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Regional strategy for knowledge management to support public health

Extensive and systematic efforts are needed to manage knowledge in the health sector and make it available to all potential users. Many of the solutions to public health problems exist but are not applied because of knowledge gaps among and within countries. These gaps can be bridged through the development of an environment that encourages the creation, sharing and effective application of knowledge to improve health. The Regional Committee is invited to discuss the regional strategy on knowledge management.

Contents

Executive summary

Knowledge management refers to all management activities necessary for effective creation, capturing, sharing and managing knowledge. In health systems, knowledge management blends people, technology and processes to create, share, translate and apply knowledge to create value and improve effectiveness. For WHO, knowledge management aims to bridge the knowledge gaps in global health.

Globally, the situation with regard to knowledge production, access and utilization is characterized by the explosion in health and biomedical literature, the information and communication technology (ICT) revolution, the emerging of the information society and knowledge economy and the globalization of health and medical services.

At regional level, there is diversity among countries with regard to the production, dissemination and utilization of health knowledge. Generally, there are low production rates of health information, weak information management institutions and procedures, weak information and communication technology infrastructure, weak networking activities, lack of financial resources to support knowledge management activities, lack of standards and tools for knowledge management, weak knowledge translation activities and low utilization of knowledge for policy making. Differences in availability of human resources, systems, tools and information and communication technology infrastructure contribute to this diversity.

The regional strategy on knowledge management aims to increase awareness and understanding of knowledge management; identify potential benefits of knowledge management to all stakeholders; provide a framework for resources mobilization in support of specific projects; communicate good knowledge management practice; act as a basis for operational plans for knowledge management at both regional and national scale; and constitute a road map for action and a mechanism for monitoring of progress.

The strategy sets strategic directions for action in support of knowledge management both at regional level and at country level. Strategic directions at regional level include managing knowledge policies at the Regional Office, enhancing publishing and dissemination of health information, promoting electronic publishing, strengthening multilingualism, and enhancing networking and communication. The Regional Office is also developing the Eastern Mediterranean Knowledge Network (EMKNet) as a strategic solution for networking and a platform for knowledge sharing in the Region.

At country level, strategic directions are to leverage e-health, or the use of ICT in health; build capacity for needs assessment, planning and evaluation; strengthen national programmes for knowledge management; enhance ICT infrastructure in health care insititutions; develop human resources; strengthen knowledge translation; promote knowledge generation; and develop knowledge hubs in WHO country offices.

Member States are recommended to: conduct a situation analysis of information and knowledge management institutions; develop national strategies for knowledge management and information technology for public health, including a national strategy for e-health; initiate projects and activities for knowledge mapping, knowledge translation and capacity-building in knowledge management; promote the establishment of national networks of health care professionals and institutions and collaborate with the Regional Office to develop and sustain the Eastern Mediterranean Knowledge Network (EMRKNet).

1. Introduction

1.1 What is knowledge management?

Extensive and systematic efforts are needed to manage information and knowledge in the health sector and make it available to its potential users. Users are health care professionals, managers, decision-makers, planners, academicians, researchers and the public at large. The increasing use of information and communication technology (ICT) has emerged as a key tool to drive efficiency and effectiveness in health systems in the Region. Global efforts towards the attainment of health for all and the achievement of the Millennium Development Goals (MDGs) by 2015 have identified a number of key obstacles to progress. Among these obstacles, one is specifically related to knowledge management and what has been termed the "know–do gap", meaning the gap between what is already known, and what is actually done in practice. This gap contributes to huge health inequalities, such as unacceptably high levels of child and maternal mortality, high incidence of infectious diseases and the spread of chronic conditions across many countries.

Knowledge management refers to all management activities necessary for effective creation, capturing, sharing, and managing knowledge. WHO defines it as "a set of principles, tools and practices that enable people to create knowledge, and to share, translate and apply what they know to create value and improve effectiveness" [1]. For WHO, the main purpose of knowledge management is to bridge the knowledge gaps between and within countries.

Knowledge management concerns itself with developing systems and processes that leverage information and knowledge in order to promote originality, creativity, intelligence and learning. The discipline of knowledge management has three major components:

- People: who create, share, and use knowledge, and who collectively comprise the organizational culture that nurtures and stimulates knowledge sharing;
- Processes: the methods to acquire, create, organize, share and transfer knowledge;
- Technology: the mechanisms that store and provide access to data, information, and knowledge created by people in various locations.

To manage knowledge, it is important to understand that there are two types of knowledge. Tacit, or implicit, knowledge is the knowledge or know-how that is in people's heads, their experience. This knowledge is rarely documented and is usually communicated using informal methods such as group discussions, meetings, conferences, etc. Explicit knowledge can be expressed in formal and systematic language and can be shared in the form of data, scientific formulae, specifications, manuals and so forth [2].

This paper seeks to clarify the function and role of knowledge management in public health to raise awareness and ensure full understanding of the added value of knowledge management and the challenges faced. The strategy presents a framework for action by the Regional Office and countries to implement knowledge management principles and practices in order to achieve their common objectives. The strategy will also help to:

- identify potential benefits of knowledge management to all stakeholders and partners;
- provide a framework for resource mobilization in support of specific projects;
- communicate good knowledge management practices;
- act as a basis for operational plans for knowledge management at both regional and national scale;
- constitute a road map for action and a mechanism for monitoring of progress.

The WHO Constitution states that "the extension to all peoples of the benefits of medical, psychological and related knowledge is essential to the fullest attainment of health." *The WHO 11th General Programme of Work 2006–2015* approved by the 59th World Health Assembly recognizes knowledge as one of several gaps which represent fundamental strategic problems. The combined result of these gaps is inefficiency, instability and exclusion from the benefits of progress. What is needed is an environment where life-saving and life-enhancing knowledge is produced, shared,

translated and used [3]. The knowledge gap is represented by inadequate research in many developing countries and in many areas of health systems, lack of transfer (translation) of research results and evidence into usable knowledge, and thus policy and practice, lack of access to information resources, lack of tools for information utilization and disparity in access to knowledge.

1.2 Scope of knowledge management

Knowledge management does not function in isolation from its environment but interacts with other related areas. In the development of the regional strategy, due consideration was given to other strategies for specific technical areas that include directions for information and knowledge management. Country Cooperation Strategies were also consulted and taken into consideration. Among the most relevant areas to link with knowledge management are:

- Research. Research produces and uses knowledge. Applying research results through access and utilization of knowledge is a prime target of knowledge management;
- Human resources management. Utilization of tacit management, team building, networking, application of experiential knowledge and building of a learning organization are all issues influenced by human resources management;
- Public information and communication. Reaching out to the public through public information campaigns, involving the community in health education programmes and repackaging of health knowledge in easy-to-use materials are impacted by knowledge management;
- Health information systems. Data collection, statistical and trends analysis, decision support systems, evidence-based practices and epidemiology are enabled by knowledge management tools and techniques.

1.3 Knowledge management in public health

The importance of knowledge management in the health care environment is increasingly understood, and now medical textbooks, journals, patient records and other reference materials are widely consulted in the development of care guidelines and treatment protocols in order to compile medical knowledge into operational form [4]. Knowledge management places extra value on the tacit knowledge that professionals hold within a health care or medical education setting. Using knowledge management tools, including information technology, allows optimum use of the collective wisdom of professionals in the institution.

Knowledge management approaches in public health, therefore, are required to:

- capture and respond to more of the critical knowledge needed to ensure public health preparedness;
- manage and integrate the information that already exists through indexing, cross-referencing and sharing;
- enable virtual teams to work collaboratively with access to shared knowledge at local, national and global levels.

The World Health Report 2000 asserted that generation and utilization of knowledge—that is, scientific and technical progress—explained almost half of the reduction in mortality between 1960 and 1990 in a sample of 115 low-income and middle-income countries, while income growth explained less than 20% and increases in the educational level of adult females less than 40% [5]. WHO and its Member States have recognized that the starting point for addressing the challenges facing health systems has been to define the elements of a clear and actionable agenda which recognizes and responds to current system underperformance and acknowledges that success depends on a range of factors in wider society. This vision includes the identification of specific health system functions for strengthening, reflecting the cross-cutting themes and areas for action at country level. These functions are common to all health systems, but are organized differently in different countries. Four universal functions of health systems have been identified: service delivery, investment, financing and stewardship. Knowledge and information is the “glue” that holds these functions

together. It is within this framework that knowledge management contributes to enhancing country health systems through the improved creation, sharing, translation and application of knowledge.

2. Situation analysis

2.1 Global situation

The global situation in terms of knowledge production, access, dissemination and utilization is characterized by several overarching trends.

- The explosion of health and biomedical literature. Health literature is represented by books, journals, theses, reports, websites, etc. that are published, semi-published or unpublished. One indicator of the size of this body of literature is the number medical journals published globally. Out of over 16 000 health sciences journals, only 4971 journals from 70 countries are currently indexed in MEDLINE, the database of the National Library of Medicine in the United States [6]. These include over 15.9 million citations, of which 75% are in the English language. Health care professionals across the world are faced with an enormous flow of health information that is mostly from English-speaking countries.
- The information and communication technology (ICT) revolution. It is difficult to present timely, accurate and comparable data on access to ICT in many countries. This represents a major obstacle to understanding the depth and causes of the digital divide between richer and poorer nations. The ownership of personal computers, internet access, telephone land lines and mobile phones, and internet, radio and television penetration are indicators that reflect the digital gap globally. For example, in 2004 the developing world had 4 times fewer fixed telephones than the industrialized world and 4 times fewer mobile subscribers per 100 people than the industrialized world. The industrialized world had 8 times the internet penetration rate of the developing world. The entire African continent—home to 56 countries—had fewer internet users than France alone. There were still around 30 countries with an internet penetration rate of less than 1% [7].
- The emerging of the information society and knowledge economy. ICT has been responsible for the transformation of the industrial society into an information society that began during the last 20 years of the 20th century and is still taking place. The information society is where information becomes the main product or essential to other products, with the recognition that organizational success depends on the ability to exploit information, and most workers depend on information flow to perform their jobs. In practice, information is heavily dependent on computerized processes and the internet [8]. An information society is emerging as the use of information increases. Access to information and communication infrastructure and technologies is improving, leading to increased access to information and knowledge. Development of the information society is very much hampered by the digital gap. The knowledge economy is the economic counterpart of the information society, whereby wealth is created through the economic exploitation of knowledge. The e-government initiatives in many countries have included health as one of their domains.
- Globalization of health and medical services. Today, the world’s populations are increasingly linked and their problems increasingly transparent. The dominant force underlying the 20th century revolution in health services has been the new global knowledge made possible by research and development [5]. Some of the health issues resulting from globalization include the global burden of some diseases such as AIDS, malaria and tuberculosis, the trans-border flow of information and medicines, the migration of health workers, drug discovery and intellectual property rights and multilateral trade agreements and their effects on health.

In 2005, WHO developed a Global Knowledge Management (KM) Strategy [9]. The Global KM Strategy focuses on national policy-makers, WHO programmes and health professionals. The objectives of the strategy are threefold: strengthening country health systems, establishing the principles and practice of KM as a public health science, and enabling WHO to become a better

learning and knowledge-sharing organization. Five strategic directions are laid out for accomplishing these objectives:

- improving access to the world's health information;
- translating knowledge into policy and action;
- sharing and reapplying experiential knowledge;
- leveraging e-health in countries;
- establishing an enabling environment for the effective use of knowledge.

2.2 Regional situation

The Arab Human Development Report 2003 examined the status of Arab knowledge in terms of demand, production and dissemination and concluded that all three are ineffectual, despite the abundance of Arab human capital. *The Arab Human Development Report 2002* also recognized knowledge as one of several deficits in the Arab world. Arab countries constitute a major part of the Region, and many of their strengths and weaknesses also apply to other countries in the Region. Knowledge deficit can be characterized by a low percentage of knowledge production, low knowledge utilization and slow emerging of the knowledge society [10].

It is estimated that the number of health sciences journals published in the Region is in the range of 500 titles, of which 320 are indexed in the Index Medicus for the Eastern Mediterranean Region. The average number of articles indexed annually in the regional Index Medicus is 5592. Among these journals, few are indexed in the MEDLINE database. There are no statistics available on the number of monographs, textbooks, reports, reference books, translations and multimedia materials published in the Region. Based on databases and book exhibitions in the Region, the Regional Office estimates regional production in the range of 1500 products annually. This is a low production/publishing rate relative to the number of medical colleges and health care professionals in the Region. It is acknowledged, however, that these figures do not represent the full picture of research in the Region, as many researchers publish in foreign journals or do not publish due to institutional or financial reasons.

Health sciences libraries in the Region are associated with several types of institution.

- Health sciences colleges, mainly medical colleges. The Region has over 565 health sciences colleges (medical colleges, colleges of pharmacy, dentistry, nursing and other paramedical educational institutions).
- Health care institutions including hospitals, clinics, laboratories and primary health care units. Libraries attached to these are mainly to service the needs of specific categories of users attached to these institutions.
- Health care administration, which includes ministries of health, health departments, health districts, etc. Libraries attached to these units are mainly to help health administrators, managers and planners to access health information.
- Part of more general library collections. These collections are found in science and technology libraries that have common aspects with health sciences such as veterinary sciences, environment, agriculture, or any other type of library, even public libraries.

The Regional Office has built a directory of health sciences libraries in the Region which is regularly updated online [11]. The directory includes full information on 404 libraries. It is used as a source of information for both reference services and trend analysis. Based on this directory and other surveys, observations and assessment reports of health sciences libraries in many countries of the Region, a number of weaknesses have been identified.

- Weak collections, especially journals, non-textbook materials and electronic resources. Large collections that may meet international standards are available only in few academic institutions in the Region.
- Lack of specialized systems to manage collections and organize knowledge. The majority of libraries either manage their collections using traditional card catalogue systems or single user computer applications.

- Lack of qualified health sciences librarians. Very few qualified medical librarians work for these libraries. The Region has two schools of medical librarianship that produce graduates to meet the needs of these two countries (Islamic Republic of Iran and Oman).
- Lack of recognition of the role of library in health care provision in general.
- Lack of information technology, apart from personal computers and single-user access to internet.
- Lack of awareness of perceived value of information by potential users of health information.

Internet connections and web presence at health care institutions in the Region are still suffering from the digital divide. In the 22 countries of the Region, 14 ministries of health have established websites. These websites vary in quality and comprehensiveness. Most of them are not sufficiently robust to serve as knowledge management tools for health professionals and the public. Health on the internet is weak in the Region. As of early 2006, a total of only 258 medical and health-related websites in the Region were found through an internet search. Of these, 42 were in Pakistan, 40 were in Egypt, 28 were in Islamic Republic of Iran, 27 were in Lebanon and 14 each were in Bahrain, Jordan, Palestine and Saudi Arabia. The remaining countries had few or none at all, such as in Djibouti, Iraq and Somalia. Rates of access to personal computers and internet use in the Arab world were estimated at 2.7 and 2.8 per 100 population, respectively, in 2002. At the sub-regional level, these indicators ranged from 13 personal computer users per 100 population in countries of the Gulf Cooperation Council (GCC) to 0.6 in the least developed countries, and from 10 internet users per 100 population in GCC countries to 0.4 in the least developed countries [12]. Internet penetration in many countries is still very low. In Afghanistan the internet penetration rate is 0.1%, Somalia 0.7%, Yemen 1.1%, Djibouti 1.2%, Sudan 3.2%, Libyan Arab Jamahiriya 3.3%, Pakistan 4.6%, Palestine 4.9%, Tunisia 8.2% and Morocco 11.6% [13]. The average internet penetration rate for the Middle East is 8.19%; however, this average is skewed by relatively high percentages in countries such as Bahrain (21.1%), Kuwait (22.3%) and United Arab Emirates (35.8%) [13].

Managing the implicit (tacit) health knowledge faces a number of challenges related to human behaviour and to social and cultural aspects of populations in the Region.

- absence of a culture of use of information for decision-making, planning, evaluation and management in the health sector;
- absence of communities of practice and other mechanisms for sharing of experience in health care;
- lack of a culture of teamwork and collaboration;
- low rate of joint authorship in research projects and publishing of health and biomedical literature; and
- lack of utilization of knowledge management tools, either traditional (after-action reviews, debriefing sessions after health interventions, exit interviews) or electronic (electronic discussion lists and newsletters and other personalized information services).

Other challenges related to the management of both implicit and explicit knowledge assets and institutions in the Region include the following:

- low literacy rates, which contribute to unequal access to health information;
- low level of production, generation and utilization of health information and knowledge;
- weak capacity in health information and knowledge management;
- lack of national health information policies, legal frameworks and legislation;
- absence of specialized educational and training institutions in the area of health information management, resulting in lack of qualified knowledge workers;
- weak information networking and resource-sharing activities among and within countries;
- unaffordability of cost of access to high quality information sources and information technology products and services;
- lack of standards, guidelines, criteria and procedures for quality control of health and biomedical information;

- diversity of information needs and requirements among countries, which requires a wide range of information products and services, formats and languages;
- absence of portals and intranets in many health care institutions;
- absence of knowledge sharing platforms, communities of practice, social networks and knowledge translation networks.

3. The strategy

3.1 Scope

The framework presented in this paper presents strategic directions for knowledge management at two levels. At regional level, strategic directions are intended for WHO in support of knowledge management in health. At country level, strategic directions for collaborative activities by WHO and Member States are aligned with regional action in order to synergize efforts. It is recognized, however, that one size does not fit all. The focus of activities will be influenced by the state of development of a country in terms of education, access to ICT resources, health situation and status of progress in achieving the MDGs. It is important that each country should develop a national health knowledge management strategy according to its own needs and based on its own situation.

3.2 Strategic directions at regional level

Managing knowledge policies

The policies regarding different knowledge management functions will be updated to align them with the overall strategy. These functions include publishing (traditional and electronic) and distribution, translation, library services and management of information and communication technology, collaborative space and portal development. The Regional Office will continue to support its publishing programme, free dissemination of information products; networking and virtual library support, e-health and telemedicine, development of computer-based applications, human resources development for knowledge management, and utilization and coordination with other partners. Specific strategic objectives are:

- supporting the establishing of national programmes for knowledge and information management in countries;
- strengthening the knowledge management culture and environment at the Regional Office;
- development and ensuring sustainability of knowledge management initiatives and services;
- fostering and supporting a learning culture to facilitate the development of new knowledge, the acquisition of new skills and the sharing of this knowledge and skills with others. The ultimate goal is to create and learning organization in which "… people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to see the whole together" [14];
- implementing monitoring and evaluation of knowledge management indicators.

Strengthening publishing and dissemination

There is growing need for high quality and relevant public health knowledge in formats and languages that are appealing to health care professionals and the public. Publishing in the context of the regional strategy aims at:

- assessing the needs of potential users for health and biomedical information and knowledge resources to support their roles as managers, practitioners, researchers, educators, communicators and life-long learners;
- promoting a culture of self-learning and aspiration for knowledge acquisition and utilization in support of public health;
- advancing the understanding of public health and primary health care through access to the right knowledge in this area;

- providing professional development activities, information, and educational resources for public health professionals at all stages of their careers, including undergraduates, graduates and practitioners, for continuous and life-long learning;
- promoting the concept of public health information, health education and community participation;
- informing legislators and other policymakers about new public health knowledge, recent developments and emerging opportunities in health systems research and their implications for health policies and sustainable development;
- making available the results of health systems research and research on specific diseases to support innovation in public health services and to fill the knowledge gaps in new areas of interest.

The Regional Office will support publishing initiatives that promote valuing, analysing, creating, sharing, using and investing in local health knowledge as a public domain. It will provide support and guidance to enhance the skills needed to develop publishable materials. Published materials will be made easy to access through various distribution and delivery channels to allow extensive sharing and rational utilization of contents.

Promoting electronic publishing

Electronic publishing is a dynamic concept. The term covers two processes: publishing through the use of electronic facilities; and publishing and dissemination of information through an electronic medium, for example on CD-ROM or via the internet. The overall objective is to use the full potential of electronic publishing to enhance equitable access to health information, whether as a replacement for traditional publishing or to supplement it. Both online (internet) and offline (e.g. compact disc) electronic publishing tools and products will be used to ensure the widest range of needs is covered. Electronic publishing has three strategic objectives: reducing costs, disseminating information quickly and widely and providing dynamism in knowledge sharing.

The Regional Office has adopted a policy for open access to its health information resources. This access can only be supported through electronic publishing using the available means.

- Maintenance, support and enhancement of a multilingual and comprehensive Regional Office website. The website will include pages on all health topics in addition to health profiles of countries, health policies and information services. It will be indexed and made available on all search engines. It will include intelligent features for better presentation and access of health knowledge;
- Electronic access to the full text of books and journals. All issues of the Eastern Mediterranean Health Journal, other serial publications and all other Regional Office publications will be made available on the internet;
- CD-ROM publishing and distribution. Offline copies of Regional Office publications will be made available to reach out to the widest range of health care professionals and institutions;
- Hosting of medical library sites on the Regional Office website, which would allow wider access to their resources;
- Digital Institutional Memory, which includes the electronic version of semi-published documents and grey literature from the Regional Office;
- Database of technical papers and presentations of regional meetings and conferences.

Expanding multilingualism

Knowledge that is presented in a language not spoken by a community or individual is knowledge not accessible. People of the Region have a rich diversity of languages including Arabic, English, Farsi, French and Urdu. The publishing policy of the Regional Office has multilingualism as a built-in strategic dimension. From the strategic perspective, multilingualism aims to facilitate the communication of quality information about health issues and health services to people of the Region in national languages. The WHO Arabic Programme is the programme for promoting and managing knowledge in Arabic.

The value of multilingualism in health can be assessed according to:

- the extent to which health sciences are taught in national languages in the Region;
- the total volume of the body of health and biomedical literature in national languages;
- the number and quality of health sciences bilingual and multilingual dictionaries;
- the number of translations to and from national languages;
- the degree to which national languages are used in electronic processing and publishing;
- the extent of training investment in health sciences knowledge workers including educators, communication officers, librarians, translators, interpreters, journalists, copy-editors, etc.

In addition to publishing health information products in multiple languages, the Regional Office will maintain an enabling environment for multilingual knowledge management, including the development, maintenance and production of multiple language versions of:

- the Unified Medical Dictionary, to support production and translation of health and biomedical literature;
- The Medical Subject Headings based on the U.S. National Library of Medicine list to support indexing and retrieval of health and biomedical literature;
- the International Classification of Diseases and all its specialized versions, to support coding in electronic health records and other forms of registration.

Machine translation and other forms of language processing will also be supported. The strategy aims at development of an expandable computer-based multilingual (Arabic, English, French) health and biomedical lexical and terminological resource as a working tool to aid translators, editors or information scientists working with medical terminology. Expansion of the effort to cover Farsi and Urdu is a long term objective. Making these tools available on the web as a public domain will support equitable access to health information.

Enhancing networking and communication

Managing tacit knowledge requires enhancing and supporting both physical and virtual networks. The Regional Office will employ and promote the use of different techniques and tools to manage tacit knowledge.

- Networks, listservs and discussion groups of health professionals and institutions such as health sciences libraries, health care informatics centres, editors of medical journals, translators of medical literature, etc.
- Communities of practice, which are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. Building of these communities constitutes an important aspect for learning from experience and sharing of resources.
- Web logs (blogs), which are web pages made up of usually short, frequently updated posts that are arranged chronologically—like a “what’s new” page or a journal. The content and purposes of blogs vary greatly—from links and commentary about other web sites, to news about a company/person/idea, to diaries, photos, poetry, mini-essays, project updates, even fiction [15].
- After-action reviews, structured as facilitated discussions at the end of each activity or project to review what happened, why and lessons leant.
- Registries for sharing of best practices and success stories, in which individuals are encouraged to record their experiences, highlight elements of success and diagnose causes of failure.

3.3 Strategic directions at country level

Leveraging e-health: use of ICT in health

E-health, or the use of information and communication technology in health, is defined by the Regional Office as “the use, in the health sector, of digital data—transmitted, stored and retrieved electronically—for clinical, educational and administrative purposes, both at the local site and at a distance” [16]. The Millennium Declaration acknowledges that ICT is an important tool to achieve the MDGs; ICT can help alleviate poverty, improve the delivery of education and health care, make

government services more accessible, and much more. Target 18 of Goal 8 calls upon countries to: “in cooperation with the private sector, make available the benefits of new technologies, specifically information and communications” [17].

E-health represents a cornerstone of the regional strategy as a major enabling factor for implementing strategic initiatives and objectives. Collaborative activities in the area of e-health will be implemented in all areas of work, with particular emphasis on the following areas.

- Measuring progress and trend analysis. ICT provides the ability to determine current status and progress towards achieving health goals and facilitates monitoring and information-sharing and identification of problems areas and bottlenecks.
- Use of statistics for quality improvement. Modern surveys and statistical techniques, heavily dependent on the advances of ICT, enable the tracking of employment, health status, income and other statistics and their disaggregation by sex.
- Health networking. Social, virtual and physical networks enable the sharing of values, experience, knowledge, funding, and technologies between the various nodes of the network. They also facilitate knowledge exchange and networking among policy-makers, practitioners and advocacy groups.
- Representation. Geographic information systems, electronic design, animation and multimedia enable graphic representation of health concepts and geographical knowledge stored as raw data. Though valuable, such data are not well understood unless they are analysed and presented graphically.
- Decentralization. With the increased information flows, the availability and usage of ICT allows greater transparency, accountability and accessibility in the delivery of public services.
- Health education and learning. ICT can be used to increase the supply of trained educators through enabling distance training of teachers and building networks that link teachers to their colleagues. ICT can also improve the efficiency and effectiveness of health sciences education and related bodies through strategic application of technologies and ICT-enabled skill development; broaden the availability of quality educational materials and resources; deliver educational and literacy programmes specifically targeted to poor girls and women; and enhance delivery of basic and in-service training for health workers.
- Delivery of health services. Examples of ICT applications for prevention of disease, health promotion and education, and diagnosis and treatment include telemedicine to overcome some of the challenges in remote areas of many countries where the population does not have access to basic health care; health records and registries; and provision of access of rural caregivers to specialist support and remote diagnosis.
- Income generation and economic opportunities. ICT provides opportunities for women to work from home, for young people to have their own small businesses and for a country to be part of the digital economy. Within the community-based initiatives programme, support for ICT-based small businesses can not only help alleviate poverty but also improve the health status of the community.
- Access to information and knowledge. Web access has substantially increased opportunities to access health information, research, literature, training materials for different purposes, such as to influence public opinion on gender equality through information or communication programmes, and increase access to reproductive health information, including information on AIDS prevention, through appropriate content in local languages.

Building capacity for needs assessment, planning and evaluation

The Regional Office will support countries to build, develop and sustain an integrated and systematic approach for managing knowledge in the health sector. This approach must be based on needs assessment, planning and evaluation. Needs assessment will require tools, resources and a change in problem-solving methods. Planning of knowledge management activities will be strengthened as an integral part of health systems development and activity that cuts across all functions in the health

system. Capacity to monitor and evaluate activities will be strengthened to allow more cost-effective operations and services and to facilitate feedback and learning from experiences.

Strengthening national programmes for knowledge management

Over the past few years, a number of countries have initiated national programmes for information management and dissemination, e-health and medical library development. These programmes, in many cases, support activities at one or two institutions. The strategy aims at the development of national integrated programmes for knowledge management which encompass all activities in all institutions. These activities may include information management activities in national health programmes, library, information and documentation services in health care and medical education institutions and networking and collaboration among institutions and individuals. Integration of resources and activities in strategic planning is considered a key success factor for cost-effective and comprehensive implementation. Moreover, to attract funding knowledge management programmes must use an integrated approach with clear objectives, deliverables and indicators.

Enhancing information and communication infrastructure in health care institutions

Information and communication infrastructure, which includes hardware, software and human resources, has become essential in health care institutions. The Regional Office will support efforts to ensure that ICT infrastructure becomes an integral part of the physical and logical structure of institutions. Each health care institution should have a minimum ICT platform for end user computing, local area networking and internet connectivity. Emphasis is on the application of ICT rather than the mere availability of hardware and software. This strategic direction is closely linked with leveraging e-health, which cannot function without the necessary ICT infrastructure.

Developing human resources

Successful implementation of the regional strategy depends to a great extent on the people who will operationalize it and those who will make use of its outcomes. Knowledge workers, who represent the human face of the strategy, include authors, researchers, editors, publishers, web designers, translators, librarians, academicians, information specialists, journalists, etc. The Regional Office will support efforts aimed at building the capacity of national knowledge workers through development of systems and tools, adoption of guidelines, education, training and learning from experiential knowledge. The strategy places equal importance on training users of knowledge resources and on raising awareness among those who translate knowledge into action. In this respect, communication will be strengthened with leaders, policy-makers, planners and managers.

Supporting knowledge translation

Knowledge translation in health refers to “the synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and improving people’s health” [18].

Knowledge translation must be strengthened in order to address the “know–do” gap between what is known and what is applied. The strategy aims at creating awareness and developing capacity in countries to ensure that existing knowledge is utilized for policy development, decision-making, planning and education. Specific knowledge translation activities will aim at ensuring that the knowledge gained from health research is rationally applied and used to its full potential through providing effective mechanisms for sharing research results with all stakeholders (policy-makers, care providers, other researchers, donor community, nongovernmental organizations and the community at large) and establishing networks and platforms to allow researchers to gauge the needs of stakeholders for new knowledge, so they can respond to these needs and emerging issues and priorities.

Promoting knowledge generation

The Regional Office will support efforts to improve the quality of information products and services and sustainability of knowledge production. Publishing represents a core indicator in the country health knowledge profile. Activities will include:

- building capacity in knowledge production activities; this includes training on publishing activities, techniques and technologies;
- developing guidelines and standards for quality control of knowledge products in the Region;
- providing technical support to evaluate knowledge production activities and propose methods for improvements;
- mapping knowledge to determine the location, ownership, value and use of knowledge assets in countries;
- maintaining national and regional inventories and databases of knowledge assets and resources.

Establishing knowledge hubs

Tools and resources will be directed towards converting WHO country offices into knowledge hubs. This will allow the office to:

- disseminate high quality reliable health information through its technical staff, library, information centre, website, media campaign, etc;
- collect high quality reliable health information from the country, verify information and its feeding to regional systems and dissemination to other interested agencies;
- provide a platform for videoconferencing services, e-learning and access to world knowledge resources;
- ensure a minimum information infrastructure in countries, which may include a local area network, local knowledge bases, reliable connectivity, access to regional and international knowledge resources, training facilities, selective collection of printed materials and human resources.

4. Eastern Mediterranean Knowledge Network for Health (EMKNet)

The body of health and biomedical literature in the Region is growing at a high rate, as measured by the number of information products being made available and professional conferences being organized. To utilize the knowledge assets in the Region effectively, the Regional Office is developing a knowledge network. This knowledge network will ensure the flow of high quality reliable information among professionals and institutions, and will serve as a forum for networking and communities of practice and creation of virtual teams in the Region. The EMKNet will be a virtual network in which each user (professional or institution) will play a dual role of knowledge broker and knowledge consumer. The real value of the content in the Network will be realized through the full involvement of national health systems in its functionality and their contribution to populate the network with quality information. The EMKNet will make extensive use of ICT infrastructure at the Regional Office, country offices and Member States. As a virtual network, EMKNet will use the internet as its platform with standard web browsers to allow access in most open standard technologies. Institutions with less developed telecommunication infrastructure can be serviced through offline electronic resources and printed materials. The basic foundation of the Network will be the creation of a data warehouse from which knowledge can be derived, such as through:

- mapping and identifying health and biomedical literature originating from the Region or about the Region in languages of the Region;
- mapping, profiling and finding public health institutions;
- locating expertise and sources of tacit knowledge within the Region;
- developing networks and communities of practice in the Region;
- identifying best practices and opportunities for exchange of experiential knowledge and collaboration.

The data warehouse will bring together three types of knowledge resource:

- bibliographic information on journals, articles, books, theses, reports, dictionaries, websites, databases, etc;
- information on expertise, including profiles of experts, professionals and practitioners who are registered as authors, researchers, peer reviewers, consultants, science advisers, etc;
- institutional information on WHO collaborating centres, health sciences colleges, research centres, health sciences libraries and information centres, official websites of health care and medical education institutions and relevant nongovernmental organizations.

Each element will be listed using international standard descriptions of entities (bibliographic, experts and institutions) in an integrated system. Each entity will be indexed using the standard medical subject headings list (MeSH) in multilingual format (English, Arabic and possibly Farsi).

5. Conclusions and recommendations

5.1 Conclusions

Knowledge management for public health is a cross-cutting activity linking together all functions of the health system. The three elements of knowledge management, people, processes and technology, work together to deliver the expected health outcomes in an efficient and cost-effective manner. There are a number of challenges to knowledge management in the Region which relate to both tacit and explicit knowledge. Analysis of the regional situation shows low rates of knowledge production, sharing and utilization and weak methods of accessing and applying knowledge. The strategic directions at regional level will support the development of policies, capacities and programmes for managing health knowledge in countries. The Regional Office will also continue developing the Eastern Mediterranean Knowledge Network for Health, in collaboration with countries. The strategy calls for countries to take steps towards institutionalization of knowledge management activities, develop capacity and make full use of the available health knowledge.

5.2 Recommendations

1. Member States should conduct a situation analysis of information and knowledge management institutions including publishers, libraries, information centres, information networks, health on the internet, information technology centres and media centres.
2. National strategies for knowledge management and information technology for public health, including a national strategy for e-health, should be developed.
3. National projects and activities for knowledge mapping, knowledge translation and capacity-building in knowledge management should be initiated.
4. The establishment of national networks of health care professionals and institutions should be promoted.
5. Member States should collaborate closely with the Regional Office to develop and sustain the Eastern Mediterranean Knowledge Network (EMRKNet).

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