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National Health Accounts Interim Estimation Model

April 2006

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Abstract

To maximize their usefulness and timeliness, NHA estimates need to include the most reliable and most recent data on government, donor, household, and employer spending on health. But, the most recent available data are often several years old, and the latest NHA estimate is consequently several years out of date. This gap presents a problem for policymakers wishing to know how (and whether) to change current programs and policies. Current values of important variables might be quite different from those estimated in the last NHA estimate, and it is difficult to assess the potential impacts of alternative policies when data on the current conditions in the health sector are unavailable. For the purposes of timely policy analysis, it would be helpful for policymakers to have an estimate of NHA for the current (or most recent) year, based on some reasonable estimates and/or assumptions about certain variables and parameters for the time that would have passed since the last NHA estimates were completed.

This paper attempts to devise and test various approaches and methods for creating interim NHA estimates that would provide up-to-date NHA data for decision makers in developing countries. The paper begins in Part One with an explanation of the concepts and methods of the proposed interim estimation approach, including tabular illustrations of the techniques proposed. It is called an “interim estimate” because it would be revised later once data on actual flows of funds in the health sector for that same 12-month period became available. This is followed in Part Two by a review of the literature on similar efforts that have been made in developed countries—a review which highlights the significant challenges faced in attempting to begin such an effort in developing countries. The proposed techniques are then, in Part Three, applied in Ethiopia in order to test their feasibility by making an interim estimation for 2002/2003 based on two previous rounds done in 1995/1996 and 1999/2000. Part Four gives the findings, conclusions, and recommendations for further work in this area.

Important recommendations include: (1) interim estimation of NHA should not be attempted on a regular basis for more than one top-level NHA table—namely, that table showing flows of funds from financing agents to health care providers; (2) no interim estimation should be attempted unless certain preconditions have been met, the two most important being: (a) that at least two (preferably more) NHA estimates have been completed using the same categories; and (b) that there have been no major disruptions in the economy or the health sector since the latest NHA estimate; (3) an interim estimate should be approached with a keen understanding of how the estimate will be used and of the variation in reliability of the different cell estimates (particularly for donor funding); and (4) since interim estimation is dependent on knowledge of assumptions and methods used in previous actual NHA estimates, reporting on such assumptions and methods should be thorough and complete in the actual estimates, with any changes noted and justified as actual estimates are updated.

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Acronyms

BLS	Bureau of Labor Statistics
CBHI	Community-based Health Insurance
CIHI	Canadian Institute for Health Information
CMS	Centers for Medicare and Medicaid Services
CPI	Consumer Price Index
CRDA	Christian Relief Development Association
DPPC	Disaster Preparedness and Prevention Commission
ESRDF	Ethiopian Social Rehabilitation and Development Fund
FMOH	Federal Ministry of Health (Ethiopia)
GDP	Gross Domestic Product
GNP	Gross National Product
HH	Household
HICES	Household Income, Consumption, and Expenditure Survey
ICHA	International Classification of Health Accounts
MOD	Ministry of Defense
MOE	Ministry of Education
MOF	Ministry of Finance
MOFED	Ministry of Finance and Economic Development (Ethiopia)
MOH	Ministry of Health
NGO	Nongovernmental Organization
NHA	National Health Accounts
NHE	National Health Estimates
OACT	Office of the Actuary
OECD	Organization for Economic Cooperation and Development
OOP	Out of Pocket
PHC	Personal Health Care
PHR<i>plus</i>	Partners for Health Reform <i>plus</i>
RB	Regional Health Bureau
SHA	System of Health Accounts
USAID	United States Agency for International Development
WMS	Welfare Monitoring Survey

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Executive Summary

To maximize their usefulness and timeliness, National Health Accounts (NHA) estimates need to include the most reliable and most recent data on government, donor, household, and employer spending on health. Very often, the most recent available data are several years old, and the latest NHA estimate is consequently several years out of date. This gap between the most recent NHA estimate and the present period, however, presents a problem for policymakers wishing to know how (and whether) to change current programs and policies. Current values of important variables might be quite different from those estimated in the last NHA estimate, and it is difficult to assess the potential impacts of alternative policies when current data are unavailable or incomplete.

For the purposes of timely policy analysis, it would be extremely helpful to be able to provide policymakers with an estimate of NHA for the current year, based on some reasonable estimates and/or assumptions about certain variables and parameters for the time that would have past since the last estimate of NHA flows of funds was completed. Because of potential unevenness in the availability and reliability of up-to-date data, however, it is likely that interim estimation will have to be limited to top-level tables (one or two of the main tables) and that updates may be more reliable for some cells (or aggregates of cells) than for others. As NHA teams achieve a longer time series of NHA estimates (beyond the two rounds that is now typical for developing countries) and are able to access to more reliable and up-to-date data, interim estimation may be able to achieve more refined estimates.

This paper will attempt to devise and test various methods for creating interim NHA estimates that would provide up-to-date NHA data for decision makers in developing countries. The paper begins in **Part One** with an explanation of the concepts and methods of the proposed interim estimation approach, including tabular illustrations of the techniques proposed. The techniques are designed to enable NHA estimators to make an interim estimate NHA for the current (or most recent) year based on NHA estimates of previous years. It is called an “interim estimate” because it would be revised later once data on actual flows of funds in the health sector for that same 12-month period became available. This is followed in **Part Two** by a review of the literature on similar efforts that have been made in developed countries—a review which highlights the significant challenges faced in attempting to begin such an effort in developing countries. The proposed techniques are then, in **Part Three**, applied in Ethiopia in order to test their feasibility. While it was intended to apply the techniques to two countries, adequate data could not be found for a second test application. **Part Four** gives the findings, conclusions, and recommendations for further work in this area.

Part One (Concepts and Methods): Interim estimates of NHA values will necessarily rely on a variety of techniques. For the most part, these techniques rely on estimation of past trends in actual NHA estimates which are then used—with any necessary adjustments—in extrapolating past trendlines forward to the interim year. Any adjustments would be made according to the analyst’s best judgment, which would be informed by all relevant data and knowledge that could be collected concerning trends in demographic and macroeconomic variables, as well as in public health policies that may have impacted flows of funds in the sector. Mathematical manipulation of past actual NHA estimates is most applicable for market-based components of NHA—that is, those flows of funds from households (out-of-pocket spending), employers, and private health insurers. For budget-driven

components, however, the use of past trends is not likely to generate reliable estimates. For government spending, interim estimates could be made by acquiring current budget estimates and applying a historical average of the spend-out rate. For donor spending, which is much less predictable than any other category of spending, there is no more reliable technique than direct acquisition of budget estimates from the major donors and applying reasonable parameters of spend-out rates to the data acquired. In general, the value of any interim estimate lies in updating the most important components of the major categories of spending. It is the dynamic changes that have occurred in the components of particular categories that are of particular interest to policymakers, and of particular usefulness to policy analysts—more so than are the totals that such components may generate.

Part Two (Literature Review): Interim estimation of NHA has been developed and performed to date only in Canada and the United States. (Countries of the Organization for Economic Cooperation and Development (OECD) are still making only actual estimates of national health expenditures.) While Canada has performed interim estimates only to bring its actual estimates up-to-date (an approach that is addressed in this paper), the United States has refined interim estimation methods to be applied for making estimates of health spending projected 10 years beyond the present. The U.S. government's efforts, which have been evolving over the past 25 years, now involve very sophisticated econometric modeling techniques that revise and extend actual, interim, and projected estimates on an annual basis—adding one year to the projections each time an estimate is made. The methods now used in the United States and Canada, of course, are not possible to apply in developing countries, simply because the required time series data are not available. Instead, the interim estimation approach developed in Part One in this paper is much more closely related to the very early components-of-growth methods used by the United States in 1980 and earlier. The most recent estimates project national health expenditures (by type of expenditure (provider) according to financing agent) through 2013. In general, the interim and projected estimates made by both Canada and the United States require, for their reliability, an extended time series of yearly estimates of actual health spending. For purposes of applying even rudimentary methods of interim estimation in developing countries, it would be necessary to have at least two point estimates of actual data that used comparable definitions and estimation methods. While two such point estimates are the minimum required, interim estimates would be more robust the more point estimates from the past there are available to be used. Obviously, the data required for the use of econometric methods are not available in developing countries, and will not be for some time to come. While NHA is designed to produce as many as nine tables of data, and while the interim estimation approach described in Part One outlines a method to estimate the two main tables, it has been the practice by both the United States and Canada only to produce one table of interim and/or projected estimates. That table is one that shows health expenditures by type of service/provider according to financing agent-making payment.

Part Three (Application in Ethiopia): Application of the proposed approach and techniques of interim NHA estimation to Ethiopia was made for the year 2002/2003 based on round one NHA estimates for 1995/1996 and round two estimates for 1999/2000. The application was made difficult by several factors. The first round of NHA estimates for the year 1995/1996 using the classification approach developing by the Partnerships for Health Reform (PHR) Project. This classification approach was modified significantly by the *Guide for producing national health accounts with special applications for low-income and middle-income countries*, also known as the *Producers' Guide*, that was published World Health Organization, World Bank, and U.S. Agency for International Development in 2003—which was used as the basis for the second round NHA estimates made for the year 1999/2000. The difference in classification of entities for which flows of funds were estimated is especially pronounced for types of services/providers. This meant that interim estimates of the cells of the table of health expenditures by financing agent could not be reliably

performed because the two NHA estimates were incomparable. However, it was possible to perform interim NHA estimates for the table showing flows of funds from original sources to financing agents. Even this estimate needed to be qualified, however. Second, government and donor expenditures estimated in the second round of NHA were substantially different from a reasonable trendline, for two important reasons. One, the Ethio-Eritrean War was taking place during the round-two estimate period (1999/2000) and government spending on health was distorted by major health spending on the military, which was partly financed by reduced health spending elsewhere. Two, the war caused some major donors to suspend and/or reduce financial assistance because of the gross distortion of resource allocation priorities caused by the war. Finally, donor spending rebounded significantly after the war, and has likely increased at a growth rate much higher than experienced before the war—primarily because donors made substantial sums available for the prevention, diagnosis, and treatment of HIV/AIDS conditions. Interim estimates of donor spending for 2002/2003, therefore, would need to be crudely estimated after gathering some primary data from donors themselves, as past trends in the growth of donor spending would have been irrelevant for extrapolating forward.

Part Four (Conclusions and Recommendations): An attempt was made to apply the interim estimation approach and techniques to a second country—Uganda—where three recent rounds of NHA estimates have been completed (rounds two through four, 1999/2000, 2000/2001, and 2001/2002). Even though all three rounds of estimates were based on the classifications suggested in the *Producers' Guide* and even though they appeared to satisfy other preconditions required to make interim estimation possible, an interim estimate could not be done because the underlying components of many of the estimates (particularly those relating to private spending) were not reported in the text of the report. Without knowledge of these components of important actual estimates, growth rates for periods beyond the years already estimated could not themselves be estimated.

Specific Conclusions

Based on the work completed in the first three parts of this report, there are a number of conclusions to be drawn:

1. Interim estimation of NHA should not be attempted on a regular basis for more than one major (top-level) NHA table. That table should be the one showing flows of funds from financing agents to health providers—the standard used by the United States in its time series of interim and projected estimates of National Health Expenditures since the 1970s. Interim estimation of the table showing flows of funds from original sources to financing agents is not of sufficient policy interest (as it does not enable policymakers to focus on differential growth rates in payments to, and receipts by, the various provider types) to be the focus of the substantial resources that would need to be devoted to this task.
2. Interim estimation of NHA in developing countries will always be plagued by a high degree of uncertainty about recent trends in donor spending. There are no easy solutions to this difficulty except to try to collect the relevant data directly. Even then, the spend-out rate (which is a function of absorptive capacity of the recipient government) will dictate the actual amount of spending, which could vary considerably from one year to the next (especially under current circumstances of large increases in obligations by special purpose funds like the Global Fund to Fight AIDS, Tuberculosis and Malaria).
3. Meeting the preconditions for interim NHA estimation is critically important if resources expended are to be efficiently used. (While it was initially thought that the Ethio-Eritrean

War may not have violated the precondition requiring relative stability, subsequent estimation efforts showed that it did. See notes included in the Annex.) In addition to the four preconditions noted in the concept paper (Part One), another one could be added: that the two or more comparable actual NHA estimates include the reporting of **all** the relevant components of major cell estimates (such as coverage/enrollment in health benefit plans, use per enrollee, costs per use, etc.).

4. Any interim NHA estimate should be approached with a keen understanding of how the interim estimate is to be used, and that data in some cells (or aggregates of cells) may be more reliable than those in others. To some extent, an updating of older actual NHA data does provide policy analysts and policymakers with a clearer picture of the current circumstances in the sector. However, it is the underlying trends in component data that is really of interest in policymakers, and, if these data cannot be presented as being the foundation for the aggregated estimates in the major cells, then it may be difficult for a policy analyst or a policymaker to draw any inferences from the gross changes that are estimated to have taken place.

Recommendations

1. A time series of at least two, preferably many more, actual NHA estimates are needed before an interim NHA estimate should be attempted.
2. The preconditions for performing an interim NHA estimate need to be strictly satisfied, especially if one is relying on only two or three actual rounds of NHA estimates.
3. Reporting on the methods and assumptions used in completing actual NHA estimates must be much more thorough and complete than has been evidenced to date in many NHA reports. Without knowing the explicit data that are the foundation for the cell totals, it is quite impossible to know how to create interim estimates according to any approach or techniques that could be devised.

Since it has proven somewhat premature to try to develop and apply interim estimation techniques to actual rounds that have already been completed in the field, some thought and preparation now needs to be given to establish the necessary basis for attempting another effort at interim estimation in the future.

Part 1

1. Developing an Interim NHA Estimation Tool: Concepts, Methods, Illustrations

1.1 Problem to be Addressed

To maximize their usefulness and timeliness, NHA estimates need to include the most reliable and most recent data on government, donor, household, and employer spending on health. Very often, the most recent available data are several years old, and the latest NHA estimate is consequently several years out of date. The principal constraint on development of more timely NHA estimates is the length of time it takes statisticians to process the most recent nationally representative household income and expenditure survey.¹ In extreme cases, the time lag between the administration of a household survey and the estimation of NHA can be as much as four years.

This gap is bound to close as countries progress beyond their first NHA estimate, and as the demand for more up-to-date NHA estimates pushes authorities to conduct more frequent household surveys. Nevertheless, there will very often be a gap of two to three years between survey administration and the availability of data for analysis and for NHA estimation.

The gap between the most recent NHA estimate and the present period, however, presents a problem for policymakers wishing to know how (and whether) to change current programs and policies. Important variables could have changed in the health sector since the last NHA estimate, and it is difficult to estimate the potential impacts of alternative policies when current data are unavailable or incomplete.

For the purposes of timely policy analysis, it would be extremely helpful to be able to provide policymakers with an estimate of NHA for the current year, based on some reasonable estimates and/or assumptions about certain variables and parameters for the period since the last estimate of actual NHA flows of funds was completed.²

¹ Recent surveys of donor and employer health spending would also be desirable if available.

² There would also be a need for series of NHA estimates for future years that would constitute a “baseline” or benchmark (representing the continuation of current laws, policies, and programs unchanged) against which a policy analyst could measure the impact of changes in law, policy, or programs. Such a “baseline” projection could use techniques similar to those developed for this interim estimation tool.

1.2 Objective

The objective of this concept paper is to propose and describe the basic features of an estimation tool that would enable NHA estimators to make an interim estimate NHA for the current year³ based on NHA estimates of previous years. It is called an “interim estimate” because it would be revised later once data on actual flows of funds in the health sector for the same 12-month period became available.

1.3 Approach and Expected Results

The interim NHA estimate would use the same accounting structure and institutional and data definitions as were used in the most recent actual NHA estimate. However, it is not possible or even necessary to replicate the entire range of NHA tables (also referred to as “matrices”). It would probably suffice to produce one or both of the two most important ones:

- ▲ Matrix 1, showing financial flows from primary sources to financing agents; and
- ▲ Matrix 2, showing flows from financing agents to providers/types of services.⁴

The data in these matrices would provide the basic data framework for more focused analyses that might be applied to particularly salient policy or program issues as identified by political leaders. In addition to the interim estimates put forth in the matrices, tabular reports would also be produced, showing:

- ▲ the major summary indicators of the relative importance of the various components of health spending in total health spending, and in the larger national and household economy; and
- ▲ the trends in important variables (or parameters) underlying the NHA estimates, including the assumptions made about their values for the interim NHA estimate.

Since NHA estimates do have much potential in providing policy-relevant data for decision makers and for providing important data for policy analysts, it is important to recognize the limits on the usefulness of these current efforts to develop interim NHA estimates. First, the level of disaggregation that is possible in these early efforts is limited. Disaggregation will be limited to decomposition of particular cell totals (but by no means all cell totals) into their components so that past growth rates of those components can be estimated for derivation of trendlines to be extrapolated towards the interim estimate year. It is unlikely, as will be shown in the development and application of the interim estimation approach and techniques, that interim estimates (and the data that are used to develop them) will be useful in determining efficient or effective resource allocation decisions—either for government or donor spending in themselves, or for the sector as a whole. Aids to resource

³ “Current year” would be defined as the year most recently ended. The specified “current year” must have ended in order that the analyst not combine, at least conceptually, estimates of past events with estimates of future events. “Current year” should also be the same 12-month period as the period used for actual NHA estimates (whether fiscal year or calendar year).

⁴ This is traditionally the table that is produced for actual estimates in time series by countries of the Organization for Economic Cooperation and Development (OECD), for interim estimates (“nowcasts”) by Canada, and for interim and projected estimates by the United States. While interim estimation of two tables would be considerably more difficult and time consuming than estimating just one (Table 2), but the option of doing two is presented here for completeness.

allocation decision-making require additional related analyses that go well beyond the scope of methods developed and discussed for interim estimation.⁵

1.4 Methodology

Design of an interim NHA estimate would include the following steps or components:

1. Satisfying the preconditions for being able to make an interim estimate;
2. Identifying the structure of the NHA table(s) (and component cells therein) to be estimated on an interim basis; if two matrices are to be estimated, their structures would establish the accounting identities across the tables (i.e., row totals in Matrix 1 equal column totals in Matrix 2);
3. Choosing the sequence in which cells of the matrix or matrices will be estimated (i.e., if two matrices are to be estimated, deciding which side of the identity equation will be estimated directly and which component of the other side of the equation will be considered the residual);
4. Specifying the estimation methods to be used and the assumptions to be adopted about the pertinent variables and parameters those methods will be applied to, including their trends over time (yearly rates of change) as can be reasonably calculated based on previous NHA estimates or on other available data or analysis;
5. Articulating any public policy or program changes that have occurred since the last NHA estimate, expressed in terms of changes in the estimation components; and
6. Performing the interim NHA estimate for the tables selected.

The methodology proposed for use in each step or component is described below.

Step One: Satisfy the preconditions for being able to make an interim estimate.

The preconditions for being able to make a reliable interim NHA estimate are:

- ▲ NHA estimates of actual flows of funds have been made for at least two separate years, at least two or three years apart;

⁵ One example would be the “marginal budgeting for bottlenecks” tool currently being developed on a country-specific basis by World Bank staff working closely with host country professionals (e.g., Health Care Financing Secretariat, Ministry of Health, Federal Democratic Republic of Ethiopia, “Health Services’ Contribution to Ethiopia’s Reaching Its Millennium Development Goals (MDGs) “Spending More and Spending Better”, Technical Note, December 2003.

- ▲ The accounting structure of the NHA (identification of institutions by row and column, data definitions, and boundaries) are very similar (for comparability) for the years for which actual NHA estimates have been made;⁶
- ▲ It has not been more than three (or, at most, four) years since the most recent NHA estimate; and
- ▲ There has not been a serious economic or political disturbance since the last NHA estimate that would make it difficult to make a reliable interim estimate.

Step Two: Identify the structure of the NHA table(s) (and component cells therein) to be estimated on an interim basis (if two matrices are to be estimated, this step would establish the accounting identities across the tables (i.e., row totals in Matrix 1 equal column totals in Matrix 2)).⁷

In discussing these steps, we refer to the generic NHA tables⁸ shown in Exhibit A.⁹ At a minimum, an interim NHA estimate should provide updated amounts for the flows of funds from primary sources to financing agents (Matrix 1) and/or for those from financing agents to providers (Matrix 2). Because of the accounting identity between row totals of Matrix 1 and column totals of Matrix 2 (each gives totals by financing agent), one can choose whether to perform a direct (interim) estimate of the components of the row totals (in Matrix 1) or of the column totals (in Matrix 2). The first would be a demand side estimate (calculating how much a purchaser or primary source actually paid to each financing agent) and the second would be a supply side estimate (calculating how the amounts received by each financing agent were distributed among providers). A direct estimate for one matrix would provide a target total for the sum of components for the same financing agent identity in the other matrix.

A third matrix showing flows of funds from financing agents to functions (Matrix 3) might also be included in the interim estimate. But, for this matrix, the estimates of distribution by function would be little more than guesswork, or an arbitrary trending forward of an identical distribution by function for each financing agent (possibly included for illustrative purposes). It is therefore not included in this model.

Step Three A: (Two matrices) Choosing the sequence in which cells of the matrices will be estimated (i.e., deciding which side of the identity equation will be estimated directly and which component of the other side of the equation will be considered the residual).

The interim estimate incorporates an estimate of the growth or expansion of each side of an identity: the total amount of money given by primary sources to financing agents must equal the total

⁶ As will be seen, this requirement means that, ideally, the two or more actual estimates on which the interim estimate would be based would have been developed using a consistent approach such as is recommended in World Health Organization, World Bank, and U.S. Agency for International Development, *Guide to producing national health accounts, with special applications for low-income and middle-income countries*, Geneva: 2003, also known as the *Producers' Guide*.

⁷ The accounting identities are not relevant if one chooses to estimate only one table. Estimating both tables would require much more work than estimating only one. An interim estimate of Matrix 2 would be sufficient to provide the core data for the sector in one table.

⁸ The structure of the table(s) selected for interim estimation will, of course, be identical to that of the most recent actual NHA estimate. Generic tables are presented here to give an illustrative framework for distinguishing alternative approaches to estimating different kinds of data from different sources.

⁹ Matrix 2 is a generic table based on the provider types according to the Partnerships for Health Reform/Partners for Health Reform *plus* approach used prior to the publication of the *Producers' Guide* in 2003.

amount of money given by financing agents to providers. One approach, discussed first, estimates totals for each financing agent by summing the contributions from each primary source to that financing agent. The other approach estimates totals for each financing agent by summing up the shares received by each provider from each financing agent.

In most situations, an interim estimate of the total for each financing agent is best made by estimating changes in payments from primary sources to each financing agent, and then summing up the amounts by financing agent. One could use the interim total arrived at to then impute part of, or all of, the distribution of payments by each financing agent among the various providers. Or, if it is possible to estimate the distribution of those funds by provider, the total could be estimated directly using estimates of provider receipts from each financing agent. Whichever approach is adopted, the interim estimate would apply the same estimation approach used in the most recent actual NHA estimate.

Each of the row totals in Matrix 1 is mathematically identical to each of the respective column totals in Matrix 2—both entities being the same financing agent. Thus, the components of the row totals in Matrix 1 equal the components of the respective column totals in Matrix 2. Referring to Exhibit A, the funds flowing from employers (J) is the sum of contributions from employers (D) and employees (E) in Matrix 1, and is also the sum of payments to providers ($c + h + m$) by employers plus the employers' administrative costs (r). The residual in the interim estimate of the flows through any particular finance agent will be the one for which an interim (direct) estimate would be, comparatively, the most uncertain.

Step Three B: (One matrix only) Choosing whether row totals or column totals will be target estimates, and then which row (provider) or column (financing agent) will be estimated as a residual in the estimating process.

Step Four: Specifying the estimation methods to be used and the assumptions to be adopted about the pertinent variables and parameters to which those methods will be applied, including their trends over time (yearly rates of change) as can be reasonably calculated based on previous NHA

This step requires the development of the specific assumptions about relevant variables and parameters that will be used in the model and identifying the estimation methods to be used for interim estimates of each cell. The estimation methods applied would be dictated by the kinds of data that were used in the most recent NHA estimate and the mathematical formulae used for arriving at the result in each cell. To accomplish this, one would divide the NHA data into components for which similar estimation techniques and/or common assumptions about relevant parameters and variables could be used. The major distinction is that some quantities are budget-driven and some quantities are demand-driven. Budget-driven quantities are determined entirely by those responsible for deciding how much to allocate, obligate, and, ultimately, spend on health care. Demand-driven quantities are determined largely by the willingness and abilities of private parties to pay for health and medical care. One set of common assumptions should be applied, as relevant, to all aspects of the interim estimate. For making the actual interim estimates of each cell in a matrix, however, assumptions will be made that are particular to that particular estimate.

Step Five: Articulating any public policy or program changes that have occurred since the last NHA estimate, expressed in terms of changes in the interim NHA estimation assumptions.

One can distinguish two types of changes in spending due to changes in health policies and/or programs:

1. Changes in direct spending by government agencies (including donors) through budget-funded activities;
2. Changes in health spending by nongovernment agencies (excluding donors), employers, and/or private individuals that are indirectly caused by changes in government policies and/or programs.

The impacts of both types of changes need to be approximated by the analyst, using whatever interim estimating methods can be most reliably applied, and incorporated in the assumptions about trends in variables and parameters as developed in Step Four. Issues involved in taking account of policy and program changes are described and discussed later in Section 5.3.

Step Six: Inserting the values into the model to perform the interim NHA estimate.

The next section (Section 5) gives a detailed description of each of the above proposed steps in interim estimation. Section 6 presents a description of the generic estimation framework and an illustrative example of the approach and methods proposed.

1.5 Interim Estimation Approaches and Techniques

Before describing the recommended process of calculating each of the elements (cells) of an interim NHA estimate, it would be helpful to review the mechanics, concepts, and methods of that process. Most of these mechanics, concepts, and methods are familiar to one who has already participated in the development of an actual NHA estimate. However, some apply only to the process of interim estimation.

1.5.1 Mathematical Structure and Mechanics of Interim Estimates

Interim NHA estimates are made, where possible and reasonable, by expanding the values of each of the cells of the most recent actual NHA estimates by applying best estimates of yearly growth rates for each cell for the number of years since the most recent actual NHA estimate.¹⁰ These estimated yearly growth rates are those that are indicated by trends reflected in the last two of more actual NHA estimates. The proposed mathematical structure and mechanics of the estimating process is described below in this section.¹¹ The process of developing best estimates of yearly growth rates using extrapolation of trends is discussed in the next section. Alternative methods for estimating cells to which trend extrapolation may not apply will need to be discussed in field applications.

¹⁰ It will be shown that using estimated trends in growth rates cannot be reasonably applied to government spending (which is subject to political changes that affect the allocation and spending decisions in unpredictable ways) nor to donor spending (which is subject to changes in donor preferences and priorities that are known to shift rather frequently).

¹¹ Discussions below of “identities” and “sequencing” are relevant only to efforts to estimate the two main matrices. The simpler process of estimating only one (if only one, Matrix 2 is recommended) does require a selection of the cells to be considered “residuals.”

1.5.1.1 Identities

The mathematical identity of the value of row totals in Matrix 1 and of column totals in Matrix 2¹² provides the opportunity to approach an interim estimate from either side of the identity equation.¹³ Since the sum of funds received by each financing agent from all sources must equal the sum of funds paid out by each financing agent to all providers (plus administration costs, reserves, working capital, etc.),¹⁴ an estimate of the first sum could be used to estimate the components of the second sum, or vice versa.

For example, as shown in Exhibit A, the flow of funds through insurers is expressed as the identity:

$$\text{Row Total J (in Matrix 1)} = \text{Column Total J (in Matrix 2)}$$

These totals can also be expressed as sums of their component parts in the respective matrices:

$$D + E \text{ (sources of funds)} = c + h + m + r \text{ (payments to providers, admin/reserves)}$$

1.5.1.2 Sequencing

The sequence in which interim estimates are performed depends mostly on which approach is most efficient given the availability and reliability of the data. Generally speaking, it is easier to estimate totals for each financing agent by summing up estimates of its sources of funds than by summing up estimates of the distribution of its payouts to providers. This being the case, the preferred sequence would be to first estimate the row totals of Matrix 1, and then insert those estimates as column totals in Matrix 2. Those column totals would then be used as target totals for estimating the distribution of payments among providers.

Thus, interim estimates of amounts flowing from D (employers) and E (households) are estimated first to arrive at an interim estimate of J in Matrix 1. Then this estimate of J is used as the total that the sum of provider payments must equal in Matrix 2.

1.5.1.3 Residuals

Conventional validation of NHA estimates is performed by ensuring consistency across tables and within tables for the sums that should be identical. Already mentioned is the identity of the row totals in Matrix 1 and the column totals in Matrix 2 (totals for different financing agents required to be consistent across tables involving financing agents). Moreover, within any particular table, it is necessary for the sum of the totals of each row to be equal to the sum of the totals of each column. Those analysts who have performed actual NHA estimates are familiar with this mathematical

¹² There can be, in practice, a difference between actual payments from primary sources to financing agents and payments from financing agents to providers during any given time period. Thus, strictly speaking, any discrepancy would be due to the fact that the financing agent could be holding, at the end of the estimation period, some net amount of monies paid in but not paid out during that period. One could assume primary sources had not spent their amounts until providers received it, include reserves with administrative costs, or add a line in Matrix 2 called "withheld/reserves" and estimate the amount left unspent.

¹³ Of course, if only one table is subjected to interim estimation, there is no requirement to ensure cross-table consistency.

¹⁴ Note that it is the convention in NHA estimates that the flow of funds is from the column identity to the row identity in all matrices.

certainty and that it requires one to choose which cell to designate as a residual—that is, one that is dictated by the estimate of the total less the estimates of all the others (it is not itself directly estimated).¹⁵

The same consistency, and the selection of a residual cell, is required when making interim NHA estimates. For interim estimation of just one NHA table, it is only necessary to choose a residual if any of the growth rates applied for expanding cells are divergent from trendline. It is unrealistic to assume all components of an NHA estimate would grow at exactly the same rate as they did between the two most recent actual NHA estimates. For interim estimation of two NHA tables, one can see how one must select a residual in order to be realistic. For example, if one were to estimate the components of column totals in Matrix 2 by replicating the same distribution among the providers (rows in Matrix 2) as was estimated for the most recent NHA estimate, this would be the same as assuming that spending on each grew at the same rate. However, it is unlikely that this would have been the case. The alternative method would be to develop separate growth rate trends for payments to each provider type, except for one, which would be chosen as the residual. Ideally, the residual cell would be chosen as the one for which a directly estimated growth rate trend is most uncertain or unreliable.

1.5.2 Concepts and Components of Interim Estimates

For the most part, interim estimates of NHA components are made by extrapolating trends revealed in the various components of actual NHA estimates from two or more past years. The longer it has been since the last actual NHA estimate, the more uncertain the use of extrapolating trends to make an interim NHA estimate. In any event, for some variables and parameters of estimation, trend extrapolation is not reliable in itself, and the rates of change to be applied in the interim estimate should be adjusted upward or downward to reflect known (or, at least, plausible) differences from the trendlines.

A major component of any interim estimate is the determination of the rates of change in key variables, and of the values of key parameters (constants). After discussing the mechanics of extrapolating trends, we discuss the most important assumptions that need to be adopted.

1.5.2.1 Extrapolation of Trends¹⁶

The basic approach to interim estimation, for cells for which it is applicable, is to extrapolate the values of “known” data taken from past actual NHA estimates to a current period (or, more precisely, to the most recent 12-month period that corresponds to the period of the most recent actual NHA estimate). Because of the aggregated nature of many actual NHA values and of the need to arrive at those values by imputing some or all of their underlying components, however, some of the “known” data are themselves based on some degree of conjecture—just as any extrapolated interim estimate would be.

But the process of extrapolating, or of predicting interim values by projecting past values to a more recent period, must be used extensively in any interim estimate. It involves calculating, for any

¹⁵ In general, a residual is one whose value is fixed at that value required in order that a row or column total be equal to the total value required by an independent calculation.

¹⁶ See Section 5.2.3.

particular variable to be estimated, the trend in past values,¹⁷ which is typically measured in terms of the average annual rate of change.

If only two point estimates of the actual value of a variable (or a cell) are available, then the trend is simply the compounded annual rate of change in that value from the first point to the second. If there are more than two point estimates, one could calculate the change as the average annual rate of change. This latter method gives equal weight to the rate of change between any two values, and does not consider the most recent point estimate as dominating or dictating the trend to be extrapolated.

For many variables, their documented trends (based on past “known” values) are a very good predictor of future (or, most recent, in this case) values. However, for some variables, there can be considerable volatility, year to year, in rates of change over time. Therefore, it is recommended that the use of trendlines for extrapolations be modified, in some cases, by the judgment of the analyst. Usually, while the analyst might confidently predict the direction of any deviation from trendline (i.e., higher or lower than what past experience would indicate), predicting accurately the degree of deviation is a very uncertain exercise. Then the analyst would need to make an educated guess on the degree to which the trendline to be extrapolated is expected to deviate from the trendline based on past “known” values.

The actual trendline averages could be adjusted by the analyst to reflect any changes away from the variable trendlines (or the parameter average) if there is good reason to believe there has been a divergence from the trend. Any policy or program changes, of course, would need to be expressed in divergences from trendlines (e.g., accelerating trendline and decelerating trendline shown in Exhibit B) implied by previous actual NHA estimates (this is dealt with directly in Step Five described in Section 5.3 below).

1.5.2.2 Specifying Assumptions

Interim estimation requires the development of the specific assumptions about relevant variables and parameters that will be used in the model and identifying the estimation method to be used for interim estimates of each cell. The estimation methods used would be dictated by the kinds of data that were used in the most recent NHA estimate and the mathematical formulae used for arriving at the result in each cell. Some assumptions about rates of change in demographic and economic variables should be applied consistently as needed across all relevant aspects of the interim estimate.

Demographic and Economic Changes

Because demographic and economic factors influence levels and patterns of spending on health in any country, it is important to calculate interim estimates of these two variables.

- ▲ Change in population
- ▲ Change in per capita income or per capita expenditure

¹⁷ Extensive use of sophisticated econometric modeling needs to be used to estimate the relative contribution of factors hypothesized to affect the growth rates. The parameters estimated from the multivariate analysis of past time series values are then applied to the simulation of values going forward from the most recent actual.

The influence of population changes, of course, is obvious. As for economic factors, the ability of governments and households to spend on health-related goods and services will depend upon levels of income available to each. As their revenues and incomes rise or fall, so will their spending on health rise and fall, more or less proportionately. Interim estimates of two indicators of spending capacity, general revenues of government and household income, would provide essential benchmarks from which aggregate estimates of health spending by each could be estimated.

For purposes of summarizing the interim NHA estimate and relating it both to previous estimates and to the current macroeconomic conditions of the country, it would be helpful to develop a table of indicators as is usually presented with NHA. This table would include such indicators as percent of government budget spent on health, percent of gross domestic product (GDP) spent on health, public and private shares of spending, health spending per capita, etc. (see example in Exhibit C.)

Government revenue/spending

As a percentage of total government revenues, health spending by government varies depending upon how policymakers respond to demands for resources from non-health sectors and how much they decide in any one year to allocate (and spend) for health. While there are many considerations to take into account when trying to make an interim estimate of government's health budget,¹⁸ a reasonable first cut would be to assume the percentage allocated to health remains the same (as in the most recent actual NHA estimate), or changes according to a recent trendline, and applying that percentage to an estimate of total government spending for the period. (One could estimate total government spending as being in the same relation to total government revenues as was estimated in the most recent actual NHA estimate, unless there are sound reasons for making it higher or lower.) (More discussion on interim estimates of government health spending is included below in Section 5.2.3.1.1.)

Household income/expenditures

As a percentage of total household spending per capita, out-of-pocket (OOP) health spending per capita varies according to household income available to be spent.¹⁹ It is known, for example, that, over time, health spending increases faster than incomes increase (when they increase) and that it decreases faster than incomes decrease (when they decrease). This phenomenon is reflected in the fact that the income elasticity of demand for health care is greater than one. Research has shown that most commonly, such income elasticities are between 1.0 and 1.6.²⁰ If it were 1.2, for example, a 10% increase in per capita income would be accompanied by a 12% increase in per capita health spending, and a 10% decrease in per capita income would be accompanied by a 12% decrease in per capita

¹⁸ This would be the approach if one does not have direct information on budgeted amounts for the same cells estimated in recent actual NHA estimates. These budget amounts, if not available, would have to be modified to reflect actual spending (see Section 5.2.3.1.1).

¹⁹ Considered in the aggregate. When OOP is disaggregated by type of spending or choice of provider, one can derive more refined estimates by applying estimated growth rates to use rates and to spending rates by type of spending or by choice of provider.

²⁰ These estimates are based on international cross-sectional time series data. Research has not established clear relationships between income and health spending over time within countries. Research also has shown that income elasticity rises with income. Thus, the higher one's income, the higher the percentage of any such increase in income (relative to those with lower incomes) will be spent on health. Similarly, the lower one's income, the lower the percentage of any increase in income (relative to those with higher incomes) will be spent on health. If changes in the distribution of household incomes accompanied changes in household incomes, then one might use a higher or lower estimate of income elasticity.

health spending. The analyst could therefore apply an (assumed) estimate of income elasticity for health spending to an interim estimate of the increase in per capita income (as might be deduced from an interim estimate of GDP divided by an interim estimate of population) in order to arrive at an interim estimate of the increase in per capita health spending.

But, since income elasticities do not by themselves explain changes in household consumption of health care, and should be considered a rather crude estimating method, other methods should be considered to supplement such a method. One such method would model per capita spending on health care as a function of a number of independent variables, with total per capita spending being a function of choice of provider and of average expenditures by type of provider by those choosing that type. Econometric estimates using past data from household surveys would give empirical coefficients on the independent variables. These would provide the basis for simulation of future household spending based on predictions of the estimated model. Such models however, require advanced knowledge of econometric techniques and are likely to be expensive to produce. Before attempting to use such modeling techniques, it may be more productive to disaggregate household spending into its most important components, e.g., spending on pharmaceuticals, and apply growth rates extrapolated from past trends in order to expand to most recent actual estimates of use rates and to spending per use. As discussed in the next sections, estimates of total spending are constructed after developing separate estimates of changed prices per use and of changed use rates (e.g., visits per person or admissions per 1,000 per year²¹).

Consumer/medical price inflation

Any changes in prices, both for consumer goods and for medical care services, are also an important factor influencing any changes in spending on such services. Indexes of prices for medical care goods and services are usually unavailable in developing countries, but, when they are, they are likely to be closely correlated with (although somewhat higher than) consumer price indices. The prices of prescription drugs, which typically rise faster than prices of medical care services, would likely be a major component of any medical care price index. Consumer price indices can be used as proxies (possibly with modest upward adjustment) for medical care price indices.

Application of price indices in making interim estimates must be done thoughtfully, however. First, there would be an interaction between (relative)²² prices and quantities that must be taken into account when trying to estimate an overall impact from changed prices. Second, the overall impact of any changes in prices would be on total revenue to providers, which is a one-dimensional effect for budget-driven estimates but could be a multi-dimensional effect in market-driven estimates.

To elaborate on the first point, total costs or total spending are fundamentally a function of price times quantity, and a change in price of any good or service can cause a change in quantity purchased. This economic relationship of price and quantity is measured by the price elasticity of demand for medical care. Generally speaking, research has shown that price elasticities of demand for medical care can vary between -0.2 and -0.8, with the lower-end elasticities experienced more frequently in

²¹ Household surveys tend to provide underestimates of inpatient use. The relative infrequency of hospital admissions in developing countries (usually 1%–3% of the population per year) is a reason for lack of accurate recall during surveys. Thus, efforts should be made to access other data sources (e.g., Ministry of Health data) to validate survey data.

²² Consumers judge the price of a service relative to prices of comparable services. Thus, while a price may not change, if prices of comparable services were to change, the nominally constant reference price would change relative to those comparable prices.

demand for acute care services and the higher-end elasticities experienced more frequently for ambulatory care services and for prescription drugs. Changes in quantity due to changes in price can be calculated by using the estimated elasticities. For example, if price elasticity were thought to be -0.5 , then a 10% increase in price would cause of 5% decrease in quantity demanded. It should be kept in mind that there could be many other factors, besides a change in price, that would cause a change in quantity demanded.

With respect to the second point, the effect of changed prices is relatively straightforward for largely budget-financed services, but is more complicated for estimating expenditures on market-based services. While there would be no changes in gross budget expenditures due to changed prices, the impact of changed prices on costs in a budget-financed provider system is simply through their impact on revenues, taking into account the changed prices and the associated changed quantities. However, net budget expenditures would be changed by the change in revenues resulting from changes in prices and quantities.²³

Note that changes in revenues can result from changes in relative prices. That is, if fees for services in private and nongovernmental facilities rise while those for government services remain the same, relative fees at government facilities decline, and quantities purchased from government would rise as patients would substitute less expensive services for the more expensive alternatives. The degree of such a substitution effect is measured by the cross-price elasticities of demand for government services with respect to demand for nongovernment services (reliable estimates of cross-price elasticities for services in developing countries are quite rare in the research literature). Also note that government fee revenue could change for reasons not related to fees in the market. They could change if collection rates or waiver/exemption rates were to change. However, data on these variables may be even less likely to be available than data on changes in fees.

The impact of changed prices on expenditures for market-based services is somewhat more complicated to estimate than those for budget-financed services. In addition to affecting the total out-of-pocket spending by households on health and medical services, changed prices also affect spending by third-party payers (insurers) and the decisions by private providers on what goods and services to produce.

Utilization of medical care services

The other factor (besides price) to determine total costs (or total spending) on health care is the quantity of services utilized. Of course, changes in utilization have much less of an impact on estimates of costs made from the supply side than on estimates of costs made from the demand side. Changes in utilization made from the demand side (i.e., estimates of payments made by employers, insurers, and households) directly impact estimates of total payments because payments are usually linked to use (unless the payment method is capitated prepayment). On the supply side, utilization changes only affect suppliers' costs at the margin—which would depend on the marginal costs of production. For services that are funded predominantly by budget transfers, changes in utilization would generally have little impact on producers' costs but would impact the net cost (say, to government or to donors) of services through its impact on revenue (to the extent fees are charged).

²³ The entity to which such fees are remitted will dictate how they are accounted for (see the *Producers' Guide*). This treatment here assumes that the Ministry of Health or the provider in question itself retains the fees—which would offset the gross budget allocation to the entity in question.

In any event, estimates of rates of changes in utilization rates (e.g., admissions per 1,000, visits per person, prescriptions per person) would be important factors to include in the set of assumptions adopted for the interim estimate.

1.5.2.3 Estimating Techniques

To make interim NHA estimates, one would divide the NHA data into components for which similar estimation techniques and/or common assumptions about relevant parameters and variables could be used (and, indeed, were used to make actual NHA estimates). One useful distinction is that some quantities are budget-driven and some quantities are demand-driven. Budget-driven quantities are determined entirely by those responsible for deciding how much to allocate, obligate, and, ultimately, spend on health care. Demand-driven quantities are determined largely by the willingness and abilities of private parties to pay for health and medical care, given the supply and prices (and quantities purchased) of such care in the market.

Estimates of budget-driven health spending

Probably the most variable and unpredictable elements of interim NHA estimates are those amounts that represent expenditures made from, and authorized by, budget transfers. The major sources for the budget-based spending in health are governments (the Ministry of Finance or the Treasury) and donors. In making interim estimates, it is important to keep in mind that NHA estimates should be for actual expenditures, which can diverge substantially from budgeted expenditures—particularly for donors' spending. Any recent data on budget allocations should be modified by past estimates of the historical differences between budgeted amounts and amounts actually spent.

Government budgets and spending

The largest such budget-based amounts spent by governments are typically the amounts spent by the Ministry of Health (and/or its offices and agents) and by other agencies of the government. The main source of these amounts is the Ministry of Finance, which transfers the funds based on decisions on budget allocations made by the policymaking bodies of government. Making interim estimates of these amounts is difficult because the outcomes of the political process can be so variable and so dependent on (1) resources available (government's general revenues), and (2) demands made by other sectors and agencies. While the latest government budget is likely to provide numbers for the amounts authorized and/or obligated to be spent, the actual amount spent may not be at all similar (in terms of the percent of the amount budgeted) as was experienced in the year of the most recent NHA estimate (or for intervening years, for that matter).

In the absence of data on the government budget for the interim estimate period,²⁴ interim estimates of budget-based spending financed by government's general revenues should thus be largely based on the rate of change in government revenues (since the most recent actual NHA estimate), subject to any modification that could be justified by the analyst's observations of changes in the relative share of the health sector (relative to the other sectors) since the most recent actual NHA estimates. The method recommended for estimating budget-based spending by government agencies on health should be fundamentally a three-step process:

²⁴ If budget data are available, the remaining task is merely to convert them to estimated expenditures using some assumption about the rate of spending relative to budgeted amounts.

1. An estimate of the country's GDP;
2. An estimate of the total spending based on the government budget, based on a continuation of the proportion of GDP devoted to government spending on all sectors (that was estimated in the most recent actual NHA estimates); and
3. An estimate of the total spending on health out of the total government budget, based on a continuation of the proportion of the total government spending based on the total budget (from the most recent actual NHA estimate).

The above estimates thus depend first and foremost on an interim estimate of GDP, which could be obtained from economic projections made periodically by the Ministry of Finance, or could be extrapolated using average growth rates that could be calculated from the most recent actual GDP estimates. An interim estimate of government spending based on its budget (for the interim year) would be the same percentage of GDP as government spending based on its budget (for the most recent actual NHA estimate). Then, an interim estimate of government health spending based on its budget (for the interim year) would be, likewise, the same percentage of total government spending as government health spending based on its budget (for the most recent actual NHA estimate).

If the analyst had solid information that the above percentages (total government spending on a percent of GDP and government health spending as a percent of total government spending) had changed since the most recent NHA estimate, then, using good judgment, the analyst could make an adjustment to those percentages.

An overall judgment on the rate of change in aggregate spending could be better informed by focusing as much as is possible on estimating the rates of change in various disaggregated components of spending. Relevant disaggregated components of budget-based spending by governments that would be relevant for such judgments would, for example, be:

- ▲ Spending by different government agencies (e.g., health spending by the military, spending on medical education by the Ministry of Education, health spending by local governments); and
- ▲ Spending on different categories of inputs needed for the delivery of health and medical services (e.g., prescription drugs, health personnel, medical supplies and equipment, and capital spending on new facilities).

Of course, an effort to focus on a specific component of budget-based spending for an interim estimate could easily require as much resources as the actual NHA estimate would normally require. Because interim estimates are intended to approximate the current values for NHA components, it is not suggested that methods used in actual NHA estimates be replicated. Rather, the analyst should appraise the changes in health policies or programs that have occurred since the most recent actual NHA estimate, and should focus on those components where there have been significantly different rates of change. (This is discussed further in Section 5.3).

For example, spending on pharmaceuticals can change more abruptly than spending on other components, both because of the likelihood of price volatility and because the resulting need for government to restrain budget-based spending on prescription drugs can lead to drastic cutbacks in allocations for them. Or, for another example, an increase in the number of private providers (of services and/or drugs) could lead to higher rates of growth in out-of-pocket spending by households simply because the services and/or drugs are more accessible (i.e., if travel costs were reduced). In the

particular cases where divergent-from-trend rates of change are likely to have occurred, a focused attempt to make an interim estimate for that component may be warranted. The resulting estimate could be the basis for an overall judgment that the trendline for the aggregate budget-based spending amount is too low or too high, and by how much.

Donors' budgets and spending

Like most components of government spending, donor spending is also almost exclusively budget-based. The analyst should therefore take a similar approach to making interim estimates of donor spending as for government spending. Donor spending is likely to be much more volatile than government spending, however. Moreover, actual expenditures usually diverge considerably from budgeted (or projected or expected) expenditures, and the degree of divergence often varies considerably from one year to the next. Since actual NHA estimates of donor spending are typically the most uncertain of all the NHA estimates, even in countries that depend heavily on donor assistance, it is important to be clear about the assumptions made when making interim estimates of donor assistance amounts.

Even more uncertain than official development assistance amounts are the amounts donors may give directly to nongovernment providers. In addition to these amounts, internal and external charitable donations can be a significant portion of total donor assistance. Moreover, in some countries, the amount of official donor assistance that sometimes bypasses the official government channels for such donations is not insignificant.

Market-based estimates: demand-side versus supply-side estimation

Estimates of flows of funds related to market-based transactions can usually be estimated on both sides of the transactions, at least in theory. On the demand side, one would estimate the amounts purchasers (patients, or, in the case of third-party payment, insurers or employers) have paid to providers for the services they rendered. On the supply side, one would estimate the amounts providers have paid for the various inputs needed to produce the services rendered.²⁵ These amounts will normally be equal in market-based transactions, since providers will need to set their fees and charges at levels allowing them to recover fully their costs of production.²⁶

This theoretical equivalence of demand-side payments to providers and supply-side payments by providers to factors of production provides a convenient mathematical identity to use in the interim estimates (as used in the actual estimates).

Most estimates of the demand side of the equation require data that can only be obtained through surveys.²⁷ Household surveys are essential to acquire the data necessary to estimate out-of-pocket

²⁵ A table giving expenditures on line items by providers is one of the standard tables produced in actual NHA estimates. It could be used as a source for validating interim NHA estimates.

²⁶ One (sometimes significant) difference between the supply side estimates and the demand side estimates is the discrepancy in timing between amounts paid for services by purchasers and the amounts paid by purchasers for inputs required to produce the services. Providers must necessarily pay for needed inputs and supplies in advance of receiving payments for services (the amount of this advance being working capital). Likewise, insureds must pay premiums to insurers in advance of the insurers' paying for benefits. In this latter case, insureds end up paying more than the amount paid for benefits because the premium would also include necessary amounts for reserves, reinsurance, and marketing and administrative costs.

²⁷ This is why it is difficult to estimate Table 2 in the absence of current data (or econometric estimation based on past data) or distribution of treatment choices, by service/provider type (as well as the prices they may change), it is virtually impossible to know how to grow payments by different service/provider type.

spending by individuals, which usually amounts to a major component of total spending. Employer and insurer surveys can provide additional data that would otherwise be virtually impossible to estimate. The best approach to an interim estimate will be dictated by the data that were available and the methods that were used to make the actual NHA estimates of employer, insurer, and household spending. Below is a brief discussion of the most common approaches used to make actual NHA estimates in each spending category, and how they can be adapted to make interim estimates.

Employer health spending

Employers provide health benefits either by insuring employees for a defined benefit for employees or by providing health and medical services directly to employees. Insuring employers can either purchase insurance from a commercial insurer or can self-insure for a defined benefit. An interim estimate of these amounts would use the standard formula originally used for the actual NHA estimate, multiplied by the assumptions about changes in the variables since then. The major components of an estimate of direct employer spending on employee health (i.e., for employers self-insuring or providing services directly) would be as follows (administrative costs would be additional):

W = number of employees (and dependents) covered by employer-provided health benefits

X = average use per covered person (visits, admissions, prescriptions)

Y = total costs per use by covered persons (visits, admissions, prescriptions)

Z = average co-payment per use (visits, admissions, prescriptions) by covered persons

Total employer spending on benefits²⁸ = [W * X] * [Y - Z]

For the interim estimate, arriving at assumptions about growth in X (since the most recent actual NHA estimates) would need to incorporate the effects of changes in average benefits offered by employers through these plans, as well as the effect on demand of any changes in co-payment rates underlying Z. The total costs per use in Y would be affected by changes in factor input prices (personnel salaries, supplies, maintenance, etc.).

W, X, and Y could be calculated (for the most recent actual NHA estimates) directly from the results of a survey (inputting to the universe of employees from the random sample stratified by size and industry). The additional amount for administrative costs for a self-insuring employer would be the cost of the administrative services provided to process the claims, which could be performed in-house or under an outsourced contract.

For an employer purchasing commercial insurance, the total cost would be the sum of premiums paid by all employers, which would include the administrative costs of the insurer. (A similar imputation process would be applied to the random sample.)

²⁸ An separate estimate of spending for each type of service (e.g., outpatient, inpatient, prescription drugs) would be summed up to produce an overall total.

Insurer health spending

The generic formula for estimating insurer spending would include variables similar to that above for employers who self-insure, except that an insurer's administrative costs (including allowances for marketing, reserves, reinsurance, and profit) would be included in the total premium charged to the employer. The average cost per insured person would very likely grow at least as fast as the estimated growth in average cost per person of employer-provided health benefits. The shares of the premium paid for by employers and employees would probably be unchanged, since there would likely be considerable stability in that statistic.

The category of "insurers" includes, in some countries, public sector insurers (where there is some form of social health insurance) as well as private sector insurers and community-based health insurance plans. Where there are multiple insurance types, they should be distinguished as distinctly separate financing intermediaries (this model treats them as one). Making interim estimates of spending by the social insurance organization should be relatively straightforward, if there is at least several years of historical data available from the actual NHA estimates.

However, private health insurer spending on health benefits is difficult to estimate even with a survey dedicated to collecting data from them, primarily because the universe of insurers is not usually well documented. For actual NHA estimates, it may be possible to identify a relatively small number of insurers that handle the majority of commercial accounts, however, and to obtain from them rough estimates of the number of lives covered and the average amount of their health insurance premiums (adjusted for benefit level). In countries where there are community-based health insurance (CBHI) plans, these data would need to be estimated separately. But it is likely that more information would be available, especially if there is an association of CBHI plans, as there is, for example, in Uganda.

For interim estimates of changes in insurer spending, it may be necessary to gather some recent primary data from several of the insurers to get some perspective on recent trends in premiums and in loss ratios (the proportion of the premiums collected that are paid out in benefits). Insurers are not able, however, to provide data on the share of the premiums that are paid by beneficiaries for group policies. These data would have to be obtained from employer surveys. For individual insurance policies, the share would, of course, be 100% and could be corroborated by a household survey (if the sample were large enough).

Household health spending

Spending on health by households includes three types of payments:

1. Payments to employers to pay the employees' shares the cost of employer-provided health benefits (usually made as payroll deductions to cover a small fraction of the total cost) that are one of two kinds:
 - a. Benefits provided directly by employers or through self-insurance; or
 - b. Benefits purchased from a commercial insurer;
2. Payments of premiums for individual health insurance policies; and
3. OOP payments directly to providers for services rendered.

Data on the magnitudes of these amounts, and on the distribution of payments among services and among provider types, are generated for actual NHA estimates in household income and expenditure surveys. These surveys are most reliable in generating estimates of OOP payments because they usually provide data on:

- ▲ The percentage distribution of services used according to provider type (for distinct types of services, like inpatient services, outpatient services, prescription drugs);
- ▲ The rates of use according to provider type (for distinct types of services); and
- ▲ The average payment per use according to provider type (for distinct types of services).

1.5.3 Accounting for Policy and/or Program Changes

One can distinguish two types of changes in spending due to changes in health policies and/or programs:

1. Changes in direct spending by government agencies (including donors) through budget-funded activities; and
2. Changes in health spending by nongovernment agencies (excluding donors), employers, and/or private individuals that are indirectly caused by changes in government policies and/or programs.

Changes of the first type are accounted for by direct interim estimates of and budget-driven spending by government and by donors. Interim estimation of any budget-driven quantities could be done by one of the methods previously discussed in Section 5.2.3.1.1. In this process, it may be necessary to ask informants in the major government and donor agencies whether there has been, or are expected to be, any changes in the percentage of budgeted funds that are actually expended. This parameter can change significantly from one year to the next, and any budget allocation figures need to be adjusted for expected expenditures using such an estimated parameter.

Changes of the second type above can occur throughout the health sector in response to changes in government policies or programs. Examples of such changes would be:

- ▲ Liberalization of policy on government doctors' ability to have private practices;
- ▲ Change in the price(s) of government-sponsored medical care and/or government-provided pharmaceuticals, or change in the government's policies on fee waivers for the poor or fee exemptions for certain diseases or treatments;
- ▲ Change in government policy on the regulation of the private medical or pharmaceutical sector;
- ▲ Change in government policy with respect to commercial health insurance and/or CBHI; and
- ▲ Change in number of government facilities, government-employed personnel, or staff salaries.

Estimating the impact of any such changes in government policies or programs would be an analytical exercise in itself, and it may be beyond the scope of an interim NHA estimate to perform one or more such impact estimate. It is necessary, however, to acknowledge at least the direction of changes in key variables and parameters (that is, whether the impacts would have a positive or negative impact on values implied by previous actual NHA estimates), if not the quantification of such changes. It is also necessary to make a conceptual distinction between what the interim NHA estimate would have been in the absence of such changes, and what it is likely to be because of them.

1.6 Illustration of the Interim Estimation Tool

The first section below describes the components of the two matrices for which interim estimates could be made. The second section provides an illustrative example of an interim estimation made for 2002 based on two recent “actual” NHA estimates made hypothetically for 1997 and 2000.

1.6.1 Components of the Interim Estimation

1.6.1.1 Estimating Financing Agent Totals from Primary Sources Amounts

Exhibit D (Matrices 1A, 1B, 1C, and 1D) shows how particular primary sources of funds for each financing agent are usually estimated, and the data sources generally used to estimate each cell. The approaches for each are summarized in Exhibit E.

Donors as Primary Source

Matrix 1A shows a distinction between donor funding of government health activities and direct donor funding of nongovernmental organization (NGO) providers (the donor as its own financing agent). As budgeted amounts, the interim estimate of these two cells would be to estimate the current year’s expected spending based on the change in the budgets for the respective cells, B and C.

Employers and Households as Primary Sources

Matrix 1B shows the four cells that can be estimated from the results of an employer survey, possibly supplemented by a survey of insurers. Cell D comprises spending by employers who self-insure health benefits for their employees (while Cell E would comprise any employee payroll deductions to share in its overall cost, leading to the total of J that an employer spends on health benefits). An interim estimate of these amounts would use the standard formula originally used for the actual NHA estimate, multiplied by the assumptions about changes in the variables since then.

The total in Cell D comprises the amount for which employers are their own financing agent, because they pay that amount directly to providers. The total in Cell E in the interim estimate, as the employee share of total costs would likely be the same share of the total of Cells D and E in the actual estimate, unless there had been, in the interim, a significant change in employer policy on payroll deductions for health benefits.

Matrix 1A shows that Cells F and G are components of the total health spending of K by insurers. Matrix 1B shows that part of household payments to insurers made through their employers (G-1 is payroll deductions to pay for the employees’ part of the total employer-paid health insurance) and Matrix 1C shows that part of household payments made to insurers for individual health

insurance policies (for which they pay 100% of the premium). G-2 would include payments made to CBHI plans. Estimates for G-1 can be obtained in employer surveys, and estimates for G-2 can be obtained in household surveys.

The generic formula for estimating insurer spending would include variables similar to those for employers who self-insure. The average cost per insured person would very likely grow at least as fast as the estimated growth in average cost per person of employer-provided health benefits (D + E). The shares of the premium paid for by employers and employees would probably be unchanged, since there would be considerable stability in that statistic.

Matrix 1C shows the cells for which household survey data are most relevant. Cell G-2 is the amount paid by households for individual health insurance policies. Cell H is the amount paid out of pocket by households for all kinds of health and medical care. Since the amount in Cell H is paid directly to providers, this amount appears as the column total for households as its own financing agent in Matrix 2. The interim estimate of Cell H should be estimated by growing it slightly more than the estimated growth in total household income (since the most recent actual NHA estimate), because the income elasticity of demand for medical care has been consistently shown to be greater than one. (A discussion of income elasticity of demand for health care, and of other possible methods for estimating growth in household spending, was included in Section 5.2.2.3.)

Donors, Employers, and Households as Own Financing Agents

Matrix 1D shows the three cells for which primary sources (donors, employers, households) act as their own financing agents (Cells C, D, and H).

1.6.1.2 Estimating Financing Agent Amounts from Amounts of Provider Receipts

Description of this step is organized according to financing agent, because each financing agent identified in the previous actual NHA estimates must have identical totals in the rows of Matrix 1 (primary sources to financing agents) and in the columns of Matrix 2 (financing agents to providers). Cells of these matrices were shown in Exhibit A. Exhibit F summarizes how components of spending by each financing agent are usually estimated, and the data sources generally used to estimate each cell.

Ministry of Health/Other Government

Because of the identity $I = I$, it is true that:

$$A + B = a + f + k + p$$

The left side of the identity identifies the sources of funds (government (A) and donors (B)) while the right side of the identity identifies the distribution of those funds among providers. Once an interim estimate of the government and donor budgets is made, the analyst can either assume the provider distribution is the same, or, if information to the contrary is available, estimate how it has been redistributed for the interim estimate.

Donors

Donors can be both a primary source and a financing agent. They are a primary source for funds given to government agencies, which then act as financing agents when they spend donor funds on their programs. Donors act as financing agents when they donate funds directly to providers (usually NGOs). Such direct donors can be internal as well as external. External donations can be private charitable contributions as well as official development assistance.

When donors act as their own financing agent, the identity for donors yields the accounting equation:

$$C = b + g + l + q.$$

Note that the amounts donors give to government agencies are not included in this identity. Those amounts are among those payments for which government agencies act as financing agents.

Employers

Because of the identity $J = J$, it is true that:

$$D + E = c + h + m + r$$

The left side of the identity identifies the sources of funds (employers (D) and households (E)) while the right side of the identity identifies the distribution of those funds among providers. The spending quantified on each side of this equation represents amounts spent directly by employers who self-insure for a defined package of employee benefits. To the extent employees contribute (regularly, out of their paychecks), those amounts are represented by E. A certain portion of all employer spending of employee health benefits is accounted for by the costs of providing medical services directly at the place of employment or in employer-owned facilities by providers employed by the company.

Insurers

Because of the identity $K = K$, it is true that:

$$F + G = d + i + n + s$$

The left side of the identity identifies the insurers' sources of funds from payment of insurance premiums (employers (F) and households (G)) while the right side of the identity identifies the distribution of those funds among providers.

Households

Households act as their own financing agent for all amounts (H) paid out-of-pocket. Translated to Matrix 2, the identity can be expressed:

$$H = e + j + o + t$$

It has already been discussed how one might make an interim estimate of the total H. That total H is equivalent to the sum, on the right side of the equation, of the OOP payments by household distributed among the various providers. Data on this distribution is the primary output of a well-designed household survey of income and expenditures, which would have been the basis for the

most recent actual NHA estimate. An interim estimate of this distribution would apply the same shares if it is assumed that use rates by provider and choices of provider did not change and the prices of the services of each type of provider, as faced by households, all grew at the same pace as each other and as household incomes grew. But this is extremely unlikely. Fees at government facilities are likely to remain constant, while fees at private facilities are likely to have increased faster than household incomes. Some adjustment to the distribution is probably indicated, but the appropriate amounts would be according to the differences in price elasticities and cross-price elasticities of demand for each provider. These are usually unknown, but reasonable estimates could be applied based on the research literature.

1.6.2 Interim Estimation of Hypothetical NHA

This section provides an illustrative example of an interim estimation made for 2002 based on two recent “actual” NHA estimates made hypothetically for 1997 and 2000.

The Excel spreadsheet that contains the illustrations and the interim estimation calculations (named “Summary Interim NHA Spreadsheets”) has contents as shown in Exhibit G. The other eight worksheets include the assumptions made (Assumptions-1, Assumptions-2, Assumptions-3, and Assumptions-4), two worksheets giving reports on the results of the interim estimates (Summary Statistics-NHA Estimates and Summary Statistics-Financing), and the two worksheets showing the two matrices (Matrix 1 and Matrix 2). The below gives a description of the steps to be followed, in sequence, in order to perform an interim estimate of the two major matrices.

1.6.2.1 Illustration of the Interim Estimation Tool

1. Create columns and rows in Matrix 1 and Matrix 2 to correspond to those from the two most recent actual NHA estimates. The actual NHA estimates for 1997 and for 2000 are shown at the top of Exhibits N and O. The structure of the tables for the interim NHA estimate for 2002 is shown below the matrix for 2000 in each of those exhibits.
2. Enter the values for the actual NHA estimates in the appropriate cells of the two matrices in Exhibits N and O for the years 1997 and 2000.
3. Enter the actual data on macroeconomic and demographic statistics and indicators in the first two columns (for years 1997 and 2000) of Exhibit H.
4. Enter yearly growth rates (for the period 1997-2000) in Column 4 of Exhibit H so that the cumulative growth rate shown in Column 2 equals that in Column 3 (this is to convert of cumulative growth rates over the three years (1997-2000) into an average compound yearly growth rate).
5. Enter chosen yearly growth rates (for the period 2000-2002) in Column 5 of Exhibit H. (The example shows that the trendline growth rates were chosen, but one could choose growth rates divergent from trendlines if there were sufficient justification and plausibility for doing so.)

6. In Exhibit I (Assumptions-2), enter yearly growth rates (for the period 1997-2000) in Column 4 so that the cumulative growth rate shown in Column 2 equals that in Column 3. (The “actual” values of budget-financed values for 1997 and for 2000 are embedded in the cell formulae, as taken from Exhibits N and O.)
7. In Exhibit I (Assumptions-2), choose yearly growth rates for the period 2000-2002, inserting them in Column 5. (These “interim” values of budget-financed values for 2002 are linked to the corresponding cells in Exhibits N and O.)
8. In Exhibit J (Assumptions-3), enter yearly growth rates (for the period 1997-2000) in Column 4 so that the cumulative growth rate shown in Column 2 equals that in Column 3. (The “actual” values of market-based values (1) for 1997 and for 2000 are embedded in the cell formulae, as taken from Exhibits N and O.)
9. In Exhibit J (Assumptions-3), choose yearly growth rates for the period 2000-2002, inserting them in Column 5. (These “interim” values of market-based values (1) for 2002 are linked to the corresponding cells in Exhibits N and O.)
10. In Exhibit K (Assumptions-4), enter yearly growth rates (for the period 1997-2000) in Column 4 so that the cumulative growth rate shown in Column 2 equals that in Column 3. (The “actual” values of market-based values (2) for 1997 and for 2000 are embedded in the cell formulae, as taken from Exhibits N and O.)
11. In Exhibit K (Assumptions-4), choose yearly growth rates for the period 2000-2002, inserting them in Column 5. (These “interim” values of market-based values (2) for 2002 are linked automatically to the corresponding cells in Exhibits N and O.)

1.6.2.2 Observations about Assumptions in Illustrative Hypothetical Example

In only a few cases did this hypothetical example use assumptions that differed from the trendline growth rates evidenced in the “actual” NHA estimates. Note in Exhibit K that the trendline indicated by “actual” NHA estimates for amounts spent on providers by insurers were 11.42% for for-profit providers and 8.46% for NGO providers. It was assumed, however, that payments to for-profit providers grew slightly faster at 12%, and to NGO providers grew slightly slower at 6%, respectively. These assumptions differing from trendline meant that the growth rate of the residual (administration/reserves) was lower than its trendline: 3.32% for the “interim” estimate versus 6.27% for the “actual” estimates. Similarly, a somewhat faster growth rate of household spending on for-profit providers (8.3% for 2000-2002 versus 8.1% for 1997-2000) meant that the growth rate of the residual spent on NGO providers is lower for 2000-2002 (3.51%) than for 1997-2000 (5.86%). Of course, since these are illustrative assumptions, there is no particular explanation for these assumptions. A real “interim” estimate would require that assumptions that were different from trendline be explained, perhaps by referring to data on changes in medical care or prescription drug price indices and their demand impacts.

In Exhibit J, it was shown that the assumed growth rates for overall spending by employers, insurers, and households did not differ from trendline. The decomposition of the various growth rates, however, shows how one could arrive at assumptions different from the trendlines. For example, for both employers and insurers, one may have calculated (for “actual” estimates) an overall growth rate that was a compounded rate with several components:

- ▲ Yearly growth in workers covered
- ▲ Yearly growth in medical care use per covered person
- ▲ Yearly growth in costs per use

Compounding these three growth rates would give an overall growth rate. The “actual” total cost estimates would have yielded an overall trendline growth rate. If one could have deduced from survey data the yearly growth of two out of the three components, the third could be calculated by using that information and the overall growth rate.

Or, for another example, if one can calculate the overall growth in household OOP payments by compounding the growth in population and the growth in OOP per person (which is a basic output of household surveys). Whenever one makes assumptions that deviate from trendline, however, one must be aware that the selection of a residual (whose value is generated by the overall growth of the row or column total less the growth of the directed values) must be checked for general plausibility.

Exhibit A
GENERIC NHA TABLES
ILLUSTRATING THE BASIC STRUCTURE OF FLOW OF FUNDS ACCOUNTING
(funds flow from column entity to row entity)
(those cells that are shaded have no flow of funds)

MATRIX ONE: FLOW OF FUNDS: PRIMARY SOURCES TO FINANCING AGENTS

Financing Agents	Primary Sources				TOTALS
	Ministry of Finance	Donors	Employers	Households	
MOH/Other Govt	A	B			I
Donors		C			C
Employers			D	E	J
Insurers			F	G	K
Households (OOP)				H	H
TOTALS					L

MATRIX TWO: FLOW OF FUNDS: FINANCING AGENTS TO PROVIDERS

Providers	Financing Agents					TOTALS
	MOH/ Other Govt	Donors	Employers	Insurers	Households OOP	
Govt providers/facilities	a	b	c	d	e	a+b+c+d+e
For-profit providers/facilities	f	g	h	i	j	f+g+h+i+j
NGO providers/facilities	k	l	m	n	o	k+l+m+n+o
Administration/reserves	p	q	r	s	t	p+q+r+s+t
TOTALS	I	C	J	K	H	L

MATRIX THREE: FLOW OF FUNDS: FINANCING AGENTS TO FUNCTIONS

Type of Services	Financing Agents					TOTALS
	MOH/ Other Govt	Donors	Employers	Insurers	Households OOP	
Personal curative: outpatient						
Personal curative: inpatient						
Longterm care		negligible	negligible	negligible	negligible	
Rehabilitation services		negligible	negligible	negligible	negligible	
Lab services						
Prescription drugs (direct)						
Prevention/public health			negligible	negligible	negligible	
Others						
TOTALS	I	C	J	K	H	L

LEGEND

- A = budgets/expenditures
- B = external funding in form of SWAP, etc.
- C = external funding in project form (own agent*)
- D = employer share of employer-paid benefits (own agent*)
- E = employee share of employer-paid benefits
- F = employer share of private premiums
- G = employee share of private premiums
- H = out-of-pocket payments (OOP) by HH (own agent*)
- L = grand total of all funds flowing toward health

NOTE: When donors (C), employers (G), and households (H) pay providers and facilities directly, they are their own financing agents, and are listed as such in Matrix 1 in order to facilitate a "pass through" of those direct payment amounts to ensure that they are fully accounted for from "sources" to "uses", shown in Matrices 2 & 3 [also note Matrix 1C]. This is known as "direct intermediation" in SHA.

NOTE: Row totals in Matrix 1 must equal column totals in Matrix 2 and in Matrix 3.

Exhibit B
Illustrating Derivation of Trendline Used to Make Interim Estimates
of Any Variables Used in Actual NHA Estimates

	1997 Actual	2000 Actual	Avg Annual Change 1997-2000	Avg Annual Change Assumed 2000-2002	Interim Estimate 2002
<i>Actual NHA Estimate</i>	100.0	139.0	6.8%		
<i>Interim NHA Estimate</i>					
Trend Continued				6.8%	158.5
Accelerating Trend (+1.0%)				7.8%	161.5
Decelerating Trend (-1.0%)				5.8%	155.6

Exhibit C

GENERIC NHA TABLE ON SUMMARY INDICATORS

<i>Item/Year</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>
	<i>(Actual)</i>	<i>(Actual)</i>	<i>(Interim)</i>
Public health spending			
Private health spending			
<i>Total health spending</i>			
Public share of total			
Private share of total			
Population (millions)			
<i>Total health spending per capita</i>			
GDP			
Constant prices GDP			
<i>Total health spending as % of GDP</i>			
Constant prices total health spending			
Constant prices total health spending per capita			
<i>Avg yearly change over previous estimate in %</i>			

MATRIX 1C: FLOW OF FUNDS: HOUSEHOLDS AS SOURCE

<i>Financing Agents</i>	<i>Primary Sources</i>				TOTALS
	Ministry of Finance	Donors	Employers	Households	
MOH/Other Govt	A	B			I
Donors		C			C
Employers			D	E	J
Insurers			F	G-2	K
Households (OOP)				H	H
TOTALS					L

Data to be estimated on the basis of household survey: G-2, H
Indicates no flow of funds

ROW TOTALS

Components

Insurers = K (F + G)

G-2

household premium payments to insurers for nongroup coverage
 (see data from employer survey, above)

G-1

Households = H

H

total direct payments out-of-pocket to providers and for drugs and services

MATRIX 1D: FLOW OF FUNDS: DONORS, EMPLOYERS, HOUSEHOLDS AS THEIR OWN INTERMEDIARIES

<i>Financing Agents</i>	<i>Primary Sources</i>				TOTALS
	Ministry of Finance	Donors	Employers	Households	
MOH/Other Govt	A	B			I
Donors		C			C
Employers			D	E	J
Insurers			F	G	K
Households (OOP)				H	H
TOTALS					L

Source is identical to financing intermediary because source pays these amounts directly to providers (or other final uses)
Indicates no flow of funds

Source = Financing Agent

Cell

Donors

C

Donors pay directly to facilities or NGOs

Employers

D

Employer share of direct payments to providers or facilities
 [total payments (J) in Matrices B & C includes employee share]

Households

H

Household out-of-pocket payments to providers or facilities

Exhibit D

**GENERIC NHA TABLES: IDENTIFYING DIFFERENT VARIABLES IN DIFFERENT CELLS
MATRIX ONE: FLOW OF FUNDS FROM PRIMARY SOURCES TO FINANCING AGENTS**

MATRIX 1A: FLOW OF FUNDS: MINISTRY OF FINANCE AND DONORS AS SOURCES

<i>Financing Agents</i>	<i>Primary Sources</i>				TOTALS
	Ministry of Finance	Donors	Employers	Households	
MOH/Other Govt	A	B			I
Donors		C			C
Employers			D	E	J
Insurers			F	G	K
Households (OOP)				H	H
TOTALS					L

	<i>Data to be estimated on the basis of info on budgeted spending</i>
	<i>Data to be estimated on the basis of donor interviews/survey</i>
	<i>Indicates no flow of funds</i>

ROW TOTALS

Components Type

MOH/Other Govt	A + B	Funding from general revenues thru MOF plus external donor contribut
	B	External donor contributions to government entities (central and local)
	C	External and internal charitable contributions directly to (NGO) provide

MATRIX 1B: FLOW OF FUNDS: EMPLOYERS (AND HOUSEHOLDS) AS SOURCES

<i>Financing Agents</i>	<i>Primary Sources</i>				TOTALS
	Ministry of Finance	Donors	Employers	Households	
MOH/Other Govt	A	B			I
Donors		C			C
Employers			D	E	J
Insurers			F	G-1	K
Households (OOP)				H	H
TOTALS					L

	<i>Data to be estimated on the basis of employer/insurer survey: D, E, F, G-</i>
	<i>Indicates no flow of funds</i>

ROW TOTALS

Components Type

Employers = J (D + E)	D	Employer share of its direct payments to providers
	E	Employee share of employer's direct payments to providers
Insurers = K (F + G)	F	Employer share of its premium payments to insurer
	G-1	Employee share of employer's premium payments to commercial insur
	G-2	(see data from household survey, below)

Exhibit E

**FLOWS OF FUNDS BY CELLS IN GENERIC NHA TABLES:
VARIABLES AND PARAMETERS TO ESTIMATE IN
DEVELOPING AN INTERIM NHA ESTIMATE FOR
MATRIX 1: PRIMARY SOURCES TO FINANCING AGENTS**

Cell	Source	Financing Agent	Flow	No Flow*	Source of Data		
					Budgets	Surveys	Survey
A	MoF	MoH/Other		X	Govt & donor		
B	Donors	MoH/Other		X			
C	Donors	Donors			X Budgets		
D	Employers	Employers			X	Employer survey	
E	HHs	Employers		X			
F	Employers	Insurers		X		Insurer survey	
G	HHs	Insurers		X			HH survey
H	HHs	HHs			X		

* Primary source is own financing agent for these funds; payments go directly to providers.

Components of Interim Estimates of Payments to Financing Agents	Variables to Estimate	Parameters to Estimate
A + B MOH/Other Government	Govt & donor budgets	
C Donors	Donors' direct donations to NGOs	
D + E Employers Employer-provided benefits (self-insured, or direct-provision) (need to break out cost-sharing, copayments by employees)	Cost per employer Cost per covered employee Number of employers providing benefits Number of employees covered by benefits Total costs of benefits	Shares of total costs (employer/employee) Employee cost of benefit Employee copayments for services
F + G Insurers Health insurance benefits (employer-purchased, individual-purchased) (need to break out cost-sharing, copayments by insureds)	Cost per covered person (paid by insurer) Cost per covered person (paid by insured) Number of persons covered by insurance Employer-purchased Individually-purchased	Shares of total costs (insurer/insured) Employee share of premium Employee copayments for services

Exhibit F
FLOWS OF FUNDS BY CELLS IN GENERIC NHA TABLES:
VARIABLES AND PARAMETERS TO ESTIMATE IN
DEVELOPING AN INTERIM ESTIMATE FOR

MATRIX 2: FINANCING AGENTS TO PROVIDERS

Types of providers: Provider characteristic (public, for-profit, NGO, etc.)

<i>Cell</i>	<i>Financing Agent</i>	<i>Provider</i>	<i>Type of Estimate/ Source of Data</i>	<i>Variables To Estimate</i>	<i>Parameters To Estimate</i>
a	MoH/Other	Govt	Budget	Spending per facility (by type of facility) Number of facilities	
f	MoH/Other	For-profit	Budget	NA	
k	MoH/Other	NGO	Budget	Spending per facility (by type of facility) Number of facilities	
p	MoH/Other	Admin/resrv	Budget	Yrly growth rate	Admin/resrv as % of total
b	Donor	Govt	Budget	Yrly growth rate	Donor share of spending
g	Donor	For-profit	Budget	NA	NA
l	Donor	NGO	Budget	Yrly growth rate	Donor share of spending
q	Donor	Admin/resrv	Budget	Yrly growth rate	Admin/resrv as % of total
c	Employers	Govt	Esurvey	Yrly growth rate	Pymnts to govt as % of total
h	Employers	For-profit	Esurvey	Yrly growth rate	Pymnts to for-profit as % of total
m	Employers	NGO	Esurvey	Yrly growth rate	Pymnts to NGO as % of total
r	Employers	Admin/resrv	Esurvey	Yrly growth rate	Admin/resrv as % of total
d	Insurers	Govt	Isurvey	Yrly growth rate	Pymnts to govt as % of total
i	Insurers	For-profit	Isurvey	Yrly growth rate	Pymnts to for-profit as % of total
n	Insurers	NGO	Isurvey	Yrly growth rate	Pymnts to NGO as % of total
s	Insurers	Admin/resrv	Isurvey	Yrly growth rate	Admin/resrv as % of total
e	HHS	Govt	HHsurvey	Yrly growth rate	Pymnts to govt as % of total
j	HHS	For-profit	HHsurvey	Yrly growth rate	Pymnts to for-profit as % of total
o	HHS	NGO	HHsurvey	Yrly growth rate	Pymnts to NGO as % of total
t	HHS	Admin/resrv	HHsurvey	NA	NA

Exhibit G

CONTENTS-DIRECTIONS TO MODEL FOR INTERIM NHA ESTIMATION

<i>Sheet #</i>	<i>Exhibit</i>	<i>Sheet Name</i>	<i>Description</i>
1	H	Assumptions 1	Macroeconomic Statistics and Indicators
2	I	Assumptions 2	Variables and Parameters for Interim Estimation of Budget-financed Values
3	J	Assumptions 3	Variables and Parameters for Interim Estimation of Primarily Market-based Values (1)
4	K	Assumptions 4	Variables and Parameters for Interim Estimation of Primarily Market-based Values (2)
5	L	Summary Statistics-NHA Estimates	Summary Statistics-NHA Estimates
6	M	Summary Statistics-Financing	Summary Statistics-Financing
7	N	Matrix One	Flows of Funds from Primary Sources to Financing Agents
8	O	Matrix Two	Flows of Funds from Financing Agents to Providers
Estimating Sequence			
		Sheet Number	
1		6, 7	Create columns and rows in Matrix One and in Matrix Two to correspond to tables from two most recent actual NHA estimates
2		6, 7	Enter actual NHA estimates for Years One and Two in Matrix One and in Matrix Two
3		1	Enter actual data on macroeconomic statistics and indicators in first two columns of Assumptions 1
4		1	Enter yearly growth rates (to equal cumulative growth rate) in Column 4 of Assumptions 1
5		1	Choose yearly growth rates for macroeconomic data (for interim estimates), inserting them in Column 5 of Assumptions 1
6		2	Enter yearly growth rates for budget-financed actual values (to equal cumulative growth rates in Column 3) in Column 4 of Assumptions 2
7		2	Choose yearly growth rates for budget-financed values (for interim estimates), inserting them in Column 5 of Assumptions 2
8		3	Enter yearly growth rates for market-based actual values (to equal cumulative growth rates in Column 3) in Column 4 of Assumptions 3 (Matrix One)
9		3	Choose yearly growth rates for budget-financed values (for interim estimates), inserting them in Column 5 of Assumptions 3 (Matrix One)
10		4	Enter yearly growth rates for market-based actual values (to equal cumulative growth rates in Column 3) in Column 4 of Assumptions 4 (Matrix One)
11		4	Choose yearly growth rates for budget-financed values (for interim estimates), inserting them in Column 5 of Assumptions 4 (Matrix Two)

Exhibit H

ASSUMPTIONS FOR NHA INTERIM ESTIMATES

Macroeconomic Statistics and Indicators

	Column1 ENTER-1	Column 2 ENTER-2	Col 3	Column 4 ENTER-3 Calculate "Actual"	Column 5 ENTER-4 Choose "Interim"	Column 6
<i>Legend</i>						
Data to be entered----->	<input type="text"/>					
Results of calculations->						
	"Actual" Year 1	"Actual" Year 2	Match Cum. Grwth	Annual Growth Trend	Annual Growth Trend	"Interim" Year 3
Year	<input type="text" value="1997"/>	<input type="text" value="2000"/>		<input type="text" value="1997-2000"/>	<input type="text" value="2000-2002"/>	<input type="text" value="2002"/>
Population	Value <input type="text" value="10,000,000"/>	<input type="text" value="10,710,000"/>				<input type="text" value="11,210,517"/>
	% Cum. Gwrth	7.10%	= 7.09%			
	% Yrly Grwth			<input type="text" value="2.31%"/>	<input type="text" value="2.31%"/>	
GDP	Value <input type="text" value="150,000,000,000"/>	<input type="text" value="166,500,000,000"/>				<input type="text" value="178,496,851,140"/>
	% Cum. Gwrth	11.00%	= 11.00%			
	% Yrly Grwth			<input type="text" value="3.54%"/>	<input type="text" value="3.54%"/>	
GDP/capita	Value	15,000	15,546			<input type="text" value="15,922"/>
	% Cum. Gwrth		3.64%	= 3.64%		
	% Yrly Grwth			<input type="text" value="1.20%"/>	<input type="text" value="1.20%"/>	
Real GDP (Base Year = 1997)	Value	150,000,000,000	157,961,538,462			<input type="text" value="137,407,594,658"/>
	% Cum. Gwrth					
	% Yrly Grwth					
Real GDP/capita (Base Year = 1997)	Value	15,000	14,749			<input type="text" value="12,257"/>
	% Cum. Gwrth					
	% Yrly Grwth					
Total govt spending	Value <input type="text" value="22,500,000,000"/>	<input type="text" value="24,975,000,000"/>				<input type="text" value="26,774,527,671"/>
	% Cum. Gwrth	11.00%	= 11.00%			
	% Yrly Grwth			<input type="text" value="3.54%"/>	<input type="text" value="3.54%"/>	
Consumer price index	Value	100	117			<input type="text" value="130"/>
	% Cum. Gwrth		17.00%	= 16.99%		
	% Yrly Grwth			<input type="text" value="5.37%"/>	<input type="text" value="5.37%"/>	
Medical price index	Value	100	122			<input type="text" value="139"/>
	% Cum. Gwrth		22.00%	= 22.02%		
	% Yrly Grwth			<input type="text" value="6.86%"/>	<input type="text" value="6.86%"/>	
Rx drug price index	Value	100	131			<input type="text" value="157"/>
	% Cum. Gwrth		31.00%	= 31.01%		
	% Yrly Grwth			<input type="text" value="9.42%"/>	<input type="text" value="9.42%"/>	
GDP Deflator			0.95			<input type="text" value="0.77"/>

Exhibit I

ASSUMPTIONS FOR NHA INTERIM ESTIMATES

Variables and Parameters for Interim Estimation of Budget-financed Values

		Column1	Column 2	Col 3	Column 4	Column 5	Column 6
		ENTER-1	ENTER-2		ENTER-3	ENTER-4	
<i>Legend</i>					Calculate	Choose	Results
	Data to be entered				"Actual"	"Interim"	
	Results of calculations						
Relevant				Match	Annual	Annual	
NHA Cell (from Exhibit A)		"Actual"	"Actual"	Cum.	Growth	Growth	"Interim"
Matrix 1	Matrix 2	1997	2000	Grwth	Trend	Trend	2002
A	<i>MoF allocation to MoH/other govt (net of fee revenue, c + d + e)</i>	Value	1,205	1,398			1,543
		% Cum. Grwth	16.00% =		15.99%		
		% Yrly Grwth				5.07%	5.07%
B	<i>Donor contributions to MoH/other govt</i>	Value	344	385			416
		% Cum. Grwth	12.00% =		12.00%		
		% Yrly Grwth				3.85%	3.85%
C	<i>b + l + q Direct donor contributions</i>	Value	189	225			253
		% Cum. Grwth	19.00% =		19.00%		
		% Yrly Grwth				5.97%	5.97%
a + p	<i>MOH/Other Govt payments to govt providers and administration</i>	Value	1,261	1,462			1,613
		% Cum. Grwth	15.93% =		15.93%		
		% Yrly Grwth				5.05%	5.05%
k	<i>MOH/Other Govt payments to NGOs</i>	Value	288	321			345
		% Cum. Grwth	11.54% =		11.52%		
		% Yrly Grwth				3.70%	3.70%
c + d + e	<i>MoF revenue from fees at govt facilities</i>	Value	320	350			372
		% Cum. Grwth	9.38% =		9.37%		
		% Yrly Grwth				3.03%	3.03%

Exhibit J

ASSUMPTIONS FOR NHA INTERIM ESTIMATES

Variables and Parameters for Interim Estimation of Primarily Market-based Values (1)

		Column 1	Column 2	Col 3	Column 4	Column 5	Column 6
<i>Legend</i>							
Data to be entered----->		ENTER-1	ENTER-2		ENTER-3	ENTER-4	
Results of calculations----->					"Actual"	"Interim"	
<i>Relevant</i>				<i>Match</i>	<i>Annual</i>	<i>Annual</i>	
<i>NHA Cell (from Exhibit A)</i>		"Actual"	"Actual"	<i>Cum.</i>	<i>Growth</i>	<i>Growth</i>	<i>"Interim"</i>
<i>Matrix 1</i>		1997	2000	<i>Grwth</i>	<i>Trend</i>	<i>Trend</i>	2002
Financing Agents: Amounts Received From							
Employers as Financing Agents (J)							
D + E	Total payments by employers (D + E)	Value	64	78			89
		% Cum. Grwth		21.56% =	21.58%		
		% Yrly Grwth			6.73%	6.73%	
D	Net payments by employers (D)	Value	60	73			84
		% Cum. Grwth		22.00% =	22.02%		
		% Yrly Grwth			6.86%	6.86%	
E	Payments by employees for benefits (E)	Value	4	5			5
		% Cum. Grwth		15.00% =	15.00%		
		% Yrly Grwth			4.77%	4.77%	
Insurers as Financing Agents (K)							
F + G	Total premiums received by insurers (F + G)	Value	238	316			382
		% Cum. Grwth		32.73% =	32.74%		
		% Yrly Grwth			9.90%	9.90%	
F	Share of premiums paid by employers (F)	Value	211	285			348
		% Cum. Grwth		35.00% =	35.00%		
		% Yrly Grwth			10.52%	10.52%	
G1	Share of premiums paid by employees (G1)	Value	24	28			30
		% Cum. Grwth		15.21% =	15.20%		
		% Yrly Grwth			4.83%	4.83%	
G2	Total premiums paid by individuals (G2)	Value	3	3.4			4
		% Cum. Grwth		13.33% =	13.33%		
		% Yrly Grwth			4.26%	4.26%	
G1 + G2	Insurance premiums by individuals (G1 + G2)	Value	27	31			34
		% Cum. Grwth		15.00% =	15.00%		
		% Yrly Grwth			4.77%	4.77%	
Households as Financing Agents (H)							
H	Total OOP payments by households (H)	Value	3,179	3,974			4,611
		% Cum. Grwth		25.00% =	24.99%		
		% Yrly Grwth			7.72%	7.72%	

		<i>Actual</i>	<i>Interim</i>
		<i>Estimates</i>	<i>Estimates</i>
		<i>1997-2000</i>	<i>2000-2002</i>
Employers as Financing Agents (J)			
	Yearly growth in workers covered	1.10%	1.10%
	Yearly growth in medical care use per cap	3.00%	3.00%
	Yearly growth in costs per use	2.49%	2.49%
D + E	Yearly growth in total costs/payments	6.73%	6.73%
Insurers as Financing Agents (K)			
	Yearly growth in workers covered	3.60%	3.60%
	Yearly growth in medical care use per cap	3.00%	3.00%
	Yearly growth in costs per use	2.99%	2.99%
F + G	Yearly growth in total costs/payments	9.90%	9.90%
Households as Financing Agents (H)			
	Yearly growth in population	2.31%	2.31%
	Yearly growth in OOP per person	5.29%	5.29%
H	Yearly growth in Total OOP	7.72%	7.72%

Exhibit K

ASSUMPTIONS FOR NHA INTERIM ESTIMATES

Variables and Parameters for Interim Estimation of Primarily Market-based Values (2)

		Column 1	Column 2	Col 3	Column 4	Column 5	Column 6
<i>Legend</i>							
	Data to be entered----->	ENTER-1	ENTER-2		ENTER-3	ENTER-4	
	Results of calculations----->				Calculate	Choose	
	Residual----->				"Actual"	"Interim"	
<i>Relevant</i>		"Actual"	"Actual"	<i>Match</i>	<i>Annual</i>	<i>Annual</i>	
<i>NHA Cell (from Exhibit A)</i>		1997	2000	<i>Cum. Grwth</i>	<i>Growth Trend</i>	<i>Growth Trend</i>	<i>"Interim" 2002</i>
<i>Matrix 2</i>							
Financing Agents: Amounts Paid To Employers as Financing Agents (J)							
c	Share of total spent on govt providers	Value	0	0	0.00%		0
		% Cum. Grwth					
		% Yrly Grwth			0.00%	0.00%	
h	Share of total spent on for-profit providers	Value	48	60	24.99%		70
		% Cum. Grwth		25.00%			
		% Yrly Grwth			7.72%	7.72%	
m	Share of total spent on NGO providers	Value	5	6	10.01%		6
		% Cum. Grwth		10.00%			
		% Yrly Grwth			3.23%	3.23%	
r	Share of total spent on administration/reserves	Value	11	13	13.66%		14
		% Cum. Grwth		13.64%			
		% Yrly Grwth			4.36%	4.36%	
c+h+m+r	Total Flow from Employers	Value	64	78	21.89%		89
		% Cum. Grwth		21.88%			
		% Yrly Grwth			6.82%	6.82%	
Insurers as Financing Agents (K)							
d	Share of total spent on govt providers	Value	0	0	0.00%		0
		% Cum. Grwth					
		% Yrly Grwth			0.00%	0.00%	
l	Share of total spent on for-profit providers	Value	154	213	38.32%		267
		% Cum. Grwth		38.31%			
		% Yrly Grwth			11.42%	12.00%	
n	Share of total spent on NGO providers	Value	29	37	27.59%		42
		% Cum. Grwth		27.59%			
		% Yrly Grwth			8.46%	6.00%	
s	Share of total spent on administration/reserves	Value	55	66	20.01%		73
		% Cum. Grwth		20.00%			
		% Yrly Grwth			6.27%	3.32%	
d+l+n+s	Total Flow from Insurers	Value	238	316	32.77%		382
		% Cum. Grwth		32.77%			
		% Yrly Grwth			9.91%	9.91%	
Households as Financing Agents (H)							
e	Share of total spent on govt providers	Value	320	350	9.37%		372
		% Cum. Grwth		9.38%			
		% Yrly Grwth			3.03%	3.03%	
j	Share of total spent on for-profit providers	Value	2,752	3,496	26.32%		4,100
		% Cum. Grwth		27.03%			
		% Yrly Grwth			8.10%	8.30%	
o	Share of total spent on NGO providers	Value	107	128	18.64%		139
		% Cum. Grwth		19.63%			
		% Yrly Grwth			5.86%	3.51%	
e+j+o	Total Flow from Households	Value	3,179	3,974	18.63%		4,611
		% Cum. Grwth		25.01%			
		% Yrly Grwth			5.86%	5.86%	

Exhibit L

SUMMARY STATISTICS: NHA Estimates

	<i>"Actual"</i> Amount	1997 Percent	<i>"Actual"</i> Amount	2000 Percent	<i>"Interim"</i> Amount	2002 Percent
Sources of Financing						
<i>Ministry of Finance</i>	1,205	23%	1,398	22%	1,543	21%
<i>Donors</i>	533	10%	610	10%	668	9%
<i>Employers</i>	271	5%	358	6%	432	6%
<i>Households</i>	3,210	62%	4,009	63%	4,650	64%
TOTAL	5,219	100%	6,375	100%	7,293	100%
Financing Agents						
<i>MOH/Other Govt</i>	1,549	30%	1,783	28%	1,959	27%
<i>Donors</i>	189	4%	225	4%	253	3%
<i>Employers</i>	64	1%	78	1%	89	1%
<i>Insurers</i>	238	5%	316	5%	382	5%
<i>Households</i>	3,179	61%	3,974	62%	4,611	63%
TOTAL	5,219	100%	6,375	100%	7,293	100%
Providers						
<i>Government</i>	1,407	27%	1,609	25%	1,762	24%
<i>Private for-profit</i>	2,954	57%	3,769	59%	4,437	61%
<i>Private not-for-profit</i>	618	12%	717	11%	785	11%
<i>Administration/reserves</i>	240	5%	280	4%	309	4%
TOTAL	5,219	100%	6,375	100%	7,293	100%

Exhibit M

SUMMARY STATISTICS: Health Care Financing

<i>Item/Year</i>	<i>1997 "Actual" Amount</i>	<i>2000 "Actual" Amount</i>	<i>2002 "Interim" Amount</i>
Public health spending (<i>in millions</i>)	1,549	1,783	1,959
Private health spending (<i>in millions</i>)	3,670	4,592	5,334
Total health spending	5,219	6,375	7,293
Avg yearly change over previous estimate in %		7.0%	7.1%
Public share of total	30%	28%	27%
Private share of total	70%	72%	73%
Population	10,000,000	10,710,000	11,210,517
Total health spending per capita	522	595	651
Avg yearly change over previous estimate in %		4.5%	3.1%
GDP (<i>in millions</i>)	150,000	166,500	178,497
Constant prices GDP (<i>in millions</i>)	150,000	157,962	137,408
Total health spending as % of GDP	3.5%	3.8%	4.1%
Constant prices total health spending	5,219	6,048	5,614
Avg yearly change over previous estimate in %		5.0%	3.4%
Constant prices total health spending per capita	522	565	501
Avg yearly change over previous estimate in %		2.7%	1.9%

Exhibit N
NHA ESTIMATES: MATRIX ONE
Flows of Funds from Primary Sources to Financing Agents

"Actual" Year

1997 Primary Sources

Financing Agents	1997 Primary Sources					TOTALS	Percent
	Ministry of Finance	Donors	Employers	Household			
MOH/Other Govt	1,205	344				1,549	30%
Donors		189				189	4%
Employers			60	4		64	1%
Insurers			211	27		238	5%
Households (OOP)				3,179		3,179	61%
TOTALS	1,205	533	271	3,210		5,219	100%
Percent	23%	10%	5%	62%		100%	

"Actual" Year

2000 Primary Sources

Financing Agents	2000 Primary Sources					TOTALS	Percent
	Ministry of Finance	Donors	Employers	Household			
MOH/Other Govt	1,398	385				1,783	28%
Donors		225				225	4%
Employers			73	5		78	1%
Insurers			285	31		316	5%
Households (OOP)				3,974		3,974	62%
TOTALS	1,398	610	358	4,009		6,375	100%
Percent	22%	10%	6%	63%		100%	

Cumulative rates of growth: 1997-2000

Ministry of Finance	Cumulative rates of growth: 1997-2000				TOTALS	Yrly Growth
	Donors	Employers	Household			
	16%				15%	4.8%
		12%			19%	6.0%
			22%	15%	22%	7.0%
			35%	15%	33%	10.0%
				25%	25%	7.8%
	16%	14%	32%	25%	22%	7.0%

"Interim" Year

2002 Primary Sources (Using assumptions noted below --copied from Assumptions sheets)

Financing Agents	2002 Primary Sources					TOTALS	Percent
	Ministry of Finance	Donors	Employers	Household			
MOH/Other Govt	1,543	416				1,959	27%
Donors		253				253	3%
Employers			84	5		89	1%
Insurers			348	34		382	5%
Households (OOP)				4,611		4,611	63%
TOTALS	1,543	668	432	4,650		7,293	100%
Percent	21%	9%	6%	64%		100%	

Cumulative rates of growth: 2000-2002

Ministry of Finance	Cumulative rates of growth: 2000-2002				TOTALS	Yrly Growth
	Donors	Employers	Household			
	10%				10%	4.9%
		8%			12%	6.4%
			14%	10%	14%	7.0%
			22%	10%	21%	9.9%
				16%	16%	7.8%
	10%	9%	21%	16%	14.4%	7.1%

(Assumptions used for interim estimate (copied from Assumptions-3))

Assumptions for Interim (2002) NHA Estimate (growth assumed constant for 2000-2002)

Macroeconomic Variables

Yearly growth in population	2.3%	
Yearly growth in GDP per capita	1.2%	

Relevant Cell

Budget-driven Variables

Yearly growth in MOF allocation to MOH	A	5.1%
Yearly growth in Donors' contribution to Govt	B	3.9%
Yearly growth in Donors' direct contributions	C	6.0%

Market-driven Variables

Yearly growth in workers covered by employer self-insured plans	D + E	1.1%
Yearly growth in workers covered by employer group plans	F + G	3.6%
Yearly growth in medical care use by employer-insured workers	D + E	3.0%
Yearly growth in medical care use by group-insured workers	F + G	3.0%
Yearly growth in costs per use by employer-insured workers	D + E	2.5%
Yearly growth in costs per use by group-insured workers	F + G	3.0%
Yearly growth in OOP per person	H	5.3%

Parameters

Share of employer self-insurance paid by workers	5.7%
Share of employer purchased insurance paid by workers	8.0%

Derived Growth Rates (assumed constant for 2000-2002)

	Relevant Cell	
Employers as Financing Agents	D + E	6.7%
Yearly growth in workers covered		1.1%
Yearly growth in medical care use per cap		3.0%
Yearly growth in costs per use		2.5%
Insurers as Financing Agents	F + G	9.9%
Yearly growth in workers covered		3.6%
Yearly growth in medical care use per cap		3.0%
Yearly growth in costs per use		3.0%
Household OOP	H	7.7%
Yearly growth in population		2.3%
Yearly growth in OOP per person		5.3%

Exhibit O
NHA ESTIMATES: MATRIX TWO
Flows of Funds from Financing Agents to Providers

"Actual" Year

1997 Financing Agents

Providers	MOH/ Other Govt	Donors	Employers	Insurers	Households OOP	TOTALS	Percent
Govt providers/facilities	1,087		0	0	320	1,407	27%
For-profit providers/facilities			48	154	2,752	2,954	57%
NGO providers/facilities	288	189	5	29	107	618	12%
Administration/reserves	174		11	55		240	5%
TOTALS	1,549	189	64	238	3,179	5,219	100%
Percent	30%	4%	1%	5%	61%	100%	

"Actual" Year

2000 Financing Agents

Providers	MOH/ Other Govt	Donors	Employers	Insurers	Households OOP	TOTALS	Percent
Govt providers/facilities	1,260		0	0	350	1,610	25%
For-profit providers/facilities			60	213	3,496	3,769	59%
NGO providers/facilities	321	225	6	37	128	717	11%
Administration/reserves	202		13	66		280	4%
TOTALS	1,783	225	78	316	3,974	6,375	100%
Percent	28%	4%	1%	5%	62%	100%	

"Interim" Year

(Using assumptions noted below--copied from Assumptions sheets)

2002 Financing Agents

Providers	MOH/ Other Govt	Donors	Employers	Insurers	Households OOP	TOTALS	Percent
Govt providers/facilities	1,391		0	0	372	1,762	24%
For-profit providers/facilities			70	267	4,100	4,437	61%
NGO providers/facilities	345	253	6	42	139	785	11%
Administration/reserves	223		14	73		309	4%
TOTALS	1,959	253	89	382	4,611	7,293	100%
Percent	27%	3%	1%	5%	63%	100%	

(Assumptions used for interim estimate (copied from Assumptions-4))

Assumptions for Interim (2002) NHA Estimate (growth assumed constant for 2000-2002)

Variables

Yearly growth in population	2.3%
Yearly growth in per capita income	1.2%

Budget-driven Variables

Yearly growth in MOH spending	5.1%	Relevant Cells
Yearly growth in Donors' direct contributions	6.0%	a, p b, l, q

Market-driven Variables

Yearly growth in govt revenue at health facilities	3.0%	c, d, e,
Yearly growth in employer payments to for-profit providers	7.7%	h
Yearly growth in employer payments to NGO providers	3.2%	m
Yearly growth in employer payments for administration	4.4%	r
Yearly growth in insurer payments to for-profit providers	12.0%	l
Yearly growth in insurer payments to NGO providers	6.0%	n
Yearly growth in household OOP payments to for-profit providers	8.3%	j

Residuals (cells indirectly estimated using column totals less other cell amounts)

MOH/Other Govt payments to NGO providers/facilities	k
Households OOP to NGO providers/facilities	o
Insurer payments for administration/reserves	s

Cumulative rates of growth: 1997-2000

MOH/ Other Govt	Donors	Employers	Insurers	Households	TOTALS	
16%		0%	0%	9%	14.4%	5.1%
		25%	38%	27%	27.6%	8.2%
12%	19%	10%	28%	20%	16.0%	5.1%
16%		14%	20%		16.8%	6.3%
15%	19%	22%	33%	25%	22.2%	7.0%

Cumulative rates of growth: 2000-2002

MOH/ Other Govt	Donors	Employers	Insurers	Households	TOTALS	
10%				6%	9.4%	5.0%
		16%	25%	17%	17.7%	8.2%
8%	12%	7%	12%	9%	9.5%	5.9%
10%		9%	10%		10.3%	6.4%
10%	12%	14%	21%	16%	14.4%	7.1%

Parameters

Employers as Financing Agents		
Total spent on govt providers	c	0.0%
Total spent on for-profit providers	h	7.7%
Total spent on NGO providers	m	3.2%
Total spent on administration/reserves	r	4.4%
Insurers as Financing Agents		
Total spent on govt providers	d	0.0%
Total spent on for-profit providers	l	12.0%
Total spent on NGO providers	n	6.0%
Total spent on administration/reserves	s	3.3%
Household OOP		
Total spent on govt providers	e	3.0%
Total spent on for-profit providers	j	8.3%
Total spent on NGO providers	o	3.5%

Part 2

2. “Interim” or “Projected” Estimates of NHA in Developed Countries: A Review of Literature on Approaches and Methods Used

2.1 Introduction

2.1.1 Background

This effort to develop “interim” NHA estimates attempts to lay the groundwork in developing countries for much more extensive and intensive use of the NHA framework to provide a database for policy-related research and impact analysis. It has been (or will be) shown that the NHA framework can be developed not just to evaluate the effects of past policy changes, but also to estimate the likely future impacts of any proposed changes in policy—estimates that could assist policymakers to assess the relative costs and benefits of making the changes proposed.

To analyze potential future impacts of proposed policy changes, one can build on actual NHA estimates by establishing a baseline of current and future values of NHA cells—estimates made using the assumption that current laws, regulations, and patient and provider behavior does not change during the projection period. This baseline projection—trended forward from the most recent actual NHA estimates—would provide the benchmark against which one can measure the values that would result from any particular change in policy—with the values of all other influential factors assumed to be unchanged from the baseline. Thus, the potential impact of the policy change is the difference between the baseline values and the values estimated from assuming the particular change in policy.

An “interim” estimate—sometimes called a “nowcast” to distinguish it from a “forecast”—is, in a sense, a projection going forward of the last actual NHA just as much as a “forecast” would be a projection of a current (or “interim”) NHA. The same methods that would be used to develop an “interim” estimate would also be used to develop a “projected” estimate. As we develop techniques to make “interim” estimates of NHA in developing countries (as proposed and illustrated in the concept paper), it is useful to review the techniques and methods that have been used in developed countries in developing baseline projections of NHA.

2.1.2 A Review of the Relevant Literature

As part of this effort to develop methods to develop “interim” NHA estimates in developing countries, the literature on approaches and methods used in the United States and other developed countries was reviewed in order to establish the appropriate context for approaches proposed in this effort. It is not surprising that the developed countries have been estimating their National Health

Expenditures (NHE), now known as NHA, for many years, and that there is an impressive time series of such data (the latest available are for 2001) available through the Organization for Economic Cooperation and Development (OECD).²⁹ But, with the notable exception of the United States and Canada, there has not been extensive work done to date on developing “nowcasts” or “forecasts” of NHA. The United States’ series on NHE data started in 1960 and the U.S. government began publishing projections in the 1980s. The Canadian series started in 1975, and at present includes a “nowcast” of the current year (2003), but does not yet make projections.³⁰ There also have been efforts to make health expenditure projections of various kinds for policy analytic purposes. A brief review of these efforts is made below.

Section 2 examines the approaches, methods, and results of efforts in the United States to estimate NHE projections. Section 3 reports on the efforts made so far by OECD countries, highlighting research that has attempted to project the future impact of aging populations on health expenditures. Section 4 discusses the methods used by the Canadian Institute for Health Information to develop “nowcasts” (or “interim” estimates) of NHE in Canada. Section 5 summarizes the review and its implications for developing “interim” NHA estimates in developing countries.

2.2 Projections of NHA Estimates in the United States

2.2.1 Historical Evolution

The most sophisticated development of NHE estimates and projections has occurred in the United States, during more than four decades of work. After commencing the series of annual estimates of NHE in 1960, the U.S. government developed a capacity to develop projected estimates due to the statutory requirement for annual actuarial projections of the status of the program of Medicare insurance for the elderly. When the U.S. Congress first passed Medicare authorization legislation in 1965, it also created an Office of the Actuary (OACT) in the Department of Health, Education, and Welfare (now housed in the Centers for Medicare and Medicaid Services (CMS) in the Department of Health and Human Services). Since then, the Boards of Trustees of the two Medicare³¹ Trust Funds have produced annual reports that evaluate the near-term (10 years) and longer-term (75 years) financial status of the two funds under a range of possible conditions.³² Many of the models and methods used today in projections of the broader-scope NHA, which are described below, were originally developed by the OACT to assist in preparing these annual reports. All of the macroeconomic and demographic variables used in the actuarial projections are those developed by

29 Organization for Economic Cooperation and Development, *OECD Health Data 2003: a comparative analysis of 30 countries*, Paris: OECD, 2003 (see Website <http://www.oecd.org>). Also, see M. Huber, “Health Expenditure Trends in OECD Countries, 1970-1997,” *Health Care Financing Review*, Winter 1999, Vol 21, Number 2, pp. 99-117.

30 Canadian Institute for Health Information, *National Health Expenditures Trends, 1875-2003*, Ottawa, CIHI, 2003 (see Website <http://www.cihi.ca>).

31 Medicare is a federally administered insurance program focusing mostly on reimbursing inpatient hospital (Part A) and supplementary medical (outpatient) (Part B) costs of the elderly (those aged 65 or older).

32 The latest reports are: (1) Board of Trustees, *Federal Old-Age and Survivors Insurance Disability Trust Funds, 2003 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, March 2003; and (2) Board of Trustees of the Federal Hospital Insurance Trust and Federal Supplementary Medical Insurance Trust Funds, *2003 Annual Report of the Boards of Trustees of the Federal Hospital Insurance Trust and Federal Supplementary Medical Insurance Trust Funds*, March 2003.

the Social Security Administration to be used in estimating the long-term health of the Social Security Trust Fund (otherwise known as Old Age, Survivors, and Disability Insurance).

While the complex, econometrics-based modeling that is at the heart of the NHE Projections Model developed by the OACT (the current model structure was introduced in 1998) is considerably more sophisticated than what is proposed for “interim” estimation of NHA for developing countries, certain elements of it, and concepts used by it, are relevant for our efforts. Needless to say, the characteristics of the health care system of the United States are very different from those of the developing world. It is extremely technology- and resource-intensive and is dominated by the private sector—to a degree that is unparalleled in the rest of the world, even among developed countries. Moreover, spending in the health sector is a huge proportion both of government spending and of the economy in general, with health expenditures approaching 15% of GDP.³³

Additionally, not only is the system awash in data, but the breadth and depth of analyses that have been made of those health data facilitate development of accurate estimates of past spending and of relatively reliable projections of future spending, even on a disaggregated basis. The brief description of the NHE Projection Model below is written to provide a glimpse of what lies across the horizon for developing countries, in terms of data and analyses needed to develop a similar capacity for “interim” estimates and “projected” estimates of NHA.³⁴

2.2.2 Methods, Data Sources, and Specification of the Model³⁵

The OACT computes annual estimates of NHE expenditures, both to update past actuals and to extend and modify (as determined by model results) future projections. After recent past actuals are updated to incorporate any new information, projection estimates are made by using parameters of equations estimated using past estimated values inserted into models that predict future values for (1) government health spending (dominated by the Medicare and Medicaid³⁶ programs) and (2) private health spending. The projections of the government’s budget expenditures are based on actuarial techniques applied to trends based on past actual estimates, while the projections of private health spending are based on a multi-equation structural econometric model (known as the NHE Projection Model) using the parameters of the model estimated using historical values.

The NHE Projection Model aims at capturing causal relationships between major macroeconomic variables and private health spending, as well as interactions among major causal variables within the health sector. The macroeconomic and demographic outlook used in the annual Trustees’ Reports and the Medicare and Medicaid spending projected by OACT are exogenous inputs

³³ In 2001, the latest year for which comparable data are available from the OECD, the United States had the higher ratio of total health expenditure to GDP at 13.9%, followed by Switzerland (11.1%), Germany (10.7%, and Canada (9.7%). (From OECD, *op. cit.*)

³⁴ “Projected” estimates of NHE by OACT are important ingredients in the development of baseline projections of NHE that are the basis for estimates of various legislative proposals for changing federal law with respect to federal health programs. For a thorough discussion of the methodological issues involved in using such NHE estimates to estimate proposals for health reform in particular in 1994, see U.S. Congress, Office of Technology Assessment, *Understanding Estimates of National Health Expenditures under Health Reform, OTA-H 594*, Washington, DC: U.S. Government Printing Office, May 1994.

³⁵ For more detail on this model, only summarized here, see the CMS Website at

<http://www.cms.gov/statistics/nhe/projections-methodology/default-02.asp> as modified on February 11, 2003.

³⁶ Medicaid is health benefits program for the poor administered by the 50 states and jointly financed by state (45%) and federal (55%) governments.

to the multi-equation model. The NHE Projections model is thus conditional on the assumptions inherent in these projections.

Consistent with the OECD series, the OACT NHE estimates and projections trace health spending by source of funds (i.e., original sources as well as financial intermediaries) and by type of services (i.e., hospital services, physician services, retail outlet sales, etc.). (This one large matrix is essentially the equivalent of Matrix 2 in the model as articulated in this paper.)

2.2.2.1 General Approach and Methods

The NHE Projections Model has two major components: personal health care (PHC) spending and non-PHC spending. PHC spending comprises private and public health spending, the latter made up of spending by Medicare, Medicaid, and other public programs. Non-PHC spending is made up of all spending that is non-personal in nature (e.g., administration, research, and government spending on public health). The model is a “top-down” model in the sense that growth in PHC spending and in medical inflation are primarily determined at the aggregate level on the basis of exogenous projections (determined outside the model) of macroeconomic variables, of spending by Medicare and Medicaid, and other health sector assumptions. Models of spending growth and price inflation for individual types of services are then estimated and solved separately, based on models similar in specification to the aggregate model (as described below).

The core of the aggregate model of PHC spending consists of two behavioral equations explaining changes in the annual growth rates of:

- ▲ Private personal health care spending (real per capita); and
- ▲ Personal health care price inflation.

This structure implies that “real per capita spending” from private sources is determined by all factors other than changes in prices of health care as captured in the index that measures price inflation. Thus, any changes in quality or in quantity of services (i.e., any changes except those directly related to changes in prices) are implicitly embedded in the growth rate of real per capita spending.

The first equation includes three independent variables:

1. Disposable personal income growth;
2. Relative medical price inflation (of PHC); and
3. Public spending growth (real per capita).

The first variable has a positive although lagged effect on private PHC spending, reflecting a consistency with the large body of literature on the empirical relationship between national income and health spending.³⁷ The previously mentioned time-series cross-country data for the OECD countries have confirmed the importance of this relationship. It has been found that the income effect

³⁷ For a review of this literature see U. Gerdtham and B. Jonsson, “International Comparisons of Health Expenditure: Theory, Data and Econometric Analysis,” *Handbook of Health Economics* (Amsterdam: Elsevier, 2000): 11-53.

occurs with some lag, and that the sum of coefficients for all lagged periods is 1.9, which can be interpreted as an income elasticity.³⁸ It is likely that there is a strong positive relationship in developing countries, particularly in view of the fact that OOP spending has been found to be such a large share of total health spending.³⁹

The second and third variables were found to have negative impacts on PHC spending.⁴⁰ It is theoretically expected that relative medical price inflation would have a negative relationship with real per capita private PHC spending. The negative effect of public spending reflects the combined effects of shifts over time from private to public coverage and some degree of cost-shifting between public and private programs.

The models that determine projections of Medicare and Medicaid (and other public) spending are separately determined and those results are exogenous inputs to the behavioral equation explaining private PHC spending growth. The three components of private PHC spending (OOP spending, private health insurance payments, and other private) are themselves cross-cutting components of the type-of-service sectors (e.g., hospitals, physicians, etc.).

2.2.2.2 Data Sources

For most types of services, price indexes used in the model are based on the Consumer Price Indexes (CPI) published by the Bureau of Labor Statistics (BLS). However, the price index for hospital services is a BLS Producer Price Index and that for nursing home services is one compiled by the CMS. Data on private health insurance enrollment is benchmarked to the 1997 National Health Interview Survey and is then escalated using the annual change in the insured population as indicated by the Current Population Survey, a large household survey conducted yearly by the BLS. The projections for macroeconomic variables, such as economic growth and economy-wide inflation, as well as demographic variables, such as the age-sex composition of the population, are derived from the annual Medicare projections produced by the OACT. The projection of disposable income is made consistent with the economic and demographic assumptions made in the Medicare projections.

2.2.2.3 Model Specifications

The disaggregated values of the various components of each of the two dimensions of the NHE Projections Model are modeled separately and sequentially, after the model solution for total PHC is determined as described above. First, on the type-of-service dimension, there are separate models to explain the growth in each of 10 sectors in the personal health care (PHC) category, as follows:

³⁸ That is, a 1.0 percent increase in disposable personal income results in a 1.9 percent increase in private PHC spending spread over five subsequent years. This is higher than the 1.0 to 1.5 percent elasticities found in the empirical literature, which are probably lower because they include all sources of funding, not just private, as is the case here.

³⁹ Income elasticity of demand for medical services is likely to be much lower in developing countries (but certainly more than 1.0) because a much higher share of disposable income must be spent on necessities, like food, shelter, and clothing, leaving spending on health to come from a much smaller discretionary portion of household income.

⁴⁰ The estimated price elasticity is -0.4 , suggesting that a 1.0 percent increase in the relative price of health care results in a 0.4 percent decline in real per capita PHC spending.

- ▲ Hospital services
- ▲ Physician services
- ▲ Dental services
- ▲ Durable medical equipment
- ▲ Nursing home services
- ▲ Home health care
- ▲ Other, professional services
- ▲ Other, non-durables
- ▲ Other, personal services
- ▲ Pharmaceuticals

After the total for pharmaceuticals is estimated (in unconstrained fashion), the projection estimates of each of the other sectors are constrained to equal the model solution for total PHC services. The totals for each component of the non-PHC category are estimated in unconstrained fashion, but they account for a small portion of total NHE. These components are:

- ▲ Administration and net cost of private health insurance;
- ▲ Research;
- ▲ Construction; and
- ▲ Government public health.

Second, the change in composition of private spending across sources of funds (private health insurance, OOP, and other private) is also estimated econometrically. However, because the fraction of spending paid OOP varies substantially across groups according to type of insurance coverage, it is important to capture the shifts in enrollment. Most important are changes in prescription drug coverage and changes resulting from the spread of managed health care. The model for private sources of funds (as applied to each service sector) is a hybrid between the “top-down” (constrain sectors to total) and “bottom-up” (sum across sectors to obtain total) approaches. This hybrid is needed because information is available at the disaggregated level that can indicate the shifts that have taken place while these shifts are obscured by aggregate estimation.

The model includes equations for OOP and other private spending as a share of total spending for both total PHC and for each type of medical product or services. The published forecast is set equal to the summation across all sectors, and private health insurance spending for each sector is set as a residual based on forecasts of private spending in each sector and the shares of OOP and other private of this total.

2.2.2.4 A Historical Perspective on Methods used in the United States

The current version of the CMS' "NHE Projection Model" (as briefly described above) is the state of the art for methods of modeling future NHE in the United States. But it has evolved to its present sophistication and complexity from the relatively crude methods that were initially developed by U.S. government actuaries and economists more than 25 years ago. A review of those earlier approaches may be worthwhile if only because developing countries are likely to develop methods that use the simpler techniques of that time.

Freeland et al. (1980)⁴¹ described the model used to make projections of NHE for the period from 1980 to 1990. At that time, the model had two modules: a Five-factor Module for types of expenditures and a Channel of Finance Module for sources of funds. In applying these modules, analysts used the familiar assumption that historical trends and relationships would continue into the future. Interaction and consistency between the two modules were also imposed in the projection estimations.

The five factors used to project each type of expenditure (by provider or service type, as listed above) were:

1. Population growth;
2. Growth in per capita utilization;
3. Growth in the CPI;
4. Growth in medical care prices to the extent that they are in excess of the CPI index; and
5. Growth in real expenditures per unit of service (e.g., outpatient visit, inpatient day) attributable to "other factors" not included in the above four factors).

The Five-factor Module for each expenditure type is expressed as an equation that has as the dependent variable the total health expenditure in year t explained by total health expenditures in year $t-1$ multiplied exponentially by the five growth rates, each of which are known (i.e., calculated) values of independent variables (the last factor, "other", functioning as the residual growth term explaining whatever growth is not explained by the other four). The equation is sequentially solved for each year of actual data, generating growth rates that establish the historical trend used for the projection. Note that, as simple as this model is, it is really only applicable to market-based spending and is dependent on the availability of time-series (longitudinal) data on utilization and prices that need to be consistent across recent years. While data may not have been available to estimate all of these factors for each type of service to be projected, the combined effects of the five (or fewer)

⁴¹ M. Freeland, G. Calat, C.E. Schendler, "Projections of National Health Expenditures, 1980, 1985, and 1990," *Health Care Financing Review*, Winter 1980, pp. 1- 18.

factors were multiplied to obtain a composite yearly rate of growth for each type of expenditure for each year, 1979 to 1990, based on the most recent (at that time) actual estimate of NHE for 1978.⁴²

The Channel of Finance Module projected estimates of eight sources of funds:

1. Direct OOP payments
2. Private health insurance
3. Philanthropic and industrial in-plant health services
4. Medicare
5. Federal Medicaid
6. Other federal
7. State Medicaid
8. Other state and local

Estimates of Medicare and Medicaid spending were made independently of the projections for other sources (using assumptions made by the Office of Management and Budget), while the projections of all other sources are based on historical trends. The historical trends in the portions attributable as coming from each source was projected, with the sum of the proportions in each projected year constrained to equal 100%.

2.2.2.5 Results of U.S. NHE Projections: Estimates of 1980 versus Estimates of 2001

Using the current NHE Projections Model as briefly summarized above, the OACT estimates that the 2001 level of health expenditures, \$5,039 per capita or 14.1% of GDP, will rise by the year 2012 to a level of \$9,972 per capita or 17.7% of GDP. These projections reflect an average annual rate of growth in NHE of roughly 7.1% versus an average annual rate of growth in GDP of roughly 5.3% (while the population grows at an average annual rate of growth of 0.8%).⁴³

Using the 1980 NHE Projections Model, Freeland et al.⁴⁴ estimated that NHE would grow at an average annual rate of 12.1% between 1978 and 1990—from \$192.4 billion or \$863 per capita (9.1% of gross national product [GNP]) to \$757.9 billion or \$3,057 per capita (11.5% of GNP). During this same period, government's share of total health expenditures was projected to grow from 41% of the

⁴² It is the development of such time series that will be achieved by regular and routine rounds of NHA estimates in the developing countries, just as they have been conducted in the United States and other OECD countries. Of course, these methods would apply only to private sector spending in developing countries, and distinctly separate methods for projecting budget-based components of spending would need to be developed. (Most of public spending on health in the United States consists of reimbursement of expenditures that are largely determined by market-based pricing in the private marketplace.)

⁴³ S. Heffler, S., Smith, S. Keehan, M.K. Clemens, G. Won, and M. Zezza, "Health Spending Projections for 2002-2012," *Health Affairs Web Exclusive*, Project Hope, 7 February 2003, pp. W3-54—W3-65. Note that the 2001 figures are an upward revision of what was reported by the OECD report, in OECD, *op cit.*)

⁴⁴ M. Freeland et al., *op. cit.*, Table 1, p. 2.

total in 1978 to 43% of the total in 1990, with the federal share of government spending rising from 69% to 72%.

Actual NHE⁴⁵ turned out to be \$245.8 billion (or \$1,067 per capita) in 1980 and \$696.0 billion (or \$2,738 per capita) in 1990. Thus the actual average annual growth rate between 1980 and 1990 was 11.0%, rather than the 12.1% projected in 1980. Government's share of total health expenditures actually was somewhat higher than projected in 1980 at 43% and lower than expected in 1990, dropping to 41% of the total, with the federal share of government spending rising remaining steady at 68%. These stabilized actual shares for government were accounted for by a rapidly increasing share spent through private health insurance, which rose from 28% of total health spending in 1980 to over 33% in 1990.

The actual estimates of NHE for 1980 and 1990 showed that NHE as a share of GDP grew from 8.8% in 1980 to 12.0% in 1990.⁴⁶

2.3 Estimation Methods Used by National Health Expenditures in Canada

The Canadian Institute for Health Information (CIHI) publishes an annual compendium of NHE data and trends⁴⁷ that includes estimates of actual NHE starting in (calendar year) 1975 and “nowcasts” (which it calls “forecasts”) of the most recent two years of data. Literally speaking, the “forecasts” are for past or current (not future) periods, but the CIHI calls them “forecasts” because actual expenditure data is unavailable. In its most recent publication (2003), actual estimates and trends are published for the years 1975 through 2001, and “forecasts” are published for 2002 and 2003.

Forecasting methods were made using two different approaches. Provincial government health spending forecasts were developed by calculating the growth rates of past spending, and applying the calculated growth rates forward from the most recent actual estimate. The growth rates were estimated using the standard formula for calculating the average annual rate of growth as

$$(\ln(\text{value at end of period}) - \ln(\text{value at beginning of period}))/T$$

$$\text{Yearly Growth Rate} = e^{\epsilon}$$

where the constant ϵ equals 2.718, the base of the natural logarithm, and T equals the number of years in the period.⁴⁸

The growth rates for recent years in provincial government spending reported in provincial Main Estimates and Budgets were calculated using the above formula, and then applied to the most recent actual estimates (for 2002 and 2003 forecasts were trended forward from actual 2001 data). Forecasts for the remaining categories (federal direct, workers' compensation, municipal government, and the private sector) “were made entirely based on econometric analysis of time series trends. For each

⁴⁵ S. Heffler, *et al.*, *op cit.*, Tables 1, 2, and 3,

⁴⁶ *Ibid.*

⁴⁷ Canadian Institute for Health Information, *National Health Expenditure Trends, 1975-2003*, Ottawa: CIHI, 2003.

⁴⁸ This is the technical formula for the mathematical derivation of the average growth rates (as referred to in Part One (Section 5.2.1)) in any given category for components of spending over a period of T years.

series, up to 40 different univariate forecasting specifications were evaluated, and the best one (based on the root mean square error of prediction) was selected.⁴⁹ Forecasts of data items used in calculation and presentation of the health forecasts (e.g., GDP, population, government current expenditure, and CPI (health)) were taken from the relevant series of government forecasts from Statistics Canada and the Conference Board of Canada.

Canada's NHE was estimated at 9.6% of GDP in 2001 and was forecast to grow to 10.0% of GDP in 2003. The growth in NHE was forecast to be about 4.5% for 2002 and 2003, somewhat lower than the 5.4% growth experienced in the period 1996 to 2001, but higher than the average yearly growth of 3.5% between 1975 and 1991 and of 0.8% between 1991 and 1996. By 2003, the government's share of NHE was forecast to be 70%.⁵⁰

2.4 Forecast of Age-related Health Spending: OECD and Other Analytical Efforts

Although OECD countries (besides the United States) have not yet developed a capacity to do “nowcasts” (except for Canada) or “forecasts” of health spending, there has been a related effort recently to develop projections of age-related spending in OECD countries by the year 2050. The effort to estimate the fiscal impact of age-related spending for OECD countries for the first half of this century is based on national models using an agreed upon set of assumptions about macroeconomic and demographic developments for each country. The study found that there will be wide variations in the fiscal impact of aging, primarily because of pension program differences and degree of government liability, but that the current level of age-related spending, at 7% of GDP, is likely to rise to about 11% of GDP by the year 2050.⁵¹

A similar econometric modeling effort to forecast health spending on the elderly was completed by Nandakumar and Wilwerding (2004) and was applied empirically to the case of Jordan.⁵² Separate econometric models estimate both the spending in the base year and the macroeconomic growth expected over the forecast period. Then, using the results of these two estimations, health expenditures at the end of the forecast period are estimated by inserting the expected aging of the population during the period and using the expected macroeconomic growth over the same period. While this model is heavily dependent on assumptions made about the interrelationships of types of spending in the base year, it can generate alternative results as assumptions of key variables are changed. Its significant finding is that, while it the share of the population that will be over age 65 within 15 years is relatively certain (i.e., in Jordan it will rise from 7% in 2000 to 9% in 2015), the share of total health spending that will be accounted for by them will be higher to the degree overall macroeconomic growth is lower. Health spending by and for the elderly is projected to be 23% of the total if economic growth averages 5.6% per year, and is projected to be 38% if economic growth averages only 2% per year by 2015.

⁴⁹ *Ibid.*, p. 70.

⁵⁰ *Ibid.*, p. iii.

⁵¹ T.T. Dang, P. Antolin, and H. Oxley, “Fiscal Implications of Ageing: Projections of Age-related Spending,” Economics Department Working Paper No. 305, Paris: OECD, 19 September 2001 (available on at <http://www.oecd.org/eco/ec/>).

⁵² A.K. Nandakumar and J. Wilwerding, “Forecasting Expenditures on Health Care in Developing Countries: An Econometric Approach,” unpublished research report for the PHRplus Project, Bethesda, MD: Abt Associates Inc., 2004. Also, see Mahal, A. and Berman, P., “Health Expenditures and the Elderly: A Survey of Issues in Forecasting, Methods Used, and Relevance for Developing Countries,” Global Burden of Disease in Aging Populations, Research Paper No. 01.23 (cited in *Ibid.*)

2.5 Summary and Conclusions

While it is true that the applied research and estimation efforts performed in developed countries (mostly in the United States) on projections of NHE are not yet relevant or applicable to the situation faced in developing countries, where the needed time series of data is only beginning to be developed, there are several conclusions that can be drawn from this brief review of the literature.

- ▲ The most relevant approaches and methods used in developed countries are those adopted in the 1980s in the United States and those now used for “interim” estimates in Canada. These methods are relatively straightforward and use easy-to-understand formulae—formulae that are very similar to those proposed in this concept paper for use in “interim” NHA estimates. The more sophisticated and complex econometric methods now in use in the United States (and illustrated in the modeling used to forecast spending by the elderly) will not be of practical relevance in developing countries for the immediate future, at least in the context of analyses of NHA data.
- ▲ Interim estimation methods highlight the importance of knowing the value of components of growth of each category of spending for actual NHA estimates. Interim estimates of cell totals are more reliable to the degree in which the growth rates of the known components of the totals can be estimated based on past data. Methods in the literature use such components of growth when making interim or projected estimates for market-based spending categories. Unfortunately, such categories comprise only a part of the total health spending in less-developed countries, and there is nothing in the literature suggesting how to do interim estimates for which extrapolation of past growth trends may not be reliable and therefore not applicable.
- ▲ The reliability of “interim” or “projected” estimates of NHA are reduced as the time from the latest actual estimate passes. The longer the “interim,” the less reliable the estimates. This will be true even if it were not virtually certain that significant and unpredictable changes in policies and macroeconomic conditions will occur over longer time periods. For developing countries, therefore, it is reasonable to focus on “interim” estimates initially to produce up-to-date numbers for the most recent 12-month period that is no more than two or three years since the most recent actual NHA estimate. After the methods are refined for “interim” estimates, and after a time series of actual NHA estimates is also developed, then it would be reasonable to try to develop “projections” of an estimated NHA baseline that could be used for policy analytic purposes.
- ▲ The general conceptual development of “interim” and “projected” estimates in developed countries provides a valuable perspective to use in developing a framework to use in formulating new directions for more sophisticated use of NHA estimates in developing countries. Understanding and using methods for updating out-of-date actual NHA estimates will give policy analysts the skills and insights that will be useful in developing more accurate actual NHA estimates and in developing policy-relevant analytical approaches to making sense of the data they produce. The end result will be more accurate and timelier analyses of important trends in financing the health sector that will provide better support to policymakers.

Part 3

3. Application of NHA Interim Estimation Techniques to Ethiopia

3.1 Introduction

Ethiopia has completed two rounds of actual NHA estimates—the first for the year 1995/1996⁵³ and the second for the year 1999/2000.⁵⁴ The periods for which the estimates were made correspond to the Ethiopian Fiscal Years 1988 and 1992 (Ethiopian Calendar), which are equivalent to the periods from July 1st to June 30th of the respective Gregorian calendar years of 1995/1996 and 1999/2000. Budgetary data, of course, are available by fiscal year, which dictates the beginning and end of the 12-month period used in the estimates. The two specific periods (four years apart) were selected because the Ethiopian Central Statistical Authority had conducted nationwide representative surveys^{55,56} of household income, consumption, and expenditure for those periods so that comparable estimates could be made of private spending by households.

This report will describe the methods and approaches used, and the results of using data points from these two rounds of actual NHA estimates from years past in order to make an interim NHA estimate for the most recent comparable period—which, in this case, is the 12-month period from July 1, 2002, to June 30, 2003, corresponding to the Ethiopian Fiscal Year 1995. We shall refer henceforth to this period as 2002/03. Even though these interim estimates of various components of NHA may not be as precisely accurate as those that could be (and will be) estimated later (as more reliable data become available), they should be of some help to policy analysts and policymakers. They will be helpful if only because their estimation will require us to examine quantitatively the significant changes that have occurred since the 1999/2000 period that have impacted health spending both by government entities and by private employers and households since the last actual NHA round in 1999/2000.

When considering whether to attempt to do an interim NHA estimate for 2002/03 for Ethiopia, special attention focused on the fact that, of the four preconditions for doing a reasonable interim NHA estimate (outlined in the concept paper in Part One), two of them raised questions. Those two problematic preconditions were:

53 Federal Ministry of Health, NHA Team. 2001. Ethiopia: 1995/96 National Health Accounts. Addis Ababa. Federal Democratic Republic of Ethiopia.

54 Ministry of Health, Health Financing Secretariat, NHA Team. 2003. Ethiopia: 1999/00 National Health Accounts. Addis Ababa, Federal Democratic Republic of Ethiopia.

55 Central Statistical Authority. 1998. Revised Report on the 1995/96 Household Income, Consumption, and Expenditure Survey. Statistical Bulletin 204. Addis Ababa, Federal Democratic Republic of Ethiopia.

56 Central Statistical Authority. 2001. Report on the 1999/2000 Household Income, Consumption, and Expenditure Survey. Statistical Bulletin 258. Addis Ababa, Federal Democratic Republic of Ethiopia.

- ▲ The accounting structures of the NHAs done to date are similar across all previous actual NHA estimates to be used for an NHA interim estimate; and
- ▲ There has not been a serious economic or political disturbance since the last NHA estimate that would make it difficult to make a reliable interim estimate.

The first precondition will be difficult to meet for any developing country that has only recently begun to conduct NHA estimates, and Ethiopia is no exception. First-round estimates in nearly all countries that completed them in the period from 1997 through 2000 used a methodology that has since been extensively revised, standardized, and codified in the *Producers' Guide*, cited in Part One. Ethiopia, like many other countries that conducted first-round NHA estimates, has adopted the recommended boundaries, definitions, and accounting structure recommended in the guidebook. As a result, there are some significant differences in the completeness and the presentation of the estimates between the first and second rounds. It is possible, however, to revise the presentation of round estimates to mimic that of round-two estimates, and this will be done in this application. One major difference in the structure of the accounting framework between the two rounds is that the second-round estimates are much more detailed in the categorization of flows of funds than were the first-round estimates. Before an interim estimate is performed, categories will need to be collapsed into fewer categories to facilitate interim estimation and presentation in ways that can make NHA estimates comparable across years in tables of manageable size.

The second precondition appears to be a more serious problem for Ethiopia for two reasons. First, large increases in donor funding have occurred since 1999/2000. Second, the Ethio-Eritrean war took place during that same period. As for donor funding, Ethiopia is just one of many countries of Africa that are now starting to receive large flows of funds from the Global Fund to Fight AIDS, Tuberculosis, and Malaria. In some countries, like Ethiopia, the large amounts awarded by the Global Fund are supplemented by large flows from other sources to fight the same diseases (e.g., PEPFAR funds)—with the total flow of financial assistance sometimes being several times the budgets allocated from general revenues to ministries of health, and many times the amounts previously provided by international and multilateral donor agencies. The most difficult aspect of estimating how much of this large influx of funds through what channels is that there is little evidence available (reliable or not) that would help to estimate how fast this money can be spent (in relation to how fast it can be made available) by any of the many channels and agencies that are expected to spend the money. Past experience may not be a reliable guide for more recent experience.

In addition to this issue of huge increases in external financial assistance that Ethiopia has just begun to receive, there are large questions about how to address the fact that its second round of NHA was estimated for the period during which when the Ethio-Eritrean War took place. During that period of 1999 and 2000, there were significant deviations from historical trends in both government and donor spending on health. On the government side, the civilian budgets for the Ministry of Health and for the Regional Health Bureaus declined substantially, while the spending on health through the military rose considerably. At the same time, many donors suspended their programs while the war was ongoing. The second-round estimates reflect the impact of these deviations from trendlines in several major categories of spending. In the three years since that estimate, there has probably been a recovery to previous levels and patterns of spending. But the disturbance to the long-term trendlines does present problems in applying the methods and approaches outlined in the concept paper, especially to estimates of government and donor spending.

However, since Ethiopia has institutionalized its NHA estimation process, and because it is likely that actual NHA estimates will be made more regularly (possibly every two years) in the future, there are potential benefits (for future efforts) from an attempt to do an interim NHA estimate despite

the potential difficulties. One reason for proceeding is a recognition that interim estimation (or projected estimation) will always involve more “art” than “science” (or, if you will, “mathematics of accounting”), and the use of assumptions will always involve the use of educated judgments based on all evidence available.⁵⁷ A demonstration of the role of this “art” as it relates to the “science”—of making and justifying important assumptions of interim estimates—will be an important output of this application to Ethiopia. It is with this perspective that we will proceed to perform an interim NHA estimate for Ethiopia, granting that there will be importance of the first-round point estimates may not be as important as the use of recent data to extrapolate forward from the much-improved and more detailed second-round estimates.

Prior to presenting and explaining this application of interim NHA estimation methods for the period 2002/2003 (Section 4), this paper outlines the differences in the data and estimation methods between NHA1 and NHA2 (Section 2) and presents and discusses how the approaches of the concept paper are adapted to apply them to Ethiopia (Section 3).

3.2 Differences between NHA1 and NHA2

Before we proceed to a discussion of interim estimation methods to be applied in Ethiopia, it is useful to give a more detailed description of the salient differences between Ethiopia’s NHA1 and NHA2. (These differences are summarized and highlighted in **Table 1** (1995/1996), **Table 2** (1999/2000), and **Table 3** (the percentage change from NHA1 to NHA2). There were differences in inclusiveness, data sources, and classification, which were as follows.

Table 1								
Flows of Funds from Primary Sources to Financing Agents								
(in millions of Ethiopian Birr; US\$ = Birr 8.1)								
"Actual" Year								
1995/1996								
Primary Sources								
					Internal	External		
	Public	Private			Assistance	Assistance		
Financing Agents	Government	Parastatal	Private		Local			
	Revenue	Employers	Employers	Households	NGOs	Donors	TOTALS	Percent
Govt: Federal	147					9	156	11%
Govt: Regional	393					17	411	28%
Govt: Other	NE					NE	0	0%
Govt: Insurance			4	NE			4	0%
Private: Insurance		NE/NZ	NE/NZ	NE/NZ			0	0%
HHOOP				766			766	53%
NGOs	NE/NZ					98	98	7%
Parastatal Employers		21		NE/NZ			21	1%
Private Employers			NE/NZ	NE/NZ			0	0%
Donors	NE					NE	0	0%
TOTALS	540	25	0	766	98	26	1,454	100%
Percent	37%	2%	0%	53%	7%	2%	100%	

Legend: NE = not estimated; NE/NZ = not estimated, but near zero
Notes: Amounts from "Donors" to "Govt: Federal" and "Govt: Regional" are seriously underestimated.

⁵⁷ It should be noted that even actual NHA estimates involve the “art” of making estimates based on assumptions made about variables and/or constants that cannot be measured. Examples could be noted in Ethiopia’s NHA2.

Table 2**Flows of Funds from Primary Sources to Financing Agents**

(in millions of Ethiopian Birr; US\$ = Birr 8.3)

"Actual" Year**1999/2000**

<i>Primary Sources</i>									
	Public	Private			Internal Assistance	External Assistance			
Financing Agents	Government Revenue	Parastatal Employers	Private Employers	Households	Local NGOs	Donors	TOTALS	Percent	
Govt: Federal	344					207	552	19%	
Govt: Regional	514					158	673	23%	
Govt: Other	53					7	61	2%	
Govt: Insurance		6	1				7	0%	
Private: Insurance		5	1	0			7	0%	
HH OOP				1,058			1,058	36%	
NGOs	2				126	13	140	5%	
Parastatal Employers		48		0			48	2%	
Private Employers			131	0			131	4%	
Internatl Agencies	6					250	255	9%	
TOTALS	919	60	133	1,058	126	635	2,931	100%	
Percent	31%	2%	5%	36%	4%	22%	100%		

NE = not estimated; NE/NZ = not estimated, but near zero

Table 3							
Flows of Funds from Primary Sources to Financing Agents							
Percentage Increases from 1995/96 to 1999/2000							
<i>Primary Sources</i>							
<i>Financing Agents</i>	Public	Private			Internal Assistance	External Assistance	
	Government Revenue	Parastatal Employers	Private Employers	Households	Local NGOs	Donors	TOTALS
Govt: Federal	135%					2154%	254%
Govt: Regional	31%					820%	64%
Govt: Other	NA					NA	NA
Govt: Insurance		59%	NA				89%
Private: Insurance		NA	NA	NA			NA
H OOP				38%			38%
GOs	NA				29%	NA	44%
Parastatal Employers		130%		NA			130%
Private Employers			131	NA			NA
Internatl Agencies	NA					NA	NA
TOTALS	70%	142%	NA	38%	29%	2307%	102%
NA = not applicable because denominator was not estimated or was zero							

3.2.1 Internal and External Assistance as Sources of Funds

NHA1 did not estimate an amount for internal assistance, that is, the sum of the amounts that domestic charitable, NGOs spent on health services net of any fees or other kinds of revenues they may have received. NHA2 includes a category of “local NGOs” as a source of funds that was not included in NHA1. NHA2 also includes categories for external assistance that were not included in NHA1. NHA1 included only those donor amounts reported by the Ministry of Finance and Economic Development (MoFED) as having passed through that ministry. There are other channels through which external assistance (grants and loans) are provided to Ethiopians, and these are included in NHA2. The external assistance categories used in NHA2 were:

- ▲ Budget support grants
- ▲ Multilateral assistance
- ▲ Bilateral assistance
- ▲ International NGOs

In addition to expanding the classification and comprehensiveness of the “assistance” category (whether internal or external), NHA2 also expanded the scope of its efforts in collecting the relevant data in these categories. Most importantly, whereas NHA1 relied on audited reports provided by the Disaster Preparedness and Prevention Commission (DPPC) and the Christian Relief Development Association (CRDA) reports for estimates of NGO spending, NHA2 added a survey of 23 international NGOs and faith-based organizations, as well as a survey of 29 major bilateral and multilateral health sector donors. The first survey was able to capture spending that went directly to facilities and organizations in Ethiopia without being recorded in official records. The second survey captured flows of funds from donors that did not go through the MoFED and/or did not appear in the DPPC or CRDA reports.

In addition to the above expansions in comprehensiveness, NHA2 also acknowledged that new financing agents were making funds available through newly created special-purpose funding agencies like the Global Fund (although Global Fund-approved funding will not have started to be spent even in the interim estimation period (2002/2003)). Accordingly, the regional offices of the National HIV/AIDS Secretariat and the Economic and Social Rehabilitation Fund (ERSDF) are included in NHA2 to allow for inclusion of funds coming directly through those various channels and from new funding mechanisms.

Because the classifications of spending, and the comprehensiveness with which the relevant data were collected, were substantially expanded for NHA2 as compared to NHA1, the two estimates are not comparable in many major respects in this category of source of funds.

3.2.2 The Private Sector

The private for-profit sector was in its infancy during the period for which NHA1 was estimated. Therefore, there were no categories that attempted to estimate the flow of funds through such financing agents or to such health providers. In addition, health spending by private employers was very small and not estimated for NHA1, although such spending by parastatal employers was estimated as a distinct category.

Four years later, during the period for which NHA2 was estimated, the private sector had grown substantially, and there were many more for-profit retail drug outlets and numerous licensed ambulatory health clinics in operation. Several private for-profit hospitals had also opened for business in Addis Ababa, and their revenues and spending, as well as those of drugs and clinics, were included in NHA2. Moreover, more private employers had begun to spend, directly and indirectly, to finance the health benefits of their employees. These categories were therefore added to the estimates for NHA2. This included spending that went to purchase private health insurance as well as spending employers paid directly to providers who gave health services to employees, at or away from the workplace.

3.2.3 Health Spending Classifications

Aside from the changed classification of financing agents already mentioned, NHA2 adopted a substantially changed classification of health providers, based on the International Classification of Health Accounts (ICHA) as recommended in the aforementioned *Producers’ Guide*. In NHA1, the classification of 16 different categories of service providers was grouped by whether they were in the public or private sector. For NHA2, taking the ICHA classification scheme, the nine types of service providers were the primary categorization, while the public or private nature of the provider was only

sometimes (as relevant) distinguished within each category. The total number of categories (that actually were estimated and had amounts) was thus expanded for NHA2 to 47—many of them being quite minor amounts.

3.3 Adapting Proposed Interim Estimation Methods to Ethiopia

3.3.1 Implications of the Differences between NHA1 and NHA2

A first step towards interim NHA estimation (with only two rounds completed) would be to compare the comparable amounts (by cell in each major table) in order to note their differences from NHA1 to NHA2—a first step towards the more complex steps and data needed to actually perform interim estimation. But it is evident from the above that NHA1 and NHA2 are not comparable—notably, for our purposes, the two main tables: (1) flows of funds from sources to health financing agents (S→FH) and (2) flows of funds from financing agents to health providers (FH→HP). Not only are there omissions of amounts in NHA1 that are included in NHA2 (some of which should have been there), but there was a change in classification and, thus, of accounting structure from NHA1 to NHA2.

An illustration of the consequences of the differences noted between NHA1 and NHA2 is given in a simple condensation of all categories of the S→FH flows as shown in **Table 1** (1995/1996), **Table 2** (1999/2000), and **Table 3** (showing the percent growth in the four years between NHA1 and NHA2).

These tables show that total estimated health spending roughly doubled in the four-year period. However, the notable growth is in donor spending (an increase of 2,307%) and in employer spending (an increase of 142%). The donor growth is specious, since much actual donor spending was not counted in NHA1, although it is impossible to determine how much was omitted. The growth in employer spending is partly due to the very small base amount accounted for in NHA1 (it was probably underestimated as well), partly due to the subsequently more comprehensive accounting of employer spending in NHA2 (particularly on employers' own provision of health care and purchase of private health insurance), and partly due to rather significant growth in this category, reflecting how small the amount was four years earlier. Note that there seems to have been only a (relatively) modest increase in household OOP spending of 38%.⁵⁸

The percentage shares of the major sources of financing and of the flows from the sources as apportioned among the financing agents are quite different between NHA1 and NHA2. These markedly changed shares, though, should not be seen as representative of the actual changes that may have taken place in this period, for the reasons already stated.

3.3.2 Structure of the Tables to be Estimated

The structure of the S→FH table in NHA2 is not very different from that of NHA1, except that there are added categories both in source and in health financing agents. As for sources of funds

⁵⁸ Household health spending, at least, was estimated for both NHA1 and NHA2 predominantly from sources (the Central Statistical Authority's Household Income, Consumption, and Expenditure surveys) that were comparable for the periods estimated.

(columns of the table), five categories were added, four of them in the private funds category, while the “rest of the world” as a source is broken down by type of source.⁵⁹ (In NHA1, there were mainly three categories: international NGOs, external assistance, and external loans (only the amounts reported as going through official channels). For the health financing agents (rows of the table), instead of the 10 categories accounted for in NHA1, there are 16 categories accounted for in NHA2. **Table 4** shows the NHA1 table using the NHA2 structure, with the shaded rows being the categories that were omitted in NHA1. (The NHA2 S→FH table is shown in **Table 5**.) (The shaded columns in **Table 4** and **Table 5** show the “sources” categories omitted in NHA1 but included in NHA2, while the shaded rows show the same thing for “health financing agents.”

⁵⁹ The “loans” category under federal government funds was presumably included in the “general revenue” category in NHA1, while it was broken out separately in NHA2.

Table 4														
NHA1 Sources to Financing Agents, 1995-96, Ethiopia														
(in millions of Ethiopian Birr; US\$ = Birr 8.1)														
SOURCES OF FINANCING														
Public Funds S 1							Private Funds S 2					Rest of the World S 3		
Federal Govt S 1.1		Regional Govt S 1.2			S 1	Employer Funds S 2.1		Households S 2.2		Local NGOs	S 2	External Assistance 3.1		
S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	S 2.1		S 2.1.1	S 2.2.1	S 2.2.2	S 2.3	S 3.1.1		S 3.1.3		
General	Loans	Local	Federal	Subtotal	Parastatal	Private	User fees, Transport costs	Contributions, comm. part.	Local NGOs	Subtotal	Budget	Multilateral		
Revenue		Revenue	Subsidy		Employers	Employers					Support			
FINANCING AGENTS														
FEDERAL														
HF 1.1.1	MOH	66			66									
HF 1.1.2	MOD+Police	8.6			8.6									
HF 1.1.3	MOE	8.1			8.1									
HF 1.1.5	Other	63.8			63.8									
HF 1.1.5.1	MOFED													
REGIONAL														
HF 1.1.7	RBs		120.1	270.7	390.8									
HF 1.1.8	Natl HIV/AIDS													
HF 1.1.11	Other RBs		2.5		2.5									
HF1.1.12	ESRDF													
HF 1.2	Govt Ins						3.7				3.7			
HF 1	SUBTOTAL													
OTHERS														
HF 2.2	Private Ins													
HF 2.3	HH OOP							765.8			765.8			
HF 2.4	Non-profit inst.													
HF 2.5.1	Parastatals						21				21			
HF 2.5.2	Private firms													
HF 2	SUBTOTAL													
HF 3.1	Intl Agencies													
	GRAND TOTAL	146.5	0.0	122.6	270.7	539.8	24.7	0.0	765.8	0.0	0.0	790.5	0.0	0.0

Table 5

NHA2 Sources to Financing Agents, 1999-00, Ethiopia

(in millions of Ethiopian Birr; US\$ = Birr 8.3)

SOURCES OF FINANCING													
Public Funds S 1							Private Funds S 2					Rest of the	
Federal Govt S 1.1			Regional Govt S 1.2			Employer Funds S 2.1		Households S 2.2		Local NGOs		External A	
S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	S 1		S 2.1.1	S 2.1.2	S 2.2.1	S 2.2.2	S 2.3	S 2	S 3.1.1	
General Revenue	Loans	Local Revenue	Federal Subsidy	Subtotal		Parastatal Employers	Private Employers	User fees, Transport costs	Contributions, comm. part.	Local NGOs	Subtotal	Budget support grants	
FINANCING AGENTS													
FEDERAL													
HF 1.1.1	MOH	62.4	2.8			65.3				0.2	0.2	73.8	
HF 1.1.2	MOD+Police	188.8				188.8							
HF 1.1.3	MOE	65.3				65.3						0.2	
HF 1.1.5	Other	20.9				20.9							
HF 1.1.5.1	MoFED	4.0				4.0							
REGIONAL													
HF 1.1.7	RBs		35.6	418.2		453.7						22.3	
HF 1.1.8	Natl HIV/AIDS												
HF 1.1.11	Other RBs			60.6		60.6							
HF1.1.12	ESRDF		10.7	42.6		53.3				4.1	4.1	6.8	
HF 1.2	Govt Ins						5.9	1.1			7.0		
HF 1	SUBTOTAL												
OTHERS													
HF 2.2	Private Ins						5.5	1.0			6.5		
HF 2.3	HH OOP								1,053.6		1,053.6		
HF 2.4	Non-profit inst.		1.5	0.1		1.6				0.1	125.9	126.0	
HF 2.5.1	Parastatals						48.4				48.4		
HF 2.5.2	Private firms							130.7			130.7		
HF 2	SUBTOTAL												
HF 3.1	Intl Agencies		5.8			5.8							
GRAND TOTAL		341.4	56.3	521.5		919.2	59.7	132.8	1,053.6	4.2	126.0	1,376.4	103.1

Of the added health financing agent categories, one was omitted in NHA1 when it should have been counted: international agencies that provided assistance directly to providers without going through official channels. While missing from NHA1, NHA2 accounted for Birr 255 million as flowing through this channel. The other five categories added in NHA2 were omitted from NHA1 because the flows of funds in them were very minor or nonexistent in 1995/1996. These categories were MoFED (money spent overseas for health care provided to Ethiopians not able to get needed care in Ethiopia), the National HIV/AIDS Secretariat and the Ethiopian Social Rehabilitation and Development Fund (ESRDF), neither of which existed in 1995/1996, and the private insurers and private employers which were very minor items of expenditure in 1995/1996.

The flows of funds from health financing agents to providers (FH→HP) is presented for NHA2 in a table structure that reflects the IHCA classification in the *Producers' Guide*, and is very different from NHA1. While the organization of FH→HP in NHA1 is primarily organized by sector (public and private) and secondarily by type of service, the organization of this table in NHA2 is primarily by type of service, and includes more disaggregated types of services.

Thus, while it was easy to create comparable tables of the flows of funds (S→FH) for NHA1 and NHA2, it is very difficult to do likewise for flows of funds FH→HP for both rounds. This is because the financing agents categories are very different between NHA1 (as shown in **Table 6**) and NHA2 (as shown in **Tables 7A** (aggregated) and **Table 7B** (disaggregated)). The shaded columns in both tables are the equivalents of the shaded rows in **Tables 4 and 5**, with **Table 5** showing estimated quantities in some shaded cells whereas there are no such estimates in **Table 4**. But, while the shaded rows in **Table 6** show the omissions in NHA1 that were included in NHA2, it cannot easily be shown what quantities were estimated for those shaded rows simply because the classifications of the FH for NHA2 is so detailed that it would require excessive disaggregation to present them. Instead, the summary of the flows of funds FH→HP for NHA2 is shown in **Table 7A**—clearly showing the marked differences in classifications of types of provider services. It is not possible to recast NHA1 in this same framework, so it will be necessary to proceed with an interim estimation of flows of funds FH→HP using rather crude methods that do not make use of historical trend data based on NHA1—except in an ad hoc way.

TABLE											
NHA1 Flows of Funds from Financing Agents to Providers,											
FINANCING INTERMEDIARIES											
	HF 1.1.1	HF 1.1.2	HF 1.1.3	HF 1.1.5	HF 1.1.5.1	HF 1.1.7	HF 1.1.8	HF 1.1.11	HF1.1.12	HF 1.2	HF 1
PROVIDERS	FEDERAL	REGIONAL	National	Other RBs	ESRDF	Govt Ins	SUBT				
	MOH	MOD+Police	MOE	Other	MoFED	RBs	HIV/AIDS	Other RBs	ESRDF	Govt Ins	SUBT
Public providers											
Federal											
Federal hospitals	41.4										0.1
Other govt hospitals											63.8
Armed Force facilities		8.6									0.6
Research & training institutions	14.1		1.6								
Administration & general service	19.7										
Pharmacies/labs											
Nursing homes											
Public health											
Subtotal	75.2	8.6	1.6	63.8						0.7	
Regional											
Regional hospitals						143.1					0.6
Regional outpatient centers						174					0.6
<i>Other regional facilities</i>								2.5			
Research & training institutions			6.5			6.7					
Administration & general service						84.3					
Subtotal			6.5			408.1		2.5		1.2	
Parastals											
<i>Parastals</i>											
Subtotal											
Public Subtotal	75.2	8.6	8.1	63.8		408.1		2.5		1.9	
Private Providers											
For-profit hospitals											
For-profit outpatient centers											1.8
Pharmacies/labs											
NGO outpatient facilities											
NGO inpatient facilities											
Traditional healers											
Others											
Priv ins admin											
Private Subtotal											
Private Subtotal											
Rest of the World											
Not other specified											
GRAND TOTAL	75.2	8.6	8.1	63.8		408.1		2.5		3.7	

Table 7A															
NHA2 Flows of Funds from Financing Agents to Providers, 1999-00, Ethiopia															
Aggregated Data															
FINANCING INTERMEDIARIES															
		HF 1.1.1	HF 1.1.2	HF 1.1.3	HF 1.1.5	HF 1.1.5.1	HF 1.1.7	HF 1.1.8	HF 1.1.11	HF 1.1.12	HF 1.2	HF 1	HF 2.2	HF 2.3	HF 2.4
		FEDERAL				REGIONAL				OTHERS					
		MCD &						National					Private		Non-pro
		MCH	Police	MCE	Other	MoFED	RBs	HVAIDS	Other RBs	ESRDF	Govt Ins	SUBTOTAL	Insuranc	HHOOP	Institutio
HP1	Hospitals	15	189	28	18		87		61		0	398	1	101	7
HP2	Residential Care											0			0
HP3	Outpatient Care						131				1	132	2	151	47
HP4	Retail Sale of Medical Goods						0				1	1	1	800	3
HP5	Provision/admin of public health	184					102	1				287			0
HP6	General health admin & insurance	52					117				5	174	2		20
HP8	Institutions providing health-rel svcs	21		38			174			64		297			63
HP9	Rest of the world				2	4						6		2	1
HP.nsk	<i>Not specified</i>														
	TOTALS	273	189	66	21	4	612	1	61	64	7	1,296	6	1,054	140
	Percent of Total	9%	6%	2%	1%	0%	21%	0%	2%	2%	0%	44%	0%	36%	5%

Table 7B																
NHA2 Flows of Funds from Financing Agents to Providers, 1999-00, Ethiopia																
Detailed Data																
		FINANCING INTERMEDIARIES														
		HF 1.1.1	HF 1.1.2	HF 1.1.3	HF 1.1.5	HF 1.1.5.1	HF 1.1.7	HF 1.1.8	HF 1.1.11	HF 1.1.12	HF 1.2	HF 1	HF 2.2	HF 2.3	HF 2.4	
		FEDERAL					REGIONAL					OTHERS				
		MOH	MOD & Police	MOE	Other	MoFED	RBs	National HIV/AIDS	Other RBs	ESRDF	Govt Ins	SUBTOTAL	Private Insurance	HH OOP	Non-prof Institutions	
HP 1	HOSPITALS															
HP 1.1	General & Specialty Hospitals															
	Govt	15	189	28	18		87		61		0	398	1	85	1	
	Private NGO						0				0	0	0	5	6	
	Private for-profit												0	10	0	
HP 2	RESIDENTIAL CARE															
HP 2.2	NGO-nursing homes														0	
HP 3	OUTPATIENT CARE															
	Clinics & practitioners															
	Govt							131			0	131		15	0	
	Private NGO (incl FP, Rehab, Red Cross, blood banks)										0	0		7	40	
	Private for-profit (incl trad hlrs, dentists)										1	1	2	129	7	
HP 3.5	Medical/diagnostic labs															
HP 3.5.1	Govt						0					0				
HP 4	Retail Sale of Medical Goods															
HP 4.1	Pharmacies															
	Govt										0	0	0	22	1	
	Private NGO										0	0		110	2	
	Private for-profit										1	1	1	668	1	
HP 4.9	<i>All other retail sale of pharm/med goods</i>										0	0				
HP 5	Prov/admin of public health															
	Govt (5.1 + 5.2)	184						102	1			287			0	
HP 5.3	NGO															
HP 6	Gen health admin & insurance															
HP 6.1.1	Govt (6.1.1 + 6.1.2)	52						117			5	174			20	
HP 6.4	<i>Other (private) insurance</i>												2		0	
HP 8	Institutions providing health-rel svcs	21		38				174		64		297			63	
HP 8.1	<i>Research institutions</i>															
HP 8.2	<i>Training & professional inst</i>															
HP 8.3	<i>Other institutions</i>															
HP 9	Rest of the world				2	4						6		2	1	
HP.nsk	<i>Not specified</i>															
	GRAND TOTAL	273	189	66	21	4	612	1	61	64	7	1,296	6	1,054	140	
		9%	6%	2%	1%	0%	21%	0%	2%	2%	0%	44%	0%	36%	5%	

3.4 Interim Estimation of NHA in Ethiopia for 2002/2003

Application of the interim estimation techniques described in the concept paper (Part One) will have to be adapted substantially for use in the Ethiopian case, for reasons cited above. Not only are structures of the accounting different for NHA1 and NHA2, but there are significant omissions in NHA1 of data included in NHA2. Some of the omitted data, of course, are very minor amounts; but some of the omitted data—that is, the incomplete donor data—are probably of some significance. In any event, the first task of interim estimation is to decide on the structures to be used, and then to adapt the NHA1 and NHA2 data to those structures.

This section will first describe the structures to be used in the application, and the general approach to adapting the concept paper's techniques to the Ethiopian case. After specifying the macroeconomic and demographic assumptions to be used in the interim estimation for 2002/2003, this section will describe the adapted estimating techniques to be applied first to budget-driven health spending and then to market-based spending.

3.4.1 Macroeconomic and Demographic Assumptions

Basic assumptions about growth in the economy and in the population since the most recent actual NHA estimate are basic to any interim estimation effort. The time series of such macroeconomic and demographic indicators that make up these assumptions over the whole time period covered by NHA1, NHA2, and the interim estimation year are given in **Table 8**.

This table also includes data on government spending from 1995/1996 through 2002/2003, both the total and that devoted to the health sector. These data provide benchmarks for gauging the relative magnitudes of health spending—in total, as well as through public and private financing agents—for the whole period covered by the NHA1, NHA2, and the interim estimation year. It shows that, with population growing at an average annual rate of almost 3%, real GDP grew at a highly variable rate (with a high of 7.9% in 2000/2001 and a low of -3.8% estimated for 2002/2003)⁶⁰, but averaged 2.6% growth over the eight-year period. Thus, with cumulative real GDP growing at 22% over the period 1995/1996 to 2002/2003, and with total population growing at 21% over the same period, real economic growth per capita was only slightly positive (over eight years)—about 1%.

⁶⁰ The data for the last three years of this eight-year period are from Ministry of Finance and Economic Development, *Ethiopia: Sustainable Development and Poverty Reduction Program (SDPRP), Annual Progress Report*, Addis Ababa, MoFED, October 2003 (working draft).

Table 8
Macroeconomic and Demographic Assumptions for Interim NHA Estimate, Ethiopia

Macroeconomic Statistics and Indicators

		Column1 ENTER-1	Column 2 ENTER-2						Col 3	Column 4 ENTER-3 Calculate "Actual" Annual Growth Trend		
Legend												
Data to be entered----->												
Results of calculations->												
		"Actual" Round One			"Actual" Round Two			"Interim" Estimate	Match Cum. Growth	Match Cum. Growth	"Actual" Annual Growth Trend	
Year		0	1	2	3	4	5	6	7	95-99	99-02	1995-1999
		1995/1996	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003			
Population	Value	56.4	58.1	59.9	61.7	63.5	65.3	67.1	69.0			
	% Yrly Grwth		3.0%	3.1%	3.0%	2.9%	2.8%	2.8%	2.8%			
	% Cum. Gwrth		3.0%	6.2%	9.4%	12.6%	15.8%	19.0%	22.4%	12.59%	8.67%	3.01%
	% Cum. Gwrth									12.59%	8.64%	
GDP	Value	37,938	45,238	44,840	48,688	52,074	53,011	51,761	56,192			
	% Yrly Grwth		19.2%	-0.9%	8.6%	7.0%	1.8%	-2.4%	8.6%			
	% Cum. Gwrth		19.2%	18.2%	28.3%	37.3%	39.7%	36.4%	48.1%	37.26%	7.91%	8.24%
	% Cum. Gwrth									37.26%	7.91%	
GDP/capita	Value	673	779	749	789	820	812	771	814			
	% Yrly Grwth		15.8%	-3.9%	5.4%	3.9%	-1.0%	-5.0%	5.6%			
	% Cum. Gwrth		15.8%	11.3%	17.3%	21.9%	20.7%	14.6%	21.1%	21.92%	-0.71%	5.08%
	% Cum. Gwrth									21.92%	0.48%	
Real GDP (Base Year = 1980/1981)	Value	13,987	14,714	14,543	15,461	16,303	17,583	17,794	17,118			
	% Yrly Grwth		5.1%	-1.0%	6.2%	5.4%	7.6%	1.2%	-3.8%			
	% Cum. Gwrth		5.1%	4.0%	10.5%	16.6%	25.7%	27.2%	22.4%	16.56%	5.00%	3.91%
	% Cum. Gwrth									16.58%	5.00%	
Real GDP/capita (Base Year = 1997)	Value	248	253	243	251	257	269	265	248			
	% Yrly Grwth		2.1%	-4.1%	3.2%	2.5%	4.9%	-1.6%	-6.4%			
	% Cum. Gwrth		2.1%	-2.1%	1.0%	3.5%	8.6%	6.9%	0.0%	3.52%	-3.38%	0.87%
	% Cum. Gwrth									3.53%	-2.23%	
Total govt spending	Value	10,337	10,030	11,328	14,557	17,531	15,382	16,684	17,858			
	% Yrly Grwth		-3.0%	12.9%	28.5%	20.4%	-12.3%	8.5%	7.0%			
	% Cum. Gwrth		-3.0%	9.6%	40.8%	69.6%	48.8%	61.4%	72.8%	69.60%	1.87%	14.12%
	% Cum. Gwrth									69.61%	1.87%	
Consumer price index	Value (Base:95/96)	100	1.003	104.2%	108.3%	112.8%	104.7%	96.1%	110.6%			
	% Yrly Grwth		0.3%	3.9%	3.9%	4.2%	-7.2%	-8.2%	15.1%			
	% Cum. Gwrth	na	0.3%	4.2%	8.3%	12.8%	4.7%	-3.9%	10.6%	12.82%	-1.95%	3.06%
	% Cum. Gwrth									12.82%	-1.94%	
Medical price index	Value	100	NA									
Rx drug price index	Value	100	NA									
GDP Deflator		6.3%	3.1%	9.6%	1.9%	0.9%	-6.1%	0.0%	0.0%			

As for total health spending from all sources, it is shown to have been 3.8% of GDP in 1995/1996, according to NHA1, while it is shown to have been 5.6% of GDP in 1999/2001, according to NHA2. Unfortunately, as has been mentioned already, the two estimates are not comparable, and it is not possible to say definitively that the share of GDP devoted to health has increased from NHA1 to NHA2. In any event, a substantial portion of the health spending was accounted for by external and internal donor assistance—shown to be much more in NHA2 than in NHA1. (A discussion of the differences in estimation of external and internal assistance between NHA1 and NHA2 in the following section precedes the development of an approach to interim estimation of the categories in this classification for 2002/2003.)

Government spending, in total and on health, is also shown in time series in this table. There is a noticeable variation over the period. Before the war, government health spending averaged about 6% between 1995/1996 and 1998/1999, but dropped to below 4% during the years affected by the war (1999/2000 and 2000/2001)—even though spending on health by the Ministry of Defense rose markedly. In the three subsequent years, the share devoted to health rose to the 5% range, although the 5.3% share attained in 2001/2002 dropped to a preliminary estimate of 4.6% for the interim estimation period of 2002/2003.

These changes in shares of government spending devoted to health are accompanied by changes both in nominal and in real growth rates, both in total spending and in health sector spending by the government. During the eight-year period, nominal government health spending per capita rose by 17% but real government health spending per capita rose only 5%, reflecting an 11% increase in prices during the period. Most notable is the 28% decline in real government health expenditure during the year of the war (1999/2000) when NHA2 was conducted. During this same year, real total government expenditure rose by 16% (following a year in which real total government spending rose by 24%—probably reflecting the financial requirements of the build-up to the war).⁶¹

The section below adopts the approach of estimating the S→FH table first in order to get interim estimation totals for health financing agencies (FH) that can then be used as control totals for interim estimation of the FH→HP table. Because the government and donor spending totals show such variability between NHA1 and NHA2, estimating the FH→HP table first (or only, as is done in the United States and in other OECD countries) cannot be done with much reliability, since it would necessarily focus on estimating changes in payments by each health financing agent to each provider category. There are few data to go on for estimating each provider category by financing agent (in fact, there is only one year of data organized according to the classifications recommended by the *Producers' Guide*, which will be the standard going forward). Once control totals for financing agents are available, however, there could be a basis for estimating the distribution of payments for each provider category by each financing agent category. Even then, however, there are few data available to construct an interim estimate of the FH→HP table that would have a distribution of payments among providers that would be different than the distribution produced in the most recent actual NHA actual estimate—NHA2. It would seem to add little value to replicate the same distribution among providers estimated in NHA2 in the interim estimate, because it is quite likely that the distribution would have changed during that three-year interval. When more rounds of actual NHA estimates have been performed using a consistent classification, it will be possible to develop reliable trendlines from those data to apply in interim NHA estimates.

⁶¹ During the year preceding the war, real government health spending declined by 23% from the year previous to that. During the year following the war, it rose by 9%.

The next section discusses, first, the budget-driven sections of the S→FH table, and, then the market-driven categories of spending in the S→FH table.

3.4.2 Estimating Budget-driven Spending

The two major categories of health spending that are essentially budget-driven are government health spending and donor health spending. In both categories, determination of budgeted amounts allocated to health and to various subsectors of health are made predominantly on an annual basis through some deliberate decision-making process that is largely at the discretion of the decision makers. Amounts allocated can therefore vary from year to year, both down as well as up. Moreover, health officials responsible for spending the money also exercise some discretion over how much of the budgeted amount is actually spent, on what, and how fast. The “spend-out” rate for budget-driven amounts thus can vary considerably from one year to the next, even more so, at times, than the budgeted amounts themselves.

Donor health spending—in the form of financial assistance (grants or loans) from external and/or internal sources—also are subject to the same phenomena. Amounts budgeted and amounts actually spent (as a percentage of amounts budgeted) both can and do vary from year to year. In contrast to government spending, however, for which there are publicly available data on approved amounts, and, later, audited expenditure amounts, donor spending is very difficult to estimate. There are numerous independent groups involved in the health sector, and there are many that do not coordinate with official government agencies, and do not readily make (or even have) data readily available. Surveys are required in order to assure reasonable accuracy, and such surveys need to be addressed both to spending by NGOs (both external and internal) as well as to private official development assistance agencies. Estimating donor spending on an interim basis will require considerable “art” in estimation and some primary data gathering to provide guidance.

The following sections describe the relevant factors that need to be considered, and proposes some alternative approaches to interim estimation of these amounts—in both government and donor categories—for Ethiopia for 2002/2003.

3.4.3 Government Health Spending

Table 9 shows the subtotals of flows of funds from public sources to financing agents as estimated for NHA1, and **Table 10** shows the same data as estimated for NHA2 (excluding external and internal assistance, of course). In order to develop interim estimates for these flows, the totals in the individual cells that generated the subtotal for public funds will need to be individually estimated for 2002/2003. It is likely that, due to the effects of the Ethio-Ethiopian War of 1999/2000, these cells will have to be estimated by collecting the best available data, to the extent possible, without extensive research being conducted.

Cells that are most likely to have changed considerably are federal revenue support of the Ministry of Defense health spending (a large decrease could be predicted, now that the war would have been ended for three years) and federal and regional revenue support of Federal Ministry of Health spending and Regional Health Bureau spending (an increase could be predicted, due to the freeing up of funds that had been diverted to the Ministry of Defense). An attempt should also be made to distinguish the sources of funds for regional health spending between federal subsidies and regionally raised revenues. (This was not done for NHA2, as far as is known.)

Table 9**Flow of Funds from Sources to Health Financing Agents,
NHA1, 1995/1996, Ethiopia****Public Sources**

(in millions of Ethiopian Birr; US\$ = Birr 8.1)

	SOURCES OF FINANCING				
	Public Funds S 1				
	Federal Govt S 1.1		Regional Govt S 1.2		S 1
	S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	
General Revenue	Loans	Local Revenue	Federal Subsidy	Subtotal	
FINANCING AGENTS					
FEDERAL					
HF 1.1.1 MOH	66				66
HF 1.1.2 MOD+Police	8.6				8.6
HF 1.1.3 MOE	8.1				8.1
HF 1.1.5 Other	63.8				63.8
HF 1.1.5.1 MoFED					
REGIONAL					
HF 1.1.7 RBs			120.1	270.7	390.8
HF 1.1.8 Natl HIV/AIDS					
HF 1.1.11 Other RBs			2.5		2.5
HF1.1.12 ESRDF					
OTHERS					
HF 2.4 Non-profit inst.					
GRAND TOTAL	146.5	0.0	122.6	270.7	539.8

Table 10**Flow of Funds from Sources to Health Financing Agents,
NHA2, 1999/2000, Ethiopia****Public Sources**

(in millions of Ethiopian Birr; US\$ = Birr 8.3)

		SOURCES OF FINANCING				
		Public Funds S 1				
		Federal Govt S 1.1		Regional Govt S 1.2		S 1
		S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	
		General Revenue	Loans	Local Revenue	Federal Subsidy	Subtotal
FINANCING AGENTS						
FEDERAL						
HF 1.1.1	MOH	62.4	2.8			65.3
HF 1.1.2	MOD+Police	188.8				188.8
HF 1.1.3	MOE	65.3				65.3
HF 1.1.5	Other	20.9				20.9
HF 1.1.5.1	MoFED	4.0				4.0
REGIONAL						
HF 1.1.7	RBs		35.6	418.2		453.7
HF 1.1.8	Natl HIV/AIDS					
HF 1.1.11	Other RBs			60.6		60.6
HF1.1.12	ESRDF		10.7	42.6		53.3
OTHERS						
HF 2.4	Non-profit inst.		1.5	0.1		1.6
TOTALS		341.4	50.6	521.5	0.0	913.5

Federal revenue support of the National HIV/AIDS Secretariat is also likely to have increased (as matching grants to the external assistance from the Global Fund and others), as well as federal revenue support of the ESRDF.

A major factor to be used in interim estimation of budget-driven components of NHA is an estimate of the spend-out rate of budgeted or allocated funds. It is a rare year, in any country, that all, or even close to all, of budgeted funds are actually spent. This is also true of funds budgeted for expenditure by external and internal assistance agencies. (See below.) **Table 11** shows the experience of the government in Ethiopia with respect to the spend-out rates of monies budgeted for health since 1995/1996. Over the five years for which there are audited expenditure figures, the spend-out rate

varied between 94% in 1996/1997 and 61% in 1999/2000 (the year of NHA2). One could reasonably assume, for potential use in the interim estimation, that the spend-out rate would be the five-year average, at most, or 93%.

Table 11
GOVERNMENT HEALTH SPENDING, ACTUAL VERSUS BUDGETED

Government Health Expenditure Trends in Ethiopia, EFY1988 through EFY1995
(for the period 1995/1996 through 2002/2003) (in millions of birr)

	1995/1996	1996/1997	1997/1998	1999/2000	2000/2001	2001/2002	2002/2003
Budgeted Amounts	na	690	950	940	950	950	
Actual Expenditure Amounts	584.3	650.3	706.8	569.9	649.6	809.1	794.8
Federal MoH	79.8	87.5	104.5	72	113.7	72.6	109.1
Regions	504.5	562.8	602.3	497.9	535.9	736.5	685.7
TOTAL							
Expenditures as a % of Budgeted Amounts	na	94%	74%	61%	68%	85%	na

Sources:

1995/1996 - 2001/2002: FMOH, HSDP, *Final Evaluation Report*, 2003 (spending from from p. 5 of NHA2 report budgeted amounts from p.56 of Evaluation Report)

2002/2003: FMOH, HSDP, Report of the Third Joint Review Commission, 3 March 2003, p.24
(incomplete data)

Unfortunately, the unusual fiscal circumstances of the year of NHA2 (the Ethio-Eritrean War causing distortion in federal and donor spending) means that the estimates cannot be used to generate growth rate to apply to budget allocations that then would be adjusted by the spend-out rate. Instead, one is forced to develop an ad hoc estimate for the interim year. The ad hoc estimate developed used the following assumptions are shown in **Table 12** (that is presented alongside a duplicate presentation of **Table 10** to show the differences compared to NHA2):

Table 10
Flow of Funds from Sources to Health Financing Agents,
NHA2, 1999/2000, Ethiopia

Public Sources

(in millions of Ethiopian Birr; US\$ = Birr 8.3)

FINANCING AGENTS	SOURCES OF FINANCING				
	Public Funds S 1				
	Federal Govt S 1.1		Regional Govt S 1.2		S 1
	S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	
General Revenue	Loans	Local Revenue	Federal Subsidy	Subtotal	
FEDERAL					
HF 1.1.1 MOH	62.4	2.8			65.3
HF 1.1.2 MOD+Police	188.8				188.8
HF 1.1.3 MOE	65.3				65.3
HF 1.1.5 Other	20.9				20.9
HF 1.1.5.1 MoFED	4.0				4.0
REGIONAL					
HF 1.1.7 RBs		35.6	418.2		453.7
HF 1.1.8 Natl HIV/AIDS					
HF 1.1.11 Other RBs			60.6		60.6
HF 1.1.12 ESRDF		10.7	42.6		53.3
OTHERS					
HF 2.4 Non-profit inst.		1.5	0.1		1.6
HF 3.1 Intl Agencies		5.8			5.8
TOTALS	341.4	50.6	521.5	0.0	913.5

Table 12
Flow of Funds from Sources to Health Financing Agents,
Interim NHA Estimate, 2002/2003, Ethiopia

Public Sources

(in millions of Ethiopian Birr; US\$ = Birr 8.3)

FINANCING AGENTS	SOURCES OF FINANCING				
	Public Funds S 1				
	Federal Govt S 1.1		Regional Govt S 1.2		S 1
	S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	
General Revenue	Loans	Local Revenue	Federal Subsidy	Subtotal	
FEDERAL					
HF 1.1.1 MOH	72.7	3.3			76.0
HF 1.1.2 MOD+Police	28.8				28.8
HF 1.1.3 MOE	76.0				76.0
HF 1.1.5 Other	24.3				24.3
HF 1.1.5.1 MoFED	4.7				4.7
REGIONAL					
HF 1.1.7 RBs		41.4	486.9		528.3
HF 1.1.8 Natl HIV/AIDS	8.0				8.0
HF 1.1.11 Other RBs			70.5		70.5
HF 1.1.12 ESRDF		12.4	49.6		62.0
OTHERS					
HF 2.4 Non-profit inst.		1.7	0.1		1.8
HF 3.1 Intl Agencies		6.7			6.7
TOTALS	214.5	58.9	607.1	0.0	880.5

- ▲ Spending on health through the Ministry of Defense and Police dropped by Birr 160 million to Birr 28.8 million;
- ▲ The Poverty Reduction Strategy Paper provided an estimate of Birr 824 million for government spending on health in 2002/2003;
- ▲ Because it is assumed that the Birr 824 million did not include any amounts for the ESRDF, so these were assumed to be added to the Birr 824 million, bringing the total to Birr 877 million;
- ▲ It is assumed that Birr 8 million is spent by the federal government on HIV/AIDS and that this amount is included in the Birr 877 million, so that to calculate the average growth rate of all other government spending, one must account for this amount separately;
- ▲ The total of Birr 877 million implies a three-year growth rate of 16.4%, which is equivalent to an average compound yearly growth rate of 5.2%;
- ▲ Thus, the individual components of government spending are grown by 5.2% annually, except for the amount for the Ministry of Defense and Police, which is arbitrarily estimated at Birr 28.8 million, and the amount for HIV/AIDS of Birr 8 million;

Note that total government health spending is estimated (using this ad hoc interim estimation method) to have declined from NHA 2 (1999/2000) to the interim estimate year (1999/2000) from Birr 913.5 million to Birr 877.2 million, largely due to the reduction in spending on health by the Ministry of Defense and Police, which had been a necessity to provide medical care to soldiers fighting in the war. This kind of ad hoc estimation is not a method recommended for use in an interim estimate that could more reliably depend upon past year's growth rate to estimate trendlines going forward.

3.4.4 Donor Health Spending

Estimates of external and internal assistance were substantially more comprehensive (and therefore more accurate and much higher) in NHA2 as compared to NHA1. In NHA1, the amounts accounted for were only those reported as being processed through the MoFED, and were only categorized as grants and loans to government-sponsored (mostly Ministry of Health and subsidies from international NGOs to non-profit providers in Ethiopia). In NHA2, external assistance ("rest of the world") is divided into four categories:

- ▲ Budget support grants;
- ▲ Multilateral assistance (grants and loans combined);
- ▲ Bilateral assistance (grants and loans combined); and
- ▲ International NGOs.

Internal assistance from private local NGOs is considered private spending although it is also budget-driven. The totals for each of these categories for NHA1 are shown in **Table 13** and for NHA2 are shown in **Table 14**.

Table 13
Flow of Funds from Sources to Health Financing Agents,
NHA1, 1995/1996, Ethiopia
Internal and External Assistance

		Private S 2	Rest of the World S 3				
		Local NGOs	External Assistance 3.1				
		S 2.3	S 3.1.1	S 3.1.3	S 3.1.4	S 3.1.5	S 3
		Local NGOs	Budget support grants	Multilateral	Bilateral	Intl NGOs	Subtotal
FINANCING AGENTS							
FEDERAL							
HF 1.1.1	MOH					9.2	9.2
HF 1.1.2	MOD+Police						
HF 1.1.3	MOE						0.0
HF 1.1.5	Other						
HF 1.1.5.1	MoFED						
REGIONAL							
HF 1.1.7	RBs					17.2	17.2
HF 1.1.8	Natl HIV/AIDS						0.0
HF 1.1.11	Other RBs						
HF1.1.12	ESRDF						0.0
OTHERS							
HF 2.4	Non-profit inst.					97.5	97.5
HF 3.1	Intl Agencies						
TOTALS		0.0	0.0	0.0	0.0	123.9	123.9

Table 14
Flow of Funds from Sources to Health Financing Agents,
NHA2, 1999/2000, Ethiopia
Internal and External Assistance

	Private S 2		Rest of the World S 3			S 3
	Local NGOs	External Assistance 3.1				
	S 2.3	S 3.1.1	S 3.1.3	S 3.1.4	S 3.1.5	
	Local NGOs	Budget support grants	Multilateral	Bilateral	Intl NGOs	
FINANCING AGENTS						
FEDERAL						
HF 1.1.1 MOH	0.2	73.8	91.3	42.0		207.3
HF 1.1.2 MOD+Police						
HF 1.1.3 MOE		0.2	0.1			0.3
HF 1.1.5 Other						
HF 1.1.5.1 MoFED						
REGIONAL						
HF 1.1.7 RBs		22.3	89.7	41.5	4.7	158.2
HF 1.1.8 Natl HIV/AIDS			0.6			0.6
HF 1.1.11 Other RBs						
HF1.1.12 ESRDF		6.8				6.8
OTHERS						
HF 2.4 Non-profit inst.	125.9		0.5	1.2	11.2	138.7
HF 3.1 Intl Agencies			5.9	95.6	148.1	249.6
TOTALS	126.0	103.1	188.0	180.3	164.0	761.5

Not only did the actual NHA estimates for donor assistance increase considerably from NHA 1 to NHA2 (because of greater comprehensiveness), but the levels of donor assistance as well as channels through which they are flowing were considerably different also. The levels and channels by which donor assistance was flowing changed even more just three years later than NHA2 (in the 2002/2003 interim estimation year).

From NHA1 to NHA2, the most notable increases were for “Local NGOs” at Birr 126 million (not included in NHA1) and in external assistance, which was estimated at Birr 370 million in NHA2 as compared to Birr 124 million in NHA1 (which was admittedly less comprehensive in its accounting). Government reports (summarized in **Table 15**), however, show that the spend-out rate of official development assistance in health (according to the MoFED) declined drastically from 1995/1996 through 2000/2001. While spending exceeded the amount budgeted (possibly from funds held over from the previous year) in 1995/1996, the spend-out rate declined to about 15% for the two years, 1998/1999 and 1999/2000. The five-year average spend-out rate was 35%. These recently low spend-out rates do not bode well for future prospects of the government’s ability to spend the ever-increasing amounts of official external assistance that has been budgeted for the country’s HIV/AIDS, tuberculosis, and malaria problems.

Table 15
DONOR HEALTH SPENDING, ACTUAL VERSUS BUDGETED

Loans and Grants (External Assistance): Budgets and Expenditures, EFY 1989 through EFY 1993
(for the period 1995/1996 through 2000/2001) (in millions of birr)

Loans	5-Year Average					
	Budgeted Amounts	54	13	67	292	275
Actual Expenditure Amounts	46	52	10	38	58	204
Expenditures as a % of Budgeted Amounts	85%	400%	15%	13%	21%	29%
Grants						
Budgeted Amounts	40	67	21	59	165	352
Actual Expenditure Amounts	42	40	10	8	24	124
Expenditures as a % of Budgeted Amounts	105%	60%	48%	14%	15%	35%

Source: FMOH HSDPI, *Final Evaluation Report*, 2003, p.58

To make an interim estimate for donor spending in 2002/2003, a reasonable assumption would be to assume the growth over the 1999/2000 figures would be the same rate of growth as was applied to underlying amounts spent by the government (excluding the extra amount spent on the health of the troops fighting the Ethio-Eritrean War), plus some amount to reflect the fact that the year 1999/2000 was an unusually low year for donor spending because some donors had suspended aid to protest the distortion of fiscal priorities caused by the war. Thus, the underlying annual growth rate of 5.2% for government spending was increased by 1% to equal 6.2% for all categories of donor spending. The results are reflected in **Table 16** that is presented alongside a duplicate presentation of **Table 14** to show the difference as compared to NHA2. (It is implicitly assumed that the donors' composite spend-out rate does not change from NHA2 to the interim estimation period.)

Table 14

**Flow of Funds from Sources to Health Financing Agents,
NHA2, 1999/2000, Ethiopia
Internal and External Assistance**

	Private S2		Rest of the World S3				S3
	Local NGOs	External Assistance 3.1				S3	
	S23	S3.1.1	S3.1.3	S3.1.4	S3.1.5		
	Local NGOs	Budget support grants	Multilateral	Bilateral	Intl NGOs	Subtotal	
FINANCING AGENTS							
FEDERAL							
HF 1.1.1 MOH	0.2	73.8	91.3	42.0		207.3	
HF 1.1.2 MOD+Police							
HF 1.1.3 MOE		0.2	0.1			0.3	
HF 1.1.5 Other							
HF 1.1.5.1 MoFED							
REGIONAL							
HF 1.1.7 RBs		22.3	89.7	41.5	4.7	158.2	
HF 1.1.8 Natl HIV/AIDS			0.6			0.6	
HF 1.1.11 Other RBs							
HF 1.1.12 ESRDF		6.8				6.8	
OTHERS							
HF 24 Non-profit inst.	125.9		0.5	1.2	11.2	138.7	
HF 3.1 Intl Agencies			5.9	95.6	148.1	249.6	
TOTALS	126.0	103.1	188.0	180.3	164.0	761.5	

Table 16

**Flow of Funds from Sources to Health Financing Agents,
Interim NHA Estimate, 2002/2003, Ethiopia
Internal and External Assistance**

Annual Increase=

6.2%

	Private S2		Rest of the World S3		
	Local NGOs	External Assistance 3.1			S3
	S23	S3.1.1	S3.1.3	S3.1.4	
	Local NGOs	Budget support grants	Multilateral	Bilateral	
FINANCING AGENTS					
FEDERAL					
HF 1.1.1 MOH	0.2	88.4	109.3	50.3	
HF 1.1.2 MOD+Police					
HF 1.1.3 MOE		0.2	0.1		
HF 1.1.5 Other					
HF 1.1.5.1 MoFED					
REGIONAL					
HF 1.1.7 RBs		26.7	107.4	49.7	
HF 1.1.8 Natl HIV/AIDS			0.7		
HF 1.1.11 Other RBs					
HF 1.1.12 ESRDF		8.2			
OTHERS					
HF 24 Non-profit inst.	150.7		0.6	1.5	
HF 3.1 Intl Agencies			7.1	114.5	
TOTALS	151.0	123.5	225.2	215.9	

3.4.5 Estimating Market-based Spending

Table 17 (NHA1) and **Table 18 (NHA2)** show the flow of funds from original sources to financing agents (S→FH). The shaded areas in both tables represent rows and columns (hence, cells) that were not estimated for NHA1. The approach to be used in making an interim estimate of the relevant cells for 2002/2003 will apply three years' worth of growth rates to each of the four column totals of **Table 18**. While it would be easier and preferable to assume that the distribution among the various financing agents will not have changed substantially during this period, and that the shares remain the same, there are significant reasons to avoid such an assumption in this case, because there are some elements of each sum that were not estimated at all in NHA1,⁶² while they were estimated in NHA2. Therefore, the approach for calculating each row will be described separately below, indicating for each how the missing values for NHA1 are to be handled.

Table 17
Flow of Funds from Sources to Health Financing Agents,
NHA1, 1995/1996, Ethiopia
Private Sources (except for Local NGOs)

		Private Funds S 2				S 2
		Employer Funds S 2.1		Households S 2.2		
		S 2.1	S 2.1.1	S 2.2.1	S 2.2.2	
		Parastatal	Private	User fees, Transport costs	Contributions, comm. part.	
FINANCING AGENTS		Employers	Employers			Subtotal
HF 1.2	Govt Ins	3.7				3.7
HF 2.2	Private Ins					
HF 2.3	HH OOP			765.8		765.8
HF 2.4	Non-profit inst.					
HF 2.5.1	Parastatals	2.1				2.1
HF 2.5.2	Private firms					
HF 2	SUBTOTAL					
HF 3.1	Intl Agencies					
	GRAND TOTAL	24.7	0.0	765.8	0.0	790.5

Once the appropriate allowances are made for the unknown amounts in the base year, where possible, future spending on health is considered to be trendline projections of the same factors for the four years between NHA1 and NHA2. Thus the yearly growth in each relevant cell in costs/ or payments will be the sum of each of the three growth rates representing:

⁶² As was already discussed, some cells in these categories were not estimated at all, primarily because they were too small to estimate. Others, like employer direct payments for health benefits for employees, were underestimated because of the limited coverage of the survey used to determine those values. In NHA2, most of these shortcomings were addressed, and more complete and accurate estimates were made.

- ▲ Change in coverage (i.e., population growth, growth in number of employees covered by employers for health benefits);
- ▲ Change in per capita utilization by those covered; and
- ▲ Change in average price per unit of service consumed.

It will be assumed that there has been no change in technological intensity or quality per unit of service consumed (and, hence, of its cost) that is not otherwise reflected in the average price per unit (reflecting changes in the prices of inputs). Over a longer period of time, such changes attributable to a higher quality of service would be reflected in higher average charges for services, above and beyond the change in the price level of a service of constant quality.

Employers

As shown in **Tables 17 and 18**, total funds from parastatal employers rose from Birr 24.7 million in NHA1 to Birr 59.7 million in NHA2—a rise of 142% in three years. However, the NHA2 figure includes an estimate of parastatal employer spending on private health insurance of Birr 5.5 million, while NHA1 made no estimate for this category. (The NHA1 total would have been quite low, had it been estimated, because private health insurance has only recently become a large enough sum to calculate only after the private sector began to grow significantly after the period for which

Table 18
Flow of Funds from Sources to Health Financing Agents,
NHA2, 1999/2000, Ethiopia
Private Sources (except for Local NGOs)

						Private Funds S 2				
						Employer Funds S 2.1		Households S 2.2		
						S 2.1.1	S 2.1.2	S 2.2.1	S 2.2.2	S 2
						Parastatal	Private	User fees, Transport costs	Contributio ns, comm. part.	Subtotal
						Employers	Employers			
FINANCING AGENTS										
FEDERAL										
HF 1.1.5.1 MoFED										
REGIONAL										
HF 1.1.12 ESRDF									4.1	4.1
HF 1.2	Govt Ins		5.9		1.1					7.0
OTHERS										
HF 2.2	Private Ins		5.5		1.0					6.5
HF 2.3	HH OOP						1,053.6			1,053.6
HF 2.4	Non-profit inst.							0.1		0.1
HF 2.5.1	Parastatals		48.4							48.4
HF 2.5.2	Private firms				130.7					130.7
HF 3.1	Intl Agencies									
GRAND TOTAL						59.7	132.8	1,053.6	4.2	1,250.4

NHA1 was estimated.) If parastatal spending on private health insurance were omitted from the total, growth in estimated health spending by parastatals would have been 120% from NHA1 to NHA2.

The total amount of funds spent on employee health benefits by private employers was not estimated in NHA1, even though there probably was a positive (although quite low) level of spending in this category. In this short (four-year) period between NHA1 and NHA2, however, direct spending by private firms grew to the NHA2 estimate of Birr 132.8 million.

For purposes of making an interim estimate of employer payments for health care, it will be assumed that the amounts spent through the purchase of insurance and the amounts spent directly to providers have grown at the same rate since NHA2. While it is likely that growth rates differed, the amounts spent through purchase of insurance are small, and it is reasonable to make this assumption until information can be gathered that allows a distinction to be made with some reliability.

Interim estimation of employer spending on health relies upon assumptions of changes in the three principal variables noted above. Coverage decisions by employers are heavily influenced by economic and business conditions and by the price of health care. In the three years since NHA2, the economy (as measured by GDP per capita, as shown in **Table 8**) has stagnated at best—growing modestly at 5% the first year, not growing at all in the second year, and declining by almost 7% in the third year. At the same time, the consumer price index declined by 7-8% in each of the first two years before rising 15% in the third year—leaving the index virtually unchanged over the period.

For the interim estimates of private employer spending on health (either through purchased insurance or self-insurance), therefore, we will assume a coverage growth rate that is double the rate of population growth at 6% per year.⁶³ We shall assume an increase in use rates of 2% per year,⁶⁴ and in average prices per unit of services of 3% per year.⁶⁵ The results of these assumptions, shown in **Table 19**, show parastatal spending rising 38% to Birr 83.5 million in 2002/2003, and private employer spending also rising 38% to Birr 183.5 million for that same year.

⁶³ This reflects an assumption that the urban employed workforce grew twice as fast as the population did during the period from 1999/2000 and 2002/2003.

⁶⁴ This reflects an assumption that use per capita increases slightly as a response to expanded insurance coverage among the employed—a response driven by reduced OOP costs enjoyed by the insureds.

⁶⁵ This reflects an assumption that medical care prices would have risen faster than the general consumer price index, which rose hardly at all during the period.

Table 19

Derivation of NHA Interim Estimate for 2002/03

Employer and Household Funds (Private), Ethiopia

	NHA1 Total	NHA2 Total	Yearly Growth NHA1 to NHA2	Yearly Growth: NHA2 to Interim Estimate Yearly Growth Rates				2002/03 Interim Estimate	%Increase Interim Estimate/ NHA2	
				Persons Covered	Use per Person	Costs per Use	Total Costs			
Employer Funds										
Parastatals		24.7	59.7	30%	6%	2%	3%	11%	82.5	38%
Private firms	NE	132.8	NA		6%	2%	3%	11%	183.5	38%
Household Funds										
User fees		765.8	1,053.6	11%	3%	0%	3%	6%	1,258.1	19%
Community contrib.	NE	4.2	NA	NA	NA	NA	NA	4%	4.7	12%

3.4.6 Household and Community Spending

Household OOP spending on health care was estimated using data provided by two household surveys that are periodically conducted by the Central Statistical Authority. The Welfare Monitoring Survey (WMS) has been conducted in 1995/1996, 1997/1998, and 1999/2000. The Household Income, Consumption, and Expenditure Survey (HICES) has been conducted in 1995/1996 and in 1999/2000. The data generated by these two surveys were used by the NHA1 and NHA2 teams to estimate the total OOP spending by households in the respective years.

According to the two NHA estimates, total OOP spending grew by 38%, from Birr 765.8 million in 1995/1996 to Birr 1,053.6 million in 1999/2000. Considering the growth in population of about 13%, the OOP spending per capita was estimated to have grown by 22% in the same period, according to the estimate. However, the actual expenditure data reported in the HICES in the respective years shows a slight decline in the OOP spending on health—both per capita in Birr (from Birr 14.63 to Birr 13.93) and as a percentage of total per capita consumption expenditure (from 1.1% to 1.0%). Within these two relatively equivalent totals, however, the survey revealed a significant increase in the share of spending devoted to the purchase of drugs—from 60% in 1995/1996 (Birr 8.78 per capita) to 78% in 1999/2000 (Birr 10.83 per capita). Moreover, the survey revealed that the lower a household's income, the higher the percentage of OOP spending that was devoted to the purchase of drugs—approaching 100% for the lowest income segments.

The WMS provides more detailed disaggregated data on what people did when they fell ill, and these data were used to modify the raw data provided in the HICES. As shown in **Table 20**, reporting salient data from the two surveys, there are significant differences both in the percentage of the respondents reporting an illness in the two months prior to the survey and in the percentage of those reporting illness who actually sought treatment. In 1995/1996, 18% of the respondents reported an illness, and, of them, 49% sought treatment. In 1999/2000, 27% of the respondents reported an illness, and, of them, only 41% sought treatment. Thus, it is evident that, although the population is evidently sicker by 50% (during the NHA2 period as compared to the NHA1 period), those who were sick (an increased percentage as well as an increased number) were 16% less likely to seek care. These data imply that access to needed care may have grown worse between NHA1 and NHA2, even while the population suffered higher morbidity and even though the absolute number of visits may have gone up. It is the total number of visits estimated for NHA2 that apparently has driven the estimated increase in OOP per capita up by 22% (although it is not possible to know exactly what has determined either estimate by reading the texts of the two reports).

For the interim estimates of household OOP spending on health, therefore, we assume a coverage growth rate naturally equivalent to the rate of population growth at 3% per year. We shall assume no increase in use rates, and in average prices per unit of services of 3% per year. The results of these assumptions, shown in **Table 19**, show household OOP spending rising 19% to Birr 1,258.1 million in 2002/2003. For community spending, estimated at Birr 4.2 million for NHA2, it is estimated to grow at 4% yearly during the three following years, yielding an increase of 12% over the following three years, generating an interim estimate for 2002/03 of Birr 4.7 million.

Table 20
Selected Data Generated by Household Surveys in Ethiopia
Welfare Monitoring Survey and Household Income, Consumption,
Expenditure Survey, 1995/96 and 1999/00

	1995/96 HIC&ES	1999/00 HIC&ES	1995/96 WMS	1999/00 WMS
Sampled Households	23,369	25,698		
Population Sampled (in millions)	52.7	55.6		
Medical/Health Exp. Birr	14.63	13.93		
as % of Total Exp. o/w Drug Expenditures	1.12%	0.96%		
Birr	8.78	10.83		
as % of HEALTH Exp.	60%	78%		
Reported illness in two months prior to survey			18.1%	27.2%
o/w sought treatment			49.1%	41.1%
Of those who sought treatment, visited...				
Government facility			48.5%	45.5%
govt hospital			na	6.1%
govt outpt facility			na	39.4%
Traditional/self			24.6%	0.9%
Private pharmacy			na	15.5%
Individual provider			na	12.4%
Private facility			20.4%	15.2%
Mission facility			3.4%	3.3%
Other/not stated			3.1%	7.2%
			100.0%	100.0%
Data from NHA1 & NHA2	1995/96	1999/00		
Total Population	56.4	63.5		
% increase		12.6%		
Est. HH OOP spending (in millions of Birr)	765.8	1,053.6		
% increase		37.6%		
OOP spending/capita (in Birr)	13.6	16.6		
% increase		22.2%		

The results for the various components of private sector spending are reflected in **Table 21** that is presented alongside a duplicate presentation of **Table 18** to show the difference as compared to NHA2.

Table 18
Flow of Funds from Sources to Health Financing Agents,
NHA2, 1999/2000, Ethiopia
Private Sources (except for Local NGOs)

	Private Funds S 2				
	Employer Funds S 2.1		Households S 2.2		S 2
	S 2.1.1	S 2.1.2	S 2.2.1	S 2.2.2	
Parastatal Employers	Private Employers	User fees, Transport costs	Contributions, comm. part.	Subtotal	
FINANCING AGENTS					
FEDERAL					
HF 1.1.5.1 MoFED					
REGIONAL					
HF 1.1.12 ESRDF				4.1	4.1
HF 1.2 Govt Ins	5.9	1.1			7.0
OTHERS					
HF 2.2 Private Ins	5.5	1.0			6.5
HF 2.3 HH OOP			1,053.6		1,053.6
HF 2.4 Non-profit inst.				0.1	0.1
HF 2.5.1 Parastatals	48.4				48.4
HF 2.5.2 Private firms		130.7			130.7
HF 3.1 Intl Agencies					
GRAND TOTAL	59.7	132.8	1,053.6	4.2	1,250.4

Table 21
Flow of Funds from Sources to Health Financing Agents,
Interim NHA Estimate, 2002/2003, Ethiopia
Private Sources (except for Local NGOs)

	Private Funds S 2				
	Employer Funds S 2.1		Households S 2.2		S 2
	S 2.1.1	S 2.1.2	S 2.2.1	S 2.2.2	
Parastatal Employers	Private Employers	User fees, Transport costs	Contributions, comm. part.	Subtotal	
FINANCING AGENTS					
FEDERAL					
HF 1.1.5.1 MoFED					
REGIONAL					
HF 1.1.12 ESRDF				4.6	4.6
HF 1.2 Govt Ins	8.1	1.5			9.6
OTHERS					
HF 2.2 Private Ins	7.6	1.4			9.0
HF 2.3 HH OOP			1,258.1		1,258.1
HF 2.4 Non-profit inst.				0.1	0.1
HF 2.5.1 Parastatals	66.8				66.8
HF 2.5.2 Private firms		180.5			180.5
HF 3.1 Intl Agencies					
GRAND TOTAL	82.5	183.5	1,258.1	4.7	1,528.8
TOTAL Percent Change	38.1%	38.1%	19.4%	12.5%	22.3%
Private employer change	38.1%				
Household OOP change	19.4%				
NGO change	12.5%				

3.4.7 Interim NHA Estimate for 2002/2003

We arrive at a composite presentation of the interim NHA estimate for the year 2002/2003 in Ethiopia (shown in **Table 22**) by combining the results of our interim estimates for each of the three components (government spending, donor spending, and private spending) that were separately presented in **Tables 12, 16, and 20**. The increase in total health spending in 2002/2003 is estimated at only 14%. This is relatively low, because it is estimated that government health spending actually declined by 37% due to the fact that the unusually high health spending related to the Ethio-Eritrean War in 1999/2000 was reduced considerably in estimating government spending for 2002/2003.

Table 22

Interim NHA Estimate, Sources to Financing Agents, 2002/2003, Ethiopia

(in millions of Ethiopian Birr; US\$ = Birr 8.3)

SOURCES OF FINANCING															
Public Funds S 1					Private Funds S 2						Rest of the World S 3				
Federal Govt S 1.1		Regional Govt S 1.2			S 1	Employer Funds S 2		Households S 2.2		Local NGOs		External Assistance 3.1			
S 1.1.1	S 1.1.2	S 1.2.1	S 1.2.2	S 2.1.1		S 2.1.2	S 2.2.1	S 2.2.2	S 2.3	S 2	S 3.1.1	S 3.1.3	S 3.1.4	S 3.1.5	
General	Loans	Local	Federal	Subtotal	Parastatal	Private	User fees, Transport	Contributio ns, comm. part.	Local NGOs	Subtotal	Budget support grants	Multilatera l	Bilateral	Intl NGOs	
Revenue		Revenue	Subsidy		Employers	Employers	costs								
FINANCING AGENTS															
FEDERAL															
HF 1.1.1	MOH	72.7	3.3	76.0					0.2	0.2	88.4	109.3	50.3		
HF 1.1.2	MOD+Police	28.8		28.8											
HF 1.1.3	MOE	76.0		76.0							0.2	0.1			
HF 1.1.5	Other	24.3		24.3											
HF 1.1.5.1	MoFED	4.7		4.7											
REGIONAL															
HF 1.1.7	RBs		41.4	486.9	528.3						26.7	107.4	49.7	5.7	
HF 1.1.8	Natl HIV/AIDS	8										0.7			
HF 1.1.11	Other RBs			70.5	70.5										
HF1.1.12	ESRDF		12.4	49.6	62.0				4.6	4.6	8.2				
HF 1.2	Govt Ins					8.1	1.5			9.6					
HF 1	SUBTOTAL														
OTHERS															
HF 2.2	Private Ins					7.6	1.4			9.0					
HF 2.3	HH OOP							1,258.1		1,258.1					
HF 2.4	Non-profit inst.		1.7	0.1	1.8				0.1	150.7		0.6	1.5	13.4	
HF 2.5.1	Parastatals					66.8				66.8					
HF 2.5.2	Private firms						180.5			180.5					
HF 2	SUBTOTAL														
HF 3.1	Intl Agencies		6.7		6.7							7.1	114.5	177.4	
GRAND TOTAL		214.5	65.6	607.1	887.2	82.5	183.4	1,258.1	4.7	150.9	1,679.6	123.5	225.2	216.0	196.5
Percent Change		-37%	16%	16%	-3%	38%	38%	19%	12%	20%	22%	20%	20%	20%	20%

Part 4

4. Conclusions and Recommendations for Further Work on Interim NHA Estimation

An attempt was made to apply the interim estimation approach and techniques to a second country—Uganda—where three recent rounds of NHA estimates have been completed (rounds two through four, 1999/2000, 2000/2001, and 2001/2002). Even though all three rounds of estimates were based on the classifications suggested in the *Producers' Guide* and even though they appeared to satisfy other preconditions required to make interim estimation possible, an interim estimate could not be done because the underlying components of many of the estimates (particularly those relating to private spending) were not reported in the text of the report. Without knowledge of these components of important actual estimates, growth rates for periods beyond the years already estimated could not themselves be estimated.

4.1.1 1. General Conclusions

It should be emphasized that many uses of NHA data derive from their ability to generate a time series of estimates, both of aggregated totals in particular cells and for the components of the values generated in those cells, that can be extremely useful to analysts in determining the dynamic changes that are occurring in the health sector—both because of and in spite of public policy initiatives. Such time series data are the fundamental ingredients of econometric modeling upon which interim estimation will ultimately be based (as it is in the United States and Canada already). Time series data are not particularly reliable for interim estimation, however, when there are only a few (two or three) years on which to base calculations (averages) of trends. Thus, the trends upon which an interim NHA estimate is based (and an approach to which is outlined here) will be more reliable the more years of actual NHA estimates have been completed and upon which they could be based. Furthermore, the estimates of trends in growth rates are more accurately developed when cell totals are reported as composite results of components whose individual values in any year, and whose growth rates over several years, are known and are reported. Without such values and growth rates being known, it is much more difficult, as has been seen, to develop reliable interim estimates. Finally, there is an evident need to disaggregate values of parameters and component variables underlying actual NHA estimates in order to make it possible to focus policy analyses on particular interventions that focus on regions, population groups, and/or on particular diseases. For government and donor spending in these areas, however, disaggregations are extremely difficult to create (without great expense and time) and cannot generate reasonably reliable data on efficiency or effectiveness of levels of investment that can be applied to decision making in the future. Interim NHA estimates of aggregates, using reasonable actual estimates of important components of the major cells in NHA, however, can be expected to lay the groundwork for future development of NHA analytical methods that can be increasingly sophisticated in aiding decision making. For this particular effort, however, the limitations imposed by the limited number of years in which the *Producers' Guide* has been in use combined with the difficulties in updating budget-driven data (for government and donor spending) mean that interim estimation will have rather limited benefits for policy analysis and decision making until these immediate problems can be overcome by several more years of data and methods development.

4.1.2 Specific Conclusions

Based on the work completed in the first three parts of this report, there are a number of conclusions to be drawn:

1. Interim estimation of NHA should not be attempted on a regular basis for more than one major NHA table. That table should be the one showing flows of funds from financing agents to health providers—the standard used by the United States in its time series of interim and projected estimates of National Health Expenditures since the 1970s. Interim estimation of the table showing flows of funds from original sources to financing agents is not of sufficient policy interest (as it does not enable policymakers to focus on differential growth rates in payments to, and receipts by, the various provider types) to be the focus of the substantial resources that would need to be devoted to this task.
2. Interim estimation of NHA in developing countries will always be plagued by a high degree of uncertainty about recent trends in donor spending. There are no easy solutions to this difficulty except to try to collect the relevant data directly. Even then, the spend-out rate (which is a function of absorptive capacity of the recipient government) will dictate the actual amount of spending, which could vary considerably from one year to the next (especially under current circumstances of large increases in obligations by special purpose funds like the Global Fund to Fight AIDS, Tuberculosis, and Malaria).
3. Meeting the preconditions for interim NHA estimation is critically important if resources expended are to be efficiently used. (While it was initially thought that the Ethio-Eritrean War may not have violated the precondition requiring relative stability, subsequent estimation efforts showed that it did. See Notes on this decision below, in the annex.) In addition to the four preconditions noted in the concept paper (Part One), another one could be added: that the two or more comparable actual NHA estimates include the reporting of **all** the relevant components of major cell estimates (such as coverage/enrollment in health benefit plans, use per enrollee, costs per use).
4. Any interim NHA estimate should be approached with a keen understanding of how the interim estimate is to be used. To some extent, an updating of older actual NHA data does provide policy analysts and policymakers with a clearer picture of the current circumstances in the sector. However, it is the underlying trends in component data that is really of interest to policymakers, and, if these data cannot be presented as being the foundation for the aggregated estimates in the major cells, then it may be difficult for a policy analyst or a policymaker to draw any inferences from the gross changes that are estimated to have taken place.

4.1.3 Recommendations

1. A time series of at least two, preferably many more, actual NHA estimates are needed before an interim NHA estimate should be attempted.
2. The preconditions for performing an interim NHA estimate need to be strictly satisfied, especially if one is relying on only two or three actual rounds of NHA estimates.
3. Reporting on the methods and assumptions used in completing actual NHA estimates must be much more thorough and complete than has been evidenced to date in many NHA reports.

Without knowing the explicit data that are the foundation for the cell totals, it is quite impossible to know how to create interim estimates according to any approach or techniques that could be devised.

4. Since it has proven somewhat premature to try to develop and apply interim estimation techniques to actual rounds that have already been completed in the field, some thought and preparation now need to be given to establish the necessary basis for attempting another effort at interim estimation in the future.

Annex

Annex: Notes on the Application of Approaches and Methods for NHA Interim Estimates: Issues in Moving from Concept to Reality with Particular Reference to Ethiopia

As was emphasized in the concept paper, the benefits to policymakers from NHA estimates increase greatly after such estimates become regular and routine—that is, after two or more have been completed and the estimation processes have been institutionalized. With two or more NHA estimates, it is possible to start development of a time series of such estimates that can generate trend-related data. Such trend data allow policy analysts to examine the dynamics of the health sector and give them the ability to extrapolate past estimates into interim estimates and, ultimately, into projected estimates. The concept paper provides a detailed explanation of the various approaches and methods that could be applied to a limited time series of NHA estimates. While several conditions are required to complete a reasonably robust interim estimate, however, it will be difficult for most developing countries to meet them. A minimum of two NHA estimates spaced several years apart is a necessary, but not a sufficient, condition. There were other preconditions mentioned in the concept paper that are important considerations. They are:

1. It has not been more than three (or, at most, four) years since the most recent NHA estimate;
2. The accounting structures of the NHAs done to date are very similar for the actual NHA estimates to be used for an NHA interim estimate; and
3. There has not been a serious economic or political disturbance since the last NHA estimate that would make it difficult to make a reliable interim estimate.

When there are only the minimum number of two NHA estimates made to date, these other three preconditions become important. (A time series of four, five, or six NHAs would tend to make these other three preconditions less important, simply because there are more data, and there would have been a lot more experience on which to base an interim estimate, regardless of these other three preconditions.)

Application to Ethiopia: Are these preconditions sufficiently met?

After a relatively thorough examination of the two rounds of NHA completed now by Ethiopia, there are some important observations to be made on these three preconditions:

1. NHA1 was for 1995/1996 and NHA2 was for 1999/2000. The periods are consistent and were dictated by the two most recent household income and expenditure surveys done by the Central Statistical Authority. In and of themselves, I believe this span of time is reasonably

within the precondition. Also, the two surveys were very similar, generating data that at least are grounded in very similar sampling and survey questions.

2. The accounting structure for NHA2 is considerably more detailed than for NHA1, for two major reasons. First, there had been advances in methodology that are embodied in the *Producers' Guide* that were followed for NHA2, I believe. NHA1 did not have the benefit of much of the advances in NHA methodology that have occurred since the year 2001 when the NHA1 was completed. By itself, the more sophisticated and detailed structure of NHA2 does not necessarily undermine the ability to do an interim estimate. It does, however, make it necessary to collapse some of the detail back into categories that are more easily estimated using interim methods. (More on the differences below.)
3. The fact that NHA2 was estimated for a 12-month period that coincided with the Ethio-Eritrean War is a fact that does, indeed, undermine the meeting of this precondition (that no serious economic or political disturbance has occurred since the most recent NHA). It throws many of the variables underlying NHA2 off most of the trendlines that would need to be estimated for the interim estimates. Because it took several years for the financial flows in the health sector to recover to their pre-war levels and patterns, an interim estimate for just three years later (our proposed time period is 2002/2003) does present a number of serious challenges.

Observations

The more detailed structure of NHA2 is summarized as follows for the matrix showing flows from financing agents (FAs) to providers (Ps). In NHA 1, the number of financing agents was 10. In NHA2, it was 16. The additional categories were all essentially new categories that were not estimated in NHA1, as follows:

1. "Police" was added to "Ministry of Defense."
2. "National HIV/AIDS Secretariat" was added.
3. "Ethiopian Social and Rehabilitation and Development Fund" did not exist for NHA1, and was added for NHA2.
4. "Private insurance" was estimated for NHA2, but not for NHA1.
5. "(Private) Enterprises" was added (not estimated, and probably insignificant in NHA1).
6. "Rest of the world (international agencies)" was added. (Donors were included in the Ministry of Finance in NHA1, I believe.)

Some of these categories could be relatively easily estimated for an interim estimate, even though they were not in NHA1. The implications of #2 and #3, however, are complicated by the huge (promised) flows of money to come from the Global Fund. So far, the annual amount that Ethiopia has been awarded from the Global Fund is at least as large as the annual Ministry of Health budget. It would be hard to estimate (for the interim estimate) how fast these funds can be expended, when there have been documented absorptive difficulties in the past.

On the provider side, the NHA2 detail is quite extensive, with 75 categories listed (although most of these are estimated in only one or two FA categories). For NHA1, there were only 16 provider categories. While the extensive detail may be good for policy analytic purposes for actual NHA estimates, the number of categories for the interim estimate must be reduced drastically, probably to the same order of magnitude of that of NHA1 (although a few should be added because they were omitted in NHA1).

As for the effect of the Ethio-Eritrean War on the ability to do an interim estimate, it may not be as much of a problem as it seems at first glance—especially when compared to the magnitudes of the **new** flows of funds that are now expected to cascade into Ethiopia for HIB/AIDS, tuberculosis, and malaria. How exactly we should handle both issues, however, is not clear at the moment, except that methods will be developed on an ad hoc basis.

Issues to Discuss

Because of the steep learning curve all NHA teams experience between NHA1 and NHA2 (partly due to the *Producers' Guide* and other advances in methods), it is understandable that the second rounds would be very different from the first rounds. Presumably, as they go up the learning curve, the differences will diminish, but they won't disappear. Where should interim estimates fit into this dynamic?

Interim estimates, I believe, should emphasize their value from their existence and their timeliness, rather than from some imagined accuracy. That is, the methods and assumptions used to arrive at interim estimates will actually highlight the current policy choice and issues in the sector, rather than necessarily accurately estimate the flows themselves. This means that ad hoc methods will be more important to develop—specific to the particular circumstances found in each country and with each series of NHA rounds of estimates—than it will be to apply rigorously the methods outlined in the concept paper. Of course, they will be related, but the results of two or more interim estimates may well be only examples of initial efforts, not specific instances of a general approach or methods. To what extent should we try to do interim estimates (that otherwise might be called “quick-and-dirty,” “back-of-the-envelope” estimates) that try to produce something useful rather than necessarily accurate—shown to be dependent on any number of assumptions whose accuracy would not be known for some time?

If we approach application of “interim estimation concepts” in a more ad hoc way than at first anticipated, should we be less intensive in each application or more intensive?

What should be the country in which we try the second application? Should we consider decreasing the time on each application in order, perhaps, to develop a third country, and consider them to be examples of “interim estimates” that illustrate both the advantages and disadvantages of doing them?

What end result(s) do we seek:

1. Assistance to third and fourth rounds of NHA methods and actual estimates?
2. A standardized approach to “interim estimating”—standardized across countries or within countries?
3. Instructive examples of “interim estimates” that are very different in problems addressed and methods used, one from each other?