

Deriving a household welfare indicator for households surveyed in the Malawi Integrated Household Survey, 1997-98

The Integrated Household Survey (IHS) was a comprehensive socio-economic survey of the living standards of households in all districts of Malawi. The National Statistical Office administered the IHS questionnaire to almost 13,000 households over a 12 month period, November 1997 to October 1998. The survey was designed so that the information gathered could be used for an assessment of the incidence of poverty in the population at the district level and above.

Poverty is that condition in which the basic needs of a household (or individual) are not met. In order to determine whether or not a household is in poverty, one must do two things. First, one must establish a level of welfare for the household. That level, whether defined subjectively or objectively, will be compared to a level of welfare above which one assumes the basic needs of a household can be met. Establishing this poverty line is the second step needed to ascertain the poverty status of a household.

A quantitative, relatively objective analytical process is being used for the poverty analysis of the IHS data set. A welfare measure for each household in the IHS data set is established by considering all of the expenditure and consumption of a household reported in the questionnaire. This welfare measure is expressed as the total daily per capita consumption/expenditure of the household in Malawi kwacha.¹ Relative poverty analyses can be conducted directly on the basis of the distribution of this welfare indicator across the IHS sample.

For absolute poverty analyses, a poverty line is needed. The poverty line – that level of welfare defining poor households from non-poor households – is also expressed in this same unit. That is, it is fixed in terms of the welfare indicator. It has an objective character insofar as it is anchored to the costs for a household in meeting the recommended daily calorie requirements of its members, plus a certain level of basic non-food expenditure. The derivation of the poverty line is described in another document of this same series.

This paper will first describe what sort of information on consumption and expenditure is used to derive a household welfare indicator. The data in the IHS will then be described and evaluated in light of these informational requirements. Finally, a step-by-step presentation of the derivation of the welfare indicator for each of the IHS households will be described.

¹ An alternative approach to developing a household welfare measure would be to use income. However, consumption/expenditure information is more suitable for several reasons:

- First, particularly in an agricultural economy such as Malawi, income is often very lumpy. Farming households receive a large amount of cash income in May or June, and receive very little the rest of the year. On an income basis, a household which most would view as wealthy may be categorized as poor if the interview of that household was done after all farming income was received. In contrast, households are constantly expending their income and consuming. Expenditure/consumption is a smoother measure of welfare through time.
- Secondly, consumption and expenditure can be viewed as realized welfare, whereas income is more a measure of potential welfare.
- Thirdly, households are often more willing to truthfully report their consumption and expenditure than their income.
- Finally, in a strongly subsistence oriented economy such as Malawi, much income is derived from self-employed businesses or subsistence-oriented agricultural production. Assigning income values to the proceeds of these enterprises is often problematic.

Consumption components

The welfare measure is made up of four components:

- Total food consumption
 - All food consumption reported by the household is normalized to a daily consumption of individual food items.
- Total non-food non-durable good expenses
 - Similar to food items, a daily value is determined for all non-food non-durable goods consumed by the household. Included in this component are out-going income transfers.
- Estimated use-value of durable consumer goods, e.g. motor vehicles, furniture, appliances, etc.
 - The use-value is computed by deriving an imputed daily rental rate for the durable goods. This rental rate is computed by taking into account the rate of depreciation for an item (which is the inverse of the estimated lifespan for the item), the opportunity cost of the capital locked up in the durable good (the bank savings interest rate is used as a proxy), and the replacement cost of the durable good.
 - Formula: $\text{Use-value of item} = \text{current replacement value} * ((\text{rate of interest} + \text{depreciation rate for item}) / (1 - \text{depreciation rate for item}))$
- Actual or imputed rental value of housing for the household.

Data in the IHS on consumption and expenditure

The following IHS questionnaire sections contain information on consumption and expenditure:

- Section F-3 qstn. 4 - home consumption of non-farming business goods.
- Section F-4b qstn. 3.6 - household income transfers out.
- Section J-1 – ownership of durable goods.
- Section K-1 - own account (non-cash) food consumption.
- Section K-1A - own account (non-cash) non-food consumption.
- Section K-2 - major non-food household expenditures.
- Diary of expenditures.

However, there would be double-counting if all information in all of these sections were used. The information on home consumption of business goods from Section F-3, question 4 will not be used as it is assumed that the consumption noted here will also be captured in Sections K-1 and K-1A. Durable goods are found in Section J-1, but there are some durables also found in K-2. Those listed in K-2 will be brought into the analysis of durable use-values after checking for duplication.

As part of the data cleaning process, the diary of expenditures was purged of all durable goods which should be listed in section J-1 and of any items which should be recorded in section K-2.

Step-by-step derivation of the welfare indicator for each household in the IHS

The formula for the welfare indicator for a household from the IHS is as follows:

Total daily per capita consumption & expenditures =
 ((Income transfers out) + (non-food durables use-value) +
 (Non-cash non-food consumption + major non-food household
 expenditures + diary non-food expenditures) + (non-cash food
 consumption + diary food expenditures) + (Imputed housing rent))
 ÷ number of individuals in HH.

Several points on deriving the welfare indicator should be highlighted:

- Only IHS households for which we have reliable consumption and expenditure information will be used in this analysis. The selection criteria of the households used is described in a separate document in this same series.
- All monetary values reported will be adjusted to a mean daily time-step.
- All monetary values will be deflated to a common temporal price. April 1998, the middle month of the survey period, will be the base month.
 - Prices are deflated using the separate monthly Consumer Price Indices (CPI) for the three rural regions of Malawi and for the four urban centers. This information was collected by the National Statistical Office.
 - Three CPIs are used: a food CPI, a non-food CPI, and a total CPI.
 - The food CPI is applied to food consumption and expenditure and exhibits a seasonal characteristic tied to the cropping season.
 - The non-food CPI is applied to non-food consumption and expenditure and more strongly reflects MK exchange rate fluctuations than does the food CPI.
 - The total CPI is applied to expenditure and consumption which cannot be exclusively categorized as food or non-food, e.g. out-going income transfers.
 - No spatial adjustments are made to monetary values. A spatial CPI will be one of the outcomes of the poverty analysis.

The computations are done using the SPSS statistical software.

Valid households and household size: The first step of the process is to merge a file which lists the number of individuals in each of the IHS households with a file listing the valid households to be used in the poverty analysis. The household size variable provides the denominator for the equation by which the household welfare indicator is calculated. Note that each record of the working file will have expenditure and consumption information for each of the valid households.

Out-going income transfers: To this working file is then merged a variable which is the total amount of out-going income transfers for each household. As the out-going income transfers for a household are collected on an individual basis in the IHS, these amounts for a household first have to be summed, the result being total income transfers out for the household.

Use-values for durable goods: To derive use-values, three data are needed: the expected lifespan of a durable good to determine the depreciation rate, the opportunity cost of capital over the period of the survey; and the replacement value of the item. The formula used was noted above.

The first step in this process is to assemble information on all consumption durables from the J-1 and K-2 sections of the IHS. This information includes the replacement value of an item and its age. Duplicate checks are made to avoid including the same item twice if listed in both the J-1 and

the K-2.

Not all durables are considered consumption durables. Several of the durable goods listed in J-1 should be treated as production durables. These are items which contribute to enhancing the income stream of the household in question through facilitating production or processing, thus enabling higher consumption and expenditure. The argument is made that if these were counted as part of consumption and expenditure, double-counting would result. However, there is no clearly defined line between what is and is not a consumption durable. Consequently the analyst must decide.

The durable goods which appear in the questionnaire but which were excluded from the calculations to derive a welfare indicator are boat/canoe, fishing net, plough, hoe, axe, sickle, panga, and grinding mill.

The expected lifespan of each durable was calculated as twice the mean age listed for the durable in the IHS data set. This method of computing the expected lifespan of a durable is based on the assumption that the age of items owned by the IHS households is normally distributed, i.e. the mean should represent half of the expected lifespan of a durable. The monthly depreciation rate for each durable is the inverse of this expected lifespan in months.

The replacement value used for a durable was its median replacement value as listed in the IHS data set.

The opportunity cost of capital was accounted for by the proxy of the average monthly savings deposit interest rate during the time of the IHS. The average annual rate of the survey period was 15%, which corresponds to a compounded monthly interest rate of 1.1715%

The result of these computations is that a single monthly use-value was calculated for each of the consumption durables listed in the IHS. This single use-value applied to all IHS households throughout the country who owned the durable. The table below lists the monthly use-value calculated for each item using a valid household data set of 6586 households. Also included in the table is the expected lifespan of each durable and the replacement values which were used in calculating the monthly use-value.

Durable Good	Monthly use-value for item (MK)	Expected lifespan of asset (yr)	Median replacement value (MK)	n
Bed	6.68	17.0	400	2,498
Table	3.40	16.0	200	2,488
Chair	3.57	13.8	200	3,202
Refrigerator	144.21	9.6	7,000	238
Air conditioner/Fan	10.55	8.1	475	153
Stove/Cooker	4.46	4.8	150	858
Washing machine	66.04	19.7	4,125	14
Television/Video	276.50	7.5	12,000	131
Oxcart	94.76	20.8	6,000	109
Bicycle	20.21	9.7	985	2,156
Motor cycle	271.29	13.3	15,000	41
Motor vehicle	1446.72	8.1	65,000	124
Pounding mill	0.93	16.3	55	1,457
Radio	10.61	4.1	325	1,199
Other	4.53	13.3	250	8

Total non-food consumption and expenditures: Non-food consumption and expenditure is found in three separate sections of the IHS: the major household expenditures section (K-2), the non-cash non-food consumption section (K-1A), and in the diary of expenditures. Information is recorded by item. Consequently, all non-food items listed as being consumed or purchased by the household in each of the three sections was summed to derive total non-food consumption or expenditure for the household.

The diary of expenditures was kept over different time periods across households. A variable on the days the diary was kept was computed as the difference between the date of the first record in a household's diary of expenditure and the last. The total non-food expenditure of a household reported in the diary was divided by this variable to normalize it to a daily time step.

The totals from the three sections were then merged into the welfare indicator calculation working file.

Total food consumption and expenditures: Information on food consumption and expenditure is found in two places in the IHS: in the non-cash food consumption section (K-1) and in the diary of expenditures. The same procedure that was used with non-food items was used for the food items.

Housing cost component: Information on housing is provided in the K-2, where rental payments are listed, and in the durables section, J-2, where the ownership of houses are noted. This information was used to calculate an imputed housing rental value for all of the valid households. Additional information on the tenure by which a household occupies their house, provided in section I-1, was used to determine which value to use if a hh reported both paying rent and owning a house.

For households that rented their house, this amount was used for the housing cost component of the welfare indicator. For households that own the house they live in, an imputed rental value was derived in a manner similar to that used to derive a use-value for durable goods. The replacement value used was that reported. Expected lifespan for a house was calculated at twice the mean reported age of houses listed for each district. The same monthly opportunity cost of credit was used: 1.1715%. In contrast to the durable good use-value calculation, however, different housing use-values resulted for each household since the replacement value of the house reported by the household was used in the calculation, rather than a median value.

No house ownership or rental information was available for about 20 percent of valid households. For these household the median value for the house rents and imputed rental values for a district were assigned to households with no housing cost information in that district.

This information on the housing component of the welfare indicator was then merged into the

Variable	Description	Percent of households
HHSIZE	Household size	100
TOTOUTH	Total income transfers out for hh over past month	22
TOTUSVHH	Total monthly use-value of durables for hh	79
DNCASNFD	Total daily non-cash non-food consumption for hh	10
DYK2EXP	Total daily household expenditure for K-2 items	99
DYDIANFD	Daily total hh non-food diary expenditure	98
DYNCFD	Daily hh non-cash food consumption	80
DYDIARFD	Mean hh daily purchase of food (from diary)	99
HOUSING	Monthly value of housing for hh	100

working file. With this addition, all components of the household welfare indicator were in place for the calculation. The table presents the proportion of households for which information existed in the IHS for each of the welfare indicator sub-components (data set of 6586 households).

Before computing the welfare indicator, the monthly food, non-food, and total CPIs which would apply to a household in a particular district were merged into the record for that household. (See the graphs appended to this document.) Each household of the IHS was interviewed over a single month. Consequently, the CPIs for that month and the region in which the household is located were assigned to the household.

The welfare indicator was then computed. The following equation was used in SPSS. (See table above for variable descriptions.) The CPI deflation and the standardization to a daily time step (where this was not already done) was done in this equation as well.

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COMPUTE WlfrInd = SUM ((totouthh * fullcpi * 12/365),
                      (totusvhh * nonfcpi * 12/365), (dncasnfd * nonfcpi),
                      (dyk2exp* nonfcpi), (dydianfd * nonfcpi), (Dyncfd * foodcpi),
                      (dydiarfd * foodcpi), (housing * nonfcpi * 12/365)) / hhsize.
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This welfare indicator was then disaggregated into total non-food and total food expenditure and consumptions. These variables are needed for the poverty line derivation.

Using the 6586 household data set used in the examples earlier in this paper, the following total daily per capita consumption and expenditure values result.

		Malawi	Southern rural	Central rural	Northern rural	Urban	
Welfare indicator (MK)	Mean	13.64	8.07	10.13	12.22	39.22	
	Median	8.25	6.12	8.02	9.37	21.92	
Food component (MK)	Mean	7.27	5.58	7.13	7.99	11.55	
	Median	5.84	4.59	5.90	6.51	9.25	
Non-food component (MK)	Mean	6.37	2.49	3.01	4.24	27.67	
	Median	1.78	1.15	1.59	2.30	11.49	
N.B.: weighted by hh size		Valid hhs	6,586	2,468	2,379	810	929

