Measuring poverty in Lebanon using 2011 HBS

Technical report

CENTRAL ADMINISTATION OF STATISTICS (CAS)

AND

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This technical report is a joint effort of the Central Administration of Statistics of Lebanon and the World Bank. The report is a product of the World Bank's programmatic work in Lebanon and technical assistance. The CAS team includes Najwa Yaacoub and Mayssaa Daher. The World Bank team consists of Tara Vishwanath, Dean Jolliffe and Aziz Atamanov. The team received guidance and comments from Benu Bidani (Practice Manager, GPVDR) and overall support from CAS Director General Dr. Maral Tutelian. The team is also thankful for useful comments from Ken Simler (peer reviewer), Sailesh Tiwari (peer reviewer), Nobuo Yoshida (peer reviewer), Tara Vishwanath, Zurab Sajaia, Sergio Olivieri, Nandini Krishnan and Gabriel Lara Ibarra. We are also grateful to Jacob Goldston for a careful cross review of all the Stata code.

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1. Introduction and country context

According to World Bank Development Indicators, Lebanon is an upper middle income country with an estimated population of 4.5 million people and GDP per capita of 17,462 USD in 2014 (based on 2011 PPPs). The country is well known for its high level of human development and open economy. Yet, social and economic performance of the country has been moderate during the last 40 years because of numerous domestic and international political and religious shocks including wars with Israel, major political assassinations, waves of terrorism activities, and spillovers from regional conflicts—the latest being the Syrian conflict. Understanding how changes in the country – both positive and adverse factors -- have affected the population requires a timely and accurate statistical foundation.

Lebanon is a sectarian-based consensual democracy, where population demographics are a particularly sensitive and political issue. The timely collection of social, economic and demographic statistics is a difficult task in any environment, but it is all the more challenging in Lebanon where demography is directly linked to governance. In part due to these challenges, the last official census in Lebanon was conducted in 1932, and the latest update of the population estimate was made in 1964, drawing on civil status registers within the Ministry of the Interior (European Union, 2009). The Ministry of Social Affairs, supported by the United Nations Development Program (UNDP), and in partnership with the Central Administration of Statistics (CAS), undertook the first multipurpose household survey (living conditions and household budget survey). This socio-economic survey was conducted during February 2004 to April 2005 on about 13,000 households distributed nationwide. The sample covered the whole de facto population, except the Palestinian population living in the refugee camps. This data was used to construct a lower, extreme poverty line as well as an upper poverty line, both of which were used to produce measures of absolute poverty. CAS received technical support from World Bank staff on the construction of welfare aggregate, and technical support from UNDP on the estimation of household-specific poverty lines.

UNDP (2008) provides a full description of the methodology and the profile of poverty in Lebanon as portrayed by the 2004-05 data. Eight percent of the Lebanese population were estimated to be in extreme poverty (i.e. living below the extreme poverty line), essentially not able to meet their most basic food and nonfood needs in 2004/2005. An estimated 28.5 percent of the population were poor as defined by the upper poverty line. Striking differences in consumption per capita and headcount poverty rates were identified across regions with the North Lebanon, South and Bekka being the poorest.

The second household budget survey (HBS) was implemented by CAS in 2011 with technical assistance from the World Bank. In addition to meeting the core statistical needs of the government to understand the overall wellbeing of the population, the data was also needed to create a baseline for evaluating the impact of the National Poverty Targeting program, to update the proxy means test used for this program, and more generally to develop a social protection and human development strategy. The survey was conducted during the period of September 2011 to November 2012. The sample design for the 2011 HBS was different from the 2004 HBS in that it was stratified across nine regions (compared to 15 strata in 2004) and was originally planned to include 4805 households. Due to differences in the sample design, different methodologies to construct welfare aggregate and poverty line, as well as specific data issues, poverty estimates presented in this report are not comparable to estimates obtained based on 2004-05 data.

Several issues were encountered during data collection that negatively affected the quality of obtained data. The survey was originally planned to be completed in 12 weeks, but lasted over a year, thereby introducing concerns about seasonality into the regional profiles of wellbeing. Further, while the intended sample size was 4805 households, the effective sample size was 2746 households due to a non-response rate of 43 percent. This rate is high by international standards (Mistiaen and Ravallion 2003, United Nations 2005) and has the potential to introduce significant bias in point estimates if the households that did not respond to the survey were systematically different from those who did participate.

The response rate varied significantly across administrative regions (mohafaza) from very low in Beirut and Mount Lebanon (38 and 36 percent respectively) to high in South Lebanon and Nabatieh (76 percent). Conventional wisdom, and findings from analysis carried out by CAS and the World Bank, suggest that the likelihood that a household would not participate in the survey was increasing in income. The result of this systematic tendency is that poorer households were more likely to participate and were essentially "over represented" in the data. CAS and World Bank staff worked together to produce adjustment factors to the sampling weights to mitigate the potential non-response bias.

The purpose of this technical note is to describe how the welfare aggregate and poverty line were constructed in Lebanon using HBS 2011.[1] It is a part of broader collaboration between CAS and the World Bank to improve data quality and poverty monitoring capabilities in the country. Different approaches have been tested to correct non-response and to measure poverty. The note consists of eight sections. Section 2 briefly discusses main methodological issues in poverty measurement. Section 3 explains construction of different components of welfare aggregate. Section 4 documents construction of poverty lines. Triangulation of obtained poverty estimates, sensitivity analysis are conducted in section 5. This section also contains supplementary poverty numbers based on consumption per adult equivalent. Finally, section 6 concludes and discusses areas for further consideration in poverty measurement.

2. Methodological issues in poverty measurement

Measuring poverty requires two broad steps. The first step is to define an indicator to measure welfare or living standards. The second step requires setting a poverty line - the minimum welfare level below which person is considered to be poor.

The most common welfare indicators for poverty measurement are consumption or income per capita derived from survey data. The choice between them is often made based on socio-economic conditions of a country chosen for the analysis. Income is usually used to measure welfare in rich countries, while consumption is often the preferred measure of welfare in low and middle-income countries. Consumption includes both goods and services, whether purchased, home-produced or received as gifts. It thereby provides a direct measure of realized welfare (ie. it measures what was actually consumed), while income is sometimes viewed as providing a measure of potential welfare (ie. it provides a measure of what someone could potentially consume). Often times though, the choice of whether to consider income or consumption as the preferred indicator of welfare is linked more to how reliably each can be measured. Income tends to be very hard to measure in countries where agriculture and self-employment are important employment

[1] A separate technical note has been prepared to discuss a strategy for unit non-response correction (CAS and World Bank, 2015). The current note is a technical report with a sole purpose to explain the poverty methodology and should not be viewed as a poverty assessment paper.

options. Moreover, in rural areas, income is subject to substantial seasonal volatility and consumption is more likely to be representative of general level of welfare (Haughton and Khandker 2014).

The main guiding principle for welfare aggregate is to make it comprehensive enough to capture important dimensions of wellbeing, while being attentive to concerns about measurement error. The key question to ask is whether included component improves ability to correctly sort individuals in terms of their wellbeing, or if the additional information simply adds noise to the measure. Food consumption, for example, includes own production, transfers and eating outside home. Nonfood consumption usually excludes lumpy infrequent expenditures (e.g. funerals, weddings), investment and items which are hard to estimate accurately (public goods). Durables require a particular treatment because they are bought at a particular point in time, but consumed during a period of several years. Consumption should include only the annual use value of a durable rather than purchase value. The same principle should apply in measuring the value of housing services (Deaton and Zaidi 2002, Haughton and Khandker 2014).

There is no consensus in literature on whether health expenditures should be included. One argument to exclude health expenditure is because they often imply a regrettable necessity and do not contribute to welfare. An even more fundamental issue is the inability to distinguish between health expenditures aimed at improving welfare and health expenditure as regrettable necessity. The decision is sometimes made based on elasticity of health expenditure with respect to total expenditure. Essentially if one observes individuals with high values of consumption (not including health expenditures) also having high expenditures on health, then it is assumed that on average health expenditures are reflecting preventative health expenditures. So, a higher elasticity implies stronger case for inclusion.

After construction of the welfare aggregate, there is a need to make additional adjustments to allow for poverty comparisons across individuals. One of the most important adjustments is spatial and inter-temporal deflation to account for temporal and spatial difference in prices faced by households. The second important adjustment is related to the adjustment of welfare aggregate for household composition. This can be done by simply dividing household consumption by total household size or by taking into account household-economies of scale and adult-equivalence scale adjustments.

Having constructed and adjusted welfare aggregate, the next step is construction of poverty line. Households whose consumption expenditure or income fall below this line are considered poor. The standard approach in setting a poverty line, followed in Lebanon, is the "cost-of-basic-needs approach (CBN). This approach consists of several steps. The first step is to identify a minimal nutrition requirement for healthy living, usually defined in terms of minimal caloric requirements. This nutritional threshold is typically estimated to ensure that it is consistent with local tastes and consumption patterns. For obvious reasons, selecting one requirement for all individuals is an approximation given that food needs are heterogeneous across the population, but the advantage of having a single requirement is transparency, simplicity and ease of communication. The second step is to estimate costs of meeting this food energy requirement, using a diet that reflects the habits of households near the poverty line. This will give a food

component of poverty line. The third step is to add a non-food component to food poverty line which can be done in various ways (Ravallion 1998).[2]

3. Welfare aggregate and its components

This section describes the construction and adjustment of welfare aggregate in Lebanon based on 2011 HBS.

3.1 Data issues

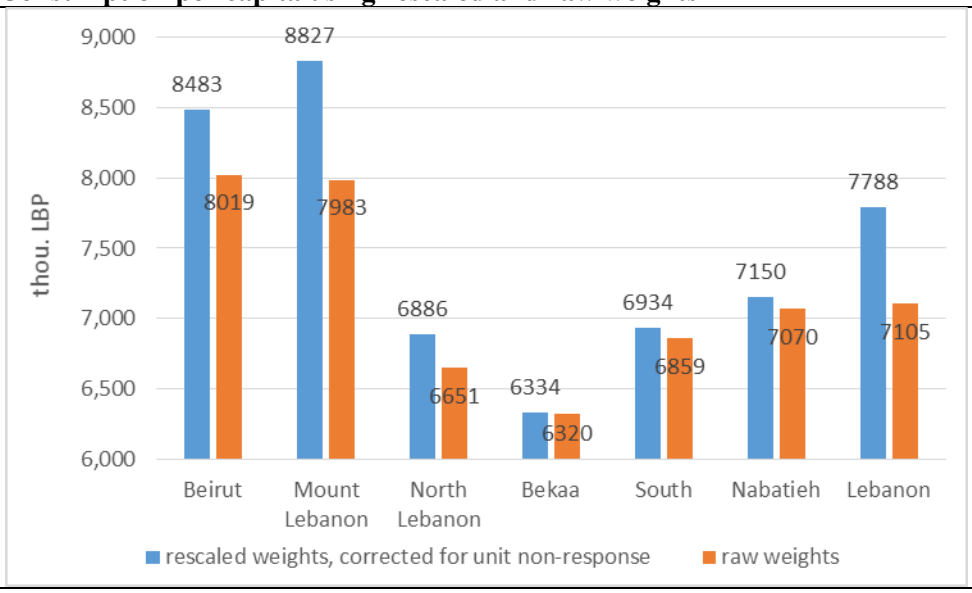
The survey was conducted during the period of September 2011 to November 2012. The sample design differed from the previous HBS and was stratified across nine areas (Beirut Governorate, Beirut suburbs, remaining Mount Lebanon, Akkar and Minieh-Danniyeh districts, remaining North Lebanon districts, Baalbeck and Hermel, remaining Bekaa, South Governorate, Nabatiyeh Governorate) and was originally planned to include 4805 households.[3] Three survey forms have been used to collect the data: an individual, seven-day diary of purchases filled in by adults older than 15 for themselves and children, an other-expenditure form, based on three month or yearly recall period and a form to capture household characteristics and living conditions.

Several important data issues should be kept in mind while interpreting results shown in this note. The most important problem is associated with substantial and systematic unit non-response (ie. targeted households that did not participate in the survey). As a result of the unit non-response, only 57 percent of the intended sample was collected. No information was collected on non-respondents, complicating any ex-post correction. In order to correct for non-response, rescaling of sample weights was done at PSU level assuming non-response uniform at this level. Impact of rescaling and empirical verification are discussed in a separate technical note (CAS and World Bank, 2015). Overall, impact of using rescaled weights over raw weights is substantial (figure 1). Using rescaled weights increase consumption per capita by 10 percent.

[2] Obtained poverty line is often called upper poverty line, while in many countries lower poverty line constructed as well. For lower poverty line, the reference population for nonfood share is from subsample of households whose total expenditures per capita are close to food poverty line.

[3] Nine strata are aggregated into six administrative regions called mohafaza. All regionally disaggregated results in this paper are shown for these six administrative regions.

Figure 1. Consumption per capita using rescaled and raw weights



Source: Authors' calculation using HBS 2011.
Note: Due to small sample size, regionally disaggregated statistics presented in this note should be treated with caution.

Due to security reasons, the survey lasted over a year instead of being completed during the intended 12 weeks. Lack of temporal stratification of the fieldwork led to data collection occurring in several regions primarily in the fall when households have substantial food purchases preparing for winter. This essentially introduces concerns about seasonality bias in any sub-national estimates. In particular in Mount Lebanon and North Lebanon, more than 50 percent of survey was conducted in autumn (figure 2). This led to distortions in food purchases as shown in figure 3. For example, purchases of olive oil were much higher than what was observed, for example, in Beirut. Having high food consumption in poor North Lebanon created a problem for construction of nonfood poverty as will be discussed and seen further in the text.

Figure 2. Timing of survey in different regions

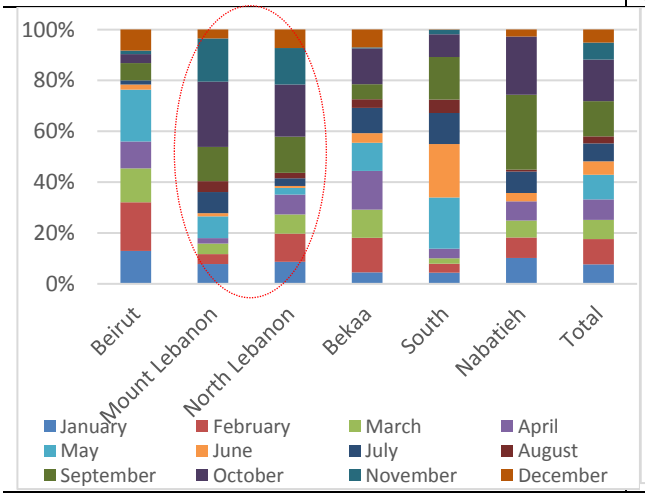
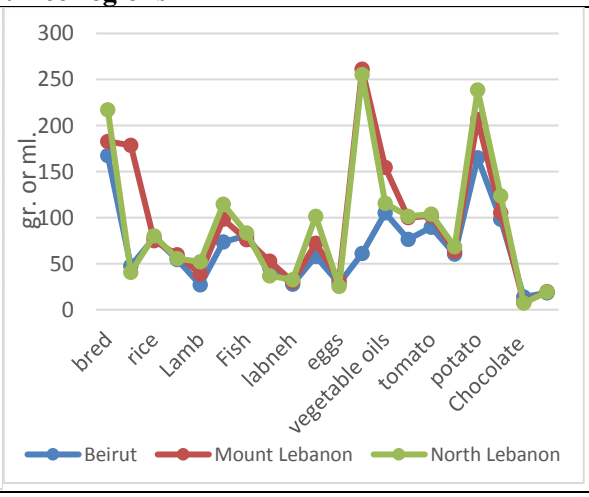


Figure 3. Daily purchases of selected products in three regions



Source: Authors' calculation using HBS 2011.

The last important issue is related to item non-response in the individual diary. About 27 percent of individuals older than 15 did not fill the diary completely (CAS distinguishes between individuals with zero purchases and those who did not fill the diary). In 8 percent of households nobody filled the individual diary. To address the item-level non-response, some missing purchases have been filled in with imputed values.

3.2 Food items

Household food consumption is constructed from information provided by the individual diary which was designed to be filled in by all adults older than 15 years of age. Each adult is supposed to report daily purchases he or she made during seven days. One household member filled the diary for children below 15 years age. The diaries and forms include food and nonfood expenditures for personal use. The food diary includes measures of all food items consumed from purchases in cash, transfers and home produced products as estimated by the respondent. An important data quality issue is that slightly less than one third of adults did not completely fill in the diaries. To address this issue, when sub-aggregates of food and nonfood items are missing, imputed values have been assigned to them. As a first step, individual-level purchasing information has been aggregated to six COICOP groups: food, non-alcoholic beverages and tobacco, furnishings and household equipment, transport, restaurants and hotels, and miscellaneous goods and services. Exact COICOP groups taken from the diary are shown in the annex.[4]

Several imputation methods were considered to impute missing purchases for six COICOP groups at individual level, but two estimators were the most methodologically appropriate for the data. The first method is based on the Tobit regression model for censored data. The second approach considered is based on predictive mean matching from multiple imputation technique where the imputed value is the average of five predictions (StataCorp 2013). Predictors used in the models include: nonfood expenditure per capita, education, marital status, gender, age group, region, employment status, type of employment, type of residence, dummy if diary is related to respondent and all family members aged less than 15.

Before imputation, respondents and non-respondents have been compared to check if there are systematic differences between them. This was done by estimating the probability of responding (with a probit estimator) based on a set of observable characteristics. The estimates reveal that the probability of filling in the diary drops with age and household size. In addition, the model indicates that those who filled the diary are from households with higher nonfood consumption per capita. (This is observed both in the unconditional bi-variate model and in models controlling for other factors.) If one assumes nonfood consumption per capita is positively correlated with food consumption per capita, imputed purchases should be lower than reported values.

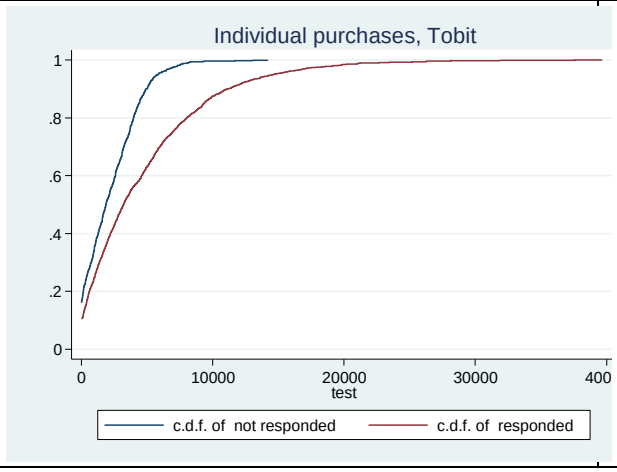
Average consumption per capita (nominal, not spatially deflated) by regions, as estimated by both imputation methods are presented in figure 5, and compared to the value from no imputation (which treats missing at the level of the six aggregates as zero). As expected, the lowest consumption per capita is observed if no imputation is done, this is because missing values at the higher level of aggregation are treated as zeros. Figure 4 compares the cumulative density function for imputed values for non-responders with responders, for each imputation approach. Figure 4 indicates that the predictive mean approach results

[4] COICOP stands for Classification of Individual Consumption According to Purpose. It is a reference classification to categorize expenditures.

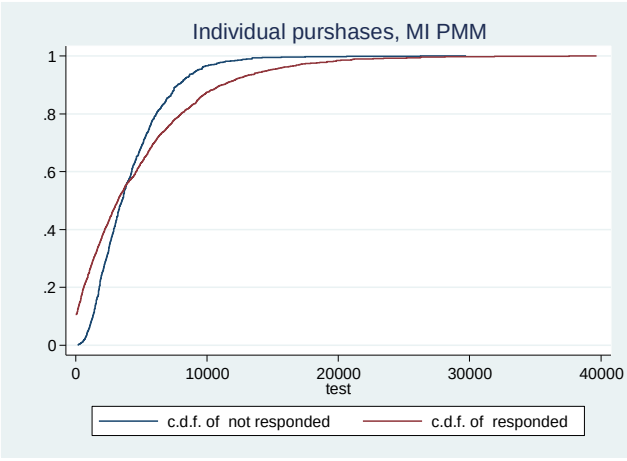
in higher values for non-responders relative to responders at lower overall consumption levels. This finding is in tension with the inference from the nonfood comparisons that non-responders have lower nonfood consumption levels. In contrast, the Tobit model predicts lower purchases as expected. In part due to this finding, and also due to the result in figure 5 that the Tobit-based imputations are more modest that then predictive mean method, the Tobit-based imputations have been used in the welfare aggregate.

Figure 4. Cumulative distribution function of imputed and actual purchases for responders and non-responders

a) Tobit

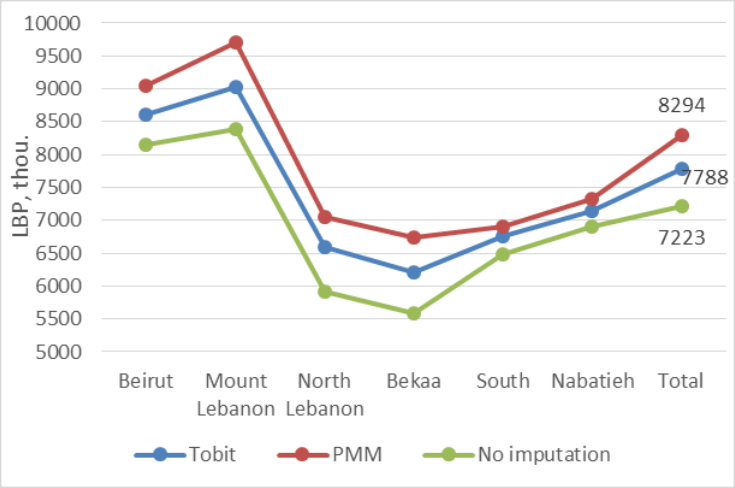


b) Predictive mean matching



Source: Authors' calculation using HBS 2011.

Figure 5. Nominal annual consumption per capita using different imputation techniques, thou. LBP



Source: Authors' calculation using HBS 2011.

3.3 Non-food items

The nonfood component of the measure of total household consumption is derived from the individual diaries, the recall, and household characteristics and living conditions forms. In particular, travel

expenditures, utilities for primary and secondary dwelling, housing services and information about rent are estimated from the household characteristics and living condition form. In a few cases there are duplicated COICOP groups across forms, and these have been removed from the welfare aggregate.

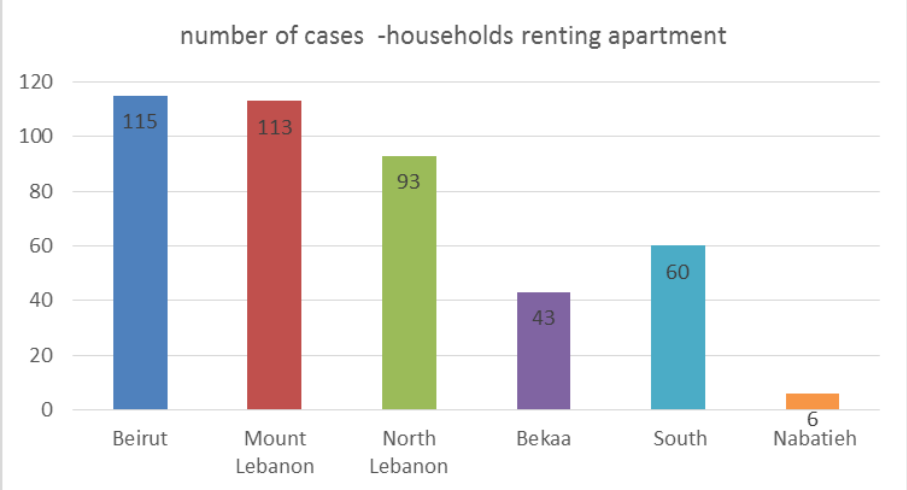
3.3.1 Rents

Information on actual and reported rents is collected in the household characteristics and living condition form. From 2,746 sampled households, 430 rented apartments. Most of the remaining households (n=2259 households) owned dwellings and reported estimated rent answering the question "how much do you estimate the monthly rent of the house/apartment you occupy". Of these households, 57 had missing values to this question.

Figure 6 presents the number of households that reported actual rent paid by regions and this reveals that sample sizes are very small in some regions. For example, in Nabatieh there are only six observations on reported rent. An implication of this is that trying to impute rental values of homeowners based on hedonic rent models will likely fail to reflect important regional variation in the cost of shelter. A second issue with reported actual rent is that rent control exists for some of the older dwellings, and this attribute is not observable (ie. the data do not allow for distinguishing rents with rent control from those without). The inclusion of rent-controlled dwellings in the hedonic rent model will contaminate the imputation for the "use-value" of the dwelling.

Table 1 reports a series of hedonic regression models where actual rent and estimated rent are regressed on a series of housing characteristics. Each of these models could potentially be used to predict the use-value of shelter, and all have potential concerns. For example, some important explanatory variables such as dwelling area are not significant in the regression explaining actual rent. While there are measurement concerns with all approaches, the concerns about sample size and rent control were the basis for deciding to use estimated rents for the models used to predict rent based on a series of housing attributes (Table 1, column 2). To ensure that all households are treated similarly, the predicted rental value from the model is used for all households. Figure 7 shows, as one expects, that inclusion of predicted rent in the consumption aggregate increases the regional dispersion of nominal consumption.

Figure 6. Regional distribution of households reporting actual rent



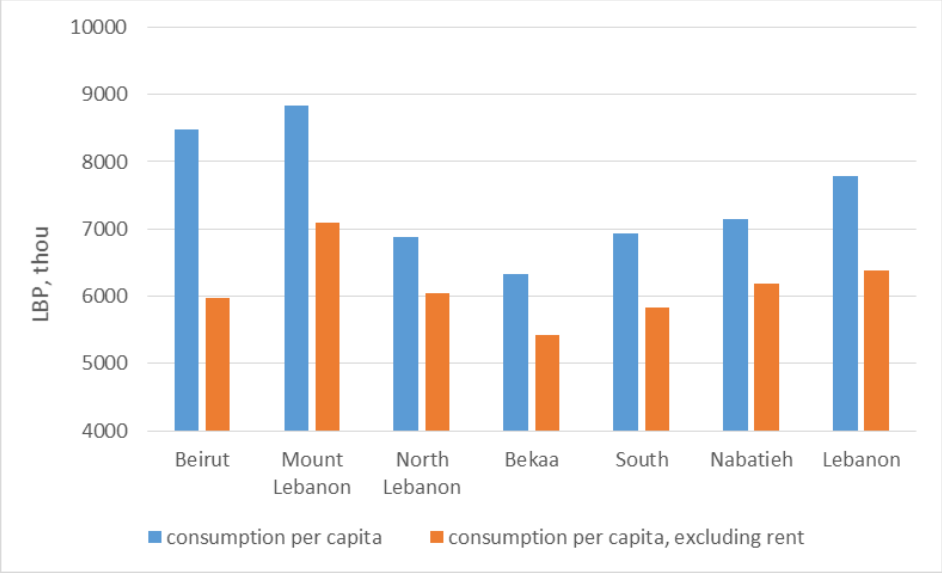
Source: Authors' calculation using HBS 2011.

Table 1. OLS regression for different rent values in logarithms

variables	Log of estimated rent of owners	Log of actual rent	Log of pooled total rent with dummy, actual versus reported
Beirut		omitted	
Mount Lebanon	-0.268***	-0.312**	-0.223***
North Lebanon	-0.810***	-0.104	-0.610***
Bekaa	-0.847***	-0.182	-0.686***
South	-0.751***	-0.346	-0.602***
Nabatieh	-0.761***	-1.271*	-0.680***
Number of rooms	0.123***	0.0926*	0.110***
An independent house		omitted	
Villa (more than one floor)	0.0517	0.00976	0.107
An apartment in an independent building	0.135***	-0.0189	0.109***
An apartment in a residential complex	0.0459	0.264	0.168***
An improvised dwelling	-1.030***	-1.747	-1.201***
Room concierge	-0.476***	-0.266	-0.415***
Others	0.14	-1.303	0.0614
Size of dwelling area	0.000814***	-0.00233	0.000452
Less than 5		omitted	
5 to 9	0.0141	-0.123	-0.127
10 to 14	-0.00784	-0.5	-0.0921
15 to 24	0.00989	-0.655	-0.127
25 to 49	-0.0506	-0.971	-0.183*
More than 49	-0.0419	-1.510**	-0.364***
Marble		omitted	
Parquet	0.0882	0.233	0.169
Tiles	-0.103***	-0.655*	-0.191***
Concrete	-0.506***	-0.598	-0.521***
Soil	-0.159		-0.373
Other	-0.301		-0.292
public sewage		omitted	
open sewage	0.178	-0.455**	0.104
septic tank	-0.153	0.435	-0.166
other	-0.0717		-0.071
no answer	-0.404*		-0.47
protected water source		omitted	
unprotected dug well	-0.0416		-0.07
unprotected spring	-0.0686		-0.181
rainwater collection	-0.134*	-0.0913	-0.157
tanker	0.0362	-0.63	-0.13
cart with small tank	-0.235***	0.276	0.107
surface water	0.0389	1.6	0.0594
Dummy, 1 is actual renter	na	na	-0.893***
Constant	5.721***	7.410***	6.038***
Observations	2259	430	2689
R-squared	0.586	0.206	0.428

Source: Authors' calculation using HBS 2011.

Figure 7. Impact of excluding rent on welfare aggregate



Source: Authors' calculation using HBS 2011.

3.3.2 Durables

Durable goods are typically important investments households make and often are useful indicators of the wealth of the households. When it is possible to estimate a use-value of these goods, it can be a potentially useful element of total consumption for distinguishing between the rich and poor. But, this estimation requires a significant amount of data and the HBS survey collects very limited information on stocks of durables. In particular, information on current value, age or condition of the goods is not available, and the exclusion of this data prevents the estimation of an annualized flow of consumption from durables. One exception to this is the case of transportation. For cars, motorcycles, buses and pick-ups owned by the household, the survey collects information on the current value, age and brand of the vehicle. Given the importance of cars and other private transportation in Lebanon, the decision was made to estimate annual use-value of these vehicles as the annual rate of depreciation. Using this information, the regression below was run with the current value of transport as a function of age of the vehicle, controlling for the brand for each type of vehicle. From this regression, we derive the annual rate of depreciation and use this as the estimated rental value of the vehicle.

$$\text{Log (current value of transport)} = F(\text{brand, age, brand*age}) \quad (1)$$

Many households use cars for business purposes by providing taxi services and report percent of gasoline spent on these activities. This percent is deducted from annual consumption flow obtained from the regression (1). Final average annual depreciation (consumption flow) is shown in table 2. On average households are estimated to consume about USD551 from their transport annually, based on an estimated depreciation rate of nine percent.

Table 2. Annualized consumption flow from transportation by quintiles		
Quintile	transport, annualized flow, thousand LBP	transport, annualized flow, USD
1	212	141
2	412	274
3	790	524
4	935	621
5	1808	1200
Total	830	551
average value of transport	9010	5979

Source: Authors' calculation using HBS 2011.

3.3.3 Education and health

As noted in section two, health expenditures can either reflect preventative care, in which case the person's wellbeing is improving, or can reflect a bad health outcome, in which case the person's wellbeing is deteriorating. To a lesser extent, education expenditures can also be viewed as either being consumption or investment (where increased economic wellbeing is realized later in life). There are no clear rules on whether education and health expenditures should be included or excluded from welfare aggregate and the decision is mostly based on country context. Following Deaton and Zaidi (2012), the elasticity of education and health expenditures to total expenditure per capita have been estimated. As often observed in other countries, elasticity of education expenditures is higher than elasticity of health expenditures: 1.22 versus 0.8 accordingly. Taking this into account and the fact that health insurance will be included in the welfare aggregate, the decision was to drop other health expenditures, but to include education expenditures. The results of the sensitivity test of dropping health expenditures will be shown further in the text in figure 19.

3.4 Adjustments to welfare aggregate

3.4.1 Spatial adjustment

Prices typically vary across regions of a country, and between cities, towns and rural areas. To account for this, spatial price deflators are often used to adjust the welfare aggregate. In many surveys, including the Lebanon HBS, estimates of prices are only available for food items. For this reason, the welfare aggregate (ie. per capita consumption) is adjusted for spatial price differences with an index based on food prices. The food spatial deflator is constructed from unit values of food products (excluding alcohol and tobacco) and is based on Paasche price index. Paasche index is calculated using the formula below

$$P_P = \sum_{k=1}^{K} w_{hk} * \frac{P_{hk}}{P_{0k}}$$

where, w_{hk} is the share of household h's budget devoted to good k. P_0 is reference price vector. P_h is a vector of prices household face. For the spatial deflator, median regional and country level prices are used for each household.

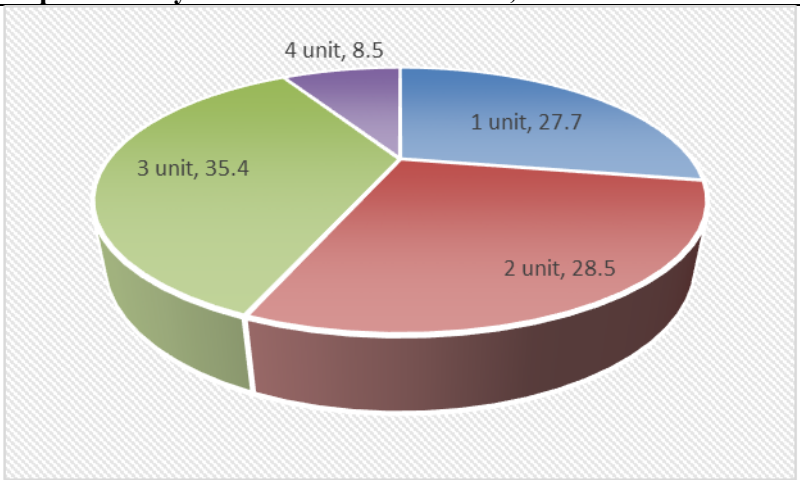
Unit food prices are calculated by dividing expenditures by purchased quantities. Several important steps have to be made before the construction of spatial deflator. The most important step is to ensure that prices

for each product are reported in the same unit. Only 28 percent of all products from food diary have one unit measure (figure 8). For an absolute majority of products two, three or even four units are reported. For example, prices for eggs can be reported in pieces, kilograms and boxes. Assuming that food items reported in one unit are on average the same quality as when reported in a different unit, it is straightforward to convert all prices to a common unit for each item. In addition to converting all prices to consistent units for each item, there is a need to clean the data for some products which are very rare and not observed throughout the country. Steps below explain the whole process in detail.

For each product a "main" unit is created. Observations in other units are dropped. Unit is considered as a "main" if it accounts for 70 or more percent of observations for this particular product. For example, bread is measured in kilograms or grams in most of the cases, water in liters and so forth. Given that prices in liters and kilograms can be used interchangeably, the "main" unit is also created if sum of observations in kilograms and liters is higher or equal to 70 percent.

Prior to estimating the price index, observations are dropped for the following reasons: 1.) if reported units is different from the designated "main" unit; 2.) there are fewer than three observations of the product in a region; 3.) the product is observed in less than three regions from six available. After cleaning the data, the number of products declined from 258 to 136. However, the impact on the number of observations and overall expenditures was not substantial. Only 20 percent of all observations and 13 percent of total expenditures were lost.

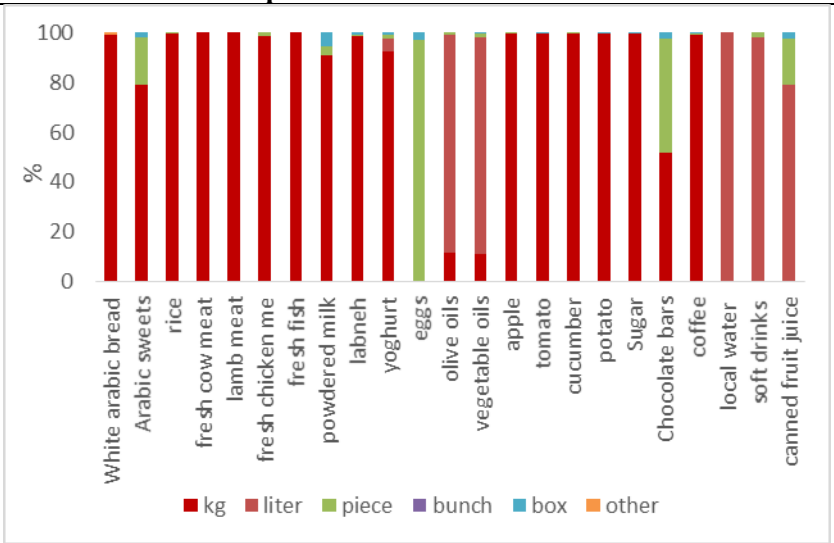
Figure 8. Shares of products by number of unit measures, %



Source: Authors' calculation using HBS 2011.

Having cleaned the price data, mean prices at household level are created. Outliers are replaced by boundary values equal to mean plus/minus two standard deviations. Weighted median prices at regional and country level are calculated for each household and product. Household level deflators are constructed for each product by dividing regional prices over country averages. Within each household, the weighted average deflator is constructed using the expenditure share of different product as the weight. Afterwards, average deflators for each of six region are calculated. A simple illustration of this procedure is shown in table 3.

Figure 9. Unit measures for selected products



Source: Authors' calculation using HBS 2011.

Table 3. Example of calculation of food deflator

			1	2	3=1/2	4	5=3*4
Region	Household id	product	median regional price	country median price	Deflator, for each product and household	Expenditure shares	deflator at household level
Beirut	1	bread	6.1	6	1.02	0.8	
Beirut	1	milk	4.2	4	1.05	0.2	1.02
Beirut	2	Bread	6.2	6	1.03	0.7	
Beirut	2	Sugar	5.5	5	1.10	0.3	1.05
Beirut	3	Bread	6.1	6	1.02	0.6	
Beirut	3	Milk	4.1	4	1.03	0.4	1.02
average deflator Beirut							1.03

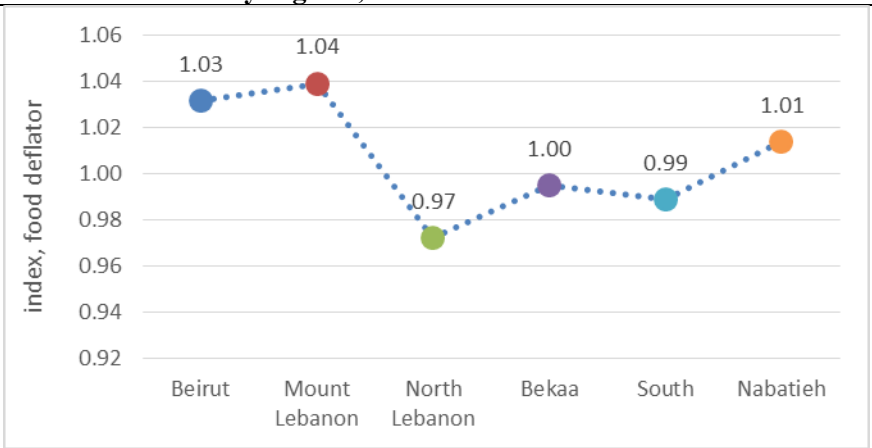
The resulting food spatial deflator is shown in figure 10. The highest food prices are observed in Mount Lebanon and Beirut. Lower than country average prices are observed in North Lebanon, Bekaa and South.

Ideally, the nonfood part of welfare aggregate should be adjusted by nonfood deflator. However, unit prices for nonfood products are not available in the survey, while ancillary data on non-food prices does not generate plausible numbers.[5] One of the ways to overcome this challenge is to use rent prices as a proxy of nonfood prices for spatial deflation. Given that actual rent values seem to be affected by rent control, we have used reported rents of owners to estimate a hedonic model regression and to predict average rent for six regions for a typical apartment. The most common apartment has five rooms with dwelling area of apartment of 140 square meters in building of 25-49 years old with public sewage, tile floor and protected

[5] Another way of calculating spatial deflator is to use external source of information on prices. The authors tried using a database with prices for 257 food and nonfood products collected by CAS, but ultimately decided that this approach would not solve the issue given that only few nonfood products in housing section were available.

source of drinking water. Predicted rents were used along with population weights to calculate nonfood deflator. The results from this analysis are shown in table 4.

Figure 10. Spatial food deflator by regions, index



Source: Authors' calculation using HBS 2011.
Notes: country average price is the base.

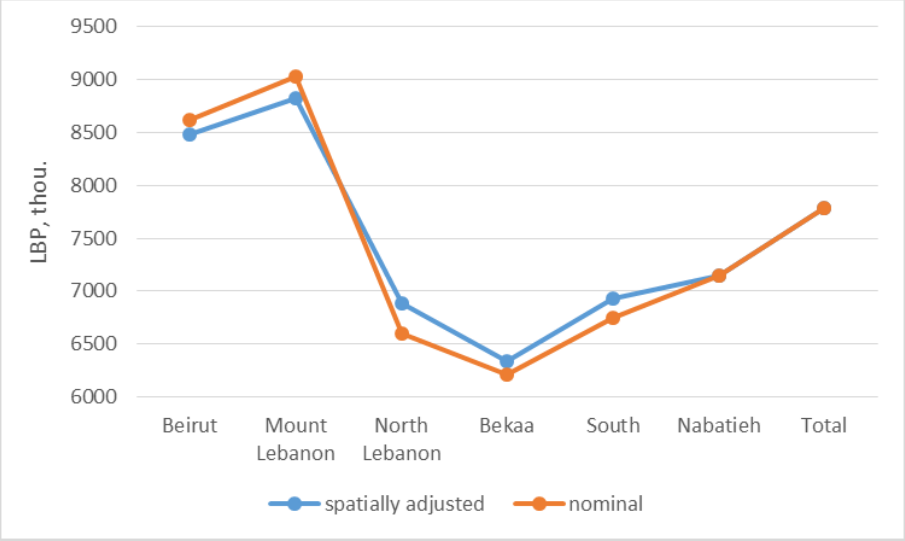
Rents in Beirut are the highest being 51 percent above the country average. Mount Lebanon is on the second place with rents being 24 percent higher than the country average. In other regions, rent prices are lower than the average for Lebanon. Given large share of nonfood consumption in Lebanon, the impact of nonfood deflator is substantial. For example, if we apply food deflator to food consumption and rent deflator to nonfood consumption, the estimated poverty rate in Beirut would be higher than in Nabatieh, which is considered to be a non-credible finding. Largely for this reason, the decision was made to apply food deflator to all components of welfare aggregate. After applying food deflator to welfare aggregate, consumption is adjusted for intra-regional variation in prices (figure 11). Expectedly, nominal welfare aggregates for Beirut and Mount Lebanon are higher than spatially deflated ones because of high prices in these regions.

Table 4. Predicted rent, nonfood and food deflators

	predicted rent in log	nonfood deflator (rent)	food deflator
Beirut	6.66	1.51	1.03
Mount Lebanon	6.40	1.24	1.04
North	5.86	0.70	0.97
Bekaa	5.82	0.66	1.00
South	5.91	0.76	0.99
Nabatieh	5.90	0.74	1.01

Source: Authors' calculation using HBS 2011.
Note:

Figure 11. Nominal and spatially adjusted welfare aggregate



Source: Authors' calculation using HBS 2011.
Notes: Imputation is based on negative binomial regression.

3.4.2 Inter-temporal adjustment

Welfare aggregate should be adjusted for inter-temporal price variation because data collection period was spread over one year. There is monthly information on prices for 12 COICOP groups in 6 regions. May 2012 was selected as a base and a new price indexes were constructed for 12 COICOP groups to deflate nominal aggregate over the entire sample.

3.4.3 Adjustment to household size

Consumption is measured at the level of the household, while poverty is most typically considered to be an individual-level attribute. This means that the value of total household consumption needs to be allocated to the members of each household in order to measure poverty. One common way of allocating household consumption to the individual is to simply divide by household size; which is to say, to evenly allocate household consumption to each member. This measure of consumption per capita is used in Tunisia and Jordan. An alternative approach is to transform the household into adult equivalents, in terms of consumption needs. This approach is used in several countries as well, including many countries in the European Union.[6] The choice between the two options depends on the demography of the country and perceptions about the equivalence scales to convert household expenditures into money metric of individual welfare.

In terms of adult equivalents, a household with two adults and two children is typically assumed to have consumption needs that are less than four adult equivalents. A household with four working-age adults is typically assumed to be equal to four adult equivalents. In practice, even when households consist of adults and children, household size is often used in part because it is simple and easy to communicate. Nevertheless, it is a strong assumption. It does not take into account the fact that kids may consume less

[6] The United States implicitly uses a mix of adult-equivalence and economies-of-scale adjustment factors by defining different basic needs for different family types.

food than adults as well as any economies of scale in consumption within a household. Economy of scale is related to existence of goods and services with a "public good" aspect to them such as television, housing and durable goods (Deaton and Zaidi, 2002). Because people can share these goods, simply dividing by household size will understate welfare of large households compared to small households.

In case of Lebanon, the previous practice was to adjust for adult equivalents and economies of scale through using household specific poverty lines. Using this approach, the food poverty line is constructed using the caloric requirements of individuals and is specific to each household depending on its demographics. In contrast, the current methodology described in this report uses a single poverty line for everyone. Given the lack of agreed upon equivalence scales for Lebanon and for the sake of transparency, simplicity and ease of communication, the official poverty estimates are based on per capita consumption.[7] In addition to the official poverty estimates based on consumption per capita, this report presents supplementary poverty estimates based on using two different options to equivalence scale. Results of this analysis are provided in section 5.2 on supplemental poverty analysis.

4. Construction of poverty line

This section is devoted to construction of poverty line as a threshold for assessing whether an individual can attain a minimum required level of wellbeing.

4.1 Food poverty line

The first step in construction of food poverty line is to calculate average costs per one calorie. This cost per calorie is then multiplied by an estimated minimum number of calories to give the food poverty line. In order to estimate cost per calorie, food consumption (purchases) from the individual diary need to be converted into calories. Given that kilocalories information for each product is provided for 100 grams/milliliters, all products in the diary should be in the same measurement units, namely grams or milliliters. Average rescaling factors were calculated for transformation using the following formula

$RF_{ij} = price_i/price_j$, where

RF is rescaling factor, i indicates either grams or milliliters and j indicates such units as boxes, bunches, pieces. For illustrative purposes assume that the average price per one gram of egg is 6.67 LBP, while one egg costs 250 LBP. Rescaling factor is equal to 0.027=6.7/250. Knowing this rescaling factor we can transform pieces intro grams. For instance, eight eggs are estimated to weigh 300 grams = 8/ 0.027.

After rescaling weights of each product into grams/milliliters, we assign calories and calculate total amount of calories consumed per day per capita for each household. For each household we also know the expenditure. This allows us to estimate the cost per calorie. Calorie intake and costs of one calorie are shown in table 5. For comparison, the same indicators are shown for 2004 as well. As expected, price per calorie is higher for wealthier households and they also consume more calories on average. For quality control purpose, average per capita quantities purchased for main products have been calculated. All numbers look plausible except oil and vegetable oils which can be associated with issues of seasonality and

[7] Per capita is based on a measure of household size that excludes guests and those living outside the country for work.

the lack of temporal stratification in the field design (and potentially also affected by respondents reporting purchases instead of consumption).

Table 5. Daily per capita calorie intake and costs in 2004 and 2011

	2011		2004	
Quintile	cost by LBP per one calorie	daily per capita calorie intake	cost by LBP per one calorie	daily per capita calorie intake
1	1.44	2094	0.73	1661
2	1.69	2515	0.79	2215
3	1.78	3114	0.86	2544
4	2.02	3095	0.95	2923
5	2.34	4174	1.18	3536
Total	1.85	2997	0.94	2576

Source: Authors' calculation using HBS 2011.
Note: UNDP (2008) is a source of 2004 data.

Given the observable variation in the cost per calorie by income group, the final step is to select a reference group upon which the cost per calorie is based. Given the desire to have this price reflect an average price for the relatively less well off, the second to fifth deciles are used to support the estimated cost per calorie. More formally, food poverty line is defined as followed

$$PL^{food} = CR * \frac{\sum_i p_i * q_i}{\sum_i C_i}, \text{ where}$$

CR is a calories requirement to meet basic need, pi prices, qi quantities, Ci calories of individual i in reference group. CR is set to 2400 calories which is around CR chosen for poverty estimation in 2004 (UNDP 2008). After plugging all necessary information into the formula, annual food poverty line for 2011 HBS is 1480.5 thousand LBP. It is 75 percent higher than the average food poverty line constructed using 2004 data.

Table 6. Daily per capita consumption of selected products, in grams or milliliters	
Products	**per capita quantity consumed in grams or milliliters**
White Arabic bread	190
Arabic sweets	66
Rice	77
Beef	54
Lamb	41
Chicken	93
Fish	81
Powdered milk	44
Labneh	30
Yoghurt	88
Eggs	30
Olive oils	**204**
Vegetable oils	**141**
Apples	92
Tomato	100
Cucumber	63
Potato	222
Sugar	122
Chocolate bars	8
Coffee	19
Local water	1196
Soft drinks	125
Canned fruit juice	65
Source: Authors' calculation using HBS 2011.	

4.2 Non-food component of poverty line

One of the common ways to estimate the non-food allowance is to increase food poverty line by the average nonfood share of households whose total expenditures are close to food poverty line. But, because of a relatively high average nonfood share, nobody in Lebanon had consumption per capita lower than food poverty line in 2011. Another common ways to estimate the non-food allowance is to increase food poverty line by the average nonfood share of households whose food expenditures are close to food poverty line. But, now in this case, the nonfood share for the subsample of household around food poverty line was around 74 percent, which is higher than the overall average of 71 percent. Almost by definition, if the nonfood allowance is greater than the average nonfood expenditure, then the resulting poverty rate will be very high. The motivation for both approaches in selecting a nonfood allowance is to find an amount that allows one to buy basic nonfood needs. In the two initial approaches considered, one resulted in a nonfood allowance that was so small, essentially no one was poor and the other sub-sample produced a nonfood allowance that is sizeable more than what most people spend on nonfood goods. Neither outcome is satisfactory.

To resolve this issue, the nonfood allowance is estimated from the same reference population as used for construction of food poverty line – 20-50th percentile. Using this subsample of households (N=786) generates average nonfood share of 69 percent which makes much more sense being lower than the average

for the whole population. Now, with the food poverty line estimated and the nonfood allowance estimated, the cost-of-basic-needs poverty line is defined simply as:

$$poverty\ line = \frac{food\ poverty\ line}{1 - nonfood\ share}$$

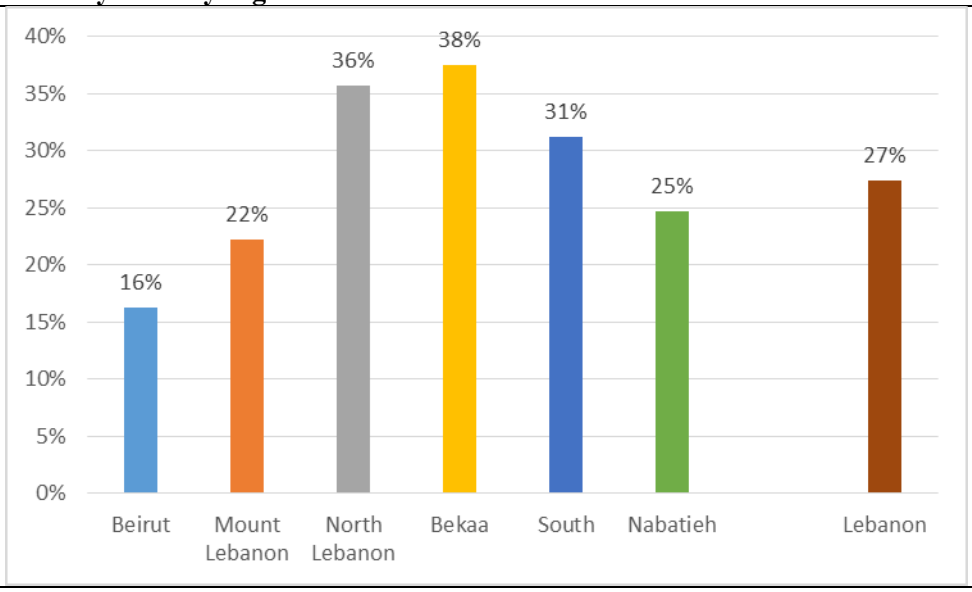
Plugging in the estimated values for each results in the estimated poverty line of 4729 ≈ 1480.5/ (1-0.687). In other words, a person who is consuming less than LBP 4,729 annually is identified as poor, and anyone above this amount is not poor.

Poverty rates

Overall, poverty in Lebanon is estimated at 27 percent. Table 7 shows the estimates for country level poverty rate, poverty gap and squared poverty gap.[8]

The regional poverty rates resulting from this poverty line are shown below (figure 12). Due to very small sample size, regional numbers should be treated with caution. Poverty is the lowest in Beirut, followed by Mount Lebanon and Nabatieh. The poorest regions are North Lebanon and Bekaa.[9]

Figure 12. Poverty rates by regions



Source: Authors' calculation using HBS 2011.
Notes: Imputation is based on negative binomial regression.

Table 7. Poverty in Lebanon, 2011/2012

	Estimate	Std. Err.	[95 percent C.I.]	
p0	0.27	0.02	0.24	0.31
p1	0.07	0.01	0.06	0.09
p2	0.03	0.00	0.02	0.04

Source: Authors' calculation using HBS 2011.

[8] Inequality measures are shown in the annex.
[9] Confidence intervals are shown in the annex

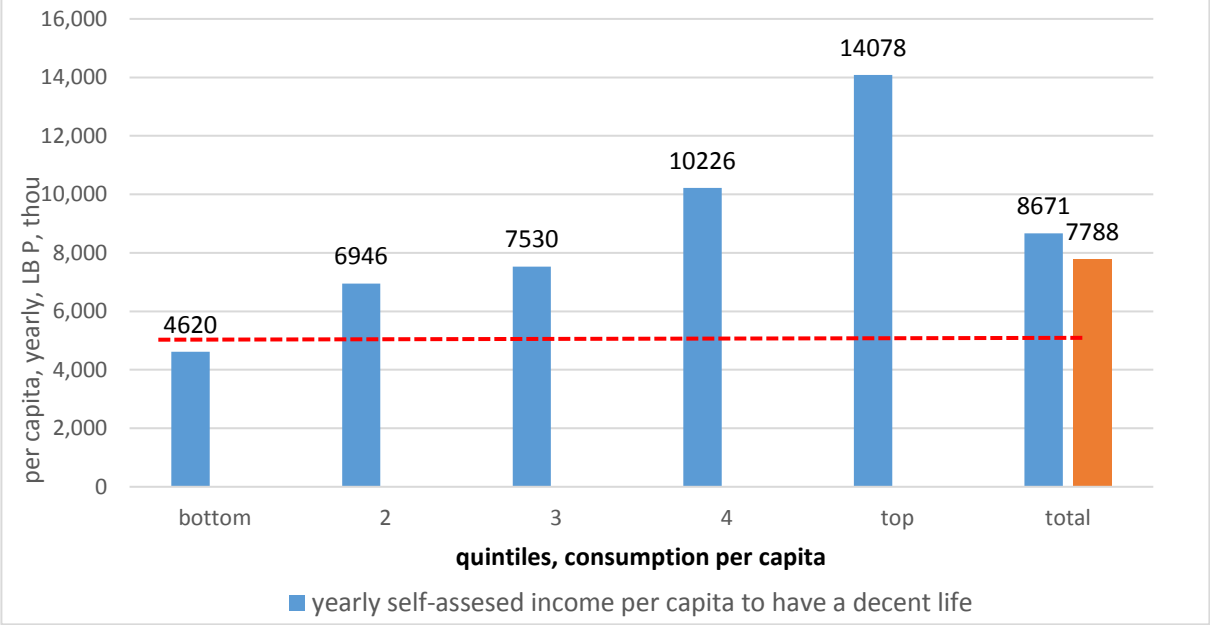
5. Supplemental information

5.1 Robustness tests of poverty rates based on consumption per capita

Prior to these estimates based on the 2011 HBS data, poverty had only been available at one other point in time since 2000. In an environment with major political and economic shocks, it is particularly important to have timely and accurate poverty estimates. The primary constraint to providing timely updates of the poverty profile and estimates is the limited supply of household survey data. Lebanon lags behind in the collection of micro data compared to other upper middle income countries (Serajuddin, et al. 2015). A key constraint to providing accurate poverty estimates for Lebanon is the issue of non-response. The 2011-12 poverty headcount of 27 percent provided in this report is derived from a nationally representative sample of households, but 43 percent of this representative sample ultimately did not participate in the survey. Analysis of the data indicates that the non-responders disproportionately came from enumeration areas that were on average better off, indicating that non-responders were less likely to be poor than responders. The sampling weights have been adjusted to account for this effect, but the effectiveness of this adjustment is largely unknown.

Given the data limitations and caveats, it is important to triangulate obtained poverty results using other information available in the 2011 HBS. In the same way, a poverty line is both a statistical and social concept. Even in the hypothetical case of data without any flaws or weaknesses, there is no guarantee that the poverty line estimated from these data will result in a definition of poverty that resonates with the social and economic norms of the society. The 2011 HBS data provides a unique opportunity to assess whether the estimated poverty line reflects values of the Lebanese population. There is a question in the survey asking households how much income they think is needed to have a decent life. This information has been used to calculate income per capita values across the distribution using consumption per capita quintiles. One would not necessarily want to base a poverty line for a country on what the wealthiest in the country deemed to be need to have a decent life, but certainly how some of the poorest in society answer this question is relevant. The estimated CBN poverty line is compared to the average income households believe is necessary by consumption quintile. Results are shown in figure 13, which shows that the CBN poverty line (red dotted line) is actually greater than the average response given by the bottom 20 percent as to the amount of income needed to live a decent life. For all other quintiles, the reported average income needed is above the CBN line. In a middle-income country, this figure provides some supporting evidence that the poverty line does indeed resonate with how the people of Lebanon might define minimum needs for the poorest people in the society.

Figure 13. Welfare aggregate, poverty line and self-assessed income per capita across quintiles



Source: Authors' calculation using HBS 2011.

Households were also asked to classify themselves into six groups: wealthier, financially well-off, average, average to poor, poor and very poor. This self-evaluation was used for poor and nonpoor households using based on objective poverty line and welfare aggregate constructed (figure 14). 38 percent of poor population rank themselves as poor or very poor compared to 13 percent among non-poor. Another interesting question was how long households can survive if they lost all sources of income. Here we also see clear correlation between objective poverty measure based on monetary poverty line and this subjective question (figure 15). Thus, the poorest population from the bottom quintile would survive for half of the month, while the richest could survive about two months. This is a piece of supporting evidence that the consumption aggregate has sorted the poor from the nonpoor in a credible way.

Figure 14. Self-assessment of households across welfare status, %

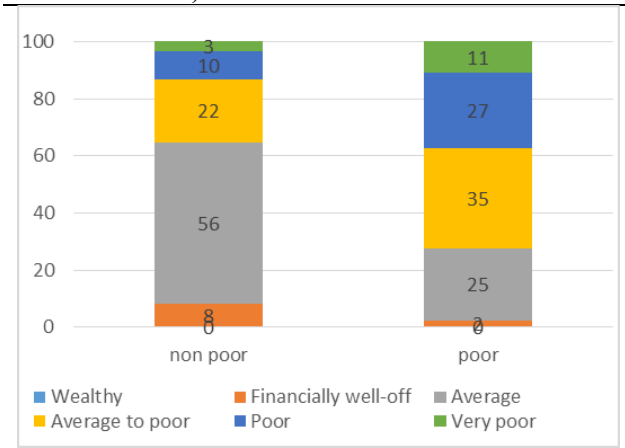
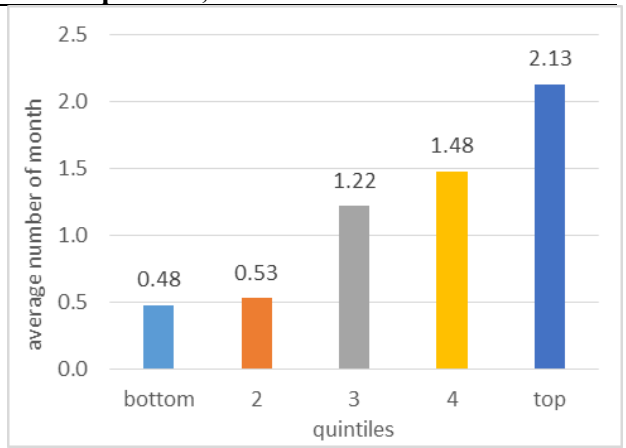


Figure 15. Number of months without income across quintiles, %



Source: Authors' calculation using HBS 2011.
Note: Reference group is population.

Possession of certain durables is often used as an important indicator of wealth. Availability of cars and computers across consumption per capita quintiles is shown in figures 16 and 17. Clearly, the poorest population are less likely to possess computers and cars compared to wealthier ones. For example, only 24 percent of population in the bottom quintile have computer compared to 70 percent among the top quintile. The fairly steep gradient in ownership of car and computers across quintiles corresponds well with expectations – as households become better-off they are more likely to own cars and computers. This is simply supporting evidence then that the construction of the consumption aggregate appears to be sorting households in the way one expects.

Figure 16. Ownership of cars across quintiles, %

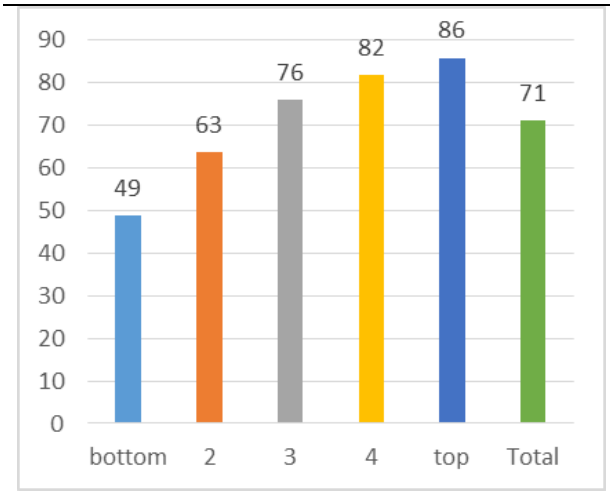
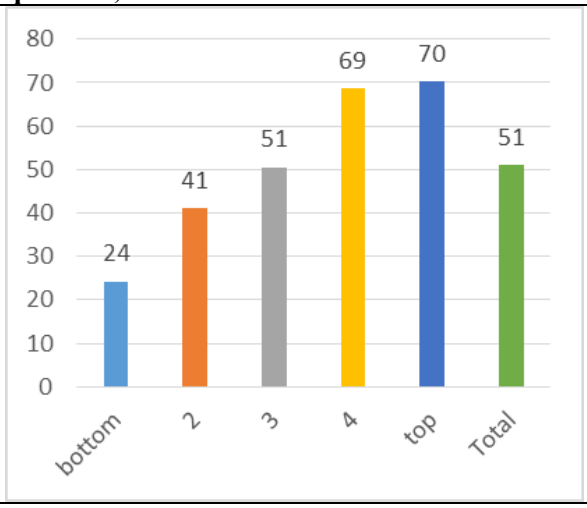


Figure 17. Ownership of computers across quintiles, %



Source: Authors' calculation using HBS 2011.
Note: Reference group is population. Cars include buses and pick-ups.

Finally, sources of income across the distribution using consumption per capita were checked (table 8). Remittances from abroad play a more important role for the richest, which is consistent with the theory and empirical findings from other studies showing that the costs of international migration preclude the poorest from migration. In contrast, transfers from NGO and government aid play a more important role for the most vulnerable from the poorest quintile. Finally, also aligning with expectations, only rich households have income from financial assets.

Table 8. Source of income across quintiles, %

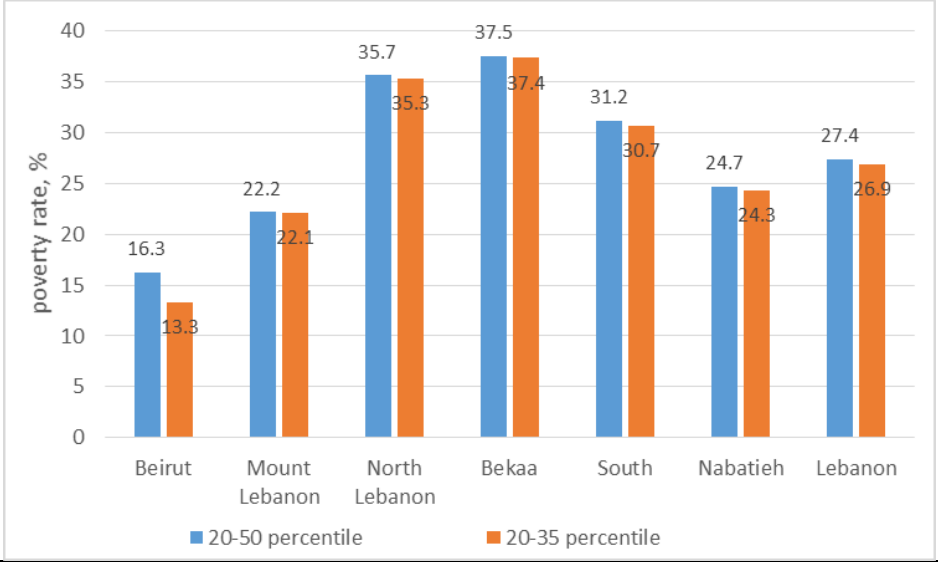
	quintiles, consumption per capita				
income source	bottom	2	3	4	top
remittances from abroad	6	13	9	17	18
transfer from NGOs	10	5	4	3	3
governmental aid	3	3	2	2	3
income from financial assets	0	1	2	4	3

Source: Authors' calculation using HBS 2011.
Note: Reference group is households.

In order to test sensitivity of poverty to different choices made, the impact of including health expenditures and use-value of durables on welfare aggregate has been explored. Sensitivity of poverty rates to changes

in poverty line and reference group were tested as well. Results are shown below. The choice between different reference groups for defining food and total poverty line affects poverty rates, but qualitatively regional results stay the same and the impact is not substantial. Figure 18 shows poverty rates for default reference group from the 20-50th percentile and alternative group from 20-35th percentile. Choosing poorer reference group lowers poverty line and as a result poverty drops, but only slightly.

Figure 18. Poverty rates for different reference groups



Source: Authors' calculation using HBS 2011.

Including health increases welfare aggregate substantially and lowers poverty from 27 to 17 percent (figure 19). In contrast, including durables has only a tiny impact (figure 20). Welfare aggregate increases, but without significant impact on poverty. Finally, sensitivity of poverty to changes in poverty lines was tested (five percent change in poverty line). Poverty rates are sensitive to the choice of poverty line given that many households are located around it. In particular, changing the poverty line by five percent changes poverty by around 12 percent (figures 21 and 22).

Figure 19. Poverty rates, including and excluding health expenditures

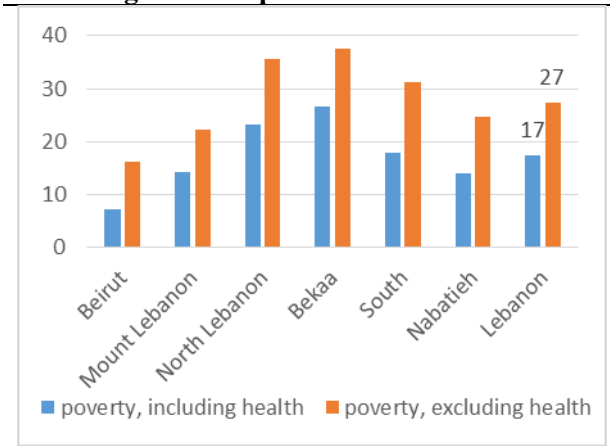
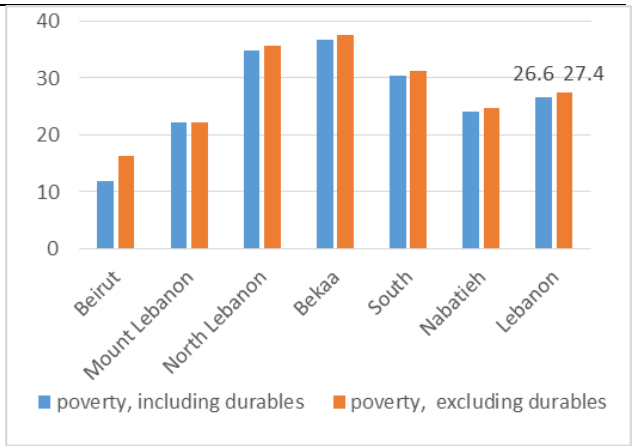


Figure 20. Poverty rates, including and excluding durables



Source: Authors' calculation using HBS 2011.

Figure 21. Poverty rates using different poverty lines

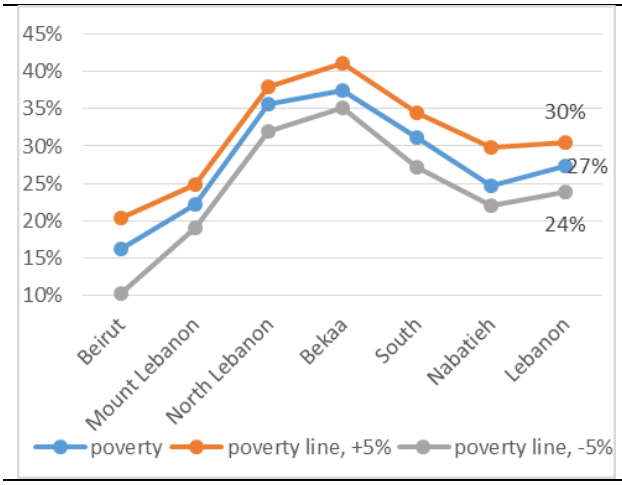
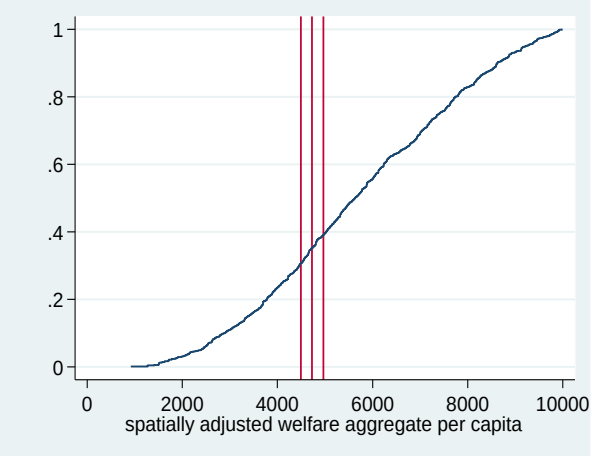


Figure 22. Cumulative distribution consumption per capita and poverty lines



Source: Authors' calculation using HBS 2011.

5.2 Supplementary poverty rates based on consumption per adult equivalent[10]

For transparency and simplicity reasons, official poverty estimates presented in this report are based on consumption per capita. While many countries use per capita consumption, this is by no means true for all countries. In some cases, basic needs are assumed to vary depending on whether the individual is an adult, a child, or an elderly person. These adjustments typically convert all individuals into their adult equivalent size. So, a child might be assumed to have needs that are half that of an adult. In other cases, poverty estimates may embed assumptions about household units being able to reap the benefits of economies of scale. The basic idea here is that two people may be able to live more cheaply if they live together rather than if they live separately. If most consumption in the household is private or not shareable (if one person consumes it, the other person cannot), then the scope for economies of scale is limited. If on the other hand, there is significant level of consumption of items that are nearly public goods at the household-level (if one person consumes it, the other person can also consume it), then there is likely to be scope for economies of scale. One implication of both adjustments is that poverty may potentially be overestimated for large households (and understated for small households) using consumption per capita welfare aggregate because they tend to have higher family size and proportionately more children.

As a very rough approximation, most food consumption is private, while consumption of nonfood items such as shelter, light, access to clean water, has some important within-household public good dimensions. In the case of Lebanon, the age structure of the population is relatively old, and so the adjustment for adult equivalence may have relatively small effects. In contrast, the nonfood share in Lebanon is relatively high, and the measurement of poverty might be quite sensitive to adjusting for economies of scale.

Household specific poverty lines, used to measure poverty for 2004-05 data, adjust for adult equivalents and economies of scale. For 2011 data, the decision was made to use a simpler and more transparent

[10] The team has conducted similar triangulation tests as was done for poverty based on consumption per capita. Results are qualitatively similar and are available upon request.

approach by constructing a single poverty line and adjusting the welfare aggregate. Also because there is no established equivalence scale for Lebanon, the adjustment of the household-level welfare aggregate was done in per capita terms. Nevertheless, for illustrative purposes, supplementary poverty estimates have been produced using two different equivalence scales. The general formula to adjust for adult equivalents and economies of scale is shown below.

$AE = (A + \alpha K)^{\theta}$, where

A is the number of adults in the household, and K is the number of children. The parameter α is the cost of a child relative to that of an adult, and lies somewhere between 0 and 1. The other parameter θ also lies between 0 and 1 and controls the extent of economies of scale. If both α and θ are equal to one, the number of adult equivalents is simply household size (Deaton and Zaidi, 2002).

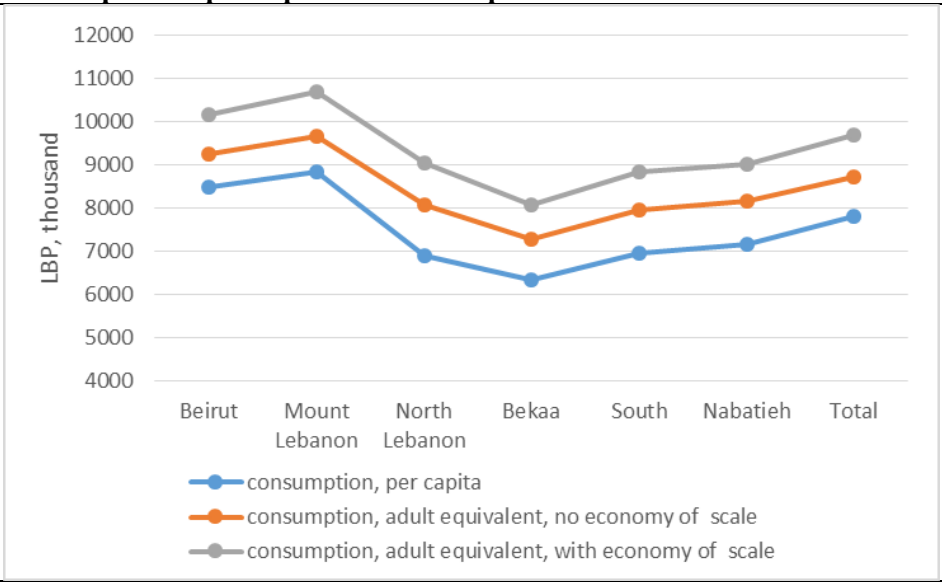
In this report, the first equivalence scale assumes that consumption needs of children (0-15 age) is one half that of the consumption needs of adults (above 15 age) or in other words α is equal to 0.5. The first specification also assumes that there is no economy of scale, so θ is equal to one. The second specification considered for illustrative purposes, maintains α equal to 0.5, while introducing economy of scale measured by θ equal to 0.92.[11]

Using adult-equivalent scales defined above requires introducing changes in the construction of food poverty line. The food poverty line is anchored to 2400 calories as the estimated nutritional requirement an average person in Lebanon needs for good health including kids and elderly. The caloric anchor corresponds to the caloric requirements used in the previous poverty report based on the 2004 HBS data. But, this estimated caloric requirement is based on taking the population-weighted average of estimated caloric needs for adults and children. When the welfare aggregate is converted into adult equivalents, the caloric requirement similarly must be based on the average caloric requirements of adults only. This report uses daily calories requirement by age and sex used to calculate poverty lines for 2004 HBS published in UNDP (2008). The simple average calories intake for adult population between 16-60 ages is 2800 calories which is higher compared to 2400 calories needed for an average person. This new anchor for caloric requirement was used to recalculate food poverty line.

Average values of consumption per adult equivalent using two proposed scales along with supplementary poverty estimates are shown in figures 23 and 24. As can be seen in figure 23, shifting welfare aggregate from per capita to adult equivalent scale makes substantial difference in terms of the level of welfare aggregate. Consumption per capita is always lower than consumption per adult equivalent regardless of the scale used. This is an expected result given that the size of household is much smaller when expressed in adult equivalents, and this leads to higher welfare aggregate. The impact of using the adult-equivalent scale is more pronounced in regions with larger household size, namely North Lebanon and Bekaa.

[11] There are no established equivalence scales for Middle East and North Africa countries and many use per capita welfare aggregates to measure poverty, while other embed equivalence scale by using household specific poverty lines. West Bank and Gaza is among the few to explicitly adjust to economy of scale and household composition. The following formula is used AE = (A + 0.46 C)^0.89.

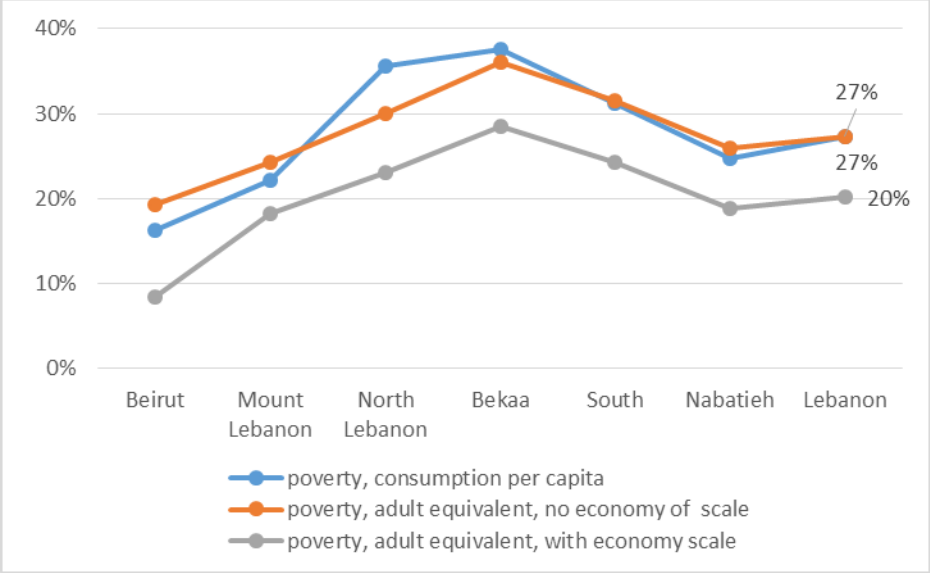
Figure 23. Consumption in per capita and adult equivalent terms



Source: Authors' calculation using HBS 2011.

The impact of using different adult-equivalence scales on poverty is less straightforward to interpret. When considering the adjustment for only adult equivalents, there is almost no change in the overall national poverty rate. This happens because food poverty line is scaled up if adult equivalent scale is used and this effect is strong enough to counterbalance impact of the higher welfare aggregate. However, the regional profile does change reflecting demographic differences in terms of the number of children per household in each of the regions. While there is not much change when adjusting for adult equivalence (at least in the example considered in this analysis), there are significant changes when examining the sensitivity of the poverty estimates for the assumption of economies of scale. This is in large part due to the issue that when accounting for economies of scale, there is no matching adjustment done to the poverty line (as was done with the adult-equivalence example). For the purposes of illustration, when the economies of scale factor shifts from 1 to 0.92 (maintaining α equal to 0.5), poverty in Lebanon drops from 27 percent to 20 percent. It is important to note that if the economies of scale factor were set at an even lower value (indicating greater economies of scale), the estimated poverty rate would drop further. While the current poverty estimate is based on per capita consumption and assumes no economies of scale in household consumption, the estimates presented in this section provide useful supplementary detail. As the economy continues to grow, and the food share shrinks, future poverty estimates for Lebanon may place greater emphasis on the value in adjusting for economies of scale.

Figure 24. Poverty rates based on consumption per capita and adult equivalent



Source: Authors' calculation using HBS 2011.

6. Concluding remarks and further steps

Collecting data in Lebanon is a particularly challenging under-taking, and these challenges force one to be cautious in presenting and interpreting the poverty estimates. The purpose of this report is to provide a transparent description of how poverty has been estimated based on the 2011 HBS, including the assumptions made and the relative sensitivity of the estimate to these assumptions. Several important caveats should be kept in mind while using and interpreting information shown in this report. Firstly, poverty numbers presented in this report cannot be compared with poverty estimates for other years because of differences in data, instruments, methodology for constructing the aggregate, methodology for estimating the poverty line, fieldwork implementation, and to some extent, sample design. Secondly, all regional estimates in this report should be viewed with caution given concerns about significant levels of nonresponse and relatively small sample sizes within regions.

Poverty measurement is an evolving concept and needs to ensure that it captures the changing realities of life of the poor. This is particularly relevant for the context of Lebanon with its exposure to external and internal shocks. There are three potential areas to consider for potential re-examination in future estimates of poverty based on the next round of HBS data collection in Lebanon. The first important issue is to establish improved methods for reducing the high rate of unit and item non-response in future household budget surveys. As indicated in the report, unit non-response was very high both in 2004 and 2011 rounds of the data, and there is ample evidence that the nonresponse was not random. There is some preliminary evidence that this may be partially related to the survey burden due to using time-intensive survey instruments such as individual diaries. Piloting different instruments to collect consumption data as well as information about non-respondents is an important step to consider. The second area for improvement can be related to changing survey design to mitigate effects of seasonality revealed in 2011 data. One potential solution to this issue is to either reduce the time frame for field work, or ensure that fieldwork is temporally stratified. Finally, further exploration of economies of scale and adult equivalence in the measurement of individual wellbeing is a third area for consideration.

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Annex

Table A1. COICOP items taken from individual diary

COICOP groups	Name
3111	food products
5611	cleaning products
5612	maintenance and cleaning products
5613	articles for cleaning
5614	paper products (including nylon and aluminum papers)
5615	other non-durable house goods
7221	fuel and lubricants for personal transport equipment
7241	other expenses related to personal transportation
7311	costs related to land transportation
9521	Newspapers
11111	Restaurants
11112	cafés and snack bars and the like (consumption at the mentioned places)
11113	ready-made foods(outdoor consumption)
11114	meals from snack bars (outdoor consumption)
11115	food and drinks from street vendor or vending machines
11121	Canteens
12131	personal care goods
12132	personal non-electrical devices
12133	cosmetic items
12135	other miscellaneous items for personal care
56212	house services supplied by enterprises or self-employed persons
111162	meals provided by societies
111163	meals provided by employers
111171	food and drink expenses at workplaces

Source: HBS 2011.

Table A2. COICOP durable items excluded from welfare aggregate

code	name
0511	Furniture
0512	Carpets and other floor coverings
0531	Major house appliances whether electric or not
0551	Major tools and equipment
071	Purchase of vehicles
08211	Telephone and telefax equipment purchasing cost
083111	Official telephone line installation cost
083112	Cellular phone line installation cost
0911	Equipment for the reception, recording and reproduction of sound and pictures
0913	Information processing equipment
0921	Major durables for outdoor recreation
0922	Musical instruments and major durables for indoor recreation
091211	Camera with accessories - new
091212	Camera with accessories - used
091213	Video camera - new
091214	Video camera - used
1231	Jewelry and watches

Source: HBS 2011.

Table A3. Inequality measures by regions

	Gini	Theil
Beirut	0.28	0.14
Mount Lebanon	0.33	0.19
North Lebanon	0.30	0.16
Bekaa	0.29	0.15
South	0.30	0.15
Nabatieh	0.27	0.13
Lebanon	0.32	0.17

Source: Authors' calculation using HBS 2011.

Table A4. Regional poverty in Lebanon, 2011/2012

	estimate	Std. Err.	[95 percent C.I.]	
Beirut	0.16	0.03	0.10	0.23
Mount Lebanon	0.22	0.03	0.16	0.28
North Lebanon	0.36	0.03	0.29	0.42
Bekaa	0.38	0.03	0.32	0.43
South	0.31	0.03	0.25	0.38
Nabatieh	0.25	0.03	0.18	0.31
Lebanon	0.27	0.02	0.24	0.31

Source: Authors' calculation using HBS 2011.

Table A5. Consumption per capita and shares by COICOP groups and quintiles

% in total expenditure by quintiles

	Food and beverages	Alcohol beverages, tobacco	Clothing and footwear	Housing and utilities	Furnishings, household equipment	Transport	Communication	Recreation	Education	Restaurants and hotels	Miscellaneous	total
bottom	35%	2%	5%	35%	2%	7%	4%	2%	4%	1%	3%	100%
2	31%	2%	6%	34%	3%	10%	4%	2%	4%	2%	3%	100%
3	30%	2%	5%	30%	2%	13%	4%	2%	5%	2%	3%	100%
4	25%	2%	5%	32%	3%	14%	5%	2%	6%	2%	4%	100%
top	22%	1%	6%	28%	3%	17%	4%	2%	8%	4%	4%	100%
Total	29%	2%	5%	32%	2%	12%	4%	2%	5%	2%	3%	100%

LBP per capita by quintiles

	Food and beverages	Alcohol beverages, tobacco	Clothing and footwear	Housing and utilities	Furnishings, household equipment	Transport	Communication	Recreation	Education	Restaurants and hotels	Miscellaneous	total
bottom	1071	71	164	1047	62	241	114	53	111	47	79	3059
2	1531	114	276	1702	126	500	181	99	191	80	142	4941
3	2010	108	347	1990	158	891	274	114	363	132	227	6615
4	2192	153	477	2819	266	1217	431	179	491	186	373	8784
top	3256	179	907	4268	403	2693	631	401	1417	734	717	15607
Total	2010	125	433	2362	203	1106	326	169	513	235	307	7788

Source: Authors' calculation using HBS 2011.
Note: after spatial deflation.