**Review of Palestine SEFSec**

**Food Security Analysis Methodology**

**Phase II**

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# Acronyms

|  |  |
| --- | --- |
| FAO | Food and Agriculture Organization of the United Nations |
| FCS | Food Consumption Score |
| FSAU | Food Security Analysis Unit |
| FSIN | Food Security Information Network |
| HCES | Household Consumption and Expenditures Surveys |
| HFIAS | Household food insecurity access scale |
| LSMS | Living Standards Measurement Survey |
| NIS | New Israeli Shekel |
| PCA | Principal components analysis |
| PCBS | Palestinian Central Bureau of Statistics |
| PECS | Palestinian Expenditure and Consumption Survey |
| PMTF | Proxy Means Test Formula |
| PSM | Propensity Score Matching |
| RCT | Randomized Controlled Trial |
| SEFSec | Socio-Economic and Food Security |
| SNAP | Supplemental Nutrition Assistance Program |
| TANGO | Technical Assistance to NGOs, International |
| UNRWA | United Nations Relief and Works Agency for Palestine Refugees in the Near East |
| USAID | United States Agency for International Development |
| WFP | World Food Programme |

# Executive summary

The annual SEFSec survey administered by the Palestinian Central Bureau of Statistics and the United Nations through FAO, UNRWA and WFP assesses the socio-economic and food security situation in the State of Palestine. From November 2013 through March 2014, the SEFSec partners engaged the services of TANGO, International staff to assess the SEFSec food security analysis methodology and make recommendations regarding how it could be improved. The resulting report proposed some methodological improvements but also raised additional questions that must be answered in order for a new SEFSec methodology to be adopted.

The purpose of this document—reporting on Phase II of the SEFSec review—is to refine and validate the preferred options presented in the Phase I report. It builds upon the Phase I review with additional analysis to assist the SEFSec partners in their decision regarding the adoption of a single new SEFSec food insecurity measurement methodology.

The issues explored and main findings are as follows.

# Validation of the stability over time and accuracy of asset-based estimates of poverty for Palestine

* A core set of eight asset-ownership variables for which data are available in both the PECS and SEFSec data sets have a stable relationship over time (at least a three-year period) with total expenditures per adult equivalent;
* These assets are used here to create three types of indexes, a PCA index, a count index, and regression-based index that draws on three additional correlates of total expenditures beyond assets;
* Among the indexes, the count and regression-based indexes are most highly correlated with total expenditures;
* The count and regression-based indexes are also best able to classify households into poverty groups, which is the most important attribute of an asset index as an input into the SEFSec food security measurement methodology. The regression index does slightly better than the count index;
* The count and regression-based indexes also perform best in terms of producing accurate estimates of poverty itself.
* Given that the main use of a measure of poverty in the context of the SEFSec food security analysis is to classify households into poverty groups (rather than produce estimates of poverty prevalences), it is recommended that the regression-based index be used for this purpose in the future.
* It is important to keep in mind that asset ownership is a conceptually valid indicator of long-term wealth, which is closely related to poverty; In the absence of other options, an asset-based measure of poverty can thus serve as a valid, stand-alone measure for the purposes of the SEFSec food insecurity analysis—even if it does not precisely track year-to-year fluctuations in expenditures-based estimates of poverty.

# Combining information from the Household Food Insecurity Access Scale (HFIAS) and Food Consumption Score (FCS) to classify households into food consumption groups

* The possibility of using a combination of the dietary *quantity* information contained in the HFIAS and the dietary *quality* information contained in the FCS to formulate food consumption groups was explored;
* Using the SEFSec 2011 data, a sub-set of five of the nine HFIAS questions pertaining specifically to “insufficient food intake and its physical consequences” was used to create a dummy variable indicating whether or not each household has insufficient dietary quantity;
* FCS data were used to create a dummy variable indicating whether or not each household has inadequate dietary quality;
* Finally, the two dummy variables are combined to classify households into the three food consumption status categories:  severely food deprived, moderately food deprived and not food deprived;
* The categories yield a classification of households that is consistent with poverty classifications, as one would expect:   households in Gaza are deemed to be more food deprived than households in West Bank (unlike the classification yielded by the HFIAS alone).

# Improved measure of resilience

* A new index of resilience is proposed for classifying households into resilience capacity groups that is based fully on the concept of “adaptive capacity”;
* The new index is calculated from seven underlying indicators representing four concepts:  human capital, employment, livelihood diversification, and asset ownership;
* The index improves on that proposed in the Phase I report in that it is conceptually more coherent, covers more dimensions of adaptive capacity (making fuller use of the available data), and is statistically stronger, as shown using SEFSec 2011 data.
* As for the Phase I index, the new index is internally consistent and yields the expected positive relationship between resilience capacity and indicators of food consumption.

# Update of the definitions and terminologies of the SEFSec food security groups

* Despite the changes in the measures of poverty, resilience and food consumption status proposed above, there are no changes in the definitions and terminologies of the food security groups from those presented in the Phase I report.

# Assessment of options for measuring pre-assistance food insecurity rates

* Measuring pre-assistance food insecurity rates in Palestine requires estimating the food insecurity prevalence that would have occurred in the absence of assistance using appropriate “impact evaluation” techniques.
* Such techniques require the identification of a control group of households not receiving assistance that is not contaminated by selection bias.
* Two prominent impact evaluation techniques cannot be applied given the current SEFSec data collection methodology:  implementing a Randomized Controlled Trial (which is also not ethical) and double-difference estimation with panel data.
* The only possible option is the use of “quasi-experimental” methods, such as Propensity Score Matching (PSM).  PSM could be used to estimate pre-assistance food insecurity prevalences if a number of conditions are met by the data.  Whether these conditions are met would require further analysis of the SEFSec data.

# Options for refining the SEFSec expenditures module

* The Phase I report found that the current SEFSec expenditures module leads to collection of data that considerably underestimates households’ total expenditures per capita, leading to strong overestimation of poverty.
* Three steps can be taken to overcome this reliability issue:

(1) Institute a shorter (one or two week) recall period;

(2) Include some expenditure items representing the food and non-food groups that are currently excluded;

(3) Include a more detailed, expanded list of food and non-food expenditure items, with the choice of items based on the experience of other surveys and analysis of the latest PECS. As a starting hypothesis, a reasonably reliable estimate of total expenditures and classification of households into poverty groups would most likely be obtained with a total of around 160 expenditure items.

* Steps (1) and (2) above would not likely lead to greatly increased data collection time and costs, however (3) will inevitably and systematically increase both.
* Only experimental testing of a set of expanded expenditures modules as part of a future PECS survey will allow for a full assessment of the trade-offs between accuracy and cost.

# Recommended methodology for SEFSec food insecurity measurement

Given the above, the final recommendations for the SEFSec food security measurement methodology are:

* Maintain the proposed Phase I methodology of classifying households into four food insecurity groups (extremely food insecure, moderately food insecure, vulnerable to food insecurity and food secure) based on (1) measures of poverty, food consumption status, and resilience and (2) a 27-cell decision matrix;
* For the above use:

\* The regression-based asset index measure of **poverty**;

\* The HFIAS-based measure of insufficient dietary quantity and FCS-based measure of inadequate dietary quality to classify households into **food consumption** status groups;

\* The improved measure of **resilience** based on the concept of adaptive capacity to classify households into three resilience groups.

* Such a food insecurity measurement methodology is conceptually valid and the most empirically sound possible given the current SEFSec data collection methodology.

Additional recommendations to consider are:

* Determine whether the appropriate statistical conditions are satisfied for implementing a quasi-experimental method (e.g., PSM) for estimating pre-assistance food insecurity prevalences;
* Implement a set of 2-3 experimental expanded expenditure modules to be administered to a random sub-set of households as part of the next PECS. Use the data to evaluate the cost versus accuracy trade-off of an expanded SEFSec expenditures module.

# 1. Introduction

The annual SEFSec survey administered by the Palestinian Central Bureau of Statistics (PCBS) and the United Nations through FAO, UNRWA and WFP assesses the socio-economic and food security situation in the State of Palestine. The analysis of the data is undertaken by the Food Security Analysis Unit (FSAU).

From November 2013 through March 2014, the SEFSec partners engaged the services of TANGO, International staff to assess the SEFSec food security analysis methodology and make recommendations regarding how it could be improved. This effort resulted in the report “Review of Palestine SEFSec Food Security Analysis Methodology,” which proposed some methodological improvements but also raised additional questions that must be answered for the FSAU to move ahead with confidence to adopt a new SEFSec methodology.

The purpose of Phase II of the SEFSec review is to refine and validate the preferred options presented in the Phase I report and produce summary statistics for the final preferred choice of the FSAU (including PCBS). The objective of this report is to build upon the work that was done in the Phase I review with additional analysis to arrive at a single new methodology upon which all members of the FSAU can agree. The specific tasks are to:

* Validate the stability over time of the asset-based index measuring poverty;
* Assess the possibility of developing a hybrid food consumption index combining the
* Household Food Insecurity Access Scale (HFIAS) and Food Consumption Score (FCS);
* Provide an improved measure of resilience;
* Update the Phase I definitions of the terminologies of food insecurity groups;
* Assess options for measuring pre-assistance food insecurity rates;
* Suggest longer-term options for refining the expenditure module; and
* Propose a single recommended methodology for consideration by the FSAU.

# 2. Validation of the stability over time and accuracy of asset-based estimates of poverty for Palestine

The Phase I report presented three options for measuring poverty: (1) relying directly on the SEFSec expenditures data, (2) using the PMTF formula employed for selecting beneficiaries for government social protection programs in Palestine, and (3) relying on an asset index. The latter was determined to be the best option. However, some additional analysis was recommended to determine whether an asset index would yield accurate estimates of poverty over time, which requires that the relationship between the assets and total expenditures is temporally stable. The purpose of this section’s analysis is to determine whether a set of temporally stable assets is available in the SEFSec surveys and, subsequently, whether an index based on them will allow accurate classification of households into poverty groups and accurate estimates of poverty. The data relied on are PECS and SEFSec data from 2009, 2010 and 2011.

It is important to keep in mind that the reliance on an asset-based measure of poverty is anticipated to be short-term, perhaps for the next five years. In the longer term, it is expected that more accurate expenditures data will be collected in the SEFSec surveys.

### 2.1 Options for constructing asset indexes

Asset indexes are used as an alternative to what is considered the most accurate—yet more costly—technique for measuring households’ income, the collection of data on households’ total expenditures. Three options for constructing asset indexes are explored here.

**1. Principal components analysis (PCA)**. Asset ownership dummy variables (1=owned, 0=not owned) are combined into an index defined as the first principal component yielded by PCA. The first component is that for which the variables are most highly inter-correlated. For this analysis, the PCA index is divided by the number of household adult equivalents.

**2. Count index.** The simple sum of the number of assets owned, also divided by the number of household adult equivalents.

**3. Regression-based index.** An index constructed using regression analysis, where the independent variables are the asset ownership dummy variables and the dependent variable is total expenditures. The regression coefficients, which are the index weights, must be obtained using data from a prior data set containing both the asset variables and data to calculate total expenditures itself. This third method may be superior since it relies not only on assets themselves but also directly on information about their relationship to total expenditures. Here we will consider two options: (1) combining asset ownership variables with other expenditure correlates, that is, household dwelling characteristics and household demographic characteristics (following Stifel and Christiaensen 2006); and (2) including only the asset ownership variables as independent variables.

The next section identifies a set of assets/expenditure correlates that have a stable relationship with total expenditures over time. These assets/correlates will later be used to construct the three asset indexes.

### 2.2 Evaluation of the stability over time of the relationship between asset ownership and total expenditures

Table 2.1 gives mean values of the asset ownership variables and other expenditure correlates that are common to both the SEFSec and PECS surveys, and that are thus potential candidates for this validation exercise, from PECS 2009, 2010 and 2011. Also reported are the calculated (real)[[1]](#footnote-1) total expenditures per adult equivalent, which will be the measure of total expenditures relied on, and estimates of both deep poverty and poverty calculated using the national poverty line. As can be seen, total expenditures and poverty have changed little over the three-year period, and there is no apparent trend upwards or downwards. Among the 16 assets, ownership has increased for eight, decreased for four, and shows no trend for four. Three is little difference in the measures of demographic characteristics over the three years.

To determine which of the assets and other expenditure correlates have a stable relationship with total expenditures, at least in the short run, OLS regressions with total expenditures per adult equivalent[[2]](#footnote-2) as the dependent variable and the correlates as independent variables are run separately for all three years, and the regression coefficients are compared across the years. Regressions are run in a series of rounds to determine which assets’ coefficients are statistically significant and stable and which not, as follows:

Round 1: Run regressions with all expenditure correlates included. The results of these initial regressions are reported in Table 2.2.

Round 2: Run regressions excluding non-asset expenditure correlates that are not statistically significant (at least at the 10% level) for at least two of the years.

Round 3: Run regressions excluding remaining non-asset variables whose coefficients have a percent difference of more than 100 between any two years.

Round 4: Run regressions excluding asset variables whose coefficients have a percent difference of more than 100 percent between any two years.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 2.1 Means of asset ownership variables and other expenditure correlates,** | | | | |
| **2009, 2010 and 2011 (PECS data)** |  |  |  |  |
|  | **2009** | **2010** | **2011** |  |
| **Asset ownership (percent of households)** |  |  |  |  |
| Refrigerator | 93.2 | 95.5 | 96.2 |  |
| Solar heater | 72.1 | 70.0 | 70.1 |  |
| Washing machine | 92.1 | 94.3 | 94.6 |  |
| Dishwasher | 1.7 | 2.5 | 1.9 |  |
| Central heating | 3.3 | 2.6 | 2.1 |  |
| Vacuum cleaner | 29.3 | 30.3 | 31.0 |  |
| Home library | 23.3 | 22.4 | 21.8 |  |
| TV | 95.8 | 96.6 | 97.6 |  |
| VCR/DVD | 24.5 | 23.7 | 21.6 |  |
| Telephone | 38.9 | 39.8 | 38.8 |  |
| Cell phone | 91.7 | 94.9 | 96.6 |  |
| Computer | 45.8 | 49.7 | 50.7 |  |
| Satellite dish | 89.1 | 92.5 | 94.4 |  |
| Radio/recorder | 59.9 | 54.3 | 46.1 |  |
| Microwave | 26.2 | 30.2 | 32.3 |  |
| Private car | 19.9 | 22.6 | 20.2 |  |
| **Dwelling characteristics** |  |  |  |  |
| Density of members per bedroom | 2.7 | 2.7 | 2.7 |  |
| Bathroom with piped water | 96.8 | 97.9 | 98.2 |  |
| Heating from gas, kerosene or electric | 58.8 | 59.5 | 55.0 |  |
| **Demographic characteristics** |  |  |  |  |
| Household size | 6.0 | 6.0 | 6.0 |  |
| Percent of household members < 16 | 37.7 | 37.5 | 36.9 |  |
| Percent of household members 16-30 | 26.8 | 25.8 | 25.8 |  |
| Percent of household members >30 | 35.5 | 36.7 | 37.3 |  |
| Female household head | 10.0 | 9.3 | 11.1 |  |
| Age of household head | 45.4 | 46.1 | 46.5 |  |
| Household head has no formal education | 18.0 | 16.4 | 16.5 |  |
| Refugee household | 47.7 | 48.1 | 47.2 |  |
| Household located in urban area | 73.5 | 73.4 | 73.6 |  |
| Household in West Bank (versus Gaza) | 66.0 | 65.8 | 65.6 |  |
|  |  |  |  |  |
| **Total expenditures per adult equivalent (monthly NIS)** | 1412 | 1439 | 1447 |  |
| **Deep poverty** a/ | 9.8 | 10.8 | 9.8 |  |
| **Poverty (National line)** a/ | 19.3 | 20.7 | 20.3 |  |
|  |  |  |  |  |
| a/ The poverty estimates represent the percent of households (as opposed to individuals) who are | | | | |
| classified as poor. | | | |  |

Note: All variable means are survey-weight corrected.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2.2 Regression of total expenditures per adult equivalent on asset ownership and** | | | | | | | |  |
| **other expenditure correlates, 2009, 2010 and 2011 (PECS data): All expenditure correlates** | | | | | | | |  |
|  | **2009** | |  | **2010** | |  | **2011** | |
|  | Coefficient | p-value |  | Coefficient | p-value |  | Coefficient | p-value |
| **Asset ownership (percent of households)** |  |  |  |  |  |  |  |  |
| Refrigerator | 0.043 | 0.186 |  | 0.095 | 0.008 |  | 0.155 | 0.000 |
| Solar heater | 0.099 | 0.000 |  | 0.063 | 0.000 |  | 0.023 | 0.112 |
| Washing machine | -0.022 | 0.479 |  | 0.016 | 0.615 |  | 0.081 | 0.007 |
| Dishwasher | 0.189 | 0.001 |  | 0.003 | 0.949 |  | 0.187 | 0.001 |
| Central heating | 0.160 | 0.000 |  | 0.325 | 0.000 |  | 0.117 | 0.025 |
| Vacuum cleaner | 0.058 | 0.003 |  | 0.077 | 0.000 |  | 0.123 | 0.000 |
| Home library | 0.037 | 0.048 |  | 0.093 | 0.000 |  | 0.080 | 0.000 |
| TV | 0.080 | 0.060 |  | -0.008 | 0.866 |  | 0.027 | 0.563 |
| VCR/DVD | 0.089 | 0.000 |  | 0.138 | 0.000 |  | 0.089 | 0.000 |
| Telephone | 0.095 | 0.000 |  | 0.083 | 0.000 |  | 0.086 | 0.000 |
| Cell phone | 0.168 | 0.000 |  | 0.147 | 0.000 |  | 0.126 | 0.001 |
| Computer | 0.076 | 0.000 |  | 0.084 | 0.000 |  | 0.093 | 0.000 |
| Satellite dish | 0.023 | 0.411 |  | 0.083 | 0.008 |  | 0.022 | 0.478 |
| Radio/recorder | 0.085 | 0.000 |  | 0.028 | 0.055 |  | 0.007 | 0.616 |
| Microwave | 0.126 | 0.000 |  | 0.123 | 0.000 |  | 0.098 | 0.000 |
| Private car | 0.307 | 0.000 |  | 0.295 | 0.000 |  | 0.234 | 0.000 |
| **Dwelling characteristics** |  |  |  |  |  |  |  |  |
| Density of members per bedroom | -0.015 | 0.043 |  | -0.041 | 0.000 |  | -0.039 | 0.000 |
| Bathroom with piped water | -0.060 | 0.148 |  | -0.011 | 0.813 |  | 0.109 | 0.015 |
| Heating from gas, kerosene or electric | 0.112 | 0.000 |  | 0.129 | 0.000 |  | 0.072 | 0.000 |
| **Demographic characteristics** |  |  |  |  |  |  |  |  |
| Household size | -0.061 | 0.000 |  | -0.047 | 0.000 |  | -0.051 | 0.000 |
| Percent of household members < 16 a/ |  |  |  |  |  |  |  |  |
| Percent of household members 16-30 | 0.000 | 0.932 |  | 0.000 | 0.614 |  | 0.001 | 0.002 |
| Percent of household members >30 | 0.000 | 0.455 |  | 0.001 | 0.008 |  | 0.002 | 0.003 |
| Female household head | 0.072 | 0.006 |  | 0.046 | 0.082 |  | 0.054 | 0.017 |
| Age of household head | 0.002 | 0.026 |  | -0.002 | 0.007 |  | -0.002 | 0.003 |
| Household head has no formal education | -0.076 | 0.000 |  | -0.012 | 0.602 |  | -0.060 | 0.003 |
| Refugee household | -0.071 | 0.000 |  | -0.031 | 0.043 |  | -0.055 | 0.000 |
| Household located in urban area | 0.001 | 0.968 |  | -0.014 | 0.367 |  | -0.004 | 0.745 |
| Household in West Bank (versus Gaza) | 0.006 | 0.750 |  | 0.056 | 0.002 |  | 0.069 | 0.000 |
|  |  |  |  |  |  |  |  |  |
| Number of observations | 3,843 |  |  | 3,749 |  |  | 4,309 |  |
| R-squared | 0.421 |  |  | 0.461 |  |  | 0.429 |  |
|  |  |  |  |  |  |  |  |  |
| a/ Reference category. |  |  |  |  |  |  |  |  |

One asset, “radio/recorder”, was excluded for the following reasons. First, its ownership has dropped considerably and continually over the three-year period, likely due to changes in consumption norms rather than incomes (see Johnston and Abreu 2013 on this issue). Second, its relationship to total expenditures has weakened over time as well. It is thus not a good candidate for helping to track trends in poverty over time.

Table 2.3 reports on the Round 4 regressions, that is, those containing only the assets and other expenditure correlates determined to have a reasonably stable relationship with total expenditures. All coefficients are statistically significant at the one percent level and have the same sign across the three years (positive or negative). The average percent difference in a variable’s coefficient between years is 20.8 between 2009 and 2010, 28.5 between 2010 and 2011 and 16.6 between 2009 and 2010.[[3]](#footnote-3) We have thus been able to identify a set of assets, along with three other expenditure correlates, that have a reasonably stable relationship with total expenditures.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 2.3 Regression of total expenditures per adult equivalent on asset ownership and** | | | | | | | |  |
| **other expenditure correlates, 2009, 2010 and 2011 (PECS data): Stable expenditure correlates only** | | | | | | | | |
|  | **2009** | |  | **2010** | |  | **2011** | |
|  | Coefficient | p-value |  | Coefficient | p-value |  | Coefficient | p-value |
| **Asset ownership (percent of households)** |  |  |  |  |  |  |  |  |
| Central heating | 0.204 | 0.000 |  | 0.361 | 0.000 |  | 0.189 | 0.000 |
| Vacuum cleaner | 0.082 | 0.000 |  | 0.113 | 0.000 |  | 0.153 | 0.000 |
| VCR/DVD | 0.115 | 0.000 |  | 0.161 | 0.000 |  | 0.121 | 0.000 |
| Telephone | 0.139 | 0.000 |  | 0.119 | 0.000 |  | 0.115 | 0.000 |
| Cell phone | 0.199 | 0.000 |  | 0.165 | 0.000 |  | 0.191 | 0.000 |
| Computer | 0.104 | 0.000 |  | 0.116 | 0.000 |  | 0.126 | 0.000 |
| Microwave | 0.139 | 0.000 |  | 0.145 | 0.000 |  | 0.115 | 0.000 |
| Private car | 0.315 | 0.000 |  | 0.313 | 0.000 |  | 0.251 | 0.000 |
| **Dwelling characteristics** |  |  |  |  |  |  |  |  |
| Heating from gas, kerosene or electric | 0.126 | 0.000 |  | 0.141 | 0.000 |  | 0.103 | 0.000 |
| **Demographic characteristics** |  |  |  |  |  |  |  |  |
| Household size | -0.064 | 0.000 |  | -0.064 | 0.000 |  | -0.067 | 0.000 |
| Refugee household | -0.070 | 0.000 |  | -0.042 | 0.003 |  | -0.078 | 0.000 |
|  |  |  |  |  |  |  |  |  |
| Number of observations | 3,843 |  |  | 3,749 |  |  | 4,309 |  |
| R-squared | 0.399 |  |  | 0.440 |  |  | 0.403 |  |
|  |  |  |  |  |  |  |  |  |

### 2.3 Comparison of PECS and SEFSec asset ownership means

In order to be able to use these variables to generate poverty estimates using the SEFSec survey data, it is of course important to know that the SEFSec and PECS surveys conducted in the same year yield similar mean values of the variables. If not, there may be differences in their definitions across the surveys or in the actual questions asked of households.

Using the 2011 data, Table 2.4 compares the PECS and SEFSec means and finds them to be quite close. The largest difference is for the percent of refugee households, which differs by only 2.7 percentage points. The largest *percentage* difference is for ownership of central heating; it is so large simply because the actual percent ownership is quite small.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 2.4 Means of stable expenditure correlates: PECS versus SEFSec 2011** | | | | | |  |
|  |  | **PECS** | **SEFSec** |  | **Differ- ence** | **Percent difference** |
| **Asset ownership (percent of households)** | | | |  |  |  |
| Central heating |  | 2.1 | 4.6 |  | -2.5 | -53.3 |
| Vacuum cleaner |  | 31.0 | 32.4 |  | -1.4 | -4.3 |
| VCR/DVD |  | 21.6 | 23.5 |  | -2.0 | -8.5 |
| Telephone |  | 38.8 | 40.2 |  | -1.4 | -3.5 |
| Cell phone |  | 96.6 | 95.7 |  | 0.9 | 0.9 |
| Computer |  | 50.7 | 53.0 |  | -2.3 | -4.3 |
| Microwave |  | 32.3 | 32.5 |  | -0.3 | -0.9 |
| Private car |  | 20.2 | 21.5 |  | -1.3 | -6.0 |
| **Dwelling characteristics** |  |  |  |  |  |  |
| Heating from gas, kerosene or electric |  | 55.0 | 53.5 |  | 1.5 | 2.9 |
| **Demographic characteristics** |  |  |  |  |  |  |
| Household size |  | 6.0 | 5.7 |  | 0.3 | 4.6 |
| Refugee household |  | 47.2 | 49.9 |  | -2.7 | -5.5 |
| Number of observations |  | 4,309 | 7,846 |  |  |  |
|  |  |  |  |  |  |  |

Note: All variable means are survey-weight corrected.

### 2.4 Evaluation of the accuracy of asset-based poverty classification and estimation

We are now in a position to calculate values of the three types of asset indexes for PECS survey households. The distributions of the asset indexes calculated using only the stable expenditure correlates are presented in Figure 2.1 (PECS 2011 data). That of total expenditures per adult equivalent is also given for comparison. The PCA, count, and first regression index (that including the non-asset expenditure correlates) all have reasonable shapes. The PCA index does not line up well with the expenditures index and, as will be seen below, this does not bode well for its use for classifying households into poverty groups. The second regression index (calculated using only assets) can be immediately ruled out because its left-hand tale does not descend to zero. Even the lowest value of the index yields poverty estimates exceeding actual prevalences in Palestine.[[4]](#footnote-4) It is excluded from further analysis.

**Figure 2.1 Distributions of asset indexes and expenditures per adult equivalent (PECS 2011 data)**

**PCA Index**



**Count Index**



**Regression index: All expenditure correlates**



**Regression index: Assets only**



Note: In the first, second and fourth figures, both total expenditures and the asset indexes were placed on a 0-1 scale for comparison purposes.

As can be seen in Table 2.5, the PECS data from all three years show that the count and regression-based indexes consistently have the highest correlations with total expenditures per capita.

|  |  |  |  |
| --- | --- | --- | --- |
| **Table 2.5 Correlations of asset indexes with total expenditures per adult equivalent, 2009, 2010 and 2011 (PECS data)** | | | |
|  | **2009** | **2010** | **2011** |
|  |  |  |  |
| Principal components index | 0.422 | 0.472 | 0.393 |
| Count index | 0.572 | 0.622 | 0.565 |
| Regression-based index | 0.590 | 0.632 | 0.571 |
|  |  |  |  |
| Note: Pearson rank correlations. All correlations are statistically significant at the 1% level. | | | |

PECS 2011 data are next used to choose poverty lines for the remaining three indexes that yield poverty estimates consistent with the actual poverty estimates for 2011 reported at the bottom of Table 2.1. The actual poverty estimates are calculated using total expenditures per adult equivalent and the 2011 poverty line set by the PCBS. The asset index-specific poverty lines are determined through repeated testing of alternative values of the index to find that value yielding the targeted actual poverty estimates.[[5]](#footnote-5)

In order to determine how well the indexes classify households into poverty groups, a sensitivity-specificity analysis is undertaken. This analysis compares how well each index mimics the classification given by total expenditures per adult equivalent itself. The asset index weights are those from 2011, the most recent year for which data are available. The results are reported in Table 2.6 for Palestine as a whole and for West Bank and Gaza. The overall percent of households mis-classified, sensitivity, and specificity are reported. Sensitivity is the percent of true poor households classified as poor. Specificity is the percent of true non-poor households classified as non-poor.

At the national level and for both sub-regions the regression and count indexes are better able to classify households into poverty groups than the PCA index, with the regression index tending to perform slightly better than the count index. For the regression index, only a minority of households, from 13.2 to 14.2 percent, is misclassified for deep poverty. Between 20.4 and 22.2 percent of households are misclassified when the national poverty line is employed.

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| **Table 2.6 Sensitivity-specificity analysis comparing actual estimates of poverty with asset index-based estimates** | | | | | | | | | | | |
|  | **2009** | | |  | **2010** | | |  | **2011** | | |
|  | Misclass- ification | Sensitivity | Specificity |  | Misclass- ification | Sensitivity | Specificity |  | Misclass- ification | Sensitivity | Specificity |
|  | (Percent of households) | | | | | | |  |  |  |  |
| **National** |  |  |  |  |  |  |  |  |  |  |  |
| **Deep poverty** |  |  |  |  |  |  |  |  |  |  |  |
| Principal components index | 18.8 | 15.6 | 88.4 |  | 19.9 | 12.7 | 88.4 |  | 19.3 | 10.0 | 89.2 |
| Count index | 15.5 | 38.6 | 89.5 |  | 14.7 | 35.2 | 91.4 |  | 13.6 | 38.1 | 92.2 |
| Regression-based index | 14.2 | 41.0 | 90.7 |  | 13.6 | 37.9 | 92.3 |  | 13.2 | 41.1 | 92.3 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Poverty (National line)** |  |  |  |  |  |  |  |  |  |  |  |
| Principal components index | 28.3 | 34.0 | 81.0 |  | 30.3 | 32.4 | 79.9 |  | 30.6 | 30.0 | 80.4 |
| Count index | 22.4 | 53.0 | 83.6 |  | 22.8 | 45.4 | 85.9 |  | 20.7 | 52.3 | 86.8 |
| Regression-based index | 21.9 | 57.1 | 83.2 |  | 22.2 | 49.1 | 85.5 |  | 20.4 | 53.3 | 87.0 |
| **West Bank** |  |  |  |  |  |  |  |  |  |  |  |
| **Deep poverty** |  |  |  |  |  |  |  |  |  |  |  |
| Principal components index | 15.3 | 17.1 | 89.8 |  | 15.9 | 18.7 | 89.4 |  | 15.6 | 15.5 | 89.3 |
| Count index | 13.7 | 33.2 | 90.4 |  | 11.9 | 26.9 | 93.0 |  | 10.8 | 28.4 | 93.6 |
| Regression-based index | 18.7 | 31.6 | 93.1 |  | 10.6 | 22.8 | 94.9 |  | 9.3 | 20.6 | 95.7 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Poverty (National line)** |  |  |  |  |  |  |  |  |  |  |  |
| Principal components index | 23.0 | 35.3 | 84.6 |  | 24.6 | 35.3 | 83.5 |  | 25.5 | 29.8 | 82.6 |
| Count index | 19.6 | 47.9 | 86.4 |  | 19.7 | 37.2 | 89.0 |  | 18.3 | 40.8 | 89.1 |
| Regression-based index | 18.7 | 47.7 | 87.5 |  | 18.8 | 38.1 | 89.9 |  | 17.4 | 34.8 | 91.2 |

Continued…

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Gaza** |  |  |  |  |  |  |  |  |  |  |  |
| **Deep poverty** |  |  |  |  |  |  |  |  |  |  |  |
| Principal components index | 26.3 | 14.1 | 85.0 |  | 28.5 | 7.4 | 85.8 |  | 26.9 | 6.0 | 88.9 |
| Count index | 19.7 | 44.0 | 87.2 |  | 20.7 | 42.6 | 87.5 |  | 19.3 | 45.1 | 89.0 |
| Regression-based index | 20.7 | 50.3 | 84.8 |  | 20.21 | 51.4 | 86.1 |  | 21.1 | 56.0 | 84.3 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Poverty (National line)** |  |  |  |  |  |  |  |  |  |  |  |
| Principal components index | 39.9 | 32.5 | 71.3 |  | 42.6 | 28.9 | 70.3 |  | 41.1 | 30.1 | 74.6 |
| Count index | 28.8 | 59.1 | 76.2 |  | 29.4 | 54.9 | 77.2 |  | 25.7 | 62.6 | 80.6 |
| Regression-based index | 29.0 | 68.4 | 72.0 |  | 29.8 | 61.9 | 74.0 |  | 26.3 | 70.1 | 75.6 |
|  |  |  |  |  |  |  |  |  |  |  |  |

Although it is not an objective of the SEFSec analysis to produce and report on estimates of poverty itself, confidence in the methodology is increased if the chosen asset index can produce reasonably accurate estimates of poverty. Table 2.7 reports estimates of poverty and deep poverty generated by the asset indexes for Palestine as a whole, the West Bank and Gaza. The 2011 predicted estimates at a national level (although not regional level) are right on target, as expected given that the poverty lines for each index was set to make this so.

Viewing the 2009 and 2010 estimates, at the national level the PCA index does best at predicting poverty. However the regression and count indexes produce estimates that are not too far off from the actual prevalences (within or near a 20 percent difference). For West Bank, the regression and count indexes produce the most accurate estimates. Finally, for Gaza, the PCA index does best overall, but the count estimates are reasonably in line with the actual estimates. Note that the regression index quite seriously over-estimates poverty (national line) in Gaza in 2009, by 11.2 percentage points.

With respect to trends, as noted in Section 2.2, there has been little change in either deep poverty or poverty (national line) over the three-year period. There is also no noticeable upward or downward trend with the exception of a slight trend upward in poverty (national line) for Gaza. By contrast, the asset-based poverty estimates at the national level do show a slight downward trend in poverty prevalence, but not a strong one. Over such a short period of time it is difficult to evaluate whether the asset-based indexes will be able to pick up on trends in poverty.

It is important to keep in mind that while it might be desirable for an asset-based measure of poverty to closely track levels and trends in expenditures poverty, it does not have to do so with great accuracy to be a valid measure for classifying households into food insecurity groups. As discussed in the Phase I report, asset ownership is a conceptually valid indicator of long-term wealth, which is closely related to living standards and thus poverty. In the absence of other options, an asset-based measure of poverty can thus serve as a valid, stand-alone measure for the purposes of the SEFSec food insecurity analysis.

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| **Table 2.7 Actual and predicted poverty prevalences, PECS 2009, 2010 and 2011** | | | | | | | |  |
|  | **2009** | |  | **2010** | |  | **2011** | |
|  | Actual | Predicted |  | Actual | Predicted |  | Actual | Predicted |
| **National** |  |  |  |  |  |  |  |  |
| **Deep poverty** |  |  |  |  |  |  |  |  |
| Principal components index | 9.8 | 12.0 |  | 10.8 | 11.0 |  | 9.8 | 9.8 |
| Count index |  | 13.0 |  |  | 11.0 |  |  | 9.7 |
| Regression-based index |  | 12.2 |  |  | 10.8 |  |  | 10.3 |
|  |  |  |  |  |  |  |  |  |
| **Poverty (National line)** |  |  |  |  |  |  |  |  |
| Principal components index | 19.3 | 21.5 |  | 20.7 | 21.6 |  | 20.3 | 20.3 |
| Count index |  | 23.1 |  |  | 20.0 |  |  | 19.6 |
| Regression-based index |  | 24.6 |  |  | 21.2 |  |  | 20.5 |
|  |  |  |  |  |  |  |  |  |
| **West Bank** |  |  |  |  |  |  |  |  |
| **Deep poverty** |  |  |  |  |  |  |  |  |
| Principal components index | 6.7 | 10.3 |  | 7.1 | 10.2 |  | 5.9 | 10.1 |
| Count index |  | 10.5 |  |  | 7.6 |  |  | 6.8 |
| Regression-based index |  | 8.0 |  |  | 5.8 |  |  | 4.5 |
|  |  |  |  |  |  |  |  |  |
| **Poverty (National line)** |  |  |  |  |  |  |  |  |
| Principal components index | 14.6 | 17.1 |  | 15.4 | 17.6 |  | 14.1 | 17.1 |
| Count index |  | 17.6 |  |  | 13.7 |  |  | 13.4 |
| Regression-based index |  | 16.8 |  |  | 13.0 |  |  | 11.2 |
|  |  |  |  |  |  |  |  |  |
| **Gaza** |  |  |  |  |  |  |  |  |
| **Deep poverty** |  |  |  |  |  |  |  |  |
| Principal components index | 15.8 | 15.5 |  | 18.0 | 12.5 |  | 17.3 | 9.2 |
| Count index |  | 17.7 |  |  | 17.5 |  |  | 15.2 |
| Regression-based index |  | 20.5 |  |  | 20.4 |  |  | 21.3 |
|  |  |  |  |  |  |  |  |  |
| **Poverty (National line)** |  |  |  |  |  |  |  |  |
| Principal components index | 28.4 | 30.1 |  | 30.9 | 29.1 |  | 32.1 | 26.4 |
| Count index |  | 33.8 |  |  | 32.0 |  |  | 31.5 |
| Regression-based index |  | 39.6 |  |  | 36.8 |  |  | 38.1 |
|  |  |  |  |  |  |  |  |  |

# 3. Combining information from the HFIAS and FCS to classify households into food consumption groups

The Phase I report verified that both insufficient dietary quantity (the amount of food people eat) and inadequate dietary quality are important food security problems in Palestine. Thus both must be taken into account in measuring the “food consumption” aspect of food insecurity in the country. The data currently collected in the SEFSec surveys allow calculation of the following two food consumption indicators that have been well-defined in previous measurement guidelines:

* The household food insecurity access scale (HFIAS) (Coates, Swindale and Bilinsky 2007), which is an experiential indicator based on people’s perceptions of their situation and self-reports of their behaviors; and
* The food consumption score (FCS) (WFP 2008), which is a non-experiential indicator based on more objective data, that is, self-reports of the frequency with which households ate foods from nine food groups over the previous week.

The Phase I report found that while the HFIAS is able to adequately capture the dietary quantity situation in Palestine, the dietary quality information in it is not comparable across West Bank and Gaza. Further, it found that while the FCS is able to capture the dietary quality situation, it does not fully capture the dietary quantity situation.

In this section the possibility of using a combination of the dietary quantity information contained in the HFIAS and the dietary quality information contained in the FCS to formulate food consumption groups as an input into the SEFSEC food security classification scheme is explored. Section 3.1 addresses measurement of dietary quantity and Section 3.2 measurement of dietary quality. Finally, Section 3.3 provides a recommended method for classifying households into food consumption groups using the SEFSec data.

### 3.1 Measure of insufficient dietary quantity

The HFIAS is constructed from the responses to nine questions. Five of the questions pertain to the domain of food insecurity called “Insufficient food intake and its physical consequences” (Coates, Swindale and Bilinsky 2007):

|  |
| --- |
| 1. Did you or any household member eat a smaller meal than you felt you needed because there was not enough food? |
| 2. Did you or any other household member eat fewer meals in a day because there was not enough food? |
| 3. Was there ever no food at all in your household because there were not resources to get more? |
| 4. Did you or any household member go to sleep at night hungry because there was not enough food? |
| 5. Did you or any household member go a whole day and night without eating anything because there was not enough food? |

The answers to these questions can be used to construct a dummy variable that is equal to 1 if the answer to any of the questions is “yes” and 0 if the answers to all the questions are “no”. Figure 3.1 shows the percent of households that are considered to have insufficient dietary quantity according to this measure for Palestine as a whole, West Bank, and Gaza as calculated using SEFSec 2011 data. Nearly one-quarter of all households in Palestine are experiencing problems of accessing sufficient food for all of their members. Consistent with the poverty data, the percent is markedly higher in Gaza than West Bank.

**Figure 3.1 Percent of households with insufficient dietary quantity (2011)**

|  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |
| Note: Calculated using SEFSec data. | | | |  |  |  |  |  |

### 3.2 Measure of inadequate dietary quality

Note: Calculated using SEFSec data.

### 3.2 Measure of insufficient dietary quality

The FCS can be used to categorize households into three groups: poor food consumption, borderline food consumption and acceptable food consumption. The Phase I report determined the appropriate cut-offs for these groups for Palestine (see Appendix 1). Here we classify households that are in the poor and borderline groups as having inadequate dietary quality and those in the acceptable group as having adequate dietary quality. Figure 3.2 reports the percent of households with insufficient dietary quantity by this measure for Palestine as a whole, West Bank, and Gaza. Just under twenty percent of all households nation-wide are experiencing problems of inadequate dietary quality. Again, consistent with the poverty data, the percent is higher in Gaza than West Bank.

**Figure 3.2 Percent of households with insufficient dietary quality (2011)**

Note: Calculated using SEFSec data.

### 3.3 Recommended method for classifying households into food consumption groups

The recommended method for classifying households into food consumption groups is to use the indicators of insufficient dietary quantity and quality to classify households into the following three “food deprivation” categories:

1. Severely food deprived:

Household is experiencing both insufficient dietary quantity and inadequate dietary quality;

2. Moderately food deprived:

Household is experiencing either insufficient dietary quantity or inadequate dietary quantity, but not both;

3. Not food deprived:

Household is experiencing neither insufficient dietary quantity nor inadequate dietary quality.

The resulting breakdown of households is reported in Figure 3.2.

**Figure 3.3 Percent of households falling into food consumption groups (2011)**

Note: Calculated using SEFSec data.

# 4. Improved measure of resilience

Resilience is households’ expected ability to recover from shocks. The measure of resilience proposed in the Phase I report was based on the following underlying variables:

* **Employment ratio:** Percent of working-age individuals in the household that are employed;
* **Full-time employment:** Number of individuals in household with full time employment (>35 hours/week);
* **Employment diversity:** Number of different sectors (out of a possible 17 sectors) that household members are employed in; and
* **Education:** Number of adults in the household that have completed secondary education or greater;
* **Index of household asset ownership.** A PCA index based on the 22 (out of 25) consumer durable assets for which data are collected in the SEFSec surveys that have a positive factor loading.
* **Index of household access to public services.** A PCA index based on the following: connection to water line, connection to sewer, connection to electricity line, remoteness to key locations (public transport, health facilities, school, shopping center), access to different types of health insurance, general restrictions on movements, and ease to reach key locations (workplace, farm land, school, health facility).

The indicators are combined into an index using PCA. Following, cluster analysis is used to break households into three groups representing low, medium and high “resilience capacity”.

### 4.1 Proposed new measure of resilience

Three “capacities” are critical for building resilience: Absorptive capacity, adaptive capacity and transformative capacity.[[6]](#footnote-6) The proposed new measure of resilience is based fully on the indicators of *adaptive capacity* that are available from the SEFSec survey data. Adaptive capacity is defined as follows:

Adaptive capacity involves making proactive and informed choices about alternative livelihood strategies based on changing conditions. Interventions to improve adaptive capacity are aimed at improving the flexibility of households and communities to respond to longer-term social, economic, and environmental change. This necessarily entails promoting livelihood diversification, supporting asset accumulation, and improving the social and human capital available to vulnerable populations.[[7]](#footnote-7)

The indicators for which SEFSec data are available for measuring this concept are:

Human capital:

* **Education:** Whether any adult household member has completed a secondary education or higher;
* **Disability status:** Whether no household member is disabled;
* **Percent of working-age members:** Percent of household members who are in the 15-64 year age group;

Employment

* **Employment ratio:** Percent of working-age individuals in the household that are employed;
* **Full-time employment:** Number of individuals in household with full time employment (>35 hours/week);

Livelihood diversification

* **Employment diversity:** Number of different sectors (out of a possible 17 sectors) that household members are employed in; and
* **Income diversity:** Number of different sources of households’ income (out of a possible 16);

Asset ownership

* **Index of household asset ownership.** A PCA index based on the 24 (out of 25) consumer durable assets for which data are collected in the SEFSec surveys that have a positive factor loading in the index.

A similar set of indicators has recently been employed by TANGO for measuring adaptive capacity as part of an impact evaluation of the USAID-funded project “Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion”. Smith et. al. (2014) show that use of such indicators provides a measure of resilience that performs as expected when analyzing the links between resilience capacity and food security indicators and the ability of resilience capacity to reduce the negative impact of shocks on food security.

As for the index proposed in Phase I, the above indicators are combined into a PCA index and cluster analysis is used to classify households into low, medium, and high groups.[[8]](#footnote-8) It is recommended that the index continue to be titled an index of “resilience capacity” (rather than adaptive capacity itself), for ease of communication. Table 4.1 reports the scoring coefficient of each indicator making up the resilience capacity index. Note that a relatively low score does not necessarily indicate that the dimension does not have a strong influence on resilience capacity; in some cases it is because its indicator is highly correlated with another indicator for which there is greater variability in the data.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 4.1 Principal components analysis scoring coefficients of resilience capacity index components** | | | | |
|  | Scoring  coefficient |  |  |  |
|  |  |  |  |  |
| Education (percent of households with an adult with a secondary or higher education | 0.261 |  |  |  |
| Disability status (Percent of households with no disabled member) | 0.141 |  |  |  |
| Percent of working-age members | 0.124 |  |  |  |
| Employment ratio | 0.554 |  |  |  |
| Full-time employment | 0.433 |  |  |  |
| Employment diversity | 0.535 |  |  |  |
| Income diversity | 0.201 |  |  |  |
| Index of household asset ownership | 0.276 |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

The new index improves on that presented in the Phase I report in that it is conceptually more coherent, being a measure of one single underlying concept. Second, it covers all dimensions of that concept, making fuller use of the available data, except “social capital”, for which data are not collected in the SEFSec surveys. Note that in the future, if the SEFSec questionnaire is to be revised, collection of data on an easily-measured indicator of social capital should be considered. Finally, it is statistically stronger in that all index components have sufficiently large scoring coefficients to be legitimately included.[[9]](#footnote-9)

Based on the SEFSec 2011 data, Table 4.1 reports the percent of households falling into each resilience capacity group along with means of the underlying indicators used to construct the index for each group. The internal consistency of the measure can be assessed by examining the patterns of variation of the indicators across the three groups. Although for some indicators there is little difference in the means between two of the groups[[10]](#footnote-10) the classification separates households into clearly different groups on the basis of the individual indicators. In almost all cases the indicators increase across the groups.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 4.2 Means of indicators of adaptive capacity and food security by resilience capacity group** | | | | | |
|  | Low | Medium | High |  | All |
|  |  |  |  |  |  |
| **Percent of households in resilience capacity groups** | 20.7 | 61.6 | 17.6 |  | 100 |
|  |  |  |  |  |  |
| **Index component means** |  |  |  |  |  |
| Education (percent of households with an adult with a secondary or higher education | 43.2 | 74.0 | 90.4 |  | 70.4 |
| Disability status (Percent of households with no disabled member) | 59.2 | 82.4 | 82.2 |  | 77.5 |
| Percent of working-age members | 59.7 | 58.4 | 71.6 |  | 61.0 |
| Employment ratio | 11.5 | 41.9 | 61.8 |  | 39.0 |
| Full-time employment | 0.04 | 0.84 | 1.97 |  | 0.87 |
| Employment diversity | 0.53 | 1.09 | 2.09 |  | 1.15 |
| Income diversity | 1.82 | 1.75 | 2.55 |  | 1.90 |
| Index of household asset ownership | -1.27 | 0.21 | 1.37 |  | 0.11 |
|  |  |  |  |  |  |
| **Food security indicator means** |  |  |  |  |  |
| Household food insecurity access scale (HFIAS) | 5.10 | 2.21 | 1.41 |  | 2.64 |
| Food consumption score (FCS) | 67.6 | 76.6 | 80.5 |  | 75.20 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

The classification also yields the expected relationship between resilience capacity and indicators of food consumption: the higher is resilience capacity, the lower is the mean HFIAS, (a scale measuring food *in*security); the higher is resilience capacity the higher is the FCS, our indicator of dietary quality.

### 4.2 Implications for measuring food security of including asset ownership in measures of both poverty and resilience

As part of the Phase II analysis agenda the question as to whether employing indicators of asset ownership in both the resilience index and poverty measure “weakens or introduces any statistical problem to the final food security estimates” was raised. As mentioned in the Phase I report, empirically, measuring both poverty and resilience using asset ownership is not a problem as long as the final measures are not perfectly correlated. In this case, resilience is measured using a wide variety of other variables than the asset index, and the final resilience index is formulated based on the inter-correlations of the asset index with these other indicators. Further, the asset index does not dominate in calculation of the resilience index—its factor loading ranks fourth out of the seven indicators included in the index. Finally, only 8 assets are used for measuring poverty, while 24 are used for measuring resilience. We would thus not expect the two measures to be strongly correlated.

# 5. Update of the definitions and terminologies of the SEFSec food security groups

Table 5.1 contains the decision matrix from the Phase I report for creating the food security groupings. The measures of poverty, resilience and food consumption status proposed in this report have the same number of categories for classifying households into groups (three each) and yield the same decision matrix (containing 27 groups). The definitions of the SEFSec food security groups (see Table 5.2) similarly remain the same as those given in the Phase I report.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Table 5.1: Decision matrix for creating food security groupings for scenarios based on poverty, resilience and food consumption status | | | | |
|  |  | Current food consumption status | | |
|  | Resilience | Severely  food deprived | Moderately food deprived | Not food deprived |
| Deep  poor | Low |  |  |  |
| Medium |  |  |  |
| High |  |  |  |
| Poor  (but not deep poor) | Low |  |  |  |
| Medium |  |  |  |
| High |  |  |  |
| Non-poor | Low |  |  |  |
| Medium |  |  |  |
| High |  |  |  |
|  |  |  |  |  |
|  |  | Extremely food insecure | |  |
|  |  | Moderately food insecure | |  |
|  |  | Vulnerable to food insecurity | |  |
|  |  | Food secure |  |  |

|  |  |  |
| --- | --- | --- |
| Table 5.2: Definition of food security groups | | |
| **Food insecurity category** | **Definition** | **Intuition** |
| Extremely food insecure | Households classified as extremely food insecure are either (1) currently severely food deprived, living in poverty (“poor” or “deep poor”), or if they are not poor, they have low resilience; or (2) currently only moderately food deprived, but either deep poor or poor with low resilience. | Households in this category are the most food deprived and poorest; If they are currently severely food deprived yet not poor, they have low resilience such that they are likely to suffer continuous consumption shortfalls in the face of shocks. |
| Moderately food insecure | Households classified as moderately food insecure are currently food deprived, whether severely or moderately. If severely food deprived, they are non-poor and have medium-to-high resilience. If moderately food deprived, they are poor with medium-to-high resilience or non-poor with low-to-medium resilience. | These households are either food deprived, poor, or have low resilience, but are not facing all of these conditions at once. |
| Vulnerable to food insecurity | Households classified as vulnerable to food insecurity are either (1) not currently food deprived, but are poor or have low resilience; or (2) are currently moderately food deprived but are not poor and have high resilience. | Households in this category are not currently food deprived (or are only moderately so), but could easily become so because they are poor or have low resilience. Another circumstance covered here that signals vulnerability is the case of a household that is not poor and is resilient, but nevertheless is currently experiencing moderate food deprivation. |
| Food secure | Households classified as "food secure" are not currently food deprived, are not poor, and have medium-to-high resilience. | Households in this category are not currently food deprived, are not poor, and are resilient to future shocks to their food consumption. |

# 6. Assessment of options for measuring pre-assistance food insecurity rates

Measuring pre-assistance food insecurity rates in Palestine requires estimating the food insecurity prevalence that would have occurred in the absence of assistance. A valid estimate of this “counterfactual” prevalence could potentially be obtained using various impact evaluation techniques, where impact evaluation is described as follows:

An impact evaluation assesses changes in the well-being of individuals, households, communities or firms that can be attributed to a particular project, program or policy. The central impact evaluation question is what would have happened to those receiving the intervention if they had not in fact received the program.  Since we cannot observe this group both with and without the intervention, the key challenge is to develop a counterfactual – that is, a group which is as similar as possible (in observable and unobservable dimensions) to those receiving the intervention.  This comparison allows for the establishment of definitive causality – attributing observed changes in welfare to the program, while removing confounding factors (World Bank 2014).

As noted in this description, because it is not possible to observe the food security status of one household both with and without assistance (since only one of these cases actually occurs), estimating a counterfactual requires identifying a comparison or “control” group of households that do not receive assistance.

In the case of assistance programs that are specifically and intentionally targeted to the poorest--such as those in Palestine--the households that do not receive assistance cannot be used as a comparison group because these households are inherently different from the households that do receive assistance (they are richer and less food insecure, hopefully). This issue is referred to as targeting-based “selection bias”. Selection bias can also occur due to “self selection” of households into an assistance program. For example, richer households who don’t need assistance don’t even apply. Certain ethnic groups with distinct characteristics may be able to rely more on friends and relatives and thus self-select out of formal assistance programs.

There are a number of techniques that can be used to identify a control group for estimating a true counterfactual that takes into account selection bias. Following is a description of three prominent techniques as well as discussion of whether or not each can be applied given the current SEFSec data collection methodology.[[11]](#footnote-11)

1. Randomized controlled trial (RCT). The allocation of assistance is randomly assigned to households (perhaps only those determined to be “poor”) and, after time has passed, the food security prevalences of the assistance and non-assistance groups are compared. Obviously this technique is not feasible using the current SEFSec data collection methodology and would not be desirable from an ethical standpoint.

2. Double-difference estimation with panel data. A baseline survey of a random sample of households is undertaken prior to the allocation of assistance. A follow-up survey is administered after some time and the change in the food insecurity prevalence for the assistance group is compared to that of a non-assistance group. The method removes the influence of selection bias due to time invariant factors. This technique would be possible to apply within the SEFSec framework if the same households were included in consecutive surveys (or at least a sub-set of households were the same). Currently the SEFSecs are not set up for this type of panel data analysis, and if a population is very mobile or under unstable crisis conditions, panel data collection would not be recommended due to a high expected percentage of drop outs.

3. Quasi-experimental methods. For this technique a random sample of households is needed in addition to collection of data on all characteristics of households that influence their selection into the assistance program, including targeting-based selection and self-selection. The data on these characteristics, along with multivariate regression, are used to identify a control group of non-assistance households that have similar characteristics to assistance households, with the only difference being that they did not receive assistance. The most widely employed such technique is Propensity Score Matching (PSM).

In principal, the SEFSec surveys could be used to conduct PSM that would yield a valid pre-assistance food insecurity prevalence. Because assistance programs in Palestine are targeted using a known Proxy Means Test Formula (PMTF), and the data used for applying the PMTF are collected in the surveys, targeting-based selection bias can be addressed. Further, on-the-ground knowledge of decision making patterns with regard to participation in assistance programs in Palestine can be used to attempt to control for any self-selection using currently-collected data.

However, three conditions must be satisfied to produce valid estimates of pre-assistance food insecurity with PSM using SEFSec survey data: (1) All major characteristics of households affecting households’ participation in assistance programs must be measurable (“observable”) with the data; (2) There must be a sufficient number of potential non-participating households to match with participating households; and (3) Participant households must be similar enough to non-participant households in the observed characteristics affecting selection so that there are sufficient non-participant households with which to make matches (the “common support” condition). Whether the latter two conditions are met can only be determined after conducting statistical tests in the context of PSM using the SEFSec data.[[12]](#footnote-12)

For an example of a PSM analysis conducted by TANGO to determine the impact of a USAID-funded food aid project see Smith et al. (2012). The United States’ Supplemental Nutrition Assistance Program (SNAP) used a similar multivariate regression technique to “adjust” for household characteristics (Mably et. al. 2013).

Note that while the current technique for estimating pre-assistance food insecurity prevalences using the SEFSec data is not described (see Chapter Section VII of the 2012 report), it most likely is not based on a true counterfactual, rendering the estimates invalid.

# 7. Options for refining the SEFSec expenditures module

The specific objective of this final task is to “Suggest longer-term options for refining the expenditure module, providing additional information on accurate and light expenditure modules suggested in the Phase 1 Report and indicate how such modules could overcome the existing shortcomings of the SEFSec consumption module without significantly increasing the data collection time and cost”.

As noted in the Phase I report, the current SEFSec expenditures module leads to collection of data that considerably underestimates households’ total expenditures per capita leading to strong overestimation of poverty. The main reasons for the underestimation are the following issues (see Smith et al. 2013, Beegle et al. 2011, and Deaton and Grosh 2000 for background):

(1) The recall period for food data collection, at one month, is too long for accurate recollection;

(2) Data are not collected for all items consumed (the “pulses, nuts and seeds”, “alcoholic beverages”, and “furniture and utensils” groups are not represented);[[13]](#footnote-13)

(3) The number of both food and non-food items for which data are collected is too small for minimally accurate data collection. Single items are too highly aggregated for respondents to remember whether and how much they acquired of them. The 2011 SEFSec has only 20 food items and 9 non-food items (a total of 29 items).

Issue (1) can be overcome by instituting a one or two week recall period. This change would not entail any additional data collection time or costs.

Issue (2) can be overcome by including some expenditure items in the “pulses, nuts and seeds”, “alcoholic beverages”, and “furniture and utensils” groups. This change would not greatly increase data collection time and costs.

Issue (3) can be overcome by including a more detailed, expanded list of food and non-food expenditure items. The choice of the number of items and their actual identify should draw on both the experience of other surveys and information on consumption patterns from the most recent PECS survey. The relevant information from the latter is the percent of households reporting positive acquisition for each expenditure item and the average percent of total expenditures for each.

The 2011 PECS consumption module has 751 expenditure items—332 food items and 419 non-food items.[[14]](#footnote-14) This is quite a large number compared to other national Household Consumption and Expenditure Surveys (HCES): the average low-and-middle-income country HCES has 102 food items and 62 non-food items.[[15]](#footnote-15) A model “Consumption” module suggested by Deaton and Grosh (2000) in the most recent World Bank Living Standard Measurement Survey (LSMS) manual for designing household surveys has 40 food items and 54 non-food items. For another example, a recent widely-cited methodological experiment conducted in Tanzania considered the “gold standard” long list of expenditure items to be that with 58 items in total.

The very large number of expenditure items in the PECS compared to these latter two examples is surely a reflection of the fact that Palestine is further along its development transition than the typical developing country. The variety of both food and non-food items available for purchase is thus greater. However, an initial look at the PECS 2011 data indicates that there is considerable flexibility for aggregating expenditure categories with possibly little reduction in the total expenditures that would be enumerated. Examples of aggregating categories are:

1. Combining “featherless fresh chicken”, “feathered fresh chicken” and “frozen chicken” into one item titled “chicken”;

2. Removing the specific food item “pears” from the list of food items (if rarely consumed) and assuming it will be covered in the “Other fresh fruits” category.

Some preliminary insight can be obtained by examining the number of expenditure items and estimated total expenditures per capita when PECS 2011 items that are not commonly consumed are excluded from calculations (see Table 7.1). Since increasing the level of aggregation would not completely exclude these items but instead re-categorize them, this provides an idea of the *maximum* total expenditures underestimation that would occur with such re-categorization.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 7.1 PECS 2011 total expenditures per capita and number of items when items with infrequent consumption are excluded** | | | | | | | | |
|  | Number of items | | |  | Total expenditures per capita (Monthly NIS) | | |
|  | Food | Non-food | Total |  | Food | Non-food | Total |
|  |  |  |  |  |  |  |  |
| All items included | 332 | 419 | 751 |  | 349.5 | 502.1 | 851.6 |
| Excluding items consumed by |  |  |  |  |  |  |  |
| < 5% of households | 198 | 139 | 337 |  | 336.2 | 426.1 | 762.3 |
| < 10% of households | 148 | 80 | 228 |  | 323.5 | 318.3 | 641.8 |
|  |  |  |  |  |  |  |  |

If all items consumed by less than 5 percent of households were completely excluded from the survey, the total number of items would fall from 751 to 337, and total expenditures per capita would fall from 852 (monthly NIS) to 762.3. Reducing the number of items by this large amount (414 items in all) would lead to only a *maximum* underestimation of total expenditures per capita of approximately 10 percent. When all items consumed by less than 10 percent of households are excluded, the number of items falls by to 228. The maximum reduction in estimated total expenditure reaches 32 percent, which would of course be unacceptable in practice.

As a starting hypothesis, a reasonably reliable estimate of total expenditures and classification of households into poverty groups would most likely be obtained with a total of around 80 food items and 80 non-food items—160 in all. The Timor-Leste Survey of Living Standards 2006 is an example of a survey conducted in a country even further along the development transition than Palestine (as judged by per-capita GDP) with roughly this number of items.[[16]](#footnote-16)

However, only experimental testing of such an expenditures module in Palestine compared to a more detailed one like the PECS will determine whether this is so. Such testing could take place by administering a set of questionnaires with a reduced expenditure module (compared to that of the PECS module) to a sub-set of households in the next PECS and determining the difference in (1) expenditure aggregates by sub-group and overall; and (2) classification of households into poverty groups through sensitivity-specificity analysis.

Regarding the cost issue, while increasing the number of items in the SEFSec expenditures module will increase measurement accuracy it *will* also inevitably and systematically increase data collection time and costs. What is unknown is by how much, which differs depending on the setting. Thus it will be important to carefully monitor data collection time and cost differences as part of the proposed experimental testing so that a full assessment of the trade-off between cost and accuracy can take place. Keep in mind that the alternative of using a low-cost asset-based measure of poverty, as discussed in Section 2, should also be included in any assessment of this trade-off.

On a final note, there are two easy steps that can be taken to reduce the time and costs of administering the SEFSec questionnaire that would help off-set any increased costs associated with an expanded expenditures module. First, as part of the expenditures module, enumerators can first ask respondents whether or not they acquired any of each expenditure item (going down the list item-by-item). Following they can go back and only ask about actual expenditures for the items for which there was positive acquisition. Such an approach could potentially save a great deal of time. Second, the SEFSec income module (Section 6) could only ask whether or not each income category was a source of income and not the average monthly income from the source. The latter information is likely to be highly inaccurate and will not be needed if good expenditures data are available.

# 8. Recommended methodology for SEFSec food insecurity measurement

Given the analyses and discussions in the previous sections of this report, the final recommendations for food security measurement using the SEFSec data are the following:

* Maintain the proposed Phase I methodology of classifying households into four food insecurity groups (extremely food insecure, moderately food insecure, vulnerable to food insecurity and food secure) based on (1) measures of poverty, food consumption status, and resilience and (2) a 27-cell decision matrix;
* For the above use:

\* The regression-based asset index measure of **poverty** calculated employing the eight assets and three other expenditure correlates having a stable relationship with total expenditures (proposed in Section 2) to classify households into three poverty groups: deep poor, poor (but not deep poor) and non-poor;

\* The HFIAS-based measure of insufficient dietary quantity and FCS-based measure of inadequate dietary quality to classify households into three **food consumption** status groups: severely food deprived, moderately food deprived, and not food deprived;

\* The improved measure of **resilience** based on the concept of adaptive capacity to classify households into three groups: low resilience, medium resilience, and high resilience.

* Such a food insecurity measurement methodology is conceptually valid and the most empirically sound possible given the current SEFSec data collection methodology.

Additional recommendations to consider are:

* Determine whether the appropriate statistical conditions are satisfied for implementing a quasi-experimental method (e.g., PSM) for estimating pre-assistance food insecurity prevalences;
* Implement a set of 2-3 experimental expanded expenditure modules[[17]](#footnote-17) to be administered to a random sub-set of households as part of the next PECS. Use the data to evaluate the cost versus accuracy trade-off of an expanded SEFSec expenditures module.

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1. “Real” expenditures are total expenditures adjusted for spatial price differences so that they reflect differences in purchasing power between the West Bank, Gaza and Jerusalem (J1). [↑](#footnote-ref-1)
2. The log of total expenditures is employed so that the dependent variable will have a normally-shaped distribution for the regression analysis (rather than log-normal). [↑](#footnote-ref-2)
3. Only two regression coefficients differ by more than 50 percent (but less than 100%) between any two years. These are those for central heating between 2010 and 2011 and “refugee household” between 2009 and 2010. [↑](#footnote-ref-3)
4. Using 2011 PECS data, the lowest poverty rate possible (based on the lowest possible value of the index as the poverty line) yields a poverty prevalence of 24.7 percent, which is higher than the prevalence calculated using the national poverty line (see Table 2.1). [↑](#footnote-ref-4)
5. For all three indexes the poverty lines yield poverty estimates that are within 0.7 percentage-points of the actual poverty prevalence. [↑](#footnote-ref-5)
6. FSIN (2014). [↑](#footnote-ref-6)
7. Béné, Wood, Newsham and Davies (2012). Absorptive capacity is the ability to minimize exposure to shocks and stress (ex ante) where possible and to recover quickly when exposed (ex post). Transformative capacity relates to governance mechanisms, policies/regulations, infrastructure, community networks, and formal safety nets that are part of the wider system in which households and communities are embedded. It refers to system-level changes that enable more lasting resilience (Smith et al. 2014). [↑](#footnote-ref-7)
8. Note that three other indicators of resilience capacity are available in the SEFSec surveys but not used to calculate the index: The first is “Absence of movement restrictions” based on the data in Section 9 of the survey (“Mobility and access to basic services”). This indicator was not included because it correlates negatively with almost all of the other indicators and enters negatively into the PCA index. The second, “Whether any household member has health insurance” was not included for the same reasons and, additionally, because it is an indicator of “absorptive capacity” rather than adaptive capacity. The third is “Access to public services”. In addition to having a negative factor loading in the PCA index, this is an indicator of “transformative” rather than adaptive capacity. [↑](#footnote-ref-8)
9. The Phase I index included an indicator of “Access to Public Services” even though its scoring coefficient was negligible. [↑](#footnote-ref-9)
10. Specifically, there is little different in “Disability status” between the medium and high groups and in the percent of working-age members and income diversity between the low and medium groups. [↑](#footnote-ref-10)
11. The techniques are discussed in detail in Khandker, Koolwal and Samad(2010). [↑](#footnote-ref-11)
12. A concern is whether there are sufficient non-participating households who have similar characteristics to participating households. To have similar characteristics they would have to be eligible to participate in the assistance programs but still not participate. [↑](#footnote-ref-12)
13. “Social protection” is also possibly not represented. [↑](#footnote-ref-13)
14. The number of non-food items is an approximation—it is not clear from the PECS survey documentation which exact non-food expenditure items are included in and excluded from the calculation of “total consumption” (see Table 2.1 in PCBS 2012). [↑](#footnote-ref-14)
15. The number of food items is from Smith et al. (2013) and refers only to interview (versus diary) surveys; the number of non-food items is from Beegle et al. (2011) and refers to Living Standards Measurement Surveys. [↑](#footnote-ref-15)
16. The questionnaire can be viewed at http://catalog.ihsn.org/index.php/catalog. [↑](#footnote-ref-16)
17. Each module would have a different number of expenditure items in order to test which yields the most reliable estimates of total expenditures and assess the relative costs of each. [↑](#footnote-ref-17)