Global Forum
for Health Research
HELPING CORRECT THE 10|90 GAP

THE COMBINED APPROACH MATRIX

A PRIORITY-SETTING TOOL FOR HEALTH RESEARCH

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Foreword

The 1990 Commission on Health Research for Development drew attention to the existence of the "10/90 gap" – a situation in which less than 10% of global health research funds from public and private sources is devoted to 90% of the world's health problems. Helping to correct this gap has been the main focus of the Global Forum for Health Research since it began operations in 1998.

One of the most important ways to address the 10/90 gap is to change the priorities that determine how existing health research funds are used. Indeed, from the perspective of responding to needs that are largely unmet, priority setting is as critical as conducting the research itself. Yet there is no simple way to set priorities – research on methodologies to help set priorities in health research is a recent development which can be traced back to the recommendations of the 1990 Commission. Since then, a number of approaches have emerged for developing and implementing priority setting.

It is important to differentiate between the *process* of priority selection (a mechanism that involves constituencies in order to decide upon research priorities) and the *tools* used for that purpose (instruments that enable the collection, organization and analysis of the mass of information needed to help set priorities). The present publication presents experiences with one such tool: the Combined Approach Matrix (CAM).

The CAM incorporates criteria and principles from earlier methods and links them into a matrix with the actors and factors that play a key role in the health status of a population. One axis of the matrix focuses on the five-step methodology of the Ad-Hoc Committee on Health Research (linking burden of disease with determinants, cost-effectiveness and financial flows), while the other underlines the fact that health research needs to operate beyond the biomedical field and to include individual and community behaviour, other sectors that have a profound influence on health, and the impact of governmental, macroeconomic policies on people's health.

The work presented in this document is the result of efforts undertaken by the Global Forum and its partners and was compiled primarily by Dr Abdul Ghaffar. It describes the CAM's background, components and applications to selected diseases, determinants and programmes identified in previous priority-setting exercises. This method aims at helping institutions at the national, regional and global levels to set their priorities in health research.

Widespread application of the Combined Approach Matrix can make a major contribution to evidence-based priority setting and thereby ensure that more health research is conducted on the most important and often most neglected areas of diseases and determinants globally. The Global Forum encourages governments and institutions and the funders and conductors of research everywhere to adapt and use this tool.

Stephen A. Matlin
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Global Forum for Health Research

Acronyms and abbreviations

ACHR	Advisory Committee on Health Research (WHO)
AIDS	acquired immunodeficiency syndrome
ALRI	acute lower respiratory infections
ARI	acute respiratory infections
BOD	burden of disease
CAM	Combined Approach Matrix
COHRED	Council on Health Research for Development
COPD	chronic obstructive pulmonary disease
DALYs	disability-adjusted life years
DFID	Department for International Development (United Kingdom)
DTUs	diarrhoea treatment and training units
ENHR	Essential National Health Research
GBD	global burden of disease
HIV	human immunodeficiency virus
IAP	indoor air pollution
ICMR	Indian Council of Medical Research
IUGR	intrauterine growth retardation
LBW	low birth weight
NCDs	noncommunicable diseases
NGOs	nongovernmental organizations
NICED	National Institute of Cholera and Enteric Diseases (India)
ORS	oral rehydration salts
ORT	oral rehydration therapy
PHC	primary health care
PMRC	Pakistan Medical Research Council
R&D	research and development
SNL	Saving Newborn Lives (Pakistan)
SWOT analysis	analysis of strengths, weaknesses, opportunities and threats
TB	tuberculosis
TDR	UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases
VHIP	Visual Health Information Profile
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

Section I

THE CASE FOR PRIORITY SETTING IN HEALTH RESEARCH

1. Introduction

Since the funding available for health research is low in comparison to its very high potential benefits, it is essential that it be based on a rational priority-setting process. The use of a sound methodology and a scientific process is critical to ensure the identification of the research priorities that will make the greatest contribution to people's health. Thus, setting priorities is as important as conducting the research itself.

The Commission on Health Research for Development (1990) reported that "too often priorities for public sector health research and development investments are determined with little concern for the magnitude of the problem to be addressed, for the extent to which scientific judgement supports the possibility that new products and initiatives will be more cost-effective than available alternatives, or for ongoing efforts elsewhere" (1). Even though it is crucial to promote development and help overcome the vicious circle of disease and poverty, health research has suffered from a severe disequilibrium. For the past decade, this imbalance has been captured in the expression the "10/90 gap", which indicates that less than 10% of the estimated US$ 70 billion spent annually on health research by private and public sectors is devoted to 90% of the world's health problems (2).

In 1996, the WHO's Ad Hoc Committee on Health Research Relating to Future Intervention Options published a landmark report, *Investing in health research and development*. Since then, considerable progress has been achieved in the development of methods and instruments for priority setting in health research, at both global and local levels (3).

The International Conference on Health Research for Development (Bangkok 2000) identified some of the key features of a revitalized health research system. One of these is that "the health research agenda has to be driven by country needs and priorities, within an interactive regional and global framework. This requires countries to develop and retain the capacity to set their research priorities, and for research and development agencies, funding bodies and other international players to respect these priorities" (4).

It must be emphasized, however, that priority setting in health research is not an easy undertaking, and most definitely will not provide results as soon as the data have been fed into the process.

The Global Forum for Health Research has focused particular attention on further developing methods and instruments which can be used for evidence-based priority setting in health research. During the past three years, it has intensified its work on setting priorities for health research (2).

Even in everyday life, setting priorities is not easy. The process is much more difficult in the field of health research, where a large number of factors and actors enter into the equation. One of the roles of health research is to ensure that the measures proposed to break the vicious circle of ill health and poverty are based on evidence, as far as is feasible, so that the resources available to finance them are used in the most efficient and effective way possible.

It is important to differentiate between the *process* of priority selection and the *tools* used for that purpose. The process is the mechanism by which constituencies and stakeholders are involved and decide upon research priorities. It is evident that ensuring the participation of communities and users is a necessary part of the process.

The tools are the instruments which facilitate (i) the organization of the huge mass of information (regarding burden of disease, available resources, determinants, present knowledge, etc.) that is necessary to establish priorities on a scientific basis and (ii) its presentation in a way that permits analysis and comparison of the various possible fields of research, eventually permitting the identification of the areas with the most promising impact on people's health.

This study aims at describing a methodology (tool) that can help institutions at the national, regional and global levels to set their own priorities in health research. It briefly describes efforts and progress on the development of different tools but focuses particularly on the Combined Approach Matrix (CAM), a research priority-setting tool developed by the Global Forum.

After a brief description of important actors and factors in the health sector, an overview of the rationale and need for priority setting in health research is provided. Four domains of priority setting are distinguished: research on priority-setting methodologies, research on determinants and risk factors, research on policies and cross-cutting issues affecting health and health research, and research on diseases and conditions. In a subsequent section, the concepts and methods based on the CAM are outlined and their applicability discussed in regard to the four domains mentioned above.

Lastly, selected examples of CAM application are reported. Examples have been chosen from global and national programmes, vulnerable groups, communicable and noncommunicable diseases, and mental and neurological disorders. In addition, an example of applying the CAM to a common risk factor (indoor air pollution) is also presented.

It is hoped that the study will help to identify the data that are needed for evidence-based decision-making in health research, facilitate the compilation and presentation of such information, and provide some guidance on how to turn the evidence into action.

2. Health and health research

Health research helps to define and quantify the key determinants that affect health. Strategic research, for example, identifies, explores and describes factors which contribute to disease or good health, and which can help define health interventions. Epidemiological methods help quantify the potential impact of planned interventions, while costing can determine their sustainability. Biomedical research varies in scope from the development of new tools to the adaptation and implementation of known tools in the field. Behavioural research uses quantitative and qualitative techniques to examine behaviour at the individual and the community levels. Research can explore determinants of health in both the health and the non-health sectors, as well as the impact of macro-decisions at the global level.

Determinants of health status in populations

WHO defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (5). Unfortunately, the state of perfect health cannot be defined in operational terms. It is, therefore, impossible to determine how many resources would be needed to achieve this happy state. Each society has to decide on the amount of resources it wants to devote to health and then establish priorities accordingly. In other words, the society makes informed decisions about its health programme. It may be useful to reflect for a moment on the meaning of the terms *informed decision-making* and *health programme*.

Informed decision-making in health should be based on an understanding of the relationship between an action and a health outcome. It requires having access to, and using, pertinent information for decision-making.

The goal of any *health programme* should be to improve the population's health status, which is measured by two components:

- The degree of ill-health, or degree of mortality and morbidity, resulting from the diseases, disabilities, violence and social maladjustments that characterize a particular community's burden of disease.
- The degree of physical and mental well-being characterizing the community.

Health status can be improved through health promotion activities, by means of burden prevention or by interventions geared at burden reduction or cure. The following are four domains of intervention:

- The environment (including family/household, community and habitat) where people's exposure to risks and hazards is being reduced or where coping capacities are strengthened
- The health system (including health and social services)
- Sectors other than health, such as workplace, legal and education sectors
- The domain of macroeconomic policies.

There have been a number of attempts to represent the complexity of the actors and factors affecting the health status of a population and their interrelationships. Insert 1 (see page 12) is one such example derived from a number of previous descriptions

(1,2,3). The insert is entitled "Main actors and factors determining the health status of a population" in recognition of the fact that, behind each group of determinants, there are institutions that are clearly responsible for dealing with a particular group of determinants.

Insert 1 draws attention to the fact that the health status of a community is largely determined by the following four broad groups of actors, corresponding to four different domains of intervention:

The individual, household and community

While genetic factors cannot be easily changed, the individual may have a degree of choice about how much risk he or she wants to take with health. The family may be able to decide, at least in part, how many children they would like to have, how they should be educated, how to handle family conflicts, how to care for any disabled members, etc. The community will greatly influence the population's health status through local decisions on sanitation, education, shelter, unemployment and handling of violence. The fact that choices and options are far more restricted for the poorest people provides one of the important linkages between poverty and ill health, and points to the health gain benefits that are associated with poverty-reduction programmes (6,7).

Health ministry and other health institutions

The health ministry and health professionals are responsible for the health legislation and policies of the country, and for health education and health promotion in general. They are the backbone of the health care system provided in the country. The organization, availability and accessibility of the health sector will profoundly influence the health status of the population.

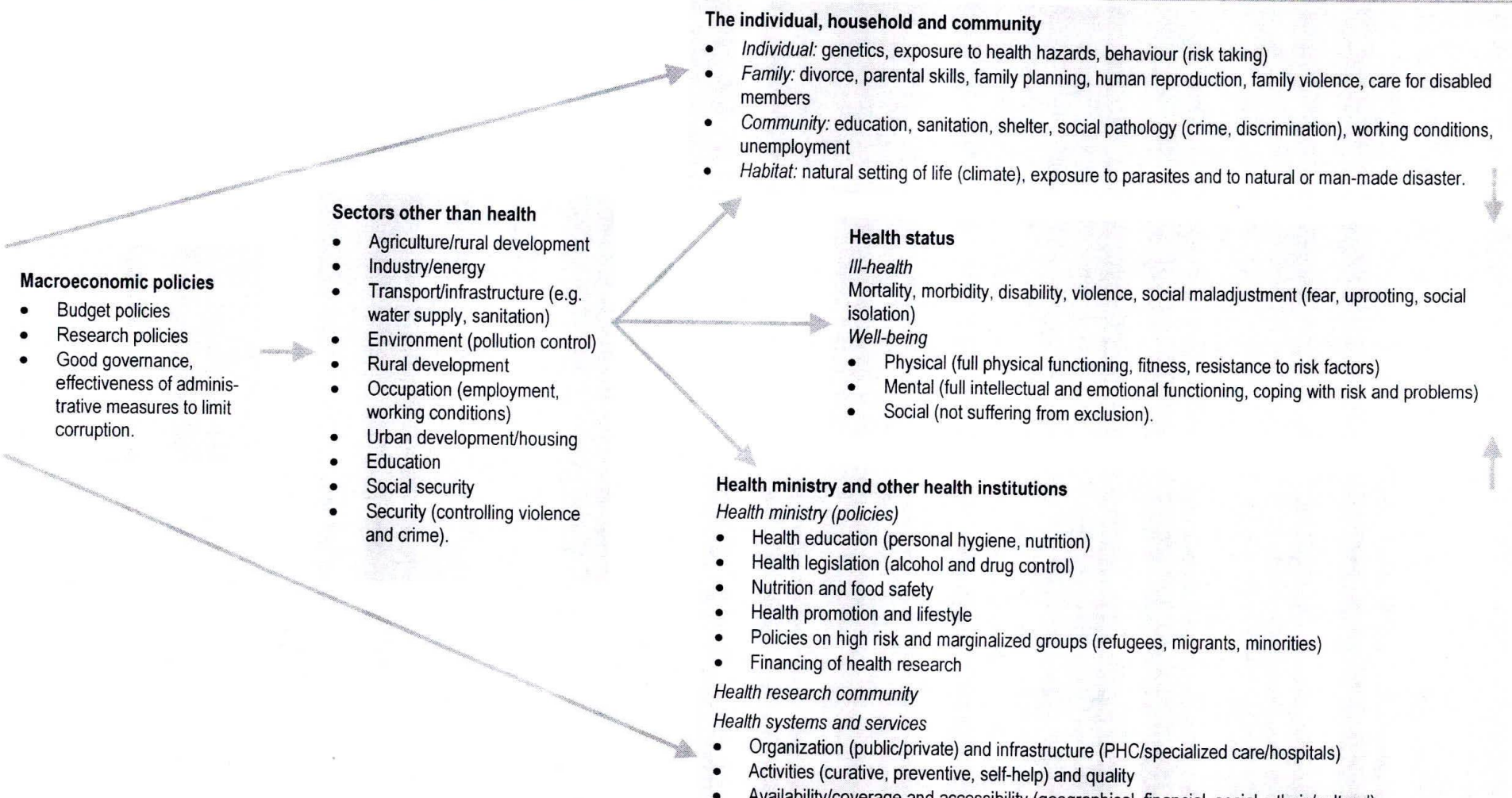
Sectors other than health

Practically all sectors of economic activity in a country have an impact on the health status of the community through national or regional policies, decisions and activities. This includes, for example, areas such as the development of the agricultural sector, the transportation system, the water supply and sanitation; industrialization; the degree of environmental pollution; the level of education; the social security system; the level of unemployment; and the security system (i.e. controlling violence and criminality).

Macroeconomic policies

Although apparently remote from the health situation of the individual, both the government's macroeconomic policies and the principles of good governance in general have a direct impact on it: for example, through the level of economic activity in a country (determined by numerous external actors, but also by government policies); trade policies; the allocation of the budget between the

Insert 1
Main actors and factors determining the health status of a population



Source: Global Forum for Health Research

various ministries; the setting of pro-poor policies to ensure that services reach the poor and that social safety nets are provided to cushion them against shocks; the degree of commitment of the ministries to their mission; the efficiency and effectiveness of the administration; and the research policies pursued by the government (7).

As mentioned above, informed decision-making in health should be based on an understanding of the relationship between action and health outcome, and on having access to, and using, pertinent information.

The contribution of health research to human development

Bad health will directly and profoundly affect the economic situation and well-being of any individual in any society. This is particularly true in the lower income countries (because their social safety nets are weaker or non-existent) and for the absolute poor, due to the vicious circle of poverty and ill health (6,7,8).

Conversely, better health will boost the individual's level of income (lower treatment costs, increased revenue, longer term increase in revenue due to better work opportunities, increase in revenues due to longer life-expectancy, etc.); increase the individual's capacity to acquire an education; increase the family's productive opportunities; and increase substantially the psychological well-being of both the individual and the family. The benefits of good health will be even greater for the absolute poor, as they may transform the vicious circle of poverty into a virtuous circle, with better nutrition, lower risks of unemployment or underemployment, better housing, better use of training opportunities, higher productivity and, overall, better control over their life situation and that of their family. The whole process is complex and difficult to quantify, but even conservative estimates suggest that health investments often yield the highest rates of return compared to other public investments.

There is strong evidence that good health is associated with access to knowledge. For example, in many developing countries, children's survival correlates highly with their mother's level of education. Educated parents are more likely to adopt health-promoting behaviours, avoid unsafe ones and seek professional help when their children are unwell (9).

Research has led to the development of vaccines, drugs, diagnostics, water treatment methods, therapeutic equipment and algorithms for clinical procedures. Their impact on health has been profound. In many developing countries, child mortality has fallen even at times of economic stagnation; it is, therefore, more than likely that these technological interventions significantly contributed to this improvement.

The development of hormonal contraception has given women greater control over their fertility, and the treatment of diarrhoeal disease has been revolutionized by oral rehydration therapy (ORT). Since epidemiologists established the link between tobacco and lung cancer in the 1950s, governments have gradually introduced policy changes to restrict smoking and millions of individuals have chosen to quit the habit. Behavioural research has led to improvements in health as well as health care. The results of research in health economics and epidemiology can increase the cost

effectiveness of interventions and hence optimize the use of health care resources (1,7).

In recent decades, the concept of development has evolved considerably, from a focus on physical capital in the 1960s and 1970s to a greater focus on human capital in the 1980s and 1990s, and finally to the present Millennium Development Goals adopted by the United Nations in September 2000 and which focus on poverty, health, gender equity, education, the environment and development partnerships (1,3,6,7,8).

The culture of research provides a rational, knowledgeable framework for progress in health. There are, therefore, strong political and economic interests for governments to invest more in health and health research, as recommended by the Commission on Macroeconomics and Health in its December 2001 report (7).

3. Priority setting

Underlying values

In the literature on the economic evaluation of health care, the recommended criterion for priority setting is essentially that of health maximization. This normative basis could, however, be considered to reflect the stated objectives in many nations' health services when these refer to *efficiency* in terms of "value for money" or "as much health as possible within the given budget". Recently, health research has shown increasing interest in attempts to reflect another objective – *equity* – in the health services financed by governments (10). Other objectives such as the measurement of the *severity of disease* have also been incorporated in the decision-making criteria of nations. Thus, before initiating an exercise of priority setting, institutions must have a clear understanding of the underlying values with which they will work.

Rationale and need for priority setting in health research

In view of the competing priorities for scarce health research funds, priority setting for health research is as critical as conducting the research itself. The process of priority setting is an important activity *per se* in that it engages institutions and individuals to question and evaluate different assumptions. A continuous review of priorities and priority-setting mechanisms is essential since research priorities change over time as a result of epidemiological, demographic and economic changes. Investment in priority setting for health research should be seen as complementary to the implementation of interventions to improve health status. The relevance of research, especially health research, is, however, frequently not recognized (1,2). Funding for health research is all too often seen as a luxury and is an easy target for budget cuts in times of financial stringency.

Priority setting in health becomes a complex task of evaluating the process using normative and other criteria outlined above. Another key consideration is the geographical level of application: local, national, regional or global. Although these multiple levels have common issues related to the appropriate use of resources, they offer vastly different settings for decision-making. Since the challenges in each will differ, the response and priorities for each will also need to be appropriate.

The Commission on Health Research for Development concluded that the majority of health research and development (R&D) resources are being used on issues that are relevant to only a minority of the world's population (1). This is reflected in the fact that little or no research is undertaken on diseases affecting mainly the poor, and the application of research results for conditions prevalent in more advanced countries is not directly transferable to less advanced countries due to the high costs of the proposed interventions and/or the country-specific nature of the research undertaken. The population that is excluded from the benefits of health research is predominantly in the developing world, largely poor, and often marginalized from both power and decision-making. This situation raises questions of an economic, social, ethical and political nature (2).

One of the main contributions of the Ad Hoc Committee on Health Research's report was the identification of specific areas where further investments in R&D would make a difference to global health (3). Their identification was based on a process that included five analytical steps, considerations of the attributable disease burden likely to be reduced by interventions and attendant costs. The intention was to identify a limited number of areas where R&D was insufficient relative to the magnitude of the problem and the potential for a significant advance. It was also to draw global attention (and resources) to these areas and track progress in promoting more work in these fields.

An important aspect of the Ad Hoc Committee's work in priority setting was to underline the need for economic analysis in health. Resource allocation within health care, and especially health research, is both value-laden and ethically charged. Yet seeking cost-effective use of health R&D funds – especially public funds – is consistent with public health aims. Such a rationale has enabled the search for priorities and prioritization processes to be further developed.

Insert 2 (page 17) shows how the Ad Hoc Committee proposes to analyse the burden of a health problem in order to identify research needs.

Historical approaches to priority setting

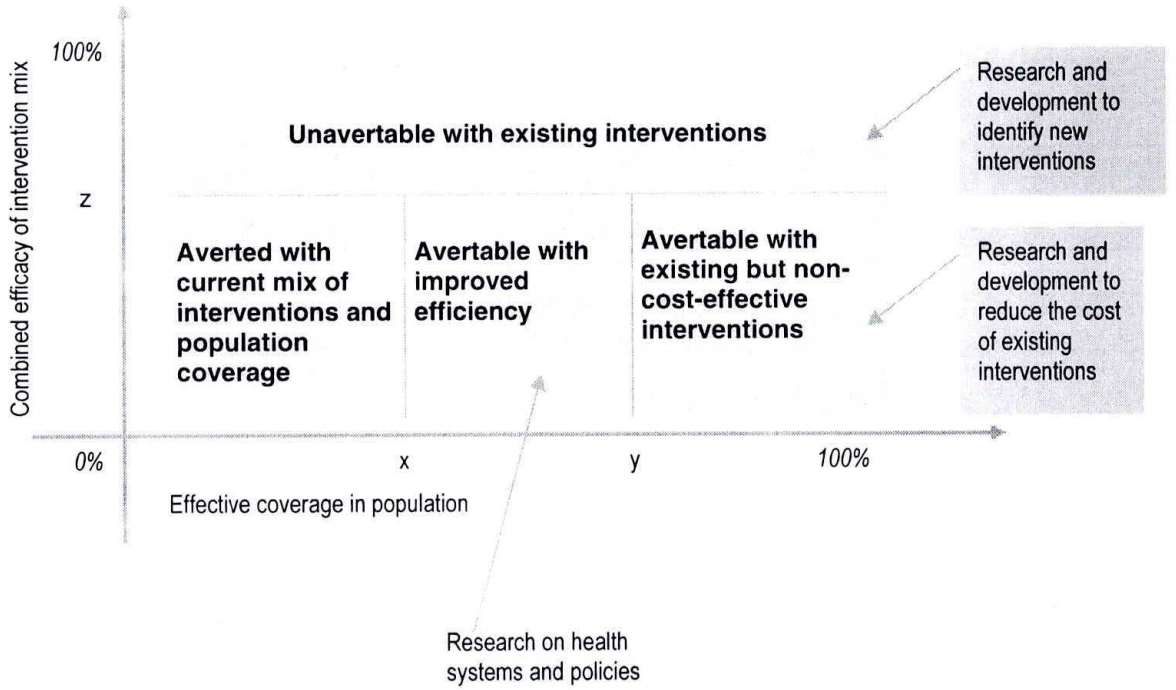
Attempts have been made, particularly in the last 15 years, to systematize the approach to setting priorities in health research. The objectives have been to make the process more transparent and to help decision-makers, particularly in the public sector, make more informed decisions, thus allocating limited research funds in the most productive way from a world perspective.

Although the various approaches tackle the problem from very different angles and with different terminologies and methodologies, there appears to be at least implicit consensus that the central objective is to have the greatest impact on the health of the greatest number of people in the community concerned (world or country level) for a given investment.

Since the Commission on Health Research for Development in 1990, priority-setting exercises have used various methods and processes. The objective of this section is to compare these various efforts on prioritization in health research in order to highlight their similarities and complementarity. An overview of this analysis is presented in Insert 3 (page 18).

Insert 2
Analysing the burden of a health problem to identify research needs

Relative shares of the burden that can and cannot be averted with existing needs



x — population coverage with current mix of interventions
y — maximum achievable coverage with a mix of available cost-effective interventions
z — combined efficacy of a mix of all available interventions

Source: Adapted from Ad Hoc Committee on Health Research, *Investing in health research and development* (WHO, 1996)

Insert 3
Comparison of various priority-setting approaches

Characteristics	Essential National Health Research	Ad Hoc Committee on Health Research	Advisory Committee on Health Research	Global Forum Combined Approach Matrix
1. Objective of priority setting	• Promote health and development on the basis of equity • Help decision-makers make rational choices in investment decisions.	Help decision-makers make rational choices in investment decisions so as to have the greatest reduction in the burden of disease for a given investment (as measured by number of DALYs averted).	Address problems of critical significance for global health: population dynamics, urbanization, environment, shortages of food and water, new and re-emerging infectious diseases.	Help decision-makers make rational choices in investment decisions so as to have the greatest reduction in the burden of disease for a given investment (as measured by number of DALYs averted), on the basis of the practical framework for priority setting in health research.
2. Focus at the global or national level?	Focus on situation analysis at the global level; method also applicable at the country level.	Focus on situation analysis at country level; residual problems to be studied at global level.	Priority to "significant" and "global" problems, requiring "imperative" attention.	Method applicable at both global and national levels.
3. Strategies/ principles	• Priorities set by all stakeholders. • Process for priority setting should be iterative and transparent. • Approach should be multi-disciplinary.	• Five-step process. • Process should be transparent.	• Priorities should be set by all stake-holders. • Process should be transparent and comparative. • Multidisciplinary approach.	• Priorities should be set by all stakeholders. • Transparent and iterative process. • Approach should be multidisciplinary (biomedical sciences, public health, economics, environmental sciences, education sciences, social and behavioural sciences).
4. Criteria for priority setting				
4.1 Burden of disease	Based on an estimate of severity and prevalence of disease.	Measured by DALYs (number of years of healthy life lost to each disease).	Allocate resources to the problems deemed of "greatest global burden".	Measured by DALYs (number of years of healthy life lost to each disease) or other appropriate indicators.
4.2 Analysis of determinants of disease burden	Analysis of multi-disciplinary determinants (biomedical, economic, social, behavioural, etc.).	• Analysis of mostly biomedical determinants • Other determinants implicit.	Analysis of multi-disciplinary determinants (biomedical, economic, social, behavioural, etc.).	Analysis of determinants at following intervention levels: • individual/family/community • health ministry and research institutions • sectors other than health • government macroeconomic policies.
4.3 Cost-effectiveness of interventions (resulting from planned research)	Some attempts at measurement in terms of impact on severity and/or prevalence.	Cost-effectiveness measured in terms of DALYs saved for a given cost.	Implicit reference to cost-effectiveness analysis.	Cost-effectiveness measured in terms of DALYs saved for a given cost.

Source: Global Forum for Health Research

Major efforts to systematize priority setting include:

Priority setting using the Essential National Health Research strategy

Based on the Commission's recommendation to "encourage all countries to undertake Essential National Health Research (ENHR)", the Council on Health Research for Development (COHRED) was established in 1993 to assist developing countries with the implementation of this strategy to organize and manage research.

In its promotion of the ENHR concept, COHRED emphasized the following principles: countries as the key actors in health research for development; the need for solid evidence to underpin an inclusive health research agenda; the need to involve all stakeholders in the prioritization process; and the need to link research results to policy and to action (10).

The three essential stages recommended by COHRED to increase the potential success of the priority-setting process are the following:

Planning the priority-setting process

- Identify leadership for the process, i.e. the central government or a body officially assigned by the government to coordinate health research in the country.
- Identify and involve stakeholders, i.e. decision-makers (at various levels), researchers, health service providers and communities.
- Gather and analyse information for setting priorities (situation analysis) in three broad categories:
  - health status (main health problems, common diseases, determinants or risk factors)
  - health care system (current status, deficiencies and problems)
  - health research system (availability of human, fiscal and institutional resources for research).

Setting the priorities

- Preparation of the information into a manageable list of priority health (system) problems and related research areas/issues.
- Step-by-step process of stakeholders who determine the criteria for selecting priorities and a method for weighting the priorities.
- Determination of the scope of the expected outcome from broad lists of priority health (system) problems to a detailed list of priority research questions.

Implementing the priorities

- From research priority areas to research portfolio: transformation of the broad list of research priority areas into a research portfolio.
- From meeting report to policy decision: integration of priorities into an appropriate governmental plan, agenda or policy to ensure political backing.
- Research priorities and a changing environment: periodic review and update of priorities.
- Investing in research priorities.

Five-step process of the Ad Hoc Committee on Health Research

Step 1: Magnitude (disease burden)
Estimate the magnitude of the problem/burden of disease by using standard established methods.

Step 2: Determinants (risk factors)
Analyse the factors (determinants) responsible for the persistence of the diseases or conditions.

Step 3: Knowledge
Assess the available knowledge to reduce or eliminate the burden of that particular disease, condition or risk factor.

Step 4: Cost-effectiveness
Assess the cost and effectiveness of agreed interventions needed to reduce the magnitude of the problem.

Step 5: Resources
Calculate/identify the present level of resources available for a particular disease, determinant or a group of diseases/conditions.

Advisory Committee on Health Research
In its 1997 publication, the Advisory Committee on Health Research (ACHR) set out the Visual Health Information Profile (VHIP), a computer-based visual display showing the "totality of the health status of a country" in a way that enables comparisons of health status both for a given country over time and between countries at a given point in time (11). It draws attention to the large diversity of actors and factors affecting the health status of a population and defines indicators of a country's health status permitting these comparisons over time and across countries.

Combined Approach Matrix of the Global Forum for Health Research
This is described in detail in the next section.

Priority-setting domains

Priorities in health research have traditionally been formulated in terms of diseases and conditions. It is now realized that this is only one domain of health research and that health determinants themselves have to be prioritized and are competing for the same funding as disease-focused priorities. But, to make things more difficult, there are at least two other areas of health research which have to be prioritized against the others, i.e. methodologies for priority setting and cross-cutting issues in health research, such as policies, poverty and health, gender and health, and research capacity strengthening.

It is, therefore, important that the prioritization exercise in health research take all of these domains into account.

Research on priority-setting methodologies

The failure in practically all countries to establish a process for priority setting based on the burden of diseases and their causes has led to a situation in which only about 10% of health research funds from public and private sources are devoted to 90% of the world's health problems (measured in disability-adjusted life years or DALYs). This extreme imbalance in research funding has a very high economic and social cost for individuals, countries and the world as a whole. To make matters worse, even the 10% of funds allocated to the 90% of the world's health problems are not used as effectively as they should be (2).

The reasons for this imbalance in health research funding include:

In the public sector

- Over 90% of research funds are spent by only a small number of countries which, understandably, have given priority to their own immediate national health research needs, even though this may be a short-sighted position.
- Decision-makers are often unaware of the magnitude of the problems outside their own national borders. In particular, they are unaware of the impact on their own country of the health situation in the rest of the world both directly (e.g. rapid growth in travel, re-emerging diseases, development of antimicrobial resistance) and indirectly (e.g. lower economic growth, migration).
- The decision-making process is influenced by a range of factors including the personal preferences of influential scientists or decision-makers, competition between institutions, donor preferences, career ambitions and tradition.
- There is insufficient understanding of the role the public sector could play in supporting the private sector in the discovery and development of drugs for "orphan" diseases.

In the private sector

- Decision-makers in the private sector are responsible for the survival and success of their enterprise and for the satisfaction of their shareholders. Their decisions are based largely on profit perspectives which inevitably limit investment in diseases prevalent in low- and middle-income countries, as market potential in these countries is often underestimated.
- In low- and middle-income countries, pharmaceutical companies have the potential to develop and produce products for diseases prevalent in these states. However, their funding capacity is comparatively small in global terms and, therefore, this potential remains largely untapped.

Research on policies and cross-cutting issues affecting health and health research

The Commission on Health Research for Development recommended the evaluation of the health impact of sectors other than health. It reported that most health research funding is in the field of clinical, biomedical and laboratory research, ranging from 60% to 90% in the countries studied, and that research activity was limited in the field of health information systems, field epidemiology, demography, behavioural sciences, health economics and management. The Commission suggested that country-specific, multidisciplinary research could overcome that shortcoming and

that research on policies, systems and determinants had as much potential as the biomedical approach.

The Ad Hoc Committee on Health Research made recommendations related to determinants, mainly in the field of health research management (1). In particular, it recommended identifying research areas and research projects likely to have the greatest impact on the largest number of people. It also recommended the use of the most cost-effective interventions to reduce the highest level of disease burden.

The Ad Hoc Committee recommended studying the underlying common determinants of health status, including population dynamics, urbanization, environmental threats, shortages of food and water, and behavioural and social problems (3).

The recommendations of ENHR projects included efforts to initiate, in each country, a demand-driven process to identify risk factors and the magnitude of health problems based on equity, health policy research and health system management and performance (10). The priorities should be identified on the basis of their ability to contribute to equity and social justice, as well as on the basis of ethical, political, social and cultural acceptability.

The International Conference (Bangkok 2000) recommended efforts to strengthen the health research systems and to link health research to development, thereby ensuring that research is carried out in the context of the prevailing problems in a given country. The priority recommendations focus on knowledge management, research capacity strengthening and governance of health research systems. The underpinning principles are health equity and sustainable health research (4).

Research on determinants and risk factors

Focusing on risks to health is key to preventing disease and injury. In its *World Health Report 2002*, WHO noted that: "Much scientific effort and most health resources are directed towards treating disease. Data on disease or injury outcomes, such as death or hospitalization, tend to focus on the need for palliative or curative services. In contrast assessments of burden resulting from risk factors will estimate the potential of prevention" (12).

The health authorities in a country should be aware of the major risks to the health of their population. If major threats exist without cost-effective solutions, then these must be placed high on the agenda for research. Reliable, comparable and locally relevant information on the size of different risks to health is therefore crucial to prioritization, especially for governments that are setting broad directions for health policy and research. A summary of key recommendations made since 1990 on health research for risk factors is given in Insert 4 below.

Insert 4
Key recommendations made since 1990 for health research on risk factors

Health research priorities	Commission Report (1990)	Ad Hoc Committee (1996)	ACHR (1997)	ENHR Projects (1999)	International Conference (2000)	Global Forum (2002)
Health policies and systems	•	•	•	•	•	•
Health information systems	•	•	•			•
Gender and socioeconomic inequalities	•	•	•	•	•	•
Health equity				•	•	•
Health cost and financing	•	•	•			•
Capacity building for health policies	•	•			•	•
Health behaviour research				•	•	
Health impact of development of other sectors	•		•	•	•	•
Sustainable health research linked to development	•		•	•	•	
Environmental degradation			•			
Child nutrition research	•	•	•			•
Food security			•	•		
Formal education			•	•	•	•
Education by health sector	•		•	•	•	•
Food and water management			•	•		
Research on social justice				•	•	
Occupational health				•		•
Reproduction and contraception	•	•			•	•
Population dynamics	•		•			•

Source: Global Forum for Health Research

Research on diseases and conditions

The Commission on Health Research for Development recommended research on specific diseases that accounted for the highest burden in developing countries. It differentiated between causes of death in developing and developed countries, and drew attention to the high burden in the former in comparison with the low investment in research. The Commission noted that, as the epidemiological transition evolves, developing countries will increasingly face a double burden of pre-transitional diseases (communicable diseases) and post-transitional diseases (noncommunicable diseases and injuries).

In its report, the Ad Hoc Committee on Health Research combined diseases with determinants (3). Based on the use of the VHIP, WHO's ACHR focused its recommendations in 1997 on both diseases with the highest burden in developing countries and the underlying common determinants of health status (11). Recommendations in 1999 by ENHR projects focus on countries. The International Conference in Bangkok (2000) shifted its focus and recommendations on the revitalization of health research systems to deal with the most prevalent diseases in low- and middle-income countries and research capacity strengthening. It seeks to lower the burden of disease by addressing health equity issues and decreasing health inequalities.

A summary of key recommendations made since 1990 on research priorities for diseases and conditions is given in Insert 5 below.

Insert 5
Key recommendations made since 1990 on research priorities for diseases and conditions

Health research priorities	Commission Report (1990)	Ad Hoc Committee (1996)	ACHR (1997)	ENHR Projects (1999)	International Conference (2000)	Global Forum (2002)
Tropical diseases (malaria, schistosomiasis, leprosy)	•	•	•	•	The International Conference 2000 focused on the need to improve health research systems to deal with nationally prevailing diseases	•
TB–HIV	•	•	•	•		•
Childhood diseases (diarrhoeal and respiratory diseases)	•	•	•	•		•
Sexually transmitted infections	•	•	•	•		
Dengue				•		
Maternal mortality	•	•	•	•		•
Cancer/diabetes			•	•		•
Cardiovascular diseases	•	•	•	•		•
Mental/neuro-logical diseases	•	•	•	•		•
Violence and injuries	•	•	•	•		•
Chronic degenerative diseases	•	•	•			

Source: Global Forum for Health Research

Section II

COMBINED APPROACH MATRIX: PRINCIPLES, ELEMENTS AND FUNCTIONS

1. Principles

The Combined Approach Matrix (CAM) is a tool that aims at (i) helping to classify, organize and present the large body of information that enters into the priority-setting process; (ii) identifying gaps in health research; and, on this basis, (iii) identifying health research priorities, based on a process which should include the main stakeholders in health and health research.

Priority setting in health research must take into account an "economic" dimension as underlined in the Ad Hoc Committee's five-step process (1996) as well as an "institutional" dimension, which is emphasized by the 1991 ENHR approach and the 1997 Visual Health Information Profile proposed by the Advisory Committee on Health Research. The "institutional" approach argues that the health status of a population depends as much on actors and factors outside the health sector as on the national health system itself.

The CAM's objective is to incorporate both the economic and the institutional dimensions into a single tool for priority setting. The resulting matrix for priority setting is presented in Insert 6 below.

The advantage of the proposed matrix is that it will help organize, summarize and present all available information on one disease, risk factor, group or condition, and facilitate comparisons between the likely cost-effectiveness of different types of interventions at different levels. The information may be partial, and probably even sketchy in some cases, but it will improve progressively, and even limited information is sometimes sufficient to indicate promising avenues for research.

Insert 6
The Global Forum Combined Approach Matrix for health research priority setting

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macro-economic policies
1. Disease burden*				
2. Determinants				
3. Present level of knowledge				
4. Cost and effectiveness				
5. Resource flows**				

* Global total estimated at US$ 1.4 billion DALYS. National estimates should be used for national exercises.
** Global total estimated at US$ 73.5 billion DALYS for 1998. National estimates should be used for national exercises.

Source: Global Forum for Health Research

2. The main elements of the CAM

The economic dimensions of priority setting

The components of the five-step process identified in the Ad Hoc Committee's 1996 report (3) are the following:

Step 1: Disease burden

Measure the disease burden as years of healthy life lost due to premature mortality, morbidity or disability. Summary measures, such as the DALY, can be used to measure the magnitude. Other methods serving the same purpose can also be used.

A number of examples are presented in Section III of this report. It should be noted that the term "burden of disease" (BOD) has been loosely applied according to available data sources. These ranged from simple desk reviews of some international reports, to the Global Burden of Disease Studies and national reports and research studies. Put simply, the ideal is to have data available in summary measures (such as DALYs), but the process of applying the CAM should not be abandoned if such data are not available.

Step 2: Determinants

Analyse the factors responsible for the persistence of the burden, such as lack of knowledge about the condition or disease, lack of tools, failure to make use of existing tools, limitations of existing tools or factors outside the health domain.

Such information is available from global reports and the international, peer-reviewed literature. However, there are always some important, local reasons to explain why the problem persists, which need to be considered closely when identifying research priorities.

Step 3: Present level of knowledge

Assess the present knowledge base available to help solve the health problem and evaluate the applicability of solutions, including the cost and the effectiveness of existing interventions.

For this purpose, international reports and peer-reviewed literature can provide a good amount of information but local conditions and sensitivities need to be kept in mind when considering the cost and effectiveness examples from other places.

Step 4: Cost and effectiveness

Assess, against other potential interventions, the promise of the R&D effort and examine if future research developments would reduce costs, thus allowing interventions to be compared and applied to wider population segments.

This sort of information, however, is often difficult to obtain, as very few national organizations/institutes can supply it. It presents a challenge for those seeking to apply the CAM at national or local levels.

Step 5: Resource flows

Calculate the present level of investment on research for the specific disease and/or determinant.

However, it is not easy to calculate research investments because national and local health budgets in most developing countries do not disaggregate information about specific diseases and conditions, and much less about health research. This is another problem faced by health and health research managers who are attempting to set priorities, whether at global, national or local level.

The institutional dimensions of priority setting

The institutional dimensions include the following groups of actors and factors:

The individual, household and community

In the CAM, this column reviews the elements that are relevant to the reduction of disease burden and can be modified at the individual, family/household or community level. This includes interventions on primary care, prevention and education. For example, in the case of malaria, prevention using barrier methods such as insecticide-impregnated bednets is a key intervention at the individual level.

Health ministry and other health institutions

This column in the matrix assesses the contribution of the health ministry and health research systems to the control of the specific disease or condition being explored. The column focuses on:

- Biomedical interventions and their application throughout the whole health system
- Policies and structures that can help the health system reduce the burden of a specific condition
- The potential for the health research community to provide tools, processes and methods to enable the health system to reduce the burden of a disease.

Sectors other than health

This column focuses on all other ministries, departments and institutions that contribute to improving health but are not necessarily part of the health ministry or its subordinate departments. Examples include the role of the transport sector in the prevention of road traffic injuries, that of the education system (both formal and informal) in changing people's health behaviour (washing hands, smoking, substance abuse, avoiding risky behaviour in general, etc.) or that of environmental protection agencies in reducing health hazards.

Macroeconomic policies

This column in the matrix focuses on the elements at the central government level or those outside the country that can have a role in the control of the diseases or conditions. An example of this is the impact of World Trade Organization agreements concerning intellectual property rights on the provision of antiretrovirals for the treatment of people living with HIV/AIDS.

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- A national micronutrient strategy development meeting (Islamabad, January 2004)
- A symposium on newborn care with the Pakistan Paediatric Association and national neonatal group (Lahore, February 2004).

In addition, several informal consultations were undertaken with groups working on maternal and child health in Pakistan including Saving Newborn Lives (SNL), UNICEF, WHO Pakistan, the Department for International Development (DFID) and USAID. The team also reviewed the reports on the situational analysis of newborn care in Pakistan (SNL 2002) and the health systems' policy review for perinatal care undertaken with funding from the Alliance for Health Policy and Systems Research in 2002.

While all sections of the CAM were not systematically completed at all the meetings, the core group working on the project was able to address all areas through consultations held between August 2003 and February 2004. A dual listing system was used to analyse evidence gaps. Gaps were first listed and then a qualitative assessment of gaps was undertaken, classifying the levels of evidence on a numerical grid as follows:

- 1 = Sufficient data available
- 2 = Some data available
- 3 = Insufficient data (need for more research)
- 4 = No information/Critical gap/High-priority research.

Areas marked 3 or 4 would be the principal focus of research as information needs were both immediate and constrained interventions.

Guided by the available information on perinatal and newborn morbidity and mortality in Pakistan, the following key areas were identified for an in-depth analysis using the CAM:

- Birth asphyxia
- LBW including prematurity and intrauterine growth retardation (IUGR)
- Serious neonatal infections.

Conclusions: the context of research in newborn care (evidence gaps and proposed initiatives)

The data reviewed highlighted the urgent need to assess objectively the burden of mortality and morbidity pertaining to the neonatal period. These data must be derived from well designed community-based studies and reflect the diversity within Pakistan's population.

The socio-cultural and behavioural aspects of newborn care by family members and other care-providers were considered an important area requiring much formative research. This is important prior to the institution of any interventions, especially those involving behaviour change. Given the widespread ignorance of appropriate newborn feeding, thermoregulation, skin care and asepsis, these were identified as priority areas for research.

In view of LBW rates in many communities, the results revealed that the biggest challenges were to improve strategies for LBW prevention and postnatal care. A

better and holistic evaluation of risk factors for LBW is required from well conducted, representative studies carried out in the communities.

In Pakistan, most births take place at home, frequently with the help of traditional and untrained birth attendants. The CAM's results emphasized that identifying ways of optimizing viable opportunities for newborn care should be considered a priority research area. One suggested option was working with trained birth attendants and lady health workers for improved intrapartal and postnatal care of the mother and newborn. These may include methods for basic newborn resuscitation, care of the LBW infant, infection prevention and basic treatment through community health workers. Collaborating with lady health workers in these initiatives shows considerable promise, and this may be a major area for research.

In summary, the CAM allowed a systematic analysis and evaluation of the available evidence on perinatal and newborn care in Pakistan. The exercise allowed an evaluation of the existing evidence and evidence gaps with regards to the burden of disease, basic determinants and the policy framework of the Ministry of Health and other departments of the government of Pakistan.

Section IV

CHALLENGES AND OPPORTUNITIES

1. The lessons

In order to be credible and acceptable, and to serve as a basis for priority setting at national or international levels, the information presented by a priority-setting tool needs to be reliable. The strength of the CAM is its flexibility and diversity of application. Depending on the resources, area of research and availability of the required information, it may be applied by an individual researcher, a group of experts, interested stakeholders or a combination of all of them, as illustrated by the examples in the previous section.

The CAM provides a conceptual framework for compiling information relevant for priority setting in health research. More important, it is a practical and standardized tool for data presentation, and for improving transparency of rational decision-making in the priority-setting process. The method requires that very often complex information and knowledge be condensed to fit into a cell of the CAM. Experts with a profound knowledge of a specific disease may find it difficult and unacceptable to be forced to reduce the pertinent scientific literature to a few key sentences. Critics may consider this oversimplification lacking the necessary rigour for an analysis of the situation. Others, however, accept this limitation as a challenge to focus only on the essentials and to refrain from stating what cannot be expressed concisely.

The last two steps in priority setting concern the cost-effectiveness of future interventions and the resource flows for the disease/risk factor under consideration. Most investigators found it difficult to trace such information. In fact, apart from occasional studies pertaining to the health system and health services research, such information rarely exists. This, however, cannot be interpreted as a shortcoming of the CAM, but rather as an outcome of the priority-setting exercise pointing towards data required for priority research.

The focus for health research priority setting is not restricted to technical questions about the status of the disease (or risk factor), but draws attention to the various domains where interventions are possible and desirable (from the household to global macroeconomic policies). Most health professionals and decision-makers may well be aware of this in a general sense, but by applying the CAM it becomes obvious in most situations that the health status of a population broadly depends on many sectors of society and not only on the actions (or omissions) of the health services.

Application of the CAM reveals clearly that there is much more knowledge available than is actually applied. It shows that, in spite of the existence of many cost-effective interventions, a huge treatment gap (i.e. the difference in the rates between those who need and those who actually benefit from such treatment) exists, that the reasons for the persistence of a health problem may be outside the health sector and that, if there are obstacles within the health sector, they may be of a non-medical nature (such as socio-cultural distance between health care providers and clients).

These findings help to emphasize that, apart from basic medical research, other types of research are needed in order to change a population's health status for the better:

research on risk factors, health service research, operational research, research on policies and research on priority-setting methodologies.

The CAM has proven an extremely useful tool in situations where a cluster of conditions or diseases results in a health problem. For example, the application of CAM for mental disorders such as depression and schizophrenia will provide information not only to set priorities for these diseases but also for the overall burden of mental disorders.

2. Challenges and opportunities

Compiling the data and information required to complete the CAM is a challenging exercise for several reasons. Some investigators found it difficult to access appropriate information from representative settings and, in some cases, it was difficult to verify the veracity and validity of existing data. Limited institutional memory at the level of policy-makers in terms of experience of interventions and programmes was considered an obstacle while setting national research priorities. The information required is not restricted to technical questions about the status of the disease/risk factor and research, but also demands awareness, knowledge and analysis of the factors determining health at the various levels (from the individual and the family to macroeconomic policies). Although this is considered a major advantage of the method, in that it forces the users to think broadly and inclusively, it may not always be easy to find disease control experts who have the relevant skills or knowledge.

In some situations, while the CAM provided a good solid base for the necessary information, it required adaptation to the particular needs of the programme or organization. CAM users have to modify and adapt the outcome of the CAM results according to their organizational needs. Two excellent examples in this regard are the use of the CAM by the TDR and the Pakistan Medical Research Council for perinatal and neonatal care in Pakistan. Such adaptation needs to be continuous as the debate on priority setting moves forward.

Disease research strategies need to be revised and updated, as new results become available. This will be almost continuous in diseases such as malaria and HIV/AIDS for which research is ongoing. The priority-setting process is therefore iterative and should not be set in stone.

Another observation from a national team was that the CAM approach compelled them to think nationally and focus institutionally. Also, many considered that the whole process of CAM application provides an opportunity to develop capabilities, strengthen capacities, enhance skills and improve knowledge in the field of health research priority setting.

3. Conclusions

The CAM methodology provides the evidence base for priority setting in health research; it is not, however, a method that produces the priorities themselves. It can hardly be expected that there will ever be a procedure or an algorithm that automatically comes up with research priorities if the evidence base is somehow fed into the process. One would hope, however, that standardized guidelines might become available which will facilitate priority selection on the basis of the CAM.

Priority setting in health research is a dynamic process. It is realistic to expect that methods and instruments, such as the CAM, designed to facilitate this process at country, regional and global levels will be further developed, and that answers will be found to the present gaps and limitations with the help of partners in the health research world.

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Section V

ANNEXES

Annex 1
Diarrhoeal diseases research in India: application of the CAM

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
1. Disease burden	• Globally, diarrhoeal disease was responsible for 4.3% of total loss of DALYs, and >2 million deaths (3.5% of all deaths) in 2001. • In India, diarrhoeal disease is a major public health problem among children under 5 years of age. In health institutions, up to a third of total paediatric admissions are due to diarrhoeal diseases and up to 17% of all deaths in paediatric inpatients are related to diarrhoea. • The mean incidence of diarrhoea in India was 1.5 episodes per child per year in urban areas and 4.7 in rural areas; this figure was 10.5 in the slum areas around the major towns in India. • In India, 20% of deaths among children under 5 years of age were estimated to be due to diarrhoeal diseases. Globally, similar estimates (21%) were also reported for children under 5. • In the Andhra Pradesh disease burden study in India, diarrhoeal diseases were the sixth leading cause of lost DALYs in rural areas and the tenth leading cause in urban areas (based on community-rated disability weights; ranks were higher using expert-rated disability weights). • In India, case-fatality from diarrhoeal diseases among children under 6 years of age was estimated to be 0.56% for acute watery diarrhoea, 4.27% for dysentery and 11.94% for non-dysenteric persistent diarrhoea. Globally, the overall estimate of case-fatality from diarrhoea among under-5 children was estimated to be 0.15% (1.8% among children less than 1 year of age).			
2. Determinants	**1. Ignorance about nature of diarrhoeal disease and its modes of transmission** 1.1 Inadequate maintenance of personal hygiene 1.2 Inappropriate care-seeking behaviour and practices 1.3 Insufficient knowledge about water treatment, storage and handling at the household/community level 1.4 Lack of knowledge about proper infant and child feeding practices, including breastfeeding and weaning 1.5 Inadequacy of proper sanitation and waste (including excreta) disposal systems and insufficient knowledge about their importance **2. Environmental changes leading to higher transmission potential of diarrhoeagenic pathogens** 2.1 Congested and unplanned housing without adequate system for safe water supply and sanitation 2.2 Appearance of newer pathogens/strains with potential to cause life-threatening diarrhoea 2.3 Increasing problem of drug resistance for several diarrhoeagenic pathogens	**1. Problems associated with quality of health services** 1.1 Inappropriate advice regarding infant and child feeding practices 1.2 Irrational use of drugs for treatment of diarrhoea 1.3 Lack of adherence to control programme's guidelines while managing the cases **2. Lack of well-established surveillance system in most areas** 2.1 Surveillance to detect occurrence of diarrhoea cases including outbreaks, determining major pathogens in the area, changes in drug susceptibility for major organisms, detecting newer pathogens etc. 2.2 Surveillance in health care institutions to prevent and	**1. Inappropriate housing** **2. Insufficient education** **3. Inadequate safe water supply and sanitation systems** **4. Social unrest at some places** **5. Population movements within and across borders**	**1. Insufficient linkage across sectors** 1.1 Lack of proper linkage between health and other development sectors **2. Government expenditure on health and allied programmes** 2.1 Government spending in health programmes has not increased over last several years **3. Lack of sustained political commitment** **4. Persistence of huge rural/urban disparities in socioeconomic conditions and health care services**

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
	3. Socioeconomic influences 3.1 Poverty 3.2 Low literacy 3.3 Adverse cultural beliefs and taboos 3.4 Socioeconomic disruption due to natural disasters (e.g. flood, famine, etc.) **4. Public distrust over quality of existing government health services**	detect occurrences of nosocomial diarrhoea **3. Lack of infrastructure to isolate and characterize many relevant organisms** **4. Lack of appropriate health information system** 4.1 Lack of collection of data on morbidity and mortality (especially pathogen-wise break-up) in a systematic way 4.2 Lack of dissemination of information to all desired levels 4.3 Lack of timeliness in gathering and disseminating data		
3. Present level of knowledge 3.1 Interventions currently available	**1. Prevention of infection** 1.1 Maintenance of personal hygiene 1.2 Proper water treatment, storage and handling at household and community levels 1.3 Maintenance of food hygiene 1.4 Special attention to childcare practices 1.4.1 Child feeding practices, specially breastfeeding and weaning practices 1.4.2 Regular deworming of children 1.4.3 Child immunization 1.4.4 Supplementation of micronutrients (e.g. zinc) 1.5 Safe waste (including excreta) disposal system at household and community levels 1.6 Antimicrobial prophylaxis **2. Prevention of disease progression among the infected** 2.1 Use of oral rehydration therapy (ORT) 2.2 Continued feeding, including breastfeeding for breastfed children 2.3 Antibiotics, if appropriate 2.4 Timely seeking of health care 2.5 Compliance with prescribed drugs	**1. National Diarrhoeal Diseases Control Programme** 1.1 Promotion of ORT 1.2 Integration of the programme with PHC up to the lowest government health care level 1.3 Health education of the people, including free distribution of health education booklets in regional languages 1.4 Training of physicians on rational management of diarrhoea 1.5 Establishment of diarrhoea treatment and training units (DTUs) at medical colleges and district hospitals **2. Establishment of reference and advanced centres for research on diarrhoeal diseases**	**1. Appropriate housing** **2. Environmental management** 2.1 Adequate and safe water supply and sanitation 2.2 Appropriate planning for development projects 2.3 Environmental impact assessment for proposed development projects (e.g. water pollution) **3. National Water Supply and Sanitation Programme** **4. Literacy mission and health education programmes, including application of mass media** **5. Epidemic preparedness and disaster management programmes** **6. Programmes to alleviate poverty (e.g. PMRY, JRY, financial assistance from banks)**	**1. Placing diarrhoeal diseases among top priority health concerns** **2. Promoting awareness of the problem and action** **3. Arranging appropriate funding (internal and external) for research and management** **4. Subsidize tools for management (e.g. ORS, halogen tablets etc.)** **5. Involving other government and non-government agencies** **6. Decentralization process to address rural/urban disparities** **7. Legal amendments to deal with growing pollution and inappropriate use of drugs**

	3. Health education about relevant aspects for preventing diarrhoea/ dehydration	**3. Early diagnosis and treatment of affected individuals** 3.1 Recommended management guidelines 3.2 Provision of case management at all levels of government health care 3.3 Involvement of private medical practitioners 3.4 Isolation and drug susceptibility testing of diarrhoeagenic pathogens **4. Health education** **5. Early detection, containment or prevention of outbreaks/ epidemics**	**7. Rural housing schemes (Indira Vikas Yojana)**	
3.2 How cost-effective are current interventions? (refer to numbers under 3.1)	1.1 Cost-effective to reduce occurrence of diarrhoea 1.2 Cost-effective 1.3 Cost-effectiveness not established 1.4.1 Cost-effective 1.4.2 Cost-effectiveness studies are needed for routine anthelminthic treatment of preschool children 1.4.3 Overall, routine immunization of children is one of the most cost-effective approaches to prevent illnesses; cost-effectiveness specifically for prevention of diarrhoeal diseases not established 1.4.4 Cost-effectiveness of different strategies for delivering zinc supplement needs to be assessed 1.5 Cost-effective 1.6 Not cost-effective, except in some special circumstances 2.1 One of the most cost-effective health care interventions ever 2.2 Cost-effective to reduce morbidity and mortality from childhood diarrhoea 2.3 Cost-effective only in select cases 3. Cost-effective	1.1 One of the most cost-effective health care interventions ever 1.2–1.4 Cost-effective approaches 1.5 Establishment of DTUs are a cost-effective strategy for promotion of appropriate case management of diarrhoeal diseases, thus reducing burden of diarrhoeal disease 3.1–3.3 Cost-effective 3.4 Routine culture of stool or routine application of other detection techniques for community-acquired diarrhoea may not be cost-effective 4. Cost-effective 5. Cost-effectiveness of routine surveillance system is not known	1. Cost-effectiveness not known 2.1 Some water supply and sanitation intervention programmes are very cost-effective in controlling childhood diarrhoea; may be as cost-effective as ORT 2.2 - 2.4 Cost-effectiveness not known 3. Cost-effective strategy to control diarrhoeal disease burden 4. Cost-effective 5. Cost-effectiveness not known	

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
4. Cost and effectiveness	1. Community participation in planning and evaluation would be an effective approach to control the disease 2. Promoting use of inexpensive yet effective methods for water disinfection and storage at the household and community levels is a proven cost-effective intervention 3. Raising awareness about diarrhoea and its management within the community (especially among mothers) through innovative ways (e.g. educating parents through their children who are taught in an interesting way about these aspects in school; educating people through teachers, etc.) may prove an effective strategy	1. Involvement of both licensed and unlicensed health care providers in training on rational management of diarrhoea 2. Bringing out newer ORS formulations through research → some newer ORS (e.g. rice-based ORS already proved its efficacy, though its widespread use is limited by non-availability of a packaged product for some practical difficulties; research is under way to overcome these difficulties) 3. Newer diagnostic methods to identify pathogens using modern laboratory technologies → but, too much effort on identifying pathogens, especially for cases of community-acquired diarrhoea, may not be a cost-effective approach 4. Evaluation and monitoring of drug resistance pattern for major pathogens and identifying suitable/newer antimicrobials to treat them → treatment for diarrhoea with antimicrobials is indicated only in very selective cases 5. Development of vaccines against major causative agents → efforts are on for many organisms (e.g. cholera, shigella, rotavirus); they could be cost-effective but subject to some conditions apart from	1. Involvement of private sectors and NGOs, women's groups and community organizations in spreading messages about diarrhoea and its control; cost-effectiveness may be difficult to measure 2. Carefully planned communications strategy involving the coordinated use of mass media, market research and evaluation, relying on a multiplicity of channels for communication that is culturally appropriate 3. Greater use of electronic mass media to spread relevant messages in local languages – effective for the vast population of illiterates and semi-literates, as even among them more and more people are gaining access to radio, television etc.	1. Set priorities for diarrhoeal diseases research and allow sufficient budgetary allocation to deal with this continuing public health problem 2. Seek resources from national and international agencies which could be utilized for this health problem from the country's perspective 3. A revised National Health Policy addressing the prevailing rural/urban inequalities in delivery of health services is imperative 4. Optimal collaboration needed among different related national programmes (e.g. National Water Supply and Sanitation Programme) 5. Evaluation of existing programmes

		safety and efficacy (e.g. cost) 6. Establishment of a valid and reliable health information system, especially for cause-of-death information → a precondition to be able to assess effectiveness 7. Expanding surveillance system – cost-effectiveness needs to be measured 8. Use of telemedicine in special circumstances (e.g. pilgrimage) → cost-effectiveness not evaluated		
5. Resource flows	1. Individual and community efforts to prevent and control diarrhoeal diseases 2. Involvement of prominent social figures (e.g. actors/actresses, social workers) and opinion leaders (e.g. ministers, members of parliament, etc.) in raising awareness 3. Organization of camps, meetings, demonstrations etc. 4. Distribution of halogen tablets, bleaching powders etc. by community leaders and organizations	1. Funds and resources allocation under National Diarrhoeal Diseases Control Programme 2. Resources (funds, equipment, infrastructure building) for diarrhoeal diseases research and training from government and non-government agencies, as well as from international agencies	1. Gaining positive impact on diarrhoeal diseases control through resources spent on National Water Supply and Sanitation Programme 2. Sulabh International, a private organization, has been engaged in building public toilets for more than 25 years in different parts of the country 3. Involvement of government, mass media and NGOs in spreading appropriate messages 4. Improving child health through different government and non-government programmes (e.g. Integrated Child Development Services)	1. Collaborative efforts and partnerships with international organizations such as WHO, UNICEF, Japan International Cooperation Agency to fight against this menace 2. Collaboration among various national and international agencies for development and testing of vaccines against cholera, rotavirus etc. 3. Obtaining support from international agencies (e.g. World Bank) to develop and expand health care infrastructure

Source: Indian Medical Research Council

Annex 2
Pakistan's National Action Plan for noncommunicable disease prevention and control: application of the CAM

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
1. Disease burden	Noncommunicable diseases (NCDs) and injuries are amongst the top ten causes of mortality and morbidity in Pakistan; estimates indicate that they account for approximately 25% of deaths within the country. Existing population-based morbidity data on NCDs in Pakistan shows that one in three adults over the age of 45 years suffers from high blood pressure; the prevalence of diabetes is reported at 10%; and 54% men and 20% women use tobacco in one form or another. Karachi reports one of the highest incidences of breast cancer for any Asian population, with an ASR of 53.1; in addition, estimates indicate that there are 1 million severely mentally ill and more than 10 million individuals with neurotic mental illnesses within the country. Furthermore, the incidence of injuries has been reported at 41.2 per 1 000 persons per year.			
2. Determinants	1. Lack of awareness about the risks of NCDs and the consequent adoption of detrimental practices: • unhealthy diet, sedentariness, stress, use of tobacco, passive exposure to smoke, use of areca nut, indoor air pollution; • dangerous driving, commuting practices and pedestrian behaviours 2. Inappropriate care-seeking behaviour and practices, e.g. screening for risk status 3. Noncompliance with drug treatment 4. Poor access to health care and to skilled health care providers 5. Lack of a conducive physical and social environment for physical activity, particularly for women 6. Issues with accessibility to a healthy diet	1. Lack of inclusion of NCDs as part of the national health policy 2. Lack of a concerted public health response to the issue 3. Lack of integrated surveillance systems to enable an ongoing assessment of NCDs and their determinants. 4. Lack of coordination between data providers and users 5. Lack of longitudinal cohort studies to measure population-specific causal associations, which could be the target for preventive interventions. 6. Lack of clinical end-point trials in the native Pakistani setting which could set optimal targets for therapeutic interventions in primary and secondary prevention settings 7. Persistent focus of the diet and nutrition policy on undernutrition 8. Lack of resource-sensitive, scientifically valid training programmes for all categories of health care providers focusing on NCD prevention and control 9. Lack of integration of NCD prevention with primary health care 10. Lack of policy and operational research around tobacco	1. Lack of recognition of the magnitude and scale of NCDs and their economic implications. 2. Lack of efforts to assess agricultural and fiscal policies relating to food items that could have implications for increasing the demand for, and making of, healthy food more accessible 3. Lack of polices and strategies to limit production of and access to ghee as a medium for cooking 4. Lack of efforts to institute measures to reduce dependence on revenues generated from tobacco 5. Lack of measures to discourage tobacco cultivation and assist with crop diversification. 6. Lack of effective legislative measures, which stipulate standards for urban planning 7. Lack of comprehensive efforts aimed at banning tobacco advertisements 8. Lack of efforts to develop a comprehensive price policy for tobacco products 9. Lack of legislation on areca nut 10. Lack of appropriate regulatory measures to reduce exposure to risk in industrial settings 11. Lack of efforts to explore the feasibility of utilizing open spaces and playgrounds (e.g. in schools) for physical activity 12. Lack of regulatory bodies to ensure "safety" in	1. Lack of sustained political commitment

		11. Lack of sustainable public health infrastructure to support community mental health activities 12. Lack of involvement in "safety" representation on national safety and road 13. Lack of availability of drugs essential for prevention and control of NCDs at health facilities	all settings 13. Gaps in the emergency care system 14. Lack of efforts to ensure enforcement of traffic regulations 15. Lack of efforts to improve roads, vehicle design and drivers' training 16. Lack of a comprehensive policy and legislative framework relating to occupational health and safety	
3. Present level of knowledge	The present level of knowledge related both to the determinants of persistence of disease and effectiveness of prevention and control measures is largely based on evidence drawn from the developed world. This needs further exploration in the indigenous Pakistani setting	Same as 1	Same as 1	Same as 1
4. Cost and effectiveness	The present level of knowledge related to cost-effectiveness of interventions has been drawn from best practice examples in the developed world. This needs further exploration in the indigenous Pakistani setting	Same as 1	Same as 1	Same as 1
5. Resource flows	No information is available.			

Source: Pakistan Medical Research Council

Annex 3
Schizophrenia: application of the CAM

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
1. Disease burden	Globally 15,686,000 DALYs lost, which is 1.07% of total global burden of disease			
2. Determinants	• There is no proven method of primary prevention of schizophrenia • Biological risk factors include: – Genetic vulnerability (polygenic); heritability 69%–80% – Early developmental insults (LBW; perinatal brain damage; early neuroinfection) • Environmental/psychosocial risks – Urban birth – Stigma – Social isolation • High co-morbidity (e.g. substance misuse)	• There is no cure for schizophrenia • Insufficient recognition in treatment programmes that level of burden is shaped by interaction between intrinsic vulnerabilities caused by the disease and the psychosocial environment • Hospitalization with the aim of removing people with schizophrenia from public places or facilities, or otherwise restricting their freedom • Severe adverse effects of antipsychotic drugs (neurological extrapyramidal effects), interfering with psychosocial and vocational adjustment, lead to non-compliance with medication and contribute to stigma. • Treatment gap in developing countries: 67% or 17 million patients are not receiving treatment • Lack of specialists and general health workers with the knowledge and skills to manage schizophrenia across all levels of care • Lack of resources	• Stigmatizing environment (including workplace) • Mental health legislation inadequate or absent • Neglect of the large number of patients who have lost their supportive network and are homeless, vagrant or in prison • Poor coordination between services including non-health sector	• Insufficient awareness of the size of the problem and the existence of cost-effective interventions capable of reducing the burden of the disease • Lack of a coherent mental health policy
3. Present level of knowledge	• In contrast to prevention, there is sufficient knowledge of interventions that can substantially ameliorate the course of schizophrenia and reduce the resulting impairments and disabilities • Formulation of mental health policy (e.g. as part of health sector reforms) • Mental health awareness programmes (e.g. declaration of a mental health day)			
	• Community-based management programmes involving at least three operational components:			

	– Pharmacological treatment aimed at symptom control in acute episodes, maintenance of stabilization and prevention of relapse, and means of ensuring adherence to treatment protocol – Mobilization of family and community support, including provision of education about the nature of schizophrenia and its treatment, involving the family in simple problem-solving skills training and involving the local community in providing a supportive and non-stigmatizing environment – Local rehabilitation, such as maintaining the patient in appropriate work and social roles within the community, and creating opportunities for occupational and social skills training • Many of the psychological approaches have not been evaluated by economists, nor have the newest atypical antipsychotics • There are few if any evaluations of specific combinations of pharmacological and psychological therapies. • There is little evidence of the economic consequences of side-effects or non-compliance, yet one would suspect these to be important drivers of long-term costs. • Research findings point to areas where cost savings may be achieved in principle, but they may not lead to cost savings in practice: with the growth of community-based care involving multiple agencies with their own budgets and their own ways of working, there is little evidence about the incentives and constraints that might help or hinder integrated responses to schizophrenia		•
	• Reduction of stigma • Protection of patient's human rights • Prevention of premature mortality (e.g. suicide) • Prevention of criminal and offending behaviour • Skills training and illness self-management	• Antipsychotic medication (conventional antipsychotics (e.g. phenothiazines) and atypical antipsychotics (e.g. clozapine)) • Cognitive-behavioural therapy for psychotic symptoms • The primary health care model • Family interventions • Group interventions focused on the patient • Therapeutic communities • Short-term hospitalization for acute care in accordance with ethical guidelines by international bodies, such as WHO • Antipsychotic medication: conventional drugs are effective and inexpensive (chlorpromazine) but cause severe adverse effects. Atypical drugs cause fewer adverse effects, but are more expensive. Cost-effectiveness studies of conventional vs. atypical	• Supported employment approach to vocational rehabilitation • Non-stigmatization programmes • Mental health legislation • Consumer empowerment	

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
		antipsychotics originate in developed world. To achieve universal availability at low cost conventional antipsychotics are clearly to be preferred (until current atypicals come off-patent)		
4. Cost and effectiveness	• Research capacity building through on-site education, exchange programmes and distance learning • Development of local networks that link centres with the requisite expertise to their surrounding community, and creation of regional networks linking such centres through joint training programmes, staff exchanges and collaborative research • Partnerships between lead institutions in high-income countries and such collaborative networks in low-income countries			
	• Research into the aetiology of schizophrenia, particularly genetic epidemiology, neurobiology • Research into prognosis and outcome of schizophrenia in developing countries	• Research into interactive interventions involving the patient, the family and the community, cognizant of the fact that biological vulnerability and environmental influences interact and potentiate each other at every stage of schizophrenia (treatment, stabilization and residual) • Research into preventive intervention, e.g. through early detection and avoidance of treatment delay		
5. Resource flows	No information is available.			

Source: Global Forum for Health Research

Annex 4
Indoor air pollution (IAP): application of the CAM

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
1. Disease burden	4% of the global burden of disease.			
2. Determinants	**Poverty:** Individuals, including gender-related; family; population (including effects of drought, war, debt, etc.). **Awareness:** lack of awareness of health risks and/or options for change. **Culture:** Preferences, e.g. for taste of food cooked on biofuel stove; uses of smoke, e.g. food preservation; spiritual issues relating to hearth. **Access:** Limited access to cleaner fuels and appliances due to poverty, and inadequate or unreliable supply. **Participation:** lack of opportunities for participation in change.	**Ministry:** lack of awareness, hence weak health policy response; inadequate collaboration with other sectors. **Research institutions:** Relatively low priority as health research issue; limited funding; lack of population surveys of exposure (health risk); exposure assessment difficult in settings where problem is worst (cost, technical expertise required). **Health systems:** Focus on case finding and treatment; uncertain about role in reducing environmental exposure; lack of mechanisms and experience for collaboration with other sectors.	**Development/civil society organizations (CSOs):** Focus has been on technology for energy conservation and cost saving. **Non-health ministries:** Environment, housing, etc., tended to operate in own fields without collaboration with health CSOs. **Donors:** Projects often driven and funded by donors, rather than being participatory and market-led. **Finance:** lack of suitable local micro-credit or other ways to assist with costs of appliances. **Evidence:** History of poor projects, together with lack of evidence of successful initiatives, has reduced interest.	**Awareness:** Lack of awareness of health impacts of indoor air pollution specifically and more generally of interrelationships between household energy, gender, health and development. **Policy:** Lack of policy and strategy to address household energy and poverty, consequently minimal capacity. **Economic:** Distortions in energy sector, fuel subsidy policy not benefiting the poor. **Collaboration:** Inadequate support/facilitation of inter-sectoral collaboration at national and other levels.
3. Present level of knowledge	**Community development:** Allows participation in needs assessment and planning interventions. **Poverty reduction:** Opportunities for income generation, uptake of credit where available. Note that adoption of interventions (below) includes ability to pay. **Improved stoves:** Adoption of stoves that reduce emissions, save fuel, vent pollution to exterior. **Cleaner fuels:** Use of kerosene, gas, electricity where available.	**Role:** Health sector tends to view role as limited, so this needs to be clarified. Role includes: • collection and provision of data on health and exposures • raising awareness of health effects and need for prevention • provision of education at points of contact with the health system (in clinical or community settings) • collaboration with other sectors. **Research:** Tools and methods for obtaining valid information on:	Many options currently exist for these sectors, but implementation is mostly patchy and uncoordinated. **Energy supply:** Distribution of cleaner fuels (e.g. oil sector); other clean fuels (biogas, gelfuels). **Local commercial sector:** Artisans (e.g. stoves); distributors and suppliers of fuels and appliances **Education:** School and adult education on health risks, role of community, options for change. **Housing:** Integrate environmental	**National policy:** Integrated national policies on household energy, health and development are required, but mostly lacking. **Specific programmes:** Some examples of national initiatives, including China (rural stove programme), India (improved stove programme) and Brazil (promotion of gas). In general, few strategic national examples. **Poverty reduction:** Rural and urban poverty reduction can be expected to

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
	Housing: Improvements to ventilation, insulation (cold areas). **Behaviour:** Action to reduce fuel use, reduce exposure of family members.	exposure and health outcomes; effectiveness of education via health sector; role in collaborative initiatives with other sectors.	health into design and building. **Finance:** Targeted subsidies for development, local micro-credit. **Forestry, environment:** Renewable wood fuel resources and protection of the local environment.	have significant impact on fuel-use patterns.
4. Cost and effectiveness	**Who pays?** Costs are incurred by households through market mechanisms, as well as through investment by utilities (e.g. electricity) and government (targeted subsidies and credit support, if available). **Actual cost:** Costs to households made up of capital costs (appliances, etc.) and running costs (fuels, maintenance). Wide range of costs from US$5-7 (ceramic stove) to US$150+ for biogas or electric appliances. **Community perspectives:** There is a need for more information on how communities and households view *costs* and *benefits:* both are locally specific and tend to be complex – in part due to the multiple impacts/uses of household energy.	**Sectoral issues:** Although there are potentially large *health* gains from household energy interventions, most of the costs of interventions are *not borne by the health sector.* **Cost-benefit:** Estimates based on stoves in Guatemala and Kenya suggest benefits substantially outweigh costs for overall mortality and ALRI morbidity. **Cost-effectiveness:** Estimates for stoves in India indicate $50-100 per DALY saved. **Research:** Strengthen evidence and precision of health risk estimates for IAP (including ARI, COPD, TB, LBW, cancer, eye disease); evidence on wider health impacts of household energy; collaboration on systematic monitoring and evaluation.	**Sectoral issues:** In contrast to the health sector, it is the non-health sector (mainly) that "provides" the interventions. The issue of *cost* is complex, however, as interventions mostly need to be taken up through market mechanisms if widespread uptake and sustainability are to be achieved. A range of *benefits* should accrue to the non-health sector, including economic development, employment, environmental protection, etc. These are also benefits for the health sector. **Research:** Assessment of the costs and benefits of household energy development for the poor, across sectors, is a complex field requiring development.	**Integrated policy:** Not aware of any assessment of contribution to national economies, or reductions in national socioeconomic and health differentials, of integrated policies and investment in household energy for the poor. **Specific programmes:** Chinese rural stove programme implemented in more than 170 million homes, but evaluation so far limited. Indian stove programme has been problematic. South African electrification extensive, but substitution of polluting fuels limited in poor areas. In Brazil, gas is used extensively in rural areas. **Financial policy:** Evidence that fuel subsidies do not generally benefit the poor.
4.1 What types of intervention are under consideration?	**Requires combination** of (a) new technologies and other approaches to interventions, as well as (b) more effective implementation of existing interventions. New ideas include: • uptake of improved fuels, e.g. ethanol gelfuels, solar PV • innovative methods of raising awareness at community level, e.g. drama, community video, etc. • exploring opportunities for behavioural interventions, e.g.	**Awareness:** More needs to be done to raise awareness at all levels of the health sector about the health impacts of IAP on "headline" diseases such as ARI, as well as the overall impact of household energy on health, and of links between environment, health and development in general. **Define role:** If this sector is to be able to respond effectively, better methods are needed to define the role it can play at all levels (ministry, district,	**Combined approach:** As with the community level, requires new approaches as well as more effective implementation. To include: • development and supply of cleaner fuels and appliances, as well as new fuels (e.g. gelfuel) • strategic development of fuelwood sector, where appropriate • development of microcredit, which may require more evidence on cost-effectiveness to make case for loans	**Integrated policy:** Increased awareness at national level needs to lead to integrated policy, linked in to poverty-reduction efforts. Specific measures to include: • national capacity building • targeted financial support • energy policy which facilitates access of the poor to cleaner fuels • measures to assist the development of microcredit for household energy

	keeping child away from smoke • adopt new stove designs, e.g. the insulated "Ecostove" in Nicaragua • integrating house design with energy needs, e.g. better insulation. **Community participation** in planning and evaluation is required.	clinic, community) in any given setting. **Research:** Stronger evidence on varied impacts of household energy on health; methods for developing health sector role, with case studies.	and initial donor support. **Collaboration:** More effective mechanisms for inter-sectoral collaboration at various levels. **Research:** Development of new technologies and approaches to implementation, marketing, etc.	• resources for carrying out prioritized research. **Research:** Systematic reviews of experience to date with components of the above to guide more integrated policy.
4.2 How cost effective could future interventions be?	Action at community level has a great deal of potential. Participatory development, particularly involving women, can be very effective in promoting change. Some specific new interventions, such as the Ecostove (Nicaragua) and gelfuels (Africa) look promising. But there remains a pressing need for studies that assess the overall effectiveness and sustainability of interventions, covering a range of urban and rural settings. Also needed are impact assessment methods that can be applied more routinely and that are sufficiently flexible to allow for the very variable levels of capacity and information.	Some initial estimates of potential reductions in mortality and incidence of specific diseases such as ALRI from lowering IAP are becoming available. These are still based on imprecise estimates of risk, and as yet do not: • integrate wider health impacts of household energy on health, nor • consider the potential of interventions and (crucially) approaches to more effective and sustainable implementalion outlined here. **Research:** The health sector should take a lead in ensuring that the evidence for making these assessments is both available and clearly presented.	There is potential for cost-effective gains for a range of sectors, including environment, forestry, housing, education and employment. Some studies have shown the combination of short-term (health) and longer term (global environment) gains that may accrue from a range of different stove/fuel options in India – see text for examples. The interdependence of the costs and benefits for the many sectors involved makes any comprehensive economic evaluation very challenging, as there is only limited value in looking at the cost-effectiveness for one (sectoral) outcome at any one time.	Integrated policy on household energy and the poor has the potential to contribute to national socioeconomic development, particularly if the above measures can contribute to reducing inequalities in health and development in society. This is an important area for further study.
5. Resource flows	No information is available.			

Source: Global Forum for Health Research

Annex 5
Perinatal and neonatal care in Pakistan: application of the CAM

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
1. Disease burden	Information on incidence, prevalence, severity and burden of disease for specific areas. Affected age groups.	Awareness and data at the level of direct policy-making bodies (especially provincial and local governments) and health research systems.	Awareness of problem and linkages with other sectors e.g. education, population welfare, etc.	Federal-level information systems and linkages with the Planning Commission and Ministry of Finance.
2. Determinants	Socio-behavioural factors affecting susceptibility to disease and resilience to change e.g. maternal empowerment, dietary factors.	Awareness and data at the level of direct policy-making bodies (especially provincial and local governments) and health research systems.	Awareness of problem and linkages with other sectors e.g. education, population welfare, etc.	Federal-level information systems and linkages with the Planning Commission and Ministry of Finance.
3. Present level of knowledge	Information on disease burden and direct link to maternal and newborn health (available from both national and international sources).	Awareness of information at the level of direct policy-making bodies (especially provincial and local governments) and health research systems.	Awareness of problem, its burden and linkages with other sectors e.g. education, population welfare, etc.	Federal-level information systems and linkages with the Planning Commission and Ministry of Finance.
4. Cost and effectiveness (of future or possible Interventions)	Information on costing and effectiveness of interventions at community level, especially from programme settings.	Awareness of cost-effective interventions at the level of direct policy-making bodies (especially provincial and local governments) and health research systems.	Awareness of cost-effective interventions and their synergy or linkages with other sectors e.g. education, population welfare, food and environment agencies.	Federal-level awareness and sharing of information with the Planning Commission and Ministry of Finance.
5. Resource flows	Availability of funding opportunities for key areas, especially at population level.	Availability of research funding opportunities and alignment with research priorities as identified by the Ministry of Health (especially provincial and local governments) and the PMRC.	Availability of research funding opportunities and alignment with research priorities of other sectors e.g. education, population welfare, food and environment agencies.	Availability of research funding opportunities and alignment with research priorities of other sectors e.g. federal-level bodies i.e. Planning Commission and Ministry of Finance.

Source: Pakistan Medical Research Council

Annex 6
Newborn health research priorities (summary view)

	The individual, household and community	Health ministry and other health institutions	Sectors other than health	Macroeconomic policies
1. Disease burden	2	2	2	1
2. Determinants	2	3	1	3
3. Present level of knowledge	2	4	4	2
4. Cost and effectiveness (of future or possible Interventions)	4	4	4	4
5. Resource flows	2	4	1	4

1 = Sufficient data available
2 = Some data available
3 = Insufficient data (need for more research)
4 = No information/Critical gap/High-priority research area

Source: Pakistan Medical Research Council

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