AJPM FOCUS
INCLUSIVITY IN PEOPLE, METHODS, AND OUTCOMES
REVIEW ARTICLE

COVID-19, Disability, and the International Classification of Functioning, Disability and Health: A Scoping Review of Early-Stage Pandemic Response

Mackenzie G. Jones, MPH,[1] Philippa J. Clarke, PhD,[2,3] Hana Shewamoltot Meshesha, PhD,[4,5,6] Kristine A. Mulhorn, PhD,[7] Meg Ann Traci, PhD,[4,8] Els R. Nieuwenhuijsen, PhD[9]

Introduction: This study aimed to systematically identify the environmental factors that impacted people with disability during the COVID-19 pandemic.

Methods: A scoping literature review was conducted using LitCOVID (January 1—July 31, 2020). Sixty-six articles met the inclusion criteria that (1) discussed disability and/or health conditions related to functioning and (2) considered environmental factors. A qualitative content analysis was conducted using codes from the WHO International Classification of Functioning, Disability and Health.

Results: A total of 212 International Classification of Functioning, Disability and Health codes were used in the coding process. The most frequent codes referred to health services policies and public health guidelines. These policies, although generally considered facilitators for minimizing infection, were frequently identified as barriers to the health, participation, and human rights of people with disability. The lack of disability-specific population data was identified as a key barrier to planning and decision making.

Conclusions: The social determinants of health for people with disability were not adequately considered in the acute phase of infection prevention at the population level. Integrating the International Classification of Functioning, Disability and Health in emergency management provides a tool to evaluate functioning and address barriers for those in need.

AJPM Focus 2024;3(1):100152. Published by Elsevier Inc. on behalf of The American Journal of Preventive Medicine Board of Governors. *This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).*

From the [1]Montana Department of Public Health and Human Services, Helena, Montana; [2]Institute for Social Research, University of Michigan, Ann Arbor, Michigan; [3]Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, Michigan; [4]Rural Institute for Inclusive Communities, University of Montana, Missoula, Montana; [5]Department of Counseling, College of Education, University of Montana, Missoula, Montana; [6]Department of Counseling, Idaho State University, Meridian, Idaho; [7]Health Administration Department, Drexel University, Philadelphia, Pennsylvania; [8]School of Public and Community Health Sciences, College of Health, University of Montana, Missoula, Montana; and [9]Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, Michigan

Address correspondence to: Mackenzie Jones, MPH, Department of Public Health and Human Services, Room 314, Cogswell Building, 1400 Broadway, Helena MT 59601. E-mail: Mackenzie.Jones@mt.gov.

2773-0654/$36.00
https://doi.org/10.1016/j.focus.2023.100152

This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

INTRODUCTION

The events of September 11, 2001, and Hurricane Katrina disproportionately impacted people with disability,[a] who were inadequately included in emergency planning and response systems.[1–4] In 2009, Campbell and colleagues foreshadowed that people with disability would be at substantial risk in a viral pandemic because of increased risk for exposure and death, inaccessibility of risk communication, ethical issues surrounding priority treatment and vaccination, and a lack of detailed emergency preparedness plans for people with disability.[5] In recognition that a government-centric approach to disaster management was not sufficient to meet the needs of all communities, the U.S. Federal Emergency Management Agency (FEMA) shifted to a whole-community approach to emergency management.[6,7] The disability community was identified as a key stakeholder to engage in emergency management teams to maximize societal resilience to threats and hazards. Yet, almost a decade later, people with disability were once again at risk in the emergency response systems for the coronavirus disease 2019 (COVID-19) pandemic.[8]

In March 2020, the WHO[9] outlined "Disability considerations during the COVID-19 outbreak." These considerations included making public health information and communication accessible for diverse sensory needs; valuing the needs of people with disability living in institutional or high-risk settings; and ensuring accessible, affordable, and inclusive health care. However, to date, there has been no systematic evaluation of the environmental factors that hindered or facilitated the participation and activities of people with disability during the COVID-19 pandemic.

Our purpose was to systematically identify in the research literature the environmental factors that impacted people with disability as the COVID-19 pandemic emerged. Disability refers to limitations of functioning that existed before pandemic and does not include disability resulting from COVID-19. The WHO's International Classification of Functioning, Disability and Health (ICF) was used to identify the environmental factors[10]—"the physical, social, and attitudinal environment in which people live and conduct their lives."[11] Environmental factors were classified as barriers (hindrance to performance) or facilitators (aid to performance) and identified situations where environmental factors, not typically a barrier, became challenges for people with disability in the context of COVID-19. The environmental focus of this work supports a public health approach to pandemics that includes what people with disability need to survive and recover.

METHODS

A scoping literature review was conducted, followed by qualitative analysis to identify the environmental factors that were mentioned in the health and disability research literature as the COVID-19 pandemic emerged. Our reporting strategy follows the PRISMA guidelines.[12]

Literature identification and eligibility criteria

LitCOVID, a PubMed database of COVID-19 literature, was searched, including early release and online publications,[13] for the period January 1—July 31, 2020. The search term *disability* was used, resulting in 148 articles that were screened systematically using the prespecified inclusion criteria identified by our interdisciplinary team (Figure 1 and Appendix A, available online, describe the search strategy).

Research articles, editorials, and opinion pieces in English from any country were screened. After the screening of these articles, which represented a range of disability subpopulations (Table 1), we noticed that sensory disability was only mentioned in 1 of the included articles. *Deaf* or *hard of hearing* or *hearing impaired* and *blind* or *low vision* or *visually impaired* were added as search terms, resulting in 139 additional articles. A total of 114 articles where the term blind referred to blind experimental trials or a lack of understanding or judgment were removed, and the remaining 25 articles were then systematically screened.

Articles that (1) discussed disability and/or health conditions related to functioning and (2) considered environmental factors in the context of COVID-19 were included. The article review process included an abstract review, followed by a first and second full-text review. Two authors independently reviewed 173 article abstracts before meeting to select 56 and 69 articles for inclusion and exclusion, respectively. For the remaining 48 articles, where there was no clear agreement about whether the articles met the inclusion criteria, a second pair of authors, independently, reviewed these articles in their entirety to determine eligibility. They agreed that 13 should be included, whereas 32 were excluded because they focused only on disability as an outcome of

[a]The WHO defines disability as "the interaction between individuals with a health condition (e.g., cerebral palsy, Down syndrome and depression) and personal and environmental factors (e.g., negative attitudes, inaccessible transportation and public buildings, and limited social supports)."[38] To embrace a universal approach to addressing the needs of people with disability, the WHO endorses the use of the word disability alongside the word people instead of using the word disabilities.[39] Accordingly, the term people with disability was used throughout this article.

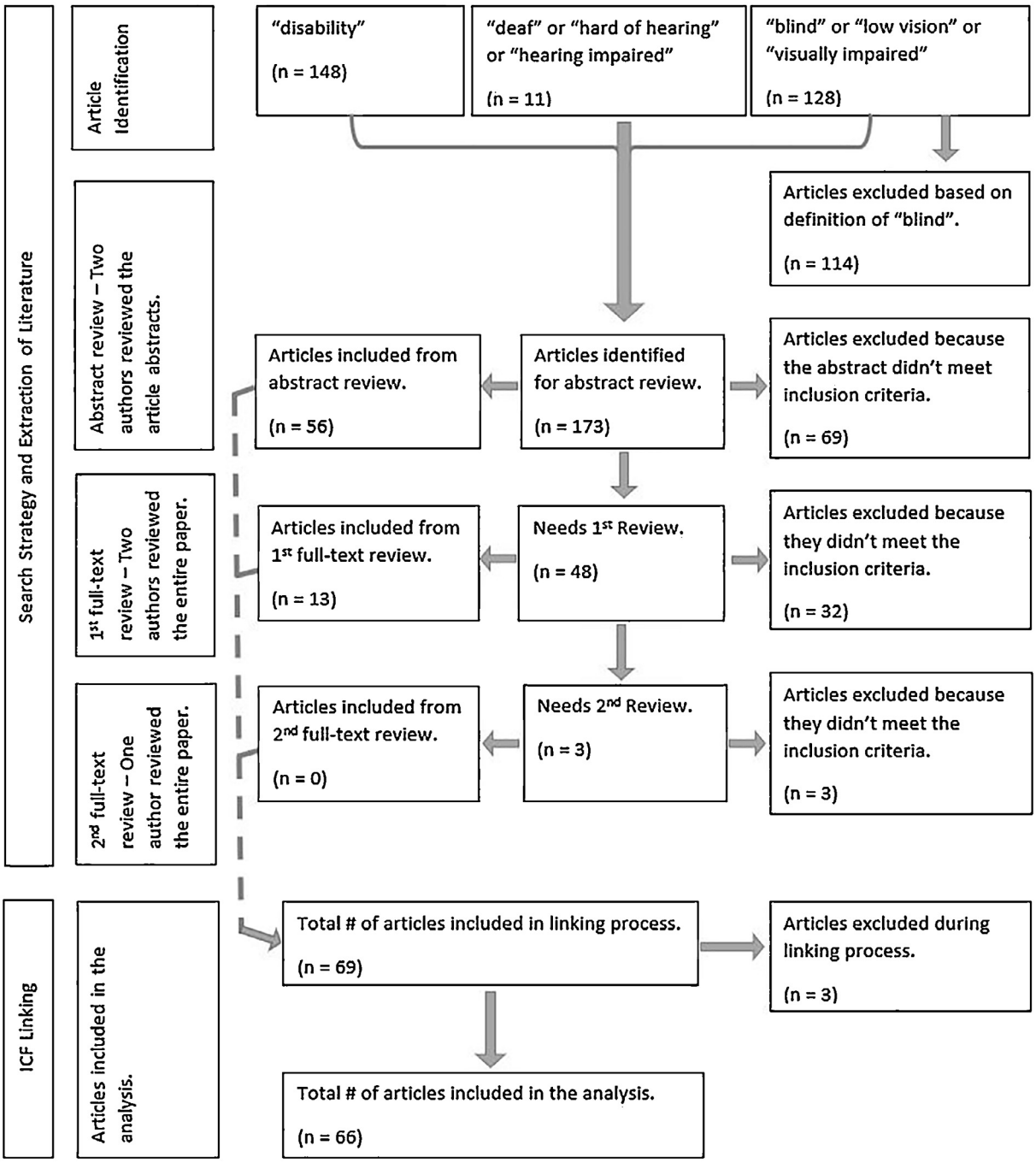

Figure 1. PRISMA flow diagram for excluded and included articles at each stage of review.

COVID-19, the rehabilitation of patients after COVID-19 diagnosis, the effectiveness of pharmaceutical drugs related to disability and COVID-19, or clinical surveillance data during COVID-19 (e.g., number of emergency department visits for stroke). They did not agree on an additional 3 articles, which were reviewed independently by a different author, who subsequently determined that they were not eligible for similar reasons. During the coding process, 3 additional articles, initially included from the abstract review, were excluded after a more detailed review. In summary, 66 and 107 articles were included and excluded, respectively, in the qualitative content analysis (Appendix B, available online, lists the 66 articles).

Table 1. Count of Disability Subpopulations in the Included Articles Using Search Term *Disability*

Disability subpopulation	Number of articles
Children with special healthcare needs	7
Chronic disease (including mental health)	8
Disability (general)	23
Disability and aging	4
Intellectual and/or developmental disability	10
Neurodegenerative disease	5
Self-care disability	1
Spinal cord injury	2
Rare diseases	1
Vision	1

Coding Methods and International Classification of Functioning, Disability and Health linking

The method was planned through an iterative process between the interdisciplinary author team and ICF experts from the WHO. Using the 4-phase tool-supported literature review approach by Bandara and colleagues,[14] NVivo (Version R1) was selected to organize, code, and analyze text from the 66 articles. Using mixed methods, we followed a deductive coding approach, using the existing codes from the ICF to situate disability within the environmental context of the COVID-19 pandemic,[14] and a summative approach to content analysis, which explored the frequency of codes and inferred meaning from context and relationships.[15] The 1,400 ICF codes were imported into NVivo as nodes and subnodes to link text content from the selected articles to environmental factors. The coding structure was aligned with the ICF's stem-branch-leaf structure within each component of the ICF. Using the example of a person with low vision, the ICF components are (1) body functions (b-codes)—visual acuity functions, (2) body structure (s-codes)—structure of eyeball, (3) activity and participation (d-codes)—seeking employment, and (4) environmental factors (e-codes)—individual attitudes of people in positions of authority. Coding primarily focused on text referring to e-codes; however, b-codes and d-codes were linked when found relevant to the COVID-19 pandemic. Consistent with the ICF framework, each e-code that was linked with text was also coded with a qualifier (i.e., barrier, facilitator, or neutral).[11] These qualifiers capture the presence of limitations in functioning at the environmental level. Owing to the amount of text reviewed, the severity of the qualifier was not captured. An e-code was considered a barrier if the text described a negative outcome or experience due to the presence or absence of that environmental factor and was considered a facilitator if the text described a positive outcome or experience. Neutral was used for codes that were neither a barrier nor facilitator for people with disability but still existed in the context of the pandemic.

We used preliminary findings to adapt the coding method for use in the context of a global pandemic. The first adjustment was the addition of a fourth qualifier, COVID-19 challenge. The qualifier allowed us to differentiate barriers that existed before the pandemic from barriers that developed or were amplified during the pandemic. It also helped us to identify environmental facilitators that were still needed to support life activities but created other challenges resulting from the pandemic response. For example, people who use public transportation to access essential items (e.g., groceries and medicine) had to go without risk exposure or pay additional fees for delivery.

The second adjustment was the specification of ICF codes to effectively capture the nuances of COVID-19 and disability content in the articles. For example, the specific descriptor congregate and long-term care housing was added under Code e5258 (housing services, systems, and policies, other specified). This allowed us to disaggregate different types of housing concerns and identify specific recommendations for pandemic response planning. ICF Linking Rules were followed when adding descriptors.[16] During the linking process, ICF codes were specified. Memos were created in NVivo to document (1) the existing ICF codes that did not fully capture the content, (2) the reason for creating a specified descriptor, and (3) coder recommendations for naming the descriptor. The research team developed a rationale for each specified code and detailed its relevance to the research question. Once agreement was reached, the specified code was added to NVivo and was used in the coding of all articles.

Analysis

Once all articles were coded, the coded content was then analyzed using NVivo (version R1) to identify frequently coded terms and relationships between coded terms across the manuscripts. Coding frequencies, text queries, and matrix coding queries were used to describe the most frequently occurring ICF codes in the extracted literature, the categorization of environmental factors using qualifiers, and the extraction of text examples from relevant codes. Code frequency was calculated as the number of times a code was linked to different sections of text. An article

could have multiple references linked to a single code if the author(s) presented different facts/arguments/statements that fit the same code. To minimize duplication of codes, individual words were not selected and linked; instead, passages of text that covered a specific point (e.g., whole sentences, multiple related sentences) were selected and linked.

RESULTS

Specified Descriptors

As stated in the methods, we developed specified descriptors for ICF codes that were too broad to capture the nuances of COVID-19 and disability content in the articles. These ICF codes, their specified descriptor, and associated text from the literature are listed in Table 2. All but 2 descriptors were added to other specified (8) codes as recommended by the Revised ICF Linking Rules.[16] The health policy descriptors were added to e5802 instead of e5808 because the authors agreed that associated text was "contained within any of the other specific categories,"[16] namely e5802 Health Policies. The addition of the descriptor e298 COVID-19 Pandemic is also unique. We recognize that there is an International Classification of Diseases, Eleventh Revision code for COVID-19 (RA01) that refers to the disease itself, but e298 COVID-19 Pandemic refers to the natural environment and human-made change (e298) that characterizes the pandemic.[17]

Coding Frequencies

The 66 articles focused on a range of topics, including disability rights, healthcare services, and social services. A total of 212 unique ICF codes were used in the text-coding process. Figure 2 presents the frequency of the top 10 ICF codes used.

As illustrated in Figure 2, the codes capture a wide swath of the environmental domains in the ICF, including supports, housing, policies, societal attitudes, and human rights. The most frequently used ICF codes referred to COVID-19—specific health services policies (e5802) and COVID-19—specific public health guidelines (e5802) used 88 and 63 times, respectively. The COVID-19—specific health services policies (e5802) code captured text referring to medical decision making and hospital policies that were implemented in the early

Table 2. Modifications to Existing ICF Codes During the Coding Process

Existing ICF codes	Contents identified in the literature	Specified descriptor for existing ICF codes
d779, particular interpersonal relationships, other specified and unspecified	Physical distance in places where exposure may occur (e.g., grocery store, doctor's office) Risk of exposure through unknown contact	d779, unknown contact with a COVID-19—positive person
e198, products and technology, other specified	Telemedicine Telephones Health websites Multidisciplinary care Delivered remotely	e198, products and technology, other specified: for health services
e2158, population, other specified	Data (often referring to a lack of data on the disability population)	e2158, population, other specified: disability-specific population data
e298, natural environment and human-made changes to the environment, other specified	COVID-19 pandemic Pandemic SARS-COV-2	e298, COVID-19 pandemic
e5258, housing services, systems, and policies, other specified	COVID-19 in congregate and long-term care housing COVID-19—related public health policies in congregate housing	e5258, housing services, systems, and policies, other specified: congregate and long-term care housing
e5802, health policies	Social distancing hand washing	e5802, health policies: COVID-19 —specific public health guidelines
e5802, health policies	Closing doctors' offices rationing care	e5802, health policies: COVID-19 —specific health services policies
e598, services, systems, and policies, other specified	HCBS benefits Inadequacy of HCBS Community supports Home assistance for health care	e598, HCBSs

HCBS, home and community-based service; ICF, International Classification of Functioning, Disability and Health.

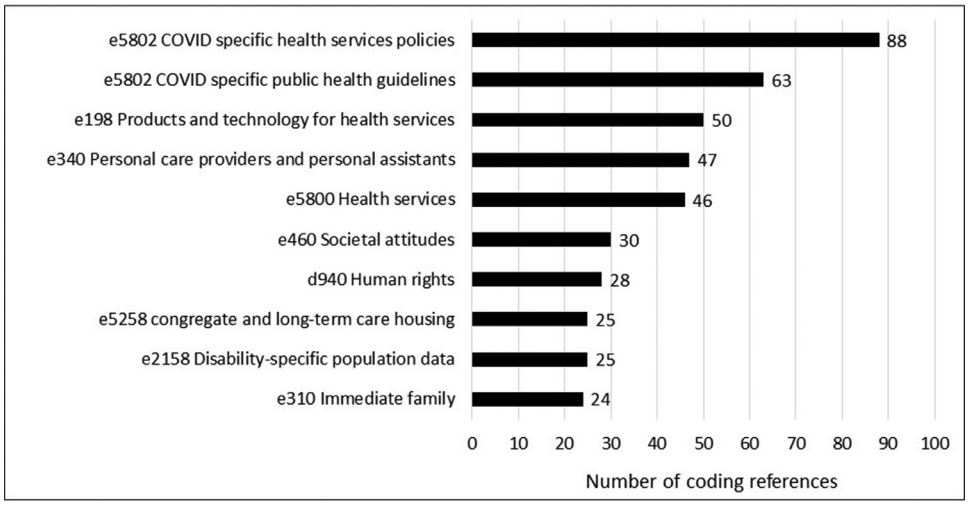

Figure 2. Frequency of top 10 ICF codes used in the coding process (*n*=66 articles).
ICF, International Classification of Functioning, Disability and Health.

months of the pandemic and how they were experienced by people with disability:

> Under the challenging conditions of a pandemic, the vague contingency directive to "begin conserving resources" opens the door to disability bias among even the most well−intentioned clinicians who must decide when and with whom to have goals of care conversations, what recommendation to make, and how forcefully to make the recommendation.[18]

> To communicate with doctors or other healthcare providers, a person who is deaf and blind needs an interpreter. Because of infection control requirements, the lack of this essential help in the ICU or other hospital settings leaves a person with communication needs especially vulnerable.[8]

References to COVID-19−specific public health guidelines (e5802) (e.g., mask wearing, isolating, social distancing) were frequently included in the disability literature discourse:

> Face coverings don't just affect those who lipread; studies have shown that 60−70% of communication is based on non-verbal cues from lip patterns and facial expressions, which are essential for anyone with communication difficulties.[19]

> . . .isolation may impact particularly negatively on functioning in disabled people. People with mental health conditions can experience symptom exacerbation, and potentially a heightened risk of severe psychiatric morbidity and suicide. People with physical impairments who rely on rehabilitation therapies may have functional declines.[20]

E-Code Qualifiers

To capture the quality of the environmental factors linked in the articles, a qualifier (i.e., barrier, facilitator, neutral, and/or COVID-19 challenge) was assigned to each e-code. Some text was coded with multiple qualifiers, meaning that e-codes could be a facilitator, barrier, and COVID-19 challenge simultaneously on the basis of how the author described how that factor was experienced by people with disability. If an e-code was assigned as a COVID-19 challenge, then it meant that the pandemic or associated emergency response affected the quality of that environmental factor, shifting a person's level of functioning, often for worse. For example, "those who live independently but rely on personal care assistants [e340] for activities of daily living [d5] also have greater difficulty protecting themselves through self-isolation [d7204]."[21] Similarly, the provision of healthcare services (e5800), a facilitator for health and functioning, became a challenge for looking after one's health (d570) because of restrictions on outpatient visits and elective surgery.

Public health and health services policies, although generally considered facilitators for minimizing infection

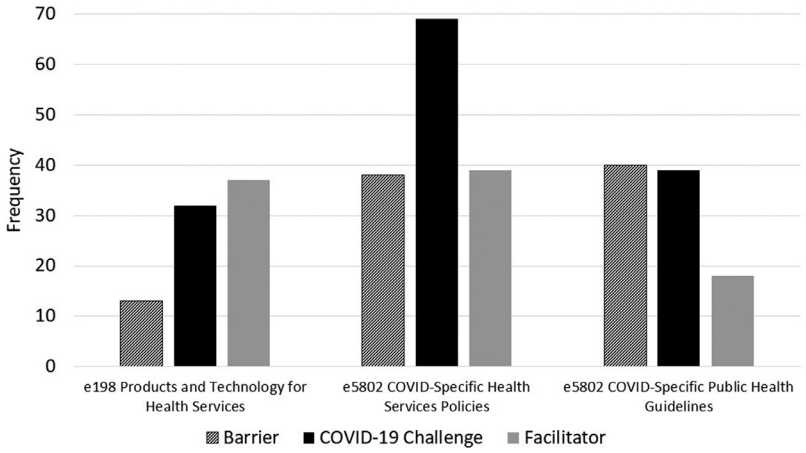

Figure 3. Frequency of e-code qualifiers associated with the 3 most common ICF codes.
ICF, International Classification of Functioning, Disability and Health.

from the virus, were frequently identified in the literature as barriers to the health and participation of people with disability. Figure 3 presents the distribution of the e-code qualifiers that were associated with the 3 most used ICF codes (COVID-19—specific health services policies [e5802], COVID-19—specific public health guidelines [e5802], and products and technology for health services [e198]) (neutral was rarely used as a qualifier in the coding process and is not presented in this study).

As illustrated in Figure 3, these environmental factors were most often discussed in the context of barriers and COVID-19—specific challenges. Health services policies (e5802), although generally considered a facilitator in pre-pandemic times, were mostly considered a challenge during the pandemic and frequently referenced as a barrier for people with disability. For example, early in the pandemic, the Centers for Disease Control and Prevention and the Centers for Medicare and Medicaid Services released policy directives to terminate or defer all ambulatory care to optimize the use of healthcare equipment and resources (e5802 COVID-19—specific health services policies). However, such policies did not consider the consequences on people for whom timely physical medicine and rehabilitation care are critical to health and functioning, as noted in, "...if these procedures are deferred, worsening impairments will increase dependence on caregivers and increase the vulnerability of disabled patients... there are also time-sensitive physiatry procedures for which procedural benefits may include a reduction in mortality, morbidity, or immediate disease burden."[22]

Telehealth (e198 products and technology for health services) was prioritized as an alternate mode of healthcare delivery and was often coded as a facilitator, for example, "...the benefits of telemedicine for persons with disability include lower cost of care, lower transportation costs, improved medication reconciliation, communication, less exposure to communicable diseases especially during a pandemic, and decreased need for paid personal assistance services."[23] However, many articles also highlighted the numerous barriers to accessing these telehealth services for people with disability, for example, "...telemedicine platforms do not have custom features to ease healthcare communications for persons who are deaf or blind or for persons with cognitive disabilities."[23] In addition to captioning and video challenges, some authors commented on structural barriers related to telemedicine (e198): "A huge obstacle for appropriate utilization of telemedicine is that broadband fast internet is inaccessible in many rural and low-income communities (even in cities) where many persons with disabilities live."[23]

Social Determinants of Health

ICF codes related to the social determinants of health (e.g., housing and employment) revealed the depth of challenges experienced by people with disability. For example, the unsafe aspects of congregate care settings (e258), including risks for infectious disease, were elevated by COVID-19: "Disabled people living in institutional settings such as group homes, assisted living facilities, and nursing homes, are at significant risk of contracting the virus in such confined settings by daily contact with numerous rotating caregivers who themselves are exposed to multiple other patients."[21]

Disability-specific barriers in the context of the employment and economic environment (labor and employment services, systems, and policies [e5908] and economic

systems [e5651]) were commonly referenced, for example, "The livelihoods of persons with disabilities are also at serious risk due to the economic downturn brought about by the pandemic. Yet, [persons with disabilities] have not been included in economic responses to the COVID-19 pandemic nor involved in planning to prevent future crises."[24] Barriers unique to the urban context—population density (e2151) and a lack of civil protection services, systems, and policies (e545)—were also highlighted: "...in low-income countries around the world where 50–75% of the urban population lives in slums or informal settlements, the difficulties of social distancing for those with a disability should not be viewed as an individual challenge but rather a failure of land use, shelter, and infrastructure planning."[24]

Limitations of Disaster Planning

Many authors noted a general lack of forward thinking in existing disaster planning protocols. One article described how a 2010 FEMA report, "Guidance on Planning for Integration of Functional Needs Support Services in General Population Shelters," was developed to address limitations in the disaster response for people with disability after Hurricanes Katrina and Rita but failed to consider a future pandemic situation with shelter-in-place conditions.[24] Critically, the lack of disability-specific population data was frequently identified as a key barrier to planning, decision making, and justice early in the pandemic literature (ICF Code e2158 used 25 times). It was argued that

> Until recently, people with disabilities have not been included in public health surveys, data analyses, and health reports, making it difficult to know the state of their health status and where existing disparities lie. . .. failure to collect data on people with disabilities and COVID-19 has resulted from the... CDC's... "short form"... which doesn't include demographics related to disability. Better disability data would inform policy and program development regarding critical issues of health disparities and health equity.[21]

Without data, the health of people with disability continues to be devalued, which was emphasized by the frequency that human rights (d940 used 28 times) and societal attitudes (e460 used 30 times) were coded as barriers in the pandemic literature:

> The COVID-19 pandemic is expected to have multiple waves associated with significant morbidity and mortality; each wave will likely perpetuate pre-existing disparities among marginalized communities across the USA and more broadly, around the world. . .. The protection of [human] rights suggests the need to ensure communities such as those with disabilities or who are unable to afford stable housing are equitably protected. . .[25]

> An unaddressed key issue linked to human rights... is how to ensure [persons with disabilities] continue to receive the support required to ensure their well-being, independence, and self-determination when their regular caregivers/ personal assistants are quarantined, fall ill, and/or are unable to continue providing support.[24]

Finally, the pervasive underrepresentation of people with disability in healthcare decision making and leadership affects things such as supply stockpiles and plans to ration, negatively impacting people with disability.[21]

Recommendations for Emergency Response Planning

Some authors looked beyond the immediate crisis to offer recommendations for a more inclusive disaster response to best support people with disability in future emergency situations. These recommendations focused on 3 key issues: (1) accessible information, (2) inclusive decision making, and (3) continued access to essential services.

Accessible information. This includes e5352 communication policies, e1250 products and technology for communication, and e5602 media policies:

> Public health and wellness information must be in audio, Braille, E-pub, and easy-to-understand formats; use captioning; relay services; text messages; and always ensure digital technologies are in compliance with W3C accessibility standards.[24]

Inclusive decision making. This includes e5951 political systems and d940 human rights:

> [Persons with disabilities] and disabled persons' organizations must be at the center of the program and policy decisions and implementation. . .. Indeed, persons with disabilities hold a privileged vantage point in understanding and dealing with crises and are a special asset in the current pandemic.[24]

> [Persons with disabilities] must be allowed to make their own choices in all aspects of their COVID-19 contingency plans when their services and supports may be interrupted. This includes choosing who provides assistance when related to their bodily functions, daily life, and individual needs.[24]

Access to essential services. This includes e545 civil protection services, systems, and policies; e598 home and community-based services; and e5850 education and training services:

> During any closure or minimization of services, [persons with disabilities] must be supported to meet their daily living requirements, including access to food (as needed with specific dietary requirements), housing, healthcare, and in-home school and community supports.[24]

In March 2020, the U.S. Secretary for Health and Human Services instructed all state governors to alleviate healthcare providers' medical malpractice liability. Resulting policies gave healthcare providers immunity if they deviated from prepandemic standards of care owing to resource or staff shortages. These policies supported healthcare services, but the needs of people with disability for quality care were deprioritized.[26] A forward-thinking recommendation called for proactive training for these situations to minimize the impact of such policies for people with disability in future catastrophic health emergencies.[27]

Other recommendations considered the economic consequences of the pandemic for people with disability (e5651 economic systems). People with disability often incur higher costs for transportation, utilities, and care, making them vulnerable to the economic shocks of the COVID-19 pandemic.[28] Some authors argue that the timely delivery of disability benefits may need to be enhanced to buffer the increased costs of living (e.g., extra costs of home deliveries and hiring of private supports due to the suspension of public services).[24] Similarly, others called for proactively addressing structural system-level factors that increased the vulnerability of people with disability during the pandemic and recommended "...increasing the diversity of the medical providers, planning locations of services such that they are easily accessible from the poorest ZIP codes by public transportation, and/or removing payer mix limitations that ration the number of public insurance patients allowed in a clinical service area."[29]

DISCUSSION

This is the first effort to systematically synthesize the international, early pandemic literature on environmental factors affecting the functioning of people with disability during COVID-19. We used the ICF to standardize language and systematically identify the salient environmental factors that were mentioned in the health and disability research literature as the COVID-19 pandemic emerged.[30] Other authors used the ICF to link the impact of the pandemic to the functioning of people with disability, but these articles only focused on a subset of the disability population and reviewed fewer articles.[31–34]

Our findings show that in the early phase of the COVID-19 pandemic, the research literature addressing the pandemic's impacts on people with disability was focused predominantly on issues related to the delivery of health services (e5802, e198) and the practice of COVID-19–specific public health guidelines (e5802). The COVID-19 challenge qualifier was frequently coded with these top 3 e-codes, which highlighted the influx of new barriers experienced by people with disability during the pandemic. The measures implemented to stop the spread of the virus (e.g., stay-at-home orders, social distancing, and masking) and to increase medical support for the infected (e.g., reallocation of health resources, health center triaging policies) significantly limited the activity and functioning of people with disability and failed to promote health equity.

Tensions around the delivery and rationing of health services were evident, given the frequency of ICF codes capturing human rights and societal attitudes. The logistical challenges of delivering telemedicine further compounded the difficulties in delivering equitable health care as a primary mode of health services. The absence, inaccessibility, and unreliability of telehealth services were experienced as barriers until innovative problem solving and new service programs aided a person's functioning and health.

Environmental factors such as housing services, systems, and policies (e525) that provide benefits, structured programs, and operations designed to support the needs of individuals with disability have instead become a source of risk (COVID-19 challenge). These results highlight how the social determinants of health for people with disability were negatively impacted, cracking the foundation for a safe and equitable pandemic recovery. Many of these environmental challenges were unanticipated and unintended, resulting from a general failure to consider the consequences of situations, actions, and policies for people with disability in the emergency pandemic response.

In response to the general lack of equitable emergency preparation, authors called for a proactive approach to including people with disability in future emergency pandemic planning. This goes beyond ensuring that people with disability are well informed about disaster risk factors and prevention. It is about empowering people with disability to be actively involved in public health and healthcare decision making[21] and increasing their representation in hospital leadership and ethical boards

before a crisis emerges.[35] As noted, "Governments and local authorities should establish Pandemic Responses Task Forces that include people with disability to make sure that the latter are consulted, and accessibility, inclusivity, and universal design are mainstreamed into risk reduction responses."[24]

Despite FEMA's whole-community approach to emergency management, minimal effort was made in the early phase of the pandemic to prevent further harm to people with disability through policy, systems, or environmental modifications. Using the ICF, we assessed the environment in terms of facilitator, barrier, or COVID-19 challenge, which created a model for identifying risk caused by a change in environmental context (i.e., COVID-19). This model could be used proactively to detect the risk of future disasters and their impact on the functioning of people with disability. This could support the development of guidelines for universal design[11] in any disaster plan if emergency management, public health, and disability stakeholders worked together.

When using the ICF to detect risk of future disasters, the challenge qualifier should remain a part of the model and be considered for formal inclusion in the ICF framework. The challenge qualifier allows the stakeholders to distinguish environmental factors that are temporarily and contextually presenting risks for people with disability from environmental factors typically coded as barriers or facilitators in a nonemergency context.

To promote a systems change in how disability is considered and addressed in emergency planning, we recommend that the WHO organize a forum with people with disability to (1) acknowledge the inequitable emergency response as described in the results of our literature review and content analysis, (2) review our recommendations for using the ICF to detect risk of future disasters, and (3) create updated guidance for inclusive emergency planning that involves the ICF. We believe that the implementation of our recommendations will help build a more resilient community in the face of future disasters and public health emergencies.

Limitations

Limitations of this review may include using English-only articles, the restricted date range, the use of 1 database, code duplication, and qualitative research dissemination bias.[36,37] By excluding non-English articles, we may have missed additional environmental factors impacting non-English speaking countries. The decision to restrict our search to early pandemic literature was to highlight the phase of drastic decision making and how those decisions impacted people with disability inequitably. We restricted our database search to LitCOVID because it curated thousands of COVID-19–specific articles from PubMed and was updated daily.[13] We allowed duplication of codes because we did not want to underrepresent the different contexts and qualifiers (i.e., barrier, facilitator, COVID-19 challenge) of environmental factors that were discussed in the same article. We recommend that future research search additional databases and review articles published after July 31, 2020 to identify how processes and policies changed to address the emergency planning errors and public health oversight.

ACKNOWLEDGMENTS

We would like to acknowledge Huib Ten Napel and Marijke de Kleijn-de Vrankrijker with the WHO Collaborating Centre for the Family of International Classifications in the Netherlands for providing feedback and suggestions during the planning and writing phases of this project. We would also like to thank Kanbi Knippling with the University of Montana for her contribution toward the input of 3,000 International Classification of Functioning, Disability and Health codes into NVivo.

The work does not necessarily represent the policy of National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), Administration for Community Living, Centers for Disease Control and Prevention, or HHS and one should not assume endorsement by the federal government.

This study is partially supported by a grant from the National Institute on Disability and Rehabilitation Research, U.S. Department of Education (Number H133B080023). This project received additional support from the Research and Training Center on Disability in Rural Communities under a grant from the NIDILRR (Grant Number 90RTCP0002). NIDILRR is a Center within the Administration for Community Living, HHS. This project also had support from cooperative agreements between the Centers for Disease Control and Prevention, HHS, and the Montana Department of Public Health and Human Services (DD16-1603 and DD21-2103). Additional support came from the NIH (National Institute of Nursing Research and the National Institute on Minority Health and Health Disparities [Award Number U01NR020556]).

Declaration: None.

CREDIT AUTHOR STATEMENT

Mackenzie Jones: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Software, Visualization, Writing — original draft, Writing — review and editing. Philippa Clarke: Conceptualization, Data curation, Formal analysis, Methodology, Software, Visualization, Writing — original draft, Writing — review and editing. Hana Meshesha: Data curation, Methodology, Visualization, Writing — original draft, Writing — review and editing. Kristine Mulhorn: Conceptualization, Data curation, Methodology, Writing — original draft, Writing — review and editing. Meg Ann Traci: Conceptualization, Data curation, Methodology, Funding acquisition, Software, Writing — original draft, Writing — review and editing. Els Nieuwenhuijsen:

Conceptualization, Data curation, Methodology, Writing — original draft, Writing — review and editing.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.focus.2023.100152.

REFERENCES

1. Enders A, Brandt Z. Using geographic information system technology to improve emergency management and disaster response for people with disabilities. *J Disabil Policy Stud.* 2007;17(4):223–229. https://doi.org/10.1177/10442073070170040501.
2. Loy B, Hirsh A, Batiste LC. Including employees with disabilities in emergency evacuation plans: 9/11's effect on the demand for information. *Work.* 2006;27(4):407–411. Accessed February 25, 2022.
3. White GW, Fox MH, Rooney C, Cahill A. Assessing the impact of Hurricane Katrina on persons with disabilities. *Kans Nurse.* 2007;82(6):9. Accessed February 25, 2022.
4. National Council on Disability. The impact of Hurricanes Katrina and Rita on people with disabilities: a look back and remaining challenges. https://ncd.gov/publications/2006/aug072006#:~:text=Almost%20immediately%20after%20Hurricane%20Katrina,hit%20by%20the%20hurricane%3A%20Biloxi%2C. Accessed February 25, 2022.
5. Campbell VA, Gilyard JA, Sinclair L, Sternberg T, Kailes JI. Preparing for and responding to pandemic influenza: implications for people with disabilities. *Am J Public Health.* 2009;99(suppl 2):S294–S300. https://doi.org/10.2105/AJPH.2009.162677.
6. Kailes JI, Enders A. Moving beyond "special needs": a function-based framework for emergency management and planning. *J Disabil Policy Stud.* 2007;17(4):230–237. https://doi.org/10.1177/10442073070170040601.
7. Federal Emergency Management Agency. A whole community approach to emergency management: principles, themes, and pathways for action. U.S. Department of Homeland Security; 2011. https://www.fema.gov/sites/default/files/2020-07/whole_community_dec2011__2.pdf. Published December 2011. Accessed February 25, 2022.
8. Boyle CA, Fox MH, Havercamp SM, Zubler J. The public health response to the COVID-19 pandemic for people with disabilities. *Disabil Health J.* 2020;13(3):100943. https://doi.org/10.1016/j.dhjo.2020.100943.
9. World Health Organization. Disability considerations during the COVID-19 outbreak. https://www.who.int/publications/i/item/WHO-2019-nCoV-Disability-2020-1. Published March 26, 2020. Accessed February 25, 2022.
10. ICF Browser. Version ICF 2017 - English. Body functions. https://apps.who.int/classifications/icfbrowser/. Accessed February 9, 2022.
11. World Health Organization. ICF Beginner's Guide: towards a common language for functioning, disability, and health. ICF - The International Classification of Functioning, Disability and Health; 2002. https://www.who.int/publications/m/item/icf-beginner-s-guide-towards-a-common-language-for-functioning-disability-and-health. Published January 1, 2002. Accessed February 27, 2023.
12. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: the PRISMA statement. *Ann Intern Med.* 2009;151(4):264–269. https://doi.org/10.7326/0003-4819-151-4-200908180-00135.
13. Chen Q, Allot A, Lu Z. LitCovid: an open database of COVID-19 literature. *Nucleic Acids Res.* 2021;49(D1):D1534–D1540. https://doi.org/10.1093/nar/gkaa952.
14. Bandara W, Furtmueller E, Gorbacheva E, Miskon S, Beekhuyzen J. Achieving rigor in literature reviews: insights from qualitative data analysis and tool-support. *Commun Assoc Inf Syst.* 2015;37(1):8. https://doi.org/10.17705/1CAIS.03708.
15. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277–1288. https://doi.org/10.1177/1049732305276687.
16. Cieza A, Fayed N, Bickenbach J, Prodinger B. Refinements of the ICF Linking Rules to strengthen their potential for establishing comparability of health information. *Disabil Rehabil.* 2019;41(5):574–583. https://doi.org/10.3109/09638288.2016.1145258.
17. Contini C, Di Nuzzo M, Barp N, et al. The novel zoonotic COVID-19 pandemic: an expected global health concern. *J Infect Dev Ctries.* 2020;14(3):254–264. https://doi.org/10.3855/jidc.12671.
18. Nelson RH, Ram B, Majumder MA. Disability and contingency care. *Am J Bioeth.* 2020;20(7):190–192. https://doi.org/10.1080/15265161.2020.1779863.
19. Grote H, Izagaren F. Covid-19: the communication needs of D/deaf healthcare workers and patients are being forgotten. *BMJ.* 2020;369:m2372. https://doi.org/10.1136/bmj.m2372.
20. Kuper H, Banks LM, Bright T, Davey C, Shakespeare T. Disability-inclusive COVID-19 response: what it is, why it is important and what we can learn from the United Kingdom's response. *Wellcome Open Res.* 2020;5(79):79. https://doi.org/10.12688/wellcomeopenres.15833.1.
21. Andrews EE, Ayers KB, Brown KS, Dunn DS, Pilarski CR. No body is expendable: medical rationing and disability justice during the COVID-19 pandemic. *Am Psychol.* 2021;76(3):451–461. https://doi.org/10.1037/amp0000709.
22. Karri J, Seymour ML, Verduzco-Gutierrez M, Jayaram P. Point-of-care procedures in physiatry: practice considerations during the Covid-19 pandemic. *Am J Phys Med Rehabil.* 2020;99(7):567–570. https://doi.org/10.1097/PHM.0000000000001463.
23. Annaswamy TM, Verduzco-Gutierrez M, Frieden L. Telemedicine barriers and challenges for persons with disabilities: Covid-19 and beyond. *Disabil Health J.* 2020;13(4):100973. https://doi.org/10.1016/j.dhjo.2020.100973.
24. Pineda VS, Corburn J. Disability, urban health equity, and the coronavirus pandemic: promoting cities for all. *J Urban Health.* 2020;97(3):336–341. https://doi.org/10.1007/s11524-020-00437-7.
25. Okonkwo NE, Aguwa UT, Jang M, et al. COVID-19 and the U.S. response: accelerating health inequities. *BMJ Evid Based Med.* 2020;26(4):176–179. https://doi.org/10.1136/bmjebm-2020-111426.
26. U.S. Secretary of Health and Human Services. Declaration under the public readiness and emergency preparedness act for medical countermeasures against COVID-19. https://www.federalregister.gov/documents/2020/03/17/2020-05484/declaration-under-the-public-readiness-and-emergency-preparedness-act-for-medical-countermeasures. Published May 12, 2023. Accessed August 25, 2023.
27. Guidry-Grimes L, Savin K, Stramondo JA, et al. Disability rights as a necessary framework for crisis standards of care and the future of health care. *Hastings Cent Rep.* 2020;50(3):28–32. https://doi.org/10.1002/hast.1128.
28. John E, Thomas G, Touchet A, Morciano M. The disability price tag 2019, *Policy Report*. scope.org.uk. Published February 2019. Accessed March 11, 2022.
29. Sholas MG. The actual and potential impact of the novel 2019 coronavirus on pediatric rehabilitation: a commentary and review of its effects and potential disparate influence on Black, Latinx and Native American marginalized populations in the United States. *J Pediatr Rehabil Med.* 2020;13(3):339–344. https://doi.org/10.3233/PRM-200722.
30. Kostanjsek N. Use of the International Classification of Functioning, Disability and Health (ICF) as a conceptual framework and common language for disability statistics and health information systems. *BMC Public Health.* 2011;11(4)(suppl 4):S3. https://doi.org/10.1186/1471-2458-11-S4-S3.

31. Lebrasseur A, Fortin-Bédard N, Lettre J, et al. Impact of COVID-19 on people with physical disabilities: a rapid review. *Disabil Health J.* 2021;14(1):101014. https://doi.org/10.1016/j.dhjo.2020.101014.
32. Bıyık KS, Özal C, Tunçdemir M, Ünes S, Delioğlu K, Günel MK. The functional health status of children with cerebral palsy during the COVID-19 pandemic stay-at-home period: a parental perspective. *Turk J Pediatr.* 2021;63(2):223–236. https://doi.org/10.24953/turkjped.2021.02.006.
33. Cadwgan J, Goodwin J, Arichi T, et al. Care in COVID: a qualitative analysis of the impact of COVID-19 on the health and care of children and young people with severe physical neurodisability and their families. *Child Care Health Dev.* 2022;48(6):924–934. https://doi.org/10.1111/cch.12925.
34. Fridell A, Norrman HN, Girke L, Bölte S. Effects of the early phase of COVID-19 on the autistic community in Sweden: a qualitative multi-informant study linking to ICF. *Int J Environ Res Public Health.* 2022;19(3):1268. https://doi.org/10.3390/ijerph19031268.
35. National Council on Disability. The impact of COVID-19 on people with disabilities. https://ncd.gov/sites/default/files/NCD_COVID-19_Progress_Report_508.pdf. Published October 29, 2021. Accessed February 25, 2022.
36. Toews I, Booth A, Berg RC, et al. Further exploration of dissemination bias in qualitative research required to facilitate assessment within qualitative evidence syntheses. *J Clin Epidemiol.* 2017;88:133–139. https://doi.org/10.1016/j.jclinepi.2017.04.010.
37. Petticrew M, Egan M, Thomson H, Hamilton V, Kunkler R, Roberts H. Publication bias in qualitative research: what becomes of qualitative research presented at conferences? *J Epidemiol Community Health.* 2008;62(6):552–554. https://doi.org/10.1136/jech.2006.059394.
38. World Health Organization. Disability. https://www.who.int/health-topics/disability#tab=tab_1. Accessed February 24, 2023.
39. World Health Organization. Disability: people with disability vs people with disabilities. https://www.who.int/news-room/questions-and-answers/item/people-with-disability-vs-persons-with-disabilities. Published December 7, 2020. Accessed February 24, 2023.