Transformation of libraries during Covid-19 pandemic: A systematic review

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ABSTRACT

Purpose: This study analyze academic library services during Covid-19 pandemic (2020 and 2021), as well as the challenges they face, emerging library roles, and the most effective communication tools.
Method: A systematic review of the relevant literature was undertaken following PRISMA guidelines. The relevant literature was retrieved from four major scholarly databases (Scopus, Web of Science, Library, Information Science & Technology Abstracts (LISTA), and Library and Information Science Abstracts (LISA)). The relevant 23 studies were included fulfilling inclusion criteria. A quality assessment of the included studies was also performed.
Findings: The findings revealed that Covid-19 pandemic is certainly effecting and transforming libraries, their services and management. The library services during Covid-19 pandemic, their fundamental challenges, emerging roles, and available preferable communications tools are the categories in this study to better understand the pandemic-transformation.
Implications: The practical and policy implications are that libraries must establish infrastructure and improve accessibility in order to provide the best possible support to modern library users who access resources remotely in this rapidly evolving digital environment. Organizational policymakers and library directors should prepare emergency and disaster management plans. The libraries should ensure their presence on social media and make use of their library websites.

Introduction

The Covid-19 pandemic has caused unprecedented disruption in all walks of life. It was firstly discovered in Wuhan, China, in December 2019. Coronavirus is a disease caused by the transmission of the SARS-CoV-2 virus (COVID-19) through contact, droplet, airborne, fecal-oral, bloodborne, fomite, mother-to-child, and animal-to-human transmission (WHO, 2020). The pandemic hit all industries and organizations in early 2020. Global social structures have been disrupted by this pandemic (COVID-19). For many organizations, including libraries, the Covid-19 has spurred technological trends (Farooq et al., 2021; Rafiq, Batool, et al., 2021). Covid-19 is accelerating academic library technology acceptance and usage among library professional and users (Rafiq, Batool, et al., 2021). To slow the spread of the Covid-19 pandemic, educational institutions were forced to close their physical library services and make instant migrations to online environments to facilitate remote library users (Fasae et al., 2021; Mishra et al., 2020; Zhou, 2021). Mehta and Wang (2020) identified that the worldwide

pandemic has greatly affected library facilities, library users, and library staff. There was fear and uncertainty while decision making on the part of the library leadership during the initial pandemic era (Rafiq, Batool, et al., 2021). According to Harris (2021), there was an absence of pandemic plans, a lack of mindset and training from work at home, lack of resources, equipment and infrastructure for online working. On the other hand, the instantaneous changing information-seeking behavior of library users and their lack of digital literacy skills further aggravate the situation for libraries (Ameen, 2021; Rafiq, Batool, et al., 2021). During the initial pandemic period, the library's leadership was primarily concerned with the disruption of normal library services, the well-being of library users and library staff, maintaining social distance, developing new protocols and disinfecting the library, and improving online library access.

Rafiq, Batool, et al. (2021) described how the transition from physical to online delivery of information services has affected libraries, especially in the developing world. These libraries are facing a variety of social, economic, and technological issues due to their lack of wide-scale

technological applications, lack of off-campus access to subscribed resources, and a dearth of institutional repositories. Tammaro (2020) described the Covid-19 on Italian libraries and library professionals. The library professionals were seriously concerned about their job security, outsourcing, and the chronic scarcity of funds. The libraries were mainly affected due to the digital divide, lack of policies, issues in digitization, particularly copyright, and a lack of skillful staff. However, according to Asif and Singh (2020), traditional libraries have been turned into smart libraries as a result of technical advancement and developments. In today's pandemic scenario, libraries have a wide variety of e-resources, digital libraries, e-services, and so on. Smart libraries of the future could use knowledge and expertise, as well as distribute information in e-formats, to meet the information needs of modern library users.

As the Covid-19 greatly affected the libraries, so too did the LIS practitioners' attempts to reach the library users through online and remote services. These emergency reforms have offered an unexpected opportunity to re-evaluate and re-imagine current service models in order to improve the library's user experience. This study looks into the function of library services during Covid-19 pandemic, as well as challenges, emerging roles, and preferable communication tools. This findings of this study are helpful for libraries and information professionals in the formulation of proper policies and effective strategies to make library services more effective in the future.

Research question

1. What types of library services are being offered by libraries to their users during Covid-19 pandemic?
2. What challenges are being faced by libraries in COVID19 pandemic?
3. What were the evolving and emerging roles of libraries in this pandemic?
4. What are the preferred communication tools being used by libraries to continue their library services and to reach out to their users?

Method

This study applied a systematic literature review approach to critically appraise the published literature on libraries' services, emerging roles, challenges, and preferred communication tools during Covid-19 pandemic, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The PRISMA guidelines enable investigators to report evidence-based items that are useful for critical appraisal of published literature in a systematic way (Moher et al., 2009). PRISMA considers four elements of a study, such as identification, screening, eligibility, and included studies. Though originally developed for use in the health-care professions, it has been shown to be equally applicable in a variety of other fields. Recent research in the discipline of library and information science (LIS) has successfully used PRISMA guidelines to conduct systematic reviews of scientific literature (Ashiq, Rehman, Safdar, et al., 2021; Ashiq & Warraich, 2022). Furthermore, we also used the PRISMA 2020 Checklist developed by Page et al. (2021) to formulate the title of the study, objectives, methods, results, discussion, and other details (particularly focusing on search details, inclusion and exclusion criteria, synthesize of results, risk of bias, etc.).

Search strategy

The initial search strategy was created by combining backward and forward citations as well as the keywords used by the authors on the library services during the Covid-19 related articles. Then the initial search query was framed and reviewed by one professor (at the institute of information management, University of the Punjab, Lahore) and one chief librarian (central library, University of the Punjab, Lahore, Pakistan). Upon their suggestions, we have finalized search query to get the most relevant results. We used four key indexing and abstracting

databases to conduct our research (Scopus, Web of Science, LISTA, and LISA). The first author ran the following search query on July 4, 2021, in the four databases mentioned above. The second author repeated this process on the same date to make sure the results were correct.

("academic librar*" OR "university librar*" OR "online services" OR "information literacy" OR "digital librar*") AND ("covid 19 pandemic" OR "covid-19" OR "fake news")

Search details and screening process

The details of the search process in each databases is as follows;

  i. We used 'Web of Science core collection' using topic field and then applied the following filters (Publication years 2020–2021; Document types-articles; Web of science categories-information science library science; Languages-English). This search resulted in 161 results.
 ii. We run search query in Scopus database using TITLE-ABS-KEY (title, abstract and keyword) field and then applied the following filters (Years 2020–2021; Document type-article; Source type-journal; Language-English). This search resulted in 368 results.
iii. In LISTA (library, information science and technology abstracts) database, we just put the search query in a search box and then applied the following limiters (Scholarly journals; publication data 2020–2021; Articles; English). This search resulted in 115 results.
 iv. In LISA (library and information science abstracts) database, we run search query in a 'scholarly journal' field and then applied following filters (Publication date: 2011–2021; Document type: articles; Language: English). This search resulted in 1998 results.
  v. Overall, the total results from all 4 databases were 2642 records.

All pertinent data was downloaded and imported into Endnote Software on the same date (July 4, 2021). This process was repeated twice (once by the first author and then by the second author) to confirm that the data was accurate.

Inclusion and exclusion criteria

We included all relevant studies published between 2020 and 2021 about academic universities. Only research article (peer reviewed original articles) was included and studies that addressed more than one aspect of the study or met at least two research objectives. The studies dealing with the current library practices in the context of the Covid-19 pandemic, library challenges or issues, evolving or emerging library roles, and preferred communication tools for communicating with library stakeholders were included. Additionally, only English-language research articles were included (Fig. 1).

Synthesis of results

We used thematic approach to present and synthesize the results through MS Excel. This approach involve to systematic generating the codes and generating a descriptive themes. The findings of each study included in this review were extracted and written in MS Excel. After completing this process, the relevant themes were generated.

Risk of bias

We have reduced the risk of bias in two ways to ensure the validity of the search results and methodology approach. Firstly, we repeated the searching and downloading process (firstly by the first author and repeated by the second author). In addition to this, we also used quality

Inclusion and Exclusion Criteria

Inclusion Criteria

- Academic library
- Studies that have been published between the years 2020 to 2021.
- Studies that are published in English language only.
- Document type include only research article
- Studies that are covering at least two research questions.

Exclusion Criteria

- Non-English Language Publication
- Studies that cover a single research question such as only library services or library challenges or evolving roles or preferable communication tools during Covid-19.

Fig. 1. Inclusion and exclusion criteria.

assessment checklist of the selected studies.

In order to confirm the accuracy of the study, the risk of bias has been decreased by repeating the searching procedure, as well as data downloading, data extraction, and reporting of the results by the second author. Two researchers (author 1 and author 2) assessed the data (screening, eligibility, and included studies) and repeated the process to ensure that the data was accurate and reliable as possible. Finally, the data was extracted and double-checked.

Quality assessment of selected studies

A critical component of any systematic literature review is evaluating the quality of the papers that are being examined. Over time, a number of quality assessment checklists (QACs) have been produced (Khan et al., 2011). The researchers picked the checklist developed by

Boynton and Greenhalgh (2004), since it was deemed relevant for this review. This checklist was also used by library and information science (LIS) researchers to assess the quality of their systematic review studies (Ashiq, Rehman, Safdar, et al., 2021; Safdar et al., 2021). The checklist includes items relating to six different aspects of a study: questions and design, sampling, instrumentation, response rate, coding and analysis, and results presentation. The maximum score a study can receive is 13 based on these six views.

Table 1 shows that the category 'instrument score' was the lowest of all categories (53 out of 92), followed by 'sampling score' (32 out of 46) and 'response score' (17 out of 23). The majority of the studies did not disclose the instrument's reliability, validity, or pilot testing, which resulted in a low instrument score. Furthermore, some studies were descriptive and opinion-based, so they were not included in the sample and response score calculations. The categories 'question and design,'

Table 1
Quality assessment score of selected studies.

Studies	Question and design score (total 2)	Sampling score (total 2)	Instrument score (total 4)	Response score (total 1)	Coding and analysis score (total 2)	Presentation of result score (total 2)	Total score (out of 13)
Ameen, 2021	2	–	–	–	2	2	06
Ashiq et al., 2021a	2	2	4	1	2	2	13
Bashorun et al., 2021	2	–	–	–	2	2	06
Chigwada, 2021	2	2	2	1	2	2	11
Cox & Brewster, 2020	2	2	4	1	2	2	13
Fasae et al., 2021	2	2	4	1	2	2	13
Gotschall et al., 2021	2	1	1	1	2	2	09
Guo et al., 2020	2	2	4	1	2	2	13
Harris, 2021	2	1	2	1	2	2	10
Ifijeh & Yusuf, 2020	2	–	–	–	2	2	06
Koos et al., 2021	2	2	2	1	2	2	11
Kosciejew, 2021a, 2021b	2	2	3	1	2	2	12
Koulouris et al., 2021	2	2	3	1	2	2	12
Mbambo-Thata, 2021	2	2	2	1	2	2	11
Mehta & Wang, 2020	2	–	2	–	2	2	08
Naeem & Bhatti, 2020	2	–	–	–	2	2	06
Obenauf, 2021	2	–	–	–	2	2	06
Ocholla, 2021	2	2	3	1	2	2	12
Rafiq et al., 2021a	2	2	4	1	2	2	13
Tammaro, 2020	2	2	3	1	2	2	12
Temiz & Salelkar, 2020	2	2	3	1	2	2	12
Winata et al., 2021	2	2	3	1	2	2	12
Zhou, 2021	2	2	4	1	2	2	13
Category score (quality obtained)	46	32	53	17	46	46	240
Maximum score of categories (quality expected)	46	46	92	23	46	46	299

'code and analysis,' and 'display of result' obtained the highest scores. Overall, these 23 studies received 240 out of maximum 299 scores.

Results

Overview of selected studies

The researchers developed a comprehensive search strategy to retrieve the maximum amount of relevant data. There were 2642 records identified in total (Fig. 2). The identified articles' bibliographic information was imported into the endnote software. The duplicate (n = 1227) and irrelevant records (n = 1310) were discarded in accordance with PRISMA guidelines, and the potential relevant records (n = 105) were selected after reading their titles and abstracts. Seven additional records were discarded due to a lack of access to their full-text (initially, it was 11 papers that we could not access. We sent DOI to our peers working abroad to get these papers. We got four papers through this channel. We have also sent emails to the remaining authors, two of them did not respond, whereas five of the emails were underlived due to the non-active email addresses).

The remaining 98 records were chosen for in-depth analysis. Of these 98 studies, 23 were found to meet the study's inclusion criteria (Fig. 2).

An overview of the included studies is presented in Table 2. It shows that the studies (n = 14) were published collaboratively with two or more than two authors. The included articles were published in 2021 (n = 13) and the rest were published in 2020 (n = 9). Articles from both the developed and developing world fulfilling the criteria were included. Most of the articles were published by the United States of America (n =

5) followed by Pakistan (n = 4), Nigeria (n = 3) and other countries. The selected articles have been published in 12 journals, with the majority of the articles (four each) being published in 'The Journal of Academic Librarianship' and 'Digital Library Perspective'. According to the methodology of the selected research, the survey approach was most frequently employed (n = 8), followed by case studies (n = 4), interviews (n = 3), and content analysis (n = 3). The participants and respondents included in these studies were chief librarians, library directors, and library professional staff, except for two studies in which data were collected from students, teachers, and librarians (serial no. 10) and library science faculty staff (serial no. 16). The sample size ranged from a maximum of n = 189 to a minimum of n = 4.

In general, the methodology reflected a holistic perspective since it included qualitative, quantitative, and descriptive studies. Furthermore, a significant number of descriptive and opinion-based studies from senior library professionals demonstrate that COVID-19 transforms libraries, their services, and management.

Library services during covid-19 pandemic

Table 3 shows the library services during Covid-19 pandemic were reported in 12 studies, and these services mainly fall under three categories, such as closer of libraries and creating awareness, instant transformation of library services, and trending remote working, respectively.

The top category was creating awareness during closer of library doors and about health, safety and wellbeing through their websites, tutorials and posters. The sudden outburst of Covid-19 pandemic forced
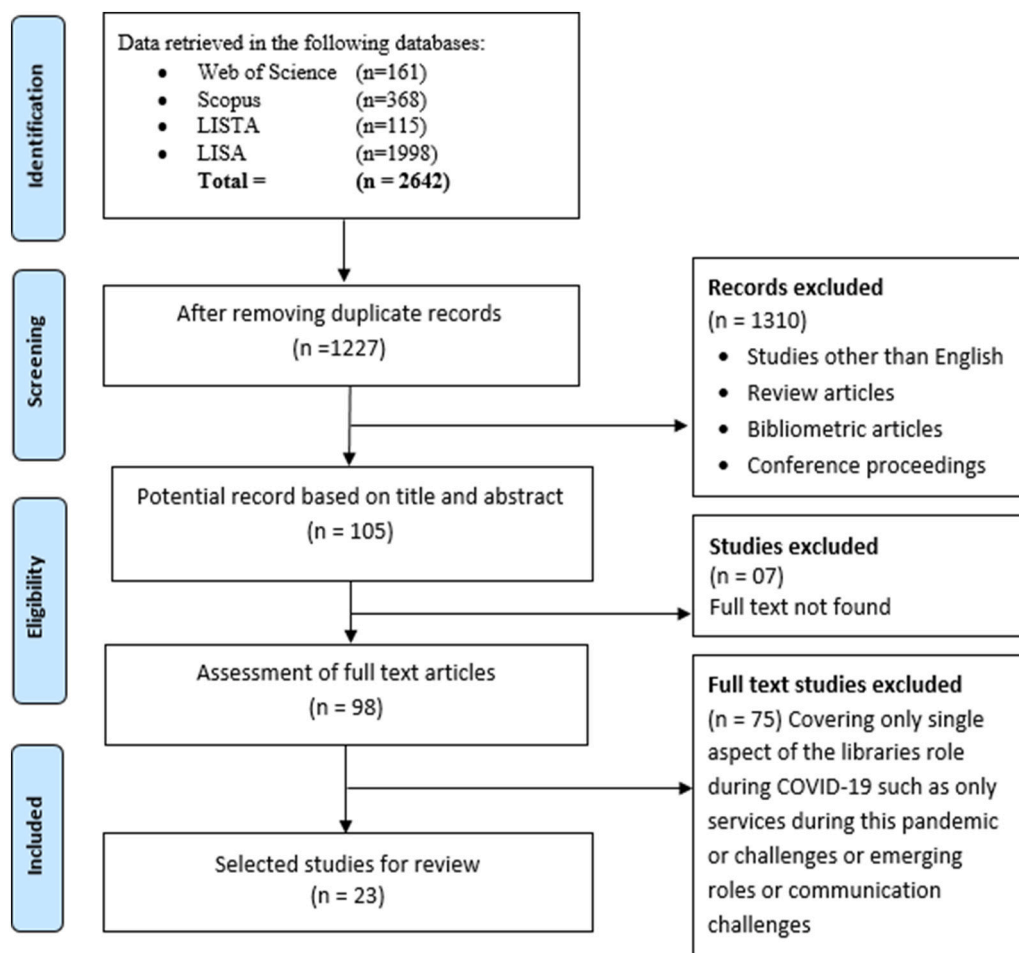

Fig. 2. Four-phase flow diagram of PRISMA guidelines.

Table 2
Overview of the selected studies.

Sr. no.	Study	Country	Method	Type of library	Target population	Sample size
1	Ameen, 2021	Pakistan	Descriptive/Viewpoint	Academic library	–	–
2	Ashiq et al., 2021a	Pakistan	Phenomenology/Interviews	Academic library	Library Directors/ Chief Librarians	n = 14
3	Bashorun et al., 2021	Nigeria	Descriptive Study (conceptual paper)	Academic library	–	–
4	Chigwada, 2021	Zimbabwe	Interview	Academic, public and special libraries	Librarians	n = 50
5	Cox & Brewster, 2020	UK	Online survey questionnaire	Academic library	Librarians	n = 53
6	Fasae et al., 2021	Nigeria	Survey	Academic library	Librarians	n = 108
7	Gotschall et al., 2021	USA	Case study (University of Central Florida, Harriet F. Ginsburg Health Sciences Library)	Academic library	–	–
8	Guo et al., 2020	China and USA	Survey	Academic library	Academic libraries	n = 137
9	Harris, 2021	Jamaica	Survey (interview)	Academic library	Librarian	n = 4
10	Ifijeh & Yusuf, 2020	Nigeria	Descriptive/Viewpoint	Academic library	–	–
11	Koos et al., 2021	USA	Case study/Stony Brook University Health Sciences Library	Health sciences library	–	–
12	Kosciejew, 2021a, 2021b	Malta	Documentary content/thematic analysis	Academic library associations	–	n = 6 (library associations)
13	Koulouris et al., 2021	Graace	Survey	All types of libraries	Libraries	n = 189
14	Mbambo-Thata, 2021	Lesotho	Case study (National University of Lesotho library)	University library	–	–
15	Mehta & Wang, 2020	USA	Case study (personal experience & observation)	Academic library	University library	–
16	Naeem & Bhatti, 2020	Pakistan	Descriptive/opinion based paper	Academic library	–	–
17	Obenauf, 2021	USA	Descriptive (Conceptual paper)	Academic library	–	–
18	Ocholla, 2021	South Africa	Content analysis (n = 60 documents) and online survey (n = 12 academicians)	Academic library	LISE academics/ faculty staff	n = 11
19	Rafiq et al., 2021a	Pakistan	Interview	Academic library	Library Heads/ Directors	n = 7
20	Tammaro, 2020	Italy	Survey	All types of libraries	Librarians	n = 70
21	Temiz & Salelkar, 2020	Sweden	content analysis (university websites and documents)	University library	Academic libraries	n = 39
22	Winata et al., 2021	Indonesia	Online survey questionnaire	Academic library	Librarians	n = 126
23	Zhou, 2021	China	Survey	Academic library	Librarians, Students and Teachers	n = 102

the libraries to close their doors and bring transformation to reach the library users. Most libraries have stopped physical services and are focusing on online services (Rafiq, Batool, et al., 2021). Another category was 'Instant transformation of library services' that includes changing regulations and access policies (Bashorun et al., 2021; Temiz & Salelkar, 2020), suspension of fines (Cox & Brewster, 2020), implementation of interlibrary loan (Tammaro, 2020; Zhou, 2021), reorganizing library websites (Cox & Brewster, 2020; Koos et al., 2021), linking remotely available resources (Cox & Brewster, 2020; Guo et al., 2020), and establishing library apps and library guides to facilitate remote access (Koos et al., 2021). The 'trending remote working' emerged as another important transformation in libraries that includes a rise in online library instructions (Guo et al., 2020; Mbambo-Thata, 2021), increasing outreach services (Mbambo-Thata, 2021), showing 24/7 h of availability and serving (Guo et al., 2020; Rafiq, Batool, et al., 2021), virtual reference services (Bashorun et al., 2021; Guo et al., 2020), making video tutorials (Temiz & Salelkar, 2020), and digitizing and launching online educational resources (Zhou, 2021). Overall, it is very crucial for libraries to plan and continuously evaluate the remote library services to improve the library users' experience and accessibility (Mbambo-Thata, 2021).

Challenges emerged during covid-19 pandemic

The challenges being faced by libraries during Covid-19 were reported in 17 studies (Table 3). These challenges fall under four major categories, such as human and infrastructural challenges, workplace anxiety and stress, Infodemic and changed information seeking behavior, and leadership and planning, respectively.

The biggest challenge is 'human and infrastructural issues' such as lack of teleworking culture and skilled issues (Ameen, 2021; Ashiq, Rehman, & Mujtaba, 2021; Chigwada, 2021; Harris, 2021; Mehta & Wang, 2020), poor technological infrastructure (Ameen, 2021; Ifijeh & Yusuf, 2020; Ocholla, 2021; Rafiq, Batool, et al., 2021), accessibility, digital divide and internet connectivity issues (Gotschall et al., 2021; Ocholla, 2021; Tammaro, 2020; Winata et al., 2021;) and digitization and copyright issues (Ameen, 2021; Tammaro, 2020; Zhou, 2021). The situation is further worsened by a shortage of funding and resources (Ashiq, Rehman, & Mujtaba, 2021; Chigwada, 2021; Ifijeh & Yusuf, 2020; Winata et al., 2021; Zhou, 2021). The Covid-19 pandemic brought anxiety and stress among the masses, and it also affected the libraries and their users. Workplace anxiety and stress have emerged a notable challenge for libraries, and it has brought uncertainty, stress, and negative emotional feelings among the library community (Kosciejew, 2021a, 2021b; Obenauf, 2021; Mehta & Wang, 2020; Fasae et al., 2021) and also job insecurity (Tammaro, 2020). According to Ocholla (2021), it was difficult for libraries in developing countries to observe social distancing due to cultural enactment. Another crucial challenge for libraries is the 'Infodemic and changing information seeking behavior' of library users. The sudden outburst of the pandemic created lots of ambiguity and panic, and there was an abundance of disinformation, fake news, social media outlets, and trolling and tension (Ameen, 2021;

Table 3
Characteristics of extracted data of selected studies.

Sr. no	Studies	Library services during Covid-19 pandemic	Challenges during Covid-19	Evolving, emerging roles and opportunities	Preferable communication tools
1	Ashiq et al., 2021a		Lack of visionary leadership, users varying information behavior, human resource challenges, monetary challenges, rapid technological development	Human capacity building, societal awareness, leadership and policy making, offering compatible smart services	
2	Naeem & Bhatti, 2020		Infodemic, unreliable social media outlets, anxiety, Rapidly changing information world	Knowledge, skills and experience, training and education, information literacy instructions, Creating myth busters, fact-checkers and credible sources,	
3	Cox & Brewster, 2020	Online learning materials, reorganizing library website, suspension of fines, recommending leisure reading and content streaming sources, linking remotely-available well-being related books,		Well-being as a library service, Inherent library value, Library services impact, library as a detective and safe place, teaching and learning support plus signposting, library as a good partner, library staff well-being	
4	Winata et al., 2021	Closer of libraries, behavior change, application of health protocols	Instability of internet networks, service limitation in working hours, managing budget during the new normal	Library administrators and staff to rethink, better decision-making, redesigning library furniture based on health protocols, keeping hygiene and disinfectants, enriching e-resources, engaging users through social media and "ask librarians" form, transforming services into online	
5	Koos et al., 2021	Staff remote working, awareness and campaigns, re-establishment of library services, establishment of library apps for continuous library services (3D4Medical), LibGuide, new protocols and disinfecting the library		Rethink about access services, increased virtual instruction/workshops, improved disaster management planning, online library instructions	.
6	Mbambo-Thata, 2021	Encouragement and consultation with staff, increase outreach services, online library instructions, planning and evaluation to improve online access		Willingness and adaptability, promote digital library services, breaking the digital divide, online service support, sustaining human contact in a digital environment, digital infrastructure	
7	Harris, 2021		Absence of pandemic plans, lack of mindset and training from work at home, lack of resources, equipment and infrastructure for online working,	Staff support and dedication, online services and e-resources, remote library modality, promotion of remote/online access, staff requisite digital skills, emergency/disaster management plan, safety and social distancing, remote/online teaching and learning, technology, digitization and website reconstruction, health and wellness	
8	Kosciejew, 2021a, 2021b		Workplace anxieties and stress, fake news, disruption and difficulty	Pandemic preparedness policies and procedures, information provision, digital migration of services, workplace arrangements/concerns, health concerns and proper/good hygiene, countering dis/misinformation, partnerships with industry including publishers	
9	Guo et al., 2020	Rumor refuting, IL instructions, COVID-19 prevention and response, access to electronic resources off-campus, free electronic resources integration, virtual references on different devices reachable 24/7, online research support services,		Increase use of social media, providing emergency information services, optimizing off-campus digital resource services, improving virtual reference services, strengthening education and training services, library safety management, supporting out-of-library disaster relief work	Website, WeChat, micro-blogs, telephone, email,
10	Zhou, 2021	Use of creativity in the organization of work, implementation of interlibrary loan, non-contact delivery and quarantine of paper-based materials, release of covid-related information, launching of online educational courses	Lack of qualified library staff, Scarcity of e-resources, internet issues, insufficient amount of print materials digitalized, copyright hinders the digitalization of textbooks	Increased access to digital resources, Promotion of online content (e-books, exhibitions, tutorials, events, concerts), enhanced communication with patrons, development of new digital paradigms for libraries, distance learning	
11					

Table 3 (*continued*)

Sr. no	Studies	Library services during Covid-19 pandemic	Challenges during Covid-19	Evolving, emerging roles and opportunities	Preferable communication tools
	Bashorun et al., 2021	Homeworking model, tele-libraries, online help desks, improve digital contents services, library automation system, mask production and sanitation of library collections, library staff safety, space management, access policies, social distancing,		Staff capacity building, up-gradation of library websites, foster digital culture, digital mindful leadership, virtual library services,	Telephone, e-mail, instant message, WhatsApp, Facebook, blogs, Twitter, YouTube
12	Rafiq et al., 2021a	Working from home, services through portal, phone, and Whatsapp, 24/7 h availability	Chaos and confusion while decision making, policy change, library accessibility, changing information seeking behavior of library users, poor digital collection and repositories, users lacking digital literacy skills,	Remote working, honing an online presence (building infrastructure), safety precautions, discouraging disinformation or fake news,	Phone, Whatsapp, Email, Google Meet, Zoom,
13	Obenauf, 2021		Uncertainty, Staff management issues,	Online library instructions, creating new protocols and procedures, adaptability and capacity building,	Email, streaming video software (Zoom, Skype, etc.), and other digital tools, Extensive use of Google products (Calendar, Drive, Docs, Sheets, etc.), phone, email, chat support, video tutorials
14	Temiz & Salelkar, 2020	Discouraging unnecessary visits, reorganizing the library services, video tutorials, introduced new services, collaboration and changes in the regulations		Availability of information, remote accessibility of resources, collaboration with other actors, increased use of existing services, motivation and support to practice social distancing	
15	Mehta & Wang, 2020		library staff anxiety, Working from home issues/lack of required infrastructure at home, Lack of training and preparedness, Negative emotional feelings (such as isolation, anxiety, uncertainty and stress),	Telecommuting, Honing online presence, Virtual reference services e.g. LibChat, Information literacy online guide, promotion of e-resources, Open educational resources, Digital repository, Increase the awareness of public health and hygiene, Leverage technologies to promote digital library services, Innovative policies and practices	social media, email and online public announcement platforms
16	Ocholla, 2021		Secure connectivity challenges, Social distancing culturally challenging, Limited mentorship/consultations, Poor technology and infrastructure, Infodemic/misinformation rise, IT knowledge and skills gaps	Growing self-learning, Increased creativity, Changes/transformation/innovation, New skills development opportunities, Digitization of libraries resources	
17	Chigwada, 2021		Policies and procedural issues, Financial and infrastructural challenges, Lack of teleworking culture,	Teleworking, New protocols and procedures, Maintain social distancing, Discourage fake news, Increase accessibility of library resources, Increase e-learning platforms	Whatsapp, Live chat, Facebook, and Skype
18	Gotschall et al., 2021		Connectivity issues, Planning and policy issues, Technology frustrations and failures, Communication and engagement challenges,	Up-gradation of library website, New and innovative ways of working, User online services (video conferencing), Seamless access to library resources, Wellness weekly email interaction (containing learning a new language with Mango, educational baby animal videos, virtual National Park tours, meditation apps, coloring apps, music therapy, a video tour of artwork hanging in the library space, and a video of crowd-sourced pet photos), Library virtual tours/orientation, Learning new communication platforms	Email, Microsoft Office, Zoom, Slack and Citrix Client
19	Fasae et al., 2021	Taking safety measures, awareness campaign through posters and short speeches, regular communication to staff, weekly disinfecting the library,	Fear of the pandemic, closure of the libraries, restriction on book borrowing,	Social media applications, increase access to library resources, societal awareness campaigns, ensuring online educational materials, emergency communication plans	
20	Ifijeh & Yusuf, 2020		Apathy towards libraries and librarians, inadequate funding, poor technological infrastructure, lack of skilled personnel	Responsive library website, adoption of the blended librarianship model, use of social networks, seamlessly migrate to the virtual learning space	Facebook, YouTube, Blogging, Whatsapp, Telegram, Twitter, Skype, Zoom

Table 3 (*continued*)

Sr. no	Studies	Library services during Covid-19 pandemic	Challenges during Covid-19	Evolving, emerging roles and opportunities	Preferable communication tools
21	Tammaro, 2020	Guarantee traditional services, interlibrary loan service, smart working at home	Digital divide, job insecurity, chronic scarcity of funds, outsourcing, lack of professionally trained staff, lack of legislation and policies, copyright issues for digitization	Ensuring health and safety, recognition in online services, libraries as home of community, increase communication and engagement, creativity in services, digital library strategy	
22	Koulouris et al., 2021	General announcements/library operations, onsite working, teleworking, rotation of onsite working	Lack of social media strategy, staffing issues, managing multiple platforms, managing trolling or tensions	Promotion of existing e- information resources, teleconference, new agreements for electronic resources, online instruction, new services development through social media	Facebook, Twitter, Instagram, Linkedlen, YouTube,
23	Ameen, 2021		Digital divide, poor ICT infrastructure, lack of funds, lack of information and digital skills, non-availability of proper workspaces at homes, human and infrastructural resources, infodemic, users' poor digital skills, access management, copyright issues	ICT infrastructure, digital fluency, review and redesigned library services (email or social media channels, links to online resources, virtual reference desk facility on the website), transforming services into digital mode, digital equality, digital literacy and news literacy	

Naeem & Bhatti, 2020; Ocholla, 2021). Additionally, the information seeking behavior of library users are rapidly changing (Ashiq, Rehman, & Mujtaba, 2021; Naeem & Bhatti, 2020) and the closing of libraries and the shifting of library services from physical to online mode also create issues for users as well as library staff, especially those lacking digital literacy skills (Ameen, 2021; Gotschall et al., 2021; Rafiq, Batool, et al., 2021). The lack of proactive and visionary 'leadership and planning' emerged as another challenge for libraries, such as lack of legislation and policies (Chigwada, 2021; Gotschall et al., 2021; Tammaro, 2020), lack of social media policy (Koulouris et al., 2021), confusion while decision making and policy change (Rafiq, Batool, et al., 2021) and absence of pandemic and disaster management plans (Harris, 2021).

Libraries emerging roles

The emerging roles of libraries during this pandemic are prevailing in the extracted data and reported in all studies (Table 3). These roles fall under four major categories such as 'infrastructure, accessibility, and outreach', 'awareness and wellbeing', 'leadership and policy-making' and 'human capacity building' respectively.

This pandemic provided an opportunity for libraries to invest in and improve the library's value. Hence, the top emerging role for libraries is to establish 'infrastructure and increase accessibility and outreach' to expand library services beyond the four walls of the libraries and reach to maximum number of library users. The crucial elements in this aspect are to foster digital culture and transform library services into online mode (Bashorun et al., 2021; Chigwada, 2021; Fasae et al., 2021; Harris, 2021; Kosciejew, 2021a, 2021b; Koulouris et al., 2021; Mehta & Wang, 2020; Rafiq, Batool, et al., 2021; Temiz & Salelkar, 2020; Winata et al., 2021; Zhou, 2021), establish and expand digital library infrastructure (Mbambo-Thata, 2021), digitization, establishing digital libraries, and e-resources (Mbambo-Thata, 2021; Mehta & Wang, 2020; Ocholla, 2021), online services and e-resources (Guo et al., 2020), promotion, website reconstruction and social media presence (Harris, 2021; Ifijeh & Yusuf, 2020; Koulouris et al., 2021; Mbambo-Thata, 2021; Mehta & Wang, 2020; Winata et al., 2021; Zhou, 2021), and virtual tours and online library instructions (Bashorun et al., 2021; Koos et al., 2021; Naeem & Bhatti, 2020; Obenauf, 2021). The second prevailing category is 'awareness and wellbeing' through societal awareness (Ashiq et al., 2021a; Gotschall et al., 2021; Fasae et al., 2021) providing fact-checkers and credible sources (Naeem & Bhatti, 2020; Rafiq, Ashiq, et al., 2021), redesigning library furniture based on health protocols, hygiene and disinfection (Kosciejew, 2021a, 2021b; Tammaro, 2020; Winata et al., 2021) and maintaining social distancing (Chigwada, 2021; Temiz & Salelkar, 2020). Another important category reported in the study was

creative and visionary 'leadership and policy making' in this pandemic to minimize uncertainty through timely and better decision making (Winata et al., 2021), improve disaster management planning (Guo et al., 2020; Harris, 2021; Koos et al., 2021), digital library strategies (Koulouris et al., 2021; Tammaro, 2020), collaboration and public-private partnership (Kosciejew, 2021a, 2021b; Temiz & Salelkar, 2020), and most importantly, digital mindful leadership (Ameen, 2021; Bashorun et al., 2021; Gotschall et al., 2021; Ocholla, 2021). The last major category focused on human capacity building and up-skilling library professionals through knowledge, experience, training, and education. Besides, the new learning includes learning new communication platforms (Gotschall et al., 2021), willingness and adaptability (Mbambo-Thata, 2021; Obenauf, 2021), and digital literacy/skills (Harris, 2021).

Preferable communications platforms

The preferable communications tools being used by libraries are reported in ten studies (Table 3). These platforms are used by libraries to engage with library stakeholders through social media sites, streaming video apps, library websites, emails, telephones, video tutorials, and micro blogging. Some libraries prepare their own applications, while some use licenced-based or freeware applications to reach remote library users as well as connect with library staff. Besides, some studies suggest transforming library websites and making them active and responsive to users in real time (Chigwada, 2021; Guo et al., 2020; Temiz & Salelkar, 2020). Overall, it is now inexorable for libraries to ensure their presence on social media platforms and provide every opportunity to reach library users through various platforms, including telephone, email, and instant messages.

Discussion

The library services during Covid-19 pandemic were reported in 12 studies, and these services mainly fall under three categories, such as creating awareness during the close of libraries, instant transformation of library services, and trending remote working, respectively. Normal life was affected by the Covid-19 pandemic during the initial period, and libraries are certainly suffering (Rafiq, Batool, et al., 2021). Fasae et al. (2021) and Zhou (2021) say that most libraries shut down their physical services because of panic and uncertainty. Besides, libraries created awareness among the public about Covid-19 prevention and response (Fasae et al., 2021; Winata et al., 2021; Zhou, 2021), refuting rumors (Guo et al., 2020), continuously disinfecting the library (Fasae et al., 2021; Koos et al., 2021), non-contact delivery and quarantine of paper-

based materials (Zhou, 2021), mask production and social distancing (Bashorun et al., 2021), and discoursing unnecessary library visits (Temiz & Salelkar, 2020).

The library's challenges mainly fall under four major categories, such as human and infrastructural challenges, workplace anxiety and stress, infodemic and changed information seeking behavior, and leadership and planning, respectively. Apparently, the libraries were not prepared for this pandemic and sudden change due to non-availability of infrastructure, skills, and planning (Ameen, 2021; Naeem & Bhatti, 2020; Ocholla, 2021; Rafiq, Batool, et al., 2021). The infodemic further complicated the situation, especially for those with workplace anxiety and stress. Ameen (2021) pointed out that the digital chasm, inadequate ICT infrastructure, insufficient finances, lack of knowledge and digital abilities, and lack of suitable workstations on one's own remained major issues. Nevertheless, gradually, with the passage of time, the library directors were transformed and changed the libraries' regulations and access policies. They concentrate on e-services and reorganizing their library websites. Ultimately, the situation has brought attention to the necessity and ubiquity of electronic resources and services. These e-services and resources are extremely important for libraries to prepare for and regularly review in order to improve the overall experience and accessibility of library users. Rafiq, Ashiq, et al. (2021) evaluated the quality of the QS world's top 50 libraries' websites and revealed that none of the university libraries got the 100% score. However, most university libraries (n = 30) got scores of at least 80%, which means they have good library services and resources.

The emerging roles of libraries mainly fall under four major categories, such as 'infrastructure, accessibility, and outreach', 'awareness and wellbeing', 'leadership and policy-making' and 'human capacity building' respectively. The central elements in this aspect are to foster digital culture, transform library services, focus on website reconstruction and show presence on social media platforms (Harris, 2021; Ifijeh & Yusuf, 2020; Koulouris et al., 2021; Mbambo-Thata, 2021; Mehta & Wang, 2020; Winata et al., 2021; Zhou, 2021). The success of this transformation demands creative and visionary leadership with explicit policy making in this pandemic and new normal libraries (Guo et al., 2020; Harris, 2021; Koos et al., 2021; Winata et al., 2021). The most important element is digital mindful leadership, which focuses on human capacity building and up-skilling library professionals through knowledge, experience, training, and education (Ameen, 2021; Ashiq, Rehman, & Mujtaba, 2021). Besides, information societies are increasingly demanding information in online and digital formats (Jbeen et al., 2021). Libraries must develop infrastructure and systems to show their online presence, increase access to services, fulfil the demands of remote library users, and most importantly, equip professional librarians with the desired set of skills (Ashiq et al., 2021a). However, in order to get the most out of online content and services, the user must have a high-speed connection to the web.

Implications of the study

Implication for practice

This systematic review provides insight into the state of libraries around the world during the Covid-19 pandemic. As a result, it has been confirmed that libraries, particularly academic libraries, undergo rapid transformations during the pandemic period. Indisputably, libraries must establish infrastructure and improve accessibility in order to provide the best possible support to modern library users who access resources remotely in this rapidly evolving digital environment. Unless we have knowledgeable and skilled library professionals, who are well versed in information technology (IT), information and communications technologies (ICTs) and digital literacy, none of this would be possible. As a result of the digital transformation, digitally mindful leadership is essential. This leadership must not only be aware of this change but also teach IT, ICT, digital literacy, and technical skills to library staff so that

they can better serve library users.

Implication for policy

This systematic review offers insights to organizational policymakers and library directors in the preparation of emergency and disaster management plans for their respective libraries. An organization's ability to respond to and recover from a disaster is determined by the effectiveness of its contingency planning. In addition, the libraries should ensure their presence on social media platforms and make use of their library websites.

Limitations of the study

This study's limitations include the number of selected databases, language filtration, search strategy, and quality assessment of the selected 23 studies. Data was extracted from four databases (Scopus, Web of Science, LISA, and LISTA). Although a rigorous search strategy was developed, some studies might be missed due to non-matching keywords. Further, we did not search for grey literature (theses, reports, proceedings, white papers, etc.) as the purpose of the study was to get results from the research articles. The results were confined to 23 studies on library transformation during the covid-19 pandemic. The study was also limited to English-language publications. While the researchers used a well-known quality assessment tool to assess the quality of each study, there is still a chance that they could missed some important information.

Conclusion

This study systematically reviewed the library's services during the COVID 19 pandemic, as well as the challenges they faced, emerging library roles, and the most effective communication tools. The methodologies of the selected studies (n = 23) reflected a holistic perspective, since they included qualitative, quantitative, and descriptive investigations. Additionally, a substantial number of descriptive and opinion-based studies conducted by senior library experts demonstrate that Covid-19 certainly affecting and transforming libraries, their services, and management. The library services during Covid-19 pandemic mainly fell under three categories, such as creating awareness during the physical closing of libraries, instant transformation of library services, and trending remote working. The challenges were human and infrastructural, workplace anxiety and stress, infodemic and changed information seeking behavior, and leadership and planning. The emerging roles of libraries were to develop infrastructure, accessibility and outreach, awareness and wellbeing, leadership and policy-making, and human capacity building. Whereas library websites, social media platforms, streaming video apps, emails, telephones, video tutorials, and micro-blogging were preferred communication tools.

Evidently, the findings of this systematic review demonstrate that the covid-19 pandemic has accelerated the rapid evolution of the digital environment in libraries. The growth of digital services, the evolution of new roles and opportunities, the rapid pace of the online environment, and the rapid change of the information landscape are all taking place. The most important thing is to stay relevant in this rapidly changing information world by taking on new roles, launching new services, training library employees, and recognizing the needs of a diverse library community.

CRediT authorship contribution statement

Murtaza Ashiq: Conceptualization, Writing-original draft, Searching and data extraction, Investigation, Visualization.

Farhat Jabeen: Methodology, Searching and data extraction, Discussion.

Khalid Mahmood: Supervision, Reviewing and Editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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