THE 3D COMBINED APPROACH MATRIX:

AN IMPROVED TOOL FOR SETTING PRIORITIES IN RESEARCH FOR HEALTH

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CONTENTS

ABBREVIATIONS AND ACRONYMS

AIDS	acquired immunodeficiency syndrome
ACHR	(WHO) Advisory Committee on Health Research
BOD	burden of disease
CAM	Combined Approach Matrix
CHNRI	Child Health and Nutrition Research Initiative
2D CAM	Two-Dimensional Combined Approach Matrix
3D CAM	Three-Dimensional Combined Approach Matrix
COHRED	Council on Health Research for Development
DALYs	disability-adjusted life years
ENHR	Essential National Health Research
GBD	global burden of disease
HEALYs	healthy life years
HIV	human immunodeficiency virus
IAP	indoor air pollution
ICMR	Indian Council of Medical Research
LMICs	low- and middle-income countries
NICED	National Institute of Cholera and Enteric Diseases
NCD	noncommunicable diseases
QALYs	quality-adjusted life years
R&D	research and development
SWOT	strengths, weaknesses, opportunities and threats
TDR	UNICEF/UNDP/World Bank/WHO Special Programme on Research and Training in Tropical Diseases
VHIP	Visual Health Information Profile
WHO	World Health Organization

EXECUTIVE SUMMARY

Background and rationale

Huge disparities in health between and within countries and populations are paralleled by huge disparities in access to health research funds and to the benefits of health research.

The main focus of the Global Forum for Health Research, established in 1998, has been to address what is known as "the 10/90 gap". While not constituting a current quantifiable measure, the 10/90 gap has become a symbol of mismatch between research needs and investments. Equity in health research, as a contribution to health equity itself, is an underlying value and major objective of the Global Forum's work.

In recognition of the importance of priority setting in health research for the achievement of this goal, the Global Forum for Health Research developed a tool called the Combined Approach Matrix (CAM). The rationale of the CAM is to bring together a large range of factors, along different dimensions, into a single analytical tool.

The point of departure was the five-step methodology developed by the World Health Organization (WHO) which links burden of disease with determinants, level of knowledge in relation to interventions, cost-effectiveness and financial flows. In order to incorporate "actors with factors", the first version of the CAM comprised two dimensions, adding an institutional dimension to the public health dimension, made up of the five elements above.

The analytical power of the tool was increased by allowing each of the public health elements to be analysed according to four institutional levels, namely the individual, community and household, the health sector, all other sectors, and governance.

The tool has now been further refined into a Three-Dimensional Combined Approach Matrix (3D CAM) which is described in this document. Through extensive experience with different applications of the CAM, it became clear that a further dimension was required to capture the multiple forms of discrimination, marginalization and vulnerability which operate *beyond the original two dimensions* to make sure that the priority setting in research benefits those with greatest need and contributes to improved health and equity.

The addition of an equity dimension to the CAM not only increases its sensitivity to the root causes of the 10/90 gap but it aligns the priority-setting process with the rights-based approach to health as stated in the WHO Constitution: "The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being *without distinction* of race, religion, political belief, economic or social condition." (emphasis added)

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The 3D Combined Approach Matrix

Priority setting in research for health is a difficult task in rich and poor countries alike. It is especially important in low-income settings where health needs are high and resources to address them are limited. The goal of priority setting in research is to identify neglected areas and invest in research that will result in improved interventions for the populations in greatest need. When research priorities are based on scientific evidence, it is easier to advocate for appropriate allocation and even for a major shift of resources towards previously neglected areas.

The 3D CAM has been developed for use in a priority-setting exercise which is based on three equally important pillars: *process, tools* and *context*.

The *process* of selecting priorities is a continuous and cyclical activity that involves a large number of stakeholders. The key is to make the process as objective and participatory as possible and define priorities that are responsive to local needs.

Priority-setting *tools* are instruments that enable the collection, organization and analysis of information needed to help set priorities.

Priority setting is a value-laden and political process which is undertaken to assess health research needs in a particular social, economic and cultural *context*. It is important to understand how values, beliefs, power structures and socio-economic factors affect society as a whole and how they interact with health.

The 3D CAM involves consideration of factors along three axes: the public health, the institutional and the equity dimensions. The *public health dimension* comprises five elements: magnitude of a health problem, determinants, level of knowledge in relation to interventions, cost-effectiveness and financial flows. The *institutional dimension* comprises four elements: the individual, household and community level; the health sector; other sectors; and governance.

The *equity dimension* is yet to be fully defined and elaborated. It aims to elucidate the correlates of poverty, powerlessness and social injustice and may include categories such as gender, poverty, disability, religion, educational status or race. Future experience with applications of the 3D matrix in different settings will clarify the usefulness and appropriateness of this new dimension.

Instructions for completing the 3D matrix are provided. There is a logical order to the process which is undertaken in participatory workshops on the basis of the fullest possible evidence. The public health dimension is completed first, followed by the institutional dimension and then the equity dimension. It is important to understand that not all cells can be filled and that in some cases, this is an indication of a gap and quite possibly, of a significant research priority.

The 3D CAM has been designed to identify, explore and analyse a large number of factors, and their complex interactions, across three different dimensions, and then to synthesize that information as concisely – and precisely – as possible, in a matrix, in order to maximize the chance that the priorities that are eventually selected, are indeed those which will contribute most effectively to equity in health.

1

EVIDENCE-INFORMED PRIORITY SETTING: EVOLUTION OF THE CAM

Efforts to encourage and facilitate the systematic incorporation of evidence into the process of health research priority setting have gradually evolved over the last two decades. In 1990, the report of the Commission on Health Research for Development noted 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 judgment supports the possibility that new products and initiatives will be more cost-effective than available alternatives, or for ongoing efforts elsewhere"*.[1]

Insert 1 Evidence-informed priority setting

The explicit and rational setting of priorities for investment in research is now accepted as an integral part of any research management process. Setting priorities in research can serve to act as a catalyst for public debate, for bringing together different stakeholders, and for creating networks. These networks would ideally comprise researchers in the public and private sectors, decision-makers in governments, and civil society. Most importantly, the very act of priority setting can provide valuable direction for the allocation of public and private research funds into areas of strategic importance. It can also serve to strengthen the role of national stakeholders as stewards of the national research agenda. National research priority setting, if it includes a regional and international perspective, can also feed into and drive regional and international agendas rather than 'respond' to the agendas suggested by others.

Source: *Priority-Setting Methodologies in Health Research*[2]

1.1 Essential National Health Research Strategy

The Commission on Health Research for Development advocated the use of a systematized approach to priority setting within each country's Essential National Health Research (ENHR) strategy. The Council on Health Research for Development (COHRED) was established in 1993 to assist developing countries with the implementation of this strategy. 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 action.[3] Three essential stages were recommended by COHRED to increase the effectiveness of the priority-setting process:

Planning the priority-setting process

- Identify leadership for the process, i.e. the central government or a body officially designated 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 by 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.

1.2 WHO Ad Hoc Committee on Health Research

In 1996, the landmark report, *Investing in health research and development*, published by the WHO Ad Hoc Committee on Health Research Relating to Future Intervention Options, recommended a five-step process for priority setting in health research:[4]

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.
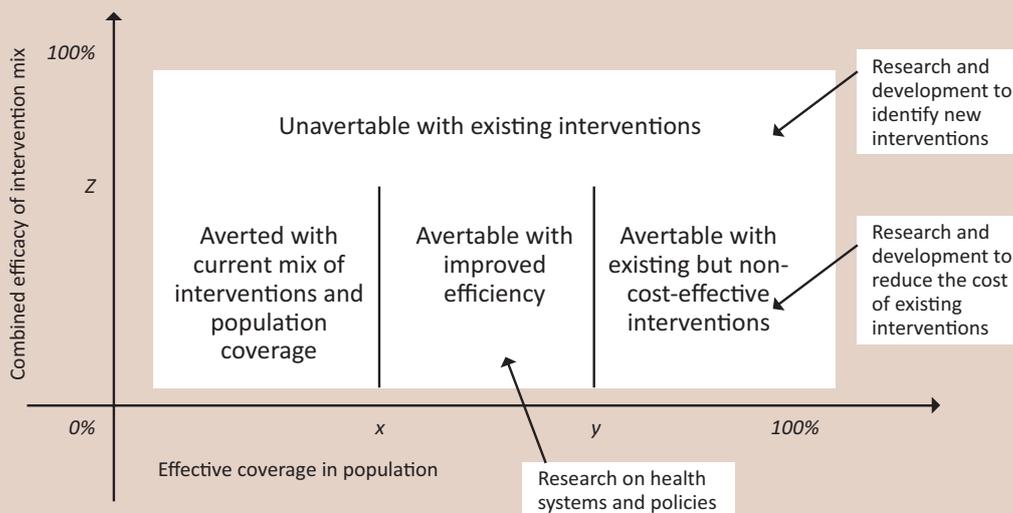
In its 1997 publication,[5] the WHO Advisory Committee on Health Research (ACHR) set out the Visual Health Information Profile (VHIP), a computer-based visual display showing the "totality of the health status of a country" in a way that enables comparisons of health

status both for a given country over time and between countries at a given point in time. 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.

One of the main contributions of the report of the Ad Hoc Committee on Health Research was the development of a methodology for the identification of specific areas where further investments in R&D would make a difference to global health. The methodology included five analytical steps, focusing attention on consideration of the attributable disease burden likely to be reduced by interventions and attendant costs (Insert 2). 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 intended 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.

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 interventions

Combined efficacy of intervention mix

100%

Unavertable with existing interventions

Research and development to identify new interventions

z

Averted with current mix of interventions and population coverage

Avertable with improved efficiency

Avertable with existing but non-cost-effective interventions

Research and development to reduce the cost of existing interventions

0%   x   y   100%

Effective coverage in population

Research on health systems and policies

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).

The International Conference on Health Research for Development (Bangkok 2000)[6] 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"*.

2

THE TWO-DIMENSIONAL COMBINED APPROACH MATRIX (2D CAM)

It became clear that (at least) two dimensions needed to be taken into account in the priority-setting process: the "public health" dimension as underlined in the Ad Hoc Committee's five-step process and an "institutional" dimension as emphasized by the Commission on Health Research for Development in its ENHR strategy and the Advisory Committee on Health Research in its VHIP modelling work.

In order to bring these two dimensions together in a single framework, the Global Forum for Health Research developed the Combined Approach Matrix (CAM).[7] The tool aims to (i) classify, organize and present the large body of information that enters into the priority-setting process; (ii) identify gaps in health research; and, on this basis, (iii) assist in identifying health research priorities, based on a process which should include the main stakeholders and take account of the context and values of those involved. The resulting matrix for priority setting is presented in Insert 3.

Insert 3 The 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				

Source: *The Combined Approach Matrix: A Tool for Priority Setting in Health Research.*

The advantage of the matrix is that it helps organize, summarize and present all available information on one disease, risk factor, group or condition, and facilitates comparisons between the likely benefits of different types of intervention at different levels. It should be noted that the information available to complete the matrix may be partial and even sketchy in some cases, but it will improve progressively, and even limited information is sometimes sufficient to indicate promising avenues for research.

2.1 Application of the 2D CAM: selected examples

The first edition (2004) of the Global Forum's publication on the CAM provided detailed accounts of its application in a number of different settings, some of which are summarized below:

Global level

The UNICEF/UNDP/World Bank/WHO Special Programme on Research and Training in Tropical Diseases (TDR) undertook a priority-setting exercise in 2002–2003 to realign TDR's strategic focus in research to address the disease control priorities of the next five years. A modification of the CAM led to the identification of the following seven questions used in the TDR prioritization process:

- What are the nature and extent of the disease burden and epidemiological trends?
- What is the current disease control strategy?
- What are the major problems/challenges for disease control?
- What research is needed to address these problems/challenges?
- What is currently being done in R&D, and what research opportunities exist?
- What are TDR's comparative advantages?
- What are the strategic emphases for R&D?

The result[8] was the definition of a set of "strategic TDR emphases" (or priorities) in its scientific and technical areas of work for the next few years.

National level

Diarrhoeal diseases research in India

In 2000, the Global Forum for Health Research presented the CAM concept and principles to a group of Indian Council of Medical Research (ICMR) scientists in New Delhi. During 2002-2003, the National Institute of Cholera and Enteric Diseases (NICED) applied the CAM to setting research priorities for diarrhoeal diseases in India. An expert group of scientists drawn from various disciplines summarized current knowledge in order to complete the cells of the CAM matrix. In addition, a SWOT (strengths, weaknesses, opportunities and threats) analysis carried out by NICED helped to highlight the Institute's major contributions and achievements, and the areas in which it has greater chances of achieving success.

The main reason for the persistence of the burden of disease appeared to be that a majority of health care providers were not consistently applying the standard guidelines for management of diarrhoeal diseases, especially those working as private practitioners. Misconceptions about infant and child feeding were widely prevalent and, in many cases, the physician was the person providing inappropriate suggestions. Although the role of antimicrobials is very limited during attacks of diarrhoea, the review revealed that their use had become routine.

The CAM application highlighted the need for better understanding of socio-cultural norms and training of health care providers. Individual and community-level information was inadequate but exposure to electronic media had a significant impact on mothers' awareness about oral rehydration treatment and its use.

Pakistan's National Action Plan for noncommunicable disease (NCD) prevention, control and health promotion

The National Action Plan was a collaborative initiative of the Ministry of Health, WHO Pakistan office and Heartfile.[9] This public-private partnership was mandated to develop an evidence-based, long-term strategic plan of action for achieving national goals for the prevention and control of NCDs.

A priority-setting workshop for the experts was also held in Islamabad, in which the CAM was introduced as a research priority-setting tool. The resulting Action Plan delivered an integrated approach to NCD prevention and control for Pakistan. In this approach, the CAM

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was used as a first step in priority setting through the organization of information relating to a concerted public health response across a range of NCDs.

Latin America

In Brazil, the Ministry of Health in Brasilia has translated the CAM into Portuguese[10] and has disseminated it for widespread application. The Ministry has adopted this tool for its own regular, systematic setting of national priorities in health research.

A report from the Global Forum documents examples of the application of the CAM in other several Latin American countries including Argentina, Bolivia, Colombia and Mexico.[11]

Specific health conditions

Schizophrenia and epilepsy

There is little infrastructure in the developing world for research in the fields of mental and neurological disorders, in part because of the neglect and stigmatization of these conditions. The Global Forum commissioned a CAM study to demonstrate the setting of research priorities in the area of mental health. Two diseases – epilepsy and schizophrenia – were chosen, as examples of neurological and psychiatric disorders respectively. A senior epidemiologist who was familiar with the application of the CAM methodology carried out desk reviews. These were based on peer-reviewed publications, mostly prepared by WHO, and other similarly authoritative international monographs and reports.

The analysis of the matrices revealed that further research is needed on a myriad of issues, such as: the concept of an additional burden to the family or the caregiver of the individual affected by a neuro-psychiatric disease; cost-effectiveness of health interventions to minimize the burden of disease on individuals and their families and caretakers; traditional and cultural concepts such as superstitions and misconceptions about the disease, leading to low consultation rates in health centres, and to a low rate of use of effective drugs; deficiencies in the health system structure; lack of personal and diagnostic facilities; lack of access to and availability of efficient means of treatment; and overcoming stigmatization and social isolation, in relation to patients, their families and their communities.

Specific risk factors

Indoor air pollution

Indoor air pollution (IAP), which derives mainly from the use of simple biomass fuels (wood, dung and crop wastes) by poor people, is a major public health problem in low-income countries and an important risk factor requiring priority research. Around three billion people and up to 80% of homes in *low- and middle*-income countries (LMICs) are still dependent on biofuels for household energy needs. Often used indoors on simple stoves with inadequate ventilation, the practice leads to high levels of indoor exposure, especially for women and young children.

While the effects of IAP manifest themselves in health outcomes, the interventions to deal with it are rooted in sectors other than health. This observation led to the application of the CAM to identify gaps in research. Desk reviews were carried out by a senior epidemiologist in order systematically to analyse the available literature. The studies, based on peer-

reviewed publications, were synthesized and the results presented to and discussed by a group of experts. The results of the exercise showed that applying the CAM in the field of indoor air pollution identified a need for a broad range of multidisciplinary research.

Vulnerable groups

Perinatal and neonatal care in Pakistan

The available evidence indicated that perinatal mortality rates in Pakistan ranged from 50 to 90 per thousand births. Application of the CAM involved an in-depth literature review of local and regional data, consultations with experts and researchers in the field and a number of meetings/workshops. The process highlighted the urgent need for an objective assessment of the burden of mortality and morbidity relating to the neonatal period. The socio-cultural and behavioural aspects of newborn care by family members and other care-providers were revealed as an important area requiring more research.

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 female health workers for improved intrapartum and postnatal care of the mother and newborn. In summary, the CAM allowed a systematic analysis and evaluation of the available evidence on perinatal and newborn care in Pakistan and of the existing evidence and evidence gaps in relation to the burden of disease, basic determinants and the policy framework of the Ministry of Health and other departments of the government of Pakistan.

Since the publication of the CAM manual in 2004, it has found widespread application, including by governments, international agencies and initiatives, as a tool to assist in research priority setting in a variety of different contexts. Examples include:

Argentina

The Argentine Forum for Health Research has applied the CAM to setting priorities in a range of research areas, including HIV/AIDS,[12] maternal morbidity/mortality,[13] road safety[14] and tobacco addiction.[15]

Child health and nutrition research

The Child Health and Nutrition Research Initiative (CHNRI) has further developed the CAM approach to produce a priority-setting tool specifically customized for its areas of interest. The CHNRI tool has been applied to a number of problems including research in child health and nutrition in the Africa, Asia-Pacific and Latin American regions[16] and research on diarrhoea.[17]

Malaysia

The Ministry of Health, Malaysia, adopted the CAM in setting its research priorities for the 9th Strategic Plan, 2006-2010. The Research and Technical Support programme of the Plan selected eight disease burdens of priority: ischemic heart diseases, mental illnesses, cerebrovascular diseases, road traffic injuries, cancers, diabetes, infectious diseases and respiratory illness.[18]

WHO

The WHO *Priority Medicines for Europe and the World* initiative conducted detailed background studies using the Global Forum's CAM framework.[19]

2.2 Lessons learnt

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 these, as illustrated by the examples in the previous sections. The CAM provides a conceptual framework for compiling information relevant for priority setting in health research. It is also a practical and standardized tool for data presentation, and for improving transparency of rational decision making in the priority-setting process.[20]

The tool requires that 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 to reduce the entirety of the pertinent scientific literature to a few key sentences. Some may consider that the exercise oversimplifies the issues and lacks rigour. Others, however, accept the challenge and find it useful as a means of distilling the essential information from a mass of complex data.

The last two steps in priority setting (in the public health dimension of the CAM) concern cost-effectiveness of interventions and resource flows for the disease/risk factor under consideration. Many investigators have found it difficult to trace such information. In fact, apart from occasional studies in health systems and health services research, such information rarely exists and the empty or partially filled row indicates a gap in data or a neglected area of research, which is one of the objectives of the exercise.

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 that populations' health is influenced by a combination of multiple factors not by health systems alone.

Application of the CAM often reveals 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 a socio-cultural gap between health care providers and patients). 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 services research, operational research, research on health policies and research on priority-setting methodologies.

The CAM has proved to be an extremely useful tool in situations where a cluster of conditions or diseases are part of a wider health problem. For example, the application of CAM to mental disorders such as depression and schizophrenia has provided information not only to set priorities for these diseases but also on the overall burden of mental disorders.

3

HEALTH EQUITY AND THE GLOBAL FORUM FOR HEALTH RESEARCH

In emphasizing the highest attainable standard of health as a fundamental human right, the WHO Constitution highlighted the importance of health equity and the need to pay attention to a range of determinants of health – including, but also going beyond, biological factors. In the subsequent decades, clear evidence has emerged of important impacts on health of economic and social factors such as poverty, gender, ability and ethnicity.[21]

Health equity, defined[22] as "the absence of unfair and avoidable or remediable differences among social groups" is a guiding principle of work undertaken by the Global Forum for Health Research.

The concept of equity is central to the idea of the '10/90 gap', an expression adopted to symbolise the continuing imbalance in the proportion of global resources for health R&D that are devoted to the health of different populations, with far too little being spent to address the health needs of populations in LMICs.[23] The Global Forum works strategically to promote and facilitate research to identify and address health inequities linked with a wide range of factors including economic, geographical, institutional, political, socio-cultural, and technological.[24] (Insert 4)

Insert 4 Research for health

The Global Forum for Health Research defines 'research for health' as research undertaken in any discipline or combination of disciplines that seeks to:

- understand the impact on health of policies, programmes, processes, actions or events originating in any sector – including, but not limited to the health sector itself and encompassing biological, economic, environmental, political, social and other determinants of health;

- assist in developing interventions that will help prevent or mitigate any adverse impact;

- contribute to the achievement of health equity and better health for all

Source: Global Forum for Health Research Strategy, 2008-2014

The importance of gender-based analysis has been widely recognized[25] and concerns for gender equity, which have always been prominent in the work of the Global Forum,[26] have been extended to considerations of inequity and bias resulting from many other forms of social discrimination. Through disaggregated collection of data and the application of analytical approaches, research can expose discrimination and contribute to its elimination.

The Global Forum supported the final development, publication and dissemination of the *BIAS FREE* Framework, an analytical tool for identifying and eliminating biases in research.[27,28] The Framework addresses multiple forms of discrimination deriving from biases based on gender, disability, age, class, caste, socio-economic status, religion, sexual orientation, etc. The *BIAS FREE* Framework consists of a set of 19 questions clustered under three main problem types: *Maintaining a hierarchy, Failing to examine differences* and *Using double standards*. The analytical questions challenge users to detect biases in research, policies, programs, service delivery and practice and also point to solutions to prevent and counter such bias.

4

THE THREE PILLARS OF PRIORITY SETTING: PROCESS, TOOLS AND CONTEXT

Priority setting in health research always presents a challenge for researchers and decision-makers but especially so in low- and middle-income countries, where the gap between health needs and resources to address them is wide. This situation is further aggravated by a lack of reliable information, weak priority-setting institutions, and unclear priority-setting processes.[29] The goal of priority setting in health research is to identify neglected areas and invest in research that will benefit large segments of the population, particularly marginalized groups, to improve health outcomes and health equity.

A priority-setting exercise is based on three equally important pillars: *process, tools and context.*

4.1 The first pillar: the process of priority setting

The process of selecting priorities is a continuous and cyclical activity that involves a large number of stakeholders. The goal is to define a research agenda that is clear, concise and responsive to local needs.

The following five steps are vital to ensure that the process of priority setting in research for health is inclusive, transparent and effective:

1. Determine focus and level of analysis
2. Select stakeholders
3. Collect data and prepare a background brief
4. Conduct a workshop to set priorities
5. Disseminate the findings

Step 1: Determine focus and level of analysis

The first step in a priority-setting exercise is to identify the level of analysis (i.e. global, regional, national or sub-national) and focus by clearly defining the research beneficiaries. This will help focus a country's research agenda on priority health problems. Without a clear focus and level of analysis, the priority-setting process may be derailed by discussions which are not relevant to the situation under examination.

Step 2: Select stakeholders

The composition of stakeholders is country-specific, but possible groups may include government, academia, scientists, health professionals, non-governmental sector, funders, civil society and international development partners as well as research beneficiaries. Considering international perspectives in the national research priority-setting helps make the process more responsive to country-specific needs and avoids donor driven research agendas. The involvement of beneficiaries of priority research areas not only ensures appropriate and relevant research, but also improves accountability.

It may not be possible to invite or gather all the stakeholders in one workshop. However, the participation of stakeholders from all sectors and disciplines that have an impact on health and their input must be obtained through smaller meetings and consultations.

Step 3: Collect data and prepare a background brief

The group or institution responsible for conducting the exercise (workshop) should prepare a background brief outlining the identified needs, a rationale for the priority-setting exercise, a synopsis of what the current priorities are and how they have been identified. This background brief will enable the workshop participants to reflect on major issues in a focused manner.

The existing evidence on the issue/topic of interest should be collected before conducting the exercise by the organizing group. Since evidence is always context-specific, a judgment should be made about its applicability beyond that context. The participants may add their own experiences or identify data that can be utilized to fill the gaps. In most low- and middle-income countries the availability of valid and reliable data may be an issue of concern. If country-specific data are not available, global literature or relevant experts from the field may provide some useful information.

Step 4: Conduct a workshop

A priority-setting exercise should be carried out in a workshop, in which all stakeholders are represented as set out in step 2. The workshop can be designed to be a one-day exercise in applying the selected priority-setting tool, provided most of the relevant data are available and participants are familiar with the use of the tool. Otherwise, the process may require two or three days. The Global Forum recommends using the Combined Approach Matrix in this workshop. The tool is described in the next section.

Step 5: Disseminate the findings

The dissemination process is an essential component of a priority-setting exercise and should be planned along with other components. Once the findings of the exercise are available they need to be disseminated as widely as possible. One approach may be to prepare a comprehensive report and conduct dissemination seminars for all relevant stakeholders. The report should present the rationale for the priority-setting process, the role of the participants, the identified priorities and gaps and the conclusions.

4.2 The second pillar: the tools for setting priorities

Tools such as the Combined Approach Matrix described in this document, are designed to enable the collection, organization and analysis of information needed to set research priorities in health. Objectivity, validity, and replicability are features that are required of any such tool to ensure that the priority-setting process is rational and transparent. When research priorities are based on evidence, one can easily justify the shift of resources into areas where they are most needed. In addition, a priority-setting tool in research for health should facilitate the exploration of a full range of research topics including biomedical, public health, health systems, social determinants or other cross-cutting issues in health.[30]

The Combined Approach Matrix, as it has evolved today, is a tool that considers three dimensions in priority setting: *public health, institutions and equity.*

4.3 The third pillar: context

Priority setting is a value-laden and political process which is undertaken to assess health research needs in a particular social, economic and cultural context. It is important to understand how values, beliefs, power structures and so on, affect society as a whole and how they interact with health.

Priority-setting decisions are guided by local values (i.e. culture, attitudes and practices) as well as context (i.e. availability of resources, political factors, epidemiological situation, etc.). The need to choose among competing values in different contexts makes priority-setting a complex process often requiring ethical judgement.[31]

All actors engaged in priority setting, whether at the global, national, institutional or personal levels, have their own underlying priorities and values. Some are explicit and some are implicit. Explicit values are often expressed in the public domain, e.g. national policy statements and global commitments or institutional missions. Implicit or underlying values may not always be openly expressed but they are part of the social and cultural context of health. Both explicit and implicit values need to be considered in priority setting because they are likely to influence programming, budgetary allocations and societal choices.

Finally, various disciplines bring different values to the priority-setting process. For example, health economics encourages a focus on cost-effectiveness and efficiency, policy approaches may emphasize legitimacy, while evidence-based medicine may look at effectiveness of interventions. When values conflict, policy-makers must make informed and careful decisions in order to reach context-specific agreements involving trade-offs of societal values.[31]

Context is mainly about the availability of resources and political factors that affect priorities in research for health. For example, despite the evidence that investing in primary health care is more cost-effective than investing in high-level specialized, tertiary health care, primary health care in most low- and middle-income countries remains underfunded. In this regard, it should be noted that resources and priorities may not match if priorities are set from a perspective that differs from that of funders. For example, the development of vaccines for neglected diseases receives high societal priority but there are far more profitable lines of enquiry for pharmaceutical research and so this remains an underfunded area.

As a final point, individual researchers might hone their technical skills and pursue interests in areas that are prestigious, intellectually challenging or professionally rewarding rather than responsive to societal needs.

To ensure that resources are directed to populations with the greatest research needs, context (resources and political factors) and values need to be considered in the priority-setting exercise in addition to the usual factors such as the magnitude of a health problem, health impact, the vulnerability of a population and the intervention costs.

5

THE THREE-DIMENSIONAL COMBINED APPROACH MATRIX (3D CAM)

In the course of numerous applications of the Combined Approach Matrix, it became clear that it has the capacity to address diverse health problems arising from a range of biological, social and other determinants. However, the underlying causes of health problems relating to poverty, powerlessness, exclusion and all kinds of discrimination such as gender, race or religion, may not be apparent or may not be recognized, depending to some extent on the qualifications and experience of those using the CAM.

During the period 2005-7, the Global Forum examined the applications of the CAM to specific issues where gender would be expected to be a key factor. Workshops were organized in Geneva, India and Zambia to conduct priority-setting exercises on HIV/AIDS and maternal mortality. These experiments demonstrated that the CAM could, in principle, be used very effectively to examine research priorities in areas where gender is an important determinant. One important lesson was that, for the CAM to serve as an appropriate tool for this kind of analysis, it was necessary both to involve facilitators experienced in gender analysis and to provide explicit guidance in how to incorporate gender considerations into the CAM process.

With the renewed interest in health equity and the very large research literature on social determinants of health, relatively little attention has been paid to the importance of equity in a research priority-setting process. Setting priorities only on the basis of two dimensions, i.e. public health and institutional, may lead to priorities which do not fully reflect the needs of the most vulnerable populations and are not aligned with the overall goal of achieving health for all and health equity. Based on this experience, and taking account of the broader range of social and economic factors that have emerged as being significant determinants of health, the Global Forum has further developed the original CAM by extension into the 'third dimension' – adding an equity dimension to the original two dimensions of the matrix. The purpose of the third dimension of the CAM is not intended as an academic discourse on equity. Rather it should be thought of as a cross-cutting issue to keep in mind in order to facilitate the planning and conduct of research, which will ultimately result in informed policy decisions that are aimed at improving not only the average level of health, but also its distribution and hence, equity.

 In addition, some of the components of the public health and institutional dimensions have also been revised. For example, the 2D CAM has been critisized for its inability to address health systems and policy issues. In the 3D CAM, instead of disease burden the magnitude of a health problem is used. Health problem could be related to medical problems such as diseases, risk factors, or conditions, and facilitates comparisons between the likely cost-effectiveness of different types of interventions at different levels. The health problem could also be related to health policies and systems, such as issues of access to healthcare, availablity of high quality services, qualified health workforce and other issues that influence people's health. On the axis of the institutional dimension, health sector and governance are used instead of health ministry and other health institutions and macroeconomic policies, respectively.

Equity is an ethical concept and a value judgment made by societies as to what constitutes fairness or social justice in a given context. Equity should be differentiated from equality which does not take into account whether the existing disparity is unfair or unjust. Simply put, equity is unfair inequality. Equity in health is defined as the absence of systematic and potentially remediable differences in one or more aspects of health across socially, demographically,

or geographically defined populations or population subgroups.[32] Inequities in health puts groups of people who are socially disadvantaged by virtue of for example being poor, female or members of certain racial or religious group, at a further disadvantage with relation to their health.[33] Equity in health directs attention towards the health of these disadvantaged population groups. For example, a policy or programme aimed at improving the health of the marginalized groups of society versus average health of the population, would be considered as equitable. Even though higher investment may be required to attend to the needs of the vulnerable populations, if equity is a goal, the investment is justified.[34]

Insert 5 The three-dimensional matrix

However, to develop an 'equitable' health policy or program, strong evidence is needed through equity research that considers the influences of various factors on the distribution of health at different levels (household, community, local, etc).

The three dimensions of the CAM and instructions for completing the matrix are presented below. It is important to have initiated a priority-setting process (see section 4) in which all interested and concerned stakeholders are involved.

5.1 The public health dimension

The public health dimension of the CAM is comprised of the following five components:

Component A. The magnitude of a health problem

The first component is to measure the magnitude of the health problem under investigation. As mentioned previously, a health problem is broadly defined and can be medical or disease-oriented as well as health system related. Depending on the problem, appropriate measure(s) can then be selected and agreed upon.

Component B. Causes (determinants) of the health problem

The second component consists of analysing the factors that are responsible for the persistence of the health problem, such as a lack of knowledge about the condition or disease, insufficient coping mechanisms, poor policies and programmes, weak institutions or factors outside the health domain.

To define a health problem, information can be collected from global reports and international, peer-reviewed literature. However, there are always some important, local reasons for the persistence of a problem, which need to be considered closely when identifying research priorities.

Component C. Available evidence/knowledge of interventions

The third component is about assessing the present knowledge available to help solve the health problem and evaluate the applicability of solutions, including the costs and the effectiveness of existing interventions. For this purpose, international reports and peer-reviewed literature can provide a good starting point but it is important to be aware that there are limits to how far international evidence can only be generalized. Local and national documents and reports should also be thoroughly analysed and local experts' opinion, sought. If information is not available this becomes a priority area for research.

Component D. Cost-effectiveness of interventions

The important point in Component D is to know whether the desired intervention is, or is expected to be, cost-effective. To this end, workshop participants should assess the promise of the R&D effort against other potential interventions, and determine whether future research developments would reduce costs, be cheaper than existing interventions, and therefore accessible to a wider group, especially to poor and marginalized populations. If such information is not available, expert opinion may provide some answers.

Component E. Present level of investments/resources flows

Component E consists of calculating the present level of investments in research for the health problem that is being considered. This will reveal the sources and amount of research funds that are being allocated to the specific problem and give a clear sense of whether the problem is a high priority on the country's research agenda.

This information is often lacking because most national and local health budgets, especially in most low- and middle-income countries do not disaggregate information about specific diseases and conditions, and much less about research for health.

5.2 The institutional dimension

The institutional dimension of the 3D matrix encompasses four groups of factors/actors that have direct or indirect impact on population's health.

Component A. The individual, household and community

While genetic factors cannot be easily changed, an individual can make some lifestyle choices that have impact on health. For example, a person may decide whether or not to smoke, make healthier dietary choices or to engage in exercise. But behavioural changes are difficult to implement if the social environment is not conducive to change.

Families' role in the health of an individual is well documented. Clinical experience shows that families influence and get influenced by the health of their members and that family interventions can improve health outcomes.[35] The way communities are organized as well as their values and perceptions also affect population's health status through local decisions on hygiene and sanitation, education, shelter, employment and handling of violence.

This column of the matrix reviews available information/evidence relating to interventions for identified problems that can be implemented at different levels, for example by the individual, family/household or community. In the case of malaria, prevention using barrier methods such as insecticide-impregnated bed nets is a key intervention at the individual, household and community level in resource-poor environments, while large scale public works such as the drainage of ponds or marshes are undertaken at the municipal or national level.

Component B. The health sector

The ministry of health is the main health policy making body in most countries and is responsible for planning, regulation and oversight of health promotion, disease prevention and treatment activities. The provision of curative and preventive services is insured by primary, secondary and tertiary level health facilities in both public and private sectors. The availability and unimpeded access to high quality health services profoundly influences the health status of a population.

This column in the matrix assesses the contribution of the health ministry and health institutions to the control of the specific health problem/ 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, for example increasing access to health services, or reducing the price of medicines, or linking community-based initiatives to basic health services.

• The potential of the health research community to provide methods and processes that enable the health system to improve health and reduce disease.

Component C. Sectors other than health

There is general consensus that certain factors commonly referred to as social determinants of health, such as access to clean water, safe housing, healthy food and environment, are linked to health outcomes. However, the health sector alone is unable to tackle the causes of ill health. Many of the health determinants have to be dealt with by policies and actions in sectors outside the health system, such as education, international trade, the labour market, environmental protection, water and sanitation, transport and road safety. With "research for health" gaining ground as a concept, it is important to go beyond what is traditionally considered the domain of the health field and include factors outside the health sector that have impact on populations' health.

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

Component D. Governance

Governance is defined broadly as "the traditions and institutions by which authority in a country is exercised. This includes the processes by which governments are elected, governments capacities to formulate and implement sound policies, the respect for its citizens and the performance of institutions that ensure economic and social interactions among them".[36] Good governance has a significant positive impact on populations' health outcomes. It is also found to enhance the effectiveness of development assistance in health. For example, the World Bank estimates that with good policies and institutions (strong property rights, reduced corruption and efficient bureaucracy), an extra 1% increase in development assistance results in 0.9 % reduction in infant mortality rates. When policies and the performance of institutions is average, infant mortality declines by only about 0.4% and with poor policies there is no significant change in infant mortality statistics.[37]

This column in the matrix focuses on the structures and institutions at central government level and international decisions or initiatives that may increase or decrease the burden of disease. An example of this is the impact of the World Trade Organization agreements concerning intellectual property rights on the provision of antiretrovirals for the treatment of people living with HIV or decreased allocations for health (research) by the ministries of finance and/or planning.

5.3 The equity dimension

As mentioned earlier, equity in health refers to the absence of systematic disparities in health (or in the major social determinants of health) among different social groups. By definition, inequity refers to avoidable disparities in health, since not all health disparities are unfair. For example, younger populations tend to be healthier, female newborns have lower weight at birth on average, and prostate problems affect only men.[38]

Equity is about distributive justice; in research for health, it is important to study not only the average level of population health but also its distribution, as well to make sure that the needs of the most vulnerable groups are identified. The equity dimension of the combined approach matrix facilitates comparison of different social groups in relation to particular health-related or health systems related problems. Social groups can be defined on the basis of gender, income level, race or ethnicity, religion or sexual orientation, depending on the context. The equity dimension takes into account the issues, concerns and biases which are not effectively addressed in the institutional and public health dimensions but are critical to the process of priority-setting in health research resulting in effective interventions carried out by appropriate sectors. For example, from the perspective of equity, health services aimed at early detection and prevention of certain diseases are effective at reducing disparities in severity of illness, while interventions outside the health sector are more likely to have greater impact on the occurrence (incidence or prevalence) of diseases.[39]

The analysis of the equity dimension starts by defining social groups *a priori* ("equity stratifiers") and then examines the health differences among them. The most commonly used equity stratifiers are *income* and *gender* but there are many more to be examined and taken into account. The Insert below gives examples of questions that need to be addressed in a priority-setting exercise when considering the equity dimension.

Insert 6 Equity and health

The distribution of health across societies is not equal; health indicators differ between and within countries. Any priority-setting exercise should highlight and address these inequalities.

Typically, the questions that need to be addressed are:

- Is the problem or burden the same across different societal groups?
- What are the differences in terms of income, assets, access to resources (e.g. land, water), by race, social class, geography, religion and gender that need to be accounted for?
- Which factors are responsible for the differences across groups?
- Do the disease factors affect the groups differently?
- Is sufficient knowledge available to focus interventions on disadvantaged groups?

Source: Global Forum for Health Research

Gender discrimination is an important source of vulnerability. However, defining this vulnerability depends on the context. Women have specific health conditions and needs, which are determined by biology and in particular by reproductive health risks. Many diseases (i.e. cardio-vascular conditions, lung cancer, mental health problems and others) manifest differently in women and men, and require different prevention measures and treatment.[40] Therefore, in addition to access to health care, it is also necessary to consider the mix of services being offered, including the need to redirect scarce resources towards services that directly benefit women. This must be taken into consideration when setting priorities for research.

Another gender-related vulnerability relates to poverty. On the whole, women are poorer than men and have less access to income earning opportunities and other resources, including health care. There are also major differences in the status accorded to men and women in different societies; different behaviours expected of them; different roles and duties assigned to them; and different opportunities for access to resources and services. These differences are not inherent in their biological makeup, but are gender-based – where 'gender' refers to social perceptions and expectations about appropriate "masculine" and "feminine" roles, behaviours and qualities. However, in health research there is too little disaggregation of data by gender. Research priorities that do not consider the gender dimension may actually contribute to gender disparities.

Income inequality is another commonly used important equity stratifier. There is a large body of literature exploring association between income inequality and population level measures of health, such as life expectancy and infant mortality. Various measures are available to quantify the extent of income inequality in a given community. For example, the Gini coefficient is frequently used for ease of comparison. If incomes in the population were distributed perfectly equally, the Gini value would be 0, and the Gini value is 1 under the condition of maximum inequality. Often it is sufficient to look at the income distribution among different population quintiles to see differences in income and the corresponding health status. Such data are available from the UN agencies, notably UNDP and WHO.

It is worth noting though that the influence of income inequality on health is still widely debated and data from aggregate-level studies of the effect of income inequality on health, are largely insufficient to support this hypothesis.[41] In contrast, it is widely accepted that poverty is a risk factor for premature mortality and increased morbidity.[42] There is ample evidence that the reverse is also true: poor health status can lead to persistent poverty and reduced economic growth.[43] Traditionally, poverty was thought of as disparities in income. Many international or national agencies still use USD1 per day as the poverty threshold to define the groups that are poor, but it is becoming increasingly clear that poverty has many dimensions and inequities to access to economic capital and natural resources as well as to public services, political process and representation and disproportionate exposure to public health risks and civil insurrection are the main barriers to poverty reduction strategies.[44]

Similar observations can be made in relation to any group that is perceived as different. For example, the health status of people living with disabilities is often substantially worse than that of the general population. Apart from any specific biological causes linked to the disability in question, a major part of the differences in health status results from stigma and discrimination which results in lack of access to resources, goods and services. This ability-linked discrimination is often especially severe for those with intellectual disabilities.

A number of major studies[45] as well as the Global Forum's own work[46,47,48,49] on poverty and equity, have highlighted the fact that inequities in health and imbalances in the allocation of resources and in access to the products of research are found in all parts of the world and are often underpinned by social inequities and human rights violations.

The equity dimension can be thought of as layers on top of the two-dimensional matrix. Each additional layer focuses on a particular issue of difference, such as gender, income inequality, race or religion and further refines the analytical power of the matrix. The

number of layers generally depends on the priority-setting exercise and the context where it is conducted.

The box below highlights some of the issues that need to be addressed in relation to gender in any research priority-setting exercise.

Insert 7 Gender and health

A gender analysis of any health condition, disease or health programme would include:

- examining sex-disaggregated data;
- identifying gender-related factors affecting who falls ill, when and where;
- identifying gender-related factors affecting responses to illness.

Some of the questions that would need to be answered are:

- Is there a difference in the biological susceptibility that determines the prevalence and incidence rates amongst men and women?
- Are there any gender-related issues that explain differences in the magnitude and severity of various health conditions and diseases?
- Are there gender differences in use of health services and services provided? What are the reasons for these differences?
- How do macroeconomic policies impact on men and women differently?
- Are there any gender inequalities in resource allocation?
- What are the gender factors at the level of the heath system that affect men and women differently?

Source: Global Forum for Health Research

5.4 Completing the 3D CAM

The three-dimensional matrix can be filled in layers and the first steps are the public health and institutional dimensions. To start this process, the best available information, with references to key sources, is provided to the participants.

The logical place to start is the first row on the public health dimension which is "Magnitude of the health problem". It has to be clarified whether it is a medical problem or a health systems issue. In most cases some data may be available at the global or national level and in a few cases at the regional level but never at the household or other levels. However, that is not essential and one can work with available global or national estimates.

The most important entries are for the second row "Determinants", which provides information on causes of health problems, especially at different levels such as the community and household. When these rows have been completed, available information and data should be entered into all cells of the matrix. Remember that when information is not available for certain cells, it can mean one of two things: the information may not be available/needed or it may indicate a research gap or priority.

Depending on the size and scope of the exercise and availability of resources, the work can be divided into two or three groups with each being responsible for a specific section of the matrix. Each group then presents its findings in a plenary where all participants have an opportunity to review the work and provide inputs to further refine the analysis.

Once there is general consensus on all entries of the two-dimensional matrix, the third, equity dimension needs to be filled. The two-dimensional matrix is reviewed from the identified equity stratifier, e.g. gender (Insert 8) or poverty (Insert 9). The participants are asked to consider that specific perspective by looking at the disaggregated data, especially the magnitude of the health problem, and then discuss the factors that are responsible. Once identified and agreed, they add this additional information into relevant cells of the matrix. This process is repeated for each particular issue of difference among social groups, such as gender, poverty, religion or race.

Insert 8 The 2D matrix reviewed from the gender equity stratifier

Source: Global Forum for Health Research

Insert 9 The 2D matrix reviewed from the poverty equity stratifier

Source: Global Forum for Health Research

The final matrix thus combines all three dimensions. The advantage of applying layers is that disparities and inequities are made an explicit part of the matrix and the research priority-setting exercise.

Once all cells are filled, a report should be prepared which describes the planning of the process, organization of the workshop, application of the CAM, the filled matrix and the identified research priorities. Such a report should be made available not only to the workshop participants and direct users of the report but also to interested partners working in the area of health, health equity and health research.

Advantages of using the 3D CAM

- **Ease of comparison**. The CAM helps organize, summarize and present *all* available information in a systematic framework related to a particular health problem, thus facilitating comparisons between the likely cost-effectiveness of different types of interventions at different levels.

- **Multidimensional approach.** By taking into consideration factors relating to the two dimensions beyond the Public Health (the Institutional and Equity dimensions), the CAM increases the chances that the final selection of research priorities will contribute to the overall goal of improving health and health equity. In addition, it facilitates identification of the impact of changes in one cell on another.

- **Ease of use**. The CAM has been and can be applied at the global, regional, national and sub-national levels by institutions, local or national governments, development agencies, academics and individual researchers.

- **Flexibility.** The CAM can be easily adapted to any health problem. It is not essential to fill out every column of the matrix. On the contrary, in some cases, lack of information indicates a gap in research which needs to be filled – which is one of the objectives of the exercise.

Points to consider:

- To ensure optimal results, it is important to thoroughly carry out the five steps preceding the application of the CAM (i.e. Pillar 1, Process), which are related to preparation, planning and involvement of stakeholders.

- Even a well conducted priority-setting exercise will need to be revisited after some time in order to adapt priorities to changing demographic, political or economic situations.

- Priority setting can only be useful if the results are implemented. Research funding agencies and policy-makers may not fully comprehend the public health concepts and terminology. Therefore it is important that results of the priority-setting exercise be presented in simple and clear language, free of technical terms and jargon so that non-health and non-research professionals can easily understand.

CONCLUSION

In view of the competing priorities for scarce resources for research for health and population needs that are largely unmet, setting priorities in research for health is as critical as conducting the research itself.

It is important to differentiate between the *process* of setting priorities and the *tools* used for collecting and analysing the data and the information that form the evidence base for identifying research gaps and priorities, and then to shift resources to areas where they are most needed.

The Combined Approach Matrix is a useful tool for priority setting in health research, but is not in itself an algorithm for priority setting. It is part of the process of setting priorities, ideally conducted in an interactive workshop that involves *all* the relevant stakeholders in decision-making.

The uniqueness of the CAM compared to other tools lies in its ability to merge three dimensions – public health, institutional and equity – in one matrix. This increases the likelihood that the research priorities that are finally set, will meet the most urgent needs and contribute to the achievement of the overall goals of health and health equity.

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