

# **PART I: POVERTY**

## **CHAPTER 2 POVERTY IN LIBERIA: LEVEL, PROFILE AND DETERMINANTS**

*In order to inform the preparation of Liberia's Poverty Reduction Strategy, a Core Welfare Questionnaire Indicator survey was implemented in 2007 by the Liberia's Institute of Statistics and Geo-Information Services. This paper uses this survey to estimate the level of poverty and vulnerability in the country, provide a profile of poverty, and analyze household level determinants of consumption and poverty. Slightly less than two third of the population (63.8 percent) is estimated to be poor. If patterns of growth that have been observed recently are maintained, poverty could be significantly reduced by 2015. In terms of the profile and determinants of poverty, as expected, consumption levels and the probability of being poor vary substantially between households according to characteristics such as geographic location, the education and employment of the household head or spouse, and household size.*

### **1. Introduction**

After many years of violent conflict that started with a coup in 1989, Liberia has again benefited from stability since the Accra Comprehensive Peace Agreement of August 2003 (on conflict as well as the transition to democracy in Liberia, see among others Kieh, 2004; Richards et al., 2005; and Sawyer, 2005). Free legislative and presidential elections took place in 2005, and the country was the first African nation to elect a woman President, Ellen Johnson Sirleaf. Demobilization efforts lead more than 100,000 to be reinserted, and most of the previously displaced population has been able to return. An additional hurdle to economic recovery was achieved in December 2007 with the clearance of the country's very high level of debt arrears by multilateral organizations (World Bank, 2007a).

Despite substantial progress since 2003, Liberia remains today one of the poorest countries, with a level of per capita GDP of only US\$130 in 2005 according to data from the latest African Development Indicators database (World Bank, 2007b). The government has recently prepared an Interim Poverty Reduction Strategy (Republic of Liberia, 2006), which organizes the country's development strategy around four pillars: enhancing national security, revitalizing economic growth (on growth in Liberia, see also Radelet, 2006), strengthening governance and the rule of law, and rehabilitating infrastructure and delivering basic services.

In order to inform the preparation of a full Poverty Reduction Strategy, a Core Welfare Questionnaire Indicator survey was implemented in 2007 by the Liberia Institute of Statistics and Geo-Information Services (LISGIS). The sample size of the survey was 3,600 household at the national level. The objective of this paper is to utilize this survey to estimate the level of poverty and vulnerability in the country by providing a profile of poverty, and analyzing on the household level determinants of poverty. The key result is that 63.8 percent of the population is estimated to be poor. This estimate of poverty is below the level obtained in a previous study by UNDP Liberia (2001, 2006), according to which 76.2 percent of the population was poor.

At the same time, a number of factors suggest that the poverty estimate provided in this paper may not be too far off from the reality of the life of the population. First, the poverty line estimated using the so-called cost of basic needs method in this paper turns out to be of the order of magnitude of what households themselves say they meet their basic needs (self-assessed poverty line). Second, the estimate of poverty is in line with what one might have expected for a

country with Liberia's level of economic development, given the experience of other West and Central African countries. Third, the estimate is also in line with the share of the population declaring having difficulties to live with their current income, as well as the share of the population declaring having unstable incomes. Of course, in a country as poor as Liberia, even those households who may not be poor because they have levels of consumption slightly above the poverty line may still live in precarious conditions.

The paper is structured as follows. Section 2 presents our methodology for estimating poverty. Section 3 presents the key results. A brief conclusion follows.

## **2. Methodology**

This section provides a description of the methodology adopted for estimating poverty. To compute a poverty measure, three ingredients are needed. First, one has to choose the relevant dimension and indicator of well-being, which is typically the total consumption of the household per capita or per equivalent adult. Second, one has to select a poverty line – that is a threshold below which a given household or individual will be classified as poor. Finally, one has to select a poverty measure – which is used for reporting on poverty data for the population as a whole or for a population sub-group only. All three ingredients above are described below in greater detail.

### **2.1. Indicator of Well Being**

The Liberia CWIQ survey consists of two questionnaires with data among others on socio-demographic variables (household composition, health, education and employment of the members of the household<sup>1</sup>), housing characteristics, levels of access to the basic services, subjective poverty perceptions, household consumption (including auto-consumption, purchases and gifts) and household income. Our welfare indicator is based on consumption per equivalent adult. Consumption is used rather than income for two main reasons. First, consumption is better measured in household surveys than income. Second, consumption is a better proxy of the well-being of the household as it provides a better picture of a household's standard of living. Third, in countries where a majority population work in the informal sector, net income is very difficult to measure. Various surveys use different methods to collect consumption data. One technique is to record a diary of the exact expenditure of the household over a certain period of time, but this method, while perhaps more precise, requires several visits to the same household over a period of time, and is therefore more time consuming and expensive for data collection. The other approach is to record the expenditure of households by asking them to recall these expenditures over a certain period during visit to the household. This second method may be implemented through a single visit or several visits. In the case of the CWIQ for Liberia, the second technique was adopted with a single visit per household. While it may lead to less precise estimates of poverty, the approach has the advantage to be implemented rather quickly, which was needed to enable the Liberian authorities to complete the work on their PRSP rapidly.

Before using expenditure data in poverty analysis, it is important to assess the quality of the data, and whether aggregates obtained for the country as a whole are reliable. This can be done for example by comparing the consumption aggregate with an aggregate obtained from a previous survey with the previous survey being used as the benchmark. However, this type of comparison is not feasible in Liberia, due to the lack of comparable previous surveys, but at least national accounts can be used. That is, one can compare the consumption computed via the survey with GDP or private consumption in the national accounts. In Liberia, the consumption

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aggregate obtained from the raw data of the CWIQ turned out to be several times higher than total GDP. Therefore, several corrections were carried out in order to correct for outliers in the data.

The corrections were made in the three raw data files related to “auto-consumption”, “frequently purchased items” and “less frequently purchased items”. In the two first files which are related to food items, three important variables are measured: the number of months in the year during which the product is consumed, the quantity consumed per month (according to the unit of measure declared by the household), and the average unit value of the product (according to the specified unit). Corrections have been made on the unit values and on the quantities declared by households. For unit values, there were a number of obvious outliers. Therefore, for the unit values greater than two times the median value, the median value was imputed instead. As for quantities, a classic method of correcting outliers has been used. For each product and each unit, and for all values greater than the mean plus two times the standard deviation, the median value was imputed instead. In the third file related to non-food item, the same types of corrections were implemented. After these corrections, an aggregate file with annual expenditures by household and by item was constructed. The total consumption in the country obtained after the corrections remained high. Therefore, a second type of corrections was made in terms of the share of each product in total household consumption. For each product and household, if the share of the product in total consumption was greater than the average share plus two times the standard deviation, the median share was imputed for this household and a new annual expenditure was computed consequently. This gave us the final consumption aggregate on which the poverty measures are based.

The measure of total household consumption takes the following components into consideration: monetary consumption (food and non-food); auto-consumption; rent attributed to households who are not tenants in their accommodation; and use value of durables. Food spending consists of daily food purchased on markets or received (for example through NGOs or the World Food Program, which is active in Liberia). Food auto-consumption was evaluated using data collected in the questionnaire. Non-food consumption includes among others spending on clothing, housing (including the estimation of imputed rent<sup>2</sup>), furnishings, education and health, transport, communication, leisure activities, the usage value of durable goods, etc. Certain categories of spending have however been excluded from the household consumption aggregate. First, some categories may be difficult to assign to household consumption due to the significant presence of people from outside the household – this is the case for spending on festivals or ceremonies during the past 12 months. In addition, some categories in the consumption questionnaire do not actually represent household consumption – this is the case for gifts given or received in cash and taxes paid during the past 12 months. Transfers received by the household are excluded from the consumption aggregate as this would lead to double counting since these monies are probably already used for consumption to satisfy household needs.

In order to compute consumption per equivalent adult, instead of using the Oxford scale, which is often adopted when the country does not have information concerning the structure and composition of its households, the adult equivalence scale recommended by the FAO was used which would seem closer to the reality of Africa (scale proposed by the 10<sup>th</sup> edition of the RDA, National Academy Press, 1989 – NAC 89, W.D.C). This scale is not fundamentally different from the scale adopted for example by Cameroon in 2001 to define its poverty threshold.

**Table 1: Scale used to compute consumption per equivalent adult**

	Scale of adult equivalence	
	Male	Female
0 – 1 year	0.27	0.27

1 – 3 years	0.45	0.45
4 – 6 years	0.61	0.61
7 – 9 years	0.73	0.73
10 – 12 years	0.86	0.73
13 – 15 years	0.96	0.83
16 – 19 years	1.02	0.77
20 – 50 years	1.00	0.77
51 years and over	0.86	0.79

Source: FAO

## 2.2. *Poverty Lines*

The poverty lines are based on the cost of basic needs method. First, the food poverty lines were estimated to assess the cost of a food basket providing 2,400 Kcal per day per adult equivalent. The poverty lines were estimated separately for urban and rural areas. As specific data for Liberia were not available in terms of the caloric conversion factors for the various food items, most products in the food questionnaire were allocated the caloric values provided by a study carried out in Guinea in 2004. These caloric equivalents indicate the caloric value for 100 grams or 100 millilitres of a products which are in part comestible.

We defined a basket of food goods consumed on a regular basis (including food auto-consumption) for the entire country (see Table 2) by the population with consumption between the second and ninth deciles (we do not use the first and last decile to avoid extreme values). The basket includes spending on the 28 food products most often consumed. These products represent more than 87 percent of total household spending on food in the country. Once the basket of food products has been defined, we determine the quantities of each product consumed per day in standard units (primarily kg or litre) per adult equivalent. Each product's consumption is then converted into calories based on Guinea conversion tables.

**Table 2: Basic Needs Food Consumption Basket for Liberia, 2007**

	Initial consumption		Adjusted consumption		Conversion Coefficient
	Quantity (grams)	Kilo calories	Quantity (grams)	Kilo Calories	
Rice	191	694	224	813	363
Local rice	136	492	159	577	363
Maize/corn	6	21	7	25	359
Cassava flour (fufu, gari, etc.)	16	53	18	62	342
Gari	5	17	6	19	342
Bread	5	13	6	15	249
Chicken	8	10	9	12	139
Game and insects (porcupine, etc.)	1	4	2	4	267
Fresh or frozen fish	36	23	43	27	64
Smoked fish (dried or salted)	3	13	4	15	374
Fresh milk	1	1	2	1	79
Eggs	1	1	1	2	140
Palm oil	27	217	32	254	798
Banana, plantain	23	31	27	36	135
Coconuts	7	25	8	30	388
Palm nut	44	177	52	208	400
Cassava leaves	21	19	25	23	91
Bitter Balls	14	5	17	5	32
Okra	3	1	3	1	36
Green Pepper	7	3	8	3	36
Hot or sweet pepper (fresh or dry)	1	0	1	0	53
Onions	5	2	6	2	41
Dried beans	4	14	5	16	336
Cassava roots	99	148	116	173	149
Sugar	4	17	5	20	400
Bouillon cubes	3	9	3	10	331
Salt	11	36	13	43	337
Soft/carbonated drinks	2	1	3	1	42
Total		2,048		2,400	

Source: Authors' calculations using CWIQ 2007, LISGIS

The amounts actually consumed for all products in the survey are adjusted in order to yield exactly a total of 2,400 Kcal per equivalent adult per day. Using the survey prices observed in the community questionnaire of the survey, we then estimate the total cost of purchasing the resulting food basket. A daily food poverty line is then estimated in urban and rural areas as follows with a normative caloric threshold of 2,400 Kcal (on the sensitivity of poverty measures to the choice of this threshold, see the annex to this paper):

$$Z_F^{U,R} = 2400 \times \frac{\sum_{i=1}^n Q_i \times P_i^{U,R}}{\sum_{i=1}^n Q_i \times C_i}$$

with  $Q_i$  being the average daily quantity of product  $i$  consumed in the country,  $C_i$  the caloric value (for 100g or 100 ml) corresponding to product  $i$  consumed, and  $P_i^{U,R}$  being the average price of product  $i$  in urban and rural areas.

Two sets of nonfood poverty lines were computed by estimating the non-food spending of (1) households whose total expenditure was equal to the food poverty line (more or less 5 percent); and (2) households whose food expenditure was equal to the food poverty line (more or less 5 percent). The total poverty lines are then the sum of the food and non-food poverty lines. The resulting poverty lines are given in Table 3. In what follows, the food poverty line will be

used to identify the extreme poor, while the total poverty line to measure poverty is based on the second approach to estimate the non-food poverty line.

**Table 3: Poverty lines for Liberia, 2007 (annual in local currency, per equivalent adult)**

	Food poverty line	Non Food poverty line, approach (1)	Non Food poverty line, approach (2)	Total poverty line (approach 1)	Total poverty line (approach 2)
Rural	14,514.49	3,849.18	6,909.9	18,363.66	21,424.39
Urban	14,431.20	5,634.96	15,792.54	20,066.16	30,223.74

Source: Authors' calculations using CWIQ 2007, LISGIS

### 2.3. Poverty measures

This section provides the mathematical expressions for the poverty measures used in the paper. Three poverty measures of the FGT class (Foster, Greer, and Thorbecke 1984) are used, namely the headcount, the poverty gap, and the squared poverty gap (for a simple introduction to poverty measurement and profiles, see Coudouel et al., 2002). The poverty headcount is the share of the population which is poor, i.e. the proportion of the population for whom consumption per equivalent adult  $y$  is less than the poverty line  $z$ . Suppose we have a population of size  $n$  in which  $q$  people are poor. Then the headcount index is defined as:

$$H = \frac{q}{n}$$

The poverty gap, which is often considered as representing the depth of poverty, is the mean distance separating the population from the poverty line, with the non-poor being given a distance of zero. Arranging consumption in ascending order  $y_1, \dots, y_q < z < y_{q+1}, \dots, y_n$  with the poorest household's consumption denoted by  $y_1$ , the next poorest  $y_2$ , etc. and the richest household's consumption by  $y_n$ . The poverty gap is defined as follows:

$$PG = \frac{1}{n} \sum_{i=1}^q \left[ \frac{z - y_i}{z} \right]$$

where  $y_i$  is the income of individual  $i$ , and the sum is taken only on those individuals who are poor (in practice, we often work with household rather than individual consumption). The poverty gap is thus a measure of the poverty deficit of the entire population, where the notion of "poverty deficit" captures the resources that would be needed (as a proportion of the poverty line) to lift all the poor out of poverty through perfectly targeted cash transfers.

The squared poverty gap is often described as a measure of the severity of poverty. While the poverty gap takes into account the distance separating the poor from the poverty line, the squared poverty gap takes the square of that distance into account. When using the squared poverty gap, the poverty gap is weighted by itself, so as to give more weight to the very poor. Said differently, the squared poverty gap takes into account the inequality among the poor. It is defined as follows:

$$SPG = \frac{1}{n} \sum_{i=1}^q \left[ \frac{z - y_i}{z} \right]^2$$

The headcount, the poverty gap, and the squared poverty gap are the first three measures of the Foster-Greer-Thorbecke class of poverty measures and a common structure is evident that suggests a generic class of additive measures (additive measures are such that aggregate poverty is equal to the population-weighted sum of poverty in various sub-groups of society). The general formula for this class of poverty measures depends on a parameter  $\alpha$  which takes a value of zero for the headcount, one for the poverty gap, and two for the squared poverty gap in the following expression:

$$P\alpha = \frac{1}{n} \sum_{i=1}^q \left[ \frac{z - y_i}{z} \right]^\alpha$$

In what follows, the discussion focuses on the headcount index of poverty. Higher order poverty measures (poverty gap and squared poverty gap) are provided in appendix (to be provided as Appendix 1).

### 3. Poverty profile and determinants

#### 3.1. Levels of Poverty and characteristics of the poor

Table 4 and Table 5 present overall and extreme poverty estimates as well as a profile of the characteristics of the poor and extreme poor, respectively. The tables first provide the share of the population according to various categories. Next, the headcount of poverty or extreme poverty (share of the population in poverty or extreme poverty within the category) is provided. The number of the poor or extreme poor is also given, as well as the share of the total number of the poor or extreme poor in different categories. At the national level, 63.8 percent of the population is poor. This means that there are 1.7 million individuals in poverty in the country. The share of the population in extreme poverty is 47.9 percent (1.3 million people).

The profile of the poverty yields expected results. Poverty is higher in rural areas (67.7 percent) than in urban areas (55.1 percent). Given that close to 70 percent of the population lives in urban areas, rural areas account for almost three quarters (73.4 percent) of the poor. The region with the largest share of the poor is the North Central region, followed by Greater Monrovia (although the capital area has a much lower share of the extreme poor, as shown in Table 5), the South Central region the North Western region, and finally the South Eastern A and B region.

**Table 4: Poverty profile based on consumption per equivalent adult, Liberia 2007**

	Share of the Population			Poverty Headcount			Number Of Poor			Contribution to Poverty		
	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National
<b>National</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>55.1</b>	<b>67.7</b>	<b>63.8</b>	<b>459,570</b>	<b>1,266,236</b>	<b>1,725,806</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Urban/rural location</b>												
Urban	30.9	-	30.9	55.1	-	55.1	459,570	-	459,570	100.0	-	26.6
Rural	-	69.1	69.1	-	67.7	67.7	-	1,266,236	1,266,236	-	100.0	73.4
<b>Region</b>												
Greater Monrovia	71.4	-	22.0	48.5	-	48.5	288,695	-	288,695	62.8	-	16.7
North Central	8.1	48.2	35.8	57.5	68.9	68.1	38,936	621,193	660,129	8.5	49.1	38.3
North Western	3.7	12.8	10.0	82.4	75.5	76.3	25,794	180,753	206,547	5.6	14.3	12.0
South Central	8.9	19.9	16.5	74.4	55.9	58.9	55,216	207,463	262,678	12.0	16.4	15.2
South Eastern A	5.6	10.2	8.8	76.7	76.6	76.7	35,609	146,104	181,713	7.7	11.5	10.5
South Eastern B	2.3	9.0	6.9	79.2	65.9	67.2	15,320	110,723	126,044	3.3	8.7	7.3
<b>Age of the individual</b>												
Less than 10	25.0	30.9	29.1	57.5	65.4	63.3	119,873	378,163	498,036	26.1	29.9	28.9
10 thru 19	26.5	22.7	23.8	57.6	72.5	67.4	127,100	307,648	434,748	27.7	24.3	25.2
20 thru 29	18.2	15.6	16.4	51.1	66.1	61.0	77,423	193,226	270,650	16.8	15.3	15.7
30 thru 39	13.7	11.9	12.4	50.8	65.1	60.2	58,155	144,485	202,640	12.7	11.4	11.7
40 thru 49	9.3	9.4	9.4	52.7	69.4	64.3	41,092	122,167	163,259	8.9	9.6	9.5
50 thru 59	4.2	4.8	4.6	57.2	67.3	64.5	20,123	60,576	80,699	4.4	4.8	4.7
60 and Over	3.1	4.7	4.2	60.3	68.0	66.2	15,804	59,971	75,775	3.4	4.7	4.4
<b>Gender of the head</b>												
Male	70.0	76.2	74.3	54.1	68.8	64.6	316,469	981,319	1,297,787	68.9	77.5	75.2
Female	30.0	23.8	25.7	57.2	64.1	61.6	143,102	284,917	428,019	31.1	22.5	24.8
<b>Marital Status of the head</b>												
Single or never married	29.4	13.3	18.3	47.6	55.9	51.8	117,074	138,713	255,787	25.5	11.0	14.8
Monogamous	56.3	67.0	63.7	57.0	68.5	65.4	267,839	858,644	1,126,483	58.3	67.8	65.3
Polygamous	2.4	8.0	6.3	54.1	75.5	73.0	10,935	112,910	123,844	2.4	8.9	7.2
Widowed, divorced, separated	11.9	11.8	11.8	64.4	70.8	68.8	63,723	155,970	219,693	13.9	12.3	12.7
<b>Education level of head</b>												
None	24.7	50.1	42.2	73.1	72.4	72.6	150,731	678,415	829,146	32.8	53.6	48.0
Some primary	3.9	9.3	7.7	58.7	60.7	60.4	19,291	106,101	125,392	4.2	8.4	7.3
Completed primary	3.1	4.3	3.9	78.0	67.8	70.3	20,075	54,732	74,807	4.4	4.3	4.3
Some secondary	19.1	21.8	21.0	53.5	66.0	62.5	85,266	268,988	354,254	18.6	21.2	20.5
Completed secondary	32.2	10.1	16.9	49.4	61.1	54.2	132,846	115,574	248,420	28.9	9.1	14.4
Post secondary	17.0	4.4	8.3	36.3	51.9	42.0	51,362	42,427	93,789	11.2	3.4	5.4

Source: Authors' calculations using CWIQ 2007, LISGIS

**Table 4 (continued): Poverty profile based on consumption per equivalent adult, Liberia 2007**

	Share of the Population			Poverty Headcount			Number Of Poor			Contribution to Poverty		
	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National
<b>Education level of Spouse</b>												
None	26.2	55.8	46.7	72.5	72.8	72.7	158,268	759,955	918,222	34.4	60.0	53.2
Some primary	5.1	8.1	7.2	49.0	60.9	58.2	20,959	92,090	113,048	4.6	7.3	6.6
Completed primary	2.0	2.4	2.3	47.5	48.2	48.0	8,030	21,312	29,342	1.7	1.7	1.7
Some secondary	11.5	5.4	7.3	57.3	69.5	63.6	54,762	70,768	125,530	11.9	5.6	7.3
Completed secondary	9.9	2.1	4.5	40.4	47.5	42.7	33,530	18,406	51,936	7.3	1.5	3.0
Post secondary	6.2	0.5	2.3	18.3	13.7	17.6	9,461	1,302	10,763	2.1	0.1	0.6
No spouse	39.1	25.7	29.8	53.5	62.9	59.1	174,561	302,404	476,965	38.0	23.9	27.6
<b>Socio-economic group of head</b>												
Public	24.3	9.2	13.9	40.7	59.0	49.1	82,596	101,978	184,574	18.0	8.1	10.7
Private formal	5.6	5.2	5.3	37.5	63.0	54.6	17,695	60,958	78,653	3.9	4.8	4.6
Private informal	6.5	3.8	4.6	52.4	52.1	52.2	28,378	36,673	65,051	6.2	2.9	3.8
Self-agriculture	3.2	46.7	33.3	79.4	71.8	72.0	21,349	627,657	649,006	4.6	49.6	37.6
Self-other	27.4	16.4	19.8	54.7	62.2	59.0	125,133	190,344	315,477	27.2	15.0	18.3
Unemployed	12.1	2.5	5.4	67.6	62.9	66.1	68,094	29,377	97,471	14.8	2.3	5.6
Inactive, other	20.9	16.2	17.7	66.8	72.2	70.3	116,325	219,250	335,575	25.3	17.3	19.4
<b>Industry of Head</b>												
Crop farming	3.5	53.0	37.7	80.1	71.3	71.6	23,474	706,604	730,077	5.1	55.8	42.3
Forestry/logging	0.5	0.2	0.3	23.0	91.8	56.3	887	3,306	4,193	0.2	0.3	0.2
Fishing	0.7	0.1	0.3	77.4	67.3	74.3	4,525	1,767	6,292	1.0	0.1	0.4
Mining/quarrying	0.4	0.6	0.5	78.9	69.0	71.2	2,576	7,668	10,245	0.6	0.6	0.6
Manufacturing/processing	0.5	0.3	0.3	70.0	64.7	67.2	3,013	3,055	6,068	0.7	0.2	0.4
Electricity/gas/water supply	1.6	0.1	0.6	31.8	14.6	30.2	4,352	215	4,566	0.9	0.0	0.3
Construction	3.1	0.7	1.5	60.1	52.7	57.5	15,406	7,380	22,786	3.4	0.6	1.3
Wholesale/retail trades	10.4	3.2	5.4	49.6	38.0	44.8	42,887	23,022	65,909	9.3	1.8	3.8
Transport, storage, communications	2.8	0.3	1.1	36.9	46.4	38.6	8,758	2,420	11,177	1.9	0.2	0.6
Banking/financial services	1.0	0.2	0.4	24.7	34.6	27.6	2,052	1,195	3,247	0.4	0.1	0.2
Community services	13.7	7.4	9.3	42.0	57.1	50.3	47,929	78,873	126,802	10.4	6.2	7.3
Other	31.2	18.9	22.7	50.7	65.4	59.2	131,901	231,540	363,441	28.7	18.3	21.1
Unemployed, Inactive	30.6	15.0	19.8	67.2	71.1	69.3	171,811	199,191	371,002	37.4	15.7	21.5
<b>Household owns cultivatable land</b>												
Yes	20.8	71.9	56.2	65.9	72.0	71.3	114,556	968,365	1,082,920	24.9	76.5	62.7
No	79.2	28.1	43.8	52.2	56.7	54.2	345,015	297,872	642,886	75.1	23.5	37.3
<b>Household uses land it does not own</b>												
No	92.8	80.6	84.4	53.6	69.6	64.2	414,975	1,049,847	1,464,822	90.3	82.9	84.9
Rented	2.8	1.9	2.2	68.6	67.2	67.8	16,037	23,873	39,910	3.5	1.9	2.3
Sharecropped	0.2	0.7	0.5	52.4	85.3	82.1	703	10,523	11,226	0.2	0.8	0.7
Private land provided free	3.1	7.9	6.4	86.9	67.4	70.3	22,640	99,245	121,885	4.9	7.8	7.1
Open access land	1.1	8.9	6.5	54.4	49.5	49.7	5,215	82,748	87,963	1.1	6.5	5.1

Source: Authors' calculations using CWIQ 2007, LISGIS

**Table 4 (continued): Poverty profile based on consumption per equivalent adult, Liberia 2007**

	Share of the Population			Poverty Headcount			Number Of Poor			Contribution to Poverty		
	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National
<b>Head has a secondary occupation</b>												
Not working	30.6	15.0	19.8	67.2	71.1	69.3	171,811	199,191	371,002	37.4	15.7	21.5
No	65.6	74.6	71.8	49.5	69.1	63.6	270,657	964,131	1,234,788	58.9	76.1	71.5
Yes	3.8	10.4	8.4	53.6	52.8	52.9	17,102	102,914	120,016	3.7	8.1	7.0
<b>Spouse has a secondary occupation</b>												
Not working	24.8	13.3	16.9	63.8	76.7	70.9	131,926	191,094	323,020	28.7	15.1	18.7
No	34.0	53.6	47.6	51.3	67.5	63.9	145,583	676,696	822,278	31.7	53.4	47.6
Yes	2.1	7.4	5.7	42.6	69.8	66.7	7,501	96,042	103,543	1.6	7.6	6.0
No spouse	39.1	25.7	29.8	53.5	62.9	59.1	174,561	302,404	476,965	38.0	23.9	27.6
<b>Age of the household head</b>												
Less than 30	12.0	11.1	11.4	47.2	51.8	50.3	47,414	107,812	155,226	10.3	8.5	9.0
30 thru 39	29.1	26.2	27.1	50.4	63.4	59.1	122,275	311,281	433,557	26.6	24.6	25.1
40 thru 49	31.0	29.9	30.2	58.3	70.3	66.5	151,059	393,238	544,297	32.9	31.1	31.5
50 thru 59	17.7	17.6	17.6	55.8	76.0	69.8	82,269	249,712	331,980	17.9	19.7	19.2
60 and Over	10.2	15.2	13.6	66.6	71.9	70.7	56,554	204,193	260,747	12.3	16.1	15.1
<b>Household size</b>												
1 individual	0.8	0.3	0.5	13.9	13.9	13.9	875	834	1,708	0.2	0.1	0.1
2 to 3 individuals	9.7	6.5	7.5	31.4	34.3	33.2	25,567	41,524	67,090	5.6	3.3	3.9
4 to 5 individuals	29.9	33.6	32.4	46.0	57.5	54.2	114,957	360,758	475,715	25.0	28.5	27.6
6 to 7 individuals	28.1	35.3	33.0	65.3	75.8	73.0	153,014	499,724	652,738	33.3	39.5	37.8
8 individuals and more	31.5	24.4	26.6	62.8	79.7	73.5	165,158	363,397	528,555	35.9	28.7	30.6
<b>Number of workers in household</b>												
None	13.3	8.0	9.6	73.3	72.8	73.0	81,582	108,475	190,057	17.8	8.6	11.0
One	31.2	10.0	16.6	53.4	58.5	55.5	138,883	109,802	248,685	30.2	8.7	14.4
Two	25.4	19.7	21.5	50.3	58.6	55.6	106,545	216,635	323,180	23.2	17.1	18.7
Three and more	30.1	62.3	52.3	52.7	71.4	68.1	132,561	831,323	963,884	28.8	65.7	55.9

Source: Authors' calculations using CWIQ 2007, LISGIS

**Table 5: Extreme poverty profile based on consumption per equivalent adult, Liberia 2007**

	Poverty Headcount			Number of Poor			Contribution to Poverty		
	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National
<b>National</b>	<b>29.0</b>	<b>56.3</b>	<b>47.9</b>	<b>242,055</b>	<b>1,053,240</b>	<b>1,295,295</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Urban/rural location</b>									
Urban	29.0	-	29.0	242,055	-	242,055	100.0	-	18.7
Rural	-	56.3	56.3	-	1,053,240	1,053,240	-	100.0	81.3
<b>Region</b>									
Greater Monrovia	22.7	-	22.7	135,338	-	135,338	55.9	-	10.4
North Central	34.4	59.4	57.6	23,243	535,059	558,302	9.6	50.8	43.1
North Western	54.3	63.3	62.2	16,999	151,402	168,401	7.0	14.4	13.0
South Central	46.2	41.4	42.2	34,303	153,843	188,146	14.2	14.6	14.5
South Eastern A	49.6	63.7	60.9	23,006	121,450	144,457	9.5	11.5	11.2
South Eastern B	47.4	54.4	53.7	9,165	91,487	100,652	3.8	8.7	7.8
<b>Age of the individual</b>									
Less than 10	31.5	53.4	47.6	65,617	308,653	374,270	27.1	29.3	28.9
10 thru 19	29.9	61.7	50.8	66,042	261,681	327,722	27.3	24.8	25.3
20 thru 29	26.7	54.0	44.7	40,390	157,822	198,212	16.7	15.0	15.3
30 thru 39	24.2	53.0	43.2	27,749	117,749	145,499	11.5	11.2	11.2
40 thru 49	27.2	57.9	48.5	21,169	101,867	123,037	8.7	9.7	9.5
50 thru 59	33.4	57.6	50.8	11,737	51,834	63,571	4.8	4.9	4.9
60 and Over	35.7	60.8	55.0	9,349	53,634	62,984	3.9	5.1	4.9
<b>Gender of the head</b>									
Male	28.4	57.3	48.9	166,095	817,036	983,131	68.6	77.6	75.9
Female	30.4	53.1	44.9	75,960	236,204	312,164	31.4	22.4	24.1
<b>Marital Status of the head</b>									
Single or never married	22.4	44.2	33.4	54,958	109,731	164,689	22.7	10.4	12.7
Monogamous	31.0	57.5	50.2	145,415	720,161	865,576	60.1	68.4	66.8
Polygamous	38.1	67.3	63.8	7,700	100,556	108,256	3.2	9.5	8.4
Widowed, divorced, separated	34.3	55.7	49.1	33,982	122,792	156,774	14.0	11.7	12.1
<b>Education level of head</b>									
None	44.0	62.0	58.8	90,745	580,945	671,691	37.5	55.2	51.9
Some primary	31.8	51.7	48.5	10,451	90,347	100,798	4.3	8.6	7.8
Completed primary	50.5	49.7	49.9	12,990	40,088	53,078	5.4	3.8	4.1
Some secondary	27.9	54.1	46.7	44,503	220,304	264,807	18.4	20.9	20.4
Completed secondary	21.3	47.5	32.1	57,456	89,866	147,322	23.7	8.5	11.4
Post secondary	18.3	38.8	25.8	25,910	31,690	57,599	10.7	3.0	4.4

Source: Authors' calculations using CWIQ 2007, LISGIS

**Table 5 (continued): Extreme poverty profile based on consumption per equivalent adult, Liberia 2007**

	Poverty Headcount			Number of Poor			Contribution to Poverty		
	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National
<b>Education level of Spouse</b>									
None	45.2	61.9	59.0	98,638	646,343	744,982	40.8	61.4	57.5
Some primary	16.3	52.2	44.3	6,984	79,035	86,020	2.9	7.5	6.6
Completed primary	20.7	26.6	25.0	3,500	11,757	15,256	1.4	1.1	1.2
Some secondary	29.5	56.9	43.6	28,203	57,880	86,083	11.7	5.5	6.6
Completed secondary	16.3	34.9	22.2	13,558	13,517	27,075	5.6	1.3	2.1
Post secondary	5.2	13.7	6.5	2,680	1,302	3,982	1.1	0.1	0.3
No spouse	27.1	50.6	41.1	88,492	243,406	331,898	36.6	23.1	25.6
<b>Socio-economic group of head</b>									
Public	20.7	41.4	30.2	41,897	71,522	113,420	17.3	6.8	8.8
Private formal	18.8	52.5	41.5	8,845	50,839	59,685	3.7	4.8	4.6
Private informal	23.1	38.4	31.7	12,501	27,050	39,551	5.2	2.6	3.1
Self-agriculture	51.3	60.9	60.6	13,794	53,285	54,646	5.7	50.6	42.2
Self-other	28.1	50.7	41.0	64,207	155,203	219,411	26.5	14.7	16.9
Unemployed	32.5	55.0	39.6	32,683	25,693	58,376	13.5	2.4	4.5
Inactive, other	39.1	62.6	54.1	68,125	190,078	258,203	28.1	18.0	19.9
<b>Industry of Head</b>									
Crop farming	53.2	60.2	60.0	15,607	596,096	611,703	6.4	56.6	47.2
Forestry/logging	23.0	65.5	43.6	887	2,361	3,247	0.4	0.2	0.3
Fishing	66.8	67.3	66.9	3,901	1,767	5,667	1.6	0.2	0.4
Mining/quarrying	13.4	55.5	46.0	436	6,172	6,608	0.2	0.6	0.5
Manufacturing/processing	70.0	60.1	64.8	3,013	2,837	5,849	1.2	0.3	0.5
Electricity/gas/water supply	12.1	14.6	12.3	1,647	215	1,862	0.7	0.0	0.1
Construction	26.4	39.7	31.1	6,779	5,557	12,336	2.8	0.5	1.0
Wholesale/retail trades	24.9	29.9	27.0	21,553	18,096	39,650	8.9	1.7	3.1
Transport, storage, communications	17.5	38.6	21.3	4,154	2,014	6,168	1.7	0.2	0.5
Banking/financial services	23.2	23.7	23.3	1,929	817	2,746	0.8	0.1	0.2
Community services	18.9	43.8	32.6	21,615	60,574	82,190	8.9	5.8	6.3
Other	26.1	50.6	40.2	67,806	179,270	247,076	28.0	17.0	19.1
Unemployed, Inactive	36.3	63.4	50.4	92,728	177,465	270,193	38.3	16.8	20.9
<b>Household owns cultivatable land</b>									
Yes	44.3	60.8	58.9	77,075	818,429	895,504	31.8	77.7	69.1
No	25.0	44.7	33.7	164,980	234,811	399,791	68.2	22.3	30.9
<b>Household uses land it does not own</b>									
No	28.3	59.2	48.7	219,043	893,587	1,112,630	90.5	84.8	85.9
Rented	35.0	31.9	33.1	8,175	11,329	19,503	3.4	1.1	1.5
Sharecropped	52.4	64.9	63.7	703	8,009	8,712	0.3	0.8	0.7
Private land provided free	47.7	53.7	52.8	12,419	79,126	91,545	5.1	7.5	7.1
Open access land	17.9	36.6	35.6	1,716	61,189	62,905	0.7	5.8	4.9

Source: Authors' calculations using CWIQ 2007, LISGIS

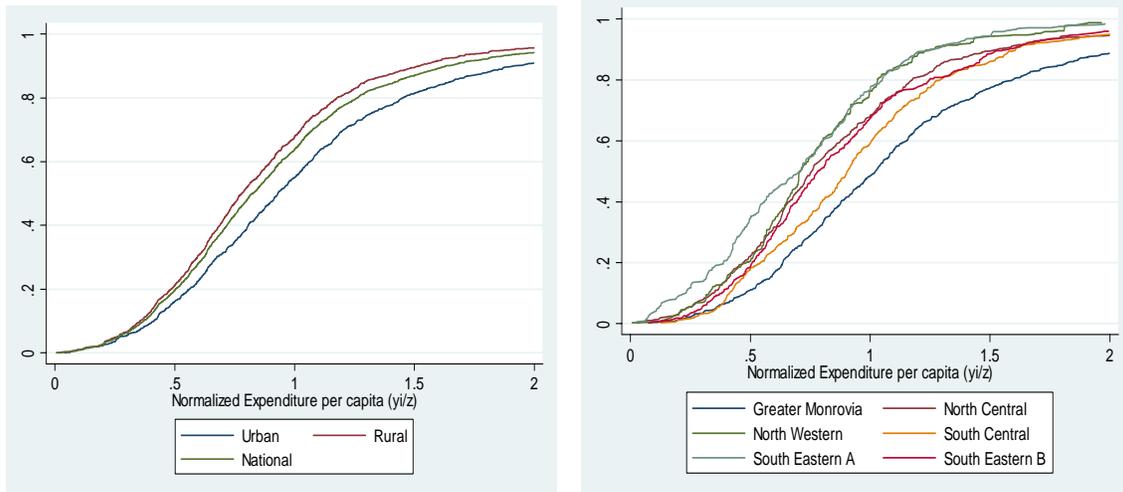
**Table 5 (continued): Extreme poverty profile based on consumption per equivalent adult, Liberia 2007**

	Poverty Headcount			Number of Poor			Contribution to Poverty		
	Urban	Rural	National	Urban	Rural	National	Urban	Rural	National
<b>Head has a secondary occupation</b>									
Not working	36.3	63.4	50.4	92,728	177,465	270,193	38.3	16.8	20.9
No	26.1	57.1	48.4	142,677	797,389	940,066	58.9	75.7	72.6
Yes	20.9	40.2	37.5	6,651	78,386	85,036	2.7	7.4	6.6
<b>Spouse has a secondary occupation</b>									
Not working	36.3	64.6	51.8	75,100	160,941	236,041	31.0	15.3	18.2
No	27.1	56.5	50.0	77,059	566,737	643,797	31.8	53.8	49.7
Yes	8.0	59.7	53.9	1,404	82,156	83,560	0.6	7.8	6.5
No spouse	27.1	50.6	41.1	88,492	243,406	331,898	36.6	23.1	25.6
<b>Age of the household head</b>									
Less than 30	24.4	41.5	35.9	24,534	86,226	110,760	10.1	8.2	8.6
30 thru 39	24.4	50.7	42.0	59,242	249,097	308,339	24.5	23.7	23.8
40 thru 49	30.6	58.5	49.6	79,222	327,005	406,228	32.7	31.0	31.4
50 thru 59	31.5	63.9	53.8	46,440	209,689	256,130	19.2	19.9	19.8
60 and Over	38.4	63.8	57.9	32,616	181,223	213,839	13.5	17.2	16.5
<b>Household size</b>									
1 individual	11.6	13.9	12.7	730	834	1,564	0.3	0.1	0.1
2 to 3 individuals	12.9	26.0	20.7	10,454	31,434	41,888	4.3	3.0	3.2
4 to 5 individuals	21.2	43.6	37.2	53,028	273,453	326,481	21.9	26.0	25.2
6 to 7 individuals	33.6	63.9	56.0	78,630	421,826	500,456	32.5	40.1	38.6
8 individuals and more	37.7	71.4	59.1	99,212	325,693	424,905	41.0	30.9	32.8
<b>Number of workers in household</b>									
None	44.3	66.0	56.7	49,297	98,397	147,695	20.4	9.3	11.4
One	27.1	47.7	35.7	70,504	89,444	159,948	29.1	8.5	12.3
Two	23.3	46.1	37.7	49,319	170,109	219,428	20.4	16.2	16.9
Three and more	29.0	59.7	54.3	72,934	695,289	768,224	30.1	66.0	59.3

Source: Authors' calculations using CWIQ 2007, LISGIS

As shown in Figure 1, which provides curves representing the share of the population in poverty in urban and rural areas as well as by regions as a function of the poverty line on the horizontal axis, the headcount is higher in rural than in urban areas for all poverty lines, but there are a few reversals in headcount rankings between different regions depending on the choice of the poverty line.

**Figure 1: Stochastic dominance by residence area, Liberia 2007**



*Source: Authors' calculations using CWIQ 2007, LISGIS*

There are few differences in poverty measures according to the age of the individuals, while differences according to the gender or the head of household are also small. Poverty seems to be higher among polygamous households than among monogamous households, and individuals who are single or never married tend to have a lower probability of being poor. In terms of demographic variables, household heads who are younger, below 30 or 40 years of age, are less likely to be poor. The larger the household size, the higher the probability of being poor.

A higher education for the household head or the spouse is associated with lower levels of poverty, as expected. In terms of the socio-economic group of head, households with a head in the public sector or with a wage in the private formal sector have lower rates of poverty. The highest levels of poverty are observed for those household heads who are self-employed in agriculture, followed by inactive heads (who are not working). Poverty rates by industry are lowest in the banking/financial sector, followed by utilities. The poverty are highest for those involved in fishing, crop farming, and mining/quarrying, as well as for those who are unemployed or inactive. Household heads who have a second occupation tend to have lower probabilities of being poor. Poverty also goes down when there is one or two workers in the household, as opposed to none or more than two (in the later case, because this denotes large household who need to have many members working). Cultivation of land is also associated with farming, and thereby poverty.

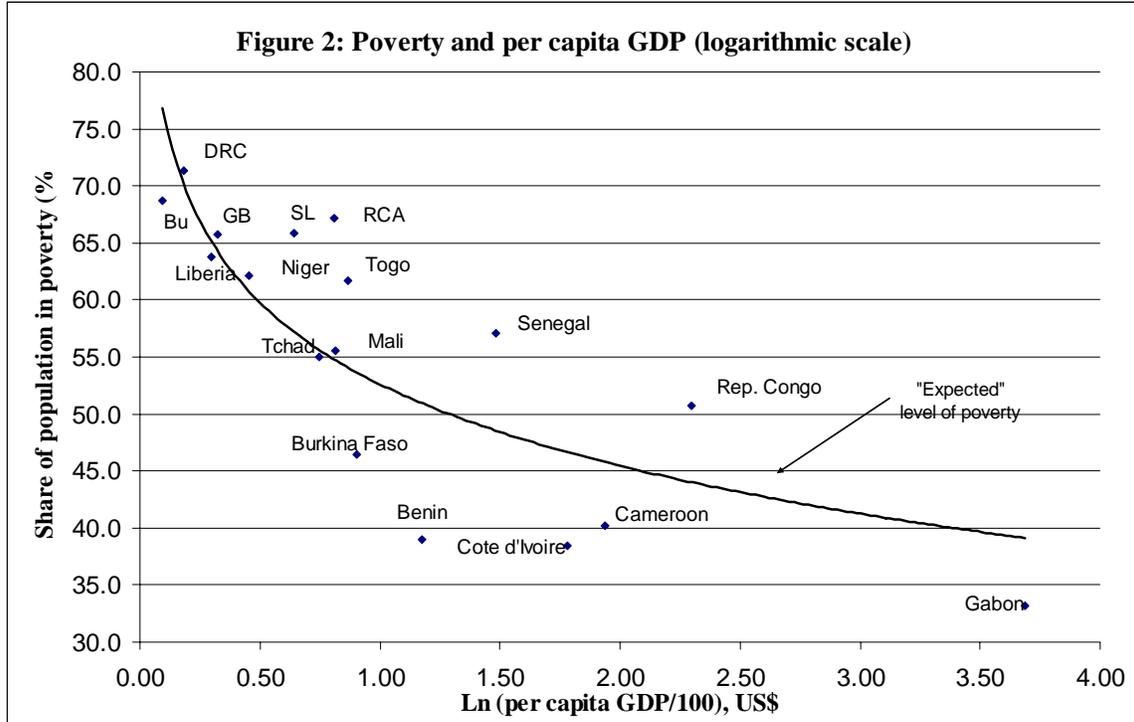
Many of the results obtained with the characteristics of the household head are also similar when using the characteristics of the spouse of the head when there is one. Similarly, the results obtained for the extreme poverty measures display a similar pattern as in the overall poverty in terms of comparisons between various sub-groups groups to the results, although there are more differences in extreme poverty between urban and rural areas than for overall poverty.

### 3.2. *Poverty comparisons with other countries*

One way to discuss the level of poverty obtained from the cost of basic needs method is to compare Liberia to other West and Central African countries (Wodon, 2007). This is done in Table 6 and Figure 2. There are 17 countries listed in the table, and most belong to the CFA franc zone. For all these countries, the World Bank has recently completed poverty assessments that include poverty measures. These poverty measures are not strictly speaking comparable between countries due to differences in methodologies used for measuring poverty. But at the same time, they can be used to set expectations as to the order of magnitude of poverty estimates that one might expect in any of the 17 countries. Most countries use a poverty line based on the cost of basic needs method, although countries differ in whether they use consumption per capita or per equivalent adult and the level of the caloric requirement norm used to determine what basic amount of food a person should consume. In two countries, a relative poverty line was chosen to measure poverty – this was done in Benin and Côte d’Ivoire (where the relative poverty line originally adopted to estimate poverty was subsequently regularly adjusted for inflation). In one country (Guinea-Bissau), the poverty line was set by the authorities to match the international benchmark of US\$1 per day per person used for monitoring the Millennium Development Goals. Apart from differences in the methodologies used to define the poverty lines, the poverty measures are based on surveys which also differ somewhat between countries, with some surveys tracking the consumption levels of households better than others.

Despite differences between countries in methodologies for estimating poverty, an inverse relationship clearly exists between the (natural) logarithm of GDP per capita and the share of the population living in poverty, as shown in Figure 2. In the figure, GDP per capita has been expressed in constant U.S. dollars for simplicity. The curve was fitted through the scatter in order to maximize the explanatory power of a univariate regression using a logarithmic specification. Therefore, the curve gives a very rough idea of the poverty level “expected” for a given level of GDP per capita<sup>3</sup>. Quite a few countries appear to have levels of poverty in line with what is expected according to the very simple and rough method used to set expectations, and this is also the case for Liberia. For example, the poorest countries in terms of per capita GDP (Guinea-Bissau and Niger) have very high levels of poverty while at the other extreme, richer countries such as Cote d’Ivoire, Cameroon, and Gabon, have lower levels of poverty. But there are also a few countries that seem to have levels of poverty that diverge from what one might have expected according. Divergence from the fitted curve may stem not only from issues of data quality or different assumptions used for measuring poverty, but also from different levels of inequality between countries (typically, a more unequal distribution of consumption will be associated with a higher level of poverty). Divergence from the fitted curve will also depend on how the curve is fitted, with alternative ways of fitting the curve leading to different levels of divergence for each country. Still, for most countries that are located “far” from the curve, there are simple data or methodological reasons that help explain why the countries are located far from the curve (see Wodon, 1997 for a discussion).

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Source: Adapted from Wodon (2007).

**Table 6: Comparison of Liberia with FCFA West and Central African countries**

	Date	GDP, US\$	GDP US\$	Methodology	Poverty
Benin	2003	325	1.18	Relative	39.0
Burundi	2006	110	0.10	CBN	68.7
Burkina Faso	2003	247	0.90	CBN	46.4
Cameroun	2001	695	1.94	CBN	40.2
Congo	2005	994	2.30	CBN	50.7
Côte d'Ivoire	2002	592	1.78	Relative	38.4
DRC	2005	120	0.18	CBN	71.3
Gabon	2005	3991	3.69	CBN	33.2
Guinea-Bissau	2002	138	0.33	\$1 per day	65.7
Liberia	2007	135	0.30	CBN	63.8
Mali	2001	226	0.82	CBN	55.6
Niger	2005	158	0.45	CBN	62.1
RCA	2003	225	0.81	CBN	67.2
Senegal	2001	442	1.49	CBN	57.1
Sierra Leone	2003	190	0.64	CBN	65.89
Tchad	2003	211	0.75	CBN	55.0
Togo	2006	238	0.87	CBN	61.7

Source: Adapted from Wodon (2007).

### 3.3. Subjective indicators of poverty and vulnerability

It is also interesting to compare objective measures of poverty with subjective perceptions of poverty as well as indicators of vulnerability (Table 7 and Table 8). Several observations from the data suggest that the level of poverty measured for Liberia, at 63.8 percent, is realistic. First, the national share of the population living in households where the household head stated that the current income of the households made the household to live with difficulty, was 57.7 percent and is of the same order of magnitude as the objective poverty estimate. Second, the level of income or consumption deemed by households to be needed in order to be able to satisfy one's needs, at Liberian \$2,049 per month per person according to subjective perceptions, is also of the order of magnitude of the poverty lines per equivalent adult estimated with the cost of basic needs and reported (on an annual basis in Table 3). Third, the share of the population in a vulnerable situation, because their income is very unstable, at 60.6 percent, is also of a similar order of magnitude. By contrast, the shares of the population that needs to borrow money, at 43.6 percent, or that is having always or often difficulties to satisfy basic needs for food, schooling or health expenditures, at slightly less than 30 percent, are lower, and closer in magnitude to the estimated measures of extreme poverty.

**Table 7: Subjective perceptions of poverty and ability to meet basic needs, Liberia 2007**

	Inability of households to satisfy needs (always or often)			Perceptions on livelihoods based on current income				Subj. poverty line
	Food	School fees	Health care	Living very well	Living reasonably well	Living carefully	Living with difficulty	
<b>Total</b>	<b>29.9</b>	<b>28.0</b>	<b>27.0</b>	<b>1.1</b>	<b>10.0</b>	<b>31.2</b>	<b>57.7</b>	<b>2,049.3</b>
Rural	32.0	28.3	30.8	0.8	8.1	28.4	62.7	1,795.3
Urban	25.3	27.5	19.0	1.8	14.1	37.1	47.0	2,451.5
<b>Region</b>								
Greater Monrovia	25.4	29.5	22.9	1.9	11.6	36.8	49.8	2,743.8
North Central	38.6	38.8	33.3	0.6	8.6	26.9	63.9	1,680.3
North Western	23.3	9.1	24.3	0.2	17.6	38.1	44.1	1,724.0
South Central	25.1	22.7	21.4	1.7	6.7	31.4	60.2	2,161.2
South Eastern A	25.8	19.0	29.0	1.4	7.7	29.6	61.3	1,827.5
South Eastern B	25.3	18.8	23.1	1.0	11.0	25.9	62.2	1,859.1
<b>National quintile</b>								
1	40.1	31.5	30.3	0.6	7.1	18.4	73.9	1,500.5
2	32.9	29.0	26.2	0.8	8.9	25.7	64.6	1,625.3
3	32.8	28.9	29.7	0.6	8.1	32.0	59.3	1,679.8
4	28.0	30.6	27.5	0.7	10.5	34.3	54.4	2,122.6
5	20.5	22.4	23.1	2.3	13.7	40.4	43.6	2,995.1

Source: Authors' calculations using CWIQ 2007, LISGIS

**Table 8: Subjective indicators on vulnerability to shocks of households, Liberia 2007**

	Financial situation of households					Stability of household income		
	Save a lot of money	Save a little money	Satisfy basic needs	Need to use savings	Need to borrow money	Very unstable	Somewhat unstable	Stable
<b>Total</b>	<b>0.1</b>	<b>10.5</b>	<b>41.5</b>	<b>4.2</b>	<b>43.6</b>	<b>60.6</b>	<b>36.1</b>	<b>3.3</b>
Rural	0.1	9.1	40.8	3.2	46.9	66.7	32.0	1.3
Urban	0.1	13.5	43.2	6.6	36.5	47.5	44.9	7.5
<b>Region</b>								
Greater Monrovia	0.2	13.1	42.5	6.1	38.1	49.0	42.7	8.3
North Central		12.8	42.1	3.3	41.8	72.4	26.8	0.8
North Western	0.1	6.9	39.3	4.2	49.6	50.6	48.2	1.1
South Central		8.1	42.1	4.1	45.7	60.0	36.5	3.6
South Eastern A	0.1	6.2	42.6	3.2	47.8	59.7	37.5	2.8
South Eastern B	0.4	6.4	36.2	5.0	52.0	54.6	42.2	3.2
<b>National quintile</b>								
1	0.1	6.5	39.2	2.3	51.9	72.4	26.7	0.9
2	0.0	8.8	34.9	3.0	53.3	70.5	27.6	1.9
3		10.2	39.1	5.0	45.7	65.0	33.5	1.5
4	0.1	9.8	43.9	4.4	41.8	54.4	43.5	2.2
5	0.2	15.2	47.5	5.8	31.3	47.7	44.3	8.0

Source: Authors' calculations using CWIQ 2007, LISGIS

### 3.4. Simulations for future poverty reduction

Liberia's economy has made a strong recovery since 2005 due to higher agriculture production and the return of displaced persons. According to World Bank (2007a), real GDP growth reached 5.3 percent in 2005 and 7.8 percent in 2006, with limited inflation. The macroeconomic framework used in the country suggests that growth could reach 9 percent or even higher in future years (Table 9). This would translate in a rate of growth of GDP per capita above 6 percent, with limited inflation.

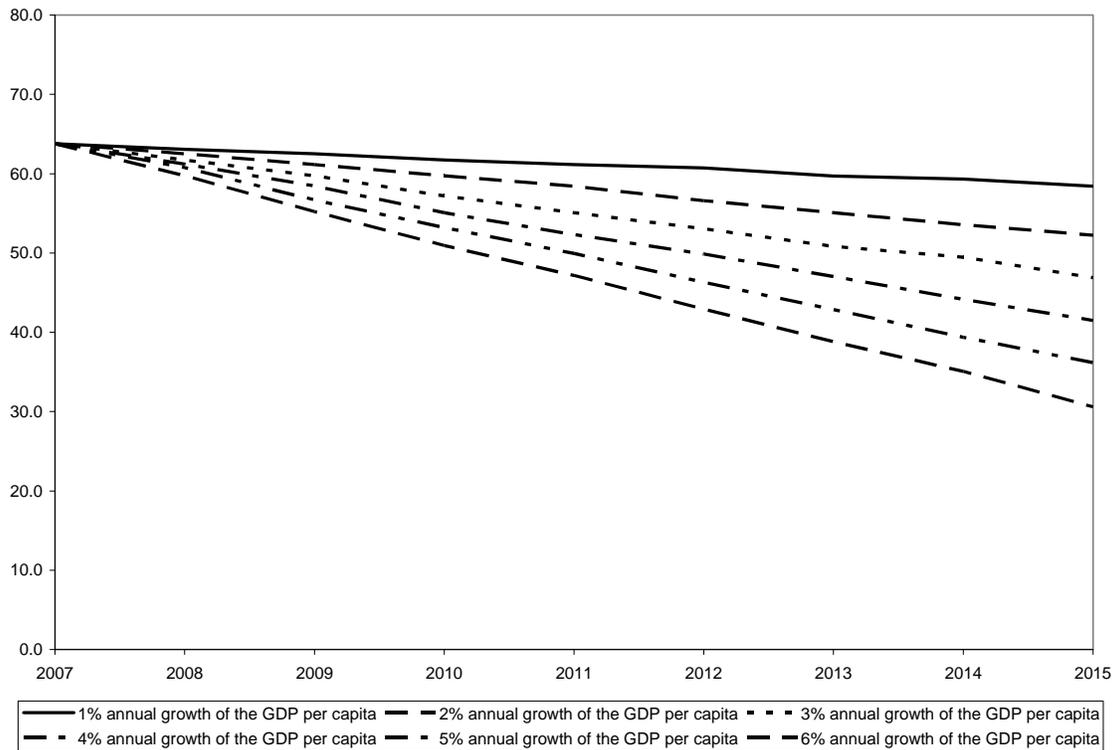
**Table 9: Liberia—Selected Economic and Financial Indicators, 2003-2010**

Indicator	2004	2005	2006	2007	2008	2009	2010
			Est.	Proj.	Proj.	Proj.	Proj.
Real GDP (% growth)	2.6	5.3	7.8	9.4	9.5	11.9	14.0
Consumer prices (annual average % growth)	3.6	6.9	7.2	11.4	9.0	8.0	7.0

Source: World Bank (2007a).

Figure 3 provides estimates of likely future poverty assuming various growth rates in GDP per capita over the medium term, up to 2015. A number of rather strong assumptions are needed to generate these estimates. First, it is assumed that growth in per capita GDP leads to equivalent growth in average consumption per equivalent. Second, it is assumed that inequality remains unchanged over time. Still, the simulations give an idea of the type of poverty reduction that could be seen in the future with a resumption of higher growth, which is useful for setting targets in the PRSP. For example, with a growth rate in GDP per capita of 6 percent per year, the share of the population in poverty could be slightly above 30 percent in 2015, which would be a remarkable improvement. It may be however that growth will initially favor better off areas, and take some time to fully trickle down to poor areas in the country, in which case the amount of poverty reduction that could be expected by 2015 would be smaller, because inequality could likely increase as the country recovers and some sectors expand more than others.

**Figure 3: Growth and poverty simulations, Liberia 2007**



Source: Authors' calculations using CWIQ 2007, LISGIS

**3.5. Correlates or determinants of poverty**

Drawing a profile of poverty is a necessary step to identify the characteristics of the population groups that are poor, but it is not sufficient to measure the impact of various household characteristics on poverty. The problem with a poverty profile lies in the fact that it provides information on who are the poor, or on the probability of being poor among various household characteristics, but cannot be used to assess the correlates of poverty. For instance, the variation of poverty rates across regions is sometimes better accounted for by the differences in households' characteristics than by the specificities of each region. To sort out the correlates or determinants of poverty and the impact of various variables on the probability of being poor, regression analysis is thus required. Table 10 provides an analysis of the correlates or determinants of poverty or well-being using standard regression techniques to explain (a) the logarithm of the consumption per equivalent adult of the household which is the variable determining whether a household is poor or not; (b) whether a household is poor or not; and (c) whether a household feels poor or not.

The regressions are run separately for Monrovia, other urban areas, and rural areas, with the results mostly as expected in terms of the marginal impacts of various variables on welfare. Apart from a constant, the regressors include: (a) geographic location variables according to key regions; (b) household size variables (number of infants, children, adults and seniors, and their squared value to take into account potential non-linearity in relationships between household size and consumption), whether the household head is a woman, the age of the head, and the marital status of the head; (c) characteristics of the household head, including level of education; socio-economic group, and whether the head has a second job; (d) the education level of the spouse of the household head when there is one; and (e) other variables including information on land cultivated, migration related to the war, and access to infrastructures. Key findings are as follows: -

- Demographic characteristics: As expected, an additional person in the household tends to reduce consumption per equivalent adult with the impact ranging from no loss to a loss of 25 percent of consumption, depending on the case. Yet the impact on the probability of being poor is less statistically significant in urban areas (except for the number of male adults), and the impact is not present for subjective poverty, as has been observed in other countries. Also as observed in a number of other countries, there are few statistically significant differences between male-headed and female-headed households. In terms of marital structure, most of the coefficients are not statistically significant as well, so that no generalizations can be drawn. Finally, the age of the head as well does not seem to make a major difference in consumption levels. Thus, in terms of demographics, the main finding is that households that are larger have a lower consumption per equivalent adult even after controlling for the differences in needs between different persons through the use of the adult equivalence scale.
- Education level of the head and spouse: As expected, consumption levels increase and the probability of being poor decreases with the education level of the household head, but the effects are statistically significant only as of secondary schooling. The impact of the spouse's education is in most cases of an order of magnitude similar to that of the head. Still, overall the impacts are not very large, which suggests that opportunities are limited through good employment to benefit from the full returns that an education can provide.
- Employment of the head: After controlling for other variables, the type of employment does not seem to affect very much the level of consumption of households or their probability of being poor. This is surprising to the extent that in many other countries, when the household head belongs to the public sector or the private formal sector, the household is typically better-off than when the head is self-employed, especially in agriculture. By contrast, if the head is unemployed or inactive, the negative impact on consumption and poverty is rather large in most instances (more so on consumption than on the probability of being poor), and indeed larger than what has been observed in other West and Central African countries. This type of finding may be used for example to advocate policies (as is actually done in Liberia's Interim Poverty Reduction Strategy) that enable the poor to find employment, for example through public works which are very much needed in Liberia to rebuild the infrastructure destroyed during the civil war. The regression results also suggest that when the head has a second job, consumption is higher, and the probability of being poor lower, at least in rural areas.
- Other variables: After controlling for other variables, if the household has a larger land size available for cultivation, consumption is higher, and the probability of being poor lower, as expected. Displaced households who have returned to their place of origin actually seem to be better off, after controlling for other variables, than non-displaced persons, perhaps because those that were displaced had higher means to enable them to leave their place of origin. Isolated households, as measured through the time it takes to reach the closest food marker, tend to have lower consumption levels and higher probabilities of being poor. Finally, there is some evidence that households in the South Central A region and to some extent in the North Western region are poorer.

**Table 10: Correlates or Determinants of Poverty, Liberia 2007**

	Objective poverty (moderate)						Objective poverty (extreme)			Subjective poverty		
	MCO: ln(yi/z)			Probit (is poor)			Probit (is poor)			Probit (feels poor)		
	Monrovia	Other urban	Rural	Monrovia	Other urban	Rural	Monrovia	Other urban	Rural	Monrovia	Other urban	Rural
<b>Region</b>												
Greater Monrovia	-	-	-	-	-	-	-	-	-	-	-	-
North Central	-	0.225**	0.067	-	-0.179**	0.014	-	-0.198***	0.046	-	-0.197***	0.138***
North Western	-	0.033	0.059	-	0.055	0.053	-	0.024	0.052	-	0.078	0.038
South Central	-	0.329***	0.272***	-	-0.035	-0.143***	-	-0.133*	-0.139***	-	0.168**	0.008
South Eastern A	-	Ref.	Ref.	-	Ref.	Ref.	-	Ref.	Ref.	-	Ref.	Ref.
South Eastern B	-	0.230***	0.208***	-	-0.023	-0.108***	-	-0.171***	-0.082**	-	-0.130**	0.145***
<b>Household composition</b>												
Children aged 0 to 5	-0.072	-0.073	-0.059*	0.004	0.011	0.069**	-0.065*	-0.059	0.055*	0.041	-0.038	-0.010
Children aged 0 to 5, squared	-0.011	-0.010	0.003	0.033	0.042	-0.008	0.046***	0.055**	-0.006	0.008	0.017	0.003
Children aged 6 to 14	-0.134***	-0.052	-0.159***	0.071*	0.054	0.139***	0.008	-0.015	0.130***	-0.040	-0.002	0.009
Children aged 6 to 14, squared	0.015**	-0.010	0.015***	-0.005	0.002	-0.014***	0.003	0.024**	-0.011**	0.003	-0.002	-0.005
Male adults aged 15 to 60	-0.242***	-0.195***	-0.151***	0.141***	0.123**	0.165***	0.053	0.073	0.167***	-0.040	-0.019	-0.011
Male adults aged 15 to 60, squared	0.027***	0.022	0.003	-0.010	0.007	-0.013***	-0.001	0.005	-0.011**	0.000	-0.012	0.003
Female adults aged 15 to 59	-0.068	-0.107	-0.139***	0.053	0.070	0.098***	-0.020	0.114	0.072**	0.006	-0.023	0.012
Female adults aged 15 to 59, squared	-0.009	0.011	0.015	0.001	-0.013	-0.008	0.011**	-0.015	-0.004	-0.002	0.002	-0.003
Seniors aged over 60	-0.196	-0.263	-0.196***	-0.001	0.049	0.215***	0.103	0.251	0.218***	0.026	0.028	0.011
Seniors aged over 60, squared	0.089	0.118	0.057	0.004	0.094	-0.060**	-0.042	-0.089	-0.057*	-0.027	0.074	0.022
<b>Age of the household head</b>	-0.016	-0.004	-0.015***	0.020**	0.003	0.014***	0.011	-0.006	0.013**	0.006	0.008	0.001
<b>Age of the household head, squared</b>	0.000	0.000	0.000**	0.000	0.000	-0.000***	0.000	0.000	-0.000**	0.000	0.000	0.000
<b>Female household head</b>	0.062	0.097	0.058	-0.040	-0.013	0.001	-0.032	-0.133**	0.032	-0.042	-0.096	0.003
<b>Head has No Spouse</b>	0.050	0.073	-0.064	-0.055	-0.294***	0.000	-0.037	-0.019	0.017	-0.016	-0.194*	-0.035
<b>Marital Status of the head</b>												
Single or never married	0.023	0.021	0.142**	-0.001	0.198**	-0.097*	0.018	-0.061	-0.128**	-0.035	-0.025	0.011
Monogamous	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Polygamous	0.264***	0.114	0.024	-0.231**	0.012	0.005	-0.038	-0.111	0.007	0.096	0.072	-0.052
Widowed or divorced or separated	-0.021	-0.035	0.068	0.043	0.222**	0.045	0.038	0.007	-0.032	0.019	0.099	0.117**

Source: Authors' calculations using CWIQ 2007, LISGIS. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 10 (continued): Correlates or Determinants of Poverty, Liberia 2007**

	Objective poverty (moderate)						Objective poverty (extreme)			Subjective poverty		
	MCO: ln(yi/z)			Probit (Is poor)			Probit (Is poor)			Probit (Feels poor)		
	Monrovia	Other urban	Rural	Monrovia	Other urban	Rural	Monrovia	Other urban	Rural	Monrovia	Other urban	Rural
<b>Education level of head</b>												
None	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary	0.167	0.170	0.112***	-0.185**	0.066	-0.040	-0.075	-0.159	-0.027	0.007	0.135	0.015
Completed primary	0.012	0.124	0.070	-0.008	0.017	0.006	0.020	-0.022	-0.063	0.021	0.171	-0.109**
Some secondary	0.169**	0.172**	0.074**	-0.151**	-0.051	-0.046	-0.091**	-0.131**	-0.022	-0.011	-0.058	-0.093***
Completed secondary	0.345***	0.202**	0.213***	-0.250***	-0.083	-0.088**	-0.137***	-0.141**	-0.102**	-0.201***	-0.066	-0.223***
Post secondary	0.524***	0.424***	0.321***	-0.341***	-0.038	-0.211***	-0.138***	-0.273***	-0.198***	-0.291***	-0.170*	-0.188***
<b>Education level of Spouse</b>												
None	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Some primary	0.137	0.239**	0.091**	-0.134	-0.178	-0.100**	-0.106*	-0.078	-0.093**	-0.020	-0.126	-0.089**
Completed primary	-0.139	0.087	0.146**	-0.152	0.100	-0.176**	-0.018	-0.021	-0.175**	-0.227	0.042	-0.066
Some secondary	0.045	0.067	0.071	-0.031	-0.136	-0.068	-0.050	-0.091	-0.071	-0.061	-0.106	-0.057
Completed secondary	0.238***	0.175**	0.114	-0.171**	-0.087	-0.164*	-0.150***	-0.076	-0.136	-0.134*	-0.353***	-0.080
Post secondary	0.481***	0.503***	0.427***	-0.378***	-0.582***	-0.474***	-0.158***		-0.335**	-0.295***	-0.386***	-0.153
<b>Socio-economic group of head of household</b>												
Public	-0.134	-0.042	-0.046	-0.216	-0.060	-0.002	0.087	0.016	-0.006	0.154	-0.102	-0.024
Private formal	-0.078	-0.126	0.069	-0.259*	0.071	-0.042	0.074	0.146	-0.036	0.060	0.017	-0.092*
Private informal	-0.146	0.059	-0.034	-0.175	-0.014	0.006	0.131	-0.023	0.012	0.337**	0.238*	-0.071
Self-agriculture	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Self-other	-0.115	-0.081	0.033	-0.202	0.012	-0.058*	0.095	-0.016	-0.037	0.322**	-0.046	-0.041
Unemployed	-0.375*	-0.214*	-0.172**	0.011	0.033	0.062	0.261*	0.172	0.131**	0.242	0.124	-0.049
Inactive, other	-0.296	-0.252***	-0.319***	-0.031	0.090	0.122***	0.211	0.199**	0.149***	0.146	0.063	-0.074**
<b>The head has a second job</b>	-0.018	0.166*	0.100**	0.031	-0.002	-0.113**	0.009	-0.091	-0.138***	0.021	-0.125	-0.045
<b>Total Acres of cultivable land owned</b>	0.008**	0.018***	0.003**	-0.011*	-0.029***	0.001	-0.001	-0.018**	0.000	-0.010*	-0.006*	-0.001
<b>Migration status due to the war</b>												
<i>Displaced</i>	-0.024	0.085	0.031	0.048	0.114	0.052	-0.083*	-0.110	0.002	0.265***	0.103	0.065
<i>Displaced and has returned to origin</i>	0.018	0.180***	0.110***	0.015	-0.050	-0.072**	-0.018	-0.157***	-0.065**	-0.043	-0.083	0.047*
<i>Never move</i>	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
<b>Accessibility of infrastructures</b>												
<i>Time to food market (in 1000 minutes)</i>	-2.315***	-3.865***	-0.131***	1.700**	4.029***	0.156***	1.278**	2.066*	0.191***	1.977**	-2.437**	0.209***
<b>Constant</b>	0.966***	-0.044	0.484***									
Observations	816.000	575.000	2204.000	816.000	575.000	2204.000	816.000	557.000	2204.000	816.000	575.000	2204.000
Adjusted R-squared	0.340	0.260	0.220									

Source: Authors' calculations using CWIQ 2007, LISGIS. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

#### **4. Conclusion**

This paper has relied on data from the 2007 CWIQ survey for Liberia in order to estimate the level of poverty and vulnerability in the country and analyze household level determinants of consumption and poverty. Slightly less than two third of the population (63.8 percent) is estimated to be poor, but it is likely that the situation of many other households who are not considered poor because they have consumption levels above the poverty line remains precarious. Therefore, poverty and vulnerability can be considered as massive. In recent years, the country has managed to grow at an impressive rate, and according to the macroeconomic framework to be used in the country's Poverty Reduction Strategy, high growth rates are expected to continue for some time. If this is indeed the case, poverty could be significantly reduced by 2015.

As in other developing countries, consumption levels and the probability of being poor vary substantially between households according to their characteristics. Poverty is significantly higher in rural than in urban areas, and there are also important differences in poverty levels between regions. Households who have an educated head or spouse are much less likely to be poor, although it is necessary to go beyond primary education to start to see a significant impact on household consumption. The type of employment of the head does not seem to have a major impact on consumption and poverty, but on the other hand, households with an unemployed or inactive head tend to be poorer. Household size is also a major determinant of poverty, with larger households being poorer, even after adjusting consumption levels for differences in needs between household members through the use of adult equivalence scales.

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## Annex I: Poverty gap and squared poverty gap measures (to be provided)

## Annex II: Sensitivity of poverty estimates to caloric threshold

The threshold of 2,400 kcal per person per day used to define the basket of basic food items that should be consumed by each equivalent adult in the household in order to meet minimum nutritional requirements can be considered as somewhat ad hoc. In some countries, lower caloric thresholds have been used (as low as 2,100 kcal), but in other countries such as Cameroon or Nigeria, higher caloric thresholds have been used (up to 2,900 kcal). On average, countries in West and Central Africa have tended to use slightly lower caloric thresholds than 2,400 kcal per equivalent adult, but there is no universally accepted norm for the choice of the threshold. Annex Table 1 provided below shows how poverty measures would change if one were to adopt a different, slightly lower caloric threshold. If the threshold were to be set at 2,300 kcal, the headcount of poverty at the national level would be reduced to 60.9 percent. If the threshold were reduced further, to 2,100 kcal or 2,200 kcal, the share of the population in poverty would be reduced much more, to 53.7 percent and 52.6 percent, respectively.

**Annex Table 1: Headcount index of poverty and sensitivity to the caloric threshold**

	Caloric Threshold	Poverty Line			Poverty headcount
		Food	Non Food	Total	
Urban	2,400	14,514.49	6,909.9	21,424.39	67.7
Rural	2,400	14,431.2	15,792.54	30,223.74	55.1
<b>National</b>					<b>63.8</b>
Urban	2,300	13,909.72	6,297.75	20,207.47	63.6
Rural	2,300	13,829.9	16,272.87	30,102.77	54.8
<b>National</b>					<b>60.9</b>
Urban	2,200	13,304.94	5,169.96	18,474.9	56.9
Rural	2,200	13,228.6	13,585.24	26,813.84	46.3
<b>National</b>					<b>53.7</b>
Urban	2,100	12,700.17	5,430.42	18,130.59	55.4
Rural	2,100	12,627.3	14,186.52	26,813.82	46.3
<b>National</b>					<b>52.6</b>

Source: Authors' calculations using CWIQ 2007, LISGIS.

In Liberia, given that there are no other available and comparable surveys to which the CWIQ can be compared, one could set the threshold at various values, and obtain different levels of poverty. For a number of reasons presented in this paper, the estimate of poverty of 63.8 percent at the national level is reasonable, even though the caloric threshold is slightly on the high side. It is also believed that consumption in the survey may have been slightly overestimated due to the methods used for gathering data in the survey, and this is another reason not to reduce the caloric threshold. While there is some liberty to change the caloric threshold when one cannot compare results from one survey to another, in future years, it will probably be important for consistent poverty measurement over time to collect similar household survey data and adopt the same norms as those used in this paper for poverty monitoring and evaluation.

## CHAPTER 3 RICE AND POVERTY IN LIBERIA

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*There has been a substantial literature on the link between rice and other cereal prices and poverty. The key in this literature is often to assess the double impact that a change in the price of rice can have through producers (who benefit from an increase in prices) and consumers (who lose out when the price increases). In Liberia however, at least under the current conditions, the impact of a change in the price of rice is not ambiguous at all. This is because a large share of the rice that is consumed is imported, while the rice that is locally produced is used mostly for auto-consumption rather than for sale on the market. In such circumstances, an increase in the price of rice, whether imported or locally produced, will tend to result in higher poverty in the country as a whole (even if some local producers will gain from this increase), while a reduction in price will lead to a reduction in poverty. Furthermore, because rice represents such a large share of the food consumption of households, any change in its price is likely to have a rather large effect on poverty measures. Using data from the 2007 CWIQ survey, we find that an increase or decrease of 20 percent in the price of rice could lead to an increase or decrease of three to four percentage points in the share of the population in poverty.*

### 1. Introduction

Food security remains a major issue in Liberia. As noted in the Comprehensive Assessment of the Agriculture Sector prepared by Liberia's Ministry of Agriculture (2007), improving rural incomes, food production, food security, safety nets and nutrition remains a key priority for the country. In part because rice production has fallen substantially during the period of conflict, a large majority of the population today is a net buyer of food, with much of food consumption coming from rice imports. There have been numerous accounts in the press over the years related to the price of rice in the country, including on issues regarding the awarding of import licences for rice. The issues related to rice are not new in Liberia. Already in 1980, riots about the price of rice led to a coup.

Any solutions to the country's rice and cereal deficit, and more generally lack of food security, will have to be multiple (see the analysis of the Comprehensive food security and nutrition survey in Republic of Liberia, 2006; see also Ejigu, 2006). High on the agenda is the fact that improved technologies must be used by farmers to increase their yields. To this end, the government and its partners are implementing a variety of programs that aim to provide better and more seeds as well as tools to farmers. As part of the 150-day action plan of the new government that took office in January 2006, one of the actions for economic revitalization consisted in distributing 20.5 million tons of seed rice to farmers, as well as 41,500 tools. In the medium term, substantial progress is expected from improved rice varieties (e.g., NERICA) and the expansion of small-scale mechanization. But for the immediate years to come, rice imports are likely to continue to remain large, with potential fluctuations in the price for consumers of rice likely also to have a major impact on the poor.

In this paper, our objective is not to advocate a particular policy for increasing local rice production (which should help in the medium term for reducing prices paid by consumers), or for reducing the price of imported rice paid by consumers through import and VAT tax reform or through further regulatory reforms (the country has already liberalized rice imports, so that there is not anymore only one firm only that can import rice as used to be the case in the recent past). Instead, our objective is much more limited. It consists in using the 2007 CWIQ survey to make an assessment of the patterns of consumption and production of rice in the country, and to assess the potential impact on poverty of changes in the price of rice using a very simple methodology.

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There has been a substantial literature on the link between rice and other cereal prices and poverty. The key in this literature is often to assess the double impact that a change in the price of rice can have through producers (who benefit from an increase in prices) and consumers (who lose out when the price increases). For example, Indonesia is a country that used to import substantial amounts of rice, but where restrictions were progressively placed on imports in order to help local producers, with imports of rice actually banned after 2004. Using a general equilibrium model, Warr (2005) find that the ban on rice imports raised the price of domestically produced rice, and that this led to an increase in poverty by almost one percentage point (on the Indonesia story as well as for a more general discussion on the experience of governments in Asia to stabilize the price of rice, see Timmer and Dawe, 2007).. Another paper on Indonesia by (Sumarto et al., 2005) using panel data suggests that the practice of subsidizing rice as part of a social safety net led to a reduction in the risk for household to be poor. Papers on Vietnam by Niimi et al. (2004) and Minot and Goletti (1998) suggest that the liberalization of rice exports probably led to a reduction in poverty despite an increase in the price of rice in the country, thanks essentially to increased rice production of rice.

In Liberia however, at least under the current conditions, the impact of a change in the price of rice is not ambiguous at all. This is because a large share of the rice that is consumed is imported, while the rice that is locally produced is used mostly for auto-consumption rather than for sale on the market. In such circumstances, an increase in the price of rice, whether imported or locally produced, will tend to result in higher poverty in the country as a whole (even if some local producers will gain from this increase), while a reduction in price will lead to a reduction in poverty. Furthermore, because rice represents such a large share of the food consumption of households, any change in the price of rice is likely to have a rather large effect on poverty measures.

The paper is structured as follows. Section 2 presents basic data on rice production and consumption in Liberia based on two main sources of information: the Comprehensive Assessment of the Agriculture Sector prepared by Liberia's Ministry of Agriculture (2007), and the results from the Comprehensive Food Security and Nutrition Survey (CFSNS) completed from March to April 2006 with data for 5,409 households. Our own analysis of patterns of rice consumption and production using the 2007 CWIQ survey (which is based on a sample of 3,600 households) is provided in Section 3. In section 4, still using data from the 2007 CWIQ survey, we provide simple techniques and simulations first for illustrating the direction of the potential impact on poverty of a balanced budget tax reform involving import rice, and second for assessing in a bit more detail the impact of changes in the price of rice on poverty among producers as well as consumers. A brief conclusion follows.

## **2. Rice production and consumption in Liberia: A brief review**

The Comprehensive Assessment of the Agriculture Sector prepared by Liberia's Ministry of Agriculture (2007) suggests that Liberia's agriculture can be characterized as comprising of three different production systems. First are large plantations which focus on export crops (rubber, palm oil, coffee and cocoa). Most of the production originates from plantations that are privately owned, but there are also a number of smaller state owned plantations operated by the Liberian Palm Products Corporation and the Liberian Cocoa and Coffee Corporation. A second component of Liberia's agriculture sector consists of privately owned commercial farms of medium size which also focus on industrial crops for export and to a lesser extent on livestock for the local market. Finally, the bulk of the population engaged in agriculture belongs to small household farms which rely on traditional production techniques that generated low yields due among others to a lack of inputs, and thereby focus on subsistence production. These household farms are small, with most of them being of around one hectare in size or even less (FAO, 2001; CFSNS, 2006).<sup>5</sup>

In terms of consumption, rice is the main staple food, followed by cassava and other food crops. Production data are scarce, but some estimates are available from the FAO. According to these estimates (table 1), cassava production has better resisted to the conflict than rice production, which has fallen from about 180,000 tons at the start of the conflict to 110,000 tons today, while the

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population has increased substantially over the same period. By contrast, cassava production appears to have increased from 380,000 tons to 490,000 tons.

**Table 1: Rice and Cassava Production; 1990 – 2004**

Year	Cassava (fresh and dried)			Rice		
	Area Harvested (1,000ha)	Production (1,000mt)	Yield (mt/ha)	Area Harvested (1,000ha)	Production (1,000mt)	Yield (mt/ha)
1990	55.00	380.00	6.91	175.00	180.00	1.03
1991	42.00	270.00	6.43	110.00	100.00	0.91
1992	40.00	280.00	6.67	120.00	110.00	0.92
1993	40.00	245.00	6.13	60.00	65.00	1.08
1994	29.00	250.00	6.25	45.00	50.00	1.11
1995	32.81	175.00	6.03	50.00	56.20	1.12
1996	43.30	213.26	6.50	75.60	94.45	1.25
1997	47.00	282.20	6.52	135.20	168.40	1.25
1998	55.50	307.00	6.53	161.90	209.40	1.29
1999	67.00	361.30	6.51	153.70	196.30	1.28
2000	72.50	440.50	6.57	143.50	183.40	1.28
2001	72.50	480.00	6.62	130.00	145.00	1.12
2002	75.00	480.00	6.62	120.00	110.00	0.92
2003	75.00	490.00	6.53	120.00	100.00	0.83
2004	75.00	490.00	6.53	120.01	110.00	0.92

Source: Ministry of Agriculture (2007), based on FAOSTAT data.

Two different systems of rice cultivation co-exist in Liberia. Upland rice cultivation is more prevalent, with 63 percent of producing households using this method of cultivation, as compared to 17 percent of households using and swamp rice cultivation methods (the rest, 21 percent of producers, combine both techniques). Upland cultivation is prevalent in River Cess, Grand Kru and Nimba, while swamp rice is found in Lofa County thanks in part to donor funding for agricultural development projects (CFSNS, 2006). Even in swamp or lowland areas, productivity or yields per hectare are often low, and well below that of neighbouring countries, and in the country as a whole, locally produced rice is used mainly for auto-consumption and subsistence. Among the constraints to productivity, households have identified the following: lack of seeds and tools (mentioned by 50% of households), lack of financial capital to purchase agricultural inputs (31 percent), lack of household labour (28 percent), and groundhog (pesticide) attacks as well as bird attacks (each cited by 19 percent of households in the CFSNS survey).

The inability of the country to produce enough rice and other cereals to feed the population has led to massive imports and has been one of the (many) factors that have led to high levels of food insecurity. The FAO (2006) describes food insecurity as a situation under which some people lack access to enough food of good quality to meet their nutrition needs in order to be able to lead an active and healthy life. According to the results of the CFSNS survey, most rural households are suffering from some forms of food insecurity: As described in Ministry of Agriculture (2007: 15):

*“Nationally 80% of the rural population is either moderately vulnerable (41%), or highly vulnerable to food insecurity (40%), while only 9% of the rural population is food secure, and 11% are food insecure... Chronic malnutrition rates reach 39% for children under five, and only 32 % of households had access to improved water sources, and other basic services were limited... The most food insecure and highly vulnerable groups [are] involved in palm oil producing and selling (64%) followed by hunters and contract labourers (respectively 61% and 58%). The more food secure and moderately vulnerable groups are among the cash and food crop producers (37%), the petty traders and the employees (44% each)”* (see table 2).

Importantly, even cash and/or food crop producers are considered likely to be food insecure (indeed, this group of households is considered as likely as many other groups to be food insecure in table 2), suggesting that food production for auto-consumption often still does not enable many households to meet their food needs.

**Table 1 Vulnerability, Incomes and Livelihood Profile in Liberia, 2006**

Livelihood Profile*	% moderately vulnerable and food secure	% highly vulnerable and food insecure	% of income derived from food crop production	% of income derived from cash crop production
Cash and food crop producers	63	37	62	22
Petty traders	56	44	5	0
Employees	55	44	4	0
Food crop farmers	53	49	74	0
Charcoal producers	53	47	8	0
Rubber tapers	53	47	5	0
Fisher folks	52	48	8	0
Palm oil and food crop producers	52	48	26	5
Skilled labourers	49	51	7	0
Contract labourers	42	58	5	0
Hunters	40	61	8	0
Palm oil producer/ seller	36	64	0	0

Source: CFSNS (2006).

### 3. Rice production and consumption in the 2007 CWIQ survey

In the rest of this section, the 2007 CWIQ survey is used to estimate rice production and consumption, and separate consumption into locally produced rice and imported rice. Table 3 provides summary data on rice consumption and production for auto-consumption, as well as a comparison with a number of other food items commonly consumed in Liberia. The total value of food consumption for the items listed in table 2 accounts for 87 percent of the total food consumption of households (these items were used for estimating a food poverty line in Liberia using the cost of basic needs method, as discussed in Backiny-Yetna et al., 2007). The following comments are worth pointing out:

- Rice is by far the largest food consumption item, accounting for more than a third of the value of total food consumption. The value of imported rice is estimated at Liberian \$6.5 billion (about \$100 million at the current exchange rate of Liberian \$62 per US\$), while that of locally produced rice is estimated at Liberian \$ 4.7 billion (this includes the imputed value of locally produced rice for auto-consumption). In total, rice thus accounts for Liberian \$10.2 billion in total consumption, a figure that can be compared to the total food consumption in table 2 estimated at Liberian \$30.2 billion.
- The total value of rice imports in 2007 is estimated in the survey at about US\$ 100 million. This is probably an overestimation of true imports, which is not surprising given that the 2007 CWIQ survey tends to overestimate consumption (Backiny-Yetna et al., 2007). At the same time, the order of magnitude of the estimation of imports is not completely off, since according to the latest staff report of the International Monetary Fund (2007), imports of rice were estimated at US\$57 million in 2006 (the exchange rate between 2006 and 2007 has not changed dramatically), and it is quite possible that not all rice imports are reported in the government's official statistics.
- The total production of local rice is estimated at approximately 103,000 tons, which may be on the low side, but is also of an appropriate order of magnitude given that according to table

1, production was estimated at 11,000 tons in 2004, and production has probably not increased dramatically since then.

- Locally produced rice is used mostly for auto-consumption, since only slightly more than one fourth of the locally producer rice is actually purchased. This finding echoes similar results obtained from the 2006 Comprehensive Food Security and Nutrition Survey.
- The share of rice consumption in terms of the total estimated caloric intake per adult equivalents of households, at 50 percent, is even larger than the share of rice in total consumption, at about a third. This underscores even more the fundamental role played by rice, including through imports, in the issue of food security in the country.

**Table 3: Structure of food consumption and role of rice in Liberia, 2007**

	Monetary value (millions of L\$)			Share in total Consumption (% of L\$)			Quantity (Tons)			Daily Calories (kcal) per eq adult		
	Purchase	Autocons., Gifts and Food aids	Total	Purchase	Autocons. Gifts and Food aids	Total	Purchase	Autocons., Gifts and Food aids	Total	Purchase	Autocons., Gifts and Food aids	Total
Imported rice	6492.9	0.0	6492.9	30.0	0.0	21.5	144898.2	0.0	144898.2	694.0	0.0	694.0
Local rice	1256.3	3478.6	4734.9	5.8	40.7	15.7	27267.1	75500.7	102767.8	130.6	361.6	492.2
Maize/corn	51.8	80.6	132.4	0.2	0.9	0.4	1737.5	2707.1	4444.6	8.2	12.8	21.1
Cassava flour (fufu, gari, etc)	137.6	123.8	261.4	0.6	1.4	0.9	6211.7	5589.7	11801.4	28.0	25.2	53.3
Gari	151.1	0.0	151.1	0.7	0.0	0.5	3663.7	0.0	3663.7	16.5	0.0	16.5
Bread	304.2	32.1	336.3	1.4	0.4	1.1	3543.0	373.9	3916.9	11.6	1.2	12.9
Chicken	625.6	261.1	886.6	2.9	3.1	2.9	4028.3	1681.0	5709.4	7.4	3.1	10.5
Game and insects (porcupine, gazelle)	158.5	163.3	321.8	0.7	1.9	1.1	370.0	536.4	906.4	1.3	1.9	3.2
Fresh or frozen fish	2549.5	640.7	3190.2	11.8	7.5	10.6	21992.1	5526.4	27518.5	18.6	4.7	23.2
Smoked fish (dried or salted)	614.3	161.3	775.6	2.8	1.9	2.6	2047.1	537.4	2584.5	10.1	2.7	12.8
Fresh milk	175.9	0.0	175.9	0.8	0.0	0.6	1087.1	0.0	1087.1	1.1	0.0	1.1
Eggs	131.4	42.7	174.1	0.6	0.5	0.6	591.9	192.5	784.4	1.1	0.4	1.4
Palm oil	1234.7	484.4	1719.1	5.7	5.7	5.7	14809.1	5810.4	20619.5	155.9	61.2	217.1
Banana, plantain	235.8	252.5	488.4	1.1	3.0	1.6	8323.8	8914.4	17238.3	14.8	15.9	30.7
Coconuts	97.4	50.5	147.9	0.5	0.6	0.5	3257.8	1687.9	4945.7	16.7	8.6	25.3
Palm nut	286.6	217.2	503.8	1.3	2.5	1.7	19097.2	14472.0	33569.2	100.8	76.4	177.2
Cassava leaves	91.5	112.4	204.0	0.4	1.3	0.7	7265.9	8924.8	16190.6	8.7	10.7	19.4
Bitter Balls	244.3	134.9	379.1	1.1	1.6	1.3	6898.4	3808.6	10707.0	2.9	1.6	4.5
Okra	103.1	69.2	172.3	0.5	0.8	0.6	1233.6	828.0	2061.6	0.6	0.4	1.0
Green Pepper	569.6	334.4	904.0	2.6	3.9	3.0	3443.7	2021.5	5465.2	1.6	1.0	2.6
Hot or sweet pepper (fresh or dry)	263.9	0.0	263.9	1.2	0.0	0.9	447.2	0.0	447.2	0.3	0.0	0.3
Onions	471.0	30.2	501.2	2.2	0.4	1.7	3375.7	216.1	3591.8	1.8	0.1	1.9
Dried beans	232.4	0.0	232.4	1.1	0.0	0.8	3143.4	0.0	3143.4	13.9	0.0	13.9
Cassava roots	362.8	580.8	943.7	1.7	6.8	3.1	28923.1	46299.2	75222.3	56.9	91.0	147.9
Sugar	249.8	0.0	249.8	1.2	0.0	0.8	3305.5	0.0	3305.5	17.4	0.0	17.4
Bouillon cubes (maggi, jumbo, etc)	754.2	0.0	754.2	3.5	0.0	2.5	1966.6	0.0	1966.6	8.6	0.0	8.6
Salt	310.4	0.0	310.4	1.4	0.0	1.0	8206.1	0.0	8206.1	36.5	0.0	36.5
Soft/carbonated drinks (coke,fanta,etc)	212.3	26.8	239.0	1.0	0.3	0.8	1552.0	195.8	1747.8	0.9	0.1	1.0
<b>Total Basket</b>	<b>18369.0</b>	<b>7277.5</b>	<b>25646.5</b>	<b>85.0</b>	<b>85.2</b>	<b>85.0</b>	<b>332686.8</b>	<b>185823.8</b>	<b>518510.6</b>	<b>1367.0</b>	<b>680.5</b>	<b>2047.5</b>
<b>Total Others food expenditures</b>	<b>3247.7</b>	<b>1265.9</b>	<b>4513.6</b>	<b>15.0</b>	<b>14.8</b>	<b>15.0</b>	<b>49982.7</b>	<b>27531.8</b>	<b>77514.5</b>	<b>205.4</b>	<b>100.8</b>	<b>306.2</b>
<b>Total food</b>	<b>21616.7</b>	<b>8543.4</b>	<b>30160.1</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>382669.6</b>	<b>213355.6</b>	<b>596025.1</b>	<b>1572.3</b>	<b>781.3</b>	<b>2353.7</b>

Source: Authors' estimation using 2007 CWIQ survey.

Table 4 provides additional data on rice consumption as estimated in monetary terms using the CWIQ 2007 survey. As expected, locally produced rice is consumed mostly by households in rural areas, and the capital of Monrovia is the area that is the most dependent on imported rice. At the same time, an overwhelming majority of households outside of the capital also consume imported rice, so that for most households, local production is apparently not large enough to meet their own needs.

There are also interesting differences in terms of the value of consumption according to the level of well-being of households, as measured by their level of total monetary consumption per equivalent adult. For imported rice, the consumption pattern is similar for all households except those located in the bottom quintile of the distribution of consumption, as these households consume only about half of what other households consume. For imported rice, there is a more traditional pattern according to which the richer a household is, the higher the expenditure of that household is as well. Still, while richer households tend to consume much more imported rice than poorer households, the consumption of imported rice among the poor is far from being negligible, so that changes in the price for consumers of imported rice can be expected to have a major impact on the measures of poverty obtained for the population as a whole, the issue to which we turn in the next section.

**Table 4: Rice consumption in Liberia for different household groups, 2007**

	% HH consuming rice			Average consumption For all HH			Average consumption for households with positive consumption		
	Locally produced rice	Imported rice	Total	Locally produced rice	Imported Rice	Total	Locally produced rice	Imported Rice	Total
<b>Residence area</b>									
Rural	80.0%	79.2%	99.2%	13201.2	10484.8	23686.0	13312.5	10573.1	23885.6
Urban	17.1%	97.3%	98.6%	1566.6	18633.0	20199.6	1589.6	18906.9	20496.6
<b>Region</b>									
Greater Monrovia	7.2%	98.2%	98.4%	227.6	19585.0	19812.5	231.3	19905.7	20137.0
North Central	87.9%	71.6%	99.0%	15216.9	9118.9	24335.8	15371.0	9211.3	24582.3
North Western	69.8%	90.9%	99.7%	9516.9	9824.7	19341.6	9545.1	9853.9	19399.0
South Central	46.3%	90.6%	98.6%	5796.7	15287.3	21084.1	5877.9	15501.4	21379.3
South Eastern A	83.8%	83.0%	99.4%	16150.2	10553.5	26703.6	16240.5	10612.5	26853.0
South Eastern B	75.6%	91.9%	99.9%	10910.1	15587.9	26498.0	10919.4	15601.2	26520.7
<b>Quintile</b>									
Q1 (poorest)	63.4%	71.8%	96.5%	5431.4	6166.7	11598.2	5631.1	6393.5	12024.7
Q2	70.0%	83.0%	99.3%	9520.0	10483.4	20003.3	9582.7	10552.4	20135.1
Q3	62.5%	85.7%	99.6%	10149.5	12912.5	23062.0	10187.9	12961.4	23149.2
Q4	58.5%	87.6%	99.7%	10400.1	14361.1	24761.2	10431.3	14404.2	24835.5
Q5 (richest)	50.7%	92.3%	99.3%	11104.2	18502.0	29606.2	11178.2	18625.3	29803.5
Total	60.1%	84.9%	99.0%	9524.0	13060.1	22584.1	9623.1	13195.9	22819.0

Source: Authors' estimation using 2007 CWIQ survey.

#### **4. Simulating the impact on poverty of changes in the price of rice**

There are two simple so-called partial equilibrium ways to discuss the potential impact of a change in the price of rice on poverty. A first way is rounded in the theory of balanced budget marginal tax reforms, and we illustrate this approach below not to actually advocate for such a reform in Liberia (more information and a more in-depth analysis would be needed before doing so), but to present the idea and technique, because this gives some additional background on the issues, especially in terms of the comparison of the consumption patterns for rice as opposed to other food items. The second approach is to actually simulate the impact of non-marginal absolute or proportionate changes in the price of rice on poverty among both rice consumers and rice producers. The results from this second approach are probably simpler to interpret for the non-specialist reader and thereby for potential reference in Liberia's Poverty Reduction Strategy, and although we are making some simplifying assumptions in implementing the approach, the orders of magnitude of the impact on poverty that are presented are likely to be correct.

##### **4.1. Marginal tax and subsidy reforms**

Figure 1 provides consumption dominance curves of the second order for imported rice and selected other food consumption items. As demonstrated by Makdissi and Wodon (2002; see also Duclos, Makdissi and Wodon, forthcoming), these curves are useful to assess the impact of so-called balanced budget marginal tax reforms on poverty. The idea is to test whether increasing a tax or subsidy for one type of goods, while reducing a tax or subsidy for another type of goods in such a way that the overall tax receipts or subsidy expenditures remain the same, will lead to a reduction or an increase in a wide range of poverty measures. If one consumption dominance curve is above another, then it is good for poverty reduction to reduce a tax (or increase a subsidy) on the good with the curve that is above the other, while increasing a tax (or reducing a subsidy) for the good that corresponds to the curve that is located below the first curve.

When using consumption dominance curves of the second order, we are in practice considering the impact of taxes or subsidies on poverty measures like the poverty gap, which takes into account not only the share of the poor in the population, but also the distance separating the poor from the poverty line or "depth" of poverty (when computing the poverty gap, the non-poor are included in the estimation, but they are given a zero distance separating them from the poverty line since they are not below that line). More simply, the consumption dominance curves of order two actually represent the cumulative share of the total consumption of a good that is made by the poor. The horizontal axis represents the level of consumption per equivalent adult normalized by the poverty line, so that a value of one corresponds to the poverty line actually used in the country. In Figure 1 for example, at a value of one on the horizontal axis (which means that we are looking at the consumption share of all the poor taken together), the value of the horizontal axis for total food consumption is about 45 percent. This means that the poor as a whole, which represent 63.8 percent of the population (see Backiny-Yetna et al., 2007) consume about 45 percent of the total food consumed in the country.

In terms of comparing different goods and curves in Figure 1, chicken and smoked fish have the lowest curves. This means that the shares of chicken and smoked fish consumed by the poor are lower for any poverty line we chose than the shares of the other items presented in the Figure. Thus, if this were feasible, it would be better to tax more chicken and smoked fish and tax less other goods. We are of course not suggesting here that this should be done – it would be very difficult in practice to tax chicken or smoked fish, as these goods are locally produced and informally sold and purchased, and thereby typically not subject to taxes. But we want to highlight the properties of the curve representing imported rice, in comparisons with other curves.

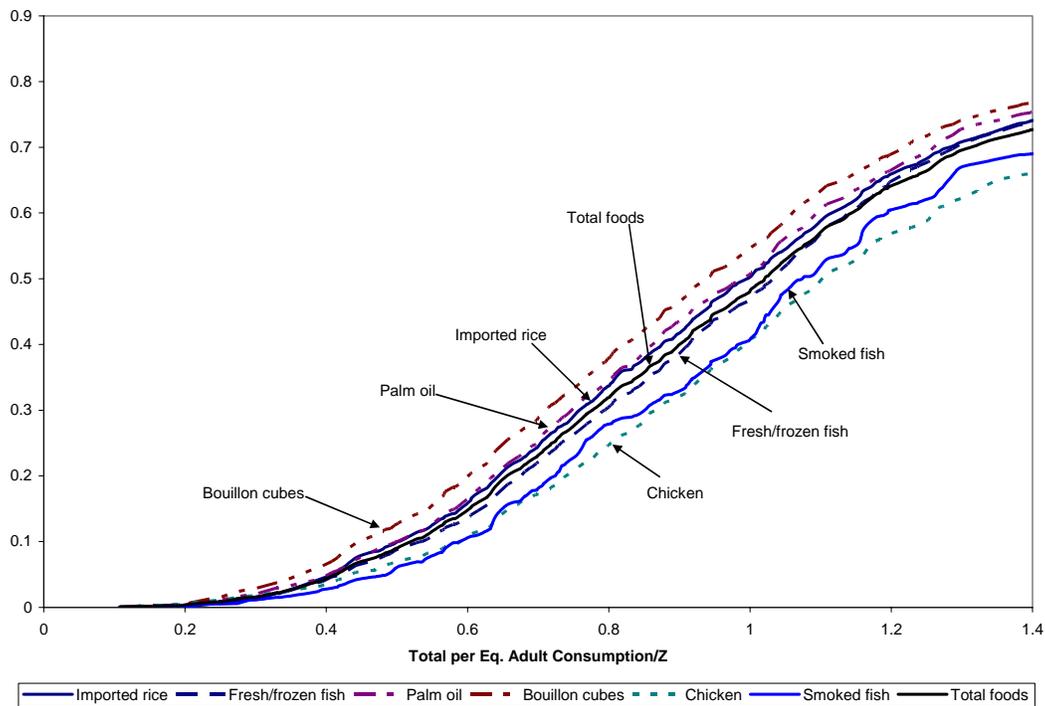
Imported rice has a consumption dominance curve that is located above the curve for overall food consumption. This means that despite the fact that imported rice is consumed more by better off households than by very poor households (as was already evident from table 4), it is still a good that could tentatively be targeted for a reduction in taxes, such as import taxes which

are currently levied on this commodity. Indeed, many other food items will be even more consumed by the non-poor than by the poor than imported rice, and in addition, most non-food items, some of which are clearly imported and thereby subject to tax, would probably have consumption dominance curves far below that obtained for food consumption as a whole.

Independently of taxation, the consumption dominance curves can also be used to argue that other measures that would help reduce the price of imported rice would be beneficial for poverty reduction, and that imported rice, due not only to its consumption pattern but also to the sheer importance of the commodity in total food consumption, should indeed be a prime candidate for efforts to reduce consumer prices (the issue is less pressing for local rice, not only because consumption of local rice is lower than for imported rice, but also because most of the local rice is actually self-consumed, so that prices pay a less important role there).

In Liberia, it has long been argued that liberalizing the imports of rice could lead to more competition (there was until recently a quasi monopoly for such imports), and that this competition could lead to a reduction in the prices ultimately paid by consumers. The data presented in Figure 1, and more generally in this paper, certainly suggest that a reduction in prices, if it were to be obtained thanks to more competition, would have a potentially large impact on poverty. In the next section, we estimate exactly how large this poverty impact may be.

**Figure 1: Cumulative CD Curve for selected food items- Order 2, Liberia 2007**



Source: Authors' estimation using 2007 CWIQ survey.

#### **4.2. *Non-marginal changes in the price of rice***

In this section, we provide estimates of the impact of changes in the price of rice (whether imported or locally produced) on the headcount index of poverty, which is simply a measure of the share of the population in poverty (i.e., with a level of consumption per equivalent adult below the poverty line; for an introduction to the concepts and techniques of poverty measurement, see Coudouel et al., 2002). We carry the simulations in a very simple way. First, for rice producers, we measure the additional income or the loss in income obtained from the sale of rice by households due to an increase or reduction in the price of rice. We assume that this difference in income translates into an equivalent difference in the consumption per equivalent adult of households used to measure poverty. We then recomputed the poverty measures keeping the poverty line intact. For consumers, we do essentially the same: we estimate the increase or decrease in the cost of rice following a change in price, taking into account the quantities actually consumed by each household. In the case of a reduction in price, we then add to the consumption aggregate the reduction in the total cost of rice for the household, since this reduction in cost means that the household can actually consume other goods (this is thus as if the household consumption had increased.) In the case of an increase in the price of rice, we subtract from the consumption aggregate the value of this increase, since the household will have to give up other consumption goods in order to be able to purchase the rice it needs. For either an increase or a decrease in the price of rice, we then compute again poverty with the adjusted consumption level.

This procedure is admittedly a very rough approach, but it has the merit of being simple. The approach may slightly overestimate the impact on poverty of changes, because we do not take into account the price elasticity of rice consumption, but this price elasticity is likely to be very low in any case, due to the fact that rice is so dominant in the diet of the population. In addition. Also, the approach does not take into account any ripple effects of changes in the price of rice on other parts of the economy. More sophisticated methods could be used to measure the “general equilibrium” effect of a change in the price of rice, but such simulations require a much larger number of assumptions which are the subject of debate. The estimations given here thus provide “first round” likely poverty effects from lower or higher rice prices paid to producing households or paid by consuming households, assuming that households don’t change their consumption patterns for rice after the change in price.

Key results from the simulations are provided in tables 5 and 6. The headcount index of poverty is the share of the population with a level of consumption per equivalent adult below the poverty line. The poverty gap takes in addition into account the distance separating the poor from the poverty line (while giving a zero distance to the non-poor). The squared poverty gap takes in addition into account the square of that distance (and thus inequality among the poor).

**Table 5: Impact of a change in consumer or producer prices for rice on poverty, Liberia 2007**

	-30%	-25%	-20%	-15%	-10%	-5%	No change	+5%	+10%	+15%	+20%	+25%	+30%
<b>Impact of changes in consumer prices only (no impact on producer prices)</b>													
Consumption per eq. adult (L\$)	25371.5	25101.1	24830.8	24560.4	24290.0	24019.7	<b>23749.3</b>	23479.0	23208.6	22938.3	22667.9	22397.6	22127.2
Average per eq. adult change in L\$	1622.1	1351.8	1081.4	811.1	540.7	270.4	-	-270.4	-540.7	-811.1	-1081.4	-1351.8	-1622.1
<b>Poverty, population as a whole</b>													
Headcount index of poverty	58.4	59.3	60.4	61.0	62.1	62.8	<b>63.8</b>	64.6	66.1	67.1	68.0	69.0	69.9
Poverty gap	21.3	21.8	22.3	22.8	23.3	23.9	<b>24.4</b>	25.0	25.6	26.2	26.8	27.5	28.1
Squared poverty gap	10.8	11.1	11.4	11.7	12.0	12.3	<b>12.7</b>	13.0	13.4	13.8	14.2	14.6	15.0
<b>Poverty, rice consumers</b>													
Headcount index of poverty	58.2	59.1	60.2	60.8	61.9	62.7	<b>63.6</b>	64.4	65.9	66.9	67.9	68.9	69.8
Poverty gap	20.9	21.4	21.9	22.5	23.0	23.5	<b>24.1</b>	24.7	25.3	25.9	26.5	27.2	27.8
Squared poverty gap	10.5	10.8	11.1	11.4	11.7	12.0	<b>12.4</b>	12.7	13.1	13.5	13.9	14.3	14.7
<b>Impact of changes in producer prices only (no impact on consumer prices)</b>													
Consumption per eq. adult (L\$)	23702.4	23710.2	23718.0	23725.8	23733.7	23741.5	<b>23749.3</b>	23757.2	23765.0	23772.8	23780.7	23788.5	23796.3
Average per eq. adult change in L\$	-47.0	-39.2	-31.3	-23.5	-15.7	-7.8	-	7.8	15.7	23.5	31.3	39.2	47.0
<b>Poverty, population as a whole</b>													
Headcount index of poverty	64.0	63.9	63.9	63.9	63.9	63.8	<b>63.8</b>	63.7	63.7	63.5	63.4	63.4	63.4
Poverty gap	24.5	24.5	24.5	24.5	24.5	24.4	<b>24.4</b>	24.4	24.4	24.4	24.3	24.3	24.3
Squared poverty gap	12.8	12.7	12.7	12.7	12.7	12.7	<b>12.7</b>	12.7	12.6	12.6	12.6	12.6	12.6
<b>Poverty, rice producers</b>													
Headcount index of poverty	70.3	70.1	70.0	69.9	69.9	69.3	<b>69.3</b>	68.8	68.6	67.5	67.1	67.1	66.8
Poverty gap	26.7	26.6	26.4	26.3	26.2	26.1	<b>26.0</b>	25.9	25.8	25.7	25.6	25.5	25.4
Squared poverty gap	13.9	13.8	13.7	13.6	13.5	13.5	<b>13.4</b>	13.3	13.2	13.2	13.1	13.0	12.9

Source: Authors' estimation using 2007 CWIQ survey.

**Table 6: Impact of a change of both producer and consumer prices of rice on poverty, Liberia 2007**

	Percentage changes in prices												
	-30%	-25%	-20%	-15%	-10%	-5%	No change	+5%	+10%	+15%	+20%	+25%	+30%
Consumption per eq. adult (L\$)	25324.5	25062.0	24799.4	24536.9	24274.4	24011.9	<b>23749.3</b>	23486.8	23224.3	22961.8	22699.2	22436.7	22174.2
Average per eq. adult change in L\$	1575.1	1312.6	1050.1	787.6	525.0	262.5	-	-262.5	-525.0	-787.6	-1050.1	-1312.6	-1575.1
<b>Poverty, population as a whole</b>													
Headcount index of poverty	58.8	59.4	60.5	61.1	62.2	62.9	<b>63.8</b>	64.6	66.0	67.0	67.7	68.9	69.8
Poverty gap	21.4	21.9	22.4	22.9	23.4	23.9	<b>24.4</b>	25.0	25.5	26.1	26.7	27.3	28.0
Squared poverty gap	10.9	11.2	11.4	11.7	12.0	12.3	<b>12.7</b>	13.0	13.4	13.7	14.1	14.5	14.9
<b>Poverty, rice producers</b>													
Headcount index of poverty	62.7	63.1	64.0	64.4	66.1	67.1	<b>69.3</b>	70.3	72.0	74.7	76.1	78.5	79.3
Poverty gap	22.9	23.3	23.8	24.3	24.9	25.4	<b>26.0</b>	26.6	27.2	27.9	28.6	29.3	30.1
Squared poverty gap	11.6	11.9	12.2	12.5	12.8	13.1	<b>13.4</b>	13.7	14.1	14.5	14.8	15.3	15.7
<b>Poverty, rice consumers</b>													
Headcount index of poverty	58.6	59.2	60.2	60.9	62.0	62.7	<b>63.6</b>	64.4	65.8	66.8	67.6	68.8	69.7
Poverty gap	21.0	21.5	22.0	22.5	23.0	23.6	<b>24.1</b>	24.7	25.2	25.8	26.4	27.1	27.7
Squared poverty gap	10.6	10.8	11.1	11.4	11.7	12.0	<b>12.4</b>	12.7	13.0	13.4	13.8	14.2	14.6

Source: Authors' estimation using 2007 CWIQ survey.

Consider first table 5, which is based only on data on the consumption of rice. At the time of the survey, the share of the population in poverty was 63.8 percent. If the price of rice could be reduced by 20 percent, and if we look only at the impact on the consumer side, poverty would fall to 60.4 percent. If the price of rice were to increase by 20 percent, poverty would increase to 68.0 percent. If we look at the producer prices, the impacts is much lower, since only locally produced rice that is actually sold must be taken into account for the simulations (for rice auto-consumed, changes in producer prices do not affect household welfare of producers). If the price of rice is reduced by 20 percent, and if we look only at the impact on the producer side, poverty would increase only to 63.9 percent, while if the price of rice for producers were to increase by 20 percent, poverty would decrease to 63.4 percent in the overall population.

The total impact of changes in the price of rice on poverty is obtained by taking both consumers and producers into account, and the results are given in table 6. If the price of rice is reduced by 20 percent, poverty is reduced in the population as a whole to 60.5 percent, while if the price of rice increases by 20 percent, poverty would increase to 67.7 percent. These are relatively large effects for a single commodity, and they underscore why the population's feelings about the price of rice run high in Liberia.

## 5. Conclusion

When assessing the potential impact of a change in the price of cereals on poverty, it is important to consider both the impact on producers (who tend to benefit from an increase in prices) and consumers (who tend to lose out when the price increases). If producers tend to be poor and if consumers live in urban areas and are better off, an increase in the price of rice, despite its impact on the cost of food, may very well be poverty reducing. In Liberia however, the impact of a change in the price of rice is not ambiguous at all. A majority of the rice consumed is imported, and a majority of the rice that is locally produced is used by farmers for their auto-consumption. Therefore, any increase (decrease) in the price of rice, whether imported or locally produced, will clearly result in an increase (decrease) in poverty, and this impact is likely to be large given the important share of food consumption allocated to rice in the country.

Using data from the 2007 CWIQ survey implemented by Liberia's Institute of Statistics, we find that a change in the price of rice of 20 percent could lead to an increase or decrease of three to four percentage points in the share of the population in poverty, which is indeed large for a single commodity. The magnitude of the impact on poverty of changes in the price of rice suggests that the issue of what can be done to help reduce the price of rice for consumers would warrant a thorough discussion under the preparation of the country's Poverty Reduction Strategy.

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For an analysis of the employment patterns of the population in Liberia, see Wingfield-Digby (2007).

Most households own the dwelling in which they live while a non-negligible share of households is housed free of charge. Both of these categories of households enjoy accommodations that are part of their consumption. It is therefore important to estimate the rent they would have paid if they were tenants. This imputed rent is only estimated for households that are not tenants, based on a regression analysis of the logarithm of the rent paid by households that are tenants. The explanatory variables used for the regression include: the area of residence (region), the type of accommodation, the materials used (walls, floor, roof), the number of rooms in the dwelling, the combustible used for cooking, the lighting source in the dwelling, the water supply source and the waste disposal method.

We use the term “very rough” because different techniques could be used to fit a curve between the points in the Figure, with a different “expected” level of poverty given the level of GDP per capita resulting from each different way of fitting the curve. In addition, the “expected” level of poverty represented by the fitted curve depends on the normalization used on the horizontal axis of the graphs.

The authors are with the World Bank. This paper was written as an input to Liberia’s Poverty Reduction Strategy. Key results were presented at a workshop organized by Liberia’s core PRSP team in Monrovia on December 10-11, 2007. The analysis is based on the 2007 CWIQ (Core Welfare Questionnaire Indicator) data collected by Liberia Institute of Statistics and Geo-Information Services under the leadership of Dr Liberty. The survey benefited from generous support from UNDP and DFID. At the World Bank, Ghislaine Delaine and Emmanuel Fiadzo also provided support for the implementation of the survey. The views expressed in this paper are those of the authors and need not reflect those of the World Bank, its Executive Directors or the countries they represent.

In fact, 53.6% of rice farms were between 0.2ha – 1.19ha with a further one-quarter of rice farms from 1.2ha – 1.69ha. For cassava, 70% of farms are of less than 0.69ha (CFSNS, 2006).

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