2007
Oven	6.25	7.34
Washing machine	5.99	7.91
Air conditioner	12.73	10.77
Dishwasher	6.71	8.29
Refrigerator with freezer	4.97	6.76
Refrigerator	4.63	6.35
Freezer	5.15	8.17
Microwave oven	5.42	7.08
Vacuum cleaner	4.53	6.28
Iron	3.72	5.67
Satellite dish	5.38	5.79
TV	6.79	7.35
Video recorder	4.64	6.29
Video camera	8.27	11.90
Stereo, CD/DVD player	6.35	5.11
Radio cassette player	5.17	5.43
PC/laptop	12.70	15.33
Motorcycle	7.41	5.93
Car	10.16	9.67
Jeep, van	7.20	9.54

Source: LSMS 2002, 2007.

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[5] Households did not specify values for durable goods aged 30 years or more.

Finally, the consumption flow from the possession of durable was obtained by multiplying the depreciation rate with the current value of the durable.

1.5.4 Regional differences in prices

Differences in the cost of living between regions can lead to the identical goods being more expensive in one region in relation to another. However, differences in expenditure/consumption caused by these regional differences in prices do not reflect the differences in the well-being of the population. Thus, for example, a kilogram of potatoes can cost up to 60 dinars in Belgrade and only 40 dinars in a rural area of Serbia. The benefit from the consumption of a kilogram of potatoes is the same, regardless of the place and price of purchase. To compare the well-being of two households or individuals, their consumption must be corrected with the regional price index. This way, the greater consumption of one household will solely be the result of the consumption of a greater quantity or the consumption of better quality goods, rather than the result of higher prices.

Since the Republican Statistics Office (RSO) only calculates the cost of living index for larger Serbian cities and does not cover rural areas, the LSMS data was used to define and calculate the price index for the relevant regions in Serbia.

The Paasche index was used to deflate consumption with regional differences in prices[6]. The Paasche index for a household living in region r is expressed as follows:

$$P_r = \sum_{k=1}^{K} \left(\frac{Q_{k,r} p_{k,r}}{Q_{k,r} p_{k,0}} \right)$$

where P_r is the price index for region r, $Q_{k,r}$ is the quantity of purchased good k in region r, $p_{k,r}$ is the price of good k in region r and $p_{k,0}$ is the reference price of good k.

This price index was calculated on the basis of data on 93 food items, so that the total consumption per adult equivalent, excluding rent, is deflated using this food price index. It is thereby assumed that the regional price variations for other goods and services (excluding rent) are similar to the variations in food prices. Since there was no regional data on the unit cost of other goods and services (excluding food), this was the only acceptable method for regional deflation of consumption.

Expenditure for rent (imputed and actual) was deflated using the regional price index of dwellings, which was calculated using data on property prices from the separate survey on regional property market prices in Serbia.

The food price index was calculated for 6 basic regions in Serbia, as well as for urban/rural areas within each region. Hence, the regional food price index covered 12 regions. These regions were also used to calculate the regional property price index.

As the LSMS did not collect data on prices of goods, the price per unit of a good was calculated as the ratio of expenditures and quantities purchased for each food item. These unit prices were

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[6] The Paasche price index is theoretically better than the Laspeyres index but requires data on quantities of all goods purchased by the household, which were collected in the LSMS. See: Grosh, Margaret and Paul Glewwe, eds. (2000), Designing Household Survey Questionnaires for Developing Countries: Lessons from 15 Years of the Living Standards Measurement Study Surveys, The World Bank, Washington, D.C.

used to calculate the individual food price index for each household. The price of food item k for region r is calculated as the median of the unit price for that good in that region. The reference price $p_{k,0}$ is calculated as the median unit price of that good for the whole country. If the frequency of the price of a food item in one region is less than 5, or if it has been determined that the value is an outlier (5 times greater than the unit price for the whole country or less than one-fifth of the national unit price), then its regional price is replaced with the country-level price of the good. The regional food price index is the median food price index of all households in the region.

Regional food price indices are shown in Table 8. In addition to the 2007 indices, the regional indices used for deflating consumption in 2002 are provided. The variation in regional food prices is significant. As was the case five years ago, in 2007, urban areas in Belgrade were most expensive, while rural areas in South-East Serbia were least expensive. However, the ratio of food prices between the most and least expensive region has increased slightly, from 15.3% in 2002 to 16.8% in 2007.

Table 8. Regional food price and property price indices, 2002-2007

	2002		2007	
Regions	**Regional food price index**	**Regional property price index**	**Regional food price index**	**Regional property price index**
Belgrade, urban	1.054	2.940	1.122	2.563
Belgrade, rural	1.060	0.747	1.064	0.877
Vojvodina, urban	0.976	1.269	1.000	1.060
Vojvodina, rural	0.960	0.424	0.973	0.370
Western Serbia, urban	0.959	1.450	1.046	1.073
Western Serbia, rural	0.931	0.608	0.986	0.385
Šumadija, urban	0.970	1.627	0.984	1.323
Šumadija, rural	0.929	0.585	0.977	0.540
East Serbia, urban	0.970	1.135	0.987	0.889
East Serbia, rural	0.966	0.501	0.918	0.299
South-East Serbia, urban	0.949	1.417	0.973	1.138
South-East Serbia, rural	0.914	0.447	0.961	0.567
Total	1.000	1.000	1.000	1.000

Source: LSMS 2002, 2007.

The regional property price indices were calculated using the same method as for the regional food price indices. Expenditure for rent (imputed and actual) was deflated using the regional property price index provided in Table 8. In 2007, dwellings in the urban areas of Belgrade are still most expensive, while the least expensive are dwellings in rural East Serbia, whereas five years ago dwellings in rural areas of Vojvodina used to be the least expensive. The increase in property prices in rural Vojvodina, compared to the national average, can be attributed to the increased investments in that region.

1.5.5 Equivalence scale
In order to define the level of well-being of individuals, and thereby their poverty level, the total household level consumption collected through surveys must be distributed between household members according to specific criteria.

One of the methods for distributing total household consumption to its members is to divide household consumption by household members. This provides consumption per capita and assumes that each household member is accredited an equal share of household resources (consumption). However, this method is inadequate as different members require different amounts of resources in order to achieve the same level of well-being. Two important facts which are overlooked during the allocation of the same amount of consumption to all household members are: a) the difference in consumption of adults and children; b) economies of scale i.e. the fact that certain costs are shared between household members, such as expenditures on housing, cars or daily newspapers, etc. Consequently, for example, a four-member household which spends 80,000 dinars per month is wealthier than a one-member household which spends 20,000 dinars per month.

The economy of scale can be approximated by adjusting the household size to the variable representing the equivalent household size. For example, a household with an equivalent size of 3.5 has to spend 3.5 times more in comparison to an adult in order to achieve the same level of well-being as the adult. Apart from household size, sex and age of household members also influence the household consumption required, so equivalence scale can also take into account these characteristics of its members.

Equivalence scale can only reflect the size of the household, and therefore depend on one parameter θ. Consumption per adult equivalent POTpj can be expressed as follows[7]:

$$POTpj = \frac{POT}{n^{\theta}} \, ,$$

where: POT - household consumption; n - number of household members; and θ - parameter.

The specific case where $\theta=1$, represents consumption per capita. OECD uses the value of $\theta=0.7$. For a typical household size in countries of East European and the former Soviet Union, the aforementioned equation represents a simplification of the OECD scale, according to which the first adult=1, the second adult=0.7 and children=0.5.

This study uses the OECD scale, which besides the household size, takes into consideration the household composition according to which the first adult = 1, other adults = 0.7 and children up to 13 years of age have a weight of 0.5.[8] This scale is expressed as follows:

OECD equivalence scale =1+0.7*(adults-1)+0.5*children013

The RSO also used this equivalence scale for its annual poverty estimates based on the Household Budget Survey (HBS) for the period 2003-2006. The shift to this equivalence scale[9], which has been recommended by OECD, contributes significantly to international comparability.

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[7] Braithwaite, J. Grootaert, C. and Milanovic, B: Poverty and Social Assistance in Transition Countries, 1999.
[8] See: Household Survey in the EU, Methodology and recommendations for harmonisation – 2003, p. 155.
[9] In 2002, units of equal consumption were used, which were estimated based on LSMS 2002 data using the Engel method. This scale is expressed as follows: Serbian scale = (1 + 0.81*(adults-1) + 0.24*children06 + 0.75*children718).

1.5.6 Poverty line

Poverty is defined using the absolute poverty line. The absolute poverty line can be defined as the consumption deemed necessary to achieve a minimum standard of living. The poverty line consists of two components: the food poverty line or extreme poverty line, and other household expenditure. Thus the poverty line is defined through two steps.

1.5.7 Food poverty line or the extreme poverty line

The first step defines the food poverty line, which is usually used to define the population living in extreme poverty. This line is defined as the consumption required to meet basic subsistence needs. The population whose total consumption is insufficient to meet the basic subsistence needs is considered to be extremely poor. In order to express this as a monetary amount, the average caloric needs of the Serbian population must be calculated, as defined by World Health Organisation standards, as well as the cost per calorie.

The food poverty line which is determined at the level of the minimum food basket included 93 food items from the 2007 LSMS. The minimum food basket was calculated using the food consumption of households whose total consumption was located in the first three deciles.

Average caloric needs. The average caloric requirements at the national level were determined based on the caloric requirements of different demographic groups, i.e. using the LSMS data from 2007 on population structure by sex and age, and nutritional needs of these demographic groups (Table 9). Caloric requirements of the population by sex and age were based on World Health Organisation (1985) data. The average caloric requirements at the national level calculated using this method amounted to 2,253 calories per day per capita in 2007.

Table 9. Estimated caloric requirements in Serbia, 2007

	Demographic structure	Daily caloric requirements
Men, 16-60	7.8	2,655
Women, 16-60	11.4	2,099
Elderly people, 60+	32.8	2,006
Children, 0-6	31.8	1,614
Children, 7-15	16.1	2,362
Total	100.0	**2,253**

Source: LSMS 2007 and World Health Organisation (1985).

Cost per calorie. The cost per calorie is calculated on the basis of food consumption of those people whose consumption per adult equivalent lies within the first three deciles. The cost per calorie is calculated through a number of steps. First, the daily caloric value of each good purchased by the household is calculated (including in-kind consumption) by multiplying the quantity of the purchased good with its caloric content by unit measure and dividing this amount by the number of days and equivalence scale used (OECD scale).[10] The caloric content of the quantities purchased is then calculated for each good at the national level, i.e. caloric consumption (by summing the caloric consumption of specific good for all households) and price of the good (median of the price of the good for all households). The cost per calorie for each good is calculated by dividing the price with the caloric consumption for that good. In the next step, the total caloric food consumption is calculated by summing the caloric consumption for all food items. Using this data, the share of the consumption of each food item in total food consumption is calculated (by dividing the caloric consumption for each item with the total

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[10] The caloric value of each food item is based on US Department of Agriculture (USDA) data.

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caloric consumption of food). The daily cost per calorie for the population whose consumption per adult equivalent lies within the first three deciles is calculated as the weighted average of prices of all goods, where the weights are the shares of consumption of each item in the total food consumption.

Finally, the extreme poverty line (food poverty line) per capita at the monthly level is obtained by multiplying the average caloric requirements at the national level (2,253 calories) with the daily cost per calorie (first three deciles) and the number of days in the month. The food line calculated using this method reflects the current food consumption of LSMS households with the lowest consumption and the prices they pay. Since consumption is expressed per adult equivalent, the food poverty line per capita is adjusted with equivalence scales used. The ratio of the average equivalence scale and the average household size has been used to adjust the food poverty line per capita to the food poverty line per adult equivalent. Consequently, a food poverty line of 4,138 dinars per month per adult equivalent has been obtained for 2007.

1.5.8 Total poverty line

The second step consists of defining the total poverty line, which in addition to expenditure for food includes expenditure for other goods and services (clothing and footwear, hygiene and furnishings, transport, health, education, etc.). It is determined as the total consumption of those households whose food consumption equalled the minimum food basket. This method resulted in a poverty line of 8,883 dinars per month per adult equivalent in 2007.

In order to estimate the total consumption which corresponds to the minimum consumer basket, the following equations are used:

$$OH = \frac{UPHpj}{MKHpj}$$

$$POTpj = \frac{UP}{PJ * IC}$$

where: OH is the ratio of household food consumption and the minimum food basket of the household; UPH is the total household food consumption (per adult equivalent); MKH is the minimum household food basket (per adult equivalent); POTpj is the consumption per adult equivalent as defined in the preceding part; UP is the total household consumption; PJ is the equivalence scale (OECD scale) and IC is the price index. Variable OH equals 1 when the household spends on food exactly the amount of the minimum food basket.

In order to obtain the poverty line which corresponds to consumption per adult equivalent at which the respondents spend on food exactly the amount of the minimum food basket, the following relation is estimated using the non-linear least square method:

$$\ln(OH_i) = \alpha_0 + \alpha_1 \ln(POTpj_i) + \alpha_2 \ln(POTpj_i)^2 + \varepsilon_i$$

where i represents the household; $\alpha_0, \alpha_1, \alpha_2$ are the parameters being estimated; and ε_i represents the error.

The estimated regression is solved for the equivalent consumption level at which the households spend on food the amount equal to the minimum consumer basket, i.e., for OH=1:

$$\ln(1) = 0 = \hat{\alpha}_0 + \hat{\alpha}_1 \ln(LS) + \hat{\alpha}_2 \ln(LS)^2,$$

where $\hat{\alpha}_0, \hat{\alpha}_1, \hat{\alpha}_2$ the estimated regression parameters, and LS are is the estimated poverty line.

By solving this equation, the following is obtained:

$$LS = \exp\left(\frac{-\hat{\alpha}_1 \pm \sqrt{\hat{\alpha}_1^2 - 4\hat{\alpha}_0\hat{\alpha}_2}}{2\hat{\alpha}_2}\right)$$

i.e., the poverty line which, in addition to expenditure for food, includes expenditure for other goods and services and amounts to 8,883 dinars per adult equivalent per month (Table 10).

Table 10. Poverty line in Serbia, 2002-2007

	Poverty line per adult equivalent per month, dinars
2002	5,234
2007	8,883

The poverty line for 2002 was calculated by adjusting the poverty line for 2007 with the increase in the cost of living for the period June 2002 - June 2007. According to RSO data, the increase in expenditure for food and non-alcoholic beverages in this period amounts to 49.7%, while the increase in prices of other goods and services (non-food) amounted to 92.1%. The food poverty line from 2007 was deflated by the increase in food and beverage prices in the period June 2002 - June 2007, while the value of non-food expenditures was deflated by the increase in non- food prices during the same period. Hence, the food poverty line in 2002 amounted to 2,764 dinars (4,138/1.497), assuming the structure of food consumption was the same as for 2007. The non-food expenditure in 2002 amounted to 2,470 (4,745/1.921), assuming that the share of non-food in the total poverty line was the same as in 2007 (4,745 dinars). Consequently, the total poverty line in 2002 amounted to 5,234 dinars per month per adult equivalent (Table 4).

1.5.9 Comparing poverty between 2002 and 2007
As has previously been mentioned, a poverty comparison between 2002 and 2007 was made possible by using: 1) the same data source - LSMS and a comparable methodology for its design and implementation (questionnaire, sample etc.); and 2) a comparable methodology for calculating all components required for defining poverty (household consumption, adult equivalent units, poverty line).

The LSMS was carried out in both years (2002 and 2007) during the same period (May-June), in order to eliminate seasonal effects. The instrument (questionnaire) for these surveys was the same for both years, with minor additions/amendments in 2007, which enabled the definition of comparable consumption aggregates for both years. Methodological explanations for the 2007 LSMS are provided above (sample, fieldwork etc.).

In addition to this, a poverty comparison for this period was made possible by using the same methodology for measuring poverty. The consumption aggregate in 2007 includes the same components as in 2002. The poverty line was calculated for 2007 and the line for 2002 was obtained by deflating the 2007 poverty line with the increase in the cost of living during the reference period, under the assumption that the consumption structure (expressed as food share and non-food share in total consumption) was the same as in 2007. This enables the monitoring of poverty changes between 2007 and 2002, assuming an unchanged poverty line (actual amount) and an unchanged consumption structure.

However, it should be emphasised that certain aspects of the methodology used for measuring poverty in Serbia in 2007 were improved in comparison to the method used for measuring poverty for the period 2002-2003, which was published in the paper by Bjeloglav et al. (2007). Since comparing poverty over time assumes that the poverty estimates are calculated using the same method, it was necessary to recalculate the poverty indicators for 2002 using the same methodology as in 2007.

Two basic methodological differences for measuring poverty, which were applied in this study for the period 2002-2007 and the method which was initially used for the period 2002-2003, refer to the equivalence scale and poverty line.

In the estimation of poverty for the period 2002-2003, an equivalence scale, estimated by Engel's method using LSMS 2002 data, was applied. This scale is expressed as follows: Serbian scale = $(1 + 0.81*(adults-1) + 0.24*children06 + 0.75*children718)$. This study used the OECD scale $(1+0.7*(adults-1)+0.5*children013)$ which is used in many countries in the region, thus contributing to international comparability. In addition, the RSO has been using this scale for a number of years for their official poverty estimates based on HBS data.

The other more significant difference is related to the poverty line, i.e. more precisely the food poverty line. The reference group for determining the food poverty line, i.e. the minimum food basket in 2002, consisted of persons whose consumption per adult equivalent was located in the first decile, while the reference group in this study consists of people whose consumption per adult equivalent is located within the first three deciles in 2007. By expanding the reference group to the first three deciles, a more realistic indication of the minimum food consumption can be obtained in comparison to the reference group from the first decile, where the outlier's extremely low values could be found. An additional reason for modifying the reference group is the fact that, in addition to the poorest 10% of the population in 2002, the following 10% with the lowest consumption are considered to be financially insecure.

Both of these changes (in equivalence scale and food poverty line), in particular the one related to the food poverty line, resulted in the revision of the poverty index for 2002, from 10.6% to 14%. To reiterate, the poverty line used in 2002 amounted to 4,489 dinars per adult equivalent, while the recalculated poverty line for the same year amounts to 5,234 dinars per adult equivalent per month.

1.5. 10 Basic poverty indicators

The most frequently used poverty indicators can be defined, according to Foster, Greer and Thorbecke (1984), as follows[11]:

$$P(\alpha) = \frac{1}{n} \sum_{i=1}^{n} \left[\max\left(\frac{z - c_i}{z}, 0 \right) \right]^{\alpha},$$

where α - parameter; z - poverty line; c_i - unit of equivalent consumption i; n – total number of respondents.

For $\alpha=0$, $P(0)$ is the poverty index that represents the number of poor people as a percentage of the total population. However, this poverty indicator does not say anything about their poverty level, i.e., to what degree is their consumption (income) below the poverty line. The poverty indicator that takes this into account is the depth of poverty (poverty gap), and is obtained for $\alpha=1$. Thus, $P(1)$ can be defined as follows:

$P(1)= P(0)*$(average deficit),

where the average deficit represents the average consumption (income) deficit of the poor as a percentage of the poverty line. The depth of poverty $P(1)$ represents the average consumption (income) deficit as a percentage of the poverty line of the total population (both poor and non-poor). When the average deficit of the poor is multiplied with the number of poor and expressed as a percentage of the gross domestic product, the minimum amount of funds required to eliminate poverty is obtained, assuming that targeting is perfect.

Finally, for $\alpha=2$, $P(2)$, called the poverty severity indicator is obtained. This indicator measures inequality among the poor, as it places a higher weight on the poor who are further away from the poverty line.

The analysis presented in the LSMS report use all three indicators as poverty indicators;

- incidence of poverty $P(0)$,
- depth of poverty $P(1)$
- poverty severity $P(2)$.

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[11] See: World Bank, "Making Transition Work for Everyone" Washington, DC, 2000.

700029	Aleksandrovac
700070	Velika Vrbnica
700509	Rokci
700614	Aleksinac
700738	Vitkovac
701050	Korman
701335	Tesica
701408	Aran|elovac
701475	Vrbica
701661	Vigoste
701866	Babusnica
702374	Stol
702455	Bajina Basta
702528	Dub
702773	Rogacica
702846	Batocina
703524	Bozdarevac
703656	Ripanj
791016	Beograd-Deo
791024	Beograd-Deo
703672	Bolec
703729	Vrcin
703770	Kalu|Erica
703826	Umcari
791032	Beograd-Deo
703869	Dobanovci
703893	Progar
703907	Surcin
791059	Beograd-Deo
704016	Vreoci
704091	Lazarevac
704229	Stepojevac
704385	Dubona
704458	Mladenovac (varos)
704504	Rajkovac
791067	Beograd-Deo
704628	Grabovac
704695	Konatice
704741	Obrenovac
704814	Stubline
704865	Borca
704911	Padinska Skela
791075	Beograd-Deo

791083	Beograd-Deo
791091	Beograd-Deo
705055	Ralja
791105	Beograd-Deo
705187	Sremcica
705195	Umka
791113	Beograd-Deo
705225	Blace
705489	Prebreza
705675	Bogatic
705713	Klenje
706094	Plavce
706388	Rujiste
706418	Bor
706493	Luka
707066	Brus
707309	Zlatari
707716	Veliki Trnovac
708216	Trejak
708402	Valjevo
708453	Vujinovaca
708771	Loznica
709042	Stubo
709158	Gornji Katun
709344	Velika Plana
709387	Krnjevo
709425	Milosevac
709492	Veliko Gradiste
709581	Kumane
709930	Krnule
710156	Vladicin Han
710610	Suva Morava
710717	Vlasotince
711110	Stajkovce
711306	Vranje
711314	Vranjska Banja
711721	Leva Reka
712396	Gracac
712582	Grkinja
712922	Golubac
713210	Brusnica
713325	Gornji Milanovac
713678	Rudnik
714038	Medve|a
714119	Resavica
714658	Doljevac
714879	Zabari

715018	Zagubica
715182	Badnjevac
715476	Staro Momcilovo
715522	Velika Jasikova
715662	Zagra|e
715891	Selacka
716138	Dubrava
716588	Kladovo
716642	Mala Vrbica
716804	Borac
717142	^estin
717436	Debelica
717657	Knjazevac
717657	Knjazevac
717983	Trgoviste
718211	Kosjeric (selo)
718513	Koceljeva
718866	\uriselo
718980	Kragujevac
719307	Adrani
719714	Kraljevo
719757	Lazac
720119	Rocevici
746649	Zica
720429	Kostajnik
720453	Krupanj
720593	Bela Voda
720895	Dedina
721107	Krusevac
721131	Lazarica
721344	Pakasnica
721611	^itluk
722103	Kursumlija
722863	Rabrovo
723002	Jabucje
723347	Lalinovac
723355	Lebane
723711	Bratmilovce
724009	Gornje Sinkovce
724246	Donji Bunibrod
724548	Leskovac
724700	Nakrivanj
725030	Susevlje
725293	Gornja Koviljaca
725480	Klupci

725536	Lipnica	735221	^ausevici	746061	Cacak
725633	Ribarice	735477	Velika Plana	746215	Zabar
725889	Guca (varosica)	736180	Prekadin	746304	Majur
725986	Kaona	736210	Prokuplje	746436	Petkovica
726273	Zivkovci	736210	Prokuplje	746517	Ribari
726591	Duboko	736716	Visevac	746606	Sabac
726818	Donji Milanovac	736872	Baljevac	729108	Donja Studena
726869	Majdanpek	737194	Kravice	800015	Ada
726893	Rudna Glava	737666	Kalenicki Prnjavor	800066	Alibunar
726966	Voljevci			800180	Apatin
727202	Salakovac	737968	Voljavce	800198	Kupusina
727784	Balajnac	738247	Majur	800279	Vajska
728268	Mionica (varosica)	738352	Jagodina	800309	Backa Palanka
		738468	Suljkovac	800350	Mladenovo
728284	Mratisic	738719	Crkvenac	800422	Tovarisevo
728560	Jabukovac	738751	Varos	800473	Backa Topola
728675	Negotin	740306	Vrbovac	800619	Njegosevo
728721	Rajac	740381	Lugavcina	800694	Backi Petrovac
728934	Brzi Brod	740454	Radinac	800716	Kulpin
729205	Kamenica	740527	Smederevo	800902	Beocin
729361	Nis	740543	Udovice	800945	Rakovac
729388	Deveti maj	740624	Glibovac	800996	Backo Petrovo Selo
729469	Popovac	740705	Ratari		
729922	Rutosi	740721	Smederevska Palanka	801003	Becej
730491	Kuzmicevo			801089	Vrsac
730602	Novi Pazar	740942	Rujevica	801224	Parta
730602	Novi Pazar	740977	Sokobanja	801330	^urug
731234	Pecka	741191	Drajinci	801445	Srpski Itebej
731307	Bosnjane	741400	Surdulica	801518	Botos
731501	Paracin	741531	Gorjani	801542	Zrenjanin
731501	Paracin	741833	Radusa	801593	Lazarevo
731510	Plana	741850	Sevojno	801658	Perlez
731714	Busur	741892	Uzice	801747	In|ija
731927	Melnica	742163	Natalinci	801763	Krcedin
731960	Petrovac	742228	Topola (varosica)	801852	Vrdnik
732176	Veliko Selo			802018	Kanjiza
732575	Pirot	742899	Lopas	802093	Tresnjevac
732664	Rsovci	743143	Stragari	802140	I|os
732893	Bradarac	743178	Trstenik	802158	Kikinda
733016	Kostolac	744255	Lucina	802212	Sajan
733067	Ostrovo	744484	Supska	802298	Uzdin
733393	Milicevo Selo	744492	]uprija	802336	Deliblato
733440	Pozega	744492	]uprija	802352	Kovin
733857	Presevo	744654	Kozuar	802433	Kula
734179	Krnjaca	744875	Tulari	802468	Ruski Krstur
734233	Priboj	745294	Zlatibor	802484	Crvenka
734683	Ivanje	745405	^ajetina	802492	Lovcenac
735078	Prijepolje	745642	Zablace	802557	Nova Crnja
		745871	Pakovrace	802611	Novi Becej

802620	Novo Milosevo		805106	Sid
802751	Budisava			
802778	Veternik			
802794	Kisac			
802824	Novi Sad			
802867	Sremska Kamenica			
802883	Futog			
802891	^enej			
802972	Deronje			
803014	Odzaci			
803057	Banatski Brestovac			
803081	Dolovo			
803138	Pancevo			
803146	Starcevo			
803189	Dec			
803324	Banatski Sokolac			
803502	Voganj			
803626	Putinci			
803634	Ruma			
803707	Senta			
803774	Konak			
803871	Backi Monostor			
803928	Kolut			
803979	Sombor			
804002	Telecka			
804045	Srbobran			
804118	Divos			
804177	Lacarak			
804266	Sremska Mitrovica			
804347	Suljam			
804401	Nova Pazova			
804410	Novi Banovci			
804428	Stara Pazova			
804452	Bajmok			
804550	Ljutovo			
804592	Palic			
804614	Subotica			
804649	^antavir			
804681	Temerin			
804754	Backo Dobro Polje			
804819	Savino Selo			
804827	Vrbas			
804975	Bingula			
805092	Sot			