THE CONSUMPTION AGGREGATE

MEASURE OF WELFARE: THE TOTAL CONSUMPTION

1.   People well-being, or utility, cannot be measured directly, therefore, consumption was used as an indirect measure of welfare. The Poverty Assessment uses total consumption in lieu of income, to measure the welfare of individuals. There are several reasons to adopt this measure. **First,** consumption is considered to be a better indicator of standards of living since its variation throughout the month or year is less than for incomes. When incomes change (e.g. by seasons), individuals tend to use their savings (in cash and in kind) to keep their consumption constant throughout the year. **Second,** consumption data tend to be more accurate than information on incomes of individuals. International experience has shown that respondents tend to provide more accurate information on their consumption that on their income. The latter is often underestimated or difficult to measure due to informal or in-kind income. **Finally,** using consumption as a measure of welfare has the advantage that poverty lines can be derived from the same data and not from other information sources.

2.   In addition, consumption has several advantages over other welfare measures, such as indicators of basic needs (as access to water, electricity, and schooling; malnutrition; etc.). While consumption is an *objective* measure of welfare, indicators of basic needs are based on various *subjective* definitions, including the level at which such needs would be "satisfied" and the weighting factors assigned to their components. On the other hand, indicators of basic needs are not responsive to short-term changes, since they mainly reflect public investments and therefore are not useful to monitor changes in economic conditions. Even though the Poverty Assessment Paper uses consumption as the basis to measure welfare and poverty, we will use the basic social indicators (as malnutrition access and use of basic services) to complement this quantitative measure by using the large amount of information available in the LSMS data.

COMPONENTS OF TOTAL CONSUMPTION

Overview

3.   The LSMS provides the required data to establish a measure of total consumption. This measure includes the annual consumption of food (both purchased and non-purchased, including self-consumption), housing (using an imputed value for self-owned housing), durable consumer goods, expenses in consumer goods and services, basic services (as water, gas, electricity), and health and education outlays. These components are described in detail below. Values used to price the consumption of these components come mainly from the household and community surveys. A price index was established and geographical cost differentials were adjusted (See below for a detailed description of the price index). Finally, information on the number of household members was used to convert the household consumption level (collected in the survey) into a measure of the individual (per capita) welfare, taking into account both household size and composition.

Food Consumption

4. **Purchased Foods.** The main data source for the component of purchased foods is Section 8.A.I of the LSMS household questionnaire ("Food, drinks, and tobacco expenditures and self consumption"). Question 3 (variable GA103) indicates if household members have purchased each good during de last 12 months. Using this section, the number of months (question 4, variable GA104) in which each food was consumed was multiplied by the average monthly value (question 5, variable GA105) to obtain the annual expense.

5. To calculate the annual expense of foods purchased in supermarkets, Section 8.A.III of the LSMS ("Frequency and Value of Purchases in Supermarkets") was used, multiplying the total value of the purchase (question 2, variable GA302) by the annual frequency of the expenditure (question 1, variable GA301[1]). In addition, the annual value of food consumption *outside* the household was calculated by multiplying question 5 (variable GB105) in Section 8.B.I ("Expenses in the last 7 days) by 52 (52 weeks a year).

6. By adding the annual expenses of all purchased foods, food purchases in supermarkets, and food consumption outside the home, the annual total expense in purchased foods is achieved.

7. **Non-Purchased Foods.** Even though the consumption of these goods is not a money outlay, the household's welfare increases in the same way as with purchased food. The main data source for the component of non-purchased foods is Section 8.A.I of the LSMS household questionnaire ("Frequency and Value of Purchases in Supermarkets"). Question 7 (variable GA107) indicates if each good has been obtained by self production or without the need to buy it (gift/grant, partial reimbursement, or from the business)

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[1] For daily purchases, the frequency was 365, for weekly purchases it was 52, for monthly purchases it was 12 and for annual purchases the frequency was one.

during the last 12 months. To obtain the annual *quantity*, the number of months in which each food was consumed (question 8, variable GA108) was multiplied by the monthly's average amount (question 9, variable GA109A[2]).

8.	To obtain the annual *value* of the non-purchased food consumption, the annual amount was multiplied by a *price*. In the case of non-purchased food, however, prices or values were not reported (since such quantities were never purchased or sold). Therefore, prices were imputed as follows. **First,** if the good was also purchased (in addition to being consumed without being purchased) by the household, the price paid was used. To impute this paid price, the total value of purchases during the last 15 days (question 6c, variable GA106C) was divided by the amount purchased during the last 15 days (question 6a, variable GA106A). **Second,** if this price was unknown (because the good was never purchased), its value was estimated using the prices paid by nearby households (geographically), since they have access to similar markets.[3]

9.	Furthermore, the consumption of free foods of Section 4 (Education) was included. To obtain the annual value of free foods in schools, the value of the foods as estimated by the respondent in questions 3 and 23 (variables P403c y P423c) was multiplied by 34 (weeks in the school year).

10.	Adding the imputed annual expenses to all non-purchased foods (internal consumption, gifts, grants) and free food in health centers and schools, the annual total expense for non-purchased foods is obtained.

Expenses for Consumer Goods and Services

11.	The main data source for outlays in goods and services that are often consumed in one year or less (as matches, soap, detergent, newspaper, deodorants, books, non job or school transportation expenses, shoes, clothing, etc.) are Sections 8.B.I, 8.B.II, and 8.B.III of the LSMS. For expenses during the last 7 days (Section 8.B.I), the value reported in question 4 was multiplied by 52 weeks to obtain the annual value.[4] For expenses during the last month (Section 8.B.II), the value reported in question two was multiplied by 12 months for the annual value.[5] All annual expenses of Section 8.B.III

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[2] After taking into consideration the product unit from question GA109B.

[3] Out of the total food consumption, non-purchased food represents 16%; and out of these, 8% had prices from the same good in the household, while the price paid by nearby households was used for 92%.

[4] From Section 8.B.I, variables GB101, GB102, GB103, GB104, GB106, GB107, GB108 were included in the consumption of consumer goods and services, but variable GB105 (food consumption outside the household) was included in food consumption.

[5] From Section 8.B.II, variables GB201-GB224 were included in the consumption of consumer goods and services. However, variables GB225-GB229, insurance, retirement, and Social Security Fund (*Caja de Seguro Social*) contributions and payments, were not included in the consumption of consumer goods and services, since they were included in health expenses and "other" expenses (see below for more details). Non-food expenses in supermarkets (questions 30, 31, variables GB230-231) were

where included directly, except for variable GB305, GB317, GB318 (durable goods purchases and repairs), the variable GB319, which was included in health expenses, and variables GB321 (direct taxes), GB323, GB324, and GB325 (transfers and donations made), which were not included in the annual expense of consumer goods and services. The total annual expense for consumer goods and services is the sum of the annual expenses of all consumer good and services.

Household Services: Energy, Water, Telephone

12.   The data source for household services expenses is Section I of the LSMS. To obtain the annual expenses for water consumed by the household, the monthly consumption (question 20, variable V120) was multiplied by 12 months. To obtain the annual expenses for electricity consumed by the household, the monthly consumption (question 26, variable V126A) was multiplied by 12 months. To obtain the annual expenses for kerosene, gas, candles, and other power sources for lighting consumed by the household, the monthly consumption (question 27, variable V127) was multiplied by 12 months. To obtain the annual expenses for cooking fuel consumed by the household, the monthly consumption (question 30, variable V130) was multiplied by 12 months. To obtain the annual expenses for telephone services consumed by the household, the monthly consumption (question 28, variable V128) was multiplied by 12 months. The total annual expense in household services is the sum of the annual expenses for all the household services.

Annual Usage Value of Housing

13.   As part of the consumption aggregate, the annual usage value of the housing must be included for each household. The data source for the housing component is Section 1 of the LSMS household questionnaire ("Information on Housing and Household").

14.   **Rented housing.** The value of the household rent is considered to be a good estimate of the housing's usage value for those households that pay for the usage of their house, apartment, or others. Therefore, for rented housings, the annual rent value was included in the consumption aggregate, calculated by multiplying the monthly rent (question 37, variable V137) by 12 months.

15.   **Not Rented Housing (own).** For not rented houses, the annual usage value of the housing was imputed as follows: (i) for most cases, the usage estimated by the owners was used; or (ii) for households which did not provide such value, the usage value of the housing was estimated by a regression (see next paragraphs for a detailed explanation of each case).

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included (multiplying the value indicated in question 31, by the annual purchase frequency indicated in question 30).

16.   *(i) Value estimated by owners.* The usage value indicated by the owners was used for most cases of own housings. Fortunately, the LSMS asked households that did not rent a house "Should you have to pay a rent for this housing, how much would you pay monthly?" (question 36, variable V136). The answer to this question was used as an estimate of the housing's rental value and therefore as an estimate of its usage value (the estimated value was multiplied by 12 months to obtain the annual value).

17.   To verify the validity of answers to question 36 (variable V136) as an estimate of the housing's rental value, three steps were involved. **First,** households that reported to have paid a rent were selected and a lineal regression was estimated between the paid value and the housing's descriptive and geographic variables. **Second,** households that did not report to have paid rents were selected and the rental value was estimated using the selected household characteristics and the parameters estimated in the first equation. **Third,** a second linear regression was estimated for the households which did not pay rent. The variables used were the value from the estimated parameters and the value reported in question 36. Table 1 shows the regression results of the first step, using the value of the paid rent as the dependent variable.

Table 1 – Linear Regression of Rented Housing Value of the paid rent = dependent variable		
Variable	Estimated Parameter	t Value
Constant	10.9	0.2427
Cement concrete or tile roof (1 or 0)	36.8	0.0000
Mosaic/brick/granite, or vinyl floor (1 or 0)	20.02	0.0205
Number of rooms	16.57	0.0000
Private shower (1 or 0)	29.99	0.0013
Monthly electricity bill (Balboas)	0.5116	0.0002
Monthly telephone bill (Balboas)	0.4416	0.0003
Number of additional sanitary services (in excess of 1)	145.58	0.0000
Urban area (1 or 0)	-27.51	0.0248
Rural area (1 or 0)	-38.48	0.0003
Indigenous area (1 or 0)	-59.55	0.0000
With a multiple R of 0.78, an adjusted R^2 of 0.61, and a F value of 79.3, with an error probability below 0.000099 ($p < 0,000099$). Data source: LSMS Panama, 1997.		

18.   When the rental value obtained using the estimated parameters was compared (in households which paid no rent) with the rental value estimated by household members (question 36, variable V136), a correlation coefficient of 0.732 ($p<0.000099$) was achieved. The average values estimated with these parameters is 89.61 and with question 36 the value was 99.57 (1:1.1 ratio). The average difference between both values was 9.9 (between 6.6 and 13.2, with a confidence interval of 95%). Given the high similitude between the values achieved by means of the estimated parameters and the answer to question 36 (variable V136), as well as the high correlation, the use of variable V136 as an estimate of the rental value is deemed appropriate.

19.   (ii) Value not estimated by owners. In 2% of the 4,945 households, the housing was not rented and households did not provide an estimate of the rental value; consequently, the estimated parameters in regression of Table 1 were used to impute the housing usage value.

Value of the Annual Usage of Durable Goods

20.   Many goods are partially consumed during the study period, such as cars, refrigerators, stoves, etc. Even if a television set has been purchased during the time period of the survey, it is expected to be used (and consumed) during many additional years. To reflect the current welfare that these goods provide to the household, the "value of one year of use" must be estimated and used, and not the cost of such goods, whether purchased in this year or in previous years.

21.   The data source for the consumption value of household durables is Section 8.F of the LSMS. Since often these goods are not entirely consumed during one year, the value of its use during the last year had to be estimated. For example, if someone bought a television set this year for B/.300.00, the consumption value of this television set is not B/. 300.00, since the individual can also use the television during the following year, i.e., the B/.300.00 will be consumed during a time period of more than one year. Food and other consumer goods do not have this characteristic, because if someone buys one liter of milk, this milk will be consumed in less than one year.

22.   In order to estimate the consumption value of the household durables, we need three data points: **First,** age of the durable good (variables F301 to F325), **Second,** remaining useful life of the durable good, and **Third,** the current value of the durable good (variables F401 to F425).

23.   To obtain the remaining useful life of the durable goods, we need to know the average lifetime of each good or, as commonly referred to, ifs useful life or expected lifetime. If we know the useful life of the durable good, we will only need to subtract its age to obtain the remaining lifetime. Fortunately, from the data of the LSMS itself we can estimate the expected lifetime of each durable good. Assuming that in one year a similar percentage of the population buys a durable good, it is to be expected that some individuals will have new ones, some will have one-year old, others two-year old, etc. Then, if we calculate the average age of all televisions sets (average of F307), we would obtain the mean life or average age of all televisions. By multiplying the mean life by two, the result would be the expected lifetime of a television set in years. If the reported age (variable F307) is subtracted from the expected lifetime of a television set, the remaining useful life of each television set is obtained. Finally, if the current value of a television set (variable F401) is divided by the remaining useful life, the usage value of the television set for one year is obtained.

24.   If the same procedure for all durable good is followed and the values of each household are added, the consumption value of the household durable goods is obtained.

Education

25.   The data source for household member's expenses in education (such as registration and enrollment fees, uniforms, books or material, travel) is Section 4 of the LSMS. The LSMS asked households for the *annual* pre-primary school expenses for children under 6 years (questions 4-6, variables P404-P406 in Section 4) and for students aged 6 and over (questions 24, 25, 26, 29, 30; variables P424, P425, P426, P429, P430). Households were also asked for the *monthly* expenses for children under 6 (questions 7-10, variables P407-P410) and students aged 6 and over (questions 31-34, variables P431-P434). To obtain the annual value of the monthly expenses, they were multiplied by 12 months.

26.   Adding the educational expenses and scholarships for all household members, the total consumption for one year of education is obtained.

Health

27.   The data source for health expenses is Section 8. Health expenses in question 19 of Section 8.B.III (variable GB319) were included: annual expenses for drugs, medical fees, medical tests, hospital admissions, and other expenses associated to the health care of household members.

28.   Annual expenses in health insurance reported in questions 27, 28, 29 of Section 8.B.II (variables GB227, GB228, GB229) were also included.

29.   Likewise, the social security cost of illness and mother-child benefits were also included, since these expenses represent the consumption of health services. Not included were social security contributions for disability, senior citizen benefits, and death, since they represent some kind of savings.[6] However, Section 8.B.II of the LSMS questionnaire asked about the *total* contribution to the Social Security Fund (question 25, variable GB225), making no distinction between the social security part for illness and mother-child benefits (representing consumption) versus disability, senior citizen benefits, and death contributions (representing savings). In order to include such distinction, the annual value reported in question 25 was adjusted by a 7.4% factor, since it represents the share of the total Social Security Fund contribution paid by workers for the illness and mother-child health care benefits.[7]

30.   The overall health expense is obtained adding all the expenditures reported in these questions.

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[6] They would be included in an income variable.

[7] From contributions paid by workers to the Social Security Fund (C.S.S., *Caja de Seguro Social*), 92.6% is allocated to disability, senior citizen benefit, and death (I.V.M., *Invalidez, Vejez y Muerte*) program and 7.4% to the illness and mother-child benefit (EyM, *Enfermedad y Maternidad*) program. Source: C.S.S.

Other

31.   The total expense also includes grants in kind received from institutions, family members, friends, and neighbors (questions 8 and 9 of Section 8.E.II, variables GE208 and GE209).[8] Likewise, the payment of alimony (question 26 in Section 8.B.II, variable GB226) was included.

Total Consumption

32.   Finally, by adding all consumption values (by household), we obtain the **total consumption** variable. Due to missing values in various sections, a large share of the consumption aggregate could be from imputations rather than observed values. Seven households were excluded because this reason[9].

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WEIGHTING TOTAL CONSUMPTION BY THE REGIONAL PRICE INDEX

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33.   Cost of living is not the same countrywide; therefore, the value of total consumption was adjusted to account for such differences in regional prices. Price indices were constructed for each Primary Sampling Unit (PSU) using the information collected in the price questionnaire and in the household questionnaire (Section 8.A).

34.   Using the consumption data of Section 8.A.I, the **"national average consumption level in pounds"** was calculated for each food article. This was achieved dividing the value of the annual consumption (variables GA104 * GA105) by the national average price per item (estimated dividing variables GA106C by GA106A)[10]. To obtain nationwide prices, at least 45 observations per item, and units expressed in pounds were required.

35.   Next, prices per article were estimated both at regional (of PSU) and national level, using the price questionnaires as the major source of information. If such information was not available in the price questionnaire, prices reported in the LSMS household questionnaire in Section 8.A.I, variables GA106C and GA106A, were used, selecting cases where units were expressed in pounds. With these prices, the purchase cost of the **"national average consumption level in pounds"** in each PSU was estimated (using prices at PSU level), as well as the purchase cost at national level (using national price averages).

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[8] However, cash grants were not included, in order to avoid double counting such transfers, since consumption associated to these cash grants was already included in other consumption forms. (Grants in kinds and cash would be included in an income variable).

[9] Also, only households with complete interview were selected.

[10] This national average price per item was used only for the estimation of the average national consumption quantities. Later, another "national average price" is estimated using a methodology based in the price questionnaire information.

36.   Finally, to obtain a variable that allows to standardize any expense at national level (to be used as a multiplier), the purchase cost at national level of the **"average national consumption level in pounds"** was divided by the purchase cost in each PSU of the **"national average consumption level in pounds",** obtaining a value for each PSU (PESO variable).

37.   Using the national average as a basis (national average = 1), the PESO variable was found to vary between 0.67 and 1.22.

VALUE OF TOTAL PER-CAPITA CONSUMPTION

38.   The final step to rank the population by welfare level (consumption) from the lowest to the highest, a share of the total consumption needs to be allocated to each household member (per capita). Consumption used by the Poverty Assessment Paper is the per capita consumption, i.e., the total value of consumption of the household divided by the number of household members. There are several other ways of allocating the household consumption to the different members, considering different requirements, economies of scale, and the presence of public services in the household. Per capita consumption was used due to its transparency, but for sensitivity tests of the consumption aggregate, other ways of dividing consumption will be used.

LEVELS OF TOTAL PER-CAPITA CONSUMPTION: PANAMA 1997

39.   The total per-capita consumption variable was used to rank the population from the lowest to the highest annual per-capita consumption level (welfare). There are considerable variations in the current per-capita consumption in Panama, as shown in the graph. In average, the annual per-capita consumption is B/.1,821. But the richest ten per cent of the population has an average consumption level of B/.6,451 and, at the other end, the poorest ten per cent of the population has an annual average per-capita consumption of B/.207.

Total Consumption Level:
Republic of Panama, 1997

% of population	Level of total annual per-capita consumption (B$)
100	6,451
90	3,165
80	2,256
70	1,713
60	1,372
50	1,097
40	853
30	646
20	432
10	207

Lowest level of total consumption

Source: LSMS, 1997