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ORIGINAL RESEARCH

Health Libraries and Information Services in Tanzania: A Strategic Assessment

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Abstract

BACKGROUND The intention of the Government of Tanzania is to establish more health information resource canters in all health facilities. With this regard, health information science personnel are needed to provide adequate and accurate health information services. However, availability of these personnel remains to be a challenge because of their non-existence.

OBJECTIVE To identify the current status and local impact of health sciences libraries and user perception of these libraries, as a prerequisite to the development of a competence-based curriculum for health information science training in Tanzania.

METHODS A needs assessment was carried out using a convenience sample of local respondents, including librarians, trainers, academicians, students, health care providers, and patients and families, drawn from national, referral, regional, district hospitals, health training institutions, and universities from both government and nongovernment entities in Tanzania. A focus group approach was used to gather data from respondents.

RESULTS Results from this assessment revealed that health science libraries in Tanzania are faced with the challenges of insufficient infrastructure, old technology, limited facilities and furniture, inadequate and incompetent library staff, lack of health sciences librarians, outdated and insufficient resources, and low knowledge and use of information technologies by library clients. Most respondents would prefer to have both physical and electronic libraries, as well as librarians with specialized health information science skills, to cope with changing nature of the medical field.

CONCLUSIONS The findings obtained from this assessment are strong enough to guide the development of a curriculum and training strategy and an operational plan and training packages for health information professionals. The development of a training curriculum for health information science professionals will mean better health information service delivery for Tanzania.

KEY WORDS health information, health information needs, health information specialist, health sciences libraries, Tanzania

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INTRODUCTION

The nation of Tanzania has begun implementing health sector reforms to improve equitable access to health information and to improve the quality of information received by all user communities. At the moment, the need for timely and quality-filtered information in health care is universal. The overwhelming amount of health information, and the absence of time and expertise on the part of physicians and other health professionals to find, assess, and apply health information in their daily decision making, have created an opportunity for information science specialists to play a major role in (1) storage, (2) retrieval, (3) appraisal, (4) management, (5) summarization, and (6) delivery of timely and reliable health information at the point of health settings.[1,2] Although there are some relatively recent studies of information needs and behaviors of health-related users in other countries in sub-Saharan Africa,[3-11] there are few specific studies on health information practices in Tanzania.[12-14]

An understanding of the training needs for medical librarians will help the Tanzanian Ministry of Health and Social Welfare (MoHSW) improve the operations of ministry-sponsored, faith-based organizations and private health science libraries, as well as those in clinical and educational units across the nation. Information specialists need to become more effective and efficient in the provision of health information services to their users, by acquiring the relevant information necessary to the health professionals and providing that information in a cost-effective and efficient manner that will enhance the provision of high-quality health services in Tanzania.

The MoHSW conducted a needs assessment project aimed at identifying the current situation of the medical and health libraries in the country and assessing the health information training requirements for librarians. The project was required to initiate a national health information science program at health training institutions to produce health information specialists who would then be in all clinical areas, hospitals, health higher learning institutions, and nursing and allied health sciences schools for both public, faith-based organizations and private entities in the country. The needs assessment project was expected to guide subsequent activities, such as the development of a budget for ongoing training and operational planning, competencies and curriculum development, and possible continuing education training modules for medical librarians at diploma, bachelors, and masters achievement levels. A follow-up meeting was held with a video conference between participants in Tanzania and colleagues who were gathered at the National Library of Medicine in the United States.

Related Work. ***Current competencies of practicing librarians in health sciences libraries in Tanzania.*** *"The health sciences librarian believes that knowledge is the sine qua non of informed decisions in health care and the health sciences librarian serves society, clients, and the institution, by working to ensure that informed decisions can be made."*[15] It has been noted that access to accurate and appropriate information is a prerequisite to good health.[16] Ultimately, services provided by health sciences librarians at many health organizations require them to act as full members of the health workforce.[17,18] Unfortunately, the health science information systems and services in Tanzania are not well organized to provide an opportunity for health librarians work in close collaboration with clinicians. The existing health information centers include university libraries serving medical and allied health faculties and students, health training institution libraries operated by the MoHSW, a central MoHSW medical library, and national, referral, regional, and district hospital libraries and libraries in some public and private health-related organizations. Many hospitals and health facilities do not have health sciences libraries or health information resource centers, and most of the librarians in Tanzania do not possess appropriate knowledge and skills to provide quality health information services in a timely and accurate manner.[12,14,19]

As a specialized field, education for medical librarianship needs special courses and lectures; medicine has its own subject classification systems, different from those used by librarians in nonmedical information. Tanzania is among the developing countries with no academic library science programs for medical librarianship. Some colleges and universities in Tanzania do offer library, information management, and information science courses at general levels; these diploma/degree/masters programs cover general library and information science concepts and competencies, and graduates are prepared primarily for work in the academic and public library sectors. Thus, a specialized curriculum in medical librarianship is needed to prepare information professionals who can deliver health information services that will make a difference in health care services and clinical research. A thorough investigation of contemporary medical information needs in Tanzania is necessary to inform medical librarian curriculum

Annals of Global Health, VOL. 82, NO. 5, 2016
September–October 2016: 912–921

development, and this must be based on an understanding of users' needs.

Basic health information needs of health sciences library users. A handful of studies on information needs, practices, behaviors, and provision of health information in Africa's developing countries has primarily focused on the needs of health professionals and a few patient groups. For example, information needs of practicing nurses may include the need for information on causes, patterns, and physical signs of disease and managing locally common presenting signs and symptoms. Patients' information needs range from the need for information on aging and hypertension to sexual functions and the roles of doctors, test results, treatments, cardiac rehabilitation, and how their families could support their lifestyle changes. They need information on "symptomatology and greater self-efficacy, health care satisfaction, and preventive health behaviours."[20]

Studies on the information needs of health practitioners have identified various sources of information that are relevant to meet their information needs. These sources include external databases, research reports and research findings, meta-analyses and systematic reviews, and up-to-date information that is filtered, summarized, and synthesized from authoritative content.[21]

Appropriate curricula for health information professionals (including health librarians). Unlike general librarianship, health librarianship is more concerned with evidence-based digital information that supports the ever-changing health-related information needs of the digital medical generation.[22] Health information science courses should include information skills, literature search, and evidence-based medicine resources training programs.[23] Health information professionals require training in (1) information science and medical informatics, (2) electronic medical records, (3) knowledge-based information and digital libraries, (4) digital imaging systems, (5) telemedicine, (6) clinical decision support, and (7) evidence-based medicine focused on developing tools to access and apply the best evidence for decision making in patient care.[24,25]

Infrastructure, facilities, and environment for health information sciences programs in developing countries. The continued use of physical facilities and print-on-paper information resources in health sciences settings is gradually being replaced by the use of virtual libraries of electronic health information resources and services. However, the lack of availability of appropriate infrastructure and facilities and of a favourable environment results in developing countries being plagued with poor, widely scattered, difficult-to-locate information resources that often become difficult to use.[26]

METHODS

This study employed focus group discussion as a research method because it provided the opportunity to include a large number of participants and to engage them and gather information about their experiences in an open-structured focus group discussion. The focus group discussion was guided with developed and structured protocol aimed at discussing the following research objectives:

RO1: To assess current health information practices of potential clients in health sciences libraries
RO2: To discover the health information needs of health sciences library users
RO3: To identify desirable levels of competence and entry qualifications for students in a training program in health information sciences

The Fact-Finding Activities. An understanding of stakeholder information needs, practices, and behaviors is crucial to planning educational strategies for training health information workers for Tanzania. To that end, the MoHSW organized a fact-finding mission to solicit stakeholders' opinions on the current status and impact of health sciences libraries, and their own information needs. Input from a variety of interested individuals—physicians, nurses, librarians, trainers, academicians, students, patients, and families—was seen as prerequisite to the development of a competence-based curriculum for training Tanzania's first generation of the health information specialists.

Two US-based consultants were invited to Tanzania to meet with a team of local experts to plan a systematic investigation of stakeholder requirements that could support the development of training for health information sciences. The project was charged with identifying the stakeholder communities, the challenges to their access and use of health information, and their current information needs and practices. This descriptive, cross-sectional needs assessment was conducted using a participatory qualitative method. Invited stakeholders were selected on the basis of their experience in different aspects of the health care system.

The situational analysis was held in 4 regions, which were randomly selected from a list of

health facilities in the Tanzanian mainland. The team conducted field visits in 4 study areas: Dar Es Salaam, Kilimanjaro, Mwanza, and Njombe (see Appendix 1 for a map of Tanzania). Each study area had 3 field visitors for data collection who carried out their investigation in the national, referral, regional, and district hospitals and health training institutions from both government and nongovernment entities within the study area. See Appendix 2 for lists the sites and institutions in which the field visits took place.

A 3-day orientation workshop and planning session was conducted in the town of Morogoro to create a tool for facilitators and note-taker teams to teach them how to conduct the investigation and collect information through focus group discussions at a series of multidisciplinary sites. Focus group discussions comprise people with a particular experience or knowledge about the subject of the research, and the discussions enable researchers to collect a lot of data quickly to facilitate the identification and exploration of beliefs, ideas, or opinions specific to the research topic. The workshop participants were able to develop a data collection tool, identify data collection sites, identify types and number of the key informants at each site, and establish a systematic approach for the focus group discussions. The group of specialists worked together to develop a set of guiding questions to use with the stakeholder discussions and also had several workshop sessions on current trends in health information practices.

Because this research was totally carried out in Tanzania, US-style institutional review board permission was not required, but the participants were advised in advance of each meeting that the discussions would be used without individual attribution, that their confidentiality would be honored, and that any tape recordings of the discussions would only be used as confidential documentation of the content of the discussions themselves and would not be made public in any way that would identify the speakers. Data collection teams agreed that the sessions would be conducted in both Kiswahili and English; to ensure better understanding and active participation on the issues, the primary language for the majority of the discussions was Kiswahili, the 2 US investigators were not involved directly in the discussions, and any photographs used in publications do not specifically identify individual participants.

At each site, the overall project goals and purpose for each focus group discussion were presented first in a plenary session by a representative from each group. After the presentation, all participants then contributed by sharing their own experiences and thoughts, leading to active discussions that were recorded by note takers. The individuals at the 4 sites formed a convenience sample of local respondents. A total of 280 Tanzanian stakeholders participated in the 24 focus groups; each group had 8-12 participants.

Data Analysis. The qualitative data gathered through focus groups discussion were initially analyzed by the facilitators and the note takers involved in conducting the focus group discussions. After completion of the focus group discussions, MoHSW staff was able to compile the evidence into a data matrix form according to themes.[27] The themes were as follows:

Theme 1: Current health information practices of potential clients in health sciences libraries

Theme 2: Health information needs of health sciences library users

Theme 3: Desirable levels of competence and entry qualifications for students in a training program in health information sciences

Prior visits to 4 study sites were undertaken; a list of themes, guiding questions, and terms of reference for the project were developed by a multidisciplinary group of experts from the MoHSW, National Council for Technical Education (NACTE), and representatives from institutions that provided training for a variety of stakeholder groups, as well as the 2 US consultants. (See Acknowledgments for a list of members of the expert team.) Each research theme (protocol) had several research questions that guided facilitators and participants in discussion and sharing of their ideas related to health information services.[27,28] At each of the 4 sites, focus groups had a facilitator and 2 note takers, all of whom were participants in the orientation sessions. The facilitator led the discussion using guiding questions (protocol) to gather in-depth information; the note takers recorded the matters arising from the discussion. Recorded conversation was transcribed, and thematic analyses were used later to analyze collected data.[28] The entire data matrix is available as a PDF electronic file of supplemental material.

RESULTS

A summary of findings with representative comments from participants is organized around the three themes. The results offer a compelling snapshot of the health information behaviors

Annals of Global Health, VOL. 82, NO. 5, 2016
September–October 2016: 912–921

and practices of various user communities who will be served by Tanzanian health information specialists.

Theme 1: Current Health Information Practices of Potential Clients in Health Sciences Libraries. Question: *What methods are currently used to locate, store, and retrieve health information?*

Participants mentioned ways of locating, storing, and retrieving health information such as shelves and cabinets, computers, use of a drop box, searching for labeling, indexing and bibliographic tools, storage gadgets such flash drives or disks, CDs, external hard drives, downloading and saving, printing and storing hard copies, presentations, databases, and other search tools like HINARI and PubMed.

Question: *What do you know about the use of electronic tools (databases, PubMed, HINARI, NLM [National Library of Medicine], MeSH [Medical Subject Headings], search engines, and library catalogues)?*

Only a few respondents reported knowledge or use of PubMed and HINARI, whereas most of them reported having knowledge or use of other library search engines and catalogues. None of them reported any knowledge or use of MeSH and NLM.

Question: *What methods are used to communicate health information?*

Respondents cited a variety of means to communicate health information: e-mail, meetings, and conferences, interpersonal communications, presentations, Web 2.0 technology, written texts, quarterly reports, morning clinical report calls, brochures, flyers, and collateral media.

- "*Communication is made through meetings, debriefings, management meetings, general meetings, and training*" (Clinician).
- "*We communicate health information through presentation, quarterly report, morning clinical report, written text, and email*" (Clinician).

Question: *What about the existence of functional library and usage skills?*

All of the respondents from training institutions and organizations reported that they had functional libraries, but only 1 university reported having a repository, and only 1 clinical institution reported having a medical library, although without any skilled medical library staff. A majority of respondents said that they had skills in using a library and that they gained that experience in their professional training in sites where there was a formal library.

- "*There are orientation sessions where users are oriented on how to use library services*" (Student).
- "*There is a system of orientation on how to use library; however, skills on how to access online information is a problem for the majority of students*" (Student).
- "*I always go to library to remind myself and gain new knowledge, but while in school it was necessary to go to library for assignment completion*" (Clinician).

However, when asked about colleagues' information practices, a majority commented that they were not sure about their colleagues because of there was no library facility in their institutions, whereas others rated their colleagues as having poor skills in the use of the library.

- "*Because here we do not have library facility, it is difficult to know if other colleagues have skills of using library or not*" (Clinician).
- "*Some students have skills, but the majority of them do not have enough knowledge*" (Academician).

Question: *What about the capability to use information communication technologies?*

A majority reported that they had basic information and communication technologies (ICTs) application skills, although a few of the participants said they were capable of higher-level ICTs skills. Some participants, however, misinterpreted the meaning of ICTs to mean very narrow sense of information *computer technologies* instead of *information and communication technologies*. A majority of the health professional participants said that they had active e-mail addresses; few patients or consumers reported having active e-mail addresses.

Question: *What about the existence of a trained health sciences librarian?*

Most of the respondents from training institutions reported having no trained health sciences librarians; rather they have general trained librarians. Apart from that, surprisingly, only 1 hospital had a library.

Question: What is your perception of the roles of a health sciences librarian in an electronic environment?

Participants were able to describe some roles for a medical librarian in an electronic environment, including the ability to ensure availability of relevant and current health information; to guide customers on how to find books and related health information resources; to facilitate health information literacy training; to communicate with other health information resource centers; to develop online

catalogues; to promote use of the library; and to manage the library.

Question: *What are your views on developing a health sciences librarian specialty?*

All participants strongly agreed on the establishment of a health information specialty, because having health information specialists can help them to get current information at the right time and cope with rapid changes in the health field.

- *"This specialty is highly needed and prioritized; it should start with diploma level"* (Academician).
- "*A medical librarianship specialty is extremely important because it will help those undertaking distance learning to access health learning materials*" (Clinician).

Question: What is your preference between a physical and an online library?

There was a wide variation in preferences among respondents; a majority preferred both an online and a physical library because of Internet problems with very slow, or no, connectivity. Some preferred only an online library because it could provide easily accessible and updated information. However, most respondents reported that they do not have skills for using online information and report problems with network connections.

Question: *How frequently do you visit a physical library?*

Those with no library facility obviously do not visit a physical library, and those with a library facility rarely visit, usually only when they have an assignment; they perceive that the existing libraries have outdated materials that do not suit the nature of their activities.

- *"We only use the library during examination periods, and when we have assignments, in that period, you find most of the students visit the library"* (Student).
- *"The higher one goes in the education ladders, the lesser time one visits the library, as most times they are busy in clinics attending to patients"* (Academician and Clinician).

Question: *How frequently are you utilizing online health information?*

Respondents had different opinions on how often they use online health information; those with connectivity use online health information daily, with some reporting that they visit online information 1-3 times per week. In some places, online information could not be obtained in a timely way because of poor Internet connections.

- *"Almost every day as medical life requires regular access to the Internet"* (Clinician)
- *"If I go to internet café or use my modem, I can get the online information that I need, but some days the Internet can be very slow in the daytime but in the evening it can be very fast"* (Librarian).

Question: *What about the provision of specific instructions to library users?*

Librarians reported providing assistance occasionally to those who are in need, and some instruction is provided by academicians in the classroom. However, some librarians said that they did not have enough knowledge to provide specific instruction, especially in an electronic environment.

- *"It depends on those who are borrowing books. Some of them are knowledgeable, but some, they do not even know the type of books they want. They just tell you, 'I have this assignment,' then you have to assist"* (Librarian).
- *"Mostly to postgraduates and not very regularly to undergraduates"* (Academician).

Question: *What do you think is the contribution of health information resources to your duties?*

Participants mentioned different ways in which health information contributed to achievement of their duties: keeping health care providers abreast of the current knowledge in their sphere of interest, improving quality of health services provided, supporting evidence-based medicine, facilitating learning process and research development, improving access to and use of research findings, and serving as a health information source to patients and public at large. Additionally, participants were able to mention challenges encountered in areas of responsible and ethical use of health information resources such as subscription fees to access online health information, plagiarism, the authenticity of information, misuse of information resources, and mutilation of library resources.

Question: *What about the provision of distance-learning courses?*

Individuals from some of the training institutions provide both on-site and distance learning courses, but none of the organizations provides online library courses.

Question: *What information is available about library operating hours and its reliability?*

The 3 university libraries that were visited operate for 14 hours during weekdays and 8 hours on weekends, including the services of a generalist librarian. Other institutions indicated that the operating hours were the official working hours

Annals of Global Health, VOL. 82, NO. 5, 2016
September–October 2016: 912–921

(7:30 AM–3:30 PM) but noted dissatisfaction with these operating hours and wanted additional service time. Most of the libraries were not equipped with ICT facilities and up-to-date health materials. The number of computers was inadequate compared with the number of users, Internet connectivity was unreliable, and e-resources were not available. In 2 of the university sites, wireless Internet connections were only available from within the library premises.

- *"Wireless Internet connection is only within library premises; it could be better to have wireless in our residence halls so as to have access to health information 24–7"* (Student).

Theme 2: Health Information Needs of Health Sciences Library Users. Question: *What is your current access to health information?*

Participants mentioned accessing books, journals, articles, research findings, published and unpublished government reports, libraries, databases, search engines, collateral media, leaflets, flyers, brochures, websites, and portals, as sourced from information necessary for health sciences.

- *"The information resources necessary for our work are books, journals, modules and ministerial policies and guidelines"* (Clinician).
- *"The needed information for our work are subscribed electronic resources such as EBSCOhost, updated library books, and book bank materials* "(Librarian).

Question: *What are the challenges encountered in communicating health information?*

Respondents indicated that the challenges they faced in communicating health information within their institutions were the misinterpretation of information, delays in information delivery, a lack of public awareness about health information, a lack of timely feedback mechanisms, incomplete information, and information sharing barriers. Furthermore, participants mentioned that the challenges faced in using library services were outdated books, the shortage of library staff, library size compared with number of users, misuse of library structures, misappropriation of library facilities, a low regard for library services, inadequate learning materials, and the lack of e-resources and reliable Internet connectivity.

Question: *How do you see the way forward in improving health information services?*

Participants proposed a wide variety of ways to improve health information services, including the establishment of health information sciences programs, improved health sciences library operating hours, the introduction of electronic libraries, the expansion of library physical infrastructures to take on an increased number of users, updating library stock, increasing number of skilled health sciences library staff, establishment of health information resource centres at each organization or institution, special set-aside funds for subscription fees, and a prohibition on misuse of libraries.

Theme 3: Desirable Levels of Competence and Entry Qualifications for Students in a Training Program in Health Information Sciences. A majority of respondents proposed that the entry qualifications for a training program in the health information sciences be the successful completion of a British-style Form Four or Form Six education, with passes in the science subjects (chemistry, biology, and physics) and passes in mathematics and English. Some suggested that a prospective trainee should also have a background in nursing, clinical medicine, health records, and other health-related fields. The following quotes are illustrative:

- *"It will be better for a person to have passed in science subjects like physics, chemistry, and biology, that will be very helpful even if a person need to know something s/he can help"* (Clinician).
- *"Not only science subjects but also s/he should have certificate/diploma in any health fields, like clinical officers and nurse assistance"* (Librarian).
- "*People with librarian qualifications can also join the course"* (Academician).
- *"The Ministry should enrol current librarians who have certificate/diploma to undergo health information science programme as a capacity building"* (Librarian).

DISCUSSION

This study sought to identify the current status and local impact of health sciences libraries and user perception of health information services. Collected data were regarded as a prerequisite to the establishment of the competence-based curriculum for health information science training. Results obtained from situational analysis and the stakeholders identified several weaknesses and challenges in the current and potential workforce, including insufficient health information literacy skills and incompetence in health information search skills and inadequate knowledge in biomedical and basic health sciences, as well as inadequate training in medical, legal, and professional ethics. It was also

found that poor communication skills and insufficient training in health information system management, information technology, management and leadership skills, and research methodology posed a potential threat in developing a successful new curriculum. Similarly, the mentioned weakness and challenges were also identified in some prior studies.[10,12-14,29-31] It is important to address the stated problems associated with accessing health information in all health care settings that can support delivery of quality services countrywide.

Research indicates that different types of health-related information are required by users. However, the information need depends on the activities performed or problems needing to be solved by information users. For instance, health professionals need health-related information to perform policy and decision-making activities, including drugs and medication categories; administration of patients; control of diseases; hospital management, training, and development; human resources for health; outbreak of infectious diseases; and equipments and tools.[12] On one hand, a study conducted to assess health information needs and behaviors of health practitioners revealed that they sought information related to specific health information, general health information, health practice, information to support teaching and learning, and information for conducting research.[13] On the other hand, health sciences students indicated that they need information concerning their education project and activities, including coursework and assignments, preparation for tests and examinations, general reading to enhance lecture notes and group discussion,[32] and information related to personal development, academic activities, and employment issues.[33] This information has been found in different sources that can be categorized as human, printed, and electronic sources. However, this study indicated a number of challenges related to access to health information that information users encounter.

Desirable levels of competence and entry qualifications for students in a training program in health information sciences are important objectives we addressed. In any educational program, the admission criteria for the potential prospective students and the duration of study have a substantial impact on the learning process and quality of the graduates. For example, a diploma in medical librarianship in the United Kingdom requires one to register for a course on information management and technology in the areas of medical sciences, and the course has to be completed within 2 to 3 years.[34] A health information specialist should be an individual with a good science background in his or her secondary school education. This suggestion is well supported by NACTE's National Technical Award learning systems. In most diploma programs in health sciences the duration of study is 3 years; for a health information specialist program the duration of study must be determined by the course content to ensure that required competencies are covered. The advancements in ICTs, the worldwide information explosion, and the unique nature of medical sciences require health information specialists and medical librarians to be conscious of legal and ethical issues that are essential for building trust with medical practitioners and patients or consumers in the process of providing health information services.[35] Competencies are outlined in Appendix 3.

Tanzanian health training institutions are at different stages of the accreditation process, but they typically have basic teaching and learning infrastructures such as teaching hospitals, classrooms, dormitories, computer laboratories, and libraries. These institutional strengths can facilitate the establishment of a diploma program in health information sciences; one institution will be chosen to implement the course. The availability of skilled human resources, reliable infrastructure, modern medical facilities, and support from medical councils have created a favorable environment for a successful launching of health information science programs in those countries.[31,36] Currently, there are issues regarding a lack of availability of qualified medical and health information specialists and infrastructure issues such as dormitories, libraries, and skills laboratories that need to be significantly renovated and improved. In some training institutions, students have reported very limited access to ICT services, including Internet connections, because of the presence of conflicting demands with institutional priorities and financial difficulties. To have a successful health information science program in a dynamic information technology environment, a stronger ICT infrastructure is of paramount significance.[37,38] A cadre of instructors—most likely from among those with an existing generalist library degree but who lack a health sciences and medical specialization—needs to be trained as teachers for the diploma program. This can best be done by having those proposed as librarian instructors earn their master's degrees in library and information science through an online

Annals of Global Health, VOL. 82, NO. 5, 2016
September–October 2016: 912–921

graduate program with a specialization in health and medical information.

CONCLUSIONS AND FUTURE WORK

The results of this situational analysis are helpful in identifying the current status and local impact of health sciences libraries and in assessing the health information training needs for medical librarians and health information specialists in Tanzania. The findings obtained from this assessment are strong enough to guide activities involved in the development of curriculum, training strategy, operational plans, and training packages for health information professionals in the country. The results of the needs assessment research provide the evidence and basic information for the development of a training curriculum for health information sciences and subsequently for the actual training that can translate to better health information service delivery for the nation.

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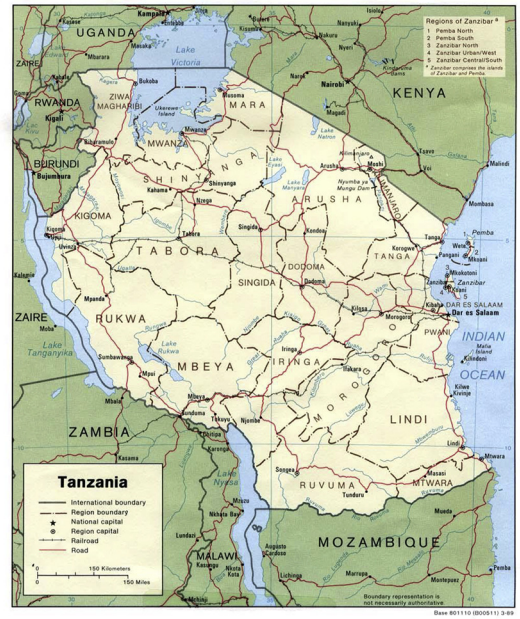
Annals of Global Health, VOL. 82, NO. 5, 2016
September–October 2016: 912–921

APPENDIX



Appendix 1. **Map of Tanzania.**

Appendix 2. Lists of the Sites and Institutions in Which the Field Visits Took Place

Study Area	Study Units
Dar Es Salaam	● Muhimbili University of Health and Allied Sciences (MUHAS) ○ Muhimbili University Library ● Muhimbili Institute of Health and Allied Sciences ○ Muhimbili School of Medical Laboratory Sciences ○ Muhimbili School of Assistant Dental Officers - Muhimbili School of Hygiene ○ Muhimbili School of Radiography ○ Muhimbili School of Nurse Tutors - Muhimbili School of Midwifery ○ Muhimbili School of Dental Laboratory Technology ○ Muhimbili School of Pharmaceutical Sciences ○ Muhimbili School of Nursing ● Muhimbili National Hospital ● Muhimbili Cardiac Surgery and Training Center ○ Muhimbili Orthopedic Institute (MOI) ● Ocean Road Cancer Institute
Kilimanjaro	● Kilimanjaro Christian Medical University College (KCMUCo) ● Kilimanjaro Christian Medical Centre (KCMC) ○ KCMC Medical Library ● KCMC School of Physiotherapy ● Kilimanjaro School of Pharmacy ● KCMC Assistant Medical Officer Anesthesia ● KCMC Health Records ● KCMC Assistant Medical Officer Ophthalmology ● KCMC Ophthalmic Nursing School ● KCMC Assistant Medical Officer Radiology ● KCMC School of Nursing ● KCMC School of Pediatric Nursing ● KCMC Regional Dermatology Centre ● KCMC Occupational Therapy ● KCMC School of Optometric ● KCMC AMO General ● Tanzania Training Centre for Orthopedic Technology

(*continued on next page*)

Appendix 2. continued

Study Area	Study Units
Mwanza	● Bugando Medical Centre (BMC) ● Catholic University of Health and Allied Sciences (CUHAS) ● Bugando Medical Centre Library Bugando School of Nursing ● Bugando School of Pharmacy ● Bugando School of Radiography ● Bugando School of Nurse Tutors ● Bugando School of Laboratory Technology ● Bugando Assistant Medical Officer Training School ● Sengerema Clinical Officer Training college ○ Sengerema Medical Library ● Sengerema School of Nursing ○ Sengerema School of Nursing Library
Njombe	● Njombe Regional Hospital (Kibena) ● Njombe District Hospital ● Njombe School of Nursing ● Ilembula School of Nursing ● Ilembula Referral Hospital

Appendix 3. Proposed Competencies for the Diploma in HIS Program

Year 1	Year 2	Year 3
Health and Medicine	Medical and Health Librarianship	Health Records Management
1. Anatomy and physiology with associated terminology	1. Types of health information	1. Schemes and tools
2. Essential medical terminology	2. Literature search/retrieval	2. Technical requirements
3. The health care environment	3. Organization of knowledge (classification, cataloguing, indexing of health/medical information)	3. Privacy and security concerns
4. Basic medical and clinical awareness	4. Digital and hard-copy collections management	4. Legal aspects
5. Standards of care/clinical processes	5. Specialized technology and applications	5. Health care management information systems
6. Introduction to common public health community issues	6. Public and technical services	6. Medical office procedures
7. Health statistics	7. Consumer health issues	7. Research methods
8. Common medical issues in Tanzania	8. Customer relations/user support/public service	8. Scholarly writing, referencing, and plagiarism
9. Library users	9. Marketing information services	9. Electronic health records
10. Information behavior of medical and health personnel	10. HIV/AIDS and tuberculosis information	10. Disease classification and coding
11. Types of clients/patrons/users for health and medical information	11. Disaster information management	11. Medical information technology
12. Ethical interaction with users and confidentiality of patient records	12. Environmental health information	12. Leadership and managerial skills
13. Evidence-based health care	13. health promotion-	13. Medical office management
14. Basic computing skills (software and hardware)	14. Database management	14. Internship
15. Communication and presentation skills	15. Library internship/practice	15. Elective
16. Clinical practical	16. Evaluation of online information	16. Repositories, records management and archives administration, conservation, and preservation
		17. Advanced metadata
		18. Medical informatics
		19. Pedagogical skills
		20. Clinical practical
		21. Research work
		22. Quality assurance

HIS, Health information sciences.