APPENDIX 1

SUMMARY OF QUESTIONNAIRE RESPONSES

1. Overview

2. Tabular Summary

3. Country Summaries

4. Questionnaire

1. Overview

Replies were received from 19 countries, plus three of the States of Australia. In this section an overview of the replies is given. In the following section a tabular summary is given of those responses that could easily be expressed in tabular form. Finally, a short summary is presented for each of the 19 countries, highlighting particularly interesting points.

Organisation and delivery of PHC

In general the responsibility for the delivery of PHC is not solely that of the Ministry of Health (Table A-1). This reflects both the broad definition of PHC accepted in most countries (e.g. including water supply and sanitation) and the fact that in a number of countries other public sector agencies, the private sector and voluntary agencies are active in this field. The main implication is that in order to fulfil the aims of PHC in most countries, the MOH needs to coordinate its efforts with other agencies. This emphasises the need for clear policies and good management structures for PHC.

In many countries PHC services and hospital services are not managed by the same organization. This suggests that shifts in the balance of resources from secondary care to PHC may be difficult to achieve and that there may be organisational barriers to coordinating the efforts of the two sectors, e.g. to encouraging ambulatory care, or shorter hospital inpatient stays.

The priorities for PHC vary from country to country. However, it was noticeable that many countries listed most of the components of PHC as priority areas. It was also interesting that lack of funds was not the only obstacle to these priorities being met. Some countries also pointed to management difficulties.

Monitoring and evaluation of PHC

Routine financial data on PHC are available in about one half of the countries (Table A-2). In most cases this is restricted to data on the total government expenditure on PHC and its relationship to total government expenditure on health care. The large variation from country to country in the proportion of health care expenditure devoted to PHC relates partly to different definitions of PHC in different countries. Hardly any countries could give estimates of non-governmental expenditure on PHC. In general, the availability of routine financial data was much less than that of activity data on PHC.

Almost all countries collect activity data (e.g. number of immunizations given, number of antenatal care visits). However, few countries have sought to link data on, or changes in, activity levels to data on, or changes in, the government expenditure on PHC. Indeed, programme budgeting approaches have not, in general, been utilised for PHC (Table A-3). This presumably arises at least in part from the difficulties in collecting data on the expenditure on individual components of PHC. Where programme budgeting methods have been applied, this is mainly to plan future expenditure. Few countries have monitored trends in expenditure through time, related expenditure on PHC to priorities, or related changes in expenditure on PHC to changes in the quantity of services delivered.

About one half of the countries reported that more detailed evaluations of the costs and/or benefits of particular PHC programme have been carried out (Table A-4). The most frequently evaluated programmes are malaria control and immunization programmes. This is not surprising because in both cases external agencies (e.g. the WHO through the Expanded Programme on Immunization) have encouraged evaluation, and the procedures for evaluating these programmes are relatively well established. Few evaluations consider costs, however.

Given the lack of routine financial information on PHC programmes in many countries, it is not easy to see how this situation will improve in the short run except through the conduct of special one-off surveys. Indeed, most evaluations that have been carried out, particularly in the developing countries, have been of an ad hoc nature, often with external support. There is clearly a need for the encouragement of institutional capacity that can make economic evaluation more of a routine activity.

Relationship of economic evaluation to health care decision making

About one third of the countries have a unit within the Ministry of Health which has economic evaluation as one of its potential functions. However, it was hard to assess whether such units possess all the necessary skills (Table A-5). The majority of countries also rely on a central capacity for planning and evaluation, usually located in the Ministry of Finance or Ministry of Planning and Development. In the case of the smaller countries, this is often the only expertise available to the Ministry of Health.

Given the intersectoral nature of health problems and the link between health and economic development, it obviously makes sense to have central coordination of planning and evaluation for health and health care. However, it could be argued that the existence of a unit within the Ministry of Health is also vital, to enable some of the special evaluation problems in the health care field to be addressed and claims for more resources to be better supported by hard data. Nevertheless, these potential benefits need to be balanced against the need for the concentration of scarce specialist skills, particularly in the smaller countries. In general, few countries would currently claim to have the capability to carry out good economic evaluation of programmes in the health care field.

Furthermore, few countries use other expertise, such as that in Universities or other institutions (Table A-6). In many cases this is because such expertise does not exist in the countries concerned.

Not surprisingly, apart from in the developed countries there was little evidence that economic evaluation had had an impact on health care decision making, although it is possible to point to modest contributions, such as the changes in tuberculosis treatment policy following an evaluation in Botswana. As indicated in the main body of this report, thought needs to be given not only to how the capability for economic evaluation can be developed, but also to how the results of such evaluations can be used by decision makers. Only in this way will any investment in skills to perform economic evaluation bear fruit.

2. Tabular Summary

A number of replies to questions are contained in the following 6 tables. Where no entry is given for a given country, this means that either:

- no reply was given to the question concerned; or
- the information was not available; or
- the answer given was not clear; or
- the question was not applicable in the country concerned.

If representatives for the various countries wish to clarify any points we would be most grateful.

Table A-1 Organisation of PHC

Country	Is the MOH solely responsible for organising and delivering PHC?	Are hospital and PHC services managed by the same organisation?
Australia	No	No
Bangladesh	Yes	Yes
Barbados	Yes	Yes
Botswana	No	No
Brunei Darussalam	Yes	No
Canada	No	No
Cyprus	No	Yes
Fiji	No	Yes
Malaysia	No	Yes, except for 4 urban are
Maldives	No	Yes
Malta	Yes	Yes
New Zealand	No	No
Papua New Guinea	No	Yes (for government service
Singapore	No	No
Solomon Islands	No	No
Swaziland	-	-
Trinidad and Tobago	No	No
Tuvalu	No	Yes
Western Samoa	Yes	Yes

Table A-2 Availability of routine data on PHC

Country	Are routine financial data collected?	Are routine data on quantity of services collected?
Australia	Yes	Yes
Bangladesh	Yes	Yes
Barbados	Yes	Yes
Botswana	-	Yes
Brunei Darussalam	No	-
Canada	No	Yes
Cyprus	No	No
Fiji	No	-
Malaysia	No	Yes
Maldives	No	No
Malta	Yes	Yes
New Zealand	-	-
Papua New Guinea	Yes	Yes
Singapore	Yes	Yes
Solomon Islands	No	Yes
Swaziland	-	-
Trinidad and Tobago	No	Yes
Tuvalu	No	Yes
Western Samoa	No	Yes

Table A-3 Use of financial data on PHC

Country	Have financial data been used for:			
	analysing trends	relating expenditure to policies	planning future expenditure	relating expenditure changes to changes in the quantit of PHC
Australia	No	No	Yes	No
Bangladesh	No	No	Yes	No
Barbados	No	No	No	No
Botswana	No	No	Yes	No
Brunei Darussalam	No	No	No	No
Canada	-	-	-	-
Cyprus	No	No	No	No
Fiji	-	-	-	-
Malaysia	Yes	Yes	Yes	Yes
Maldives	No	No	No	No
Malta	No	No	No	No
New Zealand	-	-	-	-
Papua New Guinea	No	No	No	No
Singapore	Yes	Yes	Yes	Yes
Solomon Islands	No	No	No	No
Swaziland	No	No	No	No
Trinidad and Tobago	No	No	No	No
Tuvalu	No	No	No	No
Western Samoa	No	No	No	No

Table A-4 Evaluating the costs and benefits of PHC

Country	Have there been any formal evaluations of the costs and/or benefits of PHC services in the last 10 years? (Component of PHC listed)
Australia	Many areas, including MCH, water fluoridation, nutrition
Bangladesh	Immunization programmes, malaria control, diarrhoeal disease
Barbados	None
Botswana	MCH, tuberculosis, health education
Brunei Darussalam	Some analysis from statistics, but no full evaluations
Canada	Many areas including MCH, health education, appropriate treatment for common diseases
Cyprus	Immunization programmes
Fiji	-
Malaysia	None
Maldives	None
Malta	None
New Zealand	-
Papua New Guinea	PHC development
Singapore	MCH, immunization programmes, health education, control of locally endemic diseases
Solomon Islands	Water supply, malaria control
Swaziland	Immunization programmes, diarrhoeal disease, malaria control
Trinidad and Tobago	None
Tuvalu	None
Western Samoa	Immunization programmes, filariasis control

Table A-5 Relationship between economic evaluation and health care decision making

Country	Does MOH have a section concerned with economic evaluation?	Does the section contain economists?	Is another Ministry or department involved in economic evaluation of health projects?
Australia	Yes	Yes	Yes, in the future
Bangladesh	Yes	No	Yes
Barbados	Yes	-	Yes
Botswana	Yes	Yes	Yes
Brunei Darussalam	No	-	Yes
Canada	Yes	No, but available elsewhere in government	Yes
Cyprus	No	-	Yes
Fiji	-	-	-
Malaysia	No	-	Yes
Maldives	No	-	Yes
Malta	No	-	Yes
New Zealand	-	-	-
Papua New Guinea	Yes	Yes (but position unfilled)	Yes
Singapore	No	-	No
Solomon Islands	No	-	Yes
Swaziland	No	-	Yes
Trinidad and Tobago	Yes	-	Yes
Tuvalu	No	-	Yes
Western Samoa	No	-	No

Table A-6 Commissioning economic evaluations and using the results

Country	Does the MOH use other institutions for economic evaluation of PHC?	Is there evidence that economic evaluations have had an impact on decision making?
Australia	Yes	Yes
Bangladesh	-	-
Barbados	No	-
Botswana	Yes	Yes
Brunei Darussalam	No	-
Canada	Yes	Yes
Cyprus	No	No
Fiji	-	-
Malaysia	No	-
Maldives	No	-
Malta	Yes	No
New Zealand	-	-
Papua New Guinea	No	-
Singapore	No	No
Solomon Islands	No	-
Swaziland	-	-
Trinidad and Tobago	No	-
Tuvalu	No	No
Western Samoa	No	No

3. Country Summaries

Australia

Questionnaire responses for Australia were received from the Federal Government and 3 of the States (Tasmania, South Australia and Western Australia). The major role in the provision of PHC belongs to the State Governments, although the Federal Government has a role in the provision of funding and local government has a role in basic public health matters (e.g. safe water and sanitation). The main elements of PHC are maternal and child care, family planning, immunization, prevention and control of locally endemic diseases, health education and treatment (by private medical practitioners, public hospitals, non-institutional public health services, and by private hospitals). The main Federal priorities are increased emphasis in prevention and improved coordination of the existing services. Routine financial data on PHC are available and in 1981-82 PHC expenditure was 38% of total government health expenditure. Programme budgeting will be introduced by the Federal Government in the near future. The extent to which it has been adopted at the State level varies.

There have been evaluations of a number of PHC programmes; in particular economic evaluations have been undertaken of water fluoridation and cervical cytology. In the case of some of the water fluoridation studies, in South Australia and Tasmania, there was an identifiable impact on decision making.

The obstacles to securing more value for money from PHC include the reliance on private entrepreneurial general practitioners (which sometimes inhibits a multidisciplinary approach) and the lack of appropriate outcome measures.

Specialist resources are available for programme evaluation, including economic evaluation, at the Federal level. Similar capability exists in some States and has been proposed for others. Expertise is also available in Universities and this has been used from time to time.

Bangladesh

Routine information is collected on curative and preventive PHC activities. Financial information is used to plan future expenditure. Evaluations have been, or are being carried out, on programmes of malaria control, diarrhoeal disease control and immunization, the first being commissioned locally and the second externally. The malaria control evaluation was undertaken by a local institute. None of the evaluations calculated costs. The major obstacles to PHC are socio-economic conditions such as poverty, illiteracy, lack of employment opportunities, poor transport and communications.

A planning group exists within the MOH which plans the use of health resources.

Barbados

The main PHC services are MCH including family planning, immunization, general medical care, communicable disease control and water and sanitation. Recent PHC initiatives include the construction of polyclinics offering comprehensive health care and a free drug service for priority groups. Routine financial and activity data for PHC are available and PHC absorbed 33% of government health expenditure in 1984. The main obstacle to obtaining more value for money from PHC is resource management, and the main PHC priority is improved management.

A planning unit exists in the MOH with responsibilities for planning, evaluating and implementing health programmes. It is staffed by twelve officers.

Botswana

Main PHC services are curative treatment, family health (MCH, family planning, nutrition, health education) community health (epidemiology and disease control, environmental health, occupational health), rehabilitation and oral health services. The proportion of government health sector expenditure on PHC has been estimated (40%) and service statistics are collected. Financial information is used to plan future expenditure. Evaluations have been carried out for EPI and MCH, TB control and health education. The TB evaluation calculated costs and effects of alternative treatment patterns and influenced MOH policy in favour of short course chemotherapy. Main PHC priorities are comprehensive coverage, manpower development, community involvement and intersectoral planning, and main problems in obtaining value for money are lack of continuous evalaution of costs and impact, and lack of management skills.

The planning unit of the MOH has responsibilities for planning, implementation and evaluation and 3 of the 4 staff are economists. An external agency provides further health economics expertise in the field of health financing studies.

Brunei Darussalam

Main PHC services are MCH, outpatient, travelling dispensary and flying medical services. PHC services are evaluated from routine statistical reports. Main PHC priorities are community participation, intersectoral co-ordination and health education.

The economic planning unit determines funding for health development according to PHC.

Canada

The overall responsibility for the provision of health care rests with each Provincial Government and there are therefore slight differences in the organisation and delivery of health care across the country. In general all PHC services are available, although the range varies somewhat, depending upon geographical location, available financing and local priorities. The main Federal priorities in PHC are health promotion and education, safe water and sanitation in remote and rural areas and community-based health and social services delivery systems, including the encouragement of native communities to control the delivery of their own health care services. Although routine financial data may be collected on individual services which together comprise PHC, these data are collected, analysed and published in relation to general accounting requirements within each Province. Provincial procedures also vary in relation to the use of programme budgeting methods. At the Federal level, programme budgeting methods are used to monitor the implementation of health care services to client populations.

Formal evaluations of PHC services have been carried out in a range of areas. Particular evaluations of note concern programmes to promote moderation in the use of alcohol, the periodic versus annual health examination and a programme to develop community health representatives to improve the delivery of health services in native and northern communities. The results of all these evaluations have been accepted by government and are likely to have an impact on policies in the future.

The main obstacles to obtaining more value for money from PHC are a lack of consensus as to what PHC is and who can deliver it, and the need to integrate PHC within the

health care system as a whole, so that treatment and preventive health care is available at the appropriate health care level.

Many specialist resources exist to undertake programme evaluations within the Federal and Provincial Governments and within Universities. There is evidence that some evaluations have had a direct impact on decision making.

Cyprus

Main PHC services are primary medical care, MCH, immunization, health education, environmental health, thalassaemia prevention, hydatid disease control, occupational health and school health. Recent PHC initiatives include an intersectoral development project which developed PHC infrastructure, the thalassaemia prevention and control programme and the hydatid disease programme. An EPI coverage evaluation has been done, commissioned by WHO, and carried out by a WHO/UNICEF/national team. Costs were not calculated. PHC priorities include staff orientation, prevention and control of cardiovascular diseases, neoplasms and accidents, health education, occupational health and care of the elderly. Main obstacles to obtaining value for money from PHC include lack of staff and public awareness of PHC, and shortage of PHC workers.

The planning bureau is responsible for health plans and employs an economist.

Fiji

Main PHC services are population control and family planning, food and nutrition, environmental sanitation, safe water, family health, health education, prevention of non-communicable diseases, and appropriate health services and basic drugs at the community level. Recent initiatives include training of village health workers and establishment of village PHC centres. PHC priorities are population control through family planning, health education, food and nutrition, proper drinking water and environmental sanitation, immunization and prevention of communicable and non-communicable diseases and accidents, training village health workers and provision of basic drugs at the community level.

Malaysia

The main PHC services are MCH, water and sanitation, immunization, disease prevention and injury, health education, food and nutrition, and provision of essential drugs. Main PHC priorities are the provision of basic health services to underserved/unserved areas and community education and participation. A recent PHC initiative is a community health development programme in Sarawak which trains community health volunteers.

Programme budgeting methods are in use. No formal evaluations of specific programmes have been done but annual trends in communicable diseases and health status are noted and programmes evaluated informally.

Maldives

The main PHC services are curative and preventive services run by health centres, mobile teams and hospitals, MCH clinics, and safe water and sanitation. Recent PHC initiatives include formulation of a country health plan, and national meetings on Health for All strategies and PHC promotion. PHC priorities are MCH, immunization, health education, health manpower development, control of communicable diseases, provision of safe water, sanitation and essential drugs, curative care and nutrition. Routine financial data on PHC are not available, but the PHC share of total health expenditure can be estimated (65% in 1984). A County Resource Utilization exercise has resulted in increased allocations to health and particularly to PHC.

The Ministry of Planning and Development is involved in health planning and evaluates the physical and financial progress of health projects.

Malta

Main PHC services are 24 hour GP service, personal and specialist health services in the community, health education, nutrition counselling, vaccination, school medical services, and dental, occupational and environmental health services.

A recent major intervention/evaluation initiative is a national diabetes programme, designed to establish the dimension of the problem and then design appropriate educational and treatment services. PHC expenditure can be estimated and amounts to 21% of government and 52% of total (public plus private) health expenditure. Main PHC priorities include health education and nutrition counselling, health services concerned with immunization, MHC, the elderly, non-communicable diseases, diabetes, mental health, oral health, workers' health and environmental health. Major obstacles to obtaining more value for money from PHC are lack of staff trained in economic evaluation and lack of data.

The Economic Planning Division and Treasury are involved in formulating development and annual budgets for health, and in cost evaluation. The MOH can draw on the expertise of the University Department of Management Studies.

New Zealand

There is a comprehensive range of health services provided by a combination of central and local government agencies, private medical practitioners and voluntary organisations. Eighteen health districts provide public health services. These services provide for family health, disease prevention and control, dental health, environmental health, health education, control of air pollution, food and nutrition, control of drugs and poisons, occupational health and toxicology. The main priorities are to improve the capacity of public health services in relation to areas of particular need and to facilitate access to primary medical services (with specific reference to general practitioners' services. A particular initiative involves increases in the number of staff working in 'at risk' areas involving teams of medical staff, public health nurses, health assistants and occupational health nurses - with particular focus on schools, residential areas and small factories with poor occupational health records. In addition, the government has sought to assist the work of non-governmental voluntary community groups, through its Community Health Initiatives Funding Scheme, and is promoting programmes targetted at the health of Maoris (an ethnic group with particular health needs). A significant proportion of health expenditure (around 70%) is directed toward hospital care and the need for a shift in resources toward primary health care has been identified.

At the central government level there is an annual review of health service programmes in the context of the government's expenditure review. The continued relevance of existing programmes is reviewed on a selective basis, and assessed against claims for additional resources for new policies. The Department of Health has recently prepared its first Corporate Plan. This sets out the

Department's mission, statement of philosophy, areas of emphasis and priorities, together with divisional objectives for the coming year. The plan will be prepared forthwith on an annual basis and used as a mangement tool to monitor progress on a regular basis against stated objectives and recorded priorities.

Papua New Guinea

Main PHC services are MCH and family planning, malaria, disease control, TB and leprosy, immunization, nutrition and dental services. A 3½ year research and development project in PHC has demonstrated that the PHC approach is effective in fostering village self-reliance in health care. Expenditure on PHC can be calculated when required (56% of national health budget and 65% of provincial health budgets). PHC priorities are health promotion, emphasising community health responsibilities and allocation of resources to the 'disadvantaged' to ensure equality of access. Obstacles to value for money are lack of effective management of existing resources.

The policy, planning and evaluation section of the MOH is responsible for economic evaluation. A health economist post is unfilled.

Singapore

Main PHC services are curative services, MCH including family planning, school health services and training and health education. A recent PHC initiative is the establishment of a home nursing foundation, supported by the MOH and communities, to provide free nursing care for the aged sick in their homes. PHC expenditure makes up 10% of government health expenditure, and financial information is extensively used in planning and monitoring. Formal evaluations have been done in the areas of MCH, communicable disease surveillance and health education. PHC priorities are to improve service quality at reasonable cost by phasing out small, uneconomic clinics and replacing them by fewwer, larger polyclinics. Major obstacles to value for money are increasing costs and increased public demand for higher quality PHC.

Solomon Islands

Main PHC services are disease control, basic health services, promotion and improvement of village hygiene and portable water and sanitation. Studies on PHC expenditure are planned, and routine data on the services provided are collected. Formal evaluations have been done for MCH, immunization and malaria control. Main PHC priorities are the development of appropriately trained manpower and PHC infrastructure. The major obstacle to value for money is the lack of trained staff.

Swaziland

A health sector financing and expenditure survey attempted to assess policy implementation by surveying expenditure patterns. A cost analysis has been done of three components of the CCCD programme (immunization, diarrhoeal disease control and malaria control), commissioned and carried out by external agencies.

A planning unit exists but lacks the staff (especially economists) to undertake regular economic evaluations.

Trinidad and Tobago

Main PHC services are acute and post-natal care, family planning, general medical clinics, chronic disease and accident and emergency care. Routine data are collected of the quantity of PHC services provided, but not financial data on PHC. Main PHC priorities are MCH including immunization, chronic diseases (especially hypertension and diabetes) and environmental sanitation, including food control and insect vector control. Major obstacles to value for money are poor attendances of doctors, inappropriate mix of nursing/medical personnel, poor use of trained nursing assistants and inadequate anciliary staff.

The MOH has a department responsible for national health planning, project formulation and implementation and research, with 8 members of staff.

Tuvalu

Main PHC services are MCH including family planning, water and sanitation, nutrition, immunization, health education and prevention and control of endemic diseases. Routine data are collected on quantity of services provided, but not on expenditure. Main PHC priorities are family health including family planning, nutrition, and water and sanitation facilities improvement. Major obstacles to value for money are insufficient and irregular supply of materials for water and sanitation facilities, breakdown of ship and waterpumps, and lack of community co-operation and participation.

A government planning officer has responsibility for health planning and would rely on external input for economic evaluation of health projects.

Western Samoa

Main PHC services are EPI, well baby and child health, family planning, school health, MCH, sanitation, health education, and communicable disease and malnutrition follow-up. Formal evaluations have been done for EPI/diarrhoeal diseases and filariasis control, the latter comparing the effectiveness (but not the costs) of drug distribution by a filariasis team, or district nurses and/or primary health workers. The filariasis evaluation was commissioned and carried out by the Department of Health, and the EPI evaluation by the Department with assistance from WHO and UNICEF. PHC priorities are health manpower development, water supply and sanitation, MCH and family planning, filariasis, TB and leprosy services, strengthening of health education, nutrition and oral health and chronic disease control. The main obstacle to value for money is a brain drain, resulting in a chronic shortage of staff and wasted training.

EVALUATING INVESTMENTS IN PRIMARY HEALTH CARE

COUNTRY QUESTIONNAIRE

SECTION A: BACKGROUND INFORMATION

A1. Country:

A2. Name of person completing the questionnaire:

A3. Job title:

A4. Address and telephone number:

Date Signature

SECTION B: PRIMARY HEALTH CARE IN YOUR COUNTRY

B1. Is the provision of health services for the general public a central (federal) government or local (state or provincial) government responsibility in your country?

B2. At the relevant tier of government, is the responsibility for organising and delivering primary health care (PHC) solely that of the ministry of health?

Yes	No

B2.1 If NO, please give details of other ministries, government agencies and non-government agencies that are involved.

B3. Are both hospital and PHC services in a given geographical area managed by the same organisation?

Yes	No

B3.1 If NO, please outline the administrative arrangements

B4. At the present time what are the main PHC services in your country?

B5. What are considered to be the main priorities for the development of PHC services in your country?

B6. Are there, or have there been in the last 10 years, any specific projects or initiatives in PHC that you would like to bring to our attention?

Yes	No

B6.1 If YES, please give details, e.g. objectives of the project, PHC services provided, time span of project. If any reports on the projects are freely available we would be grateful if they could be returned to us with the questionnaire.

(please continue on a separate sheet if necessary)

SECTION C: EVALUATION OF PRIMARY HEALTH CARE IN YOUR COUNTRY

C1. Is routine financial data on PHC collected in your country?

Yes	No

C1.1 If YES, please provide any of the following statistics if readily available. Space is provided for your answer below. Please add extra sheets if necessary.

- total and per capita expenditure on PHC in 1984/85 or most recently available year (in local currency);
- PHC expenditure as a proportion of total health expenditure and/or government health expenditure;
- trends in PHC expenditure over the last 5 years (or shorter period up to 5 years), e.g. as a proportion of total health expenditure and/or government health expenditure

N.B. Please make it clear

(a) what services are included in PHC expenditure

(b) whether any health expenditure figures given relate to the country as a whole, the government, or just the ministry of health.

C2. Is routine data collected on the quantity of PHC services delivered in your country?

Yes	No

C2.1 Please list each main service (e.g. immunization, ante-natal care) and the type of information collected on the volume of services provided (e.g. number of immunizations, number of ante-natal visits). Please add extra sheets if necessary.

C3. Has there been any attempt to use financial information to monitor the implementation of government health policies, in particular those relating to PHC? (e.g. through the use of programme budgeting methods)

Yes	No

C3.1 More specifically, has programme budgeting been used to:

- analyse trends in expenditure levels through time?

Yes	No

- examine whether expenditure patterns have changed in response to changes in government health policies?

Yes	No

- plan expenditure for future years?

Yes	No

- relate changes in expenditure (inputs) to changes in volume of quantity of services (outputs)?

Yes	No

Please add any further comments on the use of programme budgeting in your country below and attach copies of any available reports relating to programme budgeting exercises.

C4. Have there been, in the last 10 years, any formal evaluations considering the costs and/or benefits (outputs) of services in the following areas?
(These are the components of PHC as identified by the Alma Ata declaration.)

	Evaluation done		Title(s) of study or studies
	Yes	No	
(a) promotion of proper nutrition			
(b) adequate supply of safe water			
(c) basic sanitation			
(d) maternal and child health care including family planning			
(e) immunization against major infectious diseases			
(f) prevention and control of locally endemic diseases			
(g) education concerning prevailing health problems and the methods of preventing and controlling them			
(h) appropriate treatment for common diseases and injuries			

C4.1 For up to 3 major evaluations from the ones listed above could you please provide extra information as indicated by the questions below.

In the Appendix to this questionnaire (Section E) we list documents already in our possesssion relating to evaluations undertaken in your country. There is no need to duplicate the information in these documents. However, please ensure that the published documents contain the answers to the questions below, especially C4.1.9, C4.1.10 and C4.1.11.

Use this page for comments on the first evaluation and add further pages if you are able to comment on two further evaluations.

C4.1.1 what was the subject of the evaluation?

C4.1.2 when was the evaluation carried out?

C4.1.3 which agency commissioned the evaluation?

C4.1.4 which agency carried out the evaluation?

C4.1.5 did the evaluation incorporate any assessment of alternative strategies (e.g. alternative ways of delivering a PHC service)? If YES, please list the alternatives evaluated.

C4.1.6 were calculations made of the costs of the services being evaluated? If YES, please describe below what cost information was calculated (e.g. total costs to the government, total social costs, unit costs).

C4.1.7 what measures of output were used in the evaluation? (e.g. measures of quantity of services delivered such as number of immunizations; measures of effect on health such as change in infant mortality rate)

C4.1.8 what were the major conclusions of the evaluation?

C4.1.9 were these accepted by the government? If NO, why not?

C4.1.10 did the government take any specific decisions based on the evaluation? If YES, please give details.

C4.1.11 do you have any further comment on the effect of the evaluation on government policies or strategies?

C4.1.12 Is there someone who could provide us with further information if we need it?

Name

Address

If any reports on the evaluation are freely available we would be grateful if they could be returned to us with the questionnaire.

C5. What do you consider to be the major obstacles to obtaining more value for money from PHC activities in your country?

SECTION D ECONOMIC EVALUATION AND HEALTH CARE DECISION MAKING IN YOUR COUNTRY

In this section we ask some questions about the general role of economic evaluation in health care decision making. Although our main interest is in the PHC field, the questions relate to health care more generally.

D1. Is there a section or department in your health ministry (at the central or local level) concerned with economic evaluation and the costs and effectiveness of present and proposed health services (e.g. economic advisers' office, planning unit)?

Yes	No

If YES, please answer the following questions

D1.1 what are the major functions of the department?

D1.2 please give the number of staff, indicating the number of trained economists?

D1.3 please summarise the types of economic study carried out

D2. Is there another ministry besides the Ministry of Health that is involved in the economic evaluation of health projects (e.g. the planning ministry, finance ministry or treasury)?

Yes	No

If YES, please answer the following questions:

D2.1 what are its main functions in the health field?

D2.2 please list the number of staff who are involved in the evaluation of health projects indicating the number of trained economists.

D2.3 please summarise the type of economic work on health carried out by these people.

D3. Does the Ministry of Health draw on expertise of any university department or institute that carries out economic studies related to health?

Yes	No

If YES, please answer the following questions:

D3.1 what are the main types of economic work on health carried out in the department(s) or institute(s) concerned?

D3.2 has the Ministry of Health commissioned any studies from the department/institute(s) in the last 5 years? If YES, please list the studies.

D3.3 has the Ministry of Health made use of any other of their economic studies on health? If YES, please list the studies used and state who commissioned/funded them.

D4. Is there evidence that any of the economic evaluations of health services undertaken in your country have had an impact on decision making?

Yes	No

If YES, please answer the following questions:

D4.1 what was the title(s) of the evaluation(s)?

D4.2 what services were being evaluated?

D4.3 who commissioned the evaluation(s)?

D4.4 what persons or groups undertook the evaluation(s)?

D4.5 in what way were the evaluation results useful in, or had an impact on, health care decision making?

SECTION E: APPENDIX

Our Current State of Knowledge of Economic Evaluation of Primary Health Care Projects in Your Country

We already have in our possession the following papers relating to projects or evaluations undertaken in your country. If you wish to make any additional comments about these particular evaluations, in order to correct errors in the papers concerned or to give us more recent information, please do not hesitate to do so.

Country:

Papers already in our possession:

We have not been able to find any published papers relating to economic evaluations of PHC services in your country.

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APPENDIX 2

TECHNICAL APPENDIX

The attached papers are extracted from World Health Statistics Quarterly; 38(4), 1985.

Due acknowledgement is given.

The first paper, by Drummond and Stoddart, outlines the principles of economic evaluation. These are relevant to all countries. The second paper, by Mills, outlines additional methodological issues which arise in evaluations in developing countries.

Finally, for those unfamiliar with economic evaluation, a Glossary of Terms is provided.

PRINCIPLES OF ECONOMIC EVALUATION OF HEALTH PROGRAMMES

M. F. Drumond[a] & G. L. Stoddart[b]

Introduction

All countries, no matter what their stage of industrial development, need to make tough choices on how to use their scarce resources. The competition for resources is not only between different sectors of the economy, but within each sector as well. Should more resources be devoted to education or to health care? Within the health care sector: should more resources be devoted to primary care or to high-technology medicine? Within the treatment options for a given clinical condition (e.g. inguinal hernia), should extra resources be allocated to expand day-care surgery?

No one is going to pretend that such choices are easy to make. In all countries, resource allocation decisions in the health care field have to take account of the complex interplay of social, cultural, economic and political factors. However, for those decision-makers wanting some guidelines in the wilderness, this article discusses a method of evaluating health service options that is consistent with the notion that resources should be deployed so as to maximize the total benefits to the community. Economic evaluation, or the "cost-benefit approach", has been used quite extensively to evaluate the efficiency or cost-effectiveness of alternative health programmes or clinical procedures *(1,2)*. It starts from the premise that resources are scarce and therefore their use in one programme or treatment implies a cost; that is, benefits which could be realized from an alternate use of resources are sacrificed. Economists view the costs of health care programmes not merely as money expenditures but as potential benefits that are being forgone. For example, in some industrialized countries the cost of expansions in high-technology medicine may be that community care programmes for the elderly may not expand as much as they otherwise might. In developing countries, a commitment to large hospital developments may imply a cost in forgone rural health services.

The notion of costs as forgone opportunities (or sacrifices) provides the logic for comparing health service options in terms of their benefits and costs. Economic evaluation seeks to do just this and takes various forms depending on the problem at hand and the extent to which the benefits of programmes can be quantified and valued.

Forms of economic evaluation

Those who have studied the literature on economic evaluation in health care will have encountered a confusing range of labels such as "cost-benefit analysis" and "cost-effectiveness analysis". In our experience, the titles of studies are notoriously bad guides to their contents and the most important issue is whether the methodology used in a given study suits the problem under review. This theme is developed in the next section. The following are a few examples of different types of study to aid those wrestling with economic jargon.

The first point to note is that all the forms of economic evaluation concern choices between *alternative courses of action*. In the evaluation of prevention, diagnosis, treatment or rehabilitation, the options are usually explicitly stated and described. A minority of studies published in the literature do not compare alternatives; for example, Cohen *(3)* calculated only the costs of schistosomiasis in Zanzibar. Such studies provide important information to those assessing priorities for resources to be allocated to the control or eradication of particular diseases. However, they do not constitute economic evaluations unless they examine competing strategies. We prefer to use the terms "cost description" or "outcome description" for studies that examine costs or consequences in the health care field without embodying a comparison of options.

In some cases, the alternative to the programme under evaluation is implied to be the existing situation of "no programme" or "doing nothing". For example, the tacit alternative to a vaccination campaign may be the existing situation of treating individuals as and when they contract the disease. Some caution is advisable in considering such studies, as "doing nothing" rarely means that no costs are incurred or no services provided. Another important feature of choices in the health care field is that many of them are questions of "how much?" Rarely is it argued that no resources should be devoted to tackling a given health problem or disease, usually the question is one of how far one should go in attempting to alleviate the condition. A most spectacular illustration of this kind of choice is the screening for asymptomatic cancer of the colon, reported by Neuhauser & Lewicki *(4)*. They showed that, while the average cost per case detected by the advised protocol of six sequential tests on the same population was only around US$ 2 500, the incremental cost per case detected by performing a sixth test (having already done five) was US$ 47 million! (This was because the returns, in case finding, from repeated screening were small.) Therefore, it is always important to examine such incremental costs and their consequences when evaluating choices in the health care field.

The second point to note is that while all forms of economic evaluation consider costs, they differ in the way in which they consider consequences. Some examples will serve to make these distinctions clearer. The simplest form of analysis, "cost analysis", considers only costs and is justified only when there is good reason to believe that the alternatives being compared result in the same consequences. Such situations are rare in the health care field. One example of a cost analysis is that which was carried out by Lowson et al. *(5)* comparing different ways of providing long-term domiciliary oxygen therapy for chronic bronchitis. The authors argued that the three methods compared, cylinder oxygen, liquid oxygen and the oxygen concentrator, produced equivalent clinical effects since in all cases oxygen was administered via a face mask. However, strictly speaking, such an assumption should be tested and cost analysis therefore represents a partial form of economic trial of two medicines whose costs are similar, the emphasis being on the establishment of relative clinical effectiveness as costs are assumed to be the same.

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All other forms of economic evaluation explicitly consider both costs and consequences. The next three forms often go under the general label "cost-effectiveness analyses" and have the common feature that while costs are expressed in monetary units, consequences are not. At the risk of introducing more terminology, we prefer to use three labels which we believe highlight important differences in approach. First, in "cost-minimization analysis", equivalence in consequence is tested through controlled study, rather than assumed as in cost analysis. Typically, the economic evaluation is conducted at the same time as a controlled clinical trial. If the trial demonstrates equivalent effects for the two medical interventions, the economic evaluation can concentrate on estimating the relative costs. An example of this type of study is that by Russell et al. *(6)*. In a controlled trial of day-care surgery versus traditional in-patient surgery for inguinal hernia they found no significant difference in clinical complications or length of convalescence. Therefore, they were able to compare the economic efficiency of the alternatives by examining their relative costs, in hospital care, community care and out-of-pocket expenditure by patients.

However, it is rare to find pairs of health care interventions where the consequences are alike in all respects. Nevertheless, if there is one important dimension upon which a comparison can be made, it is still possible to compare alternatives without "valuing" the consequences. For example, it might be argued that extension of life is of overriding importance and that the options can be compared in terms of cost per year of life gained. This approach, which we call "cost-effectiveness analysis", has frequently been used in comparisons of kidney transplant, hospital dialysis, home dialysis and continuous ambulatory peritoneal dialysis for chronic renal failure *(7-9)*. Even though the alternative treatments may differ in the number of years of extra life gained, a comparison of them in cost per year of life gained can suggest how the budget for chronic renal failure treatments should be spent so as to maximize the total years of life gained. Some cost-effectiveness analyses consider effects like "cases correctly diagnosed". This is admissible providing the achievement of such intermediate clinical objectives can be clearly linked to improvements in patient outcome.

It is not usually possible to argue that there is but one relevant dimension along which achievements can be measured. For example, the quality of life afforded by kidney transplantation is likely to be higher than that under the dialysis options. In addition, some treatments, such as cancer chemotherapy, may extend life, but have associated morbidity. Therefore one would ideally like to develop a measure that considered the "utility" or quality of life gained, as well as the quantity of life gained. In a form of economic evaluation known as "cost-utility analysis", options are compared in terms of their cost per quality-adjusted life-year (QALY) gained. This approach was used by Stason & Weinstein *(10)* in a comparison of options in the screening and treatment of hypertension. They considered that a year of life on anti-hypertensive treatment, with its attendant side effects, was equivalent to about 0.99 of a year of life without such problems. In this particular study, the quality assessments were made by a panel of medical experts. In addition, the sensitivity of the study results to changes in these assessments was examined. In other studies *(11)*, researchers have obtained quality of life assessments from patients and members of the general public.

The last three forms of economic evaluation discussed have the common feature that while the consequences of interventions are assessed and measured to some degree, they are not expressed (or valued) in money terms. Obviously, valuation of all the costs and consequences in money terms would permit the broadest type of comparison. In principle, it would be possible to ascertain whether particular health care treatments or programmes were worthwhile in themselves. In "cost-benefit analysis" attempts are made to express a broad range of costs and consequences in money terms. For example, in a comparison of a community-oriented mental illness programme with the hospital-based alternative, Weisbrod et al. *(12)* measured the costs to the health sector, other public agencies, the patient and family, and monetary benefits in terms of the increased earning potential or productivity of those patients able to return to work. However, as is nearly always the case, there are categories of health consequence that are difficult to express in money terms. In practice, cost-benefit analysis concentrates on those consequences that are relatively easy to value, such as productivity gains (through return to work or extension of working life) and savings in health care resources arising from the patient's improved health. Therefore, it is our view that "cost-utility analysis", where health consequences are valued relative to one another rather than in money terms, offers the greatest scope for consideration of a broad range of costs and consequences. That is not to say that economists have failed to develop methodologies for the valuation of health consequences in money terms *(13, 14)*, rather that their practical application has been limited.

In summary, we have considered five forms of economic evaluation which differ in the extent to which they measure and value the consequences of interventions. The simplest forms, such as "cost analysis" and "cost-minimization analysis", respectively assume or test for equivalence in consequences so that the economic evaluation is of relative costs alone. "Cost-effectiveness analysis" reviews different ways of achieving the same objective, with the consequences often expressed in physical units. The more complex forms attempt some valuation of the consequences, either in money terms as in "cost-benefit analysis", or in terms of health utilities as in "cost-utility analysis". In general, we believe that the label to be attached to a given study is less important than whether the study's methodology is appropriate to the issue being examined. In the next section we outline the features of good study methodology, concluding with a checklist of ten questions to ask of any published study.

Elements of a sound economic evaluation

Posing a well-defined question in answerable form

As in all fields of scientific inquiry, it is important to be clear on the study question. For example, is it assumed that a given treatment objective, such as screening and treatment for essential hypertension, is going to be met? In which case the evaluation can concern itself with ascertaining the most efficient way of meeting the chosen objective. Alternatively, is the evaluation concerned with the more fundamental question of whether the given objective should be met, or the extent to which it should be met, compared to alternative uses of the same resources? Attempts to answer such a question are likely to require more sophisticated forms of evaluation.

A well-defined study question will also clearly identify the alternatives being compared and the viewpoint(s) from which the comparison is to be made. Questions such as "Is a community care programme for the elderly worthwhile?" beg the questions "to whom?" and "compared with what?". A well-specified question might be the following: "From the viewpoints of (a) the ministry of health, (b) other public sector agencies providing care and (c) patients and their families, is a community care programme preferable to the existing programme of institutionalization in long-term care facilities for patients of a given level of dependency?". Note that there are a number of possible viewpoints of evaluation: particular health care agencies, the patient and family and the third-party payer (i.e. government or insurance company). However, in addition, the economic evaluation should also consider the costs and consequences of alternatives to society as a whole, as this is the broadest and most comprehensive viewpoint.

Finally, in stating the chosen alternatives for comparison it is often useful if studies mention any other relevant options and why they have been excluded from further consideration.

Giving a comprehensive description of the competing alternatives

Although there are often limitations of space in health service journals, it is important to give a full description of the alternatives being evaluated. For example, one needs to know who does what, to whom, where and how often. The reasons for such a description are self-evident; readers need to judge whether the options concerned are applicable to their own setting and to assess whether any important costs or consequences have been omitted from the analysis. Therefore, an evaluation of a community care programme for the elderly would need to give details of what is involved in visits by health care workers, accommodation at home, day care, institutional relief or respite care and inputs from the family or friends.

Establishing the effectiveness of programmes or interventions

Since economic evaluation requires consideration of both the costs and consequences of options, it relies on technical evidence of the effectiveness of interventions. That is, to what extent do they meet the objectives in prevention, diagnosis, treatment or rehabilitation? In the health care field the most widely accepted method of establishing the effectiveness of interventions is the randomized-controlled trial and one would certainly expect economic evaluations to be based on such clinical research where it is both ethically and practically possible to conduct it. Where evidence from controlled trials does not exist, some assessment should be made of the impact of uncertainties in the medical evidence on the results of the economic evaluation. (We will return to this point under sensitivity analysis below.) Often the lack of good medical evidence can limit the scope for economic evaluation. In their study comparing the cost-effectiveness of cimetidine with proximal vagotomy for peptic ulcer, Culyer & Maynard *(15)* noted that, despite the large number of trials of the new drug, few were well designed. Either they did not compare relevant service alternatives (e.g. many involved a placebo, which was unlikely to be given routinely), or were too small, or were inadequately controlled. For more discussion of the quality of medical evidence see reference *(16)*.

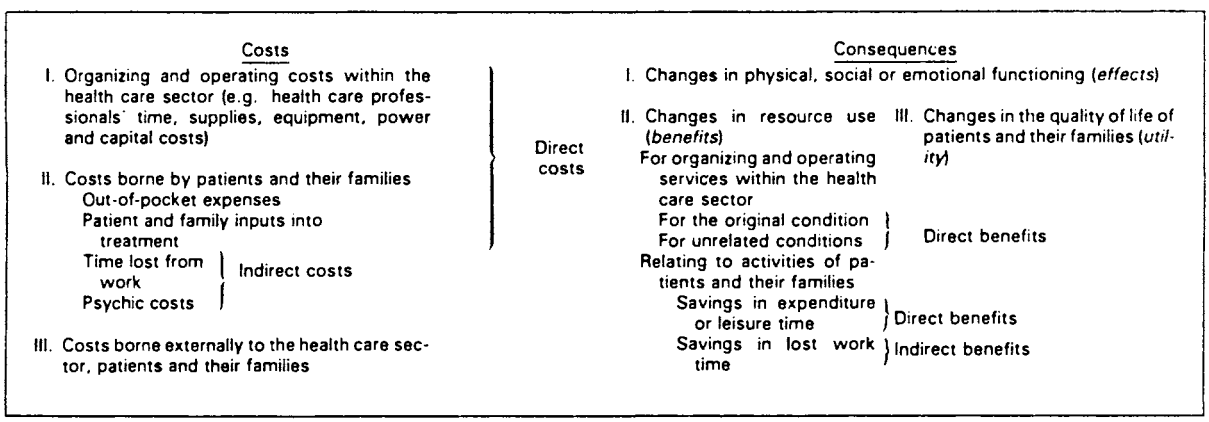
For some large public health interventions, such as vaccination campaigns, it is much harder to conduct experiments to establish effectiveness, although in some cases the efficacy of the vaccine (when administered under ideal conditions) may be known. In such cases economic evaluations may have to rely on evidence from "before-and-after" studies conducted in other locations, undertaking sensitivity analysis if review of the existing literature generates a range of estimates. In addition, some public health interventions, particularly those in the developing world, have multiple objectives (some of which may not be connected with improvements in health). This introduces further complexities in study design.

Identifying all the important and relevant costs and consequences

Even though it may not be possible or necessary to measure and value all the relevant costs and consequences of the alternatives being compared, it is important that they be identified. This is to minimize the chances that the analysis becomes biased in favour of the easily measurable items, at the expense of others.

An overview of the types of costs and consequences that may be relevant to economic evaluation of health

FIG. 1
TYPES OF COSTS AND CONSEQUENCES RELEVANT TO ECONOMIC EVALUATION OF HEALTH CARE SERVICES AND PROGRAMMES



programmes is shown in *Fig. 1*. The costs comprise those resulting from resource inputs by the health sector and other agencies providing care, and inputs by patients and families (direct costs). In addition there may be further costs resulting from time lost from work as a result of the intervention (called "indirect costs" by economists) and psychic costs (e.g. anxiety or pain and suffering caused by treatment). Finally, there may be costs borne externally to the health care sector: for example a chemical safety measure may alter the cost or availability of products if it results in more costly production processes.

Turning to consequences, it can be seen that there are changes in the physical, social or emotional functioning of individuals which give rise to two other important categories of consequence. For example, there may be changes in resource use arising from treatment. Many of these changes are likely to be in the form of resource savings, if the patient's improved health results in lower consumption of medical services. (This is one of the main arguments for preventive measures.) However, there may also be increased resource consumption in the future, if patients being cured of one condition contract others. Weinstein & Stason *(17)* argued that a hypertension screening programme, if it prevented strokes and heart attacks, would lead to increased costs in the future, owing to the diseases of old age (e.g. cancer, arthritis). These costs must be balanced against the undoubted benefits of individuals living longer.

In addition, there are likely to be other resource savings, to patients and their families, and savings in lost work time. (These mirror some of the items on the cost side of the equation.) Finally, there will be changes in the quality of life of patients and their families which are, of course, the main objective of health care interventions.

The general schema of costs and consequences outlined above reflects that found in the published literature. However, the inclusion of some items is not without controversy. In particular, the inclusion of indirect costs and benefits in the analysis biases evaluations in favour of individuals or groups that participate in the work-force. This is clearly a dilemma; while countries are crucially dependent on the wealth created by those members of the population that are at work, it may not be considered ethically defensible to give such groups priority in access to health care. Similarly, inclusion of savings in health care resources as one of the consequences, although not the subject of methodological controversy, can bias the analysis against disadvantaged groups. For example, in comparing the costs and consequences of vaccination programmes in urban and rural settings in Zambia, Ponnighaus *(18)* found programmes to be more costworthy in the large centres of population. One of the reasons for this finding was that health services were already better developed in the urban areas; therefore there were potentially more health service resources to be saved by the preventive programmes in urban locations. However, this is not necessarily a good justification for concentrating the vaccination effort in such areas.

In short, while the general schema of costs and consequences for evaluation should be as outlined in *Fig. 1*, the inclusion or exclusion of items needs to be judged in the broader context of objectives for health services in a given country; one such objective is equality in the provision of services *(19)*.

Measurement of costs and consequences in appropriate physical units

Although one tends to view the estimation procedures in economic analysis as being directed towards measurement of costs and consequences in money terms, there is an important intermediate stage. That is, one needs to measure the resource inputs to the programme in the appropriate physical units prior to valuation, e.g. hours of medical time, number of nurse visits, consumable items used, hours of family or volunteer time used. Often these estimates are not reported in published work, although they must surely have been made in order to calculate costs in financial terms. We believe it would be helpful if the "ingredients" of health programmes were listed more often, as it helps the reader identify the likely costs of implementing the programme in his own setting. This is particularly true in an international context, where results given in another country's currency may be difficult to interpret.

Estimation of many of the resource inputs may be relatively straightforward. However, "overhead" or shared costs present a particular problem. For example, if the programme or treatment is delivered as part of a larger activity, what proportion of the shared resources, such as central administration, should be attributed to a given programme? This problem will be evident in the hospital setting, where many resources are shared, but it arises also in primary care, e.g. in vaccination campaigns delivering more than one vaccine. On occasion it might be possible to identify the extra resources that are required to add the new programme to the existing activity, which it might be assumed will continue in any case. For example, one might argue that adding measles vaccination to an existing immunization programme results in little extra administration costs but involves significant extra costs in maintaining a more efficient cold chain. In principle, economists subscribe to this approach — that of identifying incremental costs and consequences — but problems arise when every programme director denies responsibility for the shared resources! Here, one needs a method of assessing the consumption of shared resources by each programme if one wants to estimate the full costs of a service that is delivered in conjunction with others, e.g. the neonatal care unit in a regional hospital. The subsequent valuation of those costs (discussed below) would be based on the opportunity cost principle. That is, what benefits could be derived from those resources if they were freed for use in other activities.

Problems in the estimation of the consequences of programmes in the physical, social or emotional functioning of individuals have already been mentioned. There are problems of interdependence here too. For example, a child who might be prevented from contracting measles by an immunization programme in a developing country may also be suffering from other diseases or malnutrition, which in turn influence the potential for life extension arising from the vaccination campaign. Similarly, a programme that saves health service resources (e.g. hospitalization) may only save the incremental costs of treating the averted illness. For example, if an influenza vaccination programme for the elderly reduces hospitalization, the full benefits of this would not be realized unless the hospital beds were put to good use, or capacity closed. If the beds remain empty the overhead costs also remain and the savings may be minimal.

Credible valuation of costs and consequences

Depending upon the form of economic evaluation being employed and the question for study, it will be necessary to express many of the measured costs and consequences in money terms. All the forms of economic evaluation require money estimates of costs. These are easier to obtain than money estimates for some of the consequences of health treatments or programmes. However, valuation of costs should not be viewed as a simple,

value-free process.

For the direct costs to the health care sector of operating health care programmes, it is normal to take existing market prices as the source of valuation. That is, estimates are taken from current operating budgets or from billings made to the health insurance plan, depending on the category of resource and the method of funding health care which exist in the country concerned. Apart from sheer convenience, the use of market prices is based on the notion that, where markets are operating perfectly, prices reflect the opportunity cost of the given resource. Of course, this approach is open to question since it is well known that markets do not operate perfectly owing to the existence of monopolies. In addition, taxes and subsidies may cause observed prices to deviate from true opportunity costs.

In principle, the price observed for each resource should be considered separately and adjusted upwards or downwards if thought necessary: that is, a shadow (or accounting) price should be calculated. In evaluations performed in industrialized countries this is rarely done and few examples exist in the literature. (For example, in a study on care of the elderly, Wager *(20)* deducted fuel tax from the cost of home nursing, as he felt the tax made that programme artificially expensive relative to institutional care.) In developing countries, particularly those operating exchange control policies, such adjustment may be more important to make.[c]

However, in all countries it may be necessary to develop shadow prices for resources that do not have a market price. For example, inputs of family time or volunteer time may have an opportunity cost, although they may not result in a financial cost to the programme. In principle, these costs should be estimated, although in practice they rarely are. Finally, as mentioned earlier, the measurement and valuation of indirect costs and benefits raises particular problems. Do the wages received by workers really reflect the opportunity cost of their labour? Is it inequitable to value these costs and consequences using wage rates, as it will bias the analysis against the poor, the elderly, the housewife and the unemployed?

The extent to which consequences in improved health are valued will depend on the form of analysis being employed. Some of the methods were mentioned earlier and will be discussed further in the context of the review of published work in later articles in this issue.

Adjusting costs and consequences for differential timing

It is usually argued that as individuals or as a community we are not indifferent to the timing of costs and consequences. Most of us would prefer to postpone resource outlays or other costs, yet receive benefits or other favourable consequences as soon as possible. This notion (known as "time preference") is particularly important when comparing alternatives whose time profiles of costs and consequences differ. For example, a preventive programme aimed at changing risk factors in cardiovascular disease requires resource outlays now, but most of the improvements in mortality and morbidity will not occur until many years in the future. This is not usually the case for curative programmes, such as coronary-artery-bypass surgery. The most widely accepted method of comparing costs and consequences occurring at different points in time is to discount costs and consequences to present values. This approach, the arithmetical procedure for which resembles a compound-interest sum performed in reverse, has the effect of giving costs and consequences in the present a greater weight in the analysis than those occurring in the future. (For details of the calculation see *(1,2)*.)

The key assumption in the approach is the choice of discount rate. There exists a good deal of economics literature on this point, which is outside the scope of this article. The main points to note are as follows. First, most economists agree that the discount rate should be greater than zero, but disagree on the precise rate. Most of the economic evaluations in the literature apply rates of between 2% and 10% in real terms.

Second, there is no reason to suppose that every country would want to discount the future at the same rate. After all, the choice of rate is a value judgement, reflecting the community's preference for goods and services now compared to later. In addition, to the extent that the composition of the community changes through time, there are also inter-generational equity issues to be addressed when making choices between those programmes which deliver benefits now rather than in the future. In some countries the government recommends a rate, as in the United Kingdom *(21)*. Where there is some uncertainty about the rate to be applied in the evaluation, the most sensible approach is to rework the analysis using a range of rates in order to assess whether it has an important impact on the study result. Often it does not.

Finally, it is worth pointing out that whereas the most common use of a discount rate is to convert costs and consequences occurring in the future to present values, another use is to convert a capital expenditure occurring at the beginning of a programme into an equivalent annual cost. This approach is useful where all the other costs and consequences are already expressed as annual recurring amounts.

Performing an incremental analysis of costs and consequences

The example of the screening test for cancer of the colon cited earlier *(4)* illustrated the importance of performing an incremental analysis of costs and consequences. That is, the relevant question to pose was not "what is the average cost per case detected by each screening strategy?", but rather "what are the extra consequences and extra costs of one strategy when compared to another?". Therefore, this is the best way to compare the alternatives being evaluated. Also, when the implicit alternative to the programme being examined is "doing nothing", it should be remembered that "doing nothing" rarely results in zero costs or zero consequences.

Performing a sensitivity analysis

This approach has already been mentioned in the discussion of uncertainties in medical evidence and uncertainties in the choice of discount rate. Sensitivity analysis is simply a reworking of the analysis using different assumptions on the values to be assigned to variables about which there is uncertainty or methodological controversy. The objective is to ascertain whether the different assumptions have any impact on study results. If the results are sensitive to the estimates assumed, further work may be justified to improve the accuracy of estimates. For example, the health consequences of a vaccination programme may be crucially dependent on vaccine

[c] See Mills A. *Economic evaluation of health programmes: application of the principles in developing countries*, p. 368 of this issue.

effectiveness and this would therefore need to be known accurately in order to perform a good economic evaluation. In other cases, accurate estimates may not be important. For example, Henderson *(22)* has shown that while there is considerable uncertainty in estimating the psychic benefits of screening for neural tube defects, these uncertainties would be unlikely to cancel out the net benefits of such screening programmes.

Including a presentation and discussion of all issues of concern to users

It will be clear from the above discussion that economic evaluations require the analyst to make a number of technical and value judgements. A good analysis will make these judgements as explicit as possible so that the reader can question them and make different judgements where appropriate. It has to be remembered that economic evaluation is an aid to decision-making and not a substitute for thought. Therefore, it is important that the evaluation includes a discussion of the main judgements made, the ways in which the costs and consequences of the alternatives may differ from one setting to another and any other important factors in the choice between options that may have been inadequately incorporated into the analysis.

It is particularly important to note the distributional impact of programmes. That is, which groups in society bear the costs and which groups benefit. Sometimes analysts may examine the incidence of costs and consequences to rich and to poor, or to particular geographical regions, as this is often a major factor in decision making. On a few occasions, distributional weights have been applied, thereby assigning a higher value to a dollar of benefit received by a poor person compared with that received by a rich person. However, if such approaches are used, care must be taken not to obscure such value judgements from the decision-maker in a mass of figures. In our view it is probably more helpful to raise the distributional issues through an intelligent discussion of study results, unless an explicit set of distributional weights has been agreed in a given country.

A checklist of questions to ask of any published study

The methodological points discussed above are summarized, in *Table 1*, in the form of a checklist. We do not suppose for one moment that any study will satisfy the reader on every criterion. Certainly our own studies do not! Rather our aim is to give the reader a methodological "gold standard" against which studies can be judged.

TABLE 1. TEN QUESTIONS TO ASK OF ANY PUBLISHED STUDY

1. Was a well-defined question posed in answerable form?
   (a) Did the study examine both costs and effects of the service(s) or programme(s)?
   (b) Did the study involve a comparison of alternatives?
   (c) Was a viewpoint for the analysis stated or was the study placed in a particular decision-making context?
2. Was a comprehensive description of the competing alternatives given (i.e. can you tell who did what to whom, where, and how often)?
   (a) Were any important alternatives omitted?
   (b) Was (should) a "do-nothing" alternative (have been) considered?
3. Was there evidence that the programmes' effectiveness had been established?
   Was this done through a randomized, controlled clinical trial? If not, how strong was the evidence of effectiveness?
4. Were all important and relevant costs and consequences for each alternative identified?
   (a) Was the range wide enough for the research question at hand?
   (b) Did it cover all relevant viewpoints (e.g. those of the community or society, patients and third-party payers)?
   (c) Were capital costs as well as operating costs included?
5. Were costs and consequences measured accurately in appropriate physical units (e.g. hours of nursing time, number of physician visits, days lost from work or years of life gained) prior to valuation?
   (a) Were any identified items omitted from measurement? If so, does this mean that they carried no weight in the subsequent analysis?
   (b) Were there any special circumstances (e.g. joint use of resources) that made measurement difficult? Were these circumstances handled appropriately?
6. Were costs and consequences valued credibly?
   (a) Were the sources of all values (e.g. market values, patient or client preferences and views, policy makers' views and health care professionals' judgements) clearly identified?
   (b) Were market values used for changes involving resources gained or used?
   (c) When market values were absent (e.g. when volunteers were used) or did not reflect actual values (e.g. clinic space was donated at a reduced rate) were adjustments made to approximate market values?
   (d) Was the valuation of consequences appropriate for the question posed (i.e. was the appropriate type, or types, of analysis — cost-effectiveness, cost-benefit or cost-utility — selected)?
7. Were costs and consequences adjusted for differential timing?
   (a) Were costs and consequences that occurred in the future "discounted" to their present values?
   (b) Was any justification given for the discount rate used?
8. Was an incremental analysis of costs and consequences of alternatives performed?
   Were the additional (incremental) costs generated by the use of one alternative over another compared with the additional effects, benefits or utilities generated?
9. Was a sensitivity analysis performed?
   (a) Was justification provided for the ranges of values (for key parameters) used in the sensitivity analysis?
   (b) Were the study results sensitive to changes in the values (within the assumed range)?
10. Did the presentation and discussion of the results of the study include all issues of concern to users?
    (a) Were the conclusions of the analysis based on some overall index or ratio of costs to consequences (e.g. cost-effectiveness ratio)? If so, was the index interpreted intelligently or in a mechanistic fashion?
    (b) Were the results compared with those of other studies that had investigated the same questions?
    (c) Did the study discuss the generalizability of the results to other settings and patient/client groups?
    (d) Did the study allude to, or take account of, other important factors in the choice or decision under consideration (e.g. distribution of costs and consequences or relevant ethical issues)?
    (e) Did the study discuss issues of implementation, such as the feasibility of adopting the "preferred" programme, given existing financial or other constraints, and whether any freed resources could be used for other worthwhile programmes?

Source: Reference *(19)*

Only in this way can the reader begin to assess the significance of published work for the policy decisions he may have to take in health service planning or in his own practice.

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ECONOMIC EVALUATION OF HEALTH PROGRAMMES: APPLICATION OF THE PRINCIPLES IN DEVELOPING COUNTRIES

Anne Mills[a]

Introduction

The essential principles of economic evaluation outlined in the article by Drummond & Stoddart in this issue[b] are the same throughout the world. However, the methodology of the economic evaluation of health programmes in developing countries draws not only on the techniques described in the literature from developed countries, but also on a well-established tradition of economic theory and analysis (namely, development economics and cost-benefit analysis) within developing countries themselves. This results in certain emphases which are not found, or only rarely found, in the literature from developed countries.

Most developing countries formulated ambitious economic development plans (covering usually a five-year period) as they achieved political independence. The plans usually set out a national framework (macro-planning) subdivided into sectors (industry, agriculture, health, etc.) with the proposals for each sector consisting of a number of individual project investments (micro-planning). Investment funds were sought overseas, particularly from development banks and aid agencies. The allocation of funds between sectors and projects was believed to be critical to the achievement of economic growth and other national objectives such as equity in the distribution of goods and services. Project appraisal techniques using cost-benefit analysis concepts were developed in order to assist decisions on how to allocate resources to maximize the achievement of national development objectives.

Much emphasis was laid initially on the macro-planning component of development plans but as disillusionment grew with both the methodologies and the practical feasibility of macro-planning, increasing stress was put on the activities of micro-planning and on project appraisal, within an overall framework of broad policy guidelines. The cost-benefit analysis techniques used in project appraisal were developed particularly by agencies such as the Organization for Economic Co-operation and Development (OECD), United Nations Industrial Development Organization (UNIDO) and the World Bank to assist in the selection and implementation of projects. The methodological advances have shifted cost-benefit analysis techniques rather far away from their original roots in developed countries *(1)*.

Owing to the general acceptance of the desirability of development planning in all sectors of developing countries, the place of cost-benefit analysis within development planning, and the insistence of aid donors on the economic appraisal of proposed projects, economic evaluation techniques seem to be applied more in developing than in developed countries *(2)*. The health sector has not been completely insulated from these influences, although it is generally agreed that conventional cost-benefit techniques need to be adapted for use in this sector *(3)*.

Indeed, the main themes of development planning and development economics have had considerable influence in shaping the approach to the economic evaluation of health sector projects. Early models of economic growth emphasized shortage of capital as a significant constraint on growth *(4)*. The need to increase material production was stressed, and second place given to expenditure for social purposes such as health. In response, economic analysis of the health sector concentrated on investigating and demonstrating (often on rather weak evidence) the link between improved health and improved productivity, arguing that the former was a pre-condition for the latter and a vital part of any policy aimed at increased economic growth.

More recently, development strategies have become less preoccupied with growth alone and more concerned with the distribution of income, as exemplified by the "basic needs" strategy *(5)*. Health, as one of the basic needs, can therefore be viewed as contributing directly to peoples' welfare rather than indirectly, *via* increased production. Economic analysis has now become less concerned with the value of health expenditure *per se*, and more interested in investigating which are the most efficient means to health improvement. Nonetheless, the productivity consequences of disease continue to be of interest to decision-makers.

Since developing countries in general lack the physical infrastructure of developed countries, the potential means for health improvement encompass a broader range of interventions than those relevant to developed countries. The improvement of water supplies and sanitation facilities in particular are important alternatives (or complements) to expansion of health service provision in developing countries. Other subjects of concern are often common ones for developed and developing countries (for instance primary health care, nutrition) although the health problems to be tackled differ significantly.

In summary, there are four main characteristics which distinguish the economic evaluation of health programmes in developing countries from that in developed countries. Firstly, evaluation techniques draw on the cost-benefit analysis methodologies developed specifically to suit the economies and development policies of developing countries. Secondly, despite the recent shifts in development philosophy, the productivity consequences of improved health remain an important theme. Thirdly, there is a close association between the application of economic evaluation techniques and the involvement of aid agencies, influencing the topics selected for evaluation, the methods of evaluation and the use made of evaluation conclusions. Finally, a wide range of potential interventions to improve health have been evaluated, ranging from those aimed primarily at environmental change to those concerned primarily with personal health.

Elements of the methodology of economic evaluation in developing countries

All the elements of a sound economic evaluation discussed in the first article in this issue[b] apply to economic evaluation in developing countries. However, some of the elements are either approached in a particular way, are given particular emphasis, or present distinctive features or problems. Where this is so, the element is discussed below.

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[b] See *Principles of economic evaluation of health programmes*, p. 355 of this issue.

Establishing effectiveness

In general, controlled trials are the accepted means of establishing the effectiveness of an intervention. These can be either clinical trials, which appraise the worth of a form of care given to individuals, or programme trials, which appraise the value of a type of health care directed at the welfare of a group or population *(6)*. A programme trial which tests a programme in a total, defined community can be termed a community trial.

There are few developing country studies that combine an economic evaluation with a clinical or programme trial. Such studies are more common in the case of interventions directed at specific diseases or conditions such as parasitic diseases and anaemia. For example, an investigation of the effect of iron-deficiency anaemia on the productivity of adult males in Indonesia evaluated the change in the productivity of three groups: one receiving elemental iron and an incentive payment, a second a placebo and an incentive payment, and a third no treatment or payment *(7)*. The Narangwal study *(8)*, discussed in a later article in this issue,[c] is a rare example of an economic evaluation combined with a programme trial directed at evaluating the effectiveness of a variety of interventions to improve infant and child health in a defined community.

Such programme trials, however, can be difficult and expensive to set up and their results may be inconclusive because many factors can confound the relationship between health activities and their consequences. It is often the case, therefore, that the information on effectiveness required for economic evaluation is obtained in other ways. These may include:

- changes in clinical case reporting or differences in prevalence or incidence rates in a defined population over a given period before and after an intervention;
- census enumerations of villages or regions in two or more time periods *(9)*;
- obtaining professional consensus, for instance through use of the Delphi technique, on the effectiveness of the interventions evaluated *(10)*;
- reviewing the evidence on effectiveness available from published sources.

Since few countries have good surveillance systems (discussed further below) and economic evaluation is not often done as part of an epidemiological trial, economic evaluation studies often rely on evidence of effectiveness taken from a diverse range of countries and programmes. Sensitivity analysis becomes indispensable as a way of exploring the implications of uncertain medical evidence on study conclusions.

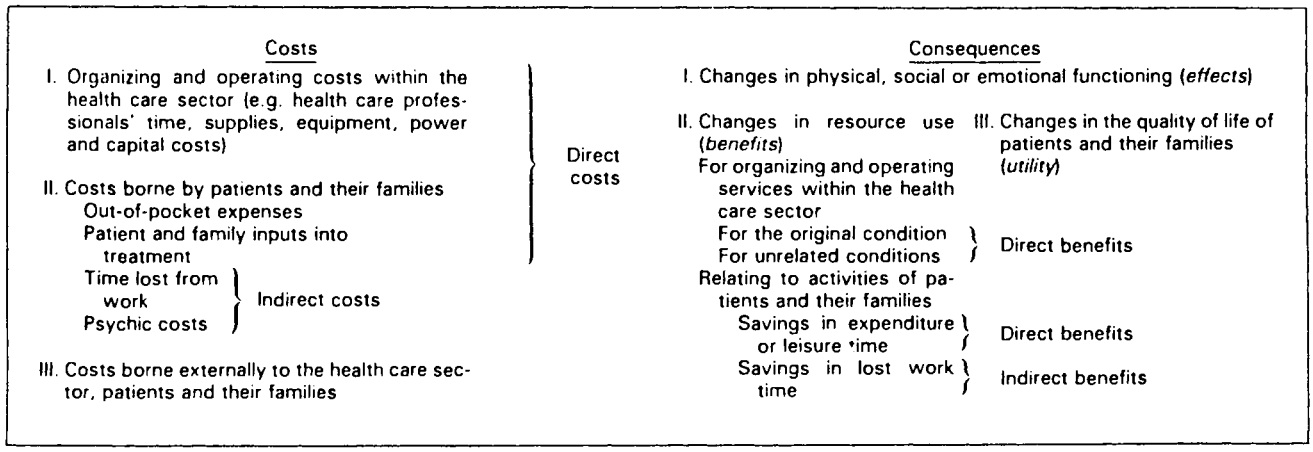
Identifying costs and consequences

The types of cost and consequence identified in *Fig. 1* of the article by Drummond & Stoddart[b] apply in general to developing countries, though with differences of emphasis particularly on the various types of consequence. The figure is reproduced again here (see *Fig. 1*). The first type of consequence, "changes in physical, social or emotional functioning", is usually measured initially in terms of changes in days of illness or deaths. Perhaps because infectious diseases predominate over chronic conditions and also because of scanty evidence, little attention has been paid to the social or emotional dimensions of illness (or to the third type of consequence, changes in the quality of life of patients and their families). In contrast, physical functioning, discussed further below, has been given considerable emphasis.

The second type of consequence listed in *Fig. 1* is "changes in resource use". The resource savings to the health care agency in the form of reduction in treatment costs resulting from a preventive programme (such as

FIG. 1

TYPES OF COSTS AND CONSEQUENCES RELEVANT TO ECONOMIC EVALUATION OF HEALTH CARE SERVICES AND PROGRAMMES



immunization) are commonly included in developing country studies. However, as pointed out, the existence of savings is dependent on the provision of health services: where these are absent, resource savings to the health care agency will be zero, but this does not necessarily imply that the preventive programme should not be provided.

Resource savings accruing to patients and their families are categorized in the figure as both direct and indirect. The direct benefits — savings in household expenditure or leisure time — may well assume significance in a developing country context where self-care or private expenditure, or traditional forms of medicine take the place of, or complement, formal health services.

In the literature on the economic consequences of disease[c] indirect benefits (savings in lost work time) are in general given greatest prominence. The studies employ

[c] See *Survey and examples of economic evaluation of health programmes in developing countries*, p. 402 of this issue.

the "human capital" approach, where health programmes are viewed as investment in people which enables them to be more productive and to increase their material well-being *(11)*. The consequences of illness are likely to go beyond lost work time — the main measure used in a developed country context — to include decreased productivity whilst at work and possibly, as Stevens *(12)* suggests, a pervasive effect on the willingness of individuals to innovate and take risks in their daily lives.

In more detail, the main effects of ill-health on production are hypothesized to stem from:

(a) reduction in the availability of labour because of premature mortality and inability to work through illness. For instance, morbidity among the labour force may disrupt a production process and morbidity among subsistence farmers at times of sowing and harvesting may have a critical effect on crop yields;

(b) reduction in productivity while at work because of loss of strength, stamina and ability to concentrate;

(c) reduction in the return to education investments because absence from school due to illness may reduce educational attainment and malnutrition and disease may impair learning ability *(13)*.

The empirical evidence on these various consequences presents a confusing picture and is summarized by Barlow *(11)* and Mills & Thomas *(14)*.

Two further economic consequences of health programmes should be mentioned since they are frequently cited though rarely quantified. Firstly, the prevalence of certain diseases (especially malaria) may restrict settlement in areas with fertile land and other resources *(15)*. The movement of labour and capital into these areas following disease control provides a benefit in the form of net additional production.

Secondly, in some countries, any consequences of health improvement affecting the size of the population may be treated as a "cost" of the health programme, to be set against the benefits. Population growth increases the dependency ratio (the proportion of the population who, because of their age, are dependent on others for their living), possibly increasing the proportion of national income that is consumed and decreasing that which is saved, and requiring additional public funds for the less immediately productive forms of public investment such as housing and schools. Knudsen, for example, allows for population growth being viewed as an undesirable consequence in his analysis of supplementary feeding programmes *(16)*. Clearly countries will differ widely in the effect of health improvement on population growth and in how they view the desirability of population growth and its social and economic consequences.

Health professionals and health economists are in general uneasy about this emphasis in the literature on the productive capacity of society *(9)*. Such an emphasis may bias project selection in favour of projects that benefit the (often predominantly male) labour force. Moreover, in a subsistence farming economy, the effect of disease on production may be mediated through redistribution of tasks within the household. For instance children may be called on to assist with farm activities *(17)*, resulting in a loss not of production but of child schooling, leisure or time devoted to the care of younger siblings.

In order to take account of these various effects, a new conceptual framework *(18)* has been suggested for assessing the social and economic consequences of the major tropical diseases. The framework attempts to look at both the risk and the actual occurrence of infection from a social perspective. (see *Fig. 2*).

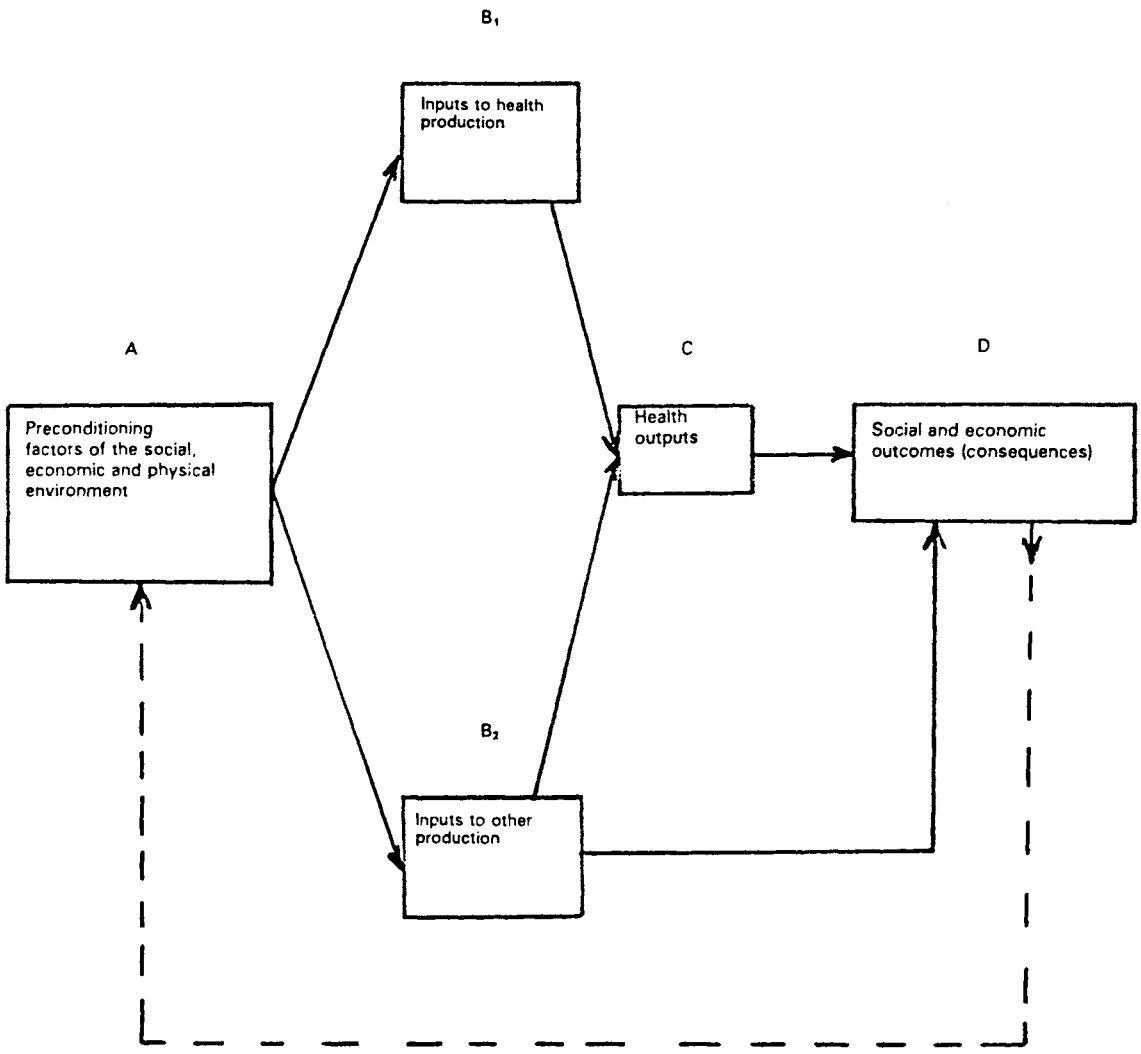
First of all, the framework takes the household rather than the individual as its unit of analysis. Household decisions heavily influence individual behaviour since resources allocated to each individual and the individuals' obligations are a result of the decisions taken by the head of the household or collectively within the household. Moreover, the consequences of disease can be mitigated by the family which both reassigns responsibilities and nurtures its members.

However, aspects of the social, economic and physical environment provide a context within which decisions at the household level are taken. These preconditioning aspects (A) include:

(i) aspects of the physical environment (climate, soil) likely to affect the household's exposure and response to disease and to determine economic production;

(ii) availability of public- and private-sector social welfare services;

FIG. 2
CONCEPTUAL FRAMEWORK FOR ASSESSING THE SOCIAL AND ECONOMIC CONSEQUENCES OF TROPICAL DISEASES FOR HOUSEHOLDS



Source : Reference *(18)* — Référence *(18)*

(iii) the household's social and economic endowments (e.g. skills, land, capital).

These factors affect household decisions about health-related (B^1) and other types of production (B^2). For instance, decisions to allocate the time of family members to certain activities — producing market and non-market goods (e.g. nutritious food), caring for each other — can be viewed as inputs to the production of health. The same can be said of the utilization of modern and traditional health facilities and behaviour that is deleterious to health, such as smoking and alcohol consumption. Material inputs (seeds, fertilizer) contribute to other production (primarily economic) as do such decisions as how to use available land and whether to raise credit.

These decisions about health- and non health-productive activities (B^1B^2) made in response to the preconditioning factors (A) will result in individual health status (C). Health status can be expressed through measures of mortality, morbidity, impairment and fertility. The figure then indicates that individual and community health status, along with other inputs and production, will in turn have social and economic consequences (D). The illness of one family member, for example, may cause a redistribution of duties, perhaps reducing the time allocated to food preparation. Less nutritious food may lead to diminished labour productivity or to illness-related work absences.

Within this conceptual framework, therefore, it is possible to trace the effects of tropical diseases on:

(i) the availability and productivity of time spent in activities in the home and market;
(ii) the demand for various subsistence commodities (nutrition and health);
(iii) the demand for marketed goods such as health services, improved housing, and improved water supplies that can be inputs into the production of better health.

Eventually, (C) and (D) outcomes, along with decisions taken outside the sphere of the household, will influence preconditioning factors (A) generating new inputs and diseases which again affect (C) and (D), reflecting the dynamic nature of such an approach.

A particular focus of the approach is on the allocation of time within the household and on the time-costs of disease, since time-costs are likely to capture more of the consequences of tropical diseases than the physical production and income losses of the traditional approach.

Measuring costs and consequences

The discussion on measuring costs and consequences in the first paper in this issue[b] applies fully to developing countries, especially, for instance, the problem of identifying the resources used by a programme when they are shared with other activities. For example, the Expanded Programme on Immunization (EPI) of the World Health Organization (WHO) has suggested a method of apportionment based on staff time in order to estimate the resources used by immunization activities at health centres *(19)*. However, two specific issues that arise in a developing country context need some discussion here: the availability of routine information on costs and consequences, and the choice of suitable measures of health effect.

Analysts in developed countries are fortunate in being able to draw on information from sophisticated routine data collection systems. Although financial information may not be totally accurate, complete, or available in the most desirable form, expenditures can be disaggregated by geographical area, institution, and department within institutions. Routine surveillance is also maintained of demographic events (births, deaths) and of certain diseases and conditions (for instance, notifiable infectious diseases). In addition, regular surveys of morbidity are carried out and additional detailed records are available from the information systems of health institutions.

In developing countries information systems vary considerably in their sophistication. Expenditure may not be disaggregated by geographical area, let alone by health institution. Different budgets may fund the same institutions, making it difficult to calculate total expenditure. Communications and accounting difficulties may mean that expenditure records of local institutions are not kept up to date and actual expenditure may not be known until many months after the end of the financial year. Hospital accounts are usually not disaggregated by individual department and it is usually necessary, for instance, to apply estimation procedures to separate in-patient from out-patient expenditure *(29)*.

Good information on the mortality, morbidity and fertility of a community is often unavailable and the records of health institutions must be used to deduce community mortality and morbidity patterns. Even where birth and death registration systems have been set up, there may be incomplete coverage of vital events. Monitoring the effect of a programme on a community usually requires a special (and expensive) data collection effort, although innovative approaches are being initiated; e.g. using village members such as community health workers to collect health and demographic information *(21)*.

Choosing a suitable measure of health effect is often a major difficulty in economic evaluation studies in developing countries. If the intervention being evaluated has a fairly narrow and specific objective (for instance, reduction in the incidence of a particular disease), deaths prevented or cases averted may be an appropriate measure. It is more useful, however, to have a measure that can be used to compare the effects of interventions targeted at different diseases which have differing effects on mortality, morbidity and disability and on various age groups. Using reduction in child mortality as a measure to compare the effect of water supply, oral rehydration and measles immunization interventions *(22)* neglects the various other effects of the interventions. Water supply in particular often appears to be very expensive in relation to its effects in such evaluations, yet reduction in child mortality is only one of the objectives of a water supply programme *(23)*.

Recently the measure "healthy days of life" has been proposed as an index of effectiveness *(24)*. The measure, a rough version of a "quality-adjusted life-year",[b] is derived from information on incidence rate, case fatality rate and the extent and duration of disability produced by a disease. Modifications to the measure have been suggested by Prescott et al. *(25)* to reflect time preference (discounted years of healthy life) and age-preference (discounted productive years of healthy life). Choice of the effectiveness measure can have a significant effect on choice of intervention. Prescott et al. compared the onchocerciasis control programme in West Africa with two measles immunization programmes (see *Table 1*). Using the measure "healthy years of life added", the onchocerciasis control programme was twice as expensive per year of healthy life added, and three times as expensive per discounted year of healthy life added as the immunization programmes. Both these measures favour interventions such as measles immunization which reduce infant and child mortality, since they produce the greatest total

TABLE 1. ESTIMATED COST-EFFECTIVENESS OF ONCHOCERCIASIS CONTROL AND MEASLES IMMUNIZATION

Effectiveness measure and cost in US$	Onchocerciasis control	Measles immunization	
		Ivory Coast	Zambia
Per year of healthy life added	20	10	12
Per productive year of healthy life added	20	15	17
Per discounted year of healthy life added	150	49	56
Per discounted productive year of healthy life added	150	190	221

Source: *Table 1 in reference (26) — Tableau 1 référence (26).*

increase in years of healthy life per case averted. However, using the measure "discounted productive years of healthy life added" switches the cost-effectiveness ranking in favour of onchocerciasis control because blindness prevention results in an immediate gain of productive years (since blindness occurs in adulthood), whereas the gain of productive years from measles immunization is deferred for some years and is thus heavily discounted.

Such measures are rightly controversial for they embody value judgements on the relative weight to be attached to preventing mortality as against morbidity as against disability, to improving the health of different age groups (especially small children and adults) and to improving health sooner in time rather than later. Little is known of the relative value that individuals and communities place on these effects.

On a practical note, data is often lacking to calculate the measure of "healthy days of life lost". For instance, different economic evaluation studies of malaria have used widely differing estimates of the length and severity of a case of malaria *(26)*.

In the absence of good information on health effects, many studies use what are often called measures of "intermediate output". These may be measures merely of contact or utilization, such as "number of patients seen" or "immunization contacts". It is preferable to use measures that more closely approximate effect on health, such as "number of fully immunized children" *(27)*. Given the difficulty and expense of assessing the health effects of many programmes, particularly those aimed at reducing ill-health through a package of interventions, such measures can be a useful short-cut for economic evaluation studies. However, it is always important to consider the validity of assuming that utilization measures are correlated with measures of health effect.

Valuation of costs and consequences

Economic evaluation techniques recommended for use in developing countries diverge most markedly from developed country practices in their approach to the valuation of costs and consequences. The article by Drummond & Stoddart[b] suggested that in certain circumstances market prices may deviate from true opportunity costs and shadow/accounting prices should be calculated.

In a highly developed market economy, the relative prices of goods and services normally provide a fair approximation of their relative production costs. In less developed countries, the local prices of goods and services often provide a much less reliable guide to their costs. Firstly, the domestic price structure may be dis-

torted by measures such as tariffs, subsidies, import licensing and excise taxes which shelter the domestic economy from international competition, and by an acute scarcity of foreign exchange. These distortions may mean that goods produced domestically could be purchased from abroad at lower real cost by using domestic resources to produce exports and exchanging them for the foreign products. The domestic price thus exaggerates the opportunity cost of the goods.

Secondly, the existence of a large pool of unemployed or underemployed labour, together with rigidities in the labour market which influence wage levels, can mean that wage rates do not reflect the opportunity cost of employment. The health services might be able to employ additional unskilled labourers without a corresponding decrease in output from their previous occupations because they were unemployed. If they were previously subsistence farmers, their opportunity cost would be greater than zero but might still be less than the market wage. (This issue is further discussed later in the text, in relation to the valuation of indirect benefits.)

The recommendation of cost-benefit methodologies (see, for instance, *3, 28, 29*) is therefore to use a system of shadow or accounting prices when valuing costs and consequences. For goods that are traded internationally, the use of "world prices" (the price at which a good can be bought on the world market) is suggested; labour is valued at its domestic opportunity cost; and the domestic value of non-traded goods and services (including labour) are translated by various procedures into world prices.

Non-traded goods can make up a large proportion of total costs and the translation into world prices may have to use a short-cut (the "standard conversion factor" *(28)*). Alternatively, non-traded goods can be valued at their domestic price and the world price of traded goods translated to rough equivalent domestic prices through the use of a shadow exchange rate *(30)*. These two methods (using a standard conversion factor and using a shadow exchange rate) are essentially equivalent.

These pricing adjustments produce shadow prices which are called "economic" or "efficiency" prices. Economic prices are intended to ensure that the prices used in an analysis reflect true opportunity costs. In addition, a further set of adjustments may be made, to convert economic prices into "social prices". Social prices are calculated to reflect a country's preference for savings versus consumption, and/or for benefiting some income groups more than others. In the case of savings, it is suggested that some developing countries may face a serious shortage of savings for private or public investment, and may wish to bias project selection by using a "savings premium" that weights costs and consequences that produce savings more heavily than those that increase consumption. In the case of income distribution, it is suggested that countries may be unable to use general economic policies to favour the lowest socioeconomic groups, and that the value of project costs and consequences accruing to different income groups could be adjusted by the use of a consumption weight which reflects the value decision-makers place on reducing inequality.

The practice of shadow pricing described above has its origin in the economic appraisal of industrial projects whose output carries a price and is internationally traded. The difficulties of valuing the consequences of health programmes, whose output is not traded and often not priced, mean that cost-effectiveness procedures are generally recommended and health consequences measured but not valued *(3)*. The principles of shadow pricing apply, although usually only to the costs and resource-saving consequences of programmes.

The importance of shadow pricing can be illustrated by reference to several hypothetical examples. For instance, construction of a hospital may involve a choice between a high-technology design using imported materials and labour-saving equipment and a low-technology design using local materials and more staff. Domestic prices (reflecting an overvalued exchange rate and market wages) might favour the first choice whereas economic prices (adjusting domestic prices to reflect their true opportunity cost) would favour the second.

In an immunization programme, one might be faced with a choice between introducing immunization in static health centres or delivering immunization through a mobile strategy. In densely-populated areas such as towns, static centres might achieve high coverage rates whereas in rural areas, achieving sufficient coverage might require a mobile strategy. A straight comparison of total costs and total consequences (number of fully-immunized children) might favour the static strategy. However, an immunization administered to a poor rural child could be weighted more heavily than one administered to a better-off urban child *(31)*. The total consequences of each strategy could thus be adjusted to reflect the different mix of rural and urban immunizations.

In general, actual economic evaluation studies of health programmes in developing countries have either neglected shadow pricing or adjusted the value of foreign exchange inputs by using a shadow exchange rate, rather than attempting a conversion of domestic prices to world prices. The study by Horton & Claquin *(32)* reviewed later in this issue[c] discusses shadow exchange rates and shadow wages. For those interested in exploring further the approach of economic and social pricing, Porter & Walsh *(33)* illustrate their application to evaluating the cost-effectiveness of the provision of rural water supplies, and Knudsen *(16)* uses economic and social prices to undertake a cost-benefit analysis of supplementary feeding in India.

A final issue that requires further discussion is the approach to the valuation of the indirect benefits of health programmes. For example, what is the value of an increase in time available for productive work? In principle it is the value of the additional production (the "marginal product"). It is this value that may then be converted to world prices, with weights attached to that proportion which is saved if a savings premium is used, and/or weights given to indirect benefits that accrue to low-income groups.

In practice, it is often difficult to establish the domestic value of the marginal product. In a perfectly competitive economy, wages should reflect the marginal product. It is clear that in developing countries there may be many reasons why this does not hold true (see also the discussion above on shadow wages). If demand for labour is slack, an increase in productivity may displace other workers. Alternatively, if there are only a few large employers, wages may be kept below their competitive level. Moreover, if a health programme results in a large additional supply of work-time, it may be used in increasingly unfavourable production situations resulting in a decreasing marginal product at least until complementary inputs such as capital goods and additional land are brought into use.

While consideration of these possibilities is complex, appreciation of their significance is important. In the past,

many studies have used an extremely crude approach towards valuing the production of additional labour time. Dunlop has reviewed the methods of valuation used in some studies of the economic impact of parasitic diseases *(9)*. In general, average or minimum wages are used, or some estimate made of the marginal product which is then valued at the market price of the good produced. These methods generally ignore the problems, outlined above, of the relationship between wages and marginal product, and the likely change in the marginal product as labour time increases.

Discussion of issues of concern to users

There are two further issues of particular relevance to economic evaluations of health programmes in developing countries: affordability and recurrent cost consequences for the government.

Because of the great scarcity of resources in the health sector in many developing countries, the ability of a country to afford a proposed programme has to be considered in addition to the question of cost-effectiveness. Governments of least developed countries spent only an average of US$ 3 per head on health services in 1981 *(34)*. An economic evaluation of a proposed new programme should consider the additional per capita expenditure required for implementation throughout the country, and whether this sum is likely to be feasible. In this assessment actual expenditure rather than shadow prices is used, since the former represents the funds that have to be found for the programme.

Associated with the question of affordability is that of recurrent cost consequences. Health programmes tend to give rise to significant recurrent costs *(35)* and since health services are often provided without charge or at a highly subsidized price, the running costs have to be borne by the government. Yet, government funds to support recurrent expenditure are usually much more scarce than development funds and may represent the most severe constraint on health sector expansion. Thus a discussion of the recurrent expenditure needs of a programme and how they might be financed should be included in a study which evaluates a new programme.

The theoretical framework of economic evaluation

The techniques of economic evaluation discussed in this issue are techniques of micro-economic analysis. Their analytical framework is a partial equilibrium framework, used to analyse interventions whose consequences have a marginal impact on the economic, demographic and social structure of a country.

Health interventions in developed countries are likely to be of this type. However, in developing countries some interventions may have a massive effect on the demographic structure, and supply and price of factors of production such as land and labour. These effects cannot easily be taken into account in a micro-economic framework. For this reason an assessment of the economic effects of the eradication of malaria in Sri Lanka took account of its impact on mortality, morbidity and fertility and used a macro-economic model to simulate their consequences for growth in income *(36)*. The economic evaluation techniques discussed here are most useful when programmes are relatively self-contained and unlikely to have consequences that spread throughout the economy.

International comparisons

The economic evaluation literature on developing countries is diverse in many respects: programmes/diseases evaluated, countries, dates of the evaluations, and methodologies used. Recently there has been interest in synthesizing studies from a number of countries in order to draw conclusions on the cost-effectiveness of different interventions. The usual approach is to establish an objective (for instance, reduction in infant mortality) and to analyse the available published literature in order to establish the range of costs and effects that have been found. This has been done, for instance, by Gwatkin et al. *(37)* who reviewed the costs of reducing infant and child mortality rates in ten primary care field projects; by Cochrane & Zachariah *(38)* who present the cost of preventing a death through a variety of interventions; and by Shepard & Cash *(39)*, who also look at the cost per death averted by different interventions.

These reviews can give very useful indications of which interventions provide the greatest return in terms of the chosen objective. However, the dangers of such comparisons are considerable. For instance:

- many programmes have multiple objectives which may be overlooked in a comparison considering one objective only;
- the effectiveness of a programme depends on a number of factors, such as delivering an effective drug or vaccine, patient compliance and coverage. These can vary considerably between different social, cultural and economic settings resulting in different levels of effectiveness for the same intervention;
- programme costs will similarly vary between different settings, for instance depending on the organizational structure and scale of the programme, administrative procedures, degree of public cooperation, environmental circumstances, population density, and the relative prices of different inputs such as drugs and various grades of manpower;
- programme costs will also vary depending on whether a new programme requires a new organizational structure or will be added on to existing activities. For instance, the unit cost of adding vaccine to an existing immunization programme is likely to differ considerably from the unit cost of setting up a new programme;
- the introduction of a new programme in a particular setting may produce resource savings for governments and households. For instance, introduction of an oral rehydration programme may reduce expenditure on hospital treatment of diarrhoeal disease *(39)*. These savings should be set against the cost of the programme and will affect its relative attractiveness in particular settings.

In addition, there are methodological problems in converting expenditure in local prices to a common base:

- the price index (e.g. a gross domestic product (GDP) deflator or consumer price index) used to convert expenditures of different dates into a common year may not be an accurate reflection of changing price levels for health service inputs;
- exchange rates are used to convert expenditure in local currencies into a common currency such as US dollars. However, exchange rate conversions can be misleading because exchange rates do not necessarily reflect the purchasing power of currencies. They may be particularly misleading when used to convert the values of goods and services which are not internationally traded *(40)*. For instance, in low-income countries manpower tends to be cheap relative to other health service inputs such as drugs. International comparisons will be affected if relative prices vary between the countries being compared, or if the interventions compared use

different mixes of inputs.

Conclusion

The tradition of cost-benefit analysis in development planning means that there is perhaps greater pressure on the health sector in developing than in developed countries to justify its proposals in economic terms. Thus there is considerable interest in the application of techniques of economic evaluation to the health sector. Unfortunately, the lack of economists with an interest in health, and the problems of obtaining adequate data on costs and consequences are considerable obstacles to good economic evaluation.

Moreover, the application of the techniques is still at an early stage and many studies aim to stretch the boundaries of the discipline rather than to provide practical guidance. The studies done under the aegis of the WHO Expanded Programme on Immunization provide a good example of the way in which early theoretical work can be developed into a methodology capable of application by health service managers. These studies emphasize two further points: the importance of choosing issues that are amenable to economic evaluation, where calculations or plausible assumptions can be made of the relationship between health interventions and health consequences; and the need for collaborative work between economists, epidemiologists and other health researchers.

The results of economic evaluation are of assistance to decision-makers, but they do not dictate their course of action. While it is important to know the cost-effectiveness of different ways of organizing primary health care activities, other consequences less easy to quantify, such as stimulating community participation and promoting the capacity to improve individual health, must not be neglected. Decision-makers will wish to take these also into account when they review the results of economic evaluation studies.

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ECONOMIC EVALUATION OF HEALTH PROGRAMMES: GLOSSARY OF TERMS

Anne Mills & M. F. Drummond

Average costs

The cost per unit of output (total costs divided by total number of units of output). Also known as unit cost.

Benefit-cost ratio

Total discounted benefits divided by total discounted costs. The outcome should be greater than 1 for an investment to be potentially worthwhile.

Capital

The stock of goods which are man-made and used in production (as opposed to consumption). Fixed capital (durable goods such as buildings and machinery) is usually distinguished from circulating capital (stocks of raw materials and semi-finished goods which are rapidly used up). In accounting conventions, capital goods are usually taken as those with a life of more than one year, such as land, buildings and equipment.

Capital costs

The cost of employing capital goods. In an economic sense, it is the rate of return forgone by not using the funds spent on particular capital goods in other ways. In accounting terms, it is the money expenditure required to purchase capital goods.

Consumption

Acquiring goods or services in order to obtain immediate satisfaction; in contrast to investment which permits greater consumption in the future by increasing a country's productive capacity.

Costs

What has to be given up to achieve something. Either:

(a) the value of the benefits which are forgone in order to achieve something (the economic definition); or
(b) the total money expenditure required to achieve something (the accounting definition).

See **Opportunity cost.**

Cost-benefit analysis

A form of economic evaluation where all the costs and consequences are expressed in money terms. In principle, this form of analysis enables one to assess whether a particular objective is worth achieving. However, estimation difficulties often reduce cost-benefit analysis to a consideration of those costs and consequences that are easy to express in money terms.

Cost-effectiveness analysis

A form of economic evaluation where the costs are expressed in money terms but where some of the consequences are expressed in physical units (e.g. life-years gained, cases detected). It is usually used to compare different ways of achieving the same objective (e.g. life saving) and assumes the objective is worth achieving. If two programmes have consequences that are identical in all respects, the analysis is sometimes called a *cost minimization analysis*. If consequences are measured in quality-adjusted life-years or "utilities", the analysis is sometimes called *cost-utility analysis*.

Cost-utility analysis

A form of economic evaluation where the costs are expressed in money terms but where some of the consequences are expressed in utility units (e.g. "quality-adjusted life-years" or "healthy days of life").

Depreciation

Decrease in the value of a capital good because of passage of time, wear and tear, etc. An allowance for depreciation may be included as an operating cost in accounts.

Demand

The quantity of goods or services that consumers wish and are able to buy at a given price in a given period.

Development funds

The funds for activities which promote a country's development. Many governments have a development budget to finance (often from external sources) activities which will increase the country's productive capacity.

Discounting

The treatment of time in the valuation of costs and benefits, requiring a choice of discount rate and time frame. This process estimates what something is worth today, given that it cannot be obtained or used until some time in the future. (i.e. its "present value").

Discount rate

The annual rate at which the value of a future cost or consequence is reduced to find its present value. The discount rate expresses society's time preference rate. For example, at a discount rate of r, an event occurring in n years' time has a present value of $(1 + r)^{-n}$.

Economic evaluation

A process whereby the costs of programmes, alternatives or options are compared with their consequences, in terms of improved health or savings in resources. Also known as the *cost-benefit approach* or *economic appraisal*. It embodies a family of techniques including cost-effectiveness analysis, cost-benefit analysis and cost-utility analysis.

Economic prices

A type of shadow price where market prices are adjusted to reflect their true opportunity cost.

Efficiency

Relates to output per unit cost of the resources employed. Resources are being used efficiently if a given output is produced at minimum cost, or maximum output is produced at a given cost ("operational" efficiency). Economists also use the term in the wider sense of cost-benefit analysis ("allocative" efficiency).

Equivalent annual cost

The recurring annual sum or annuity, which over the life of the project has a present value equal to a lump sum payment made now.

Fee-for-service

Payment of a charge per item of health care received, (e.g. consultation, diagnostic test).

Fixed costs

Costs which do not vary with the level of output in the time period considered (usually one year).

Foreign exchange

The currency of other countries. It is required by individuals and institutions to buy goods and services from, or make gifts or loans to, people in other countries.

Health sector

The part of the economy which is involved in activities intended to improve health. The term may be used to mean health services, but it is often used synonymously with the term health system, to mean health services and health-related activities.

Human capital

The skills and capabilities generated by investments in education and health.

Incremental cost

The additional cost of one programme, alternative or option over and above another.

Indirect costs

The productivity losses associated with illness, or the worktime taken up in medical treatment. Typically, these are valued by using earnings as a proxy.

Inputs

Goods and services used in production, such as capital goods (buildings, equipment, labour, raw materials, etc.).

Investment

Expenditure on capital goods which are then used in production. In a more general sense, it means undertaking any activity which involves a sacrifice (e.g. payment of money) followed by a benefit (e.g. enjoyment of a good).

Marginal cost

The change in total cost at a given scale of output when a little more or a little less output is produced. This concept of 'marginality' can also apply to benefit, value, income, production, etc.

Marginal product

The change in total production at a given scale of output resulting from an additional unit of input (e.g. labour).

National income

The money value of all goods and services earned in a country over a specified time period. It may be calculated as the sum either of incomes or of expenditures of all residents, companies and government bodies. Gross domestic product (GDP) and gross national product (GNP) are related measures.

Non-traded goods

Goods which are not imported or exported.

Operating costs

Also called recurrent costs: the cost of operating an enterprise or service; i.e. those costs of providing a service that vary with the level of output (e.g. drugs) in contrast to those which are fixed over a given time period, usually a year (e.g. capital costs). Usually calculated on an annual basis.

Opportunity costs

The benefits to be derived from using resources in their best alternative use. It is therefore a measure of the sacrifice made by using resources in a given programme. When economists use the term "cost", they mean opportunity cost. This may not be the same as health care expenditures.

Outputs

The end-result of production, that is, what is produced.

Overheads

The costs pertaining to general services (e g administration) which do not necessarily arise from the operation of a given programme

Per diem

The daily rate for reimbursement of hospital expenditures. It is usually based on the hospital average daily cost and is unlikely to reflect the costs of treating any given case. It should therefore be treated with caution when used in economic evaluations.

Present values

The value now of future costs or benefits discounted at a given rate.

Price index

A price index shows how the prices of goods and services have changed over time. It is based on a given physical quantity of items which are priced at prevailing prices. The resulting total value of the items is then expressed as a percentage of their value at some base year.

Productivity

Output per unit of input in a stated time period, e.g. labour productivity can be measured as output per person per hour.

Project appraisal

Analysis undertaken prior to project implementation to estimate net benefit in relation to costs.

Public sector

That part of the economy of a country that comes within the scope of central government, local government authorities and public corporations.

Quality-adjusted life-year

A measure which reflects both the quality and quantity of life gained from health programmes. It is usually derived by making assessments of the relative value or "utility" of defined states of health. These assessments can be made by professionals, patients or the general public and are obtained by interviews with individuals or through consensus-forming exercises.

Real terms

A variable (such as national income, or health expenditure) is expressed in "real terms" if its value has been

adjusted to remove the effect of change in price. The resulting value is said to be at a constant price.

Recurrent costs

Costs that "recur", i.e. the costs of running an enterprise, such as salary and raw material costs. Also known as operating costs.

Resources

The inputs that are used to produce and distribute goods and services. These are conventionally classified into land (including natural resources), labour (people) and capital (goods made to produce other goods). In health programmes they include inputs which are not under the control of the health sector, such as patients' time.

Scarcity

The lack of a commodity in relation to the demand for it. Resources are scarce, and thus choices must be made on how to allocate them.

Sector

The economy of a country can be divided into "sectors". The broadest classifications are between the private and public sectors, and the economic and social sectors. The latter can be divided into sectors with common activities such as manufacturing and agriculture in the economic sector and education and health in the social sector.

Sensitivity analysis

A technique designed to allow for uncertainty by testing whether plausible changes in the values of the main variables would affect the conclusions of an analysis.

Shadow prices

Adjustment of prices of goods and services in order to take into account market price distortions and government objectives. Also known as accounting prices. The most common shadow prices are for foreign exchange (shadow exchange rate) and labour (shadow wage rate).

Social cost

The cost of an activity to society and not merely to the agency carrying out the activity.

Social prices

A type of shadow price where net benefits are weighted to reflect a country's preference for savings versus consumption, and/or for favouring some income groups more than others.

Standard conversion factor

The shorthand means by which non-traded goods can be valued in terms of world prices.

Supply

The quantity of goods or services coming on the market at a given price in a given time period.

Time cost

The cost individuals incur in being inactive through illness or in travelling to and waiting for health services. Time can be valued in terms of its opportunity cost (i.e. value of lost production or lost leisure).

Trade goods

Goods which are imported or exported.

Unit cost

The total cost of an activity divided by the number of units of output produced. Also known as average cost.

World price

The value of a good when purchased internationally.