EXPERIENCE EXCHANGE

COVID-19, maternal and child health, and nutrition repository: A portal to provide updated information to health professionals amid a pandemic and continuously evolving environment

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ABSTRACT

In the early months of the COVID-19 pandemic, there was a lack of consistent guidance despite pressing questions from health professionals regarding how to limit the spread of SARS-CoV-2 while also providing optimal maternal and child health care. In response, the "COVID-19, Maternal and Child Health, and Nutrition" literature repository was assembled, mobilizing a team of graduate students to provide concise summaries of emerging peer-reviewed publications. What began as a small trickle of evidence from China quickly grew into an overwhelming amount of information – roughly 120-150 publications per week pertaining to maternal and child health in the context of COVID-19. The authors present their experiences constructing, staffing, maintaining, and disseminating this literature repository while also providing opportunities for growth and learning for the graduate student volunteers who made it possible. Many of these students also served on the frontlines of the pandemic as healthcare providers, often sharing how helpful it was for their work with patients to stay up to date with emerging research. This case study is intended to serve as a blueprint for current and future repositories, particularly those that aim to incorporate service learning into graduate education.

Key Words: Maternal health, Child Health, COVID-19, SARS-CoV-2, Repository, Pregnancy, Breastfeeding, Service learning

1. BACKGROUND

As the COVID-19 outbreak began to spread worldwide in March 2020, health professionals began questioning whether breastfeeding and the provision of breastmilk were still safe for the infants of mothers with suspected or confirmed SARS-CoV-2 infection – even when asymptomatic. In response, the corresponding author used the Emergency Nutrition Network platform[1] to generate and consolidate questions from health practitioners. Within days, 45 questions were submitted from across Europe, the Americas, Africa, and Asia. Many of these questions also came from health facility staff or non-governmental organization (NGO) staff that worked with displaced populations; while some sought clarifications on scientific aspects of transmission and inactivation of SARS-CoV-2, others sought guidance on potential programmatic adjustments. Based on the questions that emerged, it was clear that practitioners and policymakers needed more information than was available at the time to make decisions

regarding breastfeeding in the context of COVID-19. In an effort to consolidate emerging evidence that may answer these questions, the corresponding author initiated a repository in March 2020. The first issue of the repository included 25 publications from peer-reviewed journals, including research papers, reviews, case series, and guidelines regarding SARS-CoV-2 and breast milk; 23 articles were from China, of which 9 articles were written in Mandarin. A small team of volunteer students from Johns Hopkins University was organized to translate papers into English and consolidate the main findings into brief summaries. While the initial focus was on breastfeeding and SARS-CoV-2, the breadth of questions the team received demonstrated that the repository's scope needed to include other emerging topics, such as SARS-CoV-2 transmission during pregnancy, delivery, and newborn care. At first, the repository was disseminated via email exclusively to groups of health care professionals that were connected to the corresponding author. However, with increasing demand, the full repository on COVID-19 and Maternal, Child Health, and Nutrition (MCHN) was officially launched on May 14, 2020 on the Johns Hopkins Center for Humanitarian Health website.[2]

At the time there were a few existing websites that provided summaries and abstracts of peer-reviewed journals on relevant topics.[3, 4] However, one focused solely on children and excluded commentaries and reviews.[3] Another repository had a broader scope but did not offer evidence on specific populations and therefore could not meet the needs of those working in maternal and child health.[4]

The goals of the MCHN repository were to: 1) provide a 'one-stop shop' with relevant information on maternal and newborn health, pediatrics, pregnancy, and COVID-19 from peer-reviewed journals and nonpeer-reviewed sources such as MedRxiv and BioRxiv; 2) provide summaries and key observations of written materials in plain language for an international and interdisciplinary audience, with hyperlinks to each publication to allow for further detailed reading and methodology verification; and 3) help health professionals and policymakers remain up to date during a period when the rate of publication was growing exponentially.

In October 2020, a subset of the original repository was launched, exclusively containing articles related to breastfeeding, infant feeding and breast milk (BIFBM) in the context of COVID-19. This was done to better support health professionals and policy makers working in this particular field during the pandemic. In total, the full MCHN repository presents publications from February 1, 2020 to April 30, 2021, covering over 6,200 publications across the initial 15 months of the COVID-19 crisis. The repository has been used by researchers to quickly identify relevant articles related to MCHN in the context of COVID-19 for literature reviews[5–10] and was also endorsed on the websites of numerous professional organizations as a comprehensive aggregate of summaries on these topics.[11–13]

2. METHODS

2.1 Staffing the repository

Under the coordination of the corresponding author, most work was done on a volunteer basis by master's and doctoral students at the Johns Hopkins University Schools of Medicine and Public Health. A small team conducted daily searches and duplicate checks, while others focused on summarizing articles, peer-reviewing, or both. Many of these students were also working on the frontlines of the pandemic as healthcare providers in maternal and child health, providing valuable insights. Financial support from the National Institutes of Health, USA eventually allowed compensation for a few dedicated students to ensure consistency and continuity.

Graduate students were recruited by email inviting them to schedule 1-2 timed writing tests with their application. For these writing tests, candidates were asked to read and briefly summarize a study of their choice within one hour. Two reviewers independently scored submissions based on a rubric assessing clarity, accuracy, and consistency with the repository's style; combined scores from the two reviewers determined the top candidates.

Volunteers were asked for a minimum commitment of five hours per week for two academic terms. Based on the capacity of fully trained writers to summarize 2-3 articles per hour, this was estimated to cover 10 articles per week per person, including time spent reviewing feedback and revising summaries as needed. This meant that at least 15 writers were needed at any given time to match the volume of new publications, which averaged between 120-150 per week. Ultimately, commitments varied according to each student's needs and interests. Many students were able to satisfy their program's practicum requirements by volunteering with the repository. Others offered additional help based on their unique skills, such as formatting the repository, conducting surveys, and tracking user trends in Google Analytics.

It was important to ensure students remained engaged with the team and gained valuable experience. Because they were able to self-select articles to review, writers could focus on topics of their interest that aligned with their day-to-day work and studies. New writers were paired with senior writers for training, mentoring, and peer review and monthly team meetings were organized for team cohesion, support, and quality

assurance. Positive feedback shared by repository users was regularly passed along to students to demonstrate the value and impact of their work.

2.2 Search strategy

Four electronic databases (PubMed, EMBASE, Global Health (OVID), and SCOPUS) were searched daily (see Figure 1). The search terms comprised of keywords for COVID-19 and one or more of the following dimensions: reproductive health, maternal health, newborn health, child health, food security, maternal nutrition, child nutrition, breastfeeding, and lactation. Keywords were identified based on relevant literature and subject headings for each database. Additionally, a manual search of articles and a snowball search strategy were used to capture articles missed during the systematic search process.
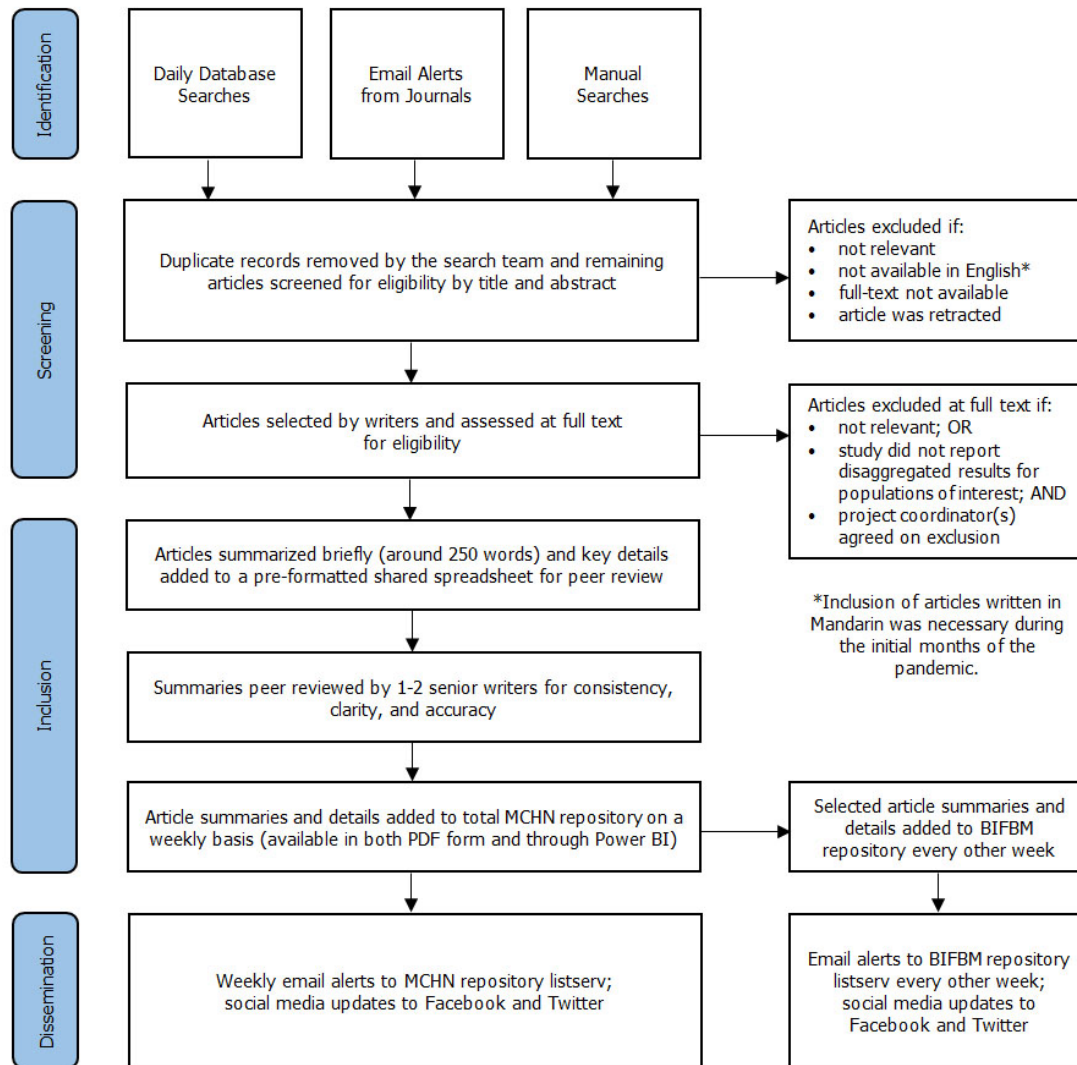

Figure 1. Flow diagram: Operational management of the MCHN and BIFBM repositories

Titles were then screened to remove duplicates and abstracts were screened according to inclusion/exclusion criteria. Articles were excluded if they were either: 1) not relevant to maternal and/or child health in the context of COVID-19; 2) the full text was not available in English (although inclusion of Mandarin was necessary in initial months); 3) the full text could not be accessed by the team; or 4) the paper had been retracted according to Retraction Watch.[14] Articles that did not focus on child or maternal health were included only if they contained disaggregated data related to mothers and/or children that could be extracted and summarized.

2.3 Data extraction

Screened titles were populated daily into a shared Excel spreadsheet. From here, writers self-selected articles of interest and extracted the following details: title, hyperlink, date

of publication, country (when applicable), publication type, and citation. Writers then synthesized information from each article into a brief summary (around 250 words) consistent with the Population, Intervention, Comparator, and Outcome (PICO) framework,[15] along with a quick preview of findings labeled "specific observations." These details were then populated into a pre-formatted template for each weekly update and peer-reviewed for quality assurance.

2.4 Quality assurance

Writers followed a standardized style guide to ensure summaries were consistent in structure, terminology, and details reported. Whenever applicable, summaries included dates of study or review, location, sample size, descriptive statistics for age, statistical significance of findings, and the authors' recommendations for clinical practice, research, or policy.

Any details in the summaries that were either missing or unclearly reported were flagged by peer-reviewers and resolved prior to each weekly update. The peer-review process ensured that each summary had at least two – sometimes three – layers of review, depending on the writers' experience, writing quality, or the complexity of the article being reviewed. Any discrepancies, errors, or missing information from the article itself were flagged by writers ahead of the peer-review process (e.g., discrepancies in statistics between the abstract and main text, unclear reporting of statistical significance, missing information on age ranges, or unclear methods of COVID-19 diagnosis or SARS-CoV-2 testing). If the issue could not be clarified, a note was directly inserted into the summary with full transparency to maintain fidelity to the original publication and avoid misinterpretation of results. A series of disclaimers on the repository site acknowledged the varying quality of rapidly released publications; therefore, direct hyperlinks were provided for each article so that readers could make quality judgments on their own.

2.5 Updates and dissemination

After a final quality check, article details and peer-reviewed summaries were added to the repository. Initially, this was done twice weekly due to the high demand for current evidence; however, results of an August 2020 survey[16] among repository users indicated most preferred updates once a week. With each update, corresponding authors of newly added publications received an automated email introducing the repository and announcing the inclusion of their publication; they were then added to a listserv to receive regular updates. Other users reached out directly to be added to the list for future updates, having been referred by colleagues.

To advertise each update, an email was sent out to the corresponding listserv announcing how many publications were added along with a brief overview of topics covered. From mid-October, 2020 onwards these updates were also announced on the Johns Hopkins Center for Humanitarian Health's Facebook and Twitter pages for further outreach.

3. UTILITY OF THE REPOSITORY

3.1 User interface

The repository was originally formatted as Portable Document Format (PDF) files, to ensure readability regardless of the device used or technological experience of the reader. As an alternative to the PDF files, the team added an interactive dashboard using Microsoft Power BI on February 9, 2021 to allow users to search by keyword or filter results by country, publication type, or date of publication. This addition was also designed to meet the needs of researchers conducting reviews to act as a supplemental resource in the literature search process.

3.2 User data

Google Analytics[17] was used to aggregate data on total users, users' current country, user trends over time, and their activity on the website. This information allowed the team to track trends for each repository (MCHN and BIFBM). Google Analytics identified users from over 150 countries visiting one or both of the repository websites. The top 10 countries with the most users were: the United States of America (approx. 50%), Australia, Brazil, Canada, India, Indonesia, Japan, Philippines, Switzerland, and the United Kingdom. In total, over 45,000 page views were recorded for both the MCHN and BIFBM repositories together from May 14, 2020 to May 1, 2021 (see Figure 2). However, this number is an underestimate since many users forwarded the PDF version of the repository to their networks and their usage would not appear in Google Analytics.

Two online surveys were distributed among repository users in August 2020[16] and March 2021,[18] generating 157 and 195 unique responses, respectively. Survey respondents stated working primarily for universities, health facilities, governments, or various organizations (such as the United Nations, humanitarian NGOs, and professional organizations). Most respondents reported that they mainly used the repository to remain up to date on the latest findings and to disseminate research findings. These user surveys helped improve the repository and better meet the needs of its users.

4. DISCUSSION

The rapid development and maintenance of the MCHN repository presented many challenges for the team, along with opportunities for innovation. In the absence of dedicated full-time staff, the team's capacity was limited to students'

availability which tended to vary across the academic year. Yet demand remained constant, with many publishing authors reaching out directly to ensure their articles were included in coming updates. Ensuring the team's output capacity matched the input of newly published research required regular monitoring to prevent a growing backlog of article summaries. In the event of such a backlog, the team prioritized research that addressed unanswered clinical questions, as well as publications from high-impact journals. At other times, studies with limited generalizability were deprioritized – such as case reports or studies related to rare forms of cancer – to ensure the most relevant evidence was avail-

able as quickly as possible; many of these articles were then summarized at a later date when the team had greater capacity. Recognizing the need for widely accessible information, many journals waived article processing fees and provided open access to publications related to SARS-CoV-2 or COVID-19. However, many articles were not available for free; this was noted directly under the publication's title in the repository. Since many users were not affiliated with academic institutions, they would instead have to rely on the summary provided in the repository. These summaries were often longer and more comprehensive than others.
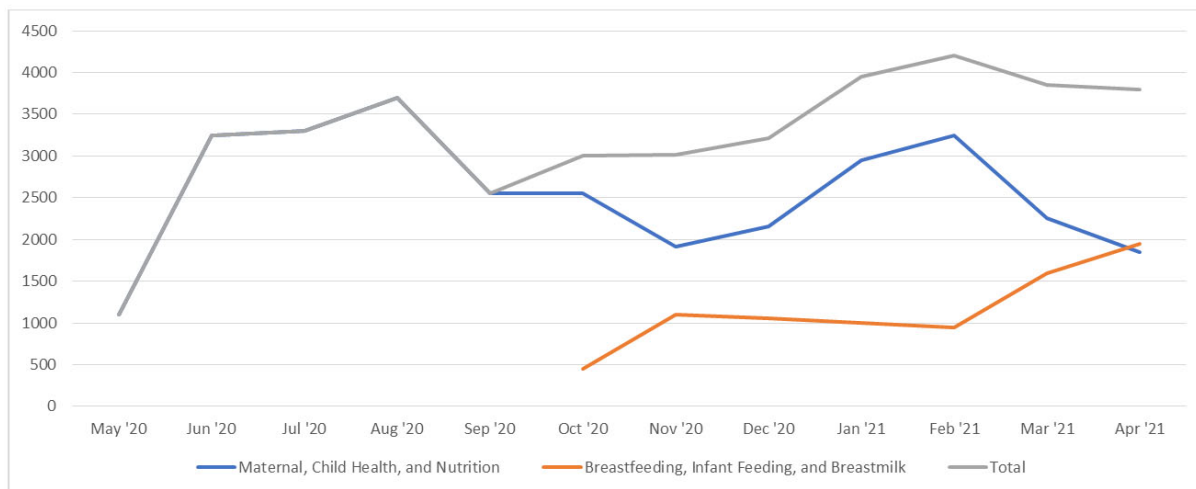

Figure 2. Number of monthly website page views May 14, 2020 – May 1, 2021

A similar repository was created in the early months of the pandemic, but its content was heavily curated, relying on a more selective strategy and dedicated full-time staff to appraise the quality of evidence.[4] Conversely, the MCHN repository did not filter based on the quality of evidence, instead offering transparency regarding unclear conclusions and inconsistencies so that readers could make their own judgments. Updates also included commentaries and letters – often excluded from repositories and reviews – in order to capture the dynamics of current controversies or emerging policy statements. In the absence of the repository, most users indicated they would use a database such as Scopus, PubMed, or Embase;[18] however, these search results are limited to one database at a time, subject to delays between publication and database inclusion, and may be limited to information available in the abstract. The team's comprehensive search strategy, multiple checks on inclusion criteria, and adherence to a standardized guide for extracting details follow many of the best practices in systematic searches;[19] this is what made the repository such a valuable asset when time and resources were scarce. The team's ever-evolving

search strategy is not typical of systematic searches; however, it was necessary in the context of an ongoing crisis. For example, the initial phase of the pandemic required a language-inclusive search strategy, translating evidence from case reports and observational studies published in Mandarin to answer pressing questions about SARS-CoV-2 transmission. As new problems emerged, clinical questions and research priorities changed. The team responded by expanding inclusion criteria to capture the indirect effects of the pandemic: disrupted reproductive healthcare, childhood immunization programs, and growing disparities in children's education, household food insecurity, and mental health. As SARS-CoV-2 spread worldwide and viral mutations emerged, the need for locally relevant and timely evidence required writers to include country and dates of data collection directly in the summary – information that is often buried within an article's main text.

Future efforts should allow for flexibility and adaptation, implementing research frameworks specific to providing new information in rapidly changing environments. Others have

offered lessons learned during the COVID-19 pandemic, noting that disseminating evidence during an ongoing pandemic should consider the importance of changing clinical problems and questions, changing settings and contexts, the "infodemic" of information and misinformation, and the information needs of key stakeholders such as policymakers.[20] Other considerations should include the use of plain language to communicate evidence so that it is accessible to an international and interdisciplinary audience. Although often excluded in literature repositories and reviews, commentaries and letters to the editor should not be overlooked in an ongoing crisis since they add the context of unanswered questions and ongoing debates. Timing is of utmost importance as well; a systematic review published in 2021 but only covering literature published in the early months of the COVID-19 pandemic can only provide an incomplete picture and may focus on clinical questions and circumstances that have since changed. For this reason, repository writers and peer-reviewers ensured every summary included specific dates of data collection or literature search.

Despite the team's success in adapting to rapidly changing information needs, the unpredictable and unrelenting nature of public health emergencies complicated long-term planning and sustainability of the repository. Although the feat of summarizing 15 months of research comprising over 6,200 publications was truly extraordinary, it was unforeseen even by the authors since it was unclear from the start how long this service would be needed. Ultimately, the project was extended twice based on continued demand and user feedback: at first to the end of 2020, and again to May 1, 2021.

5. CONCLUSION

By mobilizing graduate students to review evidence as it emerged, the MCHN repository was able to meet the evolving needs of its user base while also providing valuable learning and leadership opportunities for the next generation of public health professionals. Many volunteers also worked on the frontlines of the pandemic as health care providers – nurses, certified nurse midwives, and physicians – providing valuable perspectives on what information was needed for clinical decision-making and what questions remained unanswered. The authors present this case study as a blueprint for current and future scientific repositories so that others may learn from the team's challenges and successes.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare that they have no conflict of interest.

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