

## Setting research priorities by applying the combined approach matrix

Abdul Ghaffar\*

*Global Forum for Health Research, Geneva, Switzerland*

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**Background & objectives:** Priority setting in health research is a dynamic process. Different organizations and institutes have been working in the field of research priority setting for many years. In 1999 the Global Forum for Health Research presented a research priority setting tool called the Combined Approach Matrix or CAM. Since its development, the CAM has been successfully applied to set research priorities for diseases, conditions and programmes at global, regional and national levels. This paper briefly explains the CAM methodology and how it could be applied in different settings, giving examples and describing challenges encountered in the process of setting research priorities and providing recommendations for further work in this field.

**Methods:** The construct and design of the CAM is explained along with different steps needed, including planning and organization of a priority-setting exercise and how it could be applied in different settings.

**Results:** The application of the CAM are described by using three examples. The first concerns setting research priorities for a global programme, the second describes application at the country level and the third setting research priorities for diseases.

**Interpretation & conclusions:** Effective application of the CAM in different and diverse environments proves its utility as a tool for setting research priorities. Potential challenges encountered in the process of research priority setting are discussed and some recommendations for further work in this field are provided.

**Key words** Combined approach matrix - methodology - priority setting - research

The amount of funding available for health research is small in comparison to its very large potential benefits<sup>1</sup>. In particular, inadequate resources are devoted to research for the health of populations in the poorest countries – what has been called ‘10/90 gap’<sup>2</sup>. It is therefore essential that the allocation of available

resources be based on a rational priority-setting process. The use of a sound methodology and scientific process are critical to ensure the identification of the research priorities. One important way to address the ‘10/90 gap’ is to change the priorities that determine how existing health research funds are used. Indeed, from

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\*Present address: World Health Organization, Regional Office for the Eastern Mediterranean, PO Box 7608, Nasr City, Cairo 11371, Egypt

the perspective of responding to needs that are largely unmet, priority setting is as critical as conducting the research itself. However, priority setting is a complex and poorly documented phenomenon, and research on methodologies to help set priorities in health research is a relatively recent development which can be traced back to the recommendations in the 1990 Report of the Commission on Health Research for Development<sup>3</sup>. Since then, a number of approaches have emerged for developing and implementing priority setting<sup>4-9</sup>.

The Global Forum for Health Research, a Geneva-based international foundation, has focused particular attention on further developing methods and instruments which can be used for evidence-informed priority setting in health research. In 1999 the Global Forum presented a research priority-setting tool called the Combined Approach Matrix or CAM<sup>10</sup>. Since its development, the CAM has been successfully applied to set research priorities for diseases, conditions and programmes at global, regional and national levels.

The objectives of this paper are to briefly explain the CAM methodology and how it could be applied in different settings, giving examples and describing challenges encountered in the process of setting research priorities and providing recommendations for further work in this field.

**Material & Methods**

The CAM incorporates the criteria and principles for priority setting defined in the Essential National Health Research approach<sup>3</sup>, the Visual Health Information Profile proposed by the WHO Advisory Committee on Health Research and the five-step process of the WHO Ad Hoc Committee on Health Research<sup>11</sup>. The CAM is a tool (i) to help classify, organize and present the large body of information which enters into the priority-setting process; (ii) to

recognize gaps in health research; and, on this basis, (iii) to identify health research priorities, based on a process which should include the main stakeholders in health and health research.

The five steps (public health dimension) are linked with the four broad groups of actors and factors (institutional dimensions) determining the health status of a population to form a matrix for priority setting. The “institutional” approach argues that the health status of a population depends on actors and factors outside the health sector just as much as on the health system itself. Table I indicates the matrix for this priority-setting approach with an explanation of the information required in each component of the matrix.

**(i) The public health dimensions of priority setting**

The components of the five-step process (public health dimension) identified in the 1996 Report of the Ad-Hoc Committee are the following<sup>11</sup>:

*Step 1: Disease burden:* The disease burden is measured as years of healthy life lost due to premature mortality, morbidity or disability. Summary measures, such as the disability adjusted life years (DALY), can be used to measure the magnitude. Other methods serving the same purpose can also be used.

*Step 2: Determinants (risk factors):* The factors responsible for the persistence of the burden, such as lack of knowledge about the condition, especially concerning social<sup>12</sup> and political determinants of health, lack of tools, failure to make use of existing tools, limitations of existing tools or factors outside the health domain are analysed<sup>12</sup>.

Such information may be available from international peer-reviewed literature and global reports<sup>12</sup>. However, there are always some important local reasons for persistence of the problem and these

**Table I.** The global forum combined approach matrix for health research priority- setting

Institutional dimension

	Global / national/ local	Individual household and community	Ministry of Health and other health institutions	Organizations outside ministry of health	Macro-economic policies
Public Health Dimension					
1. Disease burden					
2. Determinants					
3. Current level of knowledge					
4. Predicted cost and effectiveness of new interventions					
5. Resource flows					

need to be considered closely while identifying the research priorities.

*Step 3: Current level of knowledge:* The current knowledge base available is assessed to help solve the health problem and evaluate the applicability of solutions, including the cost and the effectiveness of existing interventions.

For this purpose also, international reports and peer-reviewed literature may provide a good amount of information, but there is a need to be aware of the local conditions and sensitivities while considering the costs and the effectiveness examples from other places.

*Step 4: Predicted cost and effectiveness of new interventions:* The promise of the research and development effort is assessed, against other potential interventions, and it is to be examined if future research developments would reduce costs, thus allowing interventions to be compared and applied to wider population segments.

Such information is often not readily available at the outset of a research programme to develop a new intervention. However, taken from another perspective, the consideration of potential cost-effectiveness of different solutions can help to set benchmarks or targets for the development process and to point out the size of gains that may be achievable by a new approach.

*Step 5: Resource flows:* The current level of investment on research for the specific disease and/or determinant is calculated.

As is the case in step four above, in most developing countries the national and local budgets do not disaggregate information about specific diseases and conditions and this is especially the case in the area of health research. Thus this is a challenge which health and health research managers confront while setting priorities, either at the global, national or local level.

### **(ii) The institutional dimensions of priority setting**

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

*Individual, household and community:* in the CAM, this column reviews elements which are relevant to the reduction of disease burden and can be modified at the individual, family or community level. This includes relevant interventions improving 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.

*Ministry of Health and other health institutions:* this column in the matrix reviews the contribution of the ministry of health and health research system to the control of the specific disease or condition being explored. The column focuses on (i) biomedical interventions (e.g. treatment or prevention approaches) and their application throughout the health system as a whole; (ii) policies and structures which can help the health system reduce the burden of a specific condition; and (iii) the potential for the health research community to provide tools, processes and methods for the same purpose.

*Organizations outside the Ministry of Health:* this column focuses on all other ministries, departments and institutions which contribute in 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, or the role of the education system (both formal and informal) in changing people's health behaviour (washing hands, smoking, substance abuse, avoiding risky behaviour in general) or the role of environmental protection agencies in reducing health hazards.

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

In summary, the CAM (i) brings together in a systematic framework all information (current knowledge) related to a particular disease or risk factor, (ii) identifies gaps in knowledge and future challenges, (iii) relates the five-step process in priority setting (public health axis) with actors and factors (institutional axis) determining the health status of a population, (iv) permits the identification of "common factors" by looking across the diseases or risk factors, (v) is applicable to priority setting in the field of national, regional or global problems, and diseases, risk factors and determinants of health, (vi) permits the linkage of priorities in the field of health and health research, (vii) permits taking into account the large number of factors outside the health sector which have

an important impact on people's health, and (viii) CAM has its own limitations and may not be able to articulate the total burden and/or identify all gaps, especially in the case of health policy and systems research.

### Process

For simplicity, applications of the CAM are described at a country / national level only. However, similar types of processes can be followed at the local and international levels to determine health research priorities. Such processes can be applied by individual institutions as well as by local and national governments and development agencies, to identify their priority areas for engagement in, or support to, health research.

### Information gathering

At the national level the first step is to estimate the burden for each of the main diseases and risk factors in the country and to engage with all institutions and stakeholders with particular knowledge of that disease. Each institution will feed into the matrix the information at its disposal. As a result, the matrix will gradually incorporate the best available information regarding a specific disease or risk factor. In many cases, instead of solid information, the matrix will reveal how little information is available to make rational, cost-efficient and effective decisions in the fight against specific diseases or causative factors. However, absence of a particular type of data does not mean that the priority setting process can not be completed.

### Synthesis

The second step is to identify which knowledge, tools or processes that might result from research would have the largest impact on the problem in question. This may be a time-consuming and iterative process, as it is likely that various stakeholders will have different opinions as to the most important factor(s) to be studied to reduce the burden of that particular problem. However, contribution and consensus of all relevant stakeholders is extremely important. To ensure the contribution of everyone concerned and to minimize the risk of any decisions based on power and hierarchy, Nominal Group Process<sup>13</sup>: a structured problem solving, idea gathering and consensus building technique might be used for this purpose.

### Interpretation

Where the prioritization involves making choices between diseases, a further process may be required

that takes into account, among other factors, of those research topics likely to have the greatest impact in reducing the burden of disease for the country. This overall list of national research priorities may then need to be allocated among the various research institutions in the country based on their respective comparative advantages.

### Context and values

The matrix assists in summarizing information, evidence and synthesis of ideas about possible effectiveness of approaches. It does not lead automatically to a priority list. The last step requires decision-making which takes place in a specific context (*e.g.* the nature of the institution or body setting the priorities; the nature and amount of human and financial resources available, the external demands, the timescale on which results are needed, political pressures) and is conditioned by values (the ethos of the institution and the research goals, which might be to achieve the most cost-effective solution, or the most socially equitable one).

### Results

#### Selected examples of CAM application

The feasibility and usefulness of the CAM have been demonstrated over a period of several years, by its successful application in a range of settings including global programmes and national plans; communicable and noncommunicable diseases; risk factors and vulnerable groups. Here, only three examples are described, one each from a global programme, a national application and a disease, to further illustrate and explain the use of the tool.

(a) *TDR research priorities*: The UNICEF/WHO/World Bank/UNDP Special Programme for Research and Training in Tropical Diseases (TDR) is an international research programme for which WHO is the executing agency. A formal process of priority-setting was undertaken in 2002-2003 to re-align TDR's strategic focus in research to address the disease control priorities of the next five years<sup>14</sup>.

The first step in the prioritization process of TDR was to bring together the TDR Disease Research Co-ordinators, TDR staff, disease-control experts from within WHO, country programme managers and disease experts (Disease Reference Group and Scientific Working Groups) to analyse rationally and transparently the current situation of each disease.

This included taking into account the current status of research and the comparative advantages of TDR. The result was the identification and definition of a set of research priorities for different diseases called “strategic TDR emphases” in scientific and technical areas of work for the next few years<sup>14</sup>.

Realizing the global mandate and nature of TDR’s work, emphasis was not placed on the institutional dimension of the CAM but on several other dimensions considered important by TDR staff, such as what is TDR’s comparative advantage and what is the current diseases-control strategy for a specific disease? Slight modification of the CAM was therefore considered appropriate and this led to the definition of the following seven steps used in the TDR prioritization process: (i) What are the size and nature of the disease burden and epidemiological trends? (ii) What is the current disease control strategy? (iii) What are the major problems/challenges for disease control? (iv) What research is needed to address these problems/challenges? (v) What is currently being done in R&D, and what research opportunities exist? (vi) What are TDR’s comparative advantages? (vii) Strategic emphases for R&D.

The TDR prioritization strategy led to the following results: a transparent and objective prioritization process, the active participation of partners from both health research and disease control, a direct link between strategic emphases and the research needs of disease control, an efficient mechanism to communicate TDR’s strategic choices to its partners, and a continuous monitoring system for incorporating new priority needs.

(b) *The example of diarrhoeal diseases research in India:* During 2002-2003, the Indian Council of Medical Research (ICMR) and the National Institute of Cholera and Enteric Diseases (NICED), Kolkata, applied the CAM to set diarrhoeal disease research priorities in India<sup>10</sup>. An expert group of scientists drawn from various disciplines was established to conduct the task.

The expert group was charged to summarize the current knowledge to fill the cells of the CAM matrix. A SWOT (strengths, weaknesses, opportunities and threats) analysis of the Institute, taking account of its major contributions and achievements, helped to highlight the areas where NICED had the greatest chances of achieving success. The expert group held consultations with national and state-level

programme managers, other research institutes and NGOs working for the control of diarrhoeal diseases.

The available data from different sources (research studies, surveys and government and donor reports) were systematically reviewed. However, for consistency the data used for the priority setting were those reported by the National Diarrhoeal Diseases Control Programme.

Apart from the budget of the National Diarrhoeal Disease Control Programme, no other channel of flow of funds could be studied. The Public Finance Accounting Framework in India did not allow for disaggregating between health services spending, personnel costs and money spent for different research initiatives and activities. Neither were such data available from any donor reports.

Individual and community level information was inadequate, but exposure to electronic media showed a significant impact on mothers’ awareness about oral rehydration treatment and its use. The cost effectiveness of present and future interventions had not been widely studied in India and any linkage with sectors other than health was not easy to demonstrate.

The exercise revealed that the main reason for the persistence of the burden of disease was that the majority of health care providers, especially those who were working as private practitioners, were not consistently applying the standard guidelines for management of diarrhoeal diseases. Misconceptions about infant and child feeding were widely prevalent, and often it was actually the physician who provided inappropriate suggestions. Although the role of antimicrobials was very limited during attacks of diarrhoea, these had often been used routinely<sup>16</sup>. The CAM application highlighted the need for better understanding of socio-cultural norms and for improved training of health care providers.

(c) *The example of schizophrenia:* In this example, desk reviews were carried out by a senior epidemiologist who was familiar with the application of the CAM methodology<sup>10</sup>. The reviews were based on peer-reviewed publications, mostly prepared by the WHO, and other similarly authoritative international monographs and reports.

The analysis of the matrices revealed that further research is needed on:

(i) The concept of burden as it reaches beyond the individual affected by a neuro-psychiatric disease. Typically, the burden to the family or the caregiver of a patient with a mental or neurological disorder is long-lasting and significant. This is insufficiently reflected in the DALY methodology and highlights the need for the development of a more sensitive and broadly based summary measure.

(ii) Cost-effectiveness issues. The effectiveness of many interventions is largely unknown, and good measurements of cost-effectiveness are even less frequent.

(iii) Bridging the treatment gap. In developing countries, about 85 per cent of people with schizophrenia do not benefit from the available medicines and treatment methods. Various reasons explain this unacceptable reality, including traditional and cultural concepts involving superstitions and beliefs concerning the disease and its interpretation, leading to low consultation rates in health centres, and hence to low rates of use of effective drugs. Other factors contributing to this treatment gap are deficiencies in the health system structure, lack of personnel and diagnostic facilities, and non-accessibility / availability of efficient means of treatment.

(iv) Overcoming stigmatization and social isolation. This pertains not only to the patient and his/her family and community, but often also to health workers. This could be reduced by effective health education messages targeting communities, families, individuals and health care providers.

### Discussion

It is evident that the strength of the CAM lies in its flexibility and diversity of application. Depending on the resources, area of research and availability of needed information, it may be applied either by an individual researcher, a group of experts, by interested stakeholders or a combination of individuals and groups.

Application of the CAM reveals that there is often much more knowledge available than is actually applied. In spite of the existence of many cost-effective interventions, these are not being successfully used either because of failing health systems or challenging socio-political environments and/or the reasons for the persistence of a health problem may be outside the health sector. When there are obstacles within the health sector, these may be of a non medical nature.

Such findings may promote the insight that, apart from medical research, other types of research are needed also to change the health status of a population for the better; including research on risk factors, health service research, operational research, research on policies, and research on priority-setting methodologies.

Compiling the data and information required to complete the CAM is a challenging exercise for several reasons. Some investigators observed difficulties in accessing 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 when setting national research priorities. The information required is not restricted to technical questions about the status of the disease (or risk factor) and research, but also demands awareness, knowledge and analysis of the factors determining health at 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 users to think broadly and inclusively, it may not always be easy to find disease control experts who have the relevant skills or knowledge at the multiple levels required. Experience indicates that these limitations can be largely overcome by assembling teams of people with background and knowledge of the disease in question to contribute to the priority-setting process.

In some situations, while the CAM provided a sound base for assembling the relevant information, it required adaptation to the particular needs of the programme or organization. CAM users may have to modify and adapt specific questions in the CAM matrix and also flexibly apply the outcome of CAM results according to their organizational needs. Two excellent examples in this regard are the use of CAM by TDR and by the Pakistan Medical Research Council for perinatal and neonatal care in Pakistan<sup>17</sup>. In Pakistan, an additional summary Table based on the CAM output was developed which quantified the priorities according to the available data. The priorities were ranked on the scale of 1-4 (1= sufficient data available and 4= no information) (Table II). Such adaptation needs to be continuous as the debate on priorities moves forward<sup>10</sup>.

Another observation from a national team was that the CAM approach compelled them to think nationally

**Table II.** Newborn health research priorities for Pakistan<sup>17</sup>

	Individual, household and community	Ministry of Health and other health institution	Organizations outside ministry of health	Macroeconomic policies
Diseases Burden	2	2	2	1
Determinants for persistence	2	3	1	3
Present level of knowledge	2	4	4	2
Cost-effectiveness for future or possible interventions	4	4	4	4
Research 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

and focus institutionally. Also, many considered that in itself the 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<sup>17</sup>.

However, it is important to realize that the CAM summarizes the evidence base for priority setting in health research, but that it is not to be misunderstood as an algorithm for priority setting *per se*. At present, it seems unlikely that there will ever be a procedure or an algorithm that will automatically come up with research priorities if the evidence base is somehow fed into the process. One would hope, however, that standardized guidelines may become available that will facilitate priority selection on the basis of the CAM. A noteworthy step in this direction has been the development of a new approach (methodology), by the Child Health and Nutrition Research Initiative (CHNRI) which compares a larger list of systematically defined competing research options and assigns a quantitative “research priority score” to each of those options to set the research priorities<sup>15,18</sup>.

Review of available tools reveals that almost all tools are constructed on three main pillars – magnitude of the problem, cost-effectiveness of interventions and response to the issues of social justice, such as equity<sup>4,8,10,19,20</sup>. However, in our view, two additional factors should be integral components of any priority-setting equation: context (such as resource availability) and values or interests. For example, despite the recognized importance of HIV/AIDS, progress in reducing its impact has been hampered by the lack of resources in countries where the problem is most severe. The link between research priorities and resources is circular, since a principal purpose of priority setting is to justify the shift of resources into areas where they are most needed. The consequent

congruence between resources and priorities might not be achieved, if priorities are set from a perspective that differs from that of agencies providing the resources. The need for better vaccines that receive high societal priority might not be acted upon by those that pursue more profitable lines of pharmaceutical R&D.

The level of interest (values) in a field of research is related to the availability of resources (context) and the importance of research, but again congruence is not guaranteed. Individual researchers might hone their technical skills and pursue interests in areas that are more prestigious, intellectually challenging, or professionally rewarding than responsive to societal needs.

In summary, prevailing contextual factors, as well as personal and organizational values, need to be singled out for attention in addition to the usual consideration of problem magnitude, impact, vulnerability and cost in an effort to ensure that resources and interest are directed to subjects of greatest research need.

Like most tools, CAM also has its limitations. Up to now, it has been primarily applied to diseases and some programmes. However, during those exercises, especially while setting research priorities for perinatal and neonatal care in Pakistan, it was observed that for health policy and systems research, where it is hard to quantify the burden (either in DALY or any other summary measure), the CAM may not be the best tool to use. Also, while applying the CAM it is equally important to appreciate that the steps before its application, which are related to preparation, planning and involvement of interested stakeholders, are thoroughly carried out to ensure optimal results.

In conclusion, priority setting in health research is a dynamic process. However, there is still no single tool which is able to provide an objective process,

simple but effective application and is equally sensitive to the needs of managers and policy-makers and fulfils the demands of researchers. 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 address the gaps and limitations described above with the help of partners in the health research world. Analytical tools are increasingly being applied to seemingly unmeasurable factors, and we should become better acquainted with both the strengths and limitations of these tools.

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*Reprint requests:* Dr Abdul Ghaffar, Regional Advisor, Research Policy & Cooperation, World Health Organization, Regional Office for the Eastern Mediterranean, PO Box 7608 Nasr City, Cairo 11371, Egypt  
e-mail: Ghaffara@emro.who.int