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Digital Paradigm in Medical Libraries of Bangladesh with Special Reference to icddr,b Library: Key Observations and Future Directions

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Abstract

Medical libraries are facing new challenges and opportunities due to dynamic changes in the digital era for offering excellent services to health scientists and professionals. The usage of information and communication technology (ICT) has become increasingly important in various fields, including the healthcare industry. Medical libraries, in particular, have also witnessed a significant transformation in terms of their functions and services due to the adoption of the digital revolution. This article aims to investigate the usage of ICT in the selected medical libraries in Bangladesh, with a special reference to the icddr,b Library. In this connection, a comparative study is made based on six major medical libraries of Bangladesh. These libraries are compared in terms of ICT use for providing library services through library websites. Collected data are analyzed in quantitative as well as qualitative methods to explore better results. Results are shown in the form of tables and figures. This paper gives a snapshot of ICT use in medical libraries of Bangladesh.

Keywords

Information and Communication Technology; Website; Internet; Medical library; Bangladesh

Introduction

With the vast number of web-based information resources available through the Internet, locating reliable and up-to-date health and educational resources can be challenging for academics, doctors, and scientists worldwide. Implementation of ICT is becoming increasingly popular in the current information age and plays a significant role in introducing standard library systems and services in addition to providing an excellent opportunity to effectively and efficiently preserve, disseminate, and increase access to digital information resources. This study aims to investigate the present state of collection, digitalization process, preservation, Institutional Repository (IR), and online databases of the investigated six medical libraries. The study also explores the major challenges and recommendations for successfully running the medical library systems in Bangladesh. The medical library systems, both in the public and private sectors of Bangladesh, are not effective due to a lack of understanding of the values of libraries and information services to the authorities and therefore, inadequate allocation of financial resources by respective authorities to build modern libraries (Chowdhury et al., 2011). The application of information technology in libraries has enhanced efficiency and effectiveness in all aspects of information acquisition, storage, transfer, and dissemination. In keeping pace with the new technologies, traditional libraries have been modernized to make these digital libraries in terms of the dissemination of information (Uddin et al., 2017). Surveys were made with the structured questionnaire, Interviews, and personal observations and data were collected from six medical librarians to ascertain the present status of medical libraries of Bangladesh. The findings revealed that ICT usage is an important issue globally for librarians and especially the library professionals of Bangladesh in responding to meet the diversified information needs of the students, doctors, and faculties.

Literature Review

An exclusive literature review has been carried out related to modern library facilities and services rendered through using ICT technology worldwide as well as in Bangladesh with a special emphasis on medical libraries. The authors found that a good number of investigations have been carried out to study the techniques used in medical libraries worldwide but very few have been focused to explore the usage of ICT in the medical libraries of Bangladesh.

Ogugua and Ofordile conducted a study in 2022 to investigate the importance of digital reference services in Nigerian university libraries. This study revealed that Web 2.0 tools such as blogs, Facebook, Whatsapp, Second Life, Twitter, real-time using web chat applications such as video conferencing or web-camera services, short messaging system (SMS), Voice over Internet Protocol (VoIP), Instant Messaging (IM) and digital reference robots are some of the popular methods for providing effective reference services in the Nigerian academic libraries (Ogugua & Ofordile, 2022).

A study titled “Librarian Contributions to Evidence Synthesis Programs: Addressing the COVID-19 Infodemic” conducted by Charbonneau & Vela (2023) investigated the key roles of health science librarians in the area of disseminating large amounts of COVID-19 information to doctors through curating research on COVID-19, key findings, providing expert searching services of COVID-19 and to monitor the evolving research on COVID-19 (Charbonneau & Vela, 2023).

Raju and Mostofa carried out a study on “Present Status of Health Libraries in Bangladesh: a paradigm shift” in which the authors focused the present status of surveyed health libraries and the responsibilities to provide health information services for the health professional. This paper mainly explores the current status of private health libraries in Dhaka city that are facing challenges like IT infrastructure, inadequate trained manpower, lack of managerial skills, and financial constraints (Raju & Mostofa, 2015).

Islam et al. investigated cloud computing applications in library services of Bangladesh. It revealed the key barriers to the adoption of Cloud computing in libraries like subscription rate (70%), unreliable online payment system (60%), and trading system (60%). The study also proposed a model for a cloud-based library system for the efficient management of library activities and services in Bangladesh (Islam et al., 2023).

In 2019, Uddin et al. revealed a research study for Web-based library services of icddr,b. They found that icddr,b library is at the advanced level in Bangladesh for adapting modern ICT tools and technologies in order to meet the ever-changing needs and expectations of its research communities. This study highlighted the e-resource usage status of icddr,b and listed the problems and prospects of developing a modern library management system at icddr,b library (Uddin et al., 2019).

Islam et al. carried out a study to gain a detailed understanding of the structural equation modeling (SEM) for the service quality dimensions on user satisfaction in Bangladeshi public university libraries. The key finding of the study was that library resources, staff skills, demeanor approach and tangible facilities of public university libraries have a significant impact on library users' satisfaction level (Islam et al., 2023).

Saleh et al. proposed a model for the usage of augmented reality (AR) in medical libraries in Iran. The AR model may play a vital role in enhanced library services consisting of enriching resources, helping management, finding resources, strengthening education, encouraging users' information literacy, user guidance, gamification, educational justice, providing new services, and economic savings (Saleh et al., 2022).

Yoon et al. focused on adopting artificial intelligence and related technologies in public and academic libraries in North America. The study revealed that 68% of the librarians addressed the massive training programs of AI for introducing new services in academic libraries. (Yoon et al., 2022).

Kaffashan Kakhki et al. outlined the innovative usage of IT for the knowledge-absorptive capacity on academic librarians. The paper confirmed that there was a direct and positive effect IT knowledge assimilation and transformation among librarians for introducing innovative library systems and services (Kaffashan Kakhki et al., 2022).

Ahmed highlighted in his study the scenario of public universities in Bangladesh in terms of library automation, IT infrastructure, and training needs for implementing a networked electronic library for the universities in the country. His result showed that the public universities in the country are not well-equipped to deliver proper IT-based information services, mostly due to the absence of appropriate IT infrastructure and trained manpower, and inadequate access to electronic resources. Ahmed also stated that developing countries like Bangladesh are not benefiting much from the rapid advancement of IT applications in libraries (Ahmed, 2014).

Methodology

This study is prepared based on the survey method with a structured questionnaire and interviews with librarians of six medical libraries in Dhaka city. The questionnaire was used for the collection of data regarding the use of technology, library web pages, IR status, Library systems, services, databases, and software used in the libraries. Face-to-face interview with the heads of the selected medical libraries was also carried out for collecting additional data. Besides, the websites of those libraries were also reviewed. These libraries are selected as they are run by the reputed medical university, colleges, and research institutions. For the literature review; Google, Google Scholar, Scopus, and Emerald search engine and databases have been utilized. This study attempted to look at the present situation of technology use in medical libraries through quantitative and qualitative methods. Microsoft Excel is used for data analysis and prepared the tables and figures to explore the results. Endnote 20 software has also been used for managing the references used in this study.

Objectives of the study

The major two objectives of the study are mentioned below:

1. To discover the present state of medical libraries in Bangladesh particularly focused on the use of library websites based on Intranet and Internet in organizing library resources, facilities, and services.
2. To explore the existing library resources and services practiced in the medical libraries of Bangladesh to draw the attention of the respective authorities for developing required ICT infrastructure as well as librarians.

Medical Libraries of Bangladesh in the digital era

A medical library is a type of special library maintained by a university medical school, hospital, medical research institute, public health agency, or medical association to serve the information needs of students, researchers, and practitioners in health sciences discipline (medicine, nursing, dentistry, pharmacy, etc.), with collections that include print and online resources related to medicine and allied health (Reitz, 2018). Medical universities and Colleges are maintaining a library webpage integrated with

the homepage of the respective institutions. It is observed that a separate library Webpage is not available for sharing e-resources and library services in our country. Apart from icddr,b library, no medical libraries of universities and colleges are maintaining library websites using Intranet according to our survey. Most of the libraries have internet access and the users are using e-resources. But the overall scenario of the ICT infrastructure of the medical college and university libraries in Bangladesh is not satisfactory at all.

At present in Bangladesh, a good number of medical libraries have been registered to Research4Life program. Research4Life is the collective name for the five program – Hinari, AGORA, OARE, ARDI, and GOALI that provides access to e-resources to developing countries at free or low cost. More than 8700 institutions in more than 115 low-and middle-income countries registered globally as of January 2019 (Research4Life, 2019). Registered libraries from medical colleges and universities, public and private universities, and medical research institutions of Bangladesh are now using the e-resources of Research4Life.

Program for Enhancement of Research Information (PERI) was a flagship program of the International Network for the Availability of Scientific Publications (INASP) from 2001 to 2013 for strengthening research and knowledge systems in developing countries (INASP, 2018). An initiative was taken by the Bangladesh Academy of Sciences (BAS) in association with INASP making a consortium known as Bangladesh-INASP-PERI Consortium (BIPC) for getting a large number of journals from world-renowned publishers to the Bangladeshi stakeholders and more than 40 organizations and institutions registered themselves in this consortium (BAS, 2018). Now, this consortium BIPC is renamed as the Library Consortium of Bangladesh (LiCoB) and runs in association with the BAS including accessing the e-resources of 29 renowned publishers.

Furthermore, University Grants Commission (UGC) is running UGC Digital Library (UDL) since June 2012 intending to subscribe to electronic resources for the member institutions at lower rates as of Oct 2018. Ninety members registered in this consortium for getting access to scholarly writings (UGC, 2018). From this initiative, members of universities'/institutions' libraries are getting online access to resources of renowned publishers.

In addition, Bangladesh Journals OnLine (BanglaJOL) is another initiative regarding open-access journals. BanglaJOL is an online database of Bangladeshi journals (www.banglajol.info). This online platform is providing access to major Bangladeshi academic journals. This program is supported by INASP which was initiated in June 2007 and officially launched in September 2007 (BanglaJOL, 2018).

Short Profile of Surveyed Medical Libraries

icddr,b Library

It was established in 1962 and now the name of the icddr,b library is Library and Information Services Section (LISS). The icddr,b library has grown over the years to be one of the best medical libraries in the region. The library has rich collections, particularly; a broad range collection of journals that includes e-journals also has enriched the library. icddr,b library is committed to deliver world-class library and information services to meet the information needs of scientists and researchers icddr,b library is now using Web-based commercial software (Liberty) for automation. The library Intranet URL is (captured in Figure 1 mentioned below.

Home / Explore / library

Scientific Divisions
Office of the Executive Director
Office of the Deputy Executive Director
Central Management Services
Finance
Human Resources
Regulatory and Legal Affairs
Research Administration
Overview
Policy/Scope of Work
Funding
Funding Opportunities
Proposal Development
Grants Management
Institutional Review Board

Library & Information Services

icddr,b's Library and Information Services is the preeminent medical and public health library in the region. Its mission is to make available findings and results of global health research from icddr,b scientists and the international research community.

Established in 1962, icddr,b's Library and Information Services maintains a modern library and information centre equipped with the most advanced tools and information technology for collecting, processing, and storing information. It currently houses a collection of over 48,660 volumes of bound journals and books and subscribes to over 176 journals (another 115 journals free or under exchange) and 80 newsletters.

Mission:
The mission of the Library is to diffuse findings and results of global health and population research information for solving common health and population problems, especially in the context of developing countries.

Values:
The work of the library is guided by a set of values intended to support everything that we do:

- Putting users at the heart of our services
- Engaging supportively with research activities
- Empowering and encouraging scientific staff, maximizing the potential of all patrons
- Fostering collaboration and partnership
- Working cost-effectively to ensure value for money
- Building, discovering, and preserving collections
- Taking personal responsibility within a framework of shared accountability

Objectives:
LIS is the central gateway of icddr,b for 'input information'.
The broad aims and objectives of LIS are to: (a) collect, process, store, and disseminate information, (b) encourage the use and flow of information, (c) help promote appropriate research work, and reduce duplication, and (d) optimize the application of improved practices for

Figure 1: icddr,b library website on the Intranet

In Bangladesh, the first Institutional Repository (IR) is established by icddr,b Library in 2005 by using Dspace software—a digital repository system (Chowdhury et al., 2011). Finally, the Institutional Repository of icddr,b is renamed as Institutional Knowledge Repository (IKR) icddr,b library is a registered member of the Research4Life programme, Library Consortium of Bangladesh (LiCoB), UGC Digital Library (UDL), and a subscriber of UpToDate, ASM Journals, Indian Journals, Cambridge Journals, Springer Journals, EndNote, and iThenticate (Uddin et al., 2015).

Bangabandhu Sheikh Mujib Medical University (BSMMU) Central Library

In 1965 it is established as the Institute of Postgraduate Medical Research (IPGMR) and afterward, in the year 1998, it is renamed BSMMU through an Act by the National Parliament of Bangladesh. The central library has a space of 22,000 sqft. and have a capacity of 750 users at a time. The library has a notable digital collection of books and journals along with printed copies. Being a registered member of Research4Life, it has online access to electronic journals. It has a depository library of the World Health Organization (WHO) with more than 1000 copies of publications. The library is automated by System of Library and Information Management (SLIM) software (BSMMU, 2018).

BCPS Library

It is established in 1972. The library looks wonderful. Being a registered member of Research4Life, and LiCoB, it has online access to electronic journals. The library provides the services like information retrieval service, electronic library service, reference and bibliographic service, and reading room facilities which consider important library facilities at BCPS library. This library has seven computers connected to the internet with radio-link and equipped with an auto access control system. It has a good collection of printed reading materials (BCPS, 2018). Institutional Repository (IR) and library automation are planned to build at BCPS library.

National Health Library and Documentation Centre (NHLDC) Library

It is established in 1974 with the financial assistance of the World Health Organization (WHO). The library organizes various training programs for librarians, physicians, and teachers. Librarian prepares national bibliography on health science publications and publication of a directory of health science libraries. Library has 34 staff and a floor space of 10,000 sq. ft. The library is equipped with 50 PCs.

DMC Library

It is established in July 1946 during British colonial rule. This government medical college played a vital role in medical education for the undergraduate program. DMC library has a collection of printed reading materials. The textbook-based library provides services for the students of the undergraduate program. The library webpage is available on the medical college homepage (<http://www.dmc.gov.bd>) through a library tab but that link is not displaying any information about the library (DMC, 2018). IR and Intranet-based services are not available in the DMC library.

Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders (BIRDEM) Library

The library is established in 1986 and it has a good collection of printed reading materials and provides various services to students and teachers. The library floor space is 52,00 sq. ft. with 96 seating capacity, 2278 library members, and 12 staff. Library using the internet since 2001. The library has photocopy services, guiding services, SDI services, online literature Search, and lending services. Being a registered member of Research4Life and LiCoB, it has online access to electronic journals. In 2018, the library installed Senayan Library Management System (SLiMS)—a web-based free open-source software for their library management. (BIRDEM, 2018). The library has no IR and Intranet based service.

Findings and Analysis of Surveyed Medical Libraries

The six medical libraries are using ICT and we examined the ICT in terms of application of IT, security system, number of PCs, communication technologies, use of Internet and Intranet, use of automation software, digitalization equipment, and capability of libraries to access the online e-resources. Data are collected through questionnaires and informal interviews. Out of six surveyed libraries, icddr,b is the only international organization, i.e. 17%, three are government organizations (DMC, BCPS, NHLDC), i.e. 50%, and two are autonomous (BIRDEM AND BSMMU), bodies i.e. 33%.

Categories of Library Users

From Figure 2, we found that teachers, students, doctors, researchers (100%), scientists (83%), and staff (67%) are using these six libraries.

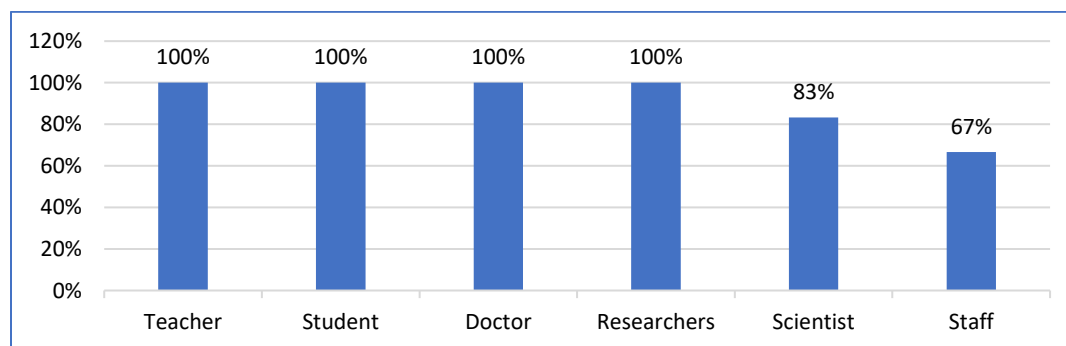


Figure 2: Categories of users in the six medical libraries

Library Print Resources

Table 1 depicts the scenario of library collections like books, theses, dissertations, loose journals, bound journals, etc. Three libraries have audio-visual materials and interestingly atlases, maps, microfilms, and microfiches are not available in these six libraries.

Table 1: Library print resources of six medical libraries

Library Resources	BSMMU Central Library	BCPS Library	NHLDC Library	DMC Library	BIRDEM Library	icddr,b Library
Books	26867	5000	18300	33557	7759	19450
Thesis/Dissertations	3537	5500	0	1600	305	350
Report	0	0	0	0	0	1905
Loose Journals	2353		60	500	21	463
Magazines	2333	0	5	0	0	7
Bound Journals/ Magazines	4630	2500	14500	0	2865	29200
Audio-Visual materials	800	2000	0	0	0	450
Atlases	0	0	0	0	0	0
Maps	0	0	0	0	0	0
Microfilms	0	0	0	0	0	0
Microfiches	0	0	0	0	0	0
News clippings	690	0	0	0	0	0

ICT and Automation Facilities

Table 2 is arranged chronologically based on ICT inception. icddr,b Library started to use ICT in 1985 and DMC Library has no data. Automation of four libraries is done partially, but icddr,b Library is fully automated. Commercial, Open Source Software, and in-house developed software are used in these libraries.

Table 2: ICT and Automation Facilities

Name of Libraries	ICT and automation Facilities	Year of ICT inception	Status of Automation	Type of Automation Soft	Software for Integrated Library System/IR
icddr,b Library	yes	1985	Full	Commercial & Open Source Software	Liberty, Dspace, RFID
BIRDEM Library	yes	1991	Partial	Open Source Software	Winisis
NHLDC Library	yes	2003	Partial	Open Source Software	PHP my library, Winisis
BCPS Library	yes	2004	Partial	In-house developed	
BSMMU Central Library	yes	2010	Partial	Open Source Software	KOHA, Dspace
DMC Library	No	No	No	No	No

Computers Connected to the Internet

BSMMU Central Library has 80 PCs (highest) i.e.51% and DMC Library has one PC (lowest) i.e. 1% shown in Figure 4. NHLDC Library has 25 PCs i.e. 22% followed by icddr,b library 27 PCs i.e. 17%.

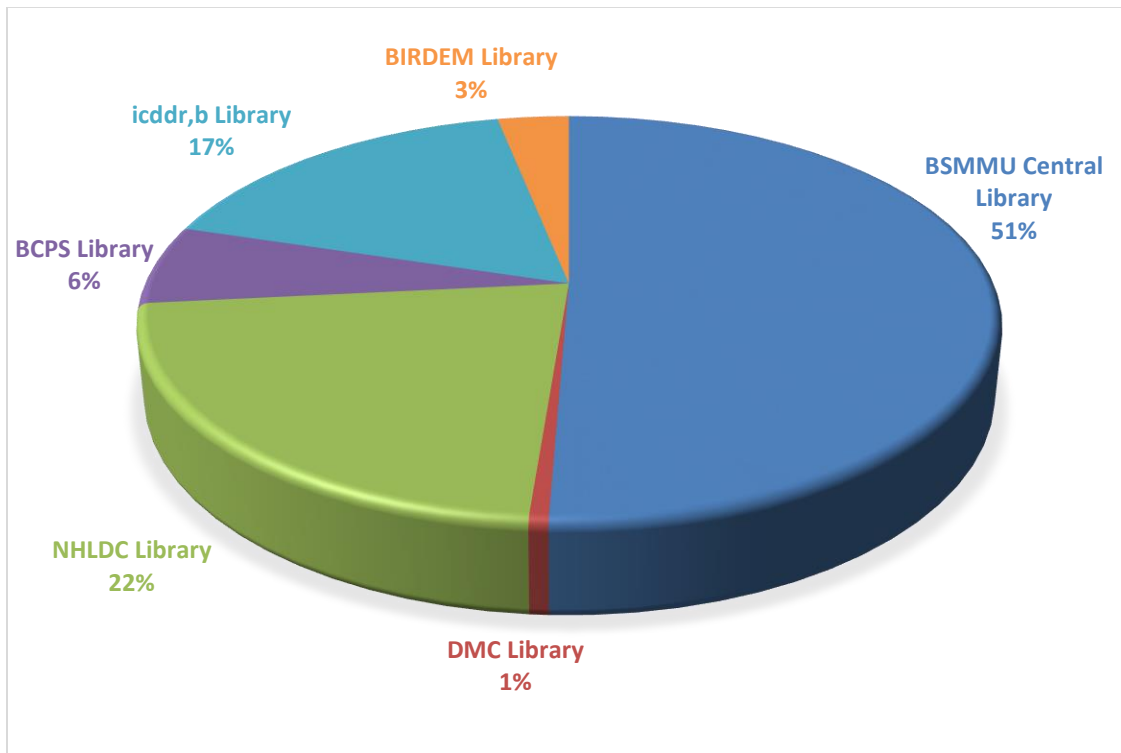


Figure 3: Number of computers connected to the Internet

Average Users of the Internet

The highest number of average users of the Internet is 370 i.e. 80% at BSMMU Central Library and the lowest number of users is 5 i.e. 1% at BCPS Library shown in Figure 4. icddr,b Library has an average number of users of 60 i.e. 13% and BIRDEM Library average users are 12 i.e. 3%.

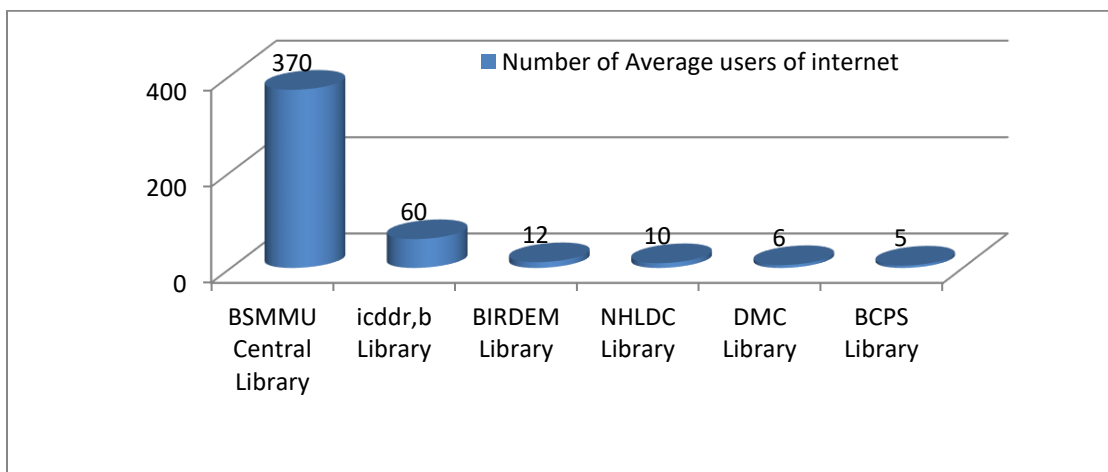


Figure 4: Number of average users of the Internet

Cost of Internet Use and Connectivity

Internet connectivity in the surveyed libraries are using broadband and Wi-Fi but icddr,b library is using LAN and Wi-Fi shown in Table 3. No charge for browsing the internet in three libraries i.e. 50% and the charge is imposed by the other three libraries i.e. 50%.

Table 3: Internet Connectivity and Cost of Internet use

University/Institution	Charge of Internet browsing	Internet Connectivity
BSMMU Central Library	No	Broadband, Wifi
DMC Library	No	wifi
NHLDC Library	Yes	Broadband, Wifi
BCPS Library	Yes	Broadband, Wifi
icddr,b Library	No	LAN, Wifi
BIRDEM Library	Yes	Broadband, Wifi

Distribution of Browsing Software

Browsing software Opera is found lowest i.e. 33.3% and Firefox is the highest i.e. 100% using these libraries shown in Figure 5. Netscape Navigator and Netscape Gold are not in use.

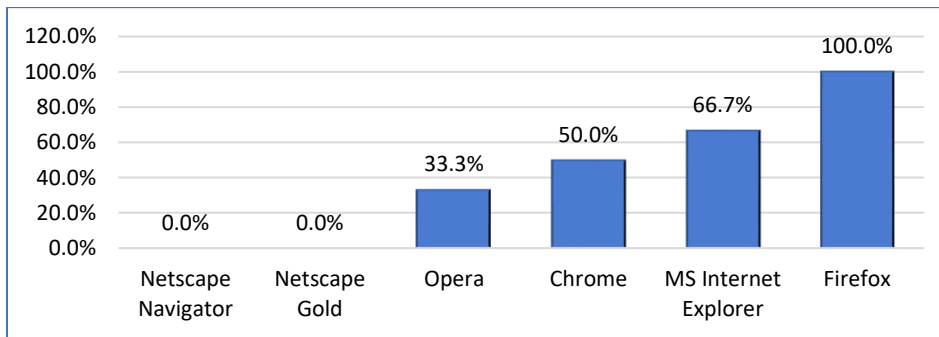


Figure 5: Distribution of browsing software in the six medical libraries.

Distribution of search engine

Medical libraries are using five search engines shown in figure 6. Google search engine is used 100% and AltaVista and Lycos are less i.e. 17%.

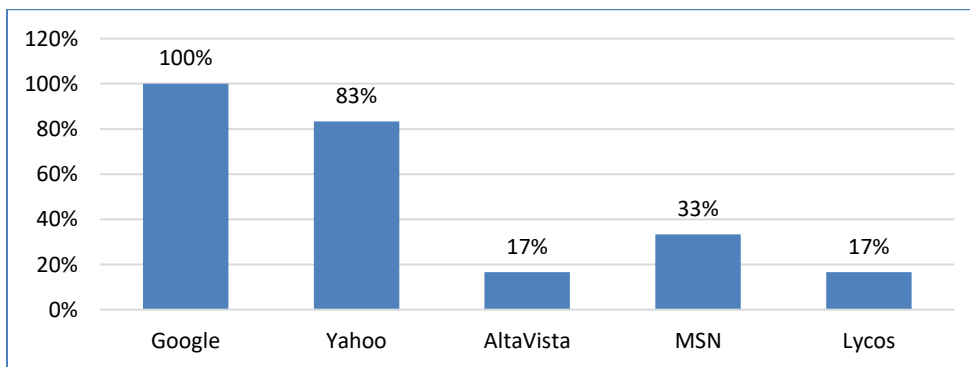


Figure 6: Distribution of search engine in the six medical libraries.

Availability of Library Website on the Internet and its Contents

In Table 4, (✓) represents the present and (–) represents the absence of the website and web contents on the internet. Except for the DMC library, every library has a website and the NHLDC Library website has been found inactive. General information about libraries is incorporated on their website. DMC Library is absent in all aspects. icddr,b Library website provides only general information.

Table 4: Library website and web contents on the Internet

Website and Web Contents	BSMMU Central Library	BCPS Library	NHLDC Library	DMC Library	BIRDEM Library	icddr,b Library
Library Website	✓	✓	✓	–	✓	✓
General information on the library, Staff, contact numbers, opening hours, services, collections, rules and regulation	✓	✓	✓	–	✓	✓
Web OPAC	–	–	–	–	–	–
Access to -book & e-journals	✓	–	–	–	–	–
Access to commercial online databases	–	–	–	–	–	–
Access to open Access database	✓	–	–	–	–	–
Link to Institutional Repository	✓	–	–	–	–	–
New book list	–	✓	–	–	–	–
FAQ	–	–	–	–	–	–
Suggestion Page	–	–	–	–	–	–
Feedback & comments	–	–	–	–	–	–
Others	–	–	–	–	–	✓

Availability of Library Website on Intranet and its Contents

In the Table 5, (✓) represent the present and (–) represent the absent of the website and web contents on the intranet. Only icddr,b library has website on the intranet (http://shetu.icddr.org/index.php?option=com_content&view=article&id=82&Itemid=541) and all library resources are incorporated here and not accessible from outside of the organization.

Table 5: Library website and web contents on the Intranet

Website and Web Contents	BSMMU Central Library	BCPS Library	NHLDC Library	DMC Library	BIRDEM Library	icddr,b Library
Library Website	–	–	–	–	–	✓
General information on the library, Staff, contact numbers, opening hours, services, collections, rules and regulation	–	–	–	–	–	✓
Web OPAC	–	–	–	–	–	✓
Access to -book & e-journals	–	–	–	–	–	✓
Access to commercial online databases	–	–	–	–	–	✓
Access to open Access database	–	–	–	–	–	✓
Link to Institutional Repository	–	–	–	–	–	✓
New book list	–	–	–	–	–	✓
FAQ	–	–	–	–	–	✓

Availability of Institutional Repository

IKR (<http://dspace.icddrb.org/jspui/>) i.e. IR is only available in icddr,b library used for preservation of scholarly materials in digital format shown in Table 6. Other five libraries do not have IR.

Table 6: Visibility of Institutional Repository (IR).

University/Institution	Yes/No	Types of Items in IR
BSMMU Central Library	No	No
BCPS Library	No	No
NHLDC Library	No	No
DMC Library	No	No
BIRDEM Library	No	No
icddr,b Library	Yes	Scientific publications

Uploaded Documents on the IKR

Uploaded digital documents on the IKR from icddr,b library are shown in Figure 7. In the twenty-one communities, the highest uploaded documents are 5479 (icddr,b external publications) and the lowest is 0 (non-communicable diseases).

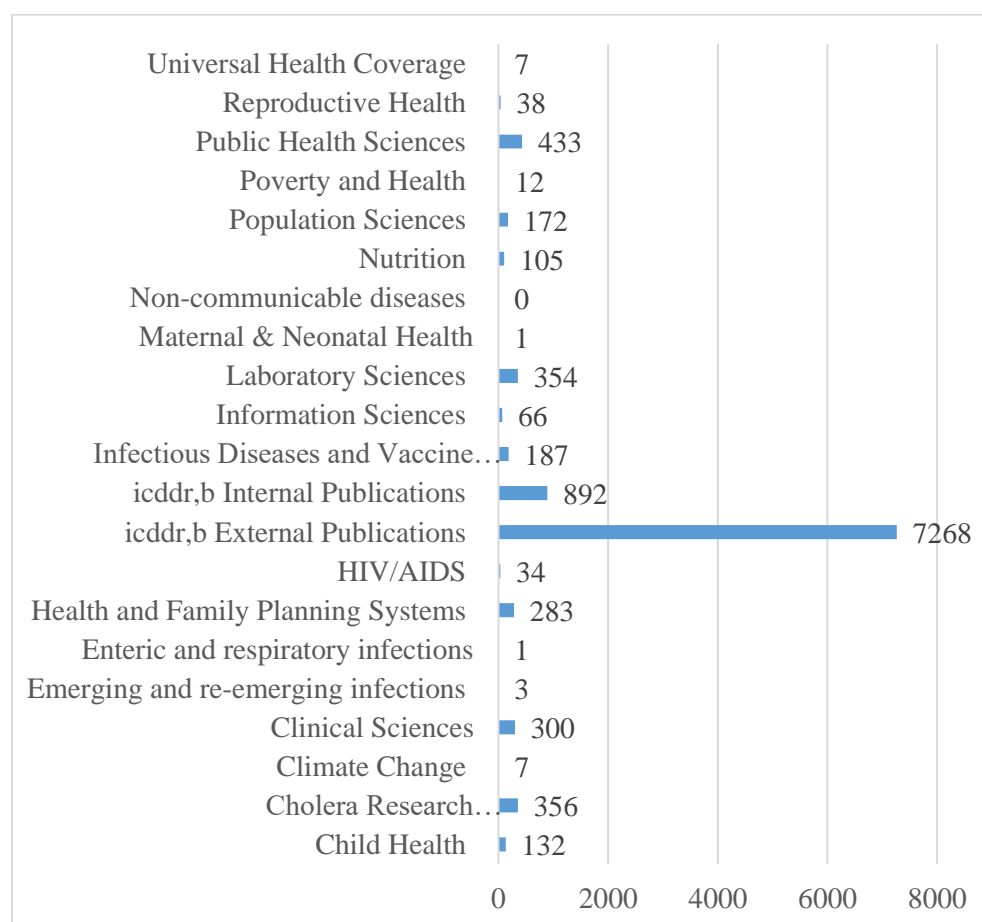


Figure 7: Communities-wise uploaded documents on the IKR of icddr,b (as on 27 Feb 2023)

Online databases/ E-resources access model

Online databases are broadly two types of e-data bases- (i) Full-Text databases and (ii) Bibliographic databases. There are several models for providing e-resources in medical libraries, including:

Subscription model: This model involves the library paying a subscription fee to gain access to a specific set of e-resources. The library typically negotiates a license agreement with the provider of the e-resource, which specifies the terms and conditions of access.

Pay-per-use model: In this model, the library pays for each use of an e-resource, rather than paying a subscription fee. This can be more cost-effective for libraries that have low levels of usage, but it can also be more complex to manage.

Consortia model: This model involves a group of libraries joining together to negotiate a subscription or license agreement for a set of e-resources. This can be more cost-effective than individual subscriptions and can provide greater access to a wider range of e-resources.

Open access model: This model involves providing e-resources that are freely available to anyone with internet access, without requiring a subscription or payment. This can be a more equitable approach, as it provides access to information to anyone, regardless of their ability to pay.

Hybrid model: This model combines elements of different models, such as providing some e-resources through subscriptions and others through open access. This can provide a more diverse and flexible approach to e-resource provision. The findings of Figure 8 indicate that ScienceDirect and Hinari are dominating online databases in all surveyed libraries apart from DMC library.

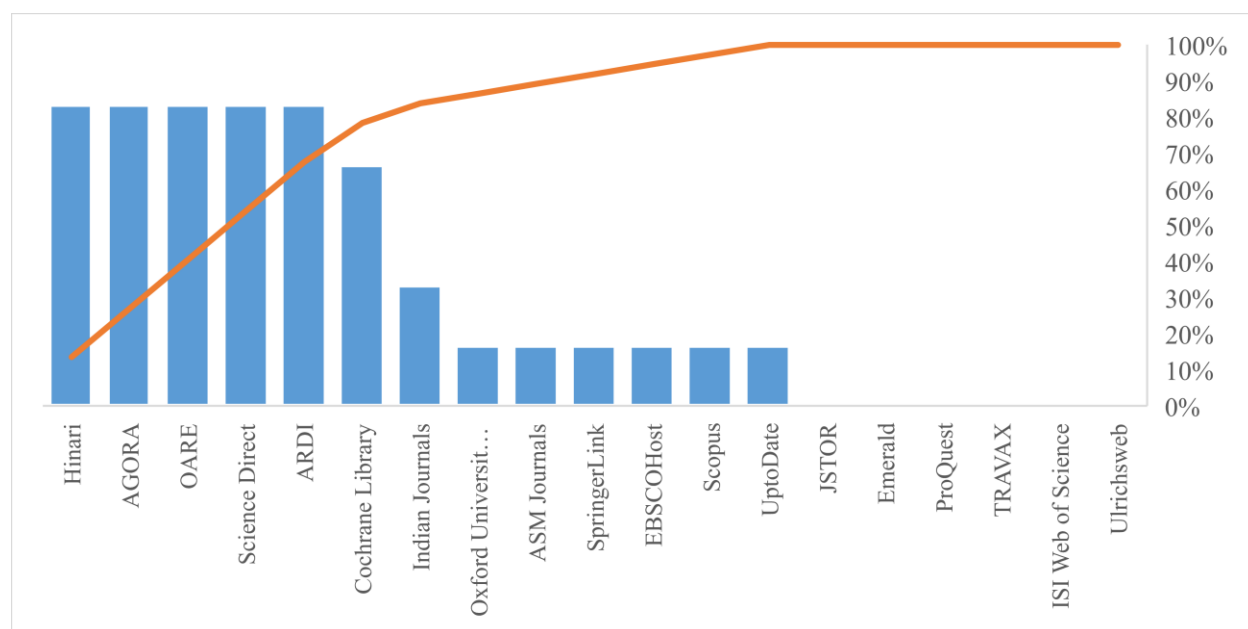


Figure 8: Status of subscribed/registered online databases/electronic platform

Available Digital/Web-based library services

Eighteen Web-based library services are taken into account in Table 7. Except for the icddr,b Library, OPAC, Web OPAC, Online renewal services, IR, Online SDI services, and Online reservation services are not offered by the other libraries. Internet services are common and distance learning service is provided by the BIRDEM library only.

Table 7: Digital/Web-based library services available among the six medical libraries.

Digital/Web-based library services	BSMMU Central Library	BCPS Library	NHLDC Library	DMC Library	BIRDEM Library	icddr,b Library
OPAC	–	–	–	–	–	√
Web OPAC	–	–	–	–	–	√
Online renewal services	–	–	–	–	–	√
IR/Digital Repository services	–	–	–	–	–	√
Online SDI services	–	–	–	–	–	√
Online reservation	–	–	–	–	–	√
Online reference query	–	–	–	–	√	√
Web 2.0	–	–	–	–	–	√
Electronic document delivery	–	√	–	–	√	√
Mobile based services	–	–	–	–	–	√
Remote access services	–	–	–	–	–	√
RFID based services	√	–	–	–	–	√
Wi-Fi services	√	√	√	–	√	√
Virtual reference service	–	–	–	–	–	√
Distance learning services	–	–	–	–	√	–
Internet Services	√	√	√	√	√	√
E-bulletin board service	–	–	–	–	–	√
E-indexing and abstracting service	–	–	–	–	–	√

Discussions

Nevertheless, apart from the icddr,b library, no medical libraries in Bangladesh have websites on Intranet to provide library services. Among these six libraries, DMC library is found poor and icddr,b library is in a strong position in terms of using technology in the perspective of Bangladesh. The rest of the four libraries are found moderately equal in using technology for managing and disseminating library resources and services. DMC library has no webpage and maintains a traditional process for library services but they are planning for automation. Except for the icddr,b library, the rest of the five medical libraries have no IR and Intranet-based library services. The data revealed from this study that the overall scenario of the surveyed medical libraries excluding icddr,b library are not in satisfactory level. So, it is assumed that the ICT scenario of the other medical libraries is not at a well-advanced level.

Challenges

The main challenges are making aware the library professionals of the medical libraries of Bangladesh about library websites using Intranet and related technical know-how. Based on our study, medical libraries and library professionals are facing the following challenges.

- Budget constraints in terms of developing Intranet/Internet
- Lack of qualified ICT knowledgeable library staff
- Inadequate ICT infrastructure

- Lack of adequate ICT training for library staff
- Building a library automation system for their library (open source or commercial software)
- The negative attitude of higher authorities toward the modernization of libraries
- Poor attitude of library professionals regarding technological change
- Internet connectivity and bandwidth
- Lack of knowledge of digitalization and modern digital devices
- Design a standard library website
- Lack of standardization of library software
- Sharing of library e-resources through library Internet/Intranet site
- Developing Institutional Repository

Future Directions

Enhanced User Experience: Medical libraries in Bangladesh can continue to enhance the user experience by providing more personalized and innovative information services.

Integration of Emerging Technologies: Medical libraries can also integrate emerging technologies such as artificial intelligence and machine learning to improve their services. These technologies can be used to provide personalized recommendations and to help users find the information they need more quickly.

Collaboration with Other Libraries: Medical libraries in Bangladesh can collaborate with other libraries to share resources and expertise. This can help to expand the range of resources available to users and to improve the quality of services provided.

Continuous Training and Professional Development: Medical libraries in Bangladesh can provide continuous training and professional development opportunities for their staff to ensure that they have the necessary skills and knowledge to provide high-quality services.

Conclusion

The digital paradigm has had a significant impact on medical libraries in Bangladesh. The use of digital technologies has increased access to information, improved search capabilities, facilitated collaboration, increased efficiency, and reduced costs. Medical libraries in Bangladesh can continue to enhance their services by providing a more personalized user experience, integrating emerging technologies, collaborating with other libraries, and providing continuous training and professional development opportunities for their staff. The icddr,b Library serves as an example of how medical libraries in Bangladesh can successfully implement the digital paradigm to provide high-quality services to their users.

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