

ESTIMATING HOUSEHOLD HEALTH EXPENDITURES

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Synopsis

In most developing countries household health spending accounts for the largest single source of financing entering the health sector. Accurate estimation of this critical part of the sector's funding base is what distinguishes National Health Accounts (NHA) from other more conventional health expenditure studies, and is the one that presents, typically, the greatest problems in estimation.

As with any other component of the NHA, estimates of household spending are best developed using information from both the demand and supply sides. For example, from data on household consumption and from data on revenues received by providers. In practice, the primary source of data in most countries will consist of household surveys. However, wherever possible this needs to be supplemented by data from the supply side. Although household surveys have long-been used to estimate private health expenditures, NHA studies have consistently shown that household survey estimates require adjustment and caution in use. In doing so, there is considerable experience in evaluating the quality of household survey estimates and in using various approaches to adjusting these estimates.

Using household survey data

Assessing quality of household survey data and making adjustments

The accuracy of household surveys in their estimates of household health spending is highly variable. Care must be taken in using these data, and it is a useful practice when compiling NHA to assume that all household survey data are suspect or need adjustment. There is a considerable body of experience and research in the evaluation of household surveys as measures of household consumption. Based on this and our own experience in working with household survey data, the following is generally the case:

1. General household consumption surveys, which are not designed specifically to measure household health spending, will tend to underestimate household health spending, in comparison with specially designed health expenditure and utilization surveys.
2. Surveys which link questions about health expenditures and utilization to a respondent's reporting of illness, will omit a significant component of health spending which is not related to illness, such as immunizations, medical check-ups, and others. This will tend to introduce an element of underestimation.
3. Many surveys under- elicit reporting of utilization and expenditures at traditional or non-formal providers, either because of reluctance of rural or poorer respondents to admit such usage to educated interviewers, or because survey instruments and training of field staff are not designed to collect these data.

4. Household surveys that use a recall period of greater than 1-2 weeks for outpatient utilization will tend to result in underreporting of utilization, and by implication expenditures, because of memory loss. The greater the recall period the greater the extent of memory loss.
5. Expenditures on drugs and medicines tend to be better recalled than expenditures on services and consultations. This can lead to an upward bias in the proportion of household spending reported in surveys to be allocated to drugs.
6. Most surveys do not sample the institutionalized population resident in hospitals or other medical institutions, and thus will underestimate expenditures by this group.
7. In more advanced countries, failure to include recently dead persons in the sample can lead to a systematic underreporting of total health expenditures, particularly in the case of hospitalizations. This is noticeably so in the USA, where a large proportion of total health expenditures are incurred during the last six months of life.
8. The most straightforward and feasible method to check the accuracy of household survey estimates is to compare independent estimates of components of household spending with those reported in the survey itself, such as for drugs.

The following example, taken from the preparation of Egypt's NHA, illustrates the variability in estimates of household spending that can arise from different surveys in the same country. It illustrates the degree of caution which must be exercised in using survey data, and the use of pharmaceutical expenditure estimates to calibrate household survey estimates.

Example 1: Adjusting household survey estimates of health spending in Egypt

When constructing Egypt's NHA, data on household health spending in Egypt were available from three surveys conducted in recent years. These were the government's own national household consumption survey conducted in 1990/91 (CAPMAS 1990), a small-scale household health survey carried out in an urban district of one province in 1992 (Kemprecos et al., 1992), and a specially designed nationally representative household health utilization and expenditure survey carried out jointly by Harvard University and the Ministry of Health during 1994/95 (Harvard/DOP 1994). The CAPMAS survey was the official national household consumption survey conducted every 5-10 years by the Egyptian government, and used by it to compile Egypt's National Income Accounts, and other socioeconomic planning data. It was conducted over several rounds during the course of the year, and involved a large sample of over 10,000 households. The Harvard/DOP survey was carried out in two rounds in order to account for seasonal variations in illness and expenditures, of which only the first round was available when constructing the 1990/91 Egypt NHAs.

The following table reports the annualized per capita expenditures on health reported by each survey. As can be seen, once the figures were adjusted for differences in prices, there was an almost two-fold variation between the CAPMAS estimate and that from the first round of the Harvard/DOP survey. Both were nationally representative household surveys, and each included at least 5,000 households in their samples. The gap of four years between the two surveys was not expected to be a significant factor in these differences, as there had been only very modest changes in income levels and prices of health services and goods during this time period.

Table 1: Recent survey-based estimates of household spending in Egypt, 1994-1995

Sample	CAPMAS	Kemprecos et al.	Harvard/DOP (First round)	Harvard/DOP (All rounds)
Time period	1990/91	1993	Dec-94	1994/95
Annualized national per capita expenditures (nominal LE)	22	73	108	90
Annualized national per capita expenditures (constant FY90 LE):	33	39	63	50

Since the CAPMAS survey was a general household survey, with a simple one-page questionnaire on health expenditures, it was expected that its estimates would be underestimated compared with those from the Harvard/DOP survey which used a multi-page instrument to record health expenditures. However, the Harvard/DOP first round results were also thought to be too high, as they implied a level of pharmaceutical spending greater than estimated from an analysis of the pharmaceutical market using a National Drug Accounts approach. The analysts were thus left with two survey estimates of household spending, one of which was likely to be less than the true level, and the other which was suspiciously too high.

Since greater credence was placed in the accuracy of the independent estimates of pharmaceutical sales, it was decided to use these to adjust the CAPMAS household survey estimates upwards.

According to the NDA estimates, pharmacy drug sales in 1990/91 amounted to LE 1,254 millions, compared with the LE 1,001 millions reported by the CAPMAS survey. This suggested that the degree of under-reporting in the CAPMAS survey was in the range of 20%. Other data on MOH user fees also suggested that the CAPMAS estimate of government user fees was too low by an even greater margin - up to 32%, as shown in Table 2 below.

Table 2: Comparison of expenditures reported in CAPMAS survey with other estimates

Item of expenditure	CAPMAS estimate (LE millions)	Other estimate (LE millions)	Ratio of CAPMAS to other estimate
Drug purchases	1,001	1,254	0.80
Fees to government hospitals	43	63	0.68

Notes:

1. All estimates are for FY90.
2. Fees to government hospitals are estimated by summing patient revenues estimated for MOH facilities, and university and teaching hospitals.

This was not considered surprising, since individuals tend to more easily remember purchases of commodities than purchases of services. In doing this, it was being assumed that the degree of underreporting of non-drug expenditures in the CAPMAS survey would be greater than for drugs. This would also be consistent with the first round of the Harvard/DOP survey that reported a lower share of drugs in overall expenditures (51% compared with 58%).

As a solution to (i) reflect that non-drug expenditures might have suffered greater underreporting in the CAPMAS survey compared with drug expenditures, (ii) incorporate what were considered accurate NDA estimates of pharmacy sales, and (iii) reflect the lower 51% share of household spending going to drugs in the Harvard/DOP survey, the following adjustments were made. The drug expenditures reported in the CAPMAS survey were adjusted upwards by 20%, while the non-drug expenditures were adjusted upwards by 35%. This resulted in a final estimate of household health spending of LE 44 per capita, compared with the Harvard/DOP First Round estimates of LE 63 per capita (expressed in constant FY1990 to adjust for inflation). This estimate implied that drug spending accounted for 54% of total household spending.

The validity of these estimates which were used in the 1990/91 Egypt NHA were later supported by the results of the second round of the Harvard/DOP survey. Because of strong, seasonal variations in health spending, the final Harvard/DOP survey estimate of spending eventually came to LE 90 per capita in 1994/95, which would have been equivalent to LE 50 in constant FY1990 LE. Moreover the accuracy of the NDA estimates of pharmacy sales was later confirmed by IMS data which were identical in their estimations of this component of household spending.

Dealing with the less than ideal

Combining household survey estimates with National Income Accounts data

In some cases, only general household consumption surveys are available, and these may not offer sufficiently disaggregated information to allow cross-checking of the estimates. In this situation, it may not be possible to cross-check the overall degree of under or over-estimation

in the survey of household expenditures. In our experience, the simplest method to control for any such error is to combine the survey estimates with information on private consumption available from the country's National Income Accounts (NIA). Total household health expenditures can be taken to be equivalent to the share of household spending devoted to health as reported in the available household survey multiplied into the NIA estimate of private consumption, or to be more precise 'household final consumption expenditure'; for example:

$$\text{Household health expenditure} = \text{Private consumption} \times \text{Share of household expenditure in survey devoted to health}$$

This approach may still yield a relatively inaccurate estimate, but at the very minimum it will be at least consistent with the NIA estimates of total household spending, and thus be unlikely to lead to misleading estimates of private health spending as a percentage of GDP. This method was also used by the World Bank for many of its estimates of private health expenditures for the World Development Report 1993, and by PAHO in some recent estimates of health expenditures in Latin America.

Using urban survey data to make national estimates

When estimating household direct health expenditures, nationally representative surveys are always preferable to urban surveys, but occasionally the only information available is from an urban survey. When this is the case, there are several important factors to consider in the decision of whether and how to use the survey.

How well do urban surveys predict national expenditures?

There is a concern that relying on urban populations to predict national levels of household health expenditures is likely to bias the results, but it is not at all clear in which direction the bias will be. It is often pointed out that urban populations tend to spend more on health than rural populations, and that relying on urban surveys to predict national levels of health expenditures will tend to bias results upwards.

While in absolute terms it is typically true that urban populations spend more on health than rural populations, it is not necessarily true that urban households spend a greater share or percentage of their income on health. Table 3 presents 16 surveys in Latin America that disaggregated household expenditures into rural and urban populations. In six of the surveys the rural expenditure share exceeded the urban share, in an additional three (Jamaica 1991, Jamaica 1992 and Peru 1985/86), the rural populations spent a greater share than populations living in the capitals and major urban centers. Since capital cities often receive the bulk of subsidized health services, surveys of national capitals, as shown here, may be just as likely to under-estimate the level of household expenditures at the national level as to over-estimate them.

Table 3: Share of Household Expenditure Devoted to Health Care

Country	Survey Year	% Urban	National	Rural	Urban		Difference Urban/National
					Major	Other	
			(1)	(2)		(3)	(3)-(1)
Belize	1982	52	3.39	3.97		2.93	-0.46
Colombia	1971	61	3.23	3.47		3.16	-0.07
Colombia	1972	61	2.97	2.78		3.03	0.06
Costa Rica	1987/88	47	3.70	3.43		3.92	0.22
Mexico	1983/84	66	2.83	3.27		2.71	-0.12
Mexico	1989	73	3.46	4.93		3.07	-0.39
Mexico	1992	73	3.39	4.43		3.30	-0.09
Brazil	1074	61	4.82	5.43			5.20
Cayman Is	1991	100	3.20	2.70	3.40		3.30
Guatemala	1979/81	37	2.02	1.40	2.30		1.80
Jamaica	1990	55	2.30	2.10	2.20		2.70
Jamaica	1991	56	1.70	1.90	1.50		2.00
Jamaica	1992	57	2.00	2.00	1.90		2.30
Jamaica	1993	58	2.40	2.40	2.40		2.80
Jamaica	1994	59	2.30	2.20	2.40		2.40
Peru	1985/86b	67	4.60	4.30	4.20		4.70

Source: Pan American Health Organization, Public Policy and Health Program.

Since determining the direction of bias may be difficult, an important question is also. *How badly would the urban portion of the surveys predict national expenditure levels for the countries in this table?* The sample in Table 3 is clearly not representative of the region as a whole, but it is useful to examine these surveys to test the relative predictive powers of the urban surveys versus an estimate based on a regional elasticity. First, it is worth noting that the difference between the Urban and National shares never exceeds 0.5% of expenditures. In terms of GDP this amounts to approximately a magnitude of between 0.3 and 0.4 % of GDP (Table 4).

Table 4: Estimates of Health Expenditures as a percentage GDP

Country	Survey year	% Urban	National Survey	Urban Portion	Region Elasticity	Difference from National Survey	
			(4)	(5)	(6)	(5)-(4)	(6)-(4)
Belize	1982	52	2.34	2.00	2.38	-0.34	0.04
Colombia	1971	61	2.38	2.33	2.68	-0.05	0.3
Colombia	1972	61	3.13	2.18	2.69	0.04	0.56
Costa Rica	1987/88	47	2.20	2.32	2.18	0.12	-0.02
Mexico	1983/84	66	1.42	1.38	2.12	-0.04	0.70
Mexico	1989	73	2.36	2.09	2.16	-0.27	-0.20
Mexico	1992	73	2.46	2.38	2.13	-0.08	-0.33
Brazil	1974	61	3.00	2.99	2.21	-0.01	-0.79
Cayman Is	1991	100	2.00	2.09	2.24	0.09	0.24
Guatemala	1979/81	37	1.60	1.64	2.18	0.04	0.58
Jamaica	1990	55	1.34	1.43	2.19	0.09	0.85
Jamaica	1991	56	1.10	1.13	2.23	0.03	1.13
Jamaica	1992	57	1.19	1.25	2.24	0.06	1.05
Jamaica	1993	58	1.45	1.27	0.14	-0.18	0.69
Jamaica	1994	59	1.97	2.06	2.45	0.09	0.48
Peru	1985/86b	67	3.17	3.07	2.05	-0.10	-1.12

Source: Pan American Health Organization, Public Policy and Health Program.

If there is a question as to whether or not to use an urban survey, having an idea of how urban surveys predict relative to alternative methods can also be helpful. One of the alternative methods is to generate a national estimate from GDP per capita and a calculated regional elasticity (these estimations can include more variables. See Henderson (1994), Govindaraj et al (1995) or Suarez et al (1995). Table 4 shows the share of GDP spent by households on health, based on the results of a national survey. It also shows the national share that would be predicted if one only had the urban portion of the survey to represent national levels, and the national share that would be predicted if the regional elasticity and per capita GDP were used instead. In comparing the estimates obtained by using the urban portion of surveys with the forecasted household expenditures from the regional elasticity, on average, the urban portion of the survey was a better predictor of the national expenditures. Overall however the regional elasticity itself was not too bad a predictor (this is not too surprising, since the regional elasticity was calculated from a sample of more than 40 surveys, including the ones in this table).

How rural is the population, and what is their contribution to GDP?

The extent to which an urban survey will badly represent the level of national expenditures of a country will also depend on two factors:

1. the degree of urbanization of the population, and
2. the share of the rural population in GDP.

An urban survey in Venezuela, where less than 10% of the population is rural is likely to provide a very good estimation of national expenditures. An urban survey in Bolivia, where 42% of the population is rural is another story. However, if that 42% was also small in terms of their share of GDP, the urban survey may not be far off. For policy purposes it is clearly better to have information on what rural populations, and those below the poverty line are spending on health, but from the perspective of national aggregation of expenditures, their overall contribution may not effect national aggregates substantially.

What are the alternatives to using the urban surveys?

The two extreme options for dealing with urban surveys are to throw them out, or to use them directly to estimate national levels of expenditures, but depending on the information available in country, other possibilities do exist for adjusting urban figures. One rough adjustment used at PAHO for urban surveys from Argentina and Brazil, was to use the percentage differences between urban and national income/expenditure levels, and the regional elasticity to adjust the urban shares (see example from Brazil below). Using information from public co-payment data, and drug sales to adjust urban data is also important.

Example 2: Estimating national household expenditures using urban survey data in Brazil

From a regional study, including more than 40 household surveys, PAHO obtained an estimate of the regional elasticity of household health expenditures with respect to income of 1.03.

There was information from an urban survey of the South-East part of Brazil (Rio de Janeiro and Sao Paulo) that households spent an average of 1,923 CR –or 6.2% of their expenditures–on health. There were also estimations that households in the urban South-East spent 31,013 CR per capita on average, while the average for the rest of Brazil was 24,229 CR. Using the relationship:

$$\text{Elasticity} = (\% \Delta \text{ Health Expenditures}) / (\% \Delta \text{ Expenditure})$$

The estimates of National health expenditures were calculated as follows:

$$HE_{\text{National}} = HE_{\text{urban}} (1 + (\text{Elasticity}) * (\% \Delta \text{ Expenditure}))$$

This calculation gave an estimated value of 1,445 CR per capita for national health expenditures, or 5.96% of household expenditures.

Finally, urban and rural households may be misrepresented in other ways also. One problem is that the share of household expenditures devoted to health in rural areas may be artificially high because of the way in which data is collected. Rural households often consume products that were produced in the household (particularly food items), so that if the survey isn't adequately corrected for own-consumption, total household expenditure or consumption used in the denominator to calculate the share of household expenditure devoted to health would be too low, and the health share would then be too high. Another problem that may occur is that publicly provided health services may be provided directly in urban areas through special facilities, but in rural areas public health systems may require individuals to seek care in private facilities, and then reimburse the expenditures incurred. Surveys rarely ask that respondents specify expenditures net of those that have been reimbursed.

Despite the possible problems mentioned above, in many cases urban surveys are the only direct measures of household expenditures in health available. Failing all else, these surveys provide valuable information on spending patterns in the urban populations (about 70% of the population of the region). Using the best information on the country situation, it should be possible to achieve a reasonable measure of household expenditures from these surveys, particularly if pharmaceutical sales can be used to calibrate the results. The most important aspect to keep in mind is that all adjustments should be well documented.

Dealing with Older Surveys

The share of the private sector in health financing has been growing steady in the last two decades for most of the region, and in some countries other changes in the health sector have been quite dramatic (for example. Brazil, Bolivia, Nicaragua, among others). For these reasons, using an older survey to estimate current expenditure levels is at best a rough approximation. When this is the only data available, however, there may be few alternatives to using a survey five to ten years old. As with the urban surveys, the reasonableness of adjusting an older survey needs to be determined on a case by case basis, using specific knowledge of the history and situation of the health sector in question.

One adjustment that PAHO has used is similar to that used to adjust an urban survey to national estimates. The example below shows how this method would have been applied in the case of Jamaica, In this case, since we did have later data for Jamaica, we can also examine the accuracy of the estimate derived.

Example 3: Estimating household health expenditures using older survey data in Jamaica

Using the regional elasticity of 1.03 mentioned above in example 1, and the following relationship:

Elasticity = (% Δ Health Expenditures)/ (% Δ Income)

we can calculate an estimate of 1990 health expenditures as follows:

$$HE_{1990} = HE_{1984} (1 + (\text{Elasticity}) * (\% \Delta \text{ Income}))$$

Below is a table of the real per capita income and health expenditures for the years 1984, 1990 and 1994, and two examples of the estimated health expenditures we would have derived had we expanded the 1984 survey to 1990 and 1994 using this methodology. In this example, the differences between the actual and predicted estimates are less than 0.3% of GDP. It is worth noting however, that Jamaica's health sector is one of the countries where this methodology can be applied with greater confidence because the levels of change in the health sector have been relatively minor, and while Jamaica experienced economic difficulties in the crises of the 1980s, the impact was less than in many of the countries in the region.

Table 5: Comparison of predicted and actual levels of household expenditures in Jamaica

	1984	1990	1994
Real per capita GDP (Jamaican \$)	11,794	12,663	12,753
Predicted real per capita household health expenditures estimates	**	140	141
Actual real per capita household health expenditures	130	170	176
Predicted share of GDP (%)	**	1.11	1.11
Actual share of GDP (%)	1.1	1.34	1.38

Estimation of pharmaceutical expenditures

Importance of accurate estimates of pharmaceutical expenditures

Expenditures on drugs and pharmaceutical supplies account for a major share of household health spending in all countries, typically ranging from 30 to 70% of the total. Accurate estimation of these are important for two reasons: (i) levels of household and national pharmaceutical expenditures can be an important policy issue in themselves, (ii) pharmaceutical expenditures may be easier to estimate than other components of household spending, and thus represent a simple method of cross-checking and calibrating NHA estimates of total household health spending.

Data sources

There are three main types of information:

1. Household surveys of health expenditures
2. Industry sources
3. National Drug Accounts estimations

Household surveys

Most household surveys, which record expenditures related to health and medical care, specifically identify expenditures on drugs. These surveys provide an immediate estimate of household expenditures on drugs. However, these estimates are associated with the same disadvantages of all household survey estimates of expenditures, in that they may systematically over or underestimate the actual level of spending. Nevertheless, they are main source of data to measure differences in the levels of spending between groups of households.

When interpreting household survey data, care must be taken to identify which components of pharmaceutical spending are being measured in the survey. Some surveys may only include expenditures on prescription medications, and exclude over-the-counter (OTC) items. In some countries (Japan and Thailand, for example) where doctors are paid for their services primarily through the fees charged for drugs, reported expenditures for drugs may actually include a large element of spending which is primarily for doctors' services.

Industry sources

In most countries the most accurate and comprehensive source of data on pharmaceutical expenditures is the pharmaceutical industry itself. As pharmaceutical markets develop, pharmaceutical suppliers increasingly rely on detailed market information to both monitor relative sales performances of companies and drugs, as well as identify new market opportunities. There is a well tested methodology for generating such information, which depends on regular monitoring of a panel of retail outlets to track retail sales, combined with collection of sales data from suppliers. In most of the larger national markets, this information is compiled by a specialist international market research company called IMS International, and where it does not operate similar national companies are found. In the smallest markets, where such market research firms do not exist, the marketing departments of the latter pharmaceutical corporations will usually compile their own in-house estimates.

Industry data, particularly that of IMS, are of very high quality, because of the commercial incentives to produce accurate estimates. The only disadvantage of this type of data is that when they are available, they are usually costly to obtain. National pharmaceutical market reports from IMS typically cost in the range of US\$2,000 to US\$10,000. However, in those countries where detailed market estimates are provided, these reports are an accurate assessment not only of total pharmaceutical sales to households, but also of pharmaceutical sales to and by the various types of health care provider. They have the added advantage of being available on a regular annual or even quarterly basis, unlike household survey data.

In Latin America, IMS market reports are available for Argentina, Brazil, Central America, Chile, Colombia, Dominican Republic, Ecuador, Mexico, Peru, Puerto Rico, Uruguay and Venezuela. Further details can be obtained from PHR/Harvard, which has discussed special arrangements with IMS for purchasing reports for LAC NHA Initiative participants.

National Drug Accounts

In the absence of pharmaceutical industry estimates, or where these are considered too expensive, National Drug Accounts can be compiled. National Drug Accounts are similar in concept to NHA. They describe in financial terms the flow of drugs in a national health care system from suppliers to ultimate uses, in much the same way as do IMS reports.

To estimate NDAs, one must have an understanding of how drugs are procured and the structure of the distribution channels in a country. Then data must be collected on the import and export of drugs, production within the country, sales by pharmaceutical suppliers to wholesalers or ultimate users, average wholesale and retail profit margins and estimates made of the financial value of drug flows within the system. With this data, it is then possible to estimate the retail value of pharmaceutical sales by distributors such as pharmacies, shops, doctors and hospitals. Annex A outlines how this was attempted in Egypt, during calculation of their NHAs.

What to do if multiple data sources are available

If information on pharmaceutical spending is available from multiple sources, it may be necessary to either select one source for use, or make a composite estimate. When doing this, it is important as in other areas of NHA work to examine the methods used to collect the data in each source, and then judge the relative strengths and weaknesses of each. In general, for many countries the IMS estimates of pharmaceutical spending will be the most reliable, at least for modern pharmaceuticals.

Analysis of Pharmaceutical Flows in Egypt

The flow of pharmaceuticals in Egypt is described in the attached diagram. All pharmaceuticals in Egypt are assumed to be derived from imports and local production. All pharmaceuticals are assumed to be sold ultimately to households, public providers and private providers or exported from the country. In this simple analysis, amounts consumed through wastage or loss and changes in consumption due to changes in stock levels from year to year are ignored.

The following quantities can be valued in terms of Egyptian Pounds.

LP	=	Local production of drugs
IM1	=	Direct imports of finished drugs by Egyptian pharmaceutical companies
IM2	=	Direct imports of finished drugs by pharmacies
EX1	=	Recorded exports of drugs by Egyptian pharmaceutical companies
EX2	=	Smuggled exports of drugs from Egypt
W	=	Total sales of drugs by Egyptian pharmaceutical companies to pharmacies and other providers
W1	=	Sales of drugs by Egyptian pharmaceutical companies to pharmacies
W2	=	Sales of drugs by Egyptian pharmaceutical companies to all public providers
W3	=	Sales of drugs by Egyptian pharmaceutical companies to all private providers (excluding pharmacies)
P1	=	Sales of drugs by pharmacies to private hospitals
P2	=	Sales of drugs by pharmacies to private hospitals
Q1	=	Sales of drugs by Egyptian drug companies to private hospitals
Q2	=	Sales of drugs by Egyptian drug companies to other private providers
HH1	=	Sales of drugs by pharmacies to households
HH2	=	Sales of drugs by public providers to households
HH3	=	Sales of drugs by private hospitals to households
HH4	=	Sales of drugs by other private providers to households

Given the above assumptions and that the diagram is a realistic description of all significant pharmaceutical flows, then the following should be true.

Total imports of drugs into Egypt recorded by customs = $IM1 + IM2$

Total exports of drugs from Egypt recorded by customs = $EX1$

$W = WI + W2 + W3$

Total sales by pharmacies = $IM2 + WI + \text{profit on drug sales}$

Total sales by pharmacies = $PI + P2 + HH1 + EX2$

Total expenditures on drugs by private providers = $PI + P2 + Q1 + Q2$

If data are gathered on each of the above flows, then estimates can be made of many of the others. In certain cases, it is not necessary to have data on the actual amounts of expenditures. Instead estimates of the relative proportions between different flows can be of value.

Data sources

Numerous data sources can be used to complete the estimates. Potential sources are listed below.

Customs and trade statistics: IM1, IM2 and EX1

Sales data from drug companies: EX1, W1, W2 and W3

Purchase data from drug companies: IM1

4. Household survey data: HHI, HH2, HH3 and HH4
5. Survey data from pharmacies: HH1, P1 and P2
6. Expenditures data from survey of private hospitals: P1 and Q1
7. Expenditures data from survey of other private providers: P2 and Q2
8. Income data from survey of private hospitals: HH3
9. Income data from survey of other private providers: HH4
10. Income and expenditures data from public providers (MOH, HIO and others): HH2
11. Estimates by experts: EX2