Improving access to health information in the developing world:

Fiona Godlee

Neil Pakenham-Walsh

Dan Ncayiyana

Barbara Cohen

Abel Packer

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This document represents a **draft** of a paper on this topic. It is a **work-in-progress** and aims to signal the important issues related to the topic. We emphasize that the final document will be developed based on perspectives, comments and suggestions from the various regional consultations to enable critical inputs from regional and country perspectives to be included in the final version.

SEND COMMENTS AND SUGGESTIONS TO :   FGodlee@bmjgroup.com

Executive summary

1.1 The advent and global spread of the internet has brought with it the potential to achieve universal access to healthcare information. By this we mean ready access to relevant, reliable, and up to date information for all those who want it. We believe that this is achievable during the next 10 years, provided there is a shared vision and global commitment to this objective.

1.2 This paper focuses on meeting the information needs of healthcare providers and those whose activities have the potential to support those needs. Healthcare providers are an extremely diverse group with widely varying social, educational, cultural, economic, and behavioural attributes. While many at all levels in health care will actively seek information and the skills to interpret it, many will not or will be frustrated in the attempt.

1.3 Barriers to accessing information and using it are still poorly understood, especially among healthcare providers and patients in the developing world. These barriers need more research.

1.4 Known and assumed barriers include: lack of physical access (slow or unreliable internet connectivity, high cost of paper, high subscription cost to products); lack of awareness of what is available; lack of relevance of available information (not meeting needs in terms of scope, style, language, format); lack of time and incentives to access information; and lack of skills to interpret it.

1.5 Most healthcare providers in developing countries continue to lack access to the information they need to deliver the best possible healthcare with available resources. There is little evidence that the majority are better served than they were 10 years ago, particularly at primary care level.

1.6 However, important progress has been made in many areas: increasing availability of information and communication technologies; increasing number and range of health information support programmes; increased availability of free resources on the internet; evolution of a loose international community committed to improving health information access; and increasing political interest in access to healthcare information as a key development issue.

1.7 This progress forms a foundation on which we can build to realize the vision of universal access to relevant, reliable, and up to date information on health care.

1.8 Progress towards this goal will require a concerted effort, cooperation and coordination among the full range of stakeholders involved in the provision and use of healthcare information. We stress the importance of biomedical research as the foundation for reliable information, and the critical role of systematic reviews and overviews in summarising what we know and what we don't. And we emphasize the critical and neglected role of local producers of healthcare materials, who are best placed to synthesize local and international information into resources that are readily useable by different healthcare providers working in different environments.

1.9 We present a range of cross-cutting issues that need to be addressed, relating to the ability of stakeholders to work effectively as an integrated whole: connectivity, skills development, evaluation, political commitment, and cooperation.

1.10 We describe WHO's important role to date, and its potential role in the future. Building on its success as a provider of reliable health information, we believe that WHO can do more as an advocate, supporting the ability of all providers and users of health information to work more effectively together to improve access for healthcare workers in developing countries.

1.11 We stress the limitations of the current paper, particularly the fact that it is based on preliminary discussion among a small group.

1.12 We therefore propose that the current paper is seen as a starting point for an inclusive global review of health information access, drawing on the experience, ideas and perspectives of the many thousands of people worldwide who are committed to access to healthcare information.

1.13 We also recommend an external review of WHO's role in health information development. This review should be informed, at least partly, by the broader global review described above.

1.14 In order to galvanise the full range of stakeholders, we recommend that WHO promotes a special initiative to improve access to healthcare information in the developing world, to be formulated and implemented by an international collaborative group convened by WHO and its partners. We suggest that the international collaborative group draft a declaration of universal access to relevant, reliable, and up to date healthcare information by 2015.

1.15   As first steps towards achieving universal access, we recommend establishing working groups in seven key areas:

- Researching information needs and barriers to use of information.

- Providing access to existing materials for healthcare providers in developing countries;

- Providing access to the results of research;

- Improving relevance and usability of materials for healthcare providers in developing countries;

- Improving reliability and currency of materials for healthcare providers in developing countries;

- Improving internet and e mail connectivity;

- Skills development and training.

1.16   We recommend these working groups adopt a highly consultative, listening, transparent approach. We recommend that the groups are selected to be fully representative of the full range of stakeholders, with the majority from low and middle-income countries.

Definitions

1.17   **Knowledge and information** Knowledge and information have been variously defined, and there is ongoing debate as to how, and indeed whether, they differ from each other. One view simply expressed is that knowledge is what is inside people's heads, while information is what you get when you write it down (or incorporate it into a discussion, lecture, tape or video); information is therefore an expression of knowledge. Another view is that, if information is the assimilation of data (facts, experiences, statistics), knowledge is information made actionable or mobilised for decision making.   This paper takes the view that there is a spectrum that encompasses knowledge and information, and that different parts of this spectrum are relevant, and necessary, to different people at different times.

1.18   **Healthcare providers** For the purposes of this paper, the term includes all health personnel who are trained to provide health care to individuals. It includes those working in primary, secondary or tertiary care; those with limited training (eg community health workers) or prolonged training (eg consultant physicians); those with minimal experience (eg first-year medical students) and those with long experience (eg nurses who have been working for 30 years). Each healthcare provider has different, indeed unique, information needs. Many healthcare providers are also researchers and/or producers of materials for other healthcare providers.

1.19   **Producers of materials for healthcare providers** We use this term to describe groups or individuals who take bits of information from a range of sources and collate them to meet the information needs of a specific audience, at local, national, regional, or international level. These groups and individuals form a broad spectrum, producing materials that range from the generic (eg WHO guidelines for Integrated Management of Childhood Illness, WHO Model Formulary) to the locally contextualized (eg a locally produced 'how-to' poster in a rural health clinic). Information materials with special functions, eg systematic reviews and original research papers, are considered separately in this paper. . Production of materials is a highly skilled activity, whether at the local or international level. In the best hands, it provides reliable, up to date, and relevant information.

1.20   **Relevance** This can be narrowly defined in terms of subject matter (disease or condition), or as in this paper, more broadly to include relevance in terms of style, format, language, and culture. More research into information needs will inform the definition of relevance.

1.21   **Reliability** This refers to the scientific accuracy and validity of information.

2 Introduction

2.1   The advent and global spread of the internet has brought with it the potential to achieve universal access to healthcare information. By this we mean ready access to relevant, reliable, and up to date information for all those who want it. We believe that this is achievable during the next 10 years, provided there is a shared vision and global commitment to this objective. We believe this commitment is imperative and long overdue.

2.2   If the main perceived challenge 10 and 20 years ago was to create information through research, the new challenge is to make full use of what we know. Failure to use what we know is ethically indefensible. Research that is lost, forgotten, or ignored is a waste of limited resources, both human and financial. Examples abound of healthcare knowledge not applied or applied only after prolonged delays (see table).

2.3   The 10/90 gap articulated by the Global Forum for Health Research, applies as much to healthcare information as it does to research. Inequities in access to information exacerbate the growing gap in health and wealth between rich and poor countries.[1] Healthcare providers need information to diagnose, manage and prevent illness, and to save lives. But many of them continue to lack access to the basic information they need to learn and to provide safe and effective healthcare. Lack of access to information further disadvantages health systems in developing countries because it prevents informed decisions about the allocation of scarce resources. Providing access to reliable health information for health workers in developing countries is potentially the single most cost-effective and achievable strategy for sustainable improvement in health care. [2]

2.4   10 years ago, a meeting to review global access to health information concluded that, for most healthcare providers in the developing world, access to healthcare information was inadequate, and that the information available to them was often unreliable or irrelevant. The meeting, organized and sponsored by the BMJ, INASP (International Network for the Availability of Scientific Publications), and DFID, recognised the huge importance of information flows within and among developing countries and the limitations of 'pushing' information to healthcare providers. A report of the meeting concluded that: 'People in the developing world should be given the chance to say what they want rather than simply be sent information.' [3]

2.5   At that time, there was optimism that, by 2004, all - or nearly all - healthcare providers in developing countries would have access to the information they needed to provide the most effective healthcare with the resources available. It was felt that, while other factors such as lack of drugs and lack of health systems infrastructure might hinder provision of healthcare, this would not be the same with information. We were at the cusp of the information age: Information and Communication Technologies (ICTs) would mean that access to reliable, relevant information would no longer be a barrier to effective healthcare.

2.6   What has been achieved in these 10 years? Despite its massive potential, the global information explosion seems to have had little impact on access to relevant, practical information for healthcare providers in developing countries, especially those working in primary care and district hospital settings. There is in fact little evidence that the majority of healthcare providers in developing countries are any better served than they were 10 years ago. They continue to lack access to the basic information they need to learn and to provide safe and effective healthcare.

2.7   There is also little evidence of widespread progress among clinical researchers within academic institutions. In 2000, Horton surveyed a sample of the Lancet's peer reviewers who were clinical researchers based in the South, asking them about the barriers they faced in their work.[4] The picture he painted from their responses varied across regions, with researchers in India, South East Asia, and South Africa generally less severely constrained than those in the rest of Africa. However, the overall the picture was bleak. Respondents described cultures unfavourable to scientific enquiry; poor basic infrastructure, including lack of or very unreliable connectivity to email and the internet; lack of funding for research; information poverty; absent or poorly resourced library services; lack of awareness of available resources or funding opportunities; inadequate peer support or mentoring; lack of opportunity to interact with colleagues at local, regional, or international level; inadequate training in planning, performing and writing up research; language barriers to reading and writing

articles; lack of incentives to publish; poor understanding of publishing outlets; too few good journals in the South, and a strong perception of a bias within North-based journals against issues and researchers from the South. Additional problems identified during consultation for this paper were language barriers and the fact that patients' healthcare records do not exist in many countries in a format that lends itself to analysis. In his review, Horton made a range of recommendations to strengthen research capacity in the South. Among these were better understanding, mentoring, involvement, and support from researchers and journals in the North, and initiatives to strengthen journals in the South.[3]

2.8 However, there has been important progress in many areas. The growth in access to the internet and e mail have greatly increased the possibilities for interaction at local, regional, and international level. More content is available to a growing number of people, especially those in tertiary hospitals, research institutions, and urban settings.

2.9 There is greater understanding of the need for an exchange of knowledge between countries and within regions. Instead of thinking in terms of getting information out to people, there is more talk of meeting information needs and building local capacity to produce and use knowledge.

2.10 There has been a marked increase in the number and range of international programmes that support information access for healthcare providers in developing countries (see *INASP-Health* Directory, http://www.inasp.info/pubs/healthdir/).

2.11 Political commitment is building. At the World Summit on the Information Society in 2003, 176 governments signed up to a specific commitment " to promote universal access with equal opportunities for all to scientific knowledge and the creation and dissemination of scientific and technical information, including open access initiatives for scientific publishing." [5]

2.12 Why have we failed to make an obvious difference to information access for the majority of the world's healthcare providers - those working in primary and district health care? One explanation may be that they are 'the most difficult to reach'. But another may be that WHO and other international organizations have failed to galvanize all stakeholders towards a common objective to increase access to health information.

2.13 Today there is new optimism, and it is more realistic than the optimism of 10 years ago: partly because of the progress made in many areas, as outlined above; and partly because of the increasing opportunities presented by information and communication technologies. These opportunities relate not only to the ability of technologies to improve the flow of health information in all directions, but also to their potential to bring together all those with an interest in improving access to healthcare information around their common objective.

2.14 We believe that there is therefore realistic cause for optimism that the next 10 years will deliver a world in which everyone has ready access to reliable, relevant, and up to date information on health care.

OBJECTIVES AND SCOPE

2.15 This paper has been commissioned by the World Health Organisation in preparation for the World Summit on Health Research in Mexico in November 2004. We were asked to:

a) Define the issues involved in improving access to healthcare information

b) Define WHO's role

c) Develop some initial objectives for improving access to healthcare information in the developing world

d) Present initial recommendations for progressing those objectives

2.16 We have chosen to focus on access to information for healthcare providers. More specifically, our focus is on access to information that is both relevant and reliable, which can inform behaviour and improve health care.

2.17 Decisions about health care (countless millions of which are made every day) drive health systems. Influencing these decisions therefore has the potential to transform health systems as well as lives. For purely practical reasons, we have not extended our scope to include the much larger group of

decision makers – patients and the public, who truly drive, or should drive, healthcare systems. We would recommend that meeting their information be the subject of a further piece of work.

2.18 We have limited ourselves to issues relating to knowledge and information about health and disease rather than other types of information such as patient records or information about local health services. Current developments in health informatics have the potential to link electronic patient records, generic health information, and information on local services. Although not immediately applicable to the developing-country context, such developments have the potential to revolutionise clinical decision making worldwide. These other types of information are therefore crucial to making good decisions about health care, but are beyond the scope of this paper.

2.19 This paper focuses on 'access to information', but equally important is the ability for healthcare professionals to communicate. This paper emphasizes the importance of communication in the context of 'access to information', for example, the importance (at a national level) of all stakeholders being able to communicate to identify priorities and develop strategies in health information development, and the importance (at an individual level) of healthcare providers being able to contribute their clinical and research experience.

2.20 Other vital forms of communication are not covered in this paper, namely the ability to communicate with: other local and distant healthcare providers, for advice on case management, and discussion of issues of common concern; local referral centres (eg referral from primary care to district hospital) for referral of emergency cases; district health officers, for provision of routine health information (data collected at the point of healthcare, eg disease surveillance) and timely feedback on how these data are being used (eg district and national reports and guidelines, informed by collation of routine health information). Clearly, technology-based efforts to enhance access to information need, wherever possible, to address these communication needs simultaneously.

METHODS AND LIMITATIONS

2.21 This paper is very much a work in progress, initially representing the views and experience of a small group of contributors with input from a wider group (acknowledged at the end). We have not performed full systematic reviews of the literature on meeting information needs, barriers to accessing information, or interventions designed to overcome those barriers. Among our recommendations we suggest that such reviews should be done or updated.

2.22 Our limited review of the literature has revealed little empirical research into information needs and barriers to the use of information among healthcare providers in developing countries. This is in itself an important limitation of our paper, and for any initiatives that might stem from it. We therefore also recommend empirical research and needs assessment in a range of countries and healthcare settings. [Note to reviewers: we intend to do a more thorough review of the literature before producing a final draft of this paper, which will also take into account your comments.]

2.23 We recognise that making information available is not in itself sufficient; we need also to identify and overcome barriers to the use of available information. However, the question of how to identify and overcome those barriers to use of information is largely beyond the scope of this paper.

2.24 We have structured part of the paper according to the main functions that people perform within a certain type of knowledge cycle. There is a risk of that this framework fails to reflect the realities and complexities of knowledge and information flow between individuals and groups. The framework, and the paper overall, presents an 'evidence-based knowledge' perspective that reflects the views of its authors. Other perspectives are needed, from the full range of stakeholders in health information development, especially those in developing countries.

2.25 We have tended to use a small number of initiatives as examples to illustrate what is being done, and what could be done more widely, to improve access to healthcare information. These examples reflect the experiences of the drafting team and reviewers, and do not represent the results of a global review of initiatives. Nor have all the examples we use yet been fully evaluated to see whether they are achieving the impact claimed for them. We recommend that such evaluation should be regularly performed on all major initiatives to ensure value for money.

2.26 This paper should be seen as the beginning of a review of the current situation and of efforts to improve things. We look forward to an extensive programme of consultation, and would, as a further recommendation, suggest that this include posting of the paper on HIF-net at WHO and the

Evidence Based Health Care email list, as well as liaison with the global review of healthcare information currently being planned by a group of agencies coordinated by INASP (see Section X.X).

3 Meeting the information needs of healthcare providers in developing countries

WHAT DO WE KNOW ABOUT THEIR INFORMATION NEEDS?

3.1 Healthcare providers are an extremely diverse group with widely varying social, educational, cultural, economic, and behavioural attributes. They have a very wide variety of information needs: the needs of a community health worker in rural Kenya are different from those of a surgeon in Kathmandu. While many at all levels in health care will actively seek information and the skills to interpret it, many will not or will be frustrated in the attempt.

3.2 Our limited review of the literature has revealed little empirical research into information needs and barriers to the use of information among healthcare providers in developing countries. A study of health information needs and services in the Cameroon concluded that there was "a dire need for health information" and that printed sources, especially journals and books, were "indispensable'.6 A small study of 57 healthcare professionals in Malawi found that only 3 had access to the internet, and that there was a need to explore other information and communication technologies such as radio and television as vehicles for transmission of healthcare information in Malawi.[7] [Note to reviewers: We will work on this while you are reviewing the paper, and hope to add more here. If you know of any good studies that we may have missed, please let us know.]

3.3 A systematic review published in 2003 searched for studies of information seeking behaviour among physicians. It identified 19 studies (all performed in industrialised countries and most in the USA), most of which took a quantitative rather than a qualitative approach. The review concluded that physicians used a wide variety of information sources. The most frequently used source was printed text (especially the prescribing guide, Physicians Desk reference); the second most frequently used was colleagues. Convenience of access, habit, reliability, high quality, speed of use, and applicability increased the chances that physicians would seek information and that they would be successful.[8]

3.4 The above review built on an earlier review that had identified 13 studies (12 from USA, 1 from Sweden).[6] This concluded that current textbooks, journals, and other existing information tools were not adequate for answering the questions that arose in daily practice; computer systems were not widely used, perhaps because they had not been developed to meet doctors' information needs; more questions arose during consultations than the doctors seemed to recognise, and most of these questions concerned treatment; many of the questions went unanswered - most could have been answered, but to do so would have required significant time and costs; doctors were most likely to seek answers to these questions from other doctors; the best information sources provided relevant, valid material that could be accessed quickly and with minimal effort; and new information tools would need to be electronic, portable, fast, easy to use, connected to both a large valid database of medical knowledge and the patient record, and such tools would need to be a servant of patients as well as doctors. The most useful sources were evidence based textbooks and systematic reviews. Journals were near the bottom along with drug advertising.[9]

3.5 Healthcare providers need both 'just-in-case' information (text books, manuals, websites) for learning at home or with colleagues, and 'just-in-time' information (drug formularies, treatment handbooks, wall posters conveying clinical practice guidelines) for use at the point of patient care.

3.6 Healthcare providers in developing countries need access to information in a wide range of formats. Contributions to HIF-net at WHO indicate that access to printed textbooks, and printed clinical guidelines and formularies, are of utmost priority among health professionals in training and practice, respectively. Reports from Africa, for example, indicate a severe and worsening shortage of textbooks, which are increasingly unaffordable. Where available, each textbook often has to be shared among several students, few students being able to afford their own copies.

3.7   Contributors to HIF-net at WHO have also emphasized the value of CD-ROMs, especially for learning materials, which tend to require prolonged use and make use of large files (and are therefore not ideal for non-broadband internet use, even among the very few who have access to internet). Studies have suggested that CD-ROM based training can be at least as effective as tutorial training, and less expensive.

3.8   Journals and databases on CD-ROM are also highly valued, particularly in libraries with poor or absent internet access.

3.9   For those with access to internet, but without the luxury of affordable Web browsing, email has been used successfully to deliver content (eg SatelLife email publications, which provide selected text from international journals).

3.10   There is a wide assumption that all healthcare providers need as much information as possible. However, it is worth noting that many healthcare providers in information-rich, industrialised countries rely largely on two or three favourite publications (for example, a national formulary and a handbook of clinical medicine). Such core resources should be considered 'essential' and made available as a priority as compared with the remaining 99.99% of biomedical information.

3.11   Internet connectivity for healthcare providers could provide important benefits both for information access and for communication with colleagues. But the ability to telephone a colleague, or a referring hospital, is at least as important as the ability to access the internet.

'Essential information'

3.12   For any individual healthcare provider, there is an undefined minimum of information which that individual needs to provide safe, effective practice with the resources available. This minimum of information may be described as 'essential information'. What is 'essential' will depend on the individual needs of the healthcare provider. However, it is clear that some types of information (eg 'Where there is no Doctor') are more broadly 'essential' in, say, the context of primary care in developing countries, than others. There needs to be more debate on the concept of 'essential information': what it is, what are the barriers to access and exchange (including copyright barriers). Most importantly, there needs to be more commitment to ensure that all healthcare providers do have access to such essential information.

3.13   One type of 'essential information' deserves particular attention - information on prescribing - presented in a way that is appropriate for their level of training and diagnostic skills. This is also important because this type of information is subject to misrepresentation by pharmaceutical companies and drug sellers.

Information and continuing professional development

3.14   Access to information will lead to knowledge and skills development only within the context of effective, coordinated programmes for continuing professional development.

3.15   Efforts are underway to harmonise and rationalise continuing medical education at country and regional level: for example, between countries in East Africa. Where appropriate, support should be given to the production of regional CME materials and activities, identifying those that are most effectively carried out at regional level, and wherever possible supporting regional activities that add value to national activities, and vice versa.

3.16   CME Uganda newsletter is a good example of how information can be exchanged effectively, and on a shoestring budget, by email. The newsletter is an integrated part of a wider, successful CME programme, built around the personal development needs of healthcare providers. It is now written mainly by local healthcare providers, and several articles have been republished in leading international journals.

Demand for information

3.17   Among healthcare providers who lack access to information, some are hungry for more information, while others are not. Lack of demand for information in the latter group may be related to many factors: lack of reading culture; low motivation associated with poor working conditions and poor
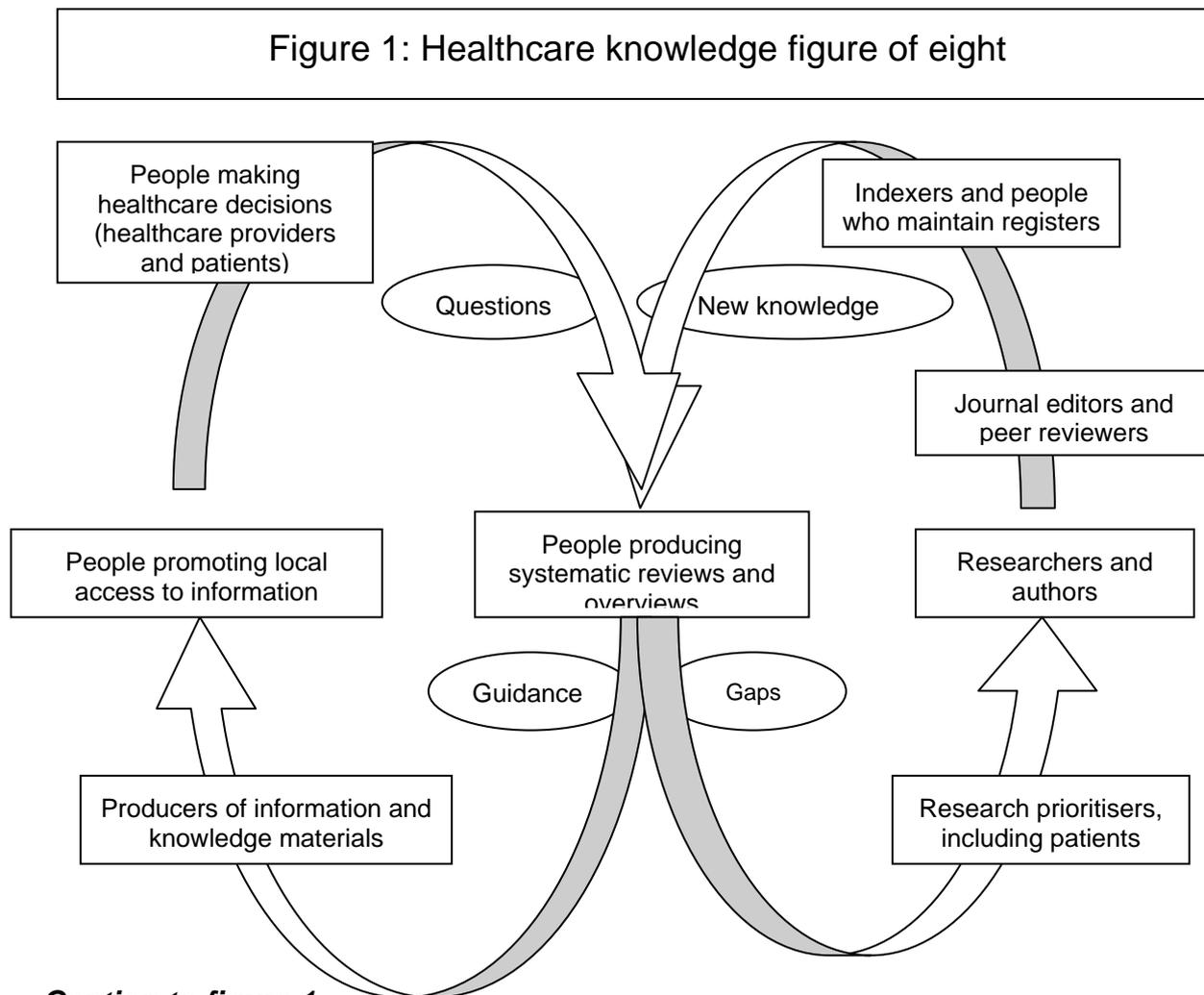
prospects for career development; lack of awareness of 'evidence-based healthcare'; or the result of long-term professionals isolation and/or long-term lack of access to information. The problem is probably compounded by North-South dominance and, in particular, the dominance of 'Push' over 'Pull' as shown in Figure 2. This is exacerbated by failures in cooperation and coordination among providers of information at international and country level - it is perhaps not surprising that there is little demand for information when so much of the information they can get is unreliable and/or irrelevant.

From access to application

3.18   The development of knowledge among healthcare providers is dependent on continuing access to relevant, reliable information. But studies also clearly show that even when such information is available, there are many potential barriers to its use. These barriers have been explored previously by various authors, again mostly in relation to health care in industrialised countries.[10] Barriers include social, behavioural, and organisational factors. As summarised by Hunt in relation to nurses, practitioners don't use research because they don't know about the findings; they don't understand them; they don't believe them; they don't know how to use them; or they are not allowed to use them.[11]

3.19   In this paper, we do not attempt to explore barriers to the application of relevant information in developing countries[12] (other than touching on critical appraisal, evaluation and interpretation). At first sight, it might appear that 'lack of resources' is an obvious barrier to the application of relevant information in developing countries. However, it should be noted that 'relevance' implies that the information is appropriate to the level of resources available. If (for example) an information source indicates a diagnostic test or treatment that is not available or affordable in a given setting, then the information was not relevant in the first place. This further emphasizes the importance of relevance, and the frustration that can be caused by access to information that is not relevant.

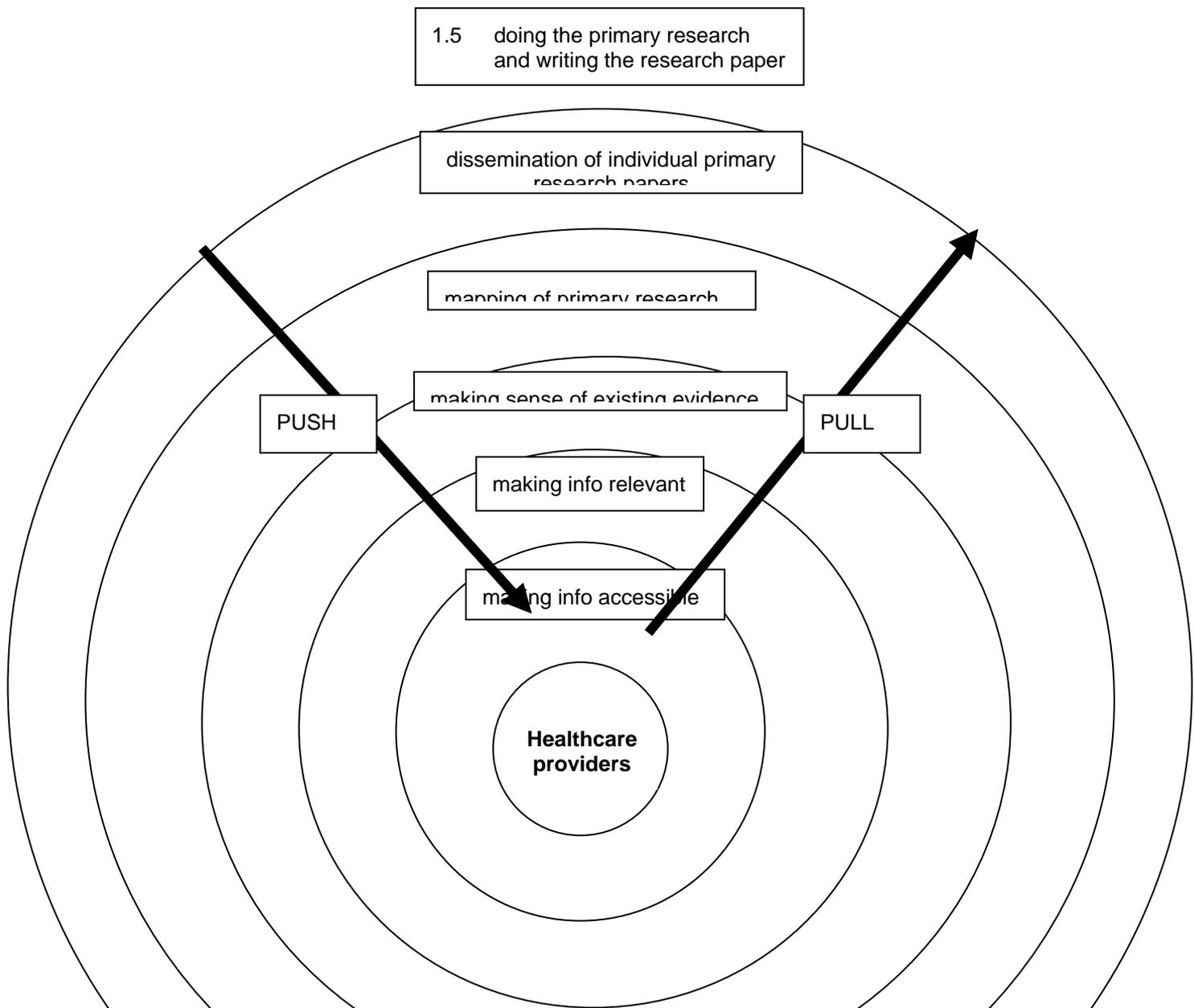## *Working together towards improved reliability and relevance*

3.20   As described above, healthcare providers need access to relevant, reliable information. How can this be achieved?

3.21   Access to relevant, reliable information for healthcare providers is dependent on effective cooperation and flows of information among all stakeholders involved in the provision and use of information.

3.22   There are many ways of describing this. In simplistic terms, the players can be described in terms of their broad functions: providing effective healthcare; enabling access to existing materials for healthcare providers; producing materials for healthcare providers; making sense of the available evidence; mapping the research literature; enabling access to the text of research articles; doing and writing up original research.

3.23   We present two models from an 'evidence-based knowledge' perspective: Figure 1 emphasises the central role of systematic reviews, while Figure 2 suggests the need to take the information needs of the healthcare provider as our starting point. In both models, research provides the foundation for evidence-based healthcare. There is, after all, "little point in effective implementation of ineffective interventions."[13]

Figure 1: Healthcare knowledge figure of eight

People making healthcare decisions (healthcare providers and patients)

Indexers and people who maintain registers

Questions

New knowledge

Journal editors and peer reviewers

People promoting local access to information

People producing systematic reviews and overviews

Researchers and authors

Guidance

Gaps

Producers of information and knowledge materials

Research prioritisers, including patients

Caption to figure 1

1.1　In a truly knowledge based health system, the flow of knowledge would form a virtuous circle, or, as characterised in figure 1, a figure of eight. Healthcare providers and patients generate questions during consultations. If there isn't a ready answer in up to date evidence based guidelines or handbooks, a question should be assessed by systematic review of the literature. The systematic review may identify good evidence to support a clinical decision, in which case this can be fed into practice. If the systematic review finds insufficient evidence to support a clinical decision, this represents a gap in our knowledge base, which should be fed into the research agenda. Ultimately, new research should be incorporated into further systematic reviews. And so the cycle continues.

1.2　What is presented here as a unidirectional flow is in reality much more complex. Information flows within and between groups in ways that are now being characterised as local information cycles. Complete, sustainable information cycles are those in which readers/users are also writers/contributors. Contributions include feedback that can impact on the information. A completely inclusive information cycle exists within the world of academic research, where all authors are readers and all readers potential authors. But information cycles also exist, or can be established, between researchers, systematic reviewers, funders of research, healthcare providers, and patients. These information cycles have the potential to greatly increase the relevance and reliability of information about health care, and to build skills, understanding, and "buy in" that will help to increase the use of that information.

1.3　Individuals can play many roles within this cycle. Healthcare providers may also be researchers or systematic reviewers; healthcare providers and researchers may also be producers of information materials (writing review articles and text book chapters).

1.4　The quality and relevance of information available at each stage depends on the quality and relevance of the information provided by the stage before. If we are to improve the quality and relevance of information available to healthcare providers in developing countries, we have to strengthen every stage in the knowledge cycle.

Figure 2: Push versus pull – two approaches to support effective healthcare

1.5   doing the primary research
and writing the research paper

dissemination of individual primary
research papers

mapping of primary research

making sense of existing evidence

PUSH

PULL

making info relevant

making info accessible

**Healthcare
providers**

Push = 'telling healthcare providers what to do' - starting with what the researcher knows (or thinks s/he knows), and pushing it to healthcare providers: 'this is what you should do'

Pull = 'listening to what healthcare providers want' - starting with what the healthcare provider knows (or wants/needs to know); understanding the information needs of healthcare providers, and responding accordingly

Arguably, there is currently too much 'push' and not enough 'pull'. A paradigm shift to a 'pull' approach has the potential to be more equitable, more efficient and more effective in promoting access and use of information that is both reliable and locally relevant.

3.24　Any individual can play two or indeed several roles in the models indicated. Indeed, complete, sustainable information cycles are those in which readers/users are also writers/contributors. Such complete cycles represent pure inclusion, as in academia where all authors are readers and all readers and authors. Local information cycles exist in other settings (hospitals, communities, health systems) but are usually less obvious and less complete. They have the potential to allow people to own individual as well as collective decisions about health care.

3.25　In developing countries, there are obvious weaknesses and gaps at every stage in Figures 1 and 2. We must address these if we are to improve the quality and relevance of information available to healthcare providers in developing countries.

ENABLING ACCESS TO EXISTING MATERIALS FOR HEALTHCARE PROVIDERS

3.26　Improving awareness of, and access to, existing information materials is probably the single most important priority in meeting the information needs of healthcare providers.

3.27　Information and communication technologies, and in particular e mail and the Internet, clearly provide a means of access to information for healthcare providers. The general issue of connectivity is discussed as a cross-cutting issue in section 4.

Libraries and resource centres

3.28　Libraries and resource centres have an important role in providing cost-effective access to computers, the internet, and printed materials for healthcare providers, particularly in poorer countries where personal ownership of these tools and materials may be unaffordable.

3.29　In order to fulfil this role, libraries need internet access; their staff need the skills to help people find what they need, which include the ability to find, evaluate and interpret information; they also need the skills to pass these skills on to others. Connectivity and training in information skills are discussed further under section 4.

3.30　Much has been learned about the development of libraries and resource centres, particularly through the work of Healthlink Worldwide and its partners. The WHO Blue Trunk Library project has provided over 1000 mini-libraries for use by district hospitals and other front-line facilities.

Knowing what is available

3.31　National reference libraries have a vital role. Thanks to the Association for Health Information in Africa (AHILA), most if not all countries in Africa now have a designated national reference library for health, which is often a medical school library. In theory, such libraries are responsible for the collection and indexing of national health publications. In practice, these libraries are severely under-resourced with minimal acquisition budgets, and are therefore unable to fulfil their mandate.

3.32　In many developing countries, it is difficult, if not impossible, for librarians and others to find out the full range of relevant publications available nationally or internationally. There are no comprehensive online resources that can help librarians to assess the range of existing publications relevant to end users in developing countries. In most cases, it is not possible to access the full text electronically.

3.33　There are stark regional differences in library support. EMRO, for example, maintains a database of locally produced books and journals from the region and publishes the List of Basic Sources for Small Medical Libraries (ie printed materials). It maintains a core list of recommended resources for small libraries, and provides financial support for libraries to procure such core resources. The WHO AFRO Library and AHILA would like to be able to do the same in Africa, but they do not have the resources to do so.

Reducing excess noise

3.34　There is a huge increase in the amount of free health information and expertise potentially accessible on the Internet etc. Many new resources are only available in electronic format.

3.35 Some healthcare providers continue to be starved of information. But many are starting to report a new and worsening problem: overload with irrelevant information. This risks causing confusion, frustration, misinterpretation, and inappropriate healthcare practice. It is partly due to the nature of current content on the internet, and partly due to unsolicited and uncoordinated dumping of printed and other materials by organisations in the North. Improving access to information without improving the quality and relevance of the information will do little to improve healthcare and may make things worse.

3.36 A global catalogue of available relevant resources is needed, especially those that are available free of charge on request. Each resource should be assessed for a range of basic indicators, including relevance for different user groups, reliability, and currency.

3.37 Many useful internet gateways have evolved, although very few have a focus on the needs of information and healthcare providers in low income countries. An example is the INASP Health Links, an internet gateway to useful websites for healthcare providers in developing countries (www.inasp.info/health/links).

3.38 Quality-controlled internet gateways are needed to serve as optional filters for those who want help to find the information they need. These gateways will exist alongside unfiltered source material (research and systematic reviews) for those who want to and have the skills to make their own selections.[7] A range of gateways could serve different user groups (eg medical students, community health worker trainers, nurses, midwives) working with different levels of resources (eg no drugs or medical equipment; minimally equipped solo primary health worker; rural clinic headed by nurse; clinic headed by clinical officer; small district hospital, etc) and in different countries or regions.

3.39 It would be useful to explore the potential of tagging to facilitate retrieval of relevant information from databases such as Medline, and of thesaurus based search tools to facilitate retrieval from the Internet as a whole.

ENABLING ACCESS TO THE FULL TEXT OF PUBLISHED RESEARCH

3.40 The peer reviewed scientific and medical literature exists in the form of journals. These are published by scientific societies; local, national, and international not-for-profit organisations (including the WHO); and commercial publishers.

3.41 Access to international journals is especially important for researchers and systematic reviewers. It is also especially important for those producing materials for healthcare providers. It is important, though perhaps less so, for healthcare providers themselves.

3.42 For those articles that exist in electronic format, abstracts are usually accessible to users through indexes such as PubMed and LILACS. However, much information is not contained in the abstract (which is also an obstacle to deciding whether an article is relevant or not), and access to the full text is therefore necessary.

Different models for covering the cost of quality control and dissemination

3.43 Researchers publish because they want to share their results (to boost the scientific enterprise where all advances are collective ones and to receive credit for their individual contributions). Commercial and non-commercial publishers want their products to be widely disseminated, in order that they maximise their impact and in turn become desirable venues for publication and marketable products. The costs of publication include mediating peer-review, production, printing, and distribution.

3.44 Historically, most journals have used a subscription-based model, in which individuals and libraries pay to access journals. Some journals breakeven financially; others regularly generate sizable profit for their publishers. The potential to reach a much greater audience provided by the digital revolution and the internet (and thus improve impact and profits) has led many journals to develop online versions of their content, and some journals exist solely in electronic format. Most electronic content is accessible to subscribers only (apart from the abstracts). For some journals, users can subscribe to the electronic version only, for others users have to pay for the paper journal and are then given access to the electronic version. Many publishers also offer a "pay-per-view" option where non-subscribers can purchase access to a particular article.

3.45   Several recent initiatives from scientists and publishers are challenging subscription based models for publishing research articles. These have been prompted by growing concerns about the sharp increase in price of journal subscriptions and publishers' profits. They fall broadly into three categories: initiatives that provide free or reduced cost dissemination; self archiving initiatives; and "open access" initiatives. It is important to emphasise that with free access and self archiving, copyright is transferred to the publisher; whereas with open access, as will be described below, copyright is retained by the author. All three categories refer only to publication of research articles. Other journal content is often described as "value added", for example, editorials and review articles. Some journals make their value added content freely available online, but charging subscribers to access this content is considered legitimate and even necessary by open access advocates.

Free and reduced cost dissemination initiatives

3.46   The past five years have seen a substantial increase in the amount of content from electronic journals that is free to users. A small number of journals allow free access to all of their online content; several others allow free access to selected items at the time of publication; others allow free access only to older content (typically 6 or 12 months after publication), usually through the publisher's own website but in some cases this back content is deposited into a public archive such as PubMedCentral.

3.47   SPARC has been influential in promoting discussion of the issues around reducing the cost of journals. A major boost to free access has come from HINARI, which now provides developing countries with access to nearly 2300 online journals. HINARI is a partnership between WHO, which administers the initiative; nearly 50 publishers (the number is constantly growing); Yale University, which provides the site architecture; funders including UNICEF, UNDP, the World Bank, and TDR, which provide training workshops, infrastructure grants, and fellowships; and the US National Library of Medicine, which provides tailored PubMed links.

3.48   HINARI provides access to staff and students within institutions (universities, schools of medicine, nursing, public health, pharmacy, dentistry, research institutes, government offices, teaching hospitals, and national medical libraries) if they are sited in countries with a gross national product (GNP) of less than $3000. (Very low income countries [GNP less than $1000 - 69 countries in the world] have been eligible for free access to included journals from January 2002. Low income countries [GNP $1000 - $3000 - 44 countries in the world] have been eligible for a year's free trial and must now pay $1000/institution/year.)

3.49   What have been the effects of HINARI? Before the initiative, a survey found that institutions in low and very low income countries had an average of two paid subscriptions to journals: in very low income countries, 56% of institutions had none and 21% had between two and five; in low income countries, these figures were 34% and 34%.

3.50   To date, HINARI has registrations from 666 institutions in 62 very low income countries, and 429 institutions in 40 low income countries. Levels of use are growing steadily. In the first six months of 2003, HINARI users downloaded 34,680 articles from the 214 journals offered by Blackwell Publishing; during the next six months, the number jumped by 113%, to 73,734 articles.

3.51   Experience at a major African research institute, with average monthly downloads running at 430 articles, suggests that HINARI has contributed to increased efficiency of research projects, improved quality of research proposals, more confidence in hypothesis generation and argumentation, better selection of reagents and equipment, more interaction among staff, a successful bid to host the secretariat of a regional initiative, and an enhanced role as communications hub for a multi-country research advisory committee.

3.52   Journals based in developing countries are now are asking to be included among HINARI's journals, seeing this as an important place to be. The most recently publishers to join are in China, India, Ukraine and Latin America.

3.53   An external evaluation of the program is now underway. While awaiting this, it is possible to conclude that HINARI has succeeded on a range of counts. There is commitment from a growing number of publishers, and usage rates are currently doubling every six months. But there are significant barriers to be overcome. Against expectation to some extent, it seems that ensuring a supply of free information from publishers was the easy part of this initiative. More difficult has been

achieving uptake. In many places there is no tradition of using research based information. It will take time to train people to use these resources and to build a research culture.

3.54   A major limiting factor is the high cost of reliable Internet access, computer equipment, and supplies (workstations, printers, paper, toner, and electric generators for backup supply). Usage levels seem to depend more on good connectivity than on the relative economic strength of the country. Some of the biggest users are in Ethiopia, Nepal, Sudan, and Vietnam, all of which are among the poorest countries in the world. Some participating institutions indicate that they are using their HINARI eligibility to leverage funding for equipment and Internet access from their governments and from international donors.

Self-archiving

3.55   Self-archiving is the depositing of published papers, both before and after peer review (preprints and postprints) into the researcher's own homepage or his/her university's eprint archive. To make ensure that self-archived articles become part of a seamless information space, the open archives initiative has developed metadata standards that make the contents of distributed archives interoperable, hence harvestable into one global virtual archive. The initiative is also making free software available to institutions to build such archives.

3.56   The permanence of self-archived articles is not clear, and it remains to be shown that they can be part of a seamless information space. Not all publishers allow self-archiving, and those that currently do may change their mind if the trend catches on and undermines their business.

Open access initiatives

3.57   The most profound challenge to the existing model of scientific publishing comes from the open-access movement, a heterogeneous and growing group of scientists, publishers, funding agencies, and charities. They share the vision of a seamless electronic scientific information space that is available to anyone with an internet connection.

3.58   Open access is a property of individual works, not necessarily journals or publishers. The following is a widely accepted definition of an open-access publication (from the Bethesda statement on open-access publishing). An Open Access Publication is one that meets the following two conditions:

1. The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use.

2. A complete version of the work and all supplemental materials, including a copy of the permission as stated above, in a suitable standard electronic format is deposited immediately upon initial publication in at least one online repository that is supported by an academic institution, scholarly society, government agency, or other well-established organization that seeks to enable open access, unrestricted distribution, interoperability, and long-term archiving (for the biomedical sciences, PubMed Central is such a repository).

3.59   To recover the costs associated with peer review, production, and provision of an electronic article, open access journals impose publication charges for each published article. The charges are collected from authors, but the idea is that institutions and funders will pay the charge to ensure wide dissemination of the research they have supported.

3.60   Several publishers have launched new open access journals, including BioMed Central (a commercial publisher) and the Public Library of Science (a not-for profit publisher currently supported by charitable funding). Some publishers have converted existing journals to open access (Lund Directory). Many others are considering a move to open access and are doing research and/or experiments to determine the potential risks and benefits.

3.61   Supporters of open access claim that it is likely to prove cheaper than the subscription model as a means of quality control and dissemination of research results: largely because author charges will create a proper market, in place of the current monopoly that allows publishers to raise prices out of

proportion to the value they add or the service they provide to authors. Supporters also claim that, regardless of any differences in overall cost, open access more completely fulfils the goal of research publication in achieving unlimited dissemination of research results.

3.62   Concerns about open access journals are numerous: that author charging as a business model has not yet been shown to be sustainable; that quality control will suffer; that journals will be driven by authors rather than the needs of users; that author charges represent a form of vanity publishing; that the literature will therefore be swamped with poor quality research reports; that conversely, large numbers of journals will fail financially and there will then be too few outlets for publication; that learned societies will no longer be able to subsidise their academic activities through journal proceeds; that while open access grows, there will be an unmanageable transition period during which institutions and funders will be forced to pay at both ends of the publication process; and that author charges will exclude articles from "poor" authors.

3.63   Responding to these concerns, supporters of open access say that there is no reason that quality control should suffer, since journals can set their acceptance criteria in exactly the same way as subscription journals, with the incentive of greater impact and prestige if they set high standards and have high rejection rates. Both BioMed Central and the Public Library of Science waive charges for authors unable to pay. Recognising that many journals do not have electronic versions that are compatible with the necessary standards for deposition in a public archive, they have also both invested in schemes to help journals to create open access online journals.

3.64   Several private and public funding agencies have come out in support of open access, including the Wellcome Trust, the Howard Hughes Medical Institute, the Max Planck Society, the German Research Agency, INSERM, and CNRS. Other charitable organizations, most notable the Open Society Institute, are covering publication charges for authors from particular countries.

3.65   Current trends suggest that increasing numbers of authors will submit their work to open access journals. These include growth in the choice of open access journals; signs that open access articles are read and cited more frequently than articles that can be accessed by subscribers only; suggestions that open access articles are more frequently covered in the popular media; and the beginnings of encouragement from funding agencies to publish in open access journals.

3.66   The transition from subscriptions to author charging will be prolonged if there are not sufficient incentives or penalties to drive the change. Traditional publishers may conclude that transition to open access is not yet necessary for or compatible with their long term survival and success. In their decisions whether or not to actively promote open access, funders and institutions will play a key role in determining the speed of any transition.

3.67   Much of the debate around open access has been adversarial, with traditional and open access publishers taking extreme positions. A more objective review of the issues would do much to inform funders and institutions in their future decisions. Such a review could specifically research the economic impact of open access publishing on journals, authors, and readers in developing countries.

CREATING INFORMATION THAT IS MORE RELEVANT AND USEABLE

3.68   Healthcare providers are a very large and diverse group, with different cadres of health worker working in different environments with varying levels of resources (eg drugs, equipment).

3.69   Each healthcare provider has specific needs for reliable, relevant materials, in the right medium (eg printed, electronic), presentations (eg text, pictures), and languages. For many healthcare providers, ownership of two or three highly relevant and reliable products may be more useful than access to the internet. A community healthcare worker may find a single copy of 'Where there is No Doctor', adapted and written in the local language, more useful than access to the thousands of journals produced by international journal publishers.

3.70   Producers of relevant, reliable materials need to have an understanding of their readers. Different types of materials require different levels of understanding. Local or national producers are best placed to produce most types of materials for local or national healthcare providers - provided they have the skills and resources to do so.

3.71   Northern-based producers continue to provide many, if not most, of the materials used in the South. These materials are often very good, but many are not, and inevitably they tend to be generic, and

unable to meet the specific needs of local healthcare providers. Even if they are translated into the local language, this does not necessarily make them relevant in terms of style and format.

3.72   There is now recognition that the 1994 paradigm of 'Getting information from developed to developing countries' (this was the title of 1994 BMA meeting[2]) is now inappropriate, or at least incomplete. Although flow from North to South may still be important, we now recognize that information flows need to be multi-directional; and that more needs to be done to support producers of local health learning and reference materials.

3.73   International and Northern 'health information providers' have previously been focused on trying to meet the needs of end users, and producing publications accordingly. This approach is now starting to be questioned. Should international organisations in fact be concentrating their efforts on supporting the long term capacities of local 'health information providers' - publishers, ministries of health, library services, local and regional NGOs?

3.74   An example is the shift in approach of Healthlink Worldwide: from being a publisher and distributor of international newsletters (Dialogue on Diarrhoea, AIDS Action etc) to being a supporting partner to enable southern producers and distributors to publish and distribute their own health learning materials.

3.75   Local producers of materials - whether ministries of health, NGOs, training colleges, publishers, or libraries - are best placed to synthesize and adapt information for local healthcare workers. They are best placed to understand not only their information needs, use of language, educational level, and level of medical training, but also the context in which the information will be used: socio-economic factors that affect healthcare interactions, the levels of available resources (e.g. drugs, diagnostic equipment), local healthcare infrastructure and services, cultural factors, and local disease patterns. There is increased understanding and awareness about the issues, but relatively little of this learning has so far been put into practice.

3.76   In addition to understanding of information needs, producers need to be aware of what is already available nationally and internationally (see Section XX above) and clearly they need to be able to access it electronically so that it can be readily transformed into different end-user media as required.

3.77   One national health learning materials programme, for example, is responsible for meeting the information needs of over 30,000 frontline health professionals. Under such pressures, lack of reliable connection to the internet is a major constraint. As the programme reported in 1999: "Our major limitation to the use of the Internet in our work is that the facility is virtually not accessible to most of the staff during normal working hours. It is the same line that we use for the telephone service. It therefore means that if you are on the net you will be blocking incoming telephone calls. Staff who want to go on the net will have to come very early in the mornings before start of work or stay behind after close of work."

3.78   There has been some support for the publishing and printing of books and journals within regions (eg EMRO), but such support has been patchy worldwide, and there has been very little support for local publishing activities in many regions, eg Africa. AMREF, for example, which was once the leading publisher of health learning materials in Africa, has not been able to sustain fully its publishing programme because of lack of financial support.

Freedom to translate, reproduce, adapt

3.79   Producers need permission/freedom/encouragement not only to access, but also to select, reproduce and translate content from national and international sources.

3.80   Useful primary and secondary healthcare materials should be made freely available online to users in developing countries and, where possible, freely reproducible/adaptable for local distribution in print or other formats.

3.81   WHO could itself be more proactive in encouraging its own practical publications to be reproduced and translated.

Skills development

3.82 Producers need a wide range of advanced skills - medical knowledge, knowledge of end-user needs, and writing and editorial skills - to identify and synthesize content from a range of international and national sources, in a way that maintains the integrity and reliability of the information while making it more relevant for local healthcare providers. Much more attention is required to define and promote such skills.

3.83 Tools and resources need to be developed to assist local producers in their task. One example is 'guidelines for creation of guidelines'.[14]

3.84 Producers also need the skills to prepare and upload publications onto the Web, not only to serve as a means of access for end-users, but also to serve as an open-access resource for other southern-based organizations.

The role of generic publications and templates

3.85 Generic information products include guidelines (eg Integrated Management of Childhood Illness), evidence based text books, abstracting journals, and drug formularies. Templates are information products that can be easily adapted for use in different contexts; an example is Where there is No Doctor, which has been adapted and translated into dozens of languages, for local use.

IMPROVING THE RELIABILITY AND CURRENCY OF HEALTHCARE INFORMATION

3.86 However good they are at producing relevant and useable materials, producers are hampered by the limited supply of reliable information on which to base their resources. As a knowledge base for healthcare decisions, the first port of call should be reliable and up to date systematic reviews and overviews. These in turn should be based on reliable research. For some questions and healthcare issues, producers will find reliable and up to date information. For many others, especially those specific to developing countries, as highlighted by the 10/90 gap, they will not.

3.87 This shortfall could be filled partly by funding more research in these areas within the rich world, but this is unlikely to achieve true relevance and will do little to buy in or capacity building. Better will be to support research and systematic review activities within developing countries themselves.

Increasing the number and quality of systematic reviews and overviews that address healthcare issues of developing countries

3.88 Systematic reviews and overviews summarise the findings of all completed research studies addressing a specific question or topic. In doing so, they can perform two key functions within the knowledge cycle (figure 1): they can guide practice on the one hand and identify gaps in our knowledge on the other. Systematic reviews are often done to address specific clinical or policy questions and to summarise a body of completed research to inform decision makers; they should also be done before new research is undertaken, to ensure that the research is necessary and to focus the research question.[15] In reality, individual systematic reviews and overviews may perform both functions simultaneously.

3.89 Access to systematic reviews and overviews in collections such as the Cochrane Library and the BMJ's *Clinical Evidence* are probably as important in developing countries as they are in developed countries. Indeed, some have argued that they are even more important in developing countries, where ineffective treatment wastes scarce resources that might otherwise have been used to treat others. However, the usefulness of existing reviews is weakened by the fact that they are based largely on developed world research, and they do not yet adequately address the global disease burden. One of the reasons for this is the paucity of research in developing countries, which is further exacerbated by the fact that much of this research is not published or indexed, and is therefore invisible to reviewers.

3.90 It is hard to estimate the number of systematic reviews in the literature. Most deal with research on treatment and prevention of diseases. The largest body of up to date reviews comes from the Cochrane Collaboration, which has produced nearly 2000 reviews since 1995, with published protocols for 1400 more. This represents impressive progress in a short time; but there is a long way

to go before all, or even the most important, aspects of health care are covered by systematic reviews. Mike Clarke of the Cochrane Collaboration recently estimated that it would take10 000 reviews to cover all current RCTs.[16] Jeremy Wyatt has estimated that there are 20 000 common clinical questions to be addressed.[Wyatt J, personal communication, 2003] Swingler at al have concluded that the number of published systematic reviews is still relatively small, with a bias towards the priorities of the developed world.[17] They analysed two databases, one of which was the Cochrane database and the other a selective UK database, DARE, which is likely to have skewed their conclusions, but the analysis is useful in fuelling a discussion about priorities.

3.91   Beyond the issue of coverage, there are methodological and practical challenges to overcome. In general, reviews currently do a poor job of providing reliable information on the harmful effects of treatments, partly because the individual studies themselves to a poor job of this. Questions around diagnosis and diagnostic tests present methodological challenges for systematic reviewers, which the Cochrane Collaboration and others are actively working on. Finally, there is the constant challenge of keeping completed systematic reviews up to date.

3.92   People undertaking systematic reviews need access to the full text of research reports, including reports of other systematic reviews; they need access to international electronic databases (such as PubMed and EMBASE) and to regional indexes and trial registers; they also need skills in literature searching, critical appraisal, epidemiology and statistics, clinical medicine and health care, writing, and peer review.

3.93   Despite their central role in knowledge based health systems, and despite the skill and time they require, systematic reviews do not currently attract the same level of academic recognition as primary (especially biomedical) research. They are largely performed by researchers and healthcare providers outside their main work activities. Proper academic recognition for such work – enabling it to be put towards applications for funding, promotion, or tenure - would be an important incentive to improve the quality and number of available reviews.

3.94   Given the vastness of the task, prioritisation is essential. If reviews were properly targeted at answering the practical questions of patients and healthcare providers, rather than simply summarising available research, they could address health information needs; they could help to set, rather than follow, global research priorities.

3.95   One way to increase the number of reviews that address the healthcare issues of developing countries is for more reviews to be produced in those countries. As an example, the Effective Health Care Alliance helps individuals and groups in middle and low income countries to prepare and update systematic reviews. Informal reports [note to reviewers: there may have been formal evaluation, in which case we will add this to the next draft] suggest that the initiative has improved the coverage of relevant healthcare issues, improved dissemination of the results of reviews, and helped to build local capacity in a range of key skills. [INCLEN should be mentioned here as well as under research below.]

Building research capacity in developing countries

3.96   Systematic reviews and overviews are only as good as the individual research studies on which they are based. There are major problems with research quality throughout the world;[18] a great deal of research is performed and published that can never reliably answer important healthcare questions.[19] The constraints on researchers in developing countries make the performance of reliable research even more difficult. However, as with systematic reviews, if research is to address the issues that are important to health care in developing countries, more and better research needs to be generated in those countries, within the context of local economies, populations, and health systems, and influenced by relevant local knowledge.

3.97   However, the trend seems currently to be in the opposite direction. As a generalisation, during the past 10 years both volume and quality of research have tremendously increased within rich countries, remained more or less static within middle income countries, and seriously declined in some low income countries.[20] Most African countries cannot afford to support medical research, and the pharmaceutical industry may be reluctant to sponsor trials in the developing world because the prospects for profit are limited even if effective treatments are developed. Not for profit organisations tend to prefer to support practical healthcare activities rather than foster research.

3.98 Reversing this trend will not be easy, and will be harder for some types of research (those requiring high cost infrastructure, for example) than others. Research is a global endeavour, based on the sharing of information. Academic research functions as a perfect information cycle, since all authors are readers and all readers are authors. Making it easier for researchers in the developing world to share information at all levels - internationally, regionally, locally - has the potential on its own to improve the volume and quality of the research they produce. [link to HINARI and BIREME evaluations, which support this statement]

3.99 The main channels for sharing information are through e mail and face to face communication, and through publication of articles and letters in journals. Researchers in developing countries need access--as readers and authors--to the global scientific and medical literature. Their contribution will in turn make this more representative of global health issues. They need internet and e mail connectivity so that they can find out about and contribute to the setting of international standards of research design and conduct. They need to know about sources of funding and possible collaborations. They need to know about the range and scope of journals, and to understand submission and peer review processes. They need to be able to take part in the evaluation of submissions as editors, peer reviewers, and members of editorial boards.

3.100 Several initiatives have focussed on building research capacity in developing countries. As an example, the WHO Eastern Mediterranean Regional Office provides training for researchers at country and regional level, helps countries develop research policies, directly sponsors research, and has developed a regional journal as an avenue for dissemination and academic recognition.

3.101 [Add information about INCLEN]

3.102 In his review, Horton made a range of recommendations to strengthen research capacity in the South. Among these were better understanding, mentoring, involvement, and support from researchers and journals in the North, and initiatives to strengthen journals in the South.[3]

Strengthening journals in the South

3.103 Journals build communities: locally between researchers and healthcare providers; and locally, regionally, and internationally within each field. They can help to build research capacity by providing education and feedback to researchers and by facilitating multidirectional exchange and debate. Given adequate web presence and indexing, journals based in the South can help researchers based in the South to share their knowledge and experiences with each other, as well as making their work visible internationally.

3.104 Haynes has articulated four ways in which journals can communicate information: from researcher to researcher; from researcher to clinician; from clinician to clinician; and from clinician to researcher. In reality, many journals play a combination of these roles.[21]

3.105 These four types of communication reflect the points at which journals can contribute to the knowledge cycle (see diagram):

They peer review and publish new research (researcher to researcher)

They peer review and publish systematic reviews and overviews (researcher to clinician)

They produce materials for healthcare providers in the form of editorials and review articles (clinician to clinician)

They have the potential to collate and channel clinical questions (clinician to researcher)

3.106 The past decade has seen a widening gap in the quality of biomedical journals in the North and South. North-based journals have in general improved and prospered. They have also increased in number as new specialty societies, interest groups, and for-profit publishers have launched new publications. Their quality has been further enhanced by high quality submissions resulting from, among other things, technological advances in research, increased availability of research funding, and the advent of evidence based medicine.

3.107 Meanwhile there have been few gains for journals in the South. On the contrary, many have regressed and died in line with the vicissitudes of regional economies. Those that survive are starved of human and material resources and of high quality submissions. These journals, such as

they are, have little or no international reach, and have limited impact on the health status of the local communities they seek to serve.

3.108 Local and regional publications continue to lack status and penetration of the market. They rely heavily in pharmaceutical advertisement, and this dents their credibility and editorial independence. Their resources are extremely limited and activities such as style and technical editing are frequently unavailable. Most editors and contributors have had little if any training in medical writing and journalism.

3.109 A survey in July 2002 of 69 African medical and health journals conducted by the Special Programme for Research and Training in Tropical Diseases (TDR) found that the majority were underfunded, did not publish regularly, lacked high quality articles and standard peer review, and were mostly invisible to the rest of the international medical community.[22] Journals in most of Africa have huge distribution problems and lack the appropriate managerial, marketing, technological and editorial skills. They operate in environments of poor communications infrastructure – specifically electricity, telephone and postal services.

3.110 Indexing of journals in the South is patchy and generally poor. According to the WHO Eastern Mediterranean Regional Office, only 5% of the indexed journals in international databases originate from the Third World.[23]

3.111 Although the current picture is bleak, there are some positive signs. Over the past five years WHO has recognised the importance of medical and health journals for building research and information capacity in developing countries. It has provided, at central and regional level, a range of different types of support for journals and journal editors in the South. International and regional editors' associations have been established to provide peer support and information for editors around the world: these include the World Association of Medical Editors (WAME), the Federation of African Medical Editors (FAME), and the Eastern Mediterranean Association of Medical Editors (EMAME).

3.112 Some regions have developed online indexes of research, as well as portals providing access to electronic medical journals in the region. [Mention EMRO/Scielo/Bireme here.] African Journals OnLine (AJOL) aims provide access to research undertaken and published in Africa; to enable the results of research carried out in Africa to become more widely known and to increase knowledge about African scholarship; to strengthen the African academic publishing sector, by providing income through encouraging print or electronic subscriptions and through the purchase of single articles; to assess the impact of using the internet to promote Africa-published journals; and to hand over a sustainable and operating programme to an African host in 2003. Free access is offered to Tables of Content and abstracts, together with links to electronic full text where available. Lack of sustained funding for AJOL has been a major constraint.

3.113 If they are to contribute fully to the knowledge cycle and help to build research capacity, journals in the South need sustained and coordinated support. Editors need internet and e mail cconnectivity and access to the full text of published articles (for peer review and commissioning of commentaries). They need training, peer support, and mentoring. They need to know about and be able to contribute to guidelines for good editorial practice, including research and publication ethics. They may need support in developing their own websites or seeking inclusion in specialised health websites and portals. They also need their contents to be retrievable through well maintained and useable online indexes: this is crucial if they are to attract high quality submissions, since in general authors write in order to be read and cited by others.

Indexing journals in the South

3.114 The most important global medical index is Medline, but the journals included in Medline are mostly from developed countries and are in English. Its selection criteria exclude most of the journals published in the developing world.

3.115 Journals that are not indexed by Medline need to be indexed somewhere, or they will be invisible to researchers, reviewers and healthcare providers. WHO has supported the evolution of regional indexes to index the regional literature. Support for these indexes is highly variable from region to region, with almost no support at all for the African Index Medicus. Despite the efforts of the WHO AFRO Library and AHILA, and the continued contributions of some African librarians, the African Index Medicus is in a state of collapse and requires urgent support. Librarian indexers in poorer countries need extra support because much of the literature remains in electronic format and, even

where it does exist in electronic format, librarians may not be able to access it because of poor or absent Internet connectivity.

3.116 All regional indexes need to be strengthened and linked electronically with Medline, allowing users to search across combinations of indexes as required. We also need to find ways to facilitate access and cross-searching with other indexes (eg CAB-Health, NISC).

3.117 Ideally these indexes would link to the full text of all published articles, and be equipped with user-friendly and efficient search tools. Alternatively (and more practicable), there could be a group of databases that each contained parts of the literature (articles in a particular language, on a particular topic, from a particular region, etc.), and which were cross-compatible so that they could function as one virtual information space.

3.118 Users need to have access to research databases and the skills to use them.

4 Cross cutting issues

CONNECTIVITY

4.1 Dissemination via e mail and the internet is in theory the most effective solution, both globally and locally. Electronic information can be viewed as the raw material, which can then be made available to end users via a range of platforms, including paper, CD Rom, and digital radio.

4.2 Internet connectivity has increased dramatically over the past 10 years, but it continues to be unavailable to most health professionals.[24] Indeed, many health information professionals - who are responsible for meeting information needs of healthcare providers - continue to have limited or no access, despite calls to give them priority. Although there is increased access to e-books and e-learning materials, these are not easily usable on the slow and expensive internet connections available to most users in developing countries.

4.3 Availability of e mail is spreading faster than internet connection, especially in Africa. Email provides new possibilities for publishing and distributing practical healthcare information. Widespread and increasing access to email has enabled researcher networks, practitioner networks, regional networks (eg AFRO-Nets), publisher networks (eg Forum for African Medical Editors), librarian networks, and multidisciplinary health information development networks (eg HIF-net at WHO). Email has also enabled one-to-one communications, both professional and personal, facilitating development of relationships and reducing feelings of professional isolation.

4.4 Some developing countries have experienced great improvements in connectivity over the past few years. But email and internet access are still available only to the minority of healthcare providers, and for most of those it is still slow and unreliable. Problems with power supply prevent technological penetration. Computer equipment and IT support is in short supply. Software to use and run these technologies is mainly in English. Most technologies have been designed for a different environment and group of users which makes them inappropriate for many countries. There is also resistance to the use of technology among healthcare professionals.

4.5 Healthcare providers should have access to email facilities wherever possible to facilitate communication and exchange. Internet access should also be made as widely available as possible, but priority should be given to those individuals and groups (libraries and local resource centres for example) who are responsible for providing information for others and who can act as hubs for local distribution by email or on paper.

4.6 E mail and internet connectivity will need to be matched by training in computer skills, provision of equipment (computers, modems, printers, power supply, software), and IT support.

4.7 Where personal computers are available but internet connections are slow and expensive, electronic materials that require substantial user time (eg educational materials) should be provided on CD-ROM or other stand-alone media

4.8 Certain technologies have the potential to 'leapfrog' barriers to access in certain settings. These include cell phones, PDAs, television, radio, and satellite datacasting. Their potential should be further investigated.

4.9   It is essential that initiatives are driven by needs and not by technology. The needs and barriers to use of technology among healthcare providers should be investigated in a range of settings to inform any initiatives.

4.10   Access to e-information has benefited health researchers most of all, health information providers less, healthcare providers less still, and patients least of all. This is partly due to differences in connectivity, but is also due to the relevance of internet-based information for different end-user groups.

SKILLS DEVELOPMENT AND TRAINING

4.11   Participants at every stage in the knowledge cycle need skills to access, evaluate, and understand information. The level and type of skill required will be different for each group, and individuals will learn in different ways.

4.12   Cost-effective methods are needed to identify and build key information skills for each professional group (nurse, doctor, researcher, librarian, journal editor) - different groups will require different levels and types of skills - basic training and continuing professional development should be tailored accordingly

4.13   The current prevailing formula of 'training workshops' needs to be reviewed and compared with other methods of skills development, including learning through sharing of experience and networking, learning 'on the job', self-directed learning, and ICT-enabled distance learning.

4.14   Individuals learn better within a culture that supports and rewards learning. Healthcare providers need information on 'learning how to learn'. They need incentives that promote continuing professional development and lifelong learning, such as well organised schemes providing CME points and professional re-accreditation.

4.15   Tools are now being developed that support active learning through reflection, problem solving, and self assessment. These could be adapted for use in developing countries

4.16   Generic training packages should be identified and developed (where necessary) and support given for 'train the trainers' programmes, including support for adaptation of generic materials for local use

4.17   There will be a vast increase in the amount of electronic information available. Searching, critical appraisal, and computer skills will be particularly important for librarians and producers of healthcare materials Healthcare providers will also need some level of critical appraisal skills to distinguish unreliable from reliable sources of information.

4.18   Researchers, systematic reviewers, journal editors and indexers need to understand research design and to have skills in searching, critical appraisal, writing, and editing.

4.19   Teaching and mentoring skills are important among all groups within the knowledge cycle, if skills are to be passed on to others and sustained.

EVALUATION AND MONITORING OF INITIATIVES TO IMPROVE ACCESS TO HEALTHCARE INFORMATION

4.20   All initiatives should be regularly evaluated and monitored to ensure value for money and to extract lessons for future initiatives. Evaluations could adopt a systematic approach, with statements of objectives and outcome criteria against which to assess progress.

4.21   There is a need to develop tools for evaluating the impact of information development activities, in terms other than usage alone. Demonstration of the impact of information activities continues to be difficult because access to information is only one of many factors that relate to healthcare practice and improved health outcomes. Valid indicators of effectiveness could greatly increase investment, since funders could direct their resources to strategies that yielded most value for money. Effective initiatives could be highlighted and replicated elsewhere.

4.22   Networking and learning programmes at international and national levels can provide a forum for exploring approaches to evaluation and sharing lessons learned about health information development.

POLITICAL COMMITMENT

"*In a neighbouring village, a village elder said, "if you give me a choice between money and information, I will choose information" ... Of course, as with all basic development problems, the challenge is primarily political. First defining the concept of information: is it to be the harmless aseptic, sterilized type usually dispensed by aid agencies and government departments, or will it be integrated in a more global understanding of the development process, i.e consciousness raising information*?" [25]

"*Now is the time to make it happen where it matters, by turning scientific knowledge into effective action for people's health…*" Dr JW Lee, Director General of WHO, 2003.

4.23 Interest in the overall issue of 'access to health information' has increased enormously, culminating in the announcement by Kofi Annan in 2000 of "A health internetwork to provide hospitals and clinics in developing countries with access to up-to-date medical information."

4.24 There is massive investment in the North in health information and knowledge systems, and huge interest in the importance of information, knowledge and ICTs for development, as witnessed by the World Summit on the Information Society (WSIS) and, more specifically in the health sector, the title of this year's WHO Annual Report: 'World Report on Knowledge for better health'.

4.25 The UK Department for International Development has recognized the importance of networking and learning in health communications, and has funded the emergence of the Exchange programme, which in turn has supported INASP to carry out its work relating to 'access to information for health professionals'.

4.26 However, the outputs of WSIS were non-specific and non-binding. There was little emphasis on the importance of access to health information. In some ways, WSIS was a missed opportunity for the health information development community.

4.27 Ways need to be found to translate the increased political awareness of the importance of information in development into action and financial commitment. More needs to be done to raise awareness of the importance of health information access, and key players like ITU and WHO should take a greater role in mobilising political and financial commitment into efforts that increase access to information for health professionals.

4.28 WHO's 2004 "World Report on Knowledge for Better Health" is a great opportunity to harness broad commitment around 'access to health information' as a global health issue. It should emphasize, in particular, the importance of access to 'essential information' for primary healthcare in low-resource settings. The publication has the potential to open up the debate to many of the issues outlined in this paper.

COOPERATION BETWEEN STAKEHOLDERS

4.29 It seems clear that sustainable progress will require cooperation and dialogue among all those with an interest in the exchange and use of health information.

4.30 The number and variety of health information support programmes has increased dramatically. This could lead to increased fragmentation and duplication, or synergy and sharing of lessons learned. Ways need to be found, such as networking and learning programmes, that ensure we move towards the latter rather than the former.

4.31 INASP has established a foundation for international cooperation among stakeholders. Over the past 7 years it has fostered a global 'community of interest' around health information development issues, supported by a range of communication tools and reference resources. These include the INASP-Health Directory (which maintains online data on leading international health information development programmes), Health Information Forum, and HIF-net at WHO (www.inasp.info/health).

4.32 At regional level, organizations concerned with health information access are also becoming increasingly multisectoral, including AHILA, which is increasingly involving not only librarians and documentalists, but also publishers, researchers and healthcare providers as well as librarians.

4.33   The Johns Hopkins University launched a new major programme 'INFO' in 2003. INFO envisions 'a world of interconnected communities where shared reproductive health information improves and saves lives'.

4.34   The Global Forum for Health Research promotes intersectoral collaboration to address the 10/90 gap.

4.35   Country-level cooperation in the provision and use of health information remains weak. It is difficult, if not impossible, to know 'who is doing what' in health information activities. Many health information development initiatives continue to be poorly planned, fragmented, competitive and duplicative. Local producers and end users often play a minor role, if any, in strategy, priority setting, problem solving, creative thinking, and generation of plans for action.

4.36   As in other sectors of international development, lack of country self-determination and lack of in-country coordination are associated with a northern-led, NGO-based project approach, providing benefits to limited geographical areas, or specific user groups, while other areas or groups remain unserved, and the public sector remains weak or even undermined. Relatively few health information programmes have had a focus on sustainability or on building capacity and strengthening existing infrastructures.

4.37   We have so far failed to find solutions for the language gap, both for researchers and for end users, and also for engagement in the development process. Organizations in developing countries continue to be unequal partners in many development activities.

4.38   The main initiatives currently under way need to be identified, mapped, and evaluated. Building on the INASP-Health Directory (which describes international support programmes), countries could be supported to map health information programmes at the country level. Support could be given to networking and learning initiatives that engage a broad range of stakeholders within developing countries, with a focus on building capacities for self-determination within those countries. The aim should be to distribute benefits as widely as possible.

4.39   Activities should be driven by the needs of end users. Efforts should be coordinated as far as possible so that lessons learned are shared and duplication avoided. International, regional and national activities need to be mapped so that individuals and organizations in developing countries can easily identify appropriate sources of free and low-cost publications, technical support, funding, contacts, and potential collaborators.

4.40   More work needs to be done on how to break down language barriers, both to increase participation in international debate on health information development, and to make a greater proportion of English-language information resources available in other languages.

4.41   Much more support is needed in Africa, but such support should be provided in a coordinated way, be demand-led and driven by the countries concerned, with an emphasis on cooperation and shared understanding rather than isolated top-down projects. Prominence should be given to sharing of lessons learned and clarification of roles of different organizations at national and regional levels. A regional framework is required, based around country needs, and developed and articulated by regional bodies such as WHO AFRO, AHILA, and FAME.

5 WHO's role

5.1   In the past, WHO has worked best as an enabler and advocate rather than a coordinator and implementer of projects. This is likely to remain the case for efforts to improve access to healthcare information in developing countries.

5.2   WHO has a unique ability to act as an honest broker, to legitimise activities, to convene groups of people to take those activities forward, and to harness expertise. Partnerships that have WHO's formal approval and collaboration gain credibility from the association and are able to attract political and financial support. But partnerships that are coordinated or implemented by WHO are often stifled, and it is arguable whether WHO is generally a cost effective implementing partner.

5.3   WHO was previously focused largely on being a provider of information, and on setting norms and standards. Its expert advisory and technical support is invaluable. While these functions remain important, WHO is now exploring its potential role as a facilitator of knowledge collaboration. It is

exploring possibilities for strategic partnership with a wider range of stakeholders. It has started to work more as a catalyst by facilitating communication networks, book exchange programmes, discussion groups and forums, training of information professionals, and provision of support to producers of healthcare information.

5.4 In his summit speech in 2000, Kofi Annan said he hoped the Health InterNetwork would connect 13 000 hospitals and clinics to relevant reliable information. This did not happen, and it is arguable whether the Health InterNetwork has made much difference for the majority of hospitals and clinics in the developing world. On the other hand, HINARI has provided an important new resource that is particularly useful for researchers and healthcare providers in tertiary referral centres.

5.5 WHO is active in almost every area of 'increasing access to information for health professionals', and yet it has so far done little to promote intersectoral collaboration or to leverage political and financial support in this area. It has so far failed to involve all stakeholders in a broad strategy, in a process that would bring a sense of ownership and community to all players.

5.6 There is increasing recognition of the importance of systematic reviews and overviews, but this is not yet matched by political and financial commitment. WHO has an important role to advocate increased support for systematic reviews and overviews that address global health issues.

5.7 It is not clear that there has been enough support for information development from WHO headquarters. For example, the position of Technical Liaison Librarian, many of whose responsibilities were directly related to health information in Africa, has not been maintained. If WHO headquarters has decided to reduce its focus on Africa, has WHO AFRO received and allocated the necessary human and financial resources to manage this?

5.8 Access to WHO publications needs to be reviewed and enhanced. Is there any evidence that WHO publications and documents are reaching their intended audiences any better than they were 10 years ago? Are the publications becoming more demand-led? Are they more relevant than they were? Are they any more affordable than they were 10 years ago? Are they being translated, reproduced and adapted for different audiences more freely than they were 10 years ago?

5.9 The future role of WHO in the Health Internetwork should be re-examined. Should WHO continue to be the implementer of this initiative, or should it find ways to make the project more cooperative and consultative, with WHO acting more as an advocate and adviser rather than coordinator/implementer?

6 Conclusions

6.1 We don't know enough about the information needs, or the barriers to meeting those needs, among people making healthcare decisions in developing countries. What we do know suggests that most of them experience substantial problems in accessing and using healthcare information.

6.2 There are no simple solutions.

6.3 The goal of universal access to information is, in theory, achievable. It is conceivable that all stakeholders will have access to the Internet. In the meantime, universal access to 'essential information' (whether printed and/or electronic) is readily achievable, provided there is adequate global commitment and cooperation.

6.4 Information is vastly more useable if it is in electronic form. Electronic information can be viewed as the raw material, which can then be made available to end users via a range of methods and platforms, including paper and digital radio. It is particularly important that producers of healthcare materials and other health information professionals have adequate internet connectivity.

6.5 The availability of information online has driven improvements in connectivity. But even with full political commitment and substantial funding, universal Internet and e mail connectivity is an enormous challenge. It may not be necessary if we successfully invest in leapfrog technologies while improving local non-electronic distribution channels to key groups.

6.6 Given the vastness of the task, we need to establish global priorities: which groups should be targeted for connection to the Internet and e mail; what types of information should be made available on line. This prioritisation should be done through inclusive consultation.

6.7   Improved access will be worthwhile only if we also tackle the things that make it hard for people to use available information. Key among these are the poor quality and irrelevance of much existing information; lack of infrastructure, time, and incentives; lack of knowledge about what is available and where to look; language barriers; lack of training and mentoring.

6.8   Improving the quality and relevance of information for people making healthcare decisions in developing countries will require improving quality and relevance at all points in the knowledge cycle.

6.9   Quality and relevance of healthcare information will also improve where there are effective local information cycles, in which users of knowledge are also contributors of knowledge and vice versa.

6.10   Apart from poor quality and irrelevance, other barriers to use among healthcare decision makers also need to be tackled. Training etc….

7   Recommendations

7.1   We envision a time when everyone has ready access to relevant, reliable, up to date information on health care that they can understand and act upon. To take us towards this goal, we make the following recommendations for action on the part of WHO and its partners.

Special initiative on healthcare information/Declaration of universal access to healthcare information by 2015

7.2   We recommend the launching of a special initiative to improve access to healthcare information in the developing world.

7.3   We suggest that the WHO and its partners establish an international collaborative group to formulate and implement the initiative. The group should include representatives of all stakeholders, including producers and users of knowledge, and the terms of reference should ensure wide and inclusive consultation.

7.4   We suggest that the international collaborative group draft a declaration of universal access to relevant, reliable, and up to date healthcare information by, say, 2015. The exact wording and timeline of such a declaration would need to be agreed through discussion and consultation.

7.5   As first steps towards achieving universal access, we recommend establishing working groups to draft strategy, objectives, and programmes of work in seven key areas:

- Researching information needs and barriers to use of information.
- Providing access to existing materials for healthcare providers in developing countries;
- Providing access to the results of research;
- Improving relevance and usability of materials for healthcare providers in developing countries;
- Improving reliability and currency of materials for healthcare providers in developing countries;
- Improving internet and e mail connectivity;
- Skills development and training.

7.6   We recommend that the majority of working group members come from low and middle income countries.

7.7   We recommend that the international collaborative group engages with, and takes advantage of, a global review of access to information for healthcare workers in developing countries. This is planned to take place from July 2004 to September 2005 around a series of conferences, including the Global Forum for Health Research meeting in Mexico City in November 2004. The process for the global review is currently being developed by a range of organizations, including Association for Health Information and Libraries in Africa, BIREME, BMJ Publishing Group, Forum for African

Medical Editors, Global Forum for Health Research, INASP, and WHO (Eastern Mediterranean Region).

Research information and learning needs and barriers to use of information.

7.8 Support systematic reviews and new research into information needs, barriers to access, and barriers to use of information among healthcare providers in developing countries.

7.9 Support initiatives that strengthen local information cycles, through face to face meetings or e mail list serves; both within sectors (eg. healthcare providers) and across sectors (involving healthcare providers, producers of knowledge materials, systematic reviewers, researchers, editors, and indexers). Such cycles or groups could be used to identify information needs, barriers to access, barriers to use of information, influential initiatives, and suggestions for future activity.

7.10 Support an international review of what has been achieved in information development over the past 10 years. Evaluate the effectiveness of key initiatives in terms of their impact on access to and use of information in developing countries. Establish models for best practice that can be replicated more widely.

Access to existing materials for healthcare providers in developing countries

7.11 Explore ways for libraries and resource centres to obtain a comprehensive overview of publications available for different types of end user.

7.12 Consider creating a global online library for health that could pull together, organise, catalogue, and annotate existing electronic knowledge resources (drug formularies, guidelines, handbooks), making it easy for libraries and end users to find information relevant to their needs.

7.13 Consider specific support for national reference centres that would provide full access to each country's formal publications (electronic and print).

7.14 Support access to 'essential' products in local languages: for example, core learning materials (eg textbooks, manuals) and reference materials (eg drug formularies).

7.15 Support access to relevant e-books and e-learning materials on CD-ROM and DVD.

7.16 Assess the potential of 'leapfrog technologies' such as cell phones, PDAs, satellite datacasting for use by individual healthcare providers in a variety of settings.

7.17 Explore the potential of radio and television for local exchange of healthcare information and distance learning.

7.18 Support initiatives aimed at reducing noise on the internet.

Access to the results of research

7.19 Evaluate models for achieving universal access to the results of primary research and systematic reviews, in collaboration with all main stakeholders.

7.20 Consider commissioning an objective evaluation of the different business models, in terms of their cost effectiveness and long term sustainability.

7.21 Convene a collaborative forum of stakeholders, including commercial publishers, academic institutions, and funders of research, to listen to concerns and explore ways forward.

Relevance and usability of materials for healthcare providers in developing countries

7.22 Increasing the relevance and usability of materials will be an evolving process. WHO and its partners can help to kick start the process and then sustain activities that prove effective. Below are various suggestions for initial action.

7.23   Support initiatives that develop local capacity both to produce relevant information and to use it. Such initiatives could focus on strengthening local information cycles, in which users and producers of knowledge work closely together.

7.24   Support initiatives that facilitate the production of materials locally. Strengthen networks for producers of health learning materials, and provide easy access to relevant source materials, including generic templates, image collections, and 'how-to' guides (eg Healthlink Worldwide's 'Quest')

7.25   Support translation of essential materials.

Reliability and currency of materials for healthcare providers in developing countries

7.26   As with relevance and usability, increasing the reliability and currency of materials will be an evolving process. The WHO and its partners can help to kick start the process and then sustain activities that prove effective. Below are various suggestions for initial action.

7.27   Support initiatives that build local capacity in systematic reviewing and research.

7.28   Support local information cycles (for example through funding face to face meetings and e mail list serves) that bring together patients, healthcare providers, systematic reviewers, and researchers.

7.29   Support the conduct, maintenance, and dissemination of systematic reviews and overviews on global health issues, including translation into other languages.

7.30   Explore ways of creating incentives for researchers to focus on important local healthcare problems. Encourage systematic reviews before new studies are started to ensure these are necessary and that they learn lessons from previous studies.

7.31   Support initiatives that will strengthen journals in the South, including direct funding for journals, funding for international and regional editors' associations and list serves, training workshops and distance learning resources, conferences, and visiting fellowships to Northern journals.

7.32   Support initiatives that will strengthen indexing of journals in the South, focussing on regional electronic indexes of published research and portals for research published online. Establish these where they are lacking, using the lessons learnt from successful initiatives such as LILACS/Scielo/BIREME and the EMRO Index Medicus and portal.

Internet and e mail connectivity

7.33   Support the provision of e mail and internet connectivity worldwide, giving priority to individuals and groups where access will have most impact at the point of greatest need. In our view, these priority groups are libraries, local resource centres, and local producers of materials for healthcare providers.

7.34   Explore potential for involving the private section through subsidies from internet providers and satellite services.

7.35   Investigate the potential of leap frog technologies

7.36   Explore ways to increase provision of computers and other hardware, and to increase the availability of IT support.

Skills development and training

7.37   Investigate the training and learning needs for each group within the knowledge cycle at different levels of healthcare (primary/secondary/tertiary) and in different countries and settings. In each case, identify and support effective training programmes, and evaluate them to ensure value for money.

7.38   Support the rationalisation of existing training initiatives within regions and sectors.

7.39   Support experimentation with active adult learning techniques, including learning needs assessment, interactive learning, reflection and response, and personal development plans.

7.40 Establish meaningful incentives to encourage uptake of training, such as CME points and re-accreditation.

7.41 Support schemes that encourage sustainable mentoring and peer support at local, regional, and international level.

WHO

7.42 Support the development of a broad strategic framework for cooperation which will enable it and all other organizations/stakeholders to work more effectively together to improve access to reliable information for healthcare workers in developing countries.

7.43 Commission an external review of WHO involvement in health information development over the past 10 years, to clarify its role and make recommendations for the future. The review should include broad consultation of all stakeholder groups.

Authors' competing interests

7.44 Fiona Godlee is editor of Clinical Evidence, which is currently available free online to users in low and very low income countries. She was previously editorial director for medicine at BioMed Central. She has no financial interest in either product but is committed to the success of evidence based medicine and improved access to information globally, as means to achieving knowledge based health care. Neil Pakenham-Walsh is programme manager of INASP-Health (full conflict of interest statement to follow). Dan J Ncayiyana (full conflict of interest statement to follow). Barbara Cohen is editorial director for the Public Library of Science (full conflict of interest statement to follow). Abel Packer is director of BIREME (full conflict of interest statement to follow)

Acknowledgements

Table: examples of effective treatments whose introduction was inappropriately delayed, and ineffective or harmful treatments whose use was inappropriately continued (to be drafted and referenced)

Anti-arrhythmics/flecanide

Steroids for preterm birth

Magnesium sulphate for pre-eclampsia

Thrombolytics for AMI

Treatments for recurrent miscarriage

Active management of the first stage of labour

Amodiaquine in malaria

(End of table)

References

[1] Lown B, Bukachi F, Xavier R. Health information in the developing world. Lancet 1998; 352:

[2] BMJ 1997; 314: 90.

[3] BMJ 1994;309:939-942 (8 October)

[4] Horton R. North and South: bridging the information gap. Lancet 2000;355: 2231-36.

[5] WSIS Draft Declaration of Principles

[6] Health information needs and services in Cameroon. Afr J Lib Arch Inf Sc, 1998 8:1:13-22.

[7] Adamson S. Muula AS, Misiri H, Chimalizeni Y, Mpando D, Phiri C, Nyaka A. What is the access to continued professional education among health workers in Blantyre, Malawi? http://216.239.59.104/search?q=cache:xnSw32Gb7IcJ:www.equinetafrica.org/Resources/downloads/Malawi%2

[8] Dawes et al 2003

[9] Smith R. What information do doctors need. BMJ 1996; 313: 1062-8.

[10] Haines A, Donald A. Getting research into practice. Second edition. BMJ Books, London: 2002.

[11] Hunt JM. Barriers to research utilization. J Adv Nurs 1996; 23: 423-5.

[12] Glasziou P. http://www.ubht.nhs.uk/evidence-in-practice/EiP2/speakers/06-3.htm

[13] Garner P et al. Implementing research findings in developing countries. In Haines A, Donald A: eds. Getting research into practice. BMJ Books, London, 2002: 162-173.

[14] Carter A. Background to the "guidelines for guidelines" series. Can Med Assoc J 1993; 148: 383.

[15] Chalmers et al

[16] Clarke M, ACPJC 2003

[17] Swingler GH, Volmink J, Ioannidid JPA. Number of published systematic reviews and global burden of disease: database analysis. BMJ 2003; 327: 1083-1084

[18] Altman D. JAMA 2003.

[19] Haynes B. ACP Journal Club.

[20] Pouris A. South African Journal of Science.

[21] Haynes B. Loose connections in medical journals. ACP (I think) sometime in the 1980s

[22] http://www.who.int/publications/tdrnews/news70/fame.htm (accessed 22 February 2004)

[23] http://www.emro.who.int/pressreleases/2003/no20.htm (accessed 22 February 2004)

[24] Tan-Torres Edejer T. Disseminating health information in developing countries: the role of the internet. BMJ 2000; 321: 797-800.

[25] Pradervand P. Knowledge is Power. International Development Review, 1980; 22: 57.