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A Systematic Review of Tools and Recommendations Advising on the Use of Qualitative Data to Inform Epidemic Response Efforts in Low- and Middle-Income Settings

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Abstract

This review aimed to identify and critically assess tools and recommendations (collectively referred to as resources) advising on the use of qualitative data to inform epidemic response in low and middle income countries (LMICs). In doing so, we seek to improve the quality of these resources and ultimately support better integration of qualitative data in epidemic response initiatives. Literature were identified through three academic research databases and one gray literature repository. The search was conducted in April 2020 and updated in February 2021. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis checklist was adhered to. Furthermore, quality assessment tools were used for both academic (the Mixed Methods Appraisal Tool) and gray literature (the AACODS checklist standing for authority, accuracy, coverage, objectivity, date, and significance). The searches yielded 4,152 articles, of which 65 met the inclusion criteria. Identified tools and recommendations rarely provided sufficient information on how they should be implemented, who their intended audiences were, how they might be adapted across contexts and whether they might be useful to researchers on a longer or shorter timeframe. A significant amount of work remains to further develop the resources available to guide the use of qualitative data within the context of epidemic outbreaks in LMICs. Key considerations and implications based on the review outcomes are discussed.

Keywords

infectious diseases, low and middle income countries, qualitative data, systematic review

Introduction

Epidemics in low- and middle-income countries (LMICs) have traditionally been viewed as primarily biomedical events that are best informed by quantitative, epidemiological data such as transmission forecasts (epicurves), growth rates (transmissibility), or genetic analysis (e.g., virulence) to name a few (Johnson & Vindrola-Padros, 2017; Polonsky et al., 2019). Increasingly, the role of contextual factors such as a region's sociocultural, economic, or political dimensions in shaping epidemic trajectories or intervention outcomes are being acknowledged (Abramowitz et al., 2015; Bedford et al., 2019; Kippax

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et al., 2011; Leach et al., 2020; Sams & Desclaux, 2017; Shah, 2020; Teti et al., 2020). Such contextual factors are often omitted, or weakly represented, within quantitative research approaches as they cannot be "neatly" equated into epidemiological models and are typically best identified by social science approaches which champion qualitative methodologies (e.g., behavioral surveillance, community mapping, interviews) (Bedford et al., 2019; Kippax et al., 2011; Leach et al., 2020; Teti et al., 2020). As a result of this shift in conceptualization, the visibility and opportunities afforded to social scientists in epidemic response contexts has dramatically increased (Abramowitz et al., 2015; Bedford et al., 2019). As put forth by Teti et al. (2020, p. 3), "*Qualitative methods can play a pivotal role in understanding epidemics…the people involved in them, and effective solutions and strategies…it is precisely at times like these that we should celebrate and make use of these methods…Qualitative methods can give insight into the current situation as it evolves and lessons to bring to bear on future epidemics and how to effectively manage them.*"

One of the most visible applications of qualitative data in informing epidemic response came during the 2014-2016 Ebola outbreak in Africa, during which social, cultural, and political insights regarding caregiving and burial rituals were critical in identifying disease transmission mechanisms while simultaneously providing culturally competent solutions (Leach et al., 2020; Shah, 2020). In addition, qualitative data has been used during epidemics to: evaluate response infrastructures, resources and organizational challenges (Johnson & Vindrola-Padros, 2017); understand unexpected or unintended consequences of public health measures (Teti et al., 2020); identify sociocultural factors enabling disease transmission (e.g., local perceptions or rumors which affect compliance with public health measures) and adapt interventions to local contexts and resilience mechanisms (Johnson & Vindrola-Padros, 2017; 2020; Sams & Desclaux, 2017; Teti et al., 2020; Vindrola-Padros et al., 2020; Whitty, 2017); and to explore or reveal social and political inequalities exacerbated by epidemic outbreaks (Johnson & Vindrola-Padros, 2017; Leach et al., 2020; Teti et al., 2020). Yet, despite its potential value and recent increases in use, qualitative data still remains widely underutilized during epidemics—particularly in relation to informing epidemic response initiatives in-real-time (Abramowitz et al., 2015; Bedford et al., 2019; Kippax et al., 2011; Leach et al., 2020; Sams & Desclaux, 2017; Shah, 2020; Teti et al., 2020). As an "emerging practice" perhaps it is understandable that there is "much still to learn" about the application and use of qualitative methods in informing epidemic response efforts (Bedford et al., 2019, p. 133).

As experienced rapid qualitative health researchers, the authors have worked in a range of healthcare contexts, including humanitarian response in LMICs, and have spent considerable time exploring how to improve the use of qualitative data in contexts where rapid research is needed, such as during epidemics. The key challenges with using qualitative data within the literature include: participant recruitment; low quality data; little time for cross-checking and limited effective communication of study findings; lengthy ethical review processes; building of research teams and funding constraints (Franzen et al., 2017; Johnson & Vindrola-Padros, 2017; Vindrola-Padros et al., 2020). A range practical "solutions" to increase the use and impact of qualitative data have also been highlighted: early integration of community leaders; creation of networks to facilitate real-time research and appropriate forms of dissemination; applicable and acceptable formation of recommendations in conjunction with local policy makers; using creative study design to overcome resourcing limitations (e.g., bypassing full transcription with in-interview note taking or selective transcription); and partnerships with other research teams (Franzen et al., 2017; Johnson & Vindrola-Padros, 2017; Vindrola-Padros et al., 2020). Yet, one of the most significant barriers to the use of qualitative data during epidemics, as experienced by the research team during previous fieldwork, was the lack of awareness among some research commissioners and fieldwork teams in how to carry out qualitative research in epidemics and a lack of awareness (or perhaps absence) of appropriate tools or recommendations to guide the process.

Thus, this review focused on systematically identifying and assessing existing tools and recommendations that advise on the collection, dissemination, or use of qualitative data to inform action during disease outbreaks within LMIC settings. We aimed to assess the tools and recommendations in terms of their purpose, intended audiences and end users, guidance on adaptations, implementation timelines, and reported barriers and facilitators. To date no one has identified and critically assessed resources for qualitative data-use to inform epidemic response in LMICs. In doing so, we seek to improve the quality of these resources and ultimately support better integration of qualitative data in epidemic response in LMIC settings. LMICs are of particular interest for this review given that their infrastructure can present unique challenges and fewer mechanisms for translating and implementing qualitative data and research into practice relative to high-income countries, as has been seen more generally with health research capacity (Franzen et al., 2017).

Methods

Design

This is a systematic review of peer-reviewed and gray literature. A systematic review was selected over other

competing methods as this was the appropriate method to enable the depth of analysis required to answer our research questions in terms of critically considering the content of identified resources. Furthermore, such an analysis was within the capacity of the team without requiring the use of quantitative-based methods (e.g., bibliometric review) to increase the manageability of the dataset (Donthu et al., 2021). The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement was used to guide the reporting of the methods and findings (Moher et al., 2009). As per PRISMA guidance, it is best practice to pre-register systematic reviews for scientific transparency. The international prospective register of systematic reviews (PROSPERO) suggested the protocol was out of scope for their repository because the review did not "*contain at least one outcome of direct patient or clinical relevance*", hence the study protocol was uploaded to the University College London discovery page to comply with PRISMA guidelines.

Terminology

Tools are defined as documents developed to guide researchers through a particular task or potentially the whole study by providing prompts, questions or a framework that can be followed step-by-step. Whereas *recommendations* are defined as providing higher-level (briefer and unstructured) advice, rather than giving extensive step-by-step guidance. Due to the stark differences in advisory depth and structure we felt that making such a distinction was empirically important. In this review where we use the term *resources*, we are referring to tools and recommendations collectively. Due to the nature of the study design and search strategy here we exclusively apply these terms to academic and gray literature which is available online as opposed to other potential mediums (e.g., websites, videos).

Research Questions

The research questions guiding the review were exploratory in nature, but driven by hypotheses around the challenges in using research resources during epidemics in LMICs:

1. What qualitative data-use resources are available in the context of infectious epidemic outbreaks in LMICs?
2. Who are the intended audiences and end users of the findings?
3. Are any adaptations discussed in relation to the specific needs/contexts of LMICs?
4. Are tools and recommendations developed for short-term or long-term use?
5. What are the barriers and facilitators encountered in the development and implementation of these resources, as reported by their developers?

Search Strategy

A search strategy was developed following an adaptation of PICOS: "data-use tools," "epidemic," and "low- and middle-income countries." The full search strategy can be found in Supporting Material 1. The search terms for each PICOS dimension were revised following a preliminary search in each of the databases. The search was applied to titles, abstracts and keywords of articles in the CINAHL Plus, Open Gray, PubMed, and Web of Science online databases. The searches were limited to publications produced from 2010 and those published in English. The search was limited to materials published after 2010 as we aimed to capture and evaluate the most up-to-date set of available resources. Furthermore, the application of qualitative data in epidemic outbreak settings became a more widely discussed following the 2014 to 2016 Ebola epidemic so this resulted in more reflexivity in the application of qualitative methods (Leach et al., 2020; Shah, 2020). Our initial search was conducted on 11 April 2020 and we re-ran the searches on 01 February 2021. PubMed was not included within the updated search as they had reformulated their search algorithm and the search strategy was no longer suitable. Search results were combined in Mendeley, and duplicates were removed.

Selection and Inclusion Criteria

All screening was peer-reviewed in accordance with the inclusion criteria below. Articles which did not meet the inclusion criteria were excluded from the review. Peer-review took the form of one reviewer screening 20% of exclusions (Tricco et al., 2017). Title/abstract screening in the first search (1 reviewer) had an agreement rate of 98.7% and full-text screening (4 reviewers) had an agreement rate of 100%. Similarly, title/abstract screening in the second search (2 reviewers) had an agreement rate of 98.1% and a full-text screening (2 reviewers) also had an agreement rate of 100%. Any disagreements were discussed until consensus was reached.

Inclusion criteria:

1. Language: English
2. Publication dates: Published 2010-Current
3. Setting: (a) LMICs AND (b) infectious disease outbreaks

- Countries were considered low- and middle-income if they were listed as either "least developed," "other low income," "lower middle income," or "upper middle income" as according to the "DAC List of ODA Recipients" (Organisation for Economic Co-operation and Development [OECD], 2020).
    - This was inferred if: the article originated from a LMIC; the tool/recommendations were being applied in a LMIC; or stemmed from an organization known to work in LMIC settings (e.g., World Health Organization, UNICEF, Médecins Sans Frontières).
- Infectious disease outbreaks were defined as illness caused (in humans) by an "infectious agent" which could result in transmission from an infected person, animal, or reservoir to a susceptible host—infectious agent meaning an organism capable of producing an infection (Barreto et al., 2006).
    - This can be in relation to a specific infectious outbreak, epidemic, pandemic or generally about outbreaks of this nature.

4. Data type considered by tool(s)/recommendation(s): qualitative
    - Mixed methods tool(s)/recommendation(s) were included, but only the elements relevant to qualitative data-use were extracted.
    - Qualitative data being data that is text-based.
    - Qualitative data does not include medical data (e.g., patient symptoms).
    - Articles were included: (1) because they were a qualitative data-use resource; or (2) because they were an article which cited the use of a qualitative data use resource, termed a "case study" in this review.

Data Extraction, Quality Assessment and Data Synthesis

The included articles were analyzed using a data extraction form developed in Research Electronic Data Capture (REDCap)—this can be found in Supporting Material 2. The form was developed after the initial screening of full-text articles and was piloted with the first five articles and amended. Well-established quality assessment measures were built into the REDCap data extraction tool. Namely, the Mixed Methods Appraisal Tool (MMAT) for research articles (Hong et al., 2018) and the AACODS for gray literature (Tyndall, 2010). The results from the assessments can be found in Supporting Material 3.

Six co-authors performed data extraction for the first search in April 2020 (ES, FR, GC, HR, KH, LM), but then paused the review process to provide researcher capacity to a team investigating the Covid-19 pandemic. The search was rerun in February 2021 and two new researchers joined the team (HvS, SK). Following extraction, the data were exported from REDCap into Excel and analyzed using narrative synthesis. This approach focuses on describing and summarizing data—typically where study characteristics, context, quality is reported on—in a structured and detailed manor (Barnett-Page & Thomas, 2009).

For the first research question, we (unsuccessfully) attempted to categorize the resources into the stages of the knowledge to action (KTA) process (Graham et al., 2006), which describes stages within the process of knowledge creation and application. Similar terms used to describe this process include knowledge translation, transfer or exchange and research utilization, implementation, dissemination, or diffusion. We believed at the onset of this review that this framework offered the opportunity to describe gaps in resources; however, we found during the analysis process that this proved to be highly complex and ambiguous because of a lack of reporting from authors regarding the research stage at which their resource could be applied. Here, the narrative synthesis is structured in relation to the aforementioned research questions.

Results

Identification of Articles

Across the first and second searches, a total of 4,152 articles were identified (after removal of duplicates). Following title/abstract screening of these articles, 272 articles remained. Following full-text screening, 57 articles were identified for inclusion, with a further eight added from handsearching, resulting in a total of 65. Table 1 reports the volume of results generated from the search strategy for both searches, with the screening process summarized in Figure 1. An overview of the results is presented in Table 2.

Characteristics of Included Articles

The characteristics of the 65 articles included in the review are summarized in Table 3. The included articles were published between 2012 and 2020. The tools and recommendations used varied in their target populations: some were global (aimed at any country), while others targeted geographical regions (e.g., LMICs) or a specific country (e.g., Nigeria). Similarly, articles either addressed epidemics in general or focused on specific infectious diseases such as Ebola, Zika, Yellow Fever, Tuberculosis,

Table 1. Database Search Results (Conducted Across All Databases on April 11, 2020, and Again in CINAHL, Web of Science and OpenGrey on February 1, 2021).

	Database							
Search terms	CINAHL PLUS		WEB OF SCIENCE		PubMed		OpenGrey	
Dates searched	11.04.20	01.02.21	11.04.20	01.02.21	11.04.20	01.02.21	11.04.20	01.02.21
"data-use"	260,893	262, 270	1,193,047	1,317,827	610,384	-	10,883	10,883
"epidemic"	57,593	83,914	240,976	302,222	216,598	-	749	749
"low- and middle-income country"	430,366	426,364	2,880,343	3,103,377	4,352,531	-	33,057	33,057
All search terms combined	471	789	2,359	3,615	1,924	-	6	6
All search terms combined, with limits imposed	392	328	1,924	1,264	1,348	-	3	0

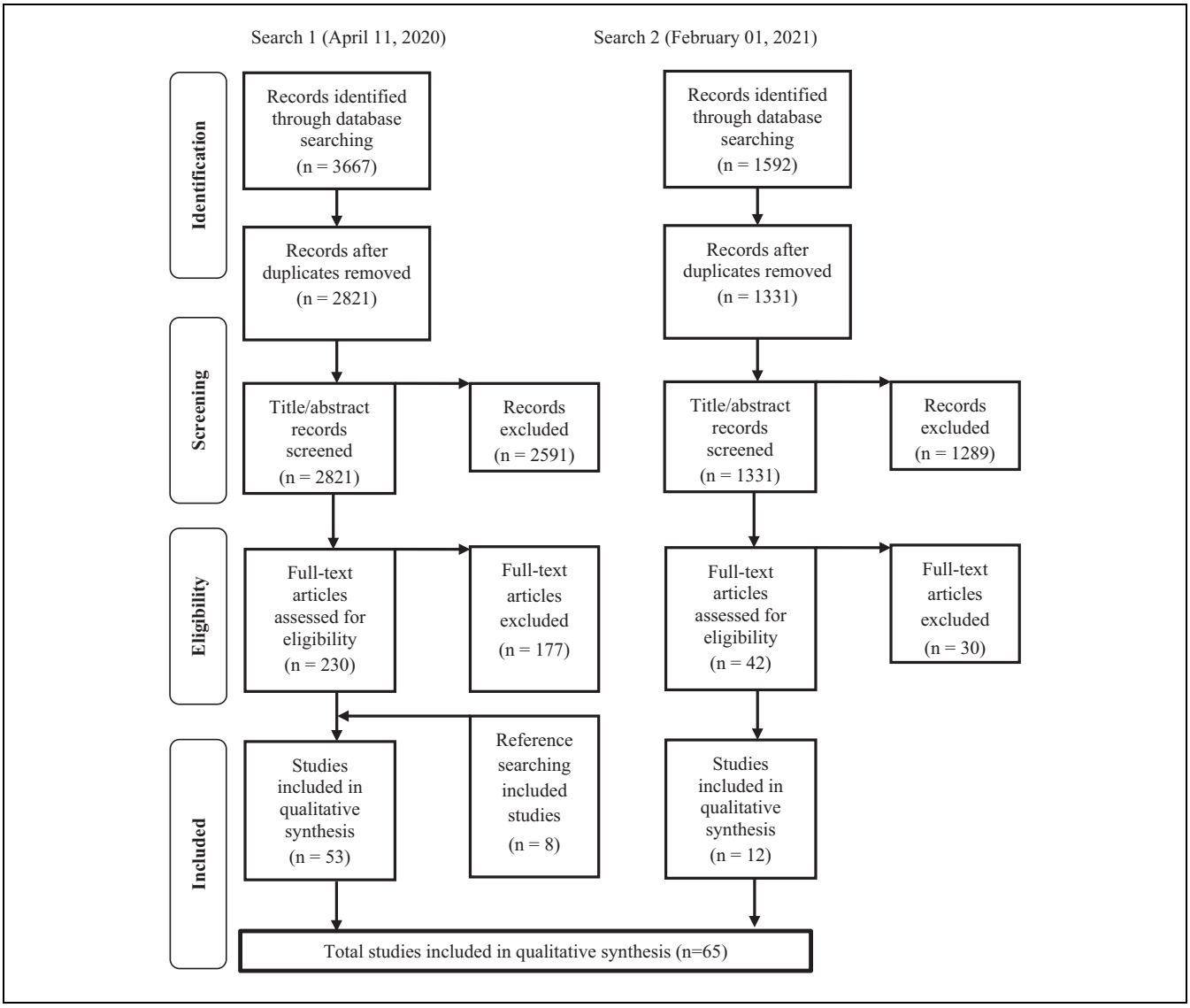

Figure 1. Flowchart of the study selection process (adapted from Moher et al., 2009).

Table 2. Overview of results.

Results	Citations
Resource type	
Tool (*n* = 36)	Abdulla et al. (2014), Adeniji (2018), Babaie et al. (2015), Baltussen et al. (2013), Baral et al. (2013), Birks et al. (2017), Chakrabarti and Frye (2017), Chen et al. (2021), Donnelly et al. (2018), Duttine et al. (2020), Fähnrich et al. (2015), Figueroa (2017), Garritty et al. (2017), Geerlings & Heffernan (2018), Ilesanmi et al. (2019), Kannan et al. (2018), Kaplan et al. (2020), Kinsman et al. (2017), Kumar & Quinn (2012), Laar et al. (2016), Lewis et al. (2020), Mantel et al. (2020), Marais et al. (2016), Mathews et al. (2019), Meyer et al. (2020), Mishra et al. (2012), Morgan et al. (2018), Pedi et al. (2017), Perscheid et al. (2018), Rada et al. (2020), Sepe & Hargreaves (2020), Smithson & Ben-Haim (2015), Tromp et al. (2018), UNICEF (2015), Urazayeva et al. (2020), WHO (n.d)
Recommendation (*n* = 29)	Avortri & Nabyonga-Orem (2019), Bain et al. (2018), Araujo da Silva et al. (2016), Dickmann et al. (2016), Florez et al. (2018), Ganju et al. (2018), Gillespie et al. (2016), Hartl (2013), Johnson & Vindrola-Padros, 2017, Kajubi et al. (2020), Kalibala et al. (2016), Kowalski et al. (2018), Lamontagne et al. (2018), Li et al. (2016), Liao et al. (2020), Lippman et al. (2014), Mbonye & Magnussen (2013), Nabyonga-Orem et al. (2016), Norris et al. (2018), Pico et al. (2017), Schünemann & Moja (2015), Mc Sween-Cadieux et al. (2017), Tao et al. (2020), Thompson (2020), Toppenberg-Pejcic et al. (2019), Tumwesigye et al. (2013), Wang et al. (2020), Xin & Xu (2012), Yekinni et al. (2019)
Purpose(s)	
Community engagement (*n* = 19)	Dickmann et al. (2016), Duttine et al. (2020), Fähnrich et al. (2015), Figueroa (2017), Gillespie et al. (2016), Hartl (2013), Kaplan et al. (2020), Kinsman et al. (2017), Li et al. (2016), Marais et al. (2016), Pedi et al. (2017), Perscheid et al. (2018), Pico et al. (2017), Sepe & Hargreaves (2020), Mc Sween-Cadieux et al. (2017), Tao et al. (2020), Thompson (2020), Toppenberg-Pejcic et al. (2019), Yekinni et al. (2019)
Policy creation/ implementation/evaluation (*n* = 18)	Adeniji (2018), Avortri & Nabyonga-Orem (2019), Baltussen et al. (2013), Araujo da Silva et al. (2016), Donnelly et al. (2018), Florez et al. (2018), Ganju et al. (2018), Garritty et al. (2017), Kowalski et al. (2018), Lamontagne et al. (2018), Mathews et al. (2019), Mbonye & Magnussen (2013), Morgan et al. (2018), Nabyonga-Orem et al. (2016), Norris et al. (2018), Tromp et al. (2018), Tumwesigye et al. (2013), WHO (n.d)
Evaluation of system/ intervention (*n* = 10)	Abdulla et al. (2014), Babaie et al. (2015), Ilesanmi et al. (2019), Kumar & Quinn (2012), Laar et al. (2016), Lewis et al. (2020), Mantel et al. (2020), Meyer et al. (2020), UNICEF (2015), Xin & Xu (2012)
Understand context (*n* = 8)	Bain et al. (2018), Baral et al. (2013), Birks et al. (2017), Geerlings & Heffernan, (2018), Kalibala et al. (2016), Lippman et al. (2014), Nabyonga-Orem et al. (2016), Rada et al. (2020)
Surveillance (*n* = 6)	Fähnrich et al. (2015), Kannan et al. (2018), Liao et al. (2020), Mishra et al. (2012), Tao et al. (2020), Wang et al. (2020)
Improvement of qualitative approaches (*n* = 4)	Chen et al. (2021), Johnson & Vindrola-Padros, 2017, Schünemann & Moja (2015), Urazayeva et al. (2020)
Informing quantitative approaches (*n* = 3)	Chakrabarti and Frye (2017), Kajubi et al. (2020), Smithson & Ben-Haim (2015)
Timeline of tools	
Unclear intended duration (*n* = 13)	Abdulla et al. (2014), Adeniji (2018), Babaie et al. (2015), Chakrabarti and Frye (2017), Chen et al. (2021), Duttine et al. (2020), Geerlings & Heffernan, (2018), Ilesanmi et al. (2019), Kaplan et al. (2020), Mathews et al. (2019), Sepe & Hargreaves (2020), Smithson & Ben-Haim (2015), Urazayeva et al. (2020)
Long (*n* = 12)	Baltussen et al. (2013), Baral et al. (2013), Birks et al. (2017), Kumar & Quinn (2012), Laar et al. (2016), Lewis et al. (2020), Mantel et al. (2020), Marais et al. (2016), Meyer et al. (2020), Mishra et al. (2012), Tromp et al. (2018), WHO (n.d)
Rapid (*n* = 9)	Fähnrich et al. (2015), Figueroa (2017), Garritty et al. (2017), Kannan et al. (2018), Morgan et al. (2018), Pedi et al. (2017), Perscheid et al. (2018), Rada et al. (2020), UNICEF (2015)
Mixed duration *(n* = 2)	Donnelly et al. (2018), Kinsman et al. (2017)
Audience(s)	
National level policymakers (*n* = 37)	Adeniji (2018), Avortri and Nabyonga-Orem (2019), Babaie et al. (2015), Bain et al. (2018), Baltussen et al. (2013), Chen et al. (2021), Dickmann et al. (2016), Donnelly et al. (2018), Fähnrich et al. (2015), Figueroa (2017), Garritty et al. (2017), Geerlings and Heffernan (2018), Gillespie et al. (2016), Ilesanmi et al. (2019), Kinsman et al. (2017), Laar et al. (2016), Lamontagne et al. (2018), Lewis et al. (2020), Li et al. (2016), Liao et al. (2020), Lippman et al. (2014), Mantel et al. (2020), Mathews et al. (2019), Mbonye and Magnussen (2013), Meyer et al. (2020), Mishra et al. (2012), Morgan et al. (2018), Norris et al. (2018), Perscheid et al. (2018), Pico et al. (2017), Smithson and Ben-Haim (2015), Tao et al. (2020), Thompson (2020), Tromp et al. (2018), Tumwesigye et al. (2013), Wang et al. (2020), WHO (n.d)

(continued)

Table 2. (continued)

Results	Citations
Researchers (*n* = 28)	Abdulla et al. (2014), Adeniji (2018), Babaie et al. (2015), Bain et al. (2018), Baral et al. (2013), Chakrabarti and Frye (2017), Araujo da Silva et al. (2016), Donnelly et al. (2018), Figueroa (2017), Florez et al. (2018), Ganju et al. (2018), Hartl (2013), Ilesanmi et al. (2019), Johnson & Vindrola-Padros (2017), Kajubi et al. (2020), Kalibala et al. (2016), Kowalski et al. (2018), Kumar and Quinn (2012), Marais et al. (2016), Mbonye & Magnussen (2013), Norris et al. (2018), Rada et al. (2020), Schünemann & Moja (2015), Mc Sween-Cadieux et al. (2017), Thompson (2020), Tumwesigye et al. (2013), Wang et al. (2020), Xin and Xu (2012).
Sub-national or local level policymakers (*n* = 26)	Babaie et al. (2015), Bain et al. (2018), Baltussen et al. (2013), Fähnrich et al. (2015), Figueroa (2017), Garritty et al. (2017), Geerlings and Heffernan (2018), Laar et al. (2016), Lamontagne et al. (2018), Lewis et al. (2020), Li et al. (2016), Liao et al. (2020), Lippman et al. (2014), Mantel et al. (2020), Meyer et al. (2020), Mishra et al. (2012), Morgan et al. (2018), Nabyonga-Orem et al. (2016), Norris et al. (2018), Pedi et al. (2017), Perscheid et al. (2018), Tao et al. (2020), Thompson (2020), Toppenberg-Pejcic et al. (2019), Tromp et al. (2018), Wang et al. (2020)
Commissioners (*n* = 2)	Donnelly et al. (2018), Lippman et al. (2014)
Local community (*n* = 1)	Birks et al. (2017)
Transferability	
Supportive statement on transferability (*n* = 38)	Adeniji (2018), Avortri and Nabyonga-Orem (2019), Babaie et al. (2015), Bain et al. (2018), Baltussen et al. (2013), Chakrabarti and Frye (2017), Chen et al. (2021), Donnelly et al. (2018), Duttine et al. (2020), Fähnrich et al. (2015), Figueroa (2017), Ganju et al. (2018), Garritty et al. (2017), Gillespie et al. (2016), Ilesanmi et al. (2019), Johnson and Vindrola-Padrosa (2017), Kalibala et al. (2016), Kaplan et al. (2020), Kinsman et al. (2017), Kumar and Quinn (2012), Lamontagne et al. (2018), Lewis et al. (2020), Lippman et al. (2014), Mantel et al. (2020), Marais et al. (2016), Mathews et al. (2019), Meyer et al. (2020), Mishra et al. (2012), Morgan et al. (2018), Nabyonga-Orem et al. (2016), Perscheid et al. (2018), Rada et al. (2020), Smithson and Ben-Haim (2015), Mc Sween-Cadieux et al. (2017), Toppenberg-Pejcic et al. (2019), Tromp et al. (2018), Urazayeva et al. (2020)WHO (n.d)
Unclear positionality on transferability (*n* = 27)	Abdulla et al. (2014), Baral et al. (2013), Birks et al. (2017), Araujo da Silva et al. (2016), Dickmann et al. (2016), Florez et al. (2018), Geerlings & Heffernan, (2018), Hartl (2013), Kajubi et al. (2020), Kannan & Magnussen (2018), Kowalski et al. (2018), Laar et al. (2016), Li et al. (2016), Liao et al. (2020), Mbonye & Magnussen (2013), Norris et al. (2018), Pedi et al. (2017), Pico et al. (2017), Schünemann and Moja (2015), Sepe and Hargreaves (2020), Tao et al. (2020), Thompson (2020), Tumwesigye et al. (2013), UNICEF (2015), Wang et al. (2020), Xin and Xu (2012), Yekinni et al. (2019)
Barriers/facilitators	
Collaboration (*n* = 20)	Avortri & Nabyonga-Orem (2019), Bain et al. (2018), Baltussen et al. (2013), Birks et al. (2017), Donnelly et al. (2018), Johnson & Vindrola-Padros (2017), Kaplan et al. (2020), Kinsman et al. (2017), Laar et al. (2016), Lippman et al. (2014), Marais et al. (2016), Mathews et al. (2019), Mbonye & Magnussen (2013), Mishra et al. (2012), Morgan et al. (2018), Pedi et al. (2017), Smithson & Ben-Haim (2015), Mc Sween-Cadieux et al. (2017), Toppenberg-Pejcic et al. (2019), Xin & Xu (2012)
Availability of resources (*n* = 12)	Adeniji (2018), Avortri & Nabyonga-Orem (2019), Birks et al. (2017), Araujo da Silva et al. (2016), Figueroa (2017), Florez et al. (2018), Gillespie et al. (2016), Mbonye & Magnussen (2013), Meyer et al. (2020), Tromp et al. (2018), WHO (n.d), Yekinni et al. (2019)
Methods (*n* = 11)	Birks et al. (2017), Duttine et al. (2020), Ganju et al. (2018), Kowalski et al. (2018), Lewis et al. (2020), Lippman et al. (2014), Mantel et al. (2020), Meyer et al. (2020), Norris et al. (2018), Pico et al. (2017), Xin & Xu (2012)
Time pressures (*n* = 11)	Bain et al. (2018), Birks et al. (2017), Donnelly et al. (2018), Figueroa (2017), Garritty et al. (2017), Johnson & Vindrola-Padros 2017, Laar et al. (2016), Lippman et al. (2014), Marais et al. (2016), Rada et al. (2020), Schünemann & Moja (2015)
Accessibility (*n* = 10)	Baltussen et al. (2013), Chakrabarti and Frye (2017), Donnelly et al. (2018), Geerlings & Heffernan (2018), Kinsman et al. (2017), Morgan et al. (2018), Rada et al. (2020), Smithson & Ben-Haim (2015), Mc Sween-Cadieux et al. (2017), Yekinni et al. (2019)
Suitability of technology and digital platforms (*n* = 10)	Fähnrich et al. (2015), Hartl (2013), Kinsman et al. (2017), Mathews et al. (2019), Mbonye & Magnussen (2013), Perscheid et al. (2018), Rada et al. (2020), Tao et al. (2020), Toppenberg-Pejcic et al. (2019), Yekinni et al. (2019)
Motivation/buy-in (*n* = 7)	Kinsman et al. (2017), Mathews et al. (2019), Mbonye & Magnussen (2013), Meyer et al. (2020), Nabyonga-Orem et al. (2016), Pedi et al. (2017), Mc Sween-Cadieux et al. (2017)

(continued)

Table 2. (continued)

Results	Citations
Tool evaluation (*n* = 7)	Avortri & Nabyonga-Orem (2019), Duttine et al. (2020), Fähnrich et al. (2015), Kowalski et al. (2018), Mantel et al. (2020), Mishra et al. (2012), Tumwesigye et al. (2013)
Geographical location	
Africa (*n* = 26)	Adeniji (2018), Baltussen et al. (2013), Birks et al. (2017), Chakrabarti and Frye (2017), Dickmann et al. (2016), Fähnrich et al. (2015), Figueroa (2017), Gillespie et al. (2016), Ilesanmi et al. (2019), Johnson & Vindrola-Padros (2017), Kajubi et al. (2020), Kinsman et al. (2017), Laar et al. (2016), Lamontagne et al. (2018), Lippman et al. (2014), Marais et al. (2016), Mathews et al. (2019), Mbonye & Magnussen (2013), Nabyonga-Orem et al. (2016), Pedi et al. (2017), Perscheid et al. (2018), Mc Sween-Cadieux et al. (2017), Thompson (2020), Tumwesigye et al. (2013), WHO (n.d), Yekinni et al. (2019)
Asia (*n* = 15)	Abdulla et al. (2014), Babaie et al. (2015), Chen et al. (2021), Ganju et al. (2018), Kannan et al. (2018), Kumar & Quinn (2012), Li et al. (2016), Liao et al. (2020), Mishra et al. (2012), Smithson & Ben-Haim (2015), Tao et al. (2020), Tromp et al. (2018), Urazayeva et al. (2020), Wang et al. (2020), Xin & Xu (2012)
Global (*n* = 13)	Baral et al. (2013), Araujo da Silva et al. (2016), Donnelly et al. (2018), Florez et al. (2018), Garritty et al. (2017), Hartl (2013), Kalibala et al. (2016), Morgan et al. (2018), Norris et al. (2018), Pico et al. (2017), Rada et al. (2020), Sepe & Hargreaves (2020), UNICEF (2015)
LMICs (*n* = 4)	Avortri & Nabyonga-Orem (2019), Bain et al. (2018), Meyer et al. (2020), Toppenberg-Pejcic et al. (2019)
Multiple (*n* = 3)	Geerlings & Heffernan (2018), Lewis et al. (2020), Mantel et al. (2020)
Not specified (*n* = 2)	Kowalski et al. (2018), Schünemann & Moja (2015)
South America (*n* = 2)	Duttine et al. (2020), Kaplan et al. (2020)
Infectious disease	
Epidemics in general (*n* = 16)	Avortri & Nabyonga-Orem (2019), Babaie et al. (2015), Bain et al. (2018), Birks et al. (2017), Araujo da Silva et al. (2016), Dickmann et al. (2016), Florez et al. (2018), Garritty et al. (2017), Kowalski et al. (2018), Mbonye & Magnussen (2013), Meyer et al. (2020), Morgan et al. (2018), Schünemann & Moja (2015), UNICEF (2015), WHO (n.d), Yekinni et al. (2019)
HIV/AIDS (*n* = 13)	Baltussen et al. (2013), Baral et al. (2013), Chakrabarti and Frye (2017), Chen et al. (2021), Ganju et al. (2018), Kajubi et al. (2020), Kalibala et al. (2016), Laar et al. (2016), Lippman et al. (2014), Mishra et al. (2012), Pico et al. (2017), Tromp et al. (2018), Tumwesigye et al. (2013)
Ebola (*n* = 10)	Fähnrich et al. (2015), Figueroa (2017), Gillespie et al. (2016), Ilesanmi et al. (2019), Johnson & Vindrola-Padros (2017) Kinsman et al. (2017), Lamontagne et al. (2018), Nabyonga-Orem et al. (2016), Pedi et al. (2017), Perscheid et al. (2018)
Combination (*n* = 6)	Donnelly et al. (2018), Hartl (2013), Marais et al. (2016), Norris et al. (2018), Thompson (2020), Toppenberg-Pejcic et al. (2019)
COVID-19 (*n* = 6)	Kaplan et al. (2020), Liao et al. (2020), Rada et al. (2020), Sepe & Hargreaves (2020), Tao et al. (2020), Wang et al. (2020)
Influenza (*n* = 4)	Geerlings & Heffernan (2018), Kumar & Quinn (2012), Li et al. (2016), Mantel et al. (2020)
Dengue (*n* = 2)	Abdulla et al. (2014), Kannan et al. (2018)
SARS (2003) (*n* = 2)	Smithson & Ben-Haim (2015), Xin & Xu (2012)
Anti-microbial resistance (*n* = 1)	Adeniji (2018)
Brucellosis (*n* = 1)	Urazayeva et al. (2020)
Malaria (*n* = 1)	Mc Sween-Cadieux et al. (2017)
Polio (*n* = 1)	Lewis et al. (2020)
Tuberculosis (*n* = 1)	Mathews et al. (2019)
Zika (*n* = 1)	Duttine et al. (2020)

and Malaria, among others. The majority of articles ($n = 52$) described developing a resource (27 recommendations and 25 tools) and 13 articles were case studies of the use of existing resources (two of which cited recommendations, and 11 of which cited tools). On average, the papers were of good quality, results of the quality assessments can be found in Supporting Material 3.

What Qualitative Data-Use Resources are Available in the Context of Infectious Epidemic Outbreaks?

The 65 resources were indexed based on their main purpose(s) to begin developing a directory for key stakeholders involved in using tools. Our interpretations were that the resources encouraged using qualitative research to: engage with communities to understand concerns and

Table 3. Summary of Articles Included in the Review.

First author name	Geographical location	Infectious disease(s)	Purpose	Timeline	Case study (yes/no)	Tool OR recommendation
Abdulla et al. (2014)	Maldives	Dengue	Evaluation—To provide a framework to qualitatively evaluate a surveillance system.	Unknown	Yes	Tool
Adeniji (2018)	Nigeria	Anti-microbial resistance (AMR)	Policy—Identifying gaps/strengths/weaknesses in current policies and strategies.	Unknown	Yes	Tool
Avortri & Nabyonga-Orem (2019)	LMICs	Epidemics in general	Policy—To translate guidelines/evidence into local-level priorities/settings.	–	No	Recommendation
Babaie et al. (2015)	East Azerbaijan	Epidemics in general	Evaluation—To provide a framework to qualitatively evaluate a surveillance system.	Unknown	Yes	Tool
Bain et al. (2018)	LMICs	Epidemics in general	Understand context—A framework for the inclusion of social and structural factors in response.	–	No	Recommendation
Baltussen et al. (2013)	South Africa	HIV	Policy—Providing a fair and rational priority-setting process to decide on policies.	Long	No	Tool
Baral et al. (2013)	Global	HIV	Understand context—A framework for the inclusion of social and structural factors in response.	Long	No	Tool
Birks et al. (2017)	Northern Tanzania	Epidemics in general	Understand context—A framework for the inclusion of social and structural factors in response.	Long	No	Tool
Chakrabarti and Frye (2017)	Malawi	HIV/AIDS	Aid quant research—Transformation of qualitative data into quantitative data (i.e., using automated text analysis particularly when there is a need to assess large volumes of data rapidly).	Unknown	No	Tool
Chen et al. (2021)	China	HIV/AIDS	Improve qual research—The improvement of the public health data collection process.	Unknown	Yes	Tool
Araujo da Silva et al. (2016)	Global	Epidemics in general	Policy—To translate guidelines/evidence into local-level priorities/settings.	–	No	Recommendation
Dickmann et al. (2016)	Morocco and Tunisia	Epidemics in general	Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	–	No	Recommendation
Donnelly et al. (2018)	Global (with specific reference to West Africa)	2014 West Africa Ebola Epidemic, Tuberculosis	Policy—To set up a well-functioning ecosystem to provide evidence that can be used to evaluate/improve/implement policy and practice.	Both	No	Tool
Duttine et al. (2020)	Brazil	Zika epidemic in 2015 to 2016 in Brazil	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	Unknown	No	Tool

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Table 3. (continued)

First author name	Geographical location	Infectious disease(s)	Purpose	Timeline	Case study (yes/no)	Tool OR recommendation
Fähnrich et al. (2015)	West Africa	Ebola	Surveillance—To improve the case management and surveillance of Ebola and other virus outbreaks AND Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	Short	No	Tool
Figueroa (2017)	Liberia	Ebola	Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	Short	No	Tool
Florez et al. (2018)	Global	Epidemics in general	Policy—Guideline development process and practices/standards for rapid guidelines.	–	No	Recommendation
Ganju et al. (2018)	India	HIV	Policy—To set up a well-functioning ecosystem to provide evidence that can be used to evaluate/improve/implement policy and practice.	–	No	Recommendation
Garritty et al. (2017)	Global	Epidemics in general	Policy—Guideline development process and practices/standards for rapid guidelines.	Short	No	Tool
Geerlings & Heffernan (2018)	Egypt	Avian Influenza a(H5N1)	Understand context—A framework for the inclusion of social and structural factors in response.	Unknown	No	Tool
Gillespie et al. (2016)	West Africa	Ebola	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	–	No	Recommendation
Hartl (2013)	Global	Severe acute respiratory syndrome 2002/ 2003; novel coronavirus outbreak in the UK in 2012	Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	–	Yes	Recommendation
Ilesanmi et al. (2019)	Tonkolili district, Sierra Leone	Ebola	Evaluation—To provide a framework to qualitatively evaluate a surveillance system.	Unknown	Yes	Tool
Johnson & Vindrola-Padros (2017)	West Africa	Ebola outbreak in West Africa 2013–2016	Improve qual research—How approaches to rapid qualitative data collection and analysis can be improved.	–	No	Recommendation
Kajubi et al. (2020)	Peri-urban community in Kampala, Uganda	HIV	Aid quant research—How to manage divergent qualitative and quantitative findings.	–	No	Recommendation

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Table 3. (continued)

First author name	Geographical location	Infectious disease(s)	Purpose	Timeline	Case study (yes/no)	Tool OR recommendation
Kalibala et al. (2016)	Global	HIV	Understand context—To increase understanding of the nature of the epidemic and the responses implemented during the epidemic.	–	No	Recommendation
Kannan et al. (2018)	Malaysia	Dengue fever	Surveillance—The use of social media as a means to surveillance public sentiment/response.	Short	No	Tool
Kaplan et al. (2020)	Bolivia, Amazon	COVID-19	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange	Unknown	No	Tool
Kinsman et al. (2017)	Sierra Leone	Ebola epidemic 2013–2016	Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	Both	No	Tool
Kowalski et al. (2018)	Not specified	Epidemics in general	Policy—Guideline development process and practices/standards for rapid guidelines.	–	No	Recommendation
Kumar & Quinn (2012)	India	Influenza	Evaluation—To analyze/improve pandemic preparedness/ prevention.	Long	Yes	Tool
Laar et al. (2016)	Greater Accra, Ghana	HIV	Evaluation—To analyze/improve pandemic preparedness/ prevention.	Long	No	Tool
Lamontagne et al. (2018)	West Africa	Ebola	Policy—To translate guidelines/evidence into local-level priorities/settings.	–	Yes	Recommendation
Lewis et al. (2020)	Africa and Asia	Polio	Evaluation—To provide a framework to qualitatively evaluate a surveillance system.	Long	Yes	Tool
Li et al. (2016)	China	2013 Avian Influenza	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	–	No	Recommendation
Liao et al. (2020)	China	COVID-19	Surveillance—The use of social media as a means to surveillance public sentiment/response.	–	No	Recommendation
Lippman et al. (2014)	North West Province South Africa	HIV	Understand context—A framework for the inclusion of social and structural factors in response.	–	No	Recommendation
Mantel et al. (2020)	Belarus, Morocco, and Thailand	Seasonal influenza	Evaluation—To evaluate and optimize program implementation.	Long	Yes	Tool

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Table 3. (continued)

First author name	Geographical location	Infectious disease(s)	Purpose	Timeline	Case study (yes/no)	Tool OR recommendation
Marais et al. (2016)	Africa	Ebola or other viral haemorrhagic fevers (VHFs)	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	Long	No	Tool
Mathews et al. (2019)	South Africa	Drug Resistant Tuberculosis	Policy—To set up a well-functioning ecosystem to provide evidence that can be used to evaluate/improve/implement policy and practice.	Unknown	No	Tool
Mbonye & Magnussen (2013)	Uganda	Epidemics in general with specific mention of malaria, HIV, viral haemorrhagic fevers, cholera	Policy—To set up a well-functioning ecosystem to provide evidence that can be used to evaluate/improve/implement policy and practice.	–	No	Recommendation
Meyer et al. (2020)	LMICs	Epidemics in general with specific mention of Ebola, and COVID-19	Evaluation—To evaluate and optimize program implementation.	Long	No	Tool
Mishra et al. (2012)	India	HIV	Surveillance—To identify the drivers of epidemics with geographic heterogeneity so that prevention programs can focus on the proximal source of infection to achieve a long-term impact.	Long	No	Tool
Morgan et al. (2018)	Global	Epidemics in general	Policy—Guideline development process and practices/standards for rapid guidelines.	Short	No	Tool
Nabyonga-Orem et al. (2016)	Liberia	Ebola outbreak	Understand context AND Policy – To use contextual data to shape the focus of policy dialogs, the requirements for participation and decisions made.	–	No	Recommendation
Norris et al. (2018)	Global	H1N1 (2009), H7N9 (2013), MERS-CoV (2013) EVD (2014-2016)	Policy—To set up a well-functioning ecosystem to provide evidence that can be used to evaluate/improve/implement policy and practice.	–	No	Recommendation
Pedi et al. (2017)	Sierra Leone, West Africa	2014 to 2015 West Africa Ebola Outbreak	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	Short	No	Tool

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Table 3. (continued)

First author name	Geographical location	Infectious disease(s)	Purpose	Timeline	Case study (yes/no)	Tool OR recommendation
Perscheid et al. (2018)	Nigeria	Ebola	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	Short	No	Tool
Pico et al. (2017)	Global	HIV and AIDS	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	–	No	Recommendation
Rada et al. (2020)	Global	COVID-19	Understand context—A protocol as to how existing data on COVID-19 can be gathered, collated and mapped to research questions to bring together existing evidence and identify where gaps in the literature are.	Short	No	Tool
Schünemann & Moja (2015)	Non specified	Epidemics in general with specific mention of Ebola and avian flu	Improve qual research—How approaches to rapid qualitative data collection and analysis can be improved.	–	No	Recommendation
Sepe & Hargreaves (2020)	Global (with specific reference to the Philippines)	COVID-19	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	Unknown	Yes	Tool
Smithson & Ben-Haim (2015)	Vietnam	SARS outbreak 2003	Aid quant research—How qualitative insights from mathematical decision theory can be used to guide epidemic responses.	Unknown	No	Tool
Mc Sween-Cadieux et al. (2017)	Burkina Faso	Malaria	Comm. Engagement—Knowledge transfer is more effective when the approach taken to it enables interaction between the different actors involved such as in seminars or workshops as opposed to written reports and websites.	–	No	Recommendation
Tao et al. (2020)	China	COVID-19	Surveillance—The use of social media as a means to surveillance public sentiment/response AND Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	–	No	Recommendation

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Table 3. (continued)

First author name	Geographical location	Infectious disease(s)	Purpose	Timeline	Case study (yes/no)	Tool OR recommendation
Thompson (2020)	Accra region, Ghana	Ebola and Cholera	Comm. Engagement—To build collaborative relationships with local communities/lay people (i.e., social mobilization/community engagement) which supports trust development and bi-directional information exchange.	–	No	Recommendation
Toppenberg-Pejcic et al. (2019)	LMICs	Ebola, Zika, Yellow Fever	Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	–	No	Recommendation
Tromp et al. (2018)	West Java province, Indonesia	HIV	Policy—To translate guidelines/evidence into local-level priorities/settings.	Long	Yes	Tool
Tumwesigye et al. (2013)	Uganda	HIV/AIDS	Policy—Identifying gaps/strengths/weaknesses in current policies and strategies.	–	No	Recommendation
UNICEF (2015)	Global	Epidemics in general	Evaluation—To evaluate and optimize program implementation.	Short	No	Tool
Urazayeva et al. (2020)	Western Kazakhstan	Brucellosis	Improve qual research—Using a model to develop data collection materials.	Unknown	Yes	Tool
Wang et al. (2020)	China	COVID-19	Surveillance—The use of social media as a means to surveillance public sentiment/response.	–	No	Recommendation
WHO (n.d)	Africa	Epidemics in general	Policy—To set up a well-functioning ecosystem to provide evidence that can be used to evaluate/improve/implement policy and practice.	Long	No	Tool
Xin & Xu (2012)	China	Severe acute respiratory syndrome epidemic in 2003	Evaluation—To analyze/improve pandemic preparedness/ prevention.	–	No	Recommendation
Yekinni et al. (2019)	Northeast Nigeria	Epidemics in general	Comm. Engagement—To develop/improve communication strategies that addresses perceptions/concerns/behavior to prevent the spread of disease.	–	No	Recommendation

behaviors that spread disease, guide social mobilization and to develop risk-based communication strategies ($n = 22$), inform the creation/implementation/evaluation of policies ($n = 18$), evaluate or assess a system or intervention (e.g., vaccination program) ($n = 11$), develop a contextual understanding of the infectious outbreak ($n = 9$), guide surveillance of cases or public sentiment (e.g., through social media) to inform response ($n = 6$), improve qualitative approaches ($n = 4$), and inform quantitative approaches, such as using contextual qualitative data to interpret quantitative outputs ($n = 3$).

Who are the Intended Audiences of the Findings?

The most frequently mentioned of which were: national level policymakers ($n = 37$, 28%); researchers ($n = 28$, 21%); and sub-national or local level policymakers ($n = 26$, 20%). Organizations that commission research (e.g., research funding bodies, charitable organizations) and local communities were the least targeted audiences. Only two articles targeted research commissioners, authored by Donnelly et al. (2018) and Lippman et al. (2014), which targeted three and five audiences respectively, raising questions about how relevant findings are provided to research commissioners. Furthermore, only one article directed its findings toward the local community (Birks et al., 2017)—this again highlights the lack of clarity of how and when local communities, who have often contributed to the research study as participants or local collaborators, are made aware of the findings.

Are Any Adaptations Discussed in Relation to the Specific Needs of Lmics?

Over half of the resources ($n = 38$) explicitly suggested that their tools and/or recommendations could be applied in varied contexts and epidemics, whilst the other 27 articles were less clear and only sometimes offered equivocal advice on transferability (see Table 2).

Within the former group, authors emphasized the importance of having an awareness of the culture of the local context to appropriately apply resources. They suggested numerous approaches to gaining cultural understandings from the onset of a project through to dissemination. For example, Lippman et al. (2014) and Toppenberg-Pejcic et al. (2019) recommended starting projects with a situational analysis in which local community leaders could either be participants in the analysis or co-leaders of the process in partnership with research teams. With regard to data collection, Chakrabarti and Frye (2017) recommended participatory research where local observers could be used to collect informal data gathered from relevant conversations. To disseminate research, Mc Sween-Cadieux et al. (2017) suggested local brokers could be used as intermediaries between researchers and users of the research to appropriately adapt the knowledge for local contexts.

A small number of authors issued hesitations against transferring tools and recommendations, but suggested they saw the benefits of shared knowledge particularly in the contexts of low income countries. For example, Nabyonga-Orem et al. (2016) suggested:

> *"Caution should be exercised in generalising these results given the unique context of Liberia. Results are generalizable in as much as the context is the same. This withstanding, we believe that our study provides lessons that can improve policy dialogue processes in low income countries." (p. 323).*

Toppenberg-Pejcic et al. (2019) who used a single framework to examine Ebola, Zika, and Yellow Fever suggested "*A one-size-fits-all approach does not work. For maximum effectiveness, local communities need to be involved with and own emergency risk communication processes.*" (p. 437). These examples raised concerns around adaptability, yet provided very little advice to readers on when and where adaptability may be more or less appropriate.

Are Tools Developed for Short-Term or Long-Term Use?

The majority of the tools did not explicitly specify a duration within which they were intended to be implemented. For most ($n = 23$), we could infer their timeline based on the type of recommendations being made or the way the tool was discussed, but for others ($n = 13$), it was unclear. Citations identified as "recommendations" were not included in this analysis because these often represent higher-level advice without a specified timeframe.

Nine of the tools appeared to be for rapid or short-term use. These included tools on how to collate and map all evidence currently available and provide timely summaries to inform response efforts (Rada et al., 2020), rapid guideline development (Garritty et al., 2017; Morgan et al., 2018), surveillance (Fähnrich et al., 2015; Kannan et al., 2018; Perscheid et al., 2018), social mobilization and community engagement (Figueroa, 2017; Pedi et al., 2017) and rapid communication (UNICEF, 2015). Not all tools which appeared to be for short-term use were clear on their timelines. Only two gave a specific duration of 1 to 3 months (Garritty et al., 2017; Morgan et al., 2018). For others, we were required to make assumptions. For example, we assumed that tools linked to real-time micro-blogging using Twitter or Weibo were rapid forms of surveillance (Kannan et al., 2018).

A further 12 tools appeared to be for long-term use. These appeared to guide teams on how to undertake

policy/prevention development (Baltussen et al., 2013; Baral et al., 2013; Meyer et al., 2020; Mishra et al., 2012; WHO, n.d), long-term community engagement (Marais et al., 2016), service mapping (Laar et al., 2016), gender analysis (Birks et al., 2017) and program improvement assessment (Lewis et al., 2020). One tool specified a duration of 5 years with a view to ensuring the strategies developed over that time were sustainable for longer term use (WHO, n.d). A further three case studies sought to use qualitative data to assess/optimize vaccine program implementation (Mantel et al., 2020) and for policy formation (Kumar & Quinn, 2012; Tromp et al., 2018). Not all of the tools which appeared to be for long-term use explicitly stated this. For instance, while we inferred the gender analysis tool (Birks et al., 2017), which sought to promote social change, to be a long-term tool, duration was not explicitly discussed.

Two of the tools could be applied to both a short-term and long-term duration (Donnelly et al., 2018; Kinsman et al., 2017). For instance, the tool provided by Donnelly et al. (2018) applied to both long-term systematic reviews and rapid synthesis or rapid evidence assessments. This tool recommended that policy makers were involved from the beginning of evidence generation in order to improve evidence implementation and that all evidence be rigorous, reviewed and pass quality assurance checks irrespective of duration. Furthermore, it stated that evidence synthesis must be transparent and clearly outline the methodologies enlisted. The tool by Kinsman et al. (2017) recommended integrating community perceptions into early phase response and preparedness plans in the short-term and long-term respectively.

What are the Barriers and Facilitators Encountered in the Development and Implementation of These Resources?

Reported barriers and facilitators spanned many resourcing, structural and process related factors. As Pedi et al. (2017) described, "*Tools and guidance can only be as effective as the systems, capacities, and resources that support them and translate them into practice*" (p. 48). Barriers and facilitators are presented in parallel as articles reflected on the same factors as both challenges and enablers depending on whether the factor was absent or present.

Assessments of Tools. Many authors suggested that a lack of assessment of tools, such as field testing, piloting, or refinement of tools, were challenges to their future application (Fähnrich et al., 2015; Kowalski et al., 2018; Mantel et al., 2020; Mishra et al., 2012; Tumwesigye et al., 2013). Similarly, other authors suggested a lack of feasibility assessments and evaluations of replication or upscaling potential were possible barriers for others who may want to borrow from their approaches (Duttine et al., 2020). Alternatively, Avortri and Nabyonga-Orem (2019) suggested that the performance of fieldwork teams implementing tools could be enabled by using standardized continuous self-assessment tools in parallel.

Duration. Time pressures while in the field were often cited as an inhibiter of tool use (Bain et al., 2018; Birks et al., 2017; Donnelly et al., 2018; Figueroa, 2017; Marais et al., 2016), particularly where the tool was time-intensive to implement (Laar et al., 2016). This inhibitor was reported across resources intended for short-term use (Figueroa, 2017), long-term use (Bain et al., 2018; Birks et al., 2017; Laar et al., 2016; Marais et al., 2016) and both (Donnelly et al., 2018). This said, this limitation is clearly more widely reported in resources intended for long-term implementation. Tools which encouraged tapping into pre-existing structures were reported as easier to implement (e.g., using pre-existing community-based organizations as a means of providing knowledge about local context and to support data collection) (Marais et al., 2016). Rapid methodologies to collecting all relevant data through document mapping or a situational analysis, were also cited as being useful to quickly understand context-specific problems, provide need assessments, to guide planning of long-term aid and to support timely decision making (Johnson & Vindrola-Padros (2017); Lippman et al., 2014; Rada et al., 2020). That said, some tools cited concerns surrounding rapidly produced data, such as a lack of generalizability, lack of cross-checking, or lack of quality or depth (Garritty et al., 2017; Johnson & Vindrola-Padros (2017); Lippman et al., 2014). Schünemann & Moja (2015) countered those opinions and suggested that rapid work required increased resources, but produced high-quality research, when done correctly.

Resources. General scarcity of resources and funding in LMICs, particularly in rural areas, was reported to negatively impact tool implementation (Araujo da Silva et al., 2016; Avortri & Nabyonga-Orem, 2019; Birks et al., 2017; Florez et al., 2018; Gillespie et al., 2016; Mbonye & Magnussen, 2013; Tromp et al., 2018; Yekinni et al., 2019). One tool acknowledged that its application across contexts required investment and thus would be subject to local resourcing contexts (Meyer et al., 2020). Moreover, many articles suggested LMICs experience difficulties identifying competent professionals to oversee implementation (Avortri & Nabyonga-Orem, 2019; Figueroa, 2017; Mbonye & Magnussen, 2013). One case study also reported challenges with implementing a tool using secondary data within their LMIC setting due to the over-representation

of data from HICs populating the tool's metrics (Adeniji, 2018).

Technology and Digital Platforms. A sample of resources cited using technology and digital platforms (e.g., SMS, radio, websites, telephones), and authors described these as enablers to data collection, dissemination, and community engagement (Fähnrich et al., 2015; Hartl, 2013; Mathews et al., 2019; Mbonye & Magnussen, 2013; Rada et al., 2020; Tao et al., 2020; Toppenberg-Pejcic et al., 2019; Yekinni et al., 2019). The usefulness of the technology was increased when they had additional offline functionality (Kinsman et al., 2017). However, challenges arose when technological systems and processes were not suitable for the implementation context (Perscheid et al., 2018), such as when the field did not allow for a fast and stable internet connection (Mbonye & Magnussen, 2013).

Accessibility. Authors highlighted the importance of tools being accessible to researchers of varied levels of experience, as well as being easy to use, practical and resource-sensitive while maintaining good standards (Chakrabarti & Frye, 2017; Geerlings & Heffernan, 2018; Kinsman et al., 2017; Morgan et al., 2018). Similarly, authors described implementation being enabled through publishing their research in open access repositories (Donnelly et al., 2018; Rada et al., 2020), using interactive approaches, such as infographics (Donnelly et al., 2018; Mc Sween-Cadieux et al., 2017). Authors also described challenges where data outputs required a higher level of competence for interpretation and suggested that these ran the risk of leaving out some stakeholders and limiting the influence on others (Baltussen et al., 2013; Mc Sween-Cadieux et al., 2017). Another reported barrier included language barriers, both in the literal sense (Yekinni et al., 2019) and between different disciplines (Smithson & Ben-Haim, 2015).

Methods. One article reported flexible and iterative application of a tool as an enabler of its use, with the added benefit of ensuring resources are continually updated (Lippman et al., 2014). Alternatively, a few authors reported standardization and systematic procedures favorably (Kowalski et al., 2018; Lewis et al., 2020; Mantel et al., 2020). One tool discussed the importance of setting clear goals and ensuring appropriate team selection and supervision (Ganju et al., 2018). Another tool advocated for theory-based, reflective practice, robust methodologies and the integration of rapid feedback (Duttine et al., 2020). Other tools cite a lack of standardized definitions and guiding conceptual frameworks as barriers to tool development or implementation (Norris et al., 2018; Xin & Xu, 2012). One tool sought to address the lack of standard definitions in line with its purpose through contributing to thinking around the operationalization of "health system resilience" (Meyer et al., 2020). General design was considered a non-issue provided that the tool was focused on implementation (Pico et al., 2017). One tool raised ethical concerns regarding fears of uncovering aggravations or lack of cultural sensitivity (Birks et al., 2017).

Collaboration. The existence of networks and collaboration across community, regional and national levels were cited as beneficial to both tool implementation and dissemination of findings (Johnson & Vindrola-Padros, 2017; Laar et al., 2016). However, top-down knowledge transfer was cited as a limitation (Toppenberg-Pejcic et al., 2019).

Community engagement was seen as particularly beneficial to identifying and connecting with local actors and adapting research to their preferences (Bain et al., 2018; Kaplan et al., 2020; Kinsman et al., 2017; Lippman et al., 2014; Marais et al., 2016; Pedi et al., 2017). Fear among local populations and a lack of trust with research teams were reported as barriers to tool implementation (Toppenberg-Pejcic et al., 2019). Local leaders were seen as a gateway to building trust within the community (Birks et al., 2017; Marais et al., 2016; Pedi et al., 2017; Smithson & Ben-Haim, 2015; Toppenberg-Pejcic et al., 2019). It was felt important that tools struck a balance between informing national response and decentralization (Kaplan et al., 2020; Mishra et al., 2012). Tools which could not be adapted to local priorities were reported as challenging to implement (Morgan et al., 2018).

Beyond community-based collaboration, an open dialog between researchers and policy makers was reported to enable applicable, contextually appropriate, and timely implemented research (Baltussen et al., 2013; Johnson & Vindrola-Padros, 2017; Kinsman et al., 2017; Mathews et al., 2019; Mbonye & Magnussen, 2013; Mc Sween-Cadieux et al., 2017). Furthermore, coordination between groups enabled research to come together from multiple fields and minimized bias from one group (Donnelly et al., 2018; Xin & Xu, 2012). Input from experts (e.g., influential organizations, or subject experts such as rapid guideline developers) was also reported as a strength (Morgan et al., 2018). Systematic dissemination to all those who were expected to use the outputs of the tool was reported as an enabler (Avortri & Nabyonga-Orem, 2019).

Lack of Motivation & Buy-In. Barriers included a lack of motivated individuals to implement the tool (Kinsman et al., 2017; Mbonye & Magnussen, 2013; Pedi et al., 2017). One tool spoke directly to address this through driving participatory self-motivated action (Meyer et al.,

2020). While actors could appreciate data as useful, their intentions toward using it was less certain; this is often typical of unidirectional relationships between researchers and end-users (Mc Sween-Cadieux et al., 2017). Buy-in was also reported as an issue, in relation to output uptake in policy dialogs, this may be due to perceptions of poor quality, bias, and lack of trust (Nabyonga-Orem et al., 2016). Information was best used when it was disseminated alongside recommendations for use (i.e., where it was clearly actionable) (Mathews et al., 2019; Mc Sween-Cadieux et al., 2017). The implementation of evidence was more successful when policymakers or general actors were eager to use it (Mathews et al., 2019; Mc Sween-Cadieux et al., 2017). This was facilitated by demand-driven research: when policy makers saw a need for research and therefore commissioned it in the first instance (Mathews et al., 2019).

Discussion

Key Findings

This article sought to identify existing resources guiding the use of qualitative data during infectious epidemics in LMICs and build an understanding of the barriers and facilitators to their use. We identified 65 existing resources guiding the use of qualitative data, which had been developed for a range of purposes linked to epidemic contexts, including: policy development, evaluation, surveillance, community engagement/risk communication, informing quantitative approaches, (qualitative) methodological improvement, and developing contextual understanding in epidemic settings. The articles' findings were directed most often at national-level policymakers, researchers and sub-national or local-level policymakers, which demonstrated the need to either involve these stakeholders in training on qualitative data or at a minimum provide details about how the approach was carried out. Local communities were overlooked as key audiences for findings, yet over half of the articles described their findings and recommendations as applicable to contexts outside of the geographic area where the study was collected or to another infectious epidemic and suggested that local communities needed to be involved in ensuring adaptability. An additional challenge was that the authors did not provide sufficient information about whether or how resources could be adapted across contexts, which is akin to the vague cautions often suggested by qualitative researchers on the generalizability or transferability of their research findings.

Surprisingly, the majority of tools did not specify or discuss an implementation timeline; and although this could be inferred based upon the terminology or context within which the tool was described for some articles, this was not possible for the remainder. For those for which timelines could be inferred, there seemed to be an equal balance between tools intended for short-term and long-term use, with a handful applicable to both short- and long-term engagements. Short-term guidance tended to focus on evidence mapping, guideline development, social mobilization, and communication, while long-term tools focused on sustainable community engagement, program improvement and policy formation.

The barriers and enablers to the use of the resources cited by authors spanned resourcing, structural and process-related factors. Many of the barriers were not "new," and included scarcity of resources, time pressures, accessibility levels of the resource, the need for increased collaboration, and a lack of buy-in and ethics, and have already been cited within academic literature (Franzen et al., 2017; Johnson & Vindrola-Padros, 2017; Vindrola-Padros et al., 2020). Perhaps the more insightful enablers to emerge from this review were the previous assessments of tools (which created perceptions of resource validation), new adaptable technology and digital platforms that had offline functionality and were thus suitable in remote contexts, and policy-driven research producing more buy-in than that driven by researchers.

Notable Gaps in the Data

A lack of transparent reporting within the reviewed articles made it challenging to answer the proposed questions of this review and limited its potential. Authors rarely provided sufficient information on how tools should be implemented, who their intended audiences were, how tools might be adapted across contexts and whether they might be useful to researchers on a longer or shorter timeframe. As part of the review, we had planned to create a navigable repository or algorithm through which fieldwork teams investigating infectious epidemics would be able to easily select a resource when in the field (suitable to the speed of the change of the epidemic), but the lack of transparent descriptions made it too challenging to map the resources. We were limited to producing a reference list instead (See Supporting Material 4).

Moreover, the limited information on whether and/or how adaptations could be made to tools being applied across contexts was particularly challenging. Most of the reviewed articles briefly described their approach to participatory research or community engagement and did not discuss the changes made to plans because of community engagement or areas where cultural adaptations may be particularly advantageous. There also appeared to be little reflection on whether case studies that had been borrowed from global uses or other contexts had been sufficiently adapted for local contexts—and little

evidence of testing to make sure that the approach reached a threshold of acceptance within the community. While it is commonly understood in qualitative health research that concepts and principles are often transferable across similar contexts, but detailed findings and approaches may not be reproduceable or generalizable, we argue that epidemic contexts shift rapidly and research teams and local communities who are commonly involved in directing and deciding adaptations *require* better information about the bounds of appropriateness of adaptations to be able to make decisions quickly in epidemic contexts.

On a related point, articles often included descriptions of local people who had been involved in the research process during epidemics, but authors provided limited information on whether local communities had received a summary of findings; however, this could be related to limitations in reporting rather than them not receiving findings at all. As most articles are written retrospectively, time will have elapsed and it will be important for authors to report on how they shared their findings with various stakeholders groups, as this is helpful information for research teams implementing resources.

Finally, the lack of description and discussion around "what is qualitative data?" or more about qualitative research in general made it difficult to know whether the research teams had undergone processes at the onset of the project to create a shared understanding of qualitative data and research—or whether the decades of guidance on methods and methodologies were overlooked altogether. Only two texts defined or described their use of qualitative data—one of which was a systematic review that examined rapid research approaches (Johnson & Vindrola-Padros, 2017) and the other a long-form empirical research study (Thompson, 2020). One possible interpretation for the omissions around the application of qualitative methods and methodologies is that the research authors tacitly assumed that readers would be able to infer elements of the methodology from the brief descriptions of data collection approaches. However, this is a problematic assumption because it appears that the vast majority of stakeholders of research on infectious epidemics are community health researchers, clinical staff, program managers, and policymakers—who are not often experienced qualitative researchers. Another possible interpretation is that the authors assumed that the audiences of the research findings did not have an interest in methodological detail.

Limitations

The search strategy was implemented in April 2020 and re-run in February 2021. Any articles published after this date were not included within the review. Furthermore, while we used a diverse search strategy, it is possible that articles which did not use these terms were not identified. That being said, if these resources were not found using the search strategy enlisted by this review, arguably, they are not particularly accessible or easy to find which might reflect their opportunities for use.

A further limitation, was that only articles produced in English were included within the review, potentially missing out on valuable contributions from other national, regional, or local LMIC producers. Unfortunately, it was not within the remit of the authors to include resources not available in English.

While this review was reactive to the emergence of Covid-19 and the notable impact this had on publication of applicable qualitative data-use resources across the world by opting to re-run the search, it was not within the scope of the review to expand to assess the implementation of such resources within HIC settings. This remains a gap within the literature.

Implications and Conclusion

This article sought to identify existing resources guiding the use of qualitative data during infectious epidemics in LMICs and build an understanding of the barriers and facilitators to their use. Authors rarely provided sufficient information on how tools should be implemented, who their intended audiences were, how tools might be adapted across contexts and whether they might be useful to researchers on a longer or shorter timeframe. Having mapped the current resource landscape in accordance with the research questions guiding the review, key considerations for the developers/users of tools and recommendations are as follows:

1. Be mindful to report identify the resource's purpose as well as the specific stages of research the resource provides guidance on. The knowledge to action (KTA) process (Graham et al., 2006) may provide helpful visuals and terminology.
2. Resource developers should consider how best to ensure their materials are accessible to their target audiences and whether appropriate actions are being taken to do so — approaches may need to differ depending on the context to be most effective.
3. Define the scope of qualitative data within the use of the tool and consider providing guidance and references to additional resources that are both practical and accessible to the varied team members involved. Consider duration of use and specify whether the resource is suitable for short- or long-term use, or, alternatively, whether it can be adapted for various implementation timelines. This

is important in helping users identify whether the tool is appropriate for their particular project and also prompts them to consider key delivery dates.
4. Seek to utilize the enablers to resource implementation identified within this review, including:
   a. Appropriately field testing, piloting, and refining resources prior to rollout.
   b. Embedding quality, feasibility, and replications assessments into the resource.
   c. Ensuring the resource is accessible (access, ease of use, etc.).
   d. Ensuring the resource can be implemented within a timely fashion (e.g., utilizing rapid methodology while maintaining research standards).
   e. Incorporating preparedness work (e.g., research training, network building).
   f. Incorporating systematic processes.
   g. Where appropriate, ensuring engagement with community members and policy actors.
5. Be mindful to accommodate to the challenges of implementing resources in LMIC epidemic outbreak settings where possible:
   a. Scarcity of resources (financial, capacity, technological, etc.).
   b. Ethical considerations.

A significant amount of work remains to further develop the resources available to guide the use of qualitative data within the context of epidemic outbreaks in LMIC settings. To move forward, it is essential that transparency is embedded in the future development of these resources. With this review, we hope to spark this reflexivity and the continued development and refinement these resources. This is needed to address the sub-optimal delivery, credibility, and timeliness of qualitative research methods within epidemic response initiatives and drive the appropriate use of qualitative data in such settings (Abramowitz et al., 2015; Bedford et al., 2019; Vindrola-Padros et al., 2020).

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Ethics Statement

Not applicable.

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Data Availability Statement

Data are available on reasonable request. All data relevant to the study are included in the article or uploaded as supplementary information.

Supplemental Material

Supplemental material for this article is available online.

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