

CLEARINGHOUSES AND THE USE OF EVIDENCE IN POLICYMAKING

CLEARINGHOUSES TARGETED AT IMPROVING USE OF RESEARCH
EVIDENCE IN POLICYMAKING: RATIONALE, USER TESTING AND USAGE

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A Thesis

Submitted to the School of Graduate Studies in

Partial Fulfillment of the Requirements for the Degree

Doctor of Philosophy

McMaster University

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Doctor of Philosophy (2015) McMaster University, Hamilton, Ontario

(Health Policy)

TITLE: Clearinghouses targeted at improving use of research
evidence in policymaking: Rationale, user-testing and usage

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NUMBER OF PAGES: viii, 182

Abstract

A clarion call for the establishment of clearinghouses as a strategy to promote evidence-informed health policymaking in low-and middle-income countries (LMICs) has gained momentum over the past two decades. Health Systems Evidence (HSE) and the Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL) are two cases of clearinghouses that were set up to provide research syntheses about the governance, financial, and delivery arrangements of health systems, and implementation strategies within them. Despite their promise as a knowledge translation strategy, little is known about the key features and intended effects of clearinghouses. Additionally, gaps remain about policymakers' and stakeholders' views about and experiences with the two clearinghouses, and about their usage and the determinants of their usage. This thesis addresses these knowledge gaps via three studies which present original scientific contributions to knowledge on this topic. The three chapters present: 1) a theoretical framework, developed using a systematic review approach, that outlines the key features and intended effects of a clearinghouse in facilitating access to and use of research evidence; 2) a qualitative approach to assess policymakers' and stakeholders' views about and experiences with HSE and the EVIPNet VHL in Uganda and Zambia; and 3) a mixed method approach to analyze usage and the determinants of usage of HSE and the EVIPNet VHL in the African region. In doing so, the chapters make theoretical, methodological, and substantive contributions to the field of health services and health systems research. They provide insights about clearinghouses and the necessity of health information literacy as a strategy to enhance the utilization of research evidence at the NGO, service, and government levels, for the purposes of informing advocacy as well as managerial, and programmatic decision-making and public policymaking in the health and social care sectors, and thereby contribute towards strengthening health systems in LMICs.

Acknowledgements

I thank almighty God for granting me sound mind and knowledge to study and complete this program successfully. Next, I admit that this thesis would not have seen the light of day without the support of certain personalities, and, therefore, it is imperative to pay compliments where compliments are due. As such, I express my gratitude to my supervisor, Professor John Lavis, for his patience and support. Further, I thank my supervisory committee members, Professor Lisa Schwartz and Professor Fadi El-Jardali, for reading and providing feedback on my thesis drafts.

I thank Professor Nelson Sewankambo and Ms Allen Nsangi in Uganda for their help with applying for ethics approval and connecting me with researchers in Uganda during my fieldwork. I thank Mr. Robert Punyo for travelling with me to meet with participants in Uganda for interviews, and for taking notes and serving as a participant observer during the interview sessions in Uganda. Likewise, my thanks also go to Dr. Margaret Maimbolwa, Director of ZAMFOHR, for her support during my fieldwork in Zambia, and Mr. Aubrey Chibulu for his help and support as a participant observer.

I acknowledge with thanks and express my gratitude and appreciation to the International Development Research Centre (IDRC), through the IDRC Research Chair in Evidence-Informed Health Policies and Health Systems (jointly held by John Lavis and Nelson Sewankambo) and McMaster University for supporting me financially to undertake the PhD program in Health Policy. My heartfelt gratitude and thanks go to my friends and colleagues at the PhD in Health Policy for your friendship and encouragement during the preparation of this thesis. I thank Professor John Lavis, Dr. Kaelan Moat, Amanda Hammil, and Adiyta (Dave) Nidumolu, for preparing and providing me with usage statistics of HSE and the EVIPNet VHL. I thank Liza Thong and Lydia Garland for their administrative assistance during the period of my studies at McMaster University.

I am grateful, from the bottom of my heart, to my brothers and friends in Canada and Ghana, for their overwhelming moral support which inspired me to fulfill my dream and ambition of obtaining a PhD. I dedicate this doctoral degree to my late father and mother, Gariba Chong Laar and Fatimah Gariba, who have passed away during my stay and studies in Canada.

Lastly, I affirm that this work is my product and I accept full responsibility for the entire dissertation and any errors it might have.

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Declaration of Academic Achievement

I, Edward Banka Gariba, do hereby declare that I conceived, designed and drafted the chapters in this thesis in collaboration with my supervisor and the supervisory committee. I was responsible for designing the study protocol, collecting and analyzing data for all the three chapters and am the lead author of each chapter to be published. Furthermore, I drafted all the chapters with the guidance and input from my supervisor. I also received comments and suggestions for revisions of initial and revised drafts of the thesis from my supervisor and the supervisory committee.

Chapter 1: Introduction

This thesis seeks to enhance our understanding of the role of clearinghouses in addressing the barriers to research uptake, particularly how clearinghouses facilitate access to and use of research evidence to inform health policymaking and to strengthen health systems. In its 2004 report, entitled “Knowledge for Better Health,” the World Health Organization (WHO) noted that “one of the deficiencies in health research systems across countries is that the research process and the policy process tend to exist in different worlds” (WHO 2004, p.26). This recognition of the gap between knowledge and action has led to several initiatives that seek to promote the use of research evidence in low- and middle-income countries (LMICs). Some examples include the Mexico Ministerial Summit in 2004 that led to the Mexico Statement, the World Assembly in 2005, and the “Call to Action” in Bamako in 2008, where member states committed to the use of research evidence to strengthen health systems (Mexico 2004; WHO 2005; Bamako 2008). Clearinghouses contribute to making such commitments achievable.

In both LMICs and high-income countries, linking research to policy faces four main challenges. First, research evidence competes with many factors in the policymaking process, including institutional constraints, interests, values, and beliefs (WHO 2004; Lavis et al., 2004; Lavis et al., 2005; Lavis et al., 2006; Nutley 2007; Lomas 1997; Jewel and Bero 2008). Second, research evidence is undervalued by policymakers as an information input (Lavis et al., 2006; Innvaer et al., 2002; Oxman et al., 2009a; Oxman et al., 2009b). Third, research evidence is often not relevant to the policy issues that policymakers face, which means it is either not addressing a priority of policymakers and stakeholders or it is not applicable to their local contexts (Lavis et al., 2006; Innvaer et al., 2002; Oxman et al., 2009). Lastly, policymakers and stakeholders contend that research evidence is not easy to use (Lavis et al., 2009; Lavis et al., 2005; Innvaer et al., 2002; Oxman et al., 2009).

In LMICs in particular, a number of issues are likely to be faced by policymakers and stakeholders in using research evidence which we will address in the empirical analyses in chapters 3 and 4. The first issue relates to the third point aforementioned, which is that research evidence is often not relevant to local contexts, as most of this research is conducted outside these settings. To illustrate, in LMICs, there has been limited funding for health research, and so there is limited local research evidence available to policymakers and stakeholders. It was in recognition of this problem that *The Bamako Call to Action* called on national governments to allocate at least 2% of budgets of ministries of health to research (Bamako 2008). Despite the request, allocations by national governments in most LMICs for health research remain below this level of commitment. For instance, the Ugandan government allocates 0.6% of its health budget to health research (National Science, Technology and Innovation Plan, 2012/2013-2017/2018). Likewise, the Zambian government allocates only 0.02% of its total budget to research, with no specific budgetary allocation for health research; external funders fund what is estimated to be 90% of the health research conducted in Zambia (COHRED Country Report, 2008).

Moreover, the internet is an issue which could affect the use of research evidence from the clearinghouses by targeted users – in most office settings in LMICs, there are poor internet services due to slower bandwidth speed, poor connectivity and intermittent power breakdowns (Oyelaran-Oyeyinka and Adela 2004; Horvath et al., 2012; McNairy et al., 2012; World Economic Forum 2014).

Additionally, the majority of clearinghouses on health systems and health policy are not situated in LMICs. For example, few clearinghouses that we know of have been developed in LMICs in Africa and Asia to provide policymakers with relevant research syntheses. There are some exceptions, including the maternal and child health portal in India, and the Ugandan clearinghouse on health systems and health policy (Khanna et al., 2013, Basaza et al., 2014). This speaks to the lack of funding for health research mentioned before, and the reality that unlike their counterparts in developed countries, securing adequate funding to sustainably maintain a clearinghouse is a challenge in LMICs. As such, Health Systems Evidence (HSE) and the Evidence-Informed Policy Networks Virtual Health Library (EVIPNet VHL) – the two clearinghouses that are the focus of this thesis – attempt to address these barriers and promote evidence-informed policymaking by providing free, available, relevant research syntheses to policymakers and stakeholders in LMICs. Although these clearinghouses are very important resources, policymakers and stakeholders in LMICs may not be aware of them. Partnerships and promotional efforts and strategies to facilitate their use may be necessary to change this.

In response to these challenges, a number of research organizations are experimenting with and testing innovative mechanisms, methodologies, and tools to support the appropriate translation of research results to policymakers and stakeholders. Systematic reviews conducted by scholars over the years have shown that three key factors are instrumental in influencing the use of research evidence, namely the timely availability of research evidence (Lavis et al., 2005); the adequacy of the interaction between researchers and policymakers (Lavis et al., 2005; Innvaer et al., 2002); and, finally, the concordance between research evidence and the beliefs, values, and interests or political objectives of policymakers (Lavis 2009; Innvaer et al., 2002;). Most mechanisms, methodologies and tools strive to address one or more of these factors.

In order to address some of the aforementioned barriers to research utilization, and to build on the factors that facilitate the uptake of research evidence, a key knowledge translation strategy is to create clearinghouses that provide high-quality, relevant, up-to-date systematic reviews and other types of relevant research evidence and related documents to policymakers and stakeholders to aid them in decision-making (Lavis et al., 2006; Lavis et al., 2009; Moat and Lavis 2011). Clearinghouses seek to address the challenges that prevent the use of research evidence, and to aid the facilitators of research use in three ways. First, clearinghouses typically provide easily accessible, high-quality research evidence to policymakers and stakeholders in a user-friendly format that is easy to read and understand. Second, clearinghouses typically provide quality ratings for articles to help policymakers and stakeholders assess the quality of policy-relevant synthesized documents, as well as a listing of the countries where studies were conducted to make it easier for users to rapidly identify whether a synthesis includes studies from the local context or from other contexts that they perceive are similar to their own.

Finally, clearinghouses make research evidence available to policymakers and stakeholders in a timely manner and can facilitate interaction between policymakers and researchers via partnerships and promotional efforts.

The Oxford Advanced Dictionary defines a clearinghouse as “an organization that collects and exchanges information on behalf of people or other organizations.” The concept is also described as any mechanism that matches providers and users of goods, services and/or information (Van Zimmeren et al., 2006). Westler defines a clearinghouse as “a program that (1) has a specific focus or subject area, (2) acquires information – published and unpublished, print and electronic, (3) organizes and indexes the collection, (4) accepts inquiries, (5) responds to inquiries in both a routine (standard) and tailored (customized) manner, (6) conducts and provides systematic searches of its information collection and (7) engages in outreach and dissemination for current and potential users” (Westler, 1987, p. 1). For the purpose of this study, health-related clearinghouses are considered to include established and searchable online databases, one-stop shops, virtual/digital health libraries, health portals, online repositories, websites or web portals that provide information about a particular topic or subject with the aim of facilitating the availability of scientific research evidence that could be used by targeted users to inform policymaking, policy advocacy, and programmatic decisions.

Evidence can be broadly defined to include findings from research results (both published and unpublished), monitoring and evaluation (M&E) studies, and population-based surveys, Ministry of Health (MOH) reports, WHO guidance, community complaints, and clinician observations (Bowen and ZWi 2005; Pang 2007; Nabyonga-Orem et al., 2014). For some scholars, “evidence concerns facts (actual or asserted) intended for use in support of a conclusion” (Lomas et al. 2005). Evidence can be classified into two forms: colloquial and scientific (Lomas et al. 2005). Evidence is defined as colloquial when it is viewed in sole relation to its relevance (“anything that establishes a fact or gives reason for believing in something”) (Lomas et al., 2005). The scientific view of evidence is defined by methodology, meaning “knowledge that is explicit (codified and propositional); systematic (uses transparent and explicit methods for codifying); and replicable (using the same methods with the same samples will lead to the same results) (Lomas et al., 2005). This thesis focuses on scientific evidence (or what will be called ‘research evidence’ in this thesis).

Recent studies have shown that policymakers’ recommendations regarding strategies for facilitating the uptake of research evidence into policy include improving the technical capacity of policymakers, packaging research results more effectively, increasing the use of social networks, and establishing fora and clearinghouse functions to help assist in evidence-based policymaking (Hyder et al., 2011; Panisset et al., 2012). The last recommendation is at the heart of this thesis, and is informed by the recognition that research clearinghouses are aimed at providing easy-to-access and relevant systematic reviews and other forms of research evidence to policymakers and stakeholders, and are considered to be one of the most promising strategies for linking research evidence to policymaking (El-Jardali et al., 2012). HSE and the EVIPNet VHL, the two clearinghouses which are the phenomena studied in chapters 3 and chapter 4 of this thesis, were set up as research clearinghouses to facilitate the timely use of research

evidence by health system policymakers and stakeholders. The following provides a brief description of the two clearinghouses and their key features.

Health Systems Evidence (HSE)

HSE is a non-profit online repository and “the world’s most comprehensive free access point for evidence to support policymakers, stakeholders, and researchers interested in strengthening or reforming health systems, or in getting cost-effective programs, services, and drugs to those who need them” (Health Systems Evidence, 2014).

HSE was established as an initiative of McMaster Health Forum (MHF). MHF is a “leading hub, operating at regional/provincial and national levels” which aims at “improving health outcomes through collective problem-solving” (McMaster Health Forum, 2014). It convenes stakeholder dialogues, produces evidence briefs and issue briefs to address “pressing health needs creatively,” and acts as “an agent of change by empowering stakeholders to set agendas, take well-considered actions and communicate the rationale for actions effectively” (McMaster Health Forum, 2014). HSE is supported by a collaboration between MHF and four partners: (1) McMaster Health Forum’s Impact Lab; (2) Cochrane Canada and its Policy Liaison Office; (3) Health Information Research Unit’s McMaster PLUS and McMaster Search Filters; and (4) Rx for Change (Moat and Lavis 2011; Health System Evidence, 2014).

HSE contains information on evidence briefs for policy, overviews of systematic reviews, systematic reviews of effects, systematic reviews addressing other questions, systematic review protocols, registered titles for systematic reviews being planned, health system reform descriptions, and descriptions of different health systems, as well as economic evaluations (Health Systems Evidence 2014). It was developed as a clearinghouse with an emphasis on policy and management-related systematic reviews, and it became available online in late 2008 (Moat and Lavis 2011). Documents that are included in HSE are identified by: (1) annual searches of Medline; (2) reviews of each monthly issue on the Cochrane Database of Systematic Reviews; (3) reviews of each weekly update from the Database of Abstracts of Reviews of Effects; (4) reviews of each update of the Cochrane Qualitative Research Methods Groups’ database of qualitative reviews; and (5) regular scanning of listservs and websites (Moat and Lavis, 2011). Moreover, documents that are uploaded into HSE are evaluated for eligibility by two independent raters and coded according to a taxonomy of health system arrangements and implementation strategies (Moat and Lavis 2011).

At present, the key features of HSE are:

- a language box where users can select one of seven languages in which they want to use HSE;
- a profile page where users can update their profiles, including signing up for a customizable monthly evidence service based on topics of interest;
- a search tips section and background information about the site;
- an open search box that allows users to enter one or more terms to find documents;
- an advanced search function to enable users to search for a specific health system

topic according to governance, financial, and delivery arrangements and implementation strategies;

- limits so users can limit their search according to: (1) focus (i.e., general or specific); (2) target (i.e., individual, community or health system); (3) theme (i.e. optimal aging, health promotion or primary care prevention, (4) domain (i.e., diseases, technologies, sectors, and providers); (5) type of document (i.e., evidence brief for policy, overview of systematic reviews, systematic review of effects, systematic review addressing other questions, systematic review in progress, systematic review being planned, economic evaluation, health reform description, and health system description); (6) publication date range; (7) Free full-text available; (8) producer of document (i.e., Cochrane collaboration reviews) and (9) relevant for low-and middle-income countries (LMICs) by virtue of its focus or inclusion of studies conducted in such settings;
- a page with an overview of search results with a series of boxes highlighting the number of each type of document retrieved;
- a search results by records page which displays the first 50 records retrieved by a search;
- a link that displays user-friendly summaries, scientific abstracts, full-text reports, and links to related documents within HSE; and
- a one-page summary outlining the title, type of document, type of question, health system topic(s), last year literature searched, quality rating, countries in which the studies (included in the synthesis) were conducted, a user-friendly summary, a full-text report if available, citation, DOI#, and links to related documents.

Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL)

In response to the Mexico Ministerial Summit on Health Research and the World Assembly resolution in May 2005 calling on the World Health Organization to “establish mechanisms to transfer knowledge in support of evidence-based public health and health care delivery systems, and evidence-based health-related policies,” the Evidence-Informed Policy Network (EVIPNet) was created (Mexico 2004; WHO 2005). The WHO and the Ministries of Health in 25 countries in Asia and Africa launched EVIPNet in 2005 to promote the use of scientific evidence in health policy formulation with the ultimate aim of strengthening health systems and improving service coverage (WHO 2007; Hamid et al., 2005; Panisset et al., 2012). EVIPNet has expanded to include countries in the Americas, Europe and the Eastern Mediterranean (Panisset et al., 2012).

EVIPNet’s main mission is to promote partnerships at the global, national and regional levels among policymakers, researchers and civil society to support evidence-informed policymaking about health systems and services in LMICs (Panisset et al., 2012). The EVIPNet VHL is a clearinghouse that contains information on evidence briefs, systematic reviews, and other types of research evidence (e.g., rapid response summaries) and policy-relevant documents (e.g., policy dialogue summaries). In addition, it has a section on resources for evidence-informed policy which include materials such as the Supporting Policy Relevant Reviews and Trials Tools (SUPPORT) tools, SURE

Guides (i.e., guidelines on writing evidence briefs for policy), learning tools and useful links, and sections on EVIPNet regions (Africa, America, Asia and Eastern Mediterranean).

The EVIPNet VHL has an open search feature with one box where users can perform a simple search, and an advanced search feature with more boxes and default terms where users can expand or limit searches using the Boolean terms (i.e., “AND”, “OR” or “NOT”). The EVIPNet VHL contains the complete content of the Latin American and Caribbean Centre on Health Sciences Information (BIREME)’s VHL plus HSE. The integration of the EVIPNet VHL and HSE enables a user to search for information on HSE directly at the EVIPNet VHL by clicking the box linking to HSE after entering search terms or key words in the open search feature.

Knowledge gap

Despite the potential promise shown by the aforementioned key features of clearinghouses in fostering evidenced-informed health policymaking, in strengthening health systems, and in improving health outcomes in LMICs, little theoretical and empirical work has been undertaken to examine the views and experiences of policymakers and stakeholders about clearinghouses, their usage patterns, and the determinants of clearinghouses’ usage. Moreover, although theoretical models exist for guiding the development and evaluation of knowledge translation strategies (Lavis et al., 2006; Lavis et al., 2009; Constandriopoulos et al., 2010), there is no theoretical model of the key features of clearinghouses or an adequate understanding of how “clearinghouses facilitate knowledge use and how they impact practice and policy” (Soydan et al., 2010, p.2). A few studies by Rosenbaum and colleagues have looked at users’ experiences with systematic-review summaries and user testing of the Cochrane Library, but none have considered clearinghouses targeted at health system policymakers and stakeholders (Rosenbaum, Glenton and Cracknell 2008; Rosenbaum et al., 2010; Rosenbaum et al., 2011; Rosenbaum, Glenton and Oxman 2010). More importantly, the participants and settings for Rosenbaum’s studies were in Norway and the UK, and policymakers and stakeholders from LMICs were not included.

Research questions

The research questions pursued in this thesis are designed to respond to the issues and knowledge gaps identified above. First, given that researchers are attempting to come up with strategies to promote knowledge translation, and given the promising key features of clearinghouses, the first element of this thesis seeks to answer the following question:

- What are the key features of a clearinghouse and their intended effects in terms of access to and use of research evidence by policymakers and stakeholders in the fields of health and social care sectors?

The second element of the thesis will answer the following question:

- What are policymakers’ and stakeholders’ views about and experiences with HSE and the EVIPNet VHL?

Finally, given the aim of the clearinghouses as a knowledge translation strategy to promote the use of research evidence by policymakers and stakeholders, this study will use a mixed methods design to assess usage and to explore the rationale for policymakers' and stakeholders' use of research evidence from HSE and the EVIPNet VHL. Specially, it seeks to answer the following questions:

- What are the usage patterns of HSE and the EVIPNet VHL by policymakers and stakeholders in Africa?
- Do policymakers and stakeholders in Uganda and Zambia reporting using research evidence from HSE and the EVIPNet VHL and, if so, how and why are they using or not using them?
- What are the determinants of usage of HSE and the EVIPNet VHL?

Research objectives

The specific objectives of this thesis are:

- to conduct a critical interpretive synthesis and inductively generate a theoretical framework of the key features of a clearinghouse and their intended effects in terms of access to and use of research evidence by policymakers and stakeholders in the fields of health and social care;
- to conduct qualitative user-testing of HSE and the EVIPNet VHL among policymakers and stakeholders in Uganda and Zambia in order to understand their views about and experiences with clearinghouses, and to seek feedback and suggestions on how to improve them; and
- to quantitatively and qualitatively analyze usage and examine the determinants of usage of HSE and the EVIPNet VHL by policymakers and stakeholders in Uganda and Zambia, as well as to outline promotional and capacity-building strategies required to influence use of research evidence from the clearinghouses by policymakers and stakeholders.

Country selection

The selection of Uganda and Zambia were informed by two rationales. First, both are ranked by the World Bank as low or lower-middle-income countries and are confronted with similar health system and implementation challenges which could be addressed by similar types of research evidence (Morisset et al., 2013; UAIS 2011; Zambian Demographic Health Survey, 2007; Zambian Ministry of Health National Health Policy, 2013). Second, both countries are politically stable and have research teams that have been actively engaged in evidence-informed policymaking. For instance, with the establishment of a knowledge translation (KT) platform, variously called Regional East African Community Health (REACH) Uganda (Van Kammen et al., 2006; Nyikal et al., 2006), and Supporting the Use of Research Evidence (SURE Uganda), the Ugandan team has utilized strategies to inform health policy decision-making that range from producing evidence briefs and convening policy dialogues (Nabudere et al., 2010; Nabudere et al., 2011; Nabudere et al., 2012, Nabudere et al., 2013; Basaza et al., 2014) to developing a rapid responses unit (RRU) and establishing a Ugandan national

clearinghouse on health policy and systems research (Mijumbi et al., 2014). In Zambia, the Zambian Forum for Health Research (ZAMFOHR), and its knowledge-translation teams have produced evidence briefs, held policy dialogues, and established a rapid response unit (Kasonde, 2009; Kasonde and Campbell, 2012; ZAMFOHR, 2011; Mwape et al., 2012).

The existence of these research networks and the political stability in Uganda and Zambia facilitated our data collection in two ways. First, we were able to obtain an initial list of respondents who participated in policy dialogues in Uganda and Zambia from the REACH Uganda and ZAMFOHR teams, which allowed us to contact these individuals for interviews as a first step. The participants in the policy dialogues were selected based on a maximum variation sampling strategy that ensures diversity (i.e., participants were representatives of a broad range of policymakers and stakeholders in the health care sector). Second, there were no violent conflicts or security issues in either Uganda or Zambia, and all offices were working with a functional, democratically elected government. Therefore, it was feasible to apply and obtain research ethics approvals, and to meet respondents in their offices to conduct interviews in an atmosphere of peace and freedom of movement. Our data collection could not have happened in politically unstable countries, or in those without the networks that exist in Uganda and Zambia.

Data collection and ethics approval

The thesis's three substantive chapters draw on a literature reviews, interviews, and usage data. A critical interpretive synthesis approach to systematic reviews was utilized to conduct a literature review of both qualitative and quantitative data, which were synthesized to develop a theoretical framework in chapter 2. Fieldwork was undertaken in Uganda and Zambia between May 2013 to September 2013 in order to collect the data for chapters 3 and 4. The data from the interviews were collected between June 2013 to September 2013, and the usage statistics data were tracked and compiled during the 10-month and 8-month period of assessments for HSE and the EVIPNet VHL respectively. An interview guide was developed, piloted with nine researchers at McMaster University, and finalized before the commencement of the interviews. Ethical approval was obtained at McMaster University in Canada through the Hamilton Integrated Research Ethics Board (HIREB). Ethics approvals were also obtained from the School of Medicine, the Research Ethics Committee of the College of Health Sciences at Makerere University in Uganda, and the Eres Converge Institutional Review Board in Zambia before the interviews.

Interviews were conducted with 50 policymakers and stakeholders in Uganda and Zambia, which comprise the data described in both chapters 3 and 4. Participants were recruited via email and telephone correspondence using an initial list of participants in policy dialogues in Uganda and Zambia and via a respondent-driven sampling strategy. Each interview lasted between 1 and 1.5 hours. Additionally, this research was carried out with careful attention to ethical standards. Written informed consent was obtained from each participant before she or he could participate in the interviews. Likewise, the interviews were tape-recorded with the consent of participants.

As a caveat, the content of the description of the clearinghouses, justification for the selection of Uganda and Zambia, and the description of data collection and ethics approval aforementioned is repeated in chapters 3 and 4, in order to forestall or clarify any queries that readers and/or reviewers might have about these subject matters when manuscripts are submitted and/or accepted for publications, given the introductory chapter would not be added to individual chapters that would be sent for publication.

Overview of the thesis

The thesis uses three different methodologies: (1) a critical interpretive synthesis; (2) a qualitative study; and (3) a mixed methods study. Each of the studies addresses different research questions and uses a different research methodology to achieve its objectives. This thesis is organized into 4 remaining chapters. Chapter 2 addresses the first objective by providing a theoretical framework to illustrate the key features of a clearinghouse and its intended effects in terms of facilitating access to and use of research evidence by policymakers and stakeholders.

In order to address the second objective, chapter 3 elicits policymakers' and stakeholders' conventions around research use, conducts user-testing of HSE and the EVIPNet VHL with policymakers and stakeholders around demonstration topics, and assesses their views about and experiences with certain key features of the clearinghouses. In addition, policymakers' and stakeholders' suggestions on ways to improve the clearinghouses were sought.

Chapter 4 addresses the last objective of the thesis by analyzing usage and the determinants of usage of Health Systems Evidence and the EVIPNet VHL among policymakers and stakeholders in the African region, and outlines strategies to promote awareness and build the capacities of targeted users. The chapter addresses the objective in three ways. First, it compiles aggregated usage statistics (quantitative data) from both clearinghouses to analyze trends and usage patterns. Second, it analyzes qualitative data to distil the determinants of usage. Third, it assesses promotional and capacity-building strategies required to influence or facilitate the use of research evidence from the clearinghouses.

Theoretical, substantive, and methodological contributions

The three distinct studies seek to make significant theoretical, substantive, and methodological contributions to the fields of health policy and health systems research, and to the linkage between clearinghouses and research-to-policy dynamics.

As a theoretical contribution, chapter 2 uses a critical interpretive synthesis (CIS) method of systematic review to inductively develop a theoretical framework which illustrates the key features of a clearinghouse and their intended effects, and proposes a key synthetic construct which, in combination with the identified key features, can facilitate the achievement of the intended effects. The key features identified are transferable to other clearinghouses in other policy fields, and provide insights about mechanisms to facilitate access to and use of research evidence from clearinghouses in

order to support evidence-informed change in health systems and evidence-informed health policymaking.

Substantive contributions were made through the empirical work conducted in Uganda and Zambia as described in chapters 3 and 4, where policymakers and stakeholders participated in user-testing by searching for research evidence on policy issues they have worked on in the past and demonstration topics: skilled birth attendance, maternal and child health, and prevention of mother-to-child transmission of HIV (PMTCT). These provided substantive and practical insights into their abilities to use the clearinghouses, and illustrated the importance of the clearinghouses as a reservoir for scientific evidence which could be used for policymaking, advocacy, service delivery, and programmatic decisions. The analyses of usage and determinants of usage provide substantive knowledge about the progress and value of clearinghouses, which is very important to both clearinghouse developers and their funders. The promotional efforts and capacity-building strategies outlined are substantive issues that, if addressed, could promote the increased use of the clearinghouses and, consequently, evidence-informed decision-making in African countries.

Methodologically, chapter 4 uses a mixed methods design to collect both qualitative and quantitative data. It uses data from interviews, and aggregated usage statistics as a complementary data set, to provide a rigorous and richer approach to analyzing clearinghouses as phenomena and their role in aiding evidence utilization by policymakers and stakeholders. It demonstrated that to better understand an intervention designed to promote the uptake of research evidence, the collective views and experiences of policymakers and stakeholders are important in determining whether the clearinghouses are meeting their aims and whether there are gaps in content areas.

The next chapters describe the study that created the theoretical framework (chapter 2) and the two studies that involved primary data collection (chapters 3 and 4). Finally, chapter 5 concludes with a recap of the theoretical, substantive, and methodological contributions of the three studies to the field of health systems research, their implications for policy and practice, and directions for future research.

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Chapter 2: Rationale for clearinghouses targeted at improving use of research evidence in policymaking: A critical interpretive synthesis

Introduction

This chapter – the first of three substantive chapters – addresses an important theoretical gap in relation to the literature on clearinghouses as a knowledge translation strategy, namely the lack of a theoretical framework with which to understand the key features and intended effects of a clearinghouse. In utilizing a critical interpretive synthesis approach to systematic review, which allowed for incorporating empirical and non empirical papers while still using a methodical approach that can be replicated by others, the chapter embraced a rigorous approach to framework development. The aspiration underlying the development of the framework was to provide clearinghouse managers and prospective developers, as well as prospective users such as policymakers and stakeholders, with a systematic approach to creating or fine-tuning a clearinghouse. The chapter lays the groundwork for the subsequent two chapters, which involve the in-depth study of two examples of clearinghouses.

I conceived the direction and design of the study alongside my supervisor, Dr. John Lavis. I developed the literature search strategy in consultation with a librarian, performed rigorous and systematic searches, retrieved data from online databases, and uploaded the information into RefWorks software. I undertook the data extraction, analysis and interpretation. I, as a first rater, and a second rater both independently rated the included articles, and I calculated kappa agreement. As well, I conducted a purposive sampling of relevant articles during the interpretation and synthesis stages to fill conceptual gaps and finalize the theoretical framework. I drafted the chapter and received comments and guidance from my supervisor, Dr. John Lavis, on the initial and later drafts. All members of the thesis supervisory committee (Dr. John Lavis, Dr. Lisa Schwartz and Dr. Fadi- El-Jardali) provided detailed comments and suggestions that were included into the version presented here.

Abstract

Introduction: Clearinghouses have been identified as a promising strategy to facilitate the utilization of research evidence by policymakers and stakeholders to inform decision-making in the health and social care sectors. Although there are several theoretical frameworks about knowledge translation, there is no known theoretical framework that identifies the key features of a clearinghouse. We conducted a systematic review to address this gap.

Methods: A critical interpretive synthesis (CIS) approach was used to review both non-empirical and empirical papers, and to develop a theoretical model that explains the essential key features of a clearinghouse. A “compass” question was used to develop a comprehensive search strategy. This strategy was used to run searches in CINAHL, EMBASE, Global Health, Health Systems Evidence (HSE), Ovid Medline, Political Science Abstracts, McMaster Health Forum’s Impact Lab database, ProQuest, PsycINFO, and Web of Science. Additional papers were purposively sampled to fill gaps in the insights obtained from these searches.

Results: A total of 933 articles were retrieved, and 25 duplicates were removed. The titles and abstracts of the remainder of the 908 articles were assessed to identify those that met the inclusion criteria, of which 843 were excluded. For the 65 articles retrieved, the full texts were independently assessed by two independent reviewers and 21 were included. 14 additional articles were purposively sampled to achieve theoretical saturation and to fill gaps in the literature. A total of 35 papers were obtained from the combination of the databases and purposive sampling. The key features of a clearinghouse that can facilitate access to and use of research evidence are: free accessible information; provision of relevant information; provision of user-friendly summaries; quality ratings; provision of search tips; timely access to up-to-date information; notification of recent updates (alerts); and partnerships and promotional efforts. The synthetic construct of health information literacy was identified. The intended effects of clearinghouses can occur at NGO, service delivery, and government levels, and for the purposes of facilitating the availability of research evidence to inform advocacy, managerial decisions, service delivery, and decision-making on systems and policies.

Conclusions: Clearinghouse managers and those wanting to establish new ones should consider the key features identified in this study when undertaking such efforts. They should also consider the intended effects of a clearinghouse, as well as ways to equip their targeted users with health information literacy to effectively maximise a clearinghouse’s usage and achieve its intended effects.

Introduction

Over more than two decades, there have been major policy commitments, resolutions, ministerial summits, and initiatives supported by world leaders, ministers of health, and the policy and research communities to promote the use of research evidence in policymaking (WHO 2000; WHO 2004; Mexico 2004; Bamako 2008; Ghaffar et al., 2008; WHO 2012). However, attempts to promote the use of research evidence have been hampered by four main challenges. First, research evidence competes with many factors in the policymaking process, such as discordance between research evidence and personal beliefs, values, and interests (WHO 2004; Lavis et al., 2004; Lavis et al., 2005; Lavis et al., 2006; Nutley 2007; Lomas 1997; Jewel and Bero 2008). Second, research evidence is undervalued by policymakers as an information input (Lavis et al., 2006; Innvaer et al., 2002; Oxman et al., 2009a; Oxman et al., 2009b). Third, research evidence is often not relevant to the policy issues that policymakers face, which means it is neither a priority of policymakers and stakeholders nor applicable to their local contexts (Lavis et al., 2006; Innvaer et al., 2002; Oxman et al., 2009). Lastly, policymakers and stakeholders contend that research evidence is not easy to use or access (Lavis et al., 2009, Lavis et al., 2005; Innvaer et al., 2002; Oxman et al., 2009). In an effort to overcome one of the barriers (i.e., research evidence is not easy to use), a number of organizations are experimenting with innovative tools by cataloguing information online in the form of web portals or websites, databases, and virtual health libraries, and populating them with content from a particular policy field or subject area, targeted at particular groups, and with a geographical focus at either the regional (i.e., sub-national), national and/or international level. These tools are known as clearinghouses. Clearinghouses can either be independent of or supported by government, and are usually housed within a not-for-profit organization such as a university, a research institute or a medical institution (Basaza et al., 2014; Dobbins et al. Ford 2009; 2010; Kasonde and Campbell 2012, Moat and Lavis 2011).

Although there are theoretical models that explain the development and evaluation of knowledge translation strategies (Lavis et al., 2006; Lavis et al., 2009; Constandriopoulos et al., 2010), there is currently no theoretical model of the key features of clearinghouses as a knowledge-translation strategy. For example, some key features of clearinghouses, such as alerts, quality ratings, search tips, and timely access to up-to-date information, have been identified in studies conducted by Haynes et al. (2006) about McMaster Premium Literature Service (McMaster PLUS), Dobbins et al. (2010) about Health Evidence and Soydan et al. (2010). However, in these studies, the authors did not identify the clearinghouses' intended effects and how their key features can serve as part of a knowledge translation strategy to aid policymakers and stakeholders in accessing and using research evidence. We seek to fill this knowledge gap.

Research objective

The specific objective of the synthesis is to inductively generate a theoretical model of the key features of a clearinghouse and its intended effects in terms of access to and use of research evidence by policymakers and stakeholders.

Methodology

In keeping with our research objective, critical interpretive synthesis was identified as an appropriate methodology for this study. Although a systematic review of effects is well suited for answering questions about the effectiveness of an intervention, and in producing an aggregate synthesis of empirical studies using a highly structured protocol (Noblit and Hare, 1988; Dixon-Woods et al., 2006), it is not suitable for a study that seeks to generate a theoretical framework. As little evidence exists about key features of clearinghouses, it is imperative to use both empirical and non-empirical sources of evidence. As well, the use of quantitative and qualitative studies is germane in assessing what is known empirically about the key features of clearinghouses that facilitate access to and use of research evidence. In light of this, various alternative review methods were considered and assessed to identify the most appropriate approach (e.g., meta-narrative synthesis, realist-review synthesis, meta-ethnography synthesis, and critical interpretive synthesis) (Pawson 2005; Greenhalgh et al., 2005; Dixon-Woods et al., 2006).

Critical interpretive synthesis (CIS) was identified as the most appropriate method for this study for three reasons. First, it is methodologically rigorous. It borrows techniques from meta-ethnography and grounded theory and integrates both quantitative and qualitative research, and both empirical and non-empirical papers, to synthesize a literature review on an issue (Hannes and Lockwood, 2012; Noblit and Hare, 1988; Greenhalgh et al., 2009; Dixon-Woods et al., 2006). Second, CIS developers explicitly state that the objective of a CIS is to generate a theory in an integrative and interpretive way rather than to test existing theories about effectiveness, which are associated with conventional aggregative systematic review methods. Third, unlike conventional systematic reviews, a CIS is not exhaustive and can use non-empirical papers. Therefore, it allows for the use of purposive sampling and theoretical sampling to add, test, and elaborate emerging analysis in an iterative way (Dixon-Woods et al., 2005). To that end, a key defining characteristic of interpretive synthesis is the development of concepts and the specification of theories that integrate those concepts (Dixon-Woods et al., 2005). In CIS, the interpretive analysis that produces the synthesis is conceptual in process and output, and the main product is not an aggregation of data, but a theory (Dixon-Woods et al., 2005).

Review question

Although most conventional systematic reviews begin with an explicit research question, it is neither feasible nor desirable to do so in this review given that the aim of critical interpretive synthesis is to allow the phenomenon of interest (i.e., key features and intended effects of clearinghouses as a knowledge translation strategy) to emerge from the analysis of the literature (Dixon-Woods et al., 2006). As such, in this CIS approach, a tentative research question was posed to guide the initial stages of the review. This tentative question, known as a “compass question” (Eakin and Mykhlovskiy 2003; Dixon-Woods et al., 2006), could be modified in response to findings from the literature review. The compass question was: What are the key features of a clearinghouse and their

intended effects in terms of access to and use of research evidence by policymakers and stakeholders?

Literature search strategy

A multi-faceted search strategy was used to retrieve and assess articles. Greenhalgh and Peacock (2005) suggest strategies for identifying papers for a review, and this approach was utilized. First, an explicit comprehensive search strategy (Appendix 1) was developed with the help of a librarian from McMaster University's Health Sciences Library. This search strategy was built around initial studies on clearinghouses such as Haynes et al. (2006) about the McMaster Premium Literature Service (McMaster PLUS), Dobbins et al. (2010) about Health Evidence, and Soydan et al. (2010) about the Evidence-Based Clearinghouses in Social Work. These papers did state some of the key features of a clearinghouse, but they did not illustrate their intended effects or how they can serve as a knowledge translation strategy in the fields of health and social care. The search strategy was used to run searches on CINAHL, EMBASE, Global Health, Health Systems Evidence (HSE), Ovid Medline, Political Science Abstracts, McMaster Health Forum (MHF)'s Impact Lab, ProQuest, PsycINFO, and Web of Science (which includes both citation indexes in the science and social sciences fields). The searches were conducted from January to April 2013. Second, reference-chaining and hand-searching were used to identify additional relevant papers. All retrieved articles from the ten databases were uploaded into RefWorks software.

Article selection

Articles were selected based on inclusion criteria. We included articles that: (1) were published between 2000 and the dates of the searches conducted in 2013; (2) describe, review, report on and compare the key features and/or intended effects of clearinghouses; (3) use any of the following approaches: commentaries and theoretical studies that describe clearinghouses and the logic behind clearinghouses; observational or survey studies, including interview-based studies that describe perceptions or views about and experiences with clearinghouses; impact (and related process) evaluations of clearinghouses, including randomized control trials, interrupted time series or controlled before/after studies that evaluate the effects of clearinghouses on access to and the use of research evidence, and systematic reviews of any of the aforementioned types of publications; and (4) focus on the broad field of health and social care, including but not limited to the domain of evidence-informed policy. No articles were excluded based on the language in which they were written. The period 2000 to 2013 was used for two reasons. First, the focus on evidence-informed policy has been most prominent in over a decade (WHO 2000). Second, previous studies on the effectiveness of knowledge translation strategies in health used the year 2000 as a limit because very few studies on this topic were likely to exist prior to 2000 (LaRocca et al., 2012; Tetro et al., 2008).

Determination of quality

Critical interpretive synthesis emphasizes the importance of assessing articles' relevance rather than study quality in terms of methodological standards because it recognizes that: (1) qualitative synthesis cannot apply a "hierarchy" of evidence as readily as traditional systematic reviews do; and (2) articles with rich conceptual knowledge may still have some design flaws. On this basis, CIS stresses that a low threshold should be applied to determining the quality of included articles in order to maximize the inclusion of multiple articles (Dixon-Woods et al., 2006). As such, the selection of included articles for this study was based on their relevance and a minimum level of quality, which presupposes that an article could only be excluded if it did not meet a minimum quality standards (e.g., if it score zero or very low in the quality assessment). For empirical papers, the five quality criteria listed in Table 1, which were adapted by Dixon-Woods et al. (2006), were used to assess their methodological quality. For non-empirical papers, the analytical strategy of Boyko et al. (2010) was used to assess their methodological quality and is shown in Table 2. Using the assessment criteria below, both the empirical and non-empirical papers were assessed (Appendices 2 and 3).

Table 1: Criteria for assessing the methodological qualities of empirical papers

Questions	Responses	
1. Are the aims and objectives of the paper clearly stated?	Yes	No
2. Is the research design clearly specified and appropriate for the aims and objectives of the research?	Yes	No
3. Do the researchers provide a clear account of the process by which their findings were reproduced?	Yes	No
4. Do the researchers display enough data to support their interpretations and conclusions?	Yes	No
5. Is the method of analysis appropriate and adequately explicated?	Yes	No

Table 2: Criteria for assessing the methodological qualities of non-empirical papers

Questions	Responses	
1. Is the purpose of the paper clearly stated?	Yes	No
2. Is the rationale or background of the paper provided?	Yes	No
3. Does the paper include adequate information and/or argumentation to support its aims and conclusion?	Yes	No

Data extraction

Data on the aims, methods, interventions (if applicable), authors and focus country, content, target groups, policy field (s), main results/findings, key features of a clearinghouse, and intended effects of the clearinghouses were extracted using a data extraction form (Appendix 4). The key features were identified at the data extraction stage whereas the generally shared features were identified at the synthesis stage. Data were coded, organized, and managed using working tables to categorize and sort emerging themes during the analysis and synthesis stages.

Synthesis

A key part of critical interpretive synthesis is the development of a synthesizing argument. This argument uses the derived evidence both to construct a theoretical framework and to illustrate the relationships between concepts and key features of the phenomenon under study. To develop a synthesis argument, we used a five-step process developed by Dixon-Woods et al. (2006). First, the extracted data were compared and analyzed to identify emerging themes of generally shared features of a clearinghouse as distinguished from the key features. Second, the identified themes were framed into concepts and “synthetic constructs.” Third, a critical analysis of the literature was conducted to identify disagreements in the evidence. Fourth, constructs were developed to explain the relationships between the key features of clearinghouses and their intended effects. Finally, following the principle of theoretical saturation, data were continually reviewed and critiqued until the principal researcher felt satisfied that no new constructs could be identified or developed. In the end, the synthesizing argument that we developed provided a conceptual framework that explains the link between the key features of a clearinghouse and their intended effects.

Results

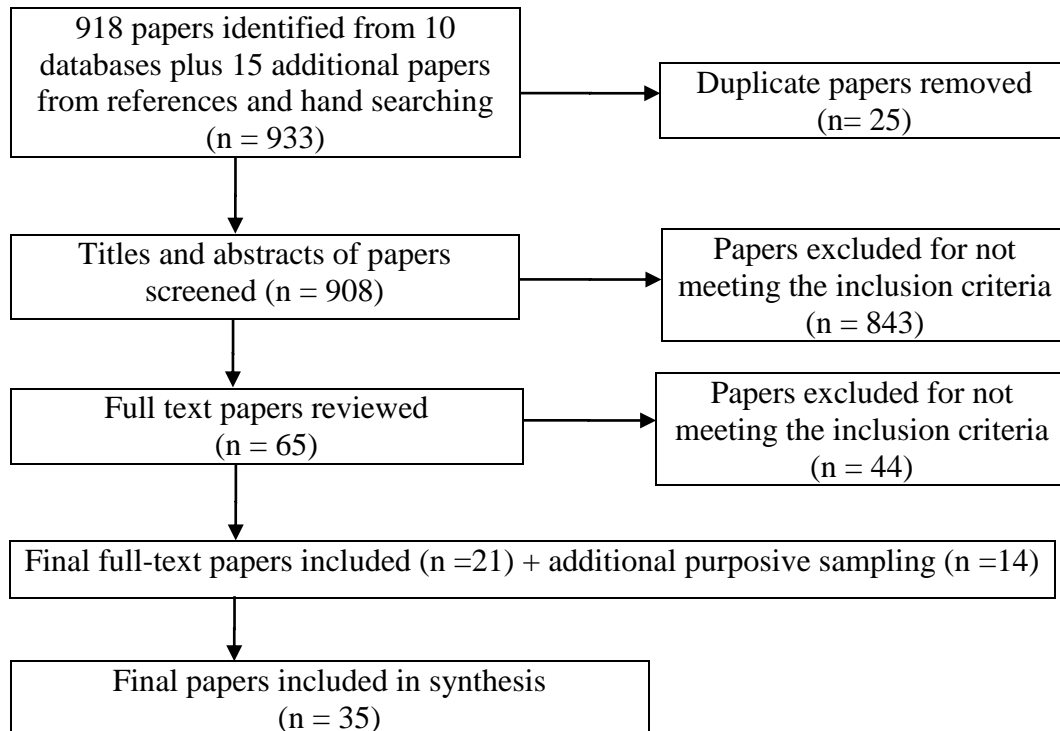
A total of 933 articles were retrieved (918 articles from 10 databases plus an initial 15 additional article obtained via hand-searching) as indicated in the flowchart below (Figure 1) and 25 articles were removed as duplicates. The titles and abstracts of the remainder of the 908 articles were assessed, with 843 articles excluded because they did not meet the inclusion criteria. For the 65 articles retrieved, the full texts were independently assessed by two independent reviewers ((Appendix 7); 21 were included, and kappa was 0.77 (95% CI: 0.61 – 0.93) – meaning a 95% chance that the estimated kappa (0.77) lies between 0.61 – 0.93 – signifying substantial (very good) agreement between raters (Landis and Koch, 1977). Disagreements were resolved by consensus. Fourty four articles were excluded because they did not meet the inclusion criteria.

The included papers were classified into 11 broad policy field and content areas: health and social care (n = 6); health services (n = 2); HIV policy (n = 2); public health (n = 2); sexual and reproductive health (n = 2); social policy (n = 2); child welfare (n = 1); diabetes and paediatric care (n = 1); drug policy (n = 1); environmental health (n = 1); and mental health policy and depression (n = 1) (Appendix 4). Of the 21 included papers, 12 were empirical papers and 9 were non-empirical papers (Appendix 4). After identifying the initial 21 articles, 14 additional articles were purposively sampled to achieve theoretical saturation and to fill gaps in the literature (Appendix 5). These articles were grouped into the following policy fields and content: evidence-based information/decision-making (n = 6); cancer control (n = 1); health monitoring and reporting (n = 1); health promotion and chronic disease prevention (n = 1); health policy and health systems (n = 1); HIV/AIDs (n = 1); malaria control policy (n =1); maternal and child health (n = 1); and pandemic influenza preparedness (n = 1) (Appendix 5).

We did a constant comparative analysis of the purposively sampled papers and the original 21 papers (Glasser 1967). Although new policy fields and contents were found after the 14 purposively sampled were analyzed and compared with the original 21 papers, we did not find additional insights or themes in relation to the key features of a clearinghouse and its intended effects, which led us to conclude that theoretical saturation was achieved (Glasser 1967; Creswell 2007).

Although we explicitly searched for articles published in any language, we did not find any articles published about a clearinghouse in languages other than English. In comparing the empirical and non-empirical papers, we found that the key features argued, stated, or found to facilitate access to and use of research evidence were predominantly found in the empirical papers, while the theoretical/non-empirical papers mostly outline or describe the generally shared features of a clearinghouse. In addition, among the key features identified, partnerships and promotional efforts were predominantly identified as key features in the included empirical papers. The quality assessments show that the empirical papers were of a high quality, with scores ranging from 4 to 5 (80% to 100%), while the non-empirical papers ranged from good to high quality, with scores ranging from 2 to 3 (67% to 100%). Due to the fact critical interpretive synthesis stresses relevance and a minimum level of quality, no papers were excluded. In keeping with the critical interpretive methodology, no paper was excluded based on the quality rating, since it could still be relevant and contribute to the theoretical framework. Disagreements in the evidence are discussed in the end of this section.

Figure 1 - Flow chart of the articles included for synthesis



General shared features of a clearinghouse

Our review of the literature found certain generally shared features of a clearinghouse. The generally shared features refer to those common features that are found in most clearinghouses.

Target audiences

Clearinghouses target a range of audiences. Professionals and policymakers tend to be the primary audiences. However, some clearinghouses, such as the HIV Case Manager Portal, target broader audiences such as HIV service providers, peer educators, and community health professional agencies (Medias et al., 2011). The included articles represent a range of clearinghouses that target: policymakers, health systems managers, and public health professionals in Canada and internationally (Dobbins et al., 2005; Moat and Lavis, 2011); health professionals such as nurses, primary health care physicians and mental health professionals (Barnett et al. 2004; Dearness and Tomlin 2001; Fitzpatrick 2007; Ford 2009; Haynes et al., 2006); and in two cases a mix of policymakers, child welfare professionals, and educational stakeholders (Soydan et al., 2010; Tuters et al., 2012).

Geographical focus

A review of the included studies shows that a clearinghouse can have a provincial/state, national, or international focus. The NHS evidence portal, NeLMH, the HIV Case Manager portal, and Information Rx focus at the national level in the UK and USA (Ford 2009; Mendias et al., 2011; Fitzpatrick 2007), while the Environment and Health Network's (HENVINET) clearinghouse focuses on providing environmental health information to countries across Europe (Liu et al., 2012). Lastly, the WHO Reproductive Health Library (RHL) is focused on low-and-middle income countries at the international level and HSE is focused on all countries (Gulmezoglu et al., 2006; Moat and Lavis, 2011).

Open and advanced search

We found in this review that almost all the clearinghouses discussed in the included papers have a search engine with open and advanced searches as generally shared features. An open search engine enables users to perform broader searches. The advanced search enables users to restrict searches to specifics such as title, abstracts, and keywords, and to use Boolean terms to search and locate articles. It also enables users to filter their searches to eliminate unnecessary and irrelevant topics, and to allow users to customize and to refine results by topic, type of information, sources, and to search for results by review quality (Bracke et al., 2008; Dobbins et al., 2004; Dong and Mondry

2004; Ford 2009). A related feature is the provision of a thesaurus to provide users with synonyms that represent the same or related words or variations in spelling (e.g., obstetrics or midwifery, programme or program). (Booth et al., 2010; Dobbins et al., 2004; Bracke et al., 2008; Barnett et al., 2004; Dong and Mondry 2004; Fitzpatrick 2007; Ford 2009; Haynes et al., 2006; Weir et al., 2010).

User-friendliness

An important generally shared feature of a clearinghouse is user-friendliness, and it has two dimensions. First, it implies that a clearinghouse must be easy to identify or find on the internet and easy for users to find information that they are searching for (Soydan et al., 2010; Horvath et al., 2012). Additionally, it means that papers deposited into a clearinghouse should ideally be free of technical jargon (i.e., written in plain language) so they can easily be understood by their targeted users (Soydan et al., 2010; Horvath et al., 2012; Tuters et al., 2004).

Availability of information in multiple languages

A review of the included articles suggests that for a clearinghouse to be able to provide information to more people, it has to overcome language barriers. As such, to be considered relevant both nationally (in countries where multiple languages are spoken) and internationally, a good clearinghouse provides accessible information in several languages. Three of the included studies mentioned these features (Gulmezoglu et al., 2006; Mendias et al., 2011; Moat and Lavis 2011). For example, the HIV Case Manager Portal provides information in two languages (i.e., English and Spanish) to users (Mendias et al., 2011) and the RHL hosted by the WHO is published in three languages and a search can be done in any of the three languages (Gulmezoglu et al., 2006) while Health Systems Evidence is available in seven languages (Moat and Lavis 2011). This enhances its ability to provide information to policymakers and stakeholders around the world, which can improve its usage internationally.

Inclusion of grey literature and other relevant documents

Another generally shared feature of a clearinghouse is the inclusion of grey literature and other relevant documents. For example, the OERE requires the inclusion of grey literature in its clearinghouse (Tuters et al., 2012). Although Health Systems Evidence has at its core a database of systematic reviews and economic evaluations, it also contains a large amount of grey (unpublished) literature (Moat and Lavis 2011). For example, it contains unpublished systematic reviews and economic evaluations and unpublished policy-relevant documents that are neither systematic reviews nor economic evaluations (i.e., health system descriptions) (Moat and Lavis 2011). This is a very important feature because grey literature and other relevant documents such as institutional documents can be highly relevant to the needs of policymakers and stakeholders.

Links to others' resources

An important generally shared feature of a clearinghouse is its ability to provide links to other resources. These resources could be links to other articles and databases both at the domestic and international levels, and links to other documents that cannot be downloaded from the site. The European Public Health Information System (EUPHIX) provides links to the Health-EU portal, and to other websites (Achtenberg et al. 2008). Both the maternal and child health portal and the clearinghouse on pandemic influenza preparedness provide links to other websites that provide additional information on maternal and child health issues and “promising practices” in treating pandemic influenza internationally (Khanna et al., 2013; La France et al., 2010).

Feedback and dialogue space

Another of the generally shared features of a clearinghouse is the provision of a feedback section where users can provide feedback about them; some have a dialogue space for online interaction among users instead. A feedback mechanism enables end users to identify a need for information, request particular information, report challenges that they are facing in getting information, and ask for assistance in accessing the information. The feedback mechanisms are provided through features such as a “contact us” button with an email that solicits feedback from users (Dobbins et al., 2010; Mendias et al., 2011). Three of the review articles identified a dialogue space or an interactive forum in the form of an instant messaging feature, a chat room, a blog, or a discussion forum as key features of a clearinghouse (Horvath et al., 2012; Nordfeldt et al., 2012; Xie et al., 2013). These features provide a platform for participants to engage in online dialogue with one another, and allow for developers or information specialists of the clearinghouse to constructively engage with the users and answer their queries (Nordfeldt et al., 2012; Horvath et al., 2012; Xie et al., 2013).

Sustainability

We found sustainability to be an important generally shared feature of a clearinghouse. A sustainable clearinghouse is one that is able to serve its target population for a long time, and can provide confidence among policymakers and stakeholders that information will be available when they need it (Soydan et al., 2010). Based on a review of the included papers, a sustainable clearinghouse has five dimensions. The first is the availability of human resources. A clearinghouse needs a research team/ technical staff with the expertise and competencies in the relevant health and social care sectors, to review and rate articles to be uploaded, as well as to update old content (Barnett et al., 2004; Tuters et al., 2012). Additionally, in order to successfully run a clearinghouse, sustainable funding is required to enable clearinghouse developers to recruit staff, pay their salaries, and cover other logistical costs such as equipment, computers, printing, and

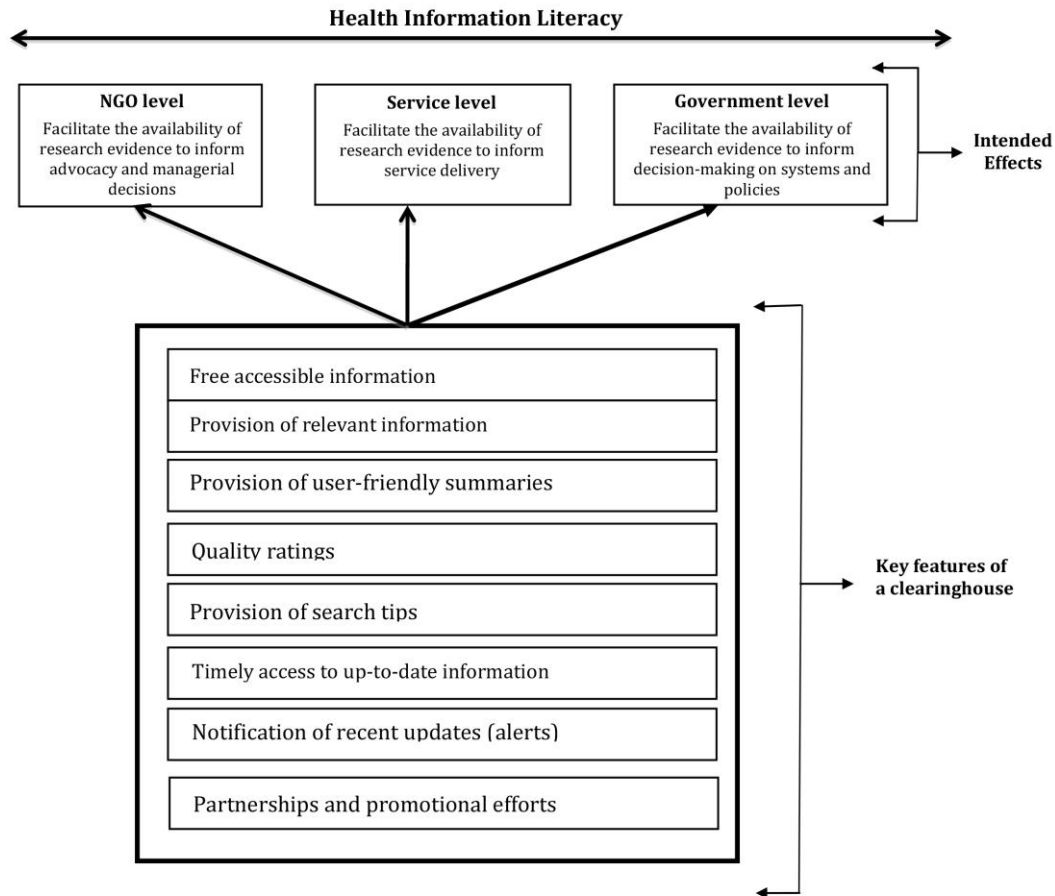
general maintenance (Dobbins et al., 2010). A third dimension is information sustainability. To avoid research evidence deficits, there is a need for timely updates of the clearinghouse with recent publication of research evidence (Barnett et al., 2004; Dobbins et al., 2010; Horvath et al., 2012; LaPelle et al., 2006).

The fourth dimension is technological sustainability. To make information in the clearinghouse accessible and navigable requires constant updates of its software and functions to make it up-to-date with current technology (Dobbins et al., 2010; Tuters et al., 2012). Finally, brokerage sustainability is an important generally shared feature. To create awareness and promote use of research evidence from the clearinghouse, there is a need for the continuous deployment of research champions or knowledge brokers to lead in brokerage roles and to facilitate the use of research evidence from the clearinghouse (Tuters et al., 2012).

Theoretical model: key features and intended effects of clearinghouses on access to and use of research evidence

On the basis of the findings from the synthesis of 35 included papers, a theoretical framework was developed illustrating the key features of clearinghouses and their intended effects on access to and use of research evidence by policymakers and stakeholders (Figure 2). This section discusses the following: (1) the key features of a clearinghouse identified as promising to facilitate access to and use of research evidence; (2) the overarching synthetic construct (health information literacy); and (3) the intended effects of a clearinghouse. The theoretical framework postulates that the key features in combination with health information literacy have the intended effects of facilitating the availability of research evidence at the NGO, service and government levels, and for the purposes of informing advocacy and managerial decisions, service delivery, and decision-making on systems and policies. These key features of a clearinghouse are distinguished from the generally shared features because they are those that are found, stated or argued, based on the literature review, to have the effect of promoting access to and use of research evidence by policymakers and stakeholders. The generally shared features were not similarly argued to have an explicit effect.

Figure 2: clearinghouse as a knowledge translation strategy



Key features of a clearinghouse

The following key features were found, stated or argued, as having the effect of facilitating access to and use of research evidence by policymakers and stakeholders: (1) free accessible information; (2) provision of relevant information; (3) provision of user-friendly summaries; (4) quality ratings; (5) provision of search tips; (6) timely access to up-to-date information; (7) notification of recent updates (alerts); and (8) partnerships and promotional efforts.

Free accessible information

An important key feature of a clearinghouse is free access to information (Zimmeren et al., 2006; Khanna et al., 2013). The provision of free access to information from a clearinghouse was found to facilitate evidence utilization (Khanna et al., 20013; Haynes et al., 2006). A number of the clearinghouses provide free full-text articles; and others provide free registration, free full-text guidelines, and ordering of available prints free of charge (Dobbins et al. 2004; Dong and Mondry 2004; Fitzpatrick 2007; Ford 2009; Haynes et al., 2006; Mendias et al., 2007; Booth and Wright 2010; Moat and Lavis 2011).

Provision of relevant information

Our review found that providing relevant content in a clearinghouse is an important key feature needed to meet the needs of their targeted users, and in facilitating access to and use of research evidence (Barnett et al., 2004; Gosine-Boodoo et al., 2013). One of the clearinghouses provides information solely on public health (Dobbins et al., 2004), while some focus on practice guidelines (Fitzpatrick 2007; Haynes et al., 2006). Additionally, some provide information on primary care, HIV, mental health and depression (Barnett et al., 2004; Dearness and Tomlin 2001; Mendias et al., 2011), while other clearinghouses provide information on health and economic evaluation of interventions, health technology assessments (HTA), and sexual and reproductive health (Booth and Wright 2010; Gulmezoglu et al., 2006).

Provision of user-friendly summaries

The provision of user-friendly summaries is a key feature of a clearinghouse that is posited to facilitate access to and use of research evidence (Horvath et al., 2012; Tuters et al., 2012). Some clearinghouses provide a standardized short summary template (2-4 pages) for each review containing a synopsis of the key points, as well as the purpose, method, and findings, and the application of findings to research and practice (Dobbins et al., 2004; Tuters et al., 2012). One of the clearinghouses requires a research team to write summaries of information before depositing them onto the website, and to present the information at a low reading level (Horvath et al., 2012). The Information Rx clearinghouse provides summaries of each guideline that has been uploaded (Fitzpatrick 2007). Health Systems Evidence provides a 1-page summary covering the title, type of document, type of question, health systems topic(s), domain, the last year the literature was searched, quality rating, country focus, and links to one or more user-friendly summaries and scientific abstracts (Moat and Lavis 2011). Essentially, the user friendly summaries described above, and SUPPORT tools provided in the EVIPNet VHL, which build capacity to make use of these user-friendly summaries, help policymakers and stakeholders to quickly grasp what the information is about, and to assess and exercise sound judgements on whether it is good fit with the policy issue under consideration, and its applicability to local contexts, before deciding whether or not to retrieve the full-text article or guideline.

Quality ratings

In most clearinghouses, quality ratings have been developed to assess the quality of articles (Soydan et al, 2010), and this review indicates that quality ratings facilitate the use of research evidence by target audiences (Haynes et al. 2006). Staff of Health Systems Evidence and Rx for Change clearinghouses use the AMSTAR tool to assess the methodological quality of systematic reviews before uploading them onto the clearinghouse (Moat and Lavis 2011; Weir et al., 2010). Health Evidence has developed a tool to assess the methodological quality of each review in its database (Dobbins et al., 2010). Finally, the review panel of the Health and Environment Network's (HENVINET) clearinghouse uses six evaluation criteria to determine the quality of a Decision Support Tool (DST) before uploading it onto the database: (1) user friendliness; (2) causal chain approach; (3) robustness; (4) user application history; (5) applicability; and (6) uncertainty (Liu et al., 2012).

Provision of search tips

Our review found that the provision of search tips has the potential to facilitate access to and use of research evidence from a clearinghouse (Haynes et al., 2006; Khanna et al., 2013; Mendias et al., 2011; McNairy et al., 2012). In most clearinghouses included in this review, search tips are provided via a short description on how to use them, videos, and guiding manuals or educational aids. For example, the National Health Service (NHS) evidence portal in the UK provides an *Evidence Introductory Guide* that provides tips for searching (Ford 2009). The WHO RHL provides practical guidance and implementation aids in the form of an educational video to guide and orient obstetricians, other clinicians, and policymakers in developing countries on how to use the clearinghouse (Gulmezoglu et al., 2006), and Health Systems Evidence provides both a short description and a video on how to search for information (Moat and Lavis, 2011).

Timely access to up-to-date information

Our review of the included papers found that the provision of timely access to up-to-date information (i.e., updating the content of the clearinghouse continually with the latest evidence) helps to facilitate the use of research evidence by end users, as policymakers and stakeholders require recent relevant research evidence to inform planning, programmatic decisions, and policy development (Barnett et al., 2004; Booth & Wright 2010; Dobbins et al., 2010; Ford 2009; Haynes et al., 2006; Horvath et al., 2012; LaPelle et al., 2005; Mendias et al., 2011; Tuters et al., 2012; LaFrance et al., 2010; Gosine-Boodoo et al., 2013; Soydan et al., 2010).

Notification of recent updates (alerts)

A key feature of a clearinghouse is an alert system that alerts users to current topics of interest. In the field of evidence-based information, this feature is essential in alerting practitioners to new, high quality, relevant research findings for their discipline

(Haynes et al., 2006). In most clearinghouses, this requires a user registration with username and password, and this information can then be used by programmers, system analysts, and webmasters to alert the user of new research evidence in general, or a particular topic of interest that the user has indicated during the registration process (Moat and Lavis 2011). The registration feature enables clearinghouse developers to profile users and assess demographics or trends of usage. The provision of alerts were found or argued to facilitate access to and use of research evidence from clearinghouses by their targeted audiences (Haynes et al., 2006; Johnson et al., 2008; Khanna et al., 2013).

Partnerships and promotional efforts

We found in the included review that partnership and promotional efforts are key features that have the potential to facilitate and influence the use of research evidence. The literature highlighted partnerships in the form of collaboration among clearinghouse developers, health professionals, health care providers, and users for consultation, content creation, dissemination, and updating of information (Barnett et al., 2004; Nordfeldt et al., 2012; Sanchez et al., 2012; Sinnock et al., 1991; Turner et al., 2002; Tuters et al., 2012; Weir et al., 2010; Zimmeren et al., 2010). A number of the included papers suggested promoting the clearinghouses to their targeted users and outlined a number of promotional activities that could promote awareness and increased use of the clearinghouse, such as: (1) printing and distribution of new materials about the site; (2) announcement of the site; and (3) public presentation and electronic notification of site updates (Barnett et al., 2004; Gulmezoglu et al., 2006; Khanna et al., 2013; La France et al., 2010; McNairy et al., 2012; Sanchez et al., 2012).

Synthesizing construct: health information literacy

The review has identified the key features of a clearinghouse that help to facilitate access to and use of research evidence by policymakers and stakeholders. However, it must be noted that the presence of these key features alone does not necessarily guarantee access to and use of research evidence. Research evidence requires knowledge and literacy skills to be used effectively. Health information literacy is an overarching synthetic construct that links the key features of a clearinghouse to achieving its intended effects of promoting access to and use of available research evidence by policymakers and stakeholders. Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Nielsen-Bohlman et al., 2004). Sorensen and colleagues argue that “health literacy is linked to literacy and entails people’s knowledge, motivation and competencies to access, understand, appraise, and apply health information in order to make judgments and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain or improve quality of life during the life course” (Sorensen et al., 2012). These definitions apply to patients or consumer decision-making and not solely to decision-making. Therefore, applying this to decision-making, health information literacy can be defined to include knowledge and skills in searching, finding, retrieving, understanding, appraising and/or contextualizing

information and using it effectively to inform advocacy, managerial, systemic, and programmatic policy decisions.

We deduced the synthetic construct of health information literacy from the synthesis through two mechanisms (Appendix 6). The first was the articulation in the included articles about the lack of what we came to recognize as health information literacy affecting access to and use of research evidence. Dobbins and colleagues posit that one of the barriers to research utilization by public health decision-makers in Canada is a lack of skills in critically appraising the reviews (Dobbins et al., 2004). Dearness and Tomlin's (2001) article on the National Electronic Library for Mental Health (NeLMH) asserts that the two main barriers to the implementation of evidence-based medicine (EBM) and evidence-based health care (EBHC) are "the lack of rapid access to high-quality-evidence and the limited skills of clinicians and policymakers in evidence-based practice" (p.2). In addition, Mendias and colleagues posit that low health literacy hampers the utilization of research evidence by health care professionals to inform health care services delivery for HIV-infected persons. This is supported by the finding that the inability of public health professionals to locate information that is available, including difficulties using search terms, hampers information access and utilization (Mendias 2011; LaPelle et al., 2006). These statements, assertions, and claims illustrate that health information literacy is an essential key resource in evidence utilization, and suggest a need for supplementary training to equip policymakers and stakeholders with health information literacy to enable them to use clearinghouses effectively.

The second mechanism was by examining the ways in which the clearinghouses emphasized the provision of certain design features to enable targeted users to use research evidence from the clearinghouse. Some of the key features of clearinghouses identified in the included review contribute to the overarching thematic domain of health information literacy. For example, a number of the articles provided search tip supports in the form of descriptions or search strategies (Dobbins et al., 2010; Booth et al., 2010); video materials, implementation aids or educational videos on how to use the clearinghouses (Gulmezoglu et al., 2006); and a video and training module on how to use a clearinghouse (Mendias et al., 2011). To illustrate, Mendias and colleagues point out that the HIV Case Manager Portal was developed with features such as "*HIV/AIDS 101 Training Module*" to improve the knowledge of health professionals, and those providing health services to HIV-infected persons (Mendias et al., 2011). The NHS clearinghouse provides an *Introductory Guide to Searching* to enable users to use the clearinghouse (Ford 2009). All these features are intended to empower targeted users by equipping them with the skills to run searches on the clearinghouses; locate and retrieve the information; evaluate the information; and use the information to solve a given problem. Undoubtedly, they contribute significantly to the theoretical concept of health information literacy. All in all, the discussions above suggest that health information literacy is crucial for understanding research evidence and its utilization. Clearinghouses should attempt to help targeted users achieve a higher level of health information literacy needed in order to use them by providing users with search tips in the form of videos and manual instructions, and by providing information in user-friendly summaries (i.e., short summaries in a plain

language and at a low-grade reading level) for easy comprehension by policymakers and stakeholders (Horvath et al., 2012; Tuters et al., 2012; Mendias et al., 2012).

Intended effects of clearinghouses in terms of access to and use of research evidence

This section discusses the intended effects of clearinghouses. The articles included in this review varied in their degree of explicitness about the intended effects of clearinghouses. As well, these intended effects could be deduced from the stated aims and objectives of the articles reviewed, as well as the descriptions, reported features, and evaluations of the clearinghouses included in this review. The intended effects of clearinghouses in relation to facilitating the availability of research evidence could occur at the levels of non-governmental organizations (NGOs), services, and government, and for the purposes of advocacy, informing managerial decisions, informing service delivery, and informing decision-making on systems and policies.

NGO level

Our review indicates that clearinghouses are intended to facilitate the availability of research evidence that could be used by those working in the NGO sector for advocacy and informing managerial decisions. Some clearinghouses provide research evidence to managers of HIV NGOs (also known as AIDS service organizations (ASOs) or community-based organizations (CBOs) (Mendias et al., 2012; Horvath et al., 2012). Some provide relevant information to social service workers (Sinnock et al., 1991). As well, one of the clearinghouses provides research evidence on malaria to malaria control program managers and global health policy advisors “for use in advocacy” (Moyes et al., 2013, p.1).

The maternal and child health portal in India contains published documents on maternal and child health (i.e., maternal health, newborn and child health, nutrition, immunization, diseases and general information) that those working for NGOs could draw research evidence from to inform advocacy or managerial decisions at the country level (Khanna et al., 2013). Portal developers described interacting with technical persons from governments and other NGOs for selecting and disseminating materials, suggesting that it has relevant information that could be used by NGO workers (Khanna et al., 2013). Moreover, it contains materials on “*policies, programs and guidelines*” [*italics in original*], including *technical publications* [*italics in original*] such as case studies, reports, and advocacy materials that could be used by those working in NGOs (Khanna et al., 2013).

Furthermore, some of the clearinghouses provide relevant information on public health, health promotion, and reproductive health that both local and international NGOs working in these policy fields, such as Care, World Vision, and Plan International, among others, could draw research evidence from to inform programmatic, operational and systemic-level decisions (Dobbins et al., 2010; Foster et al., 2005). The users of the “Promising Practices” clearinghouse for pandemic influenza include community-based organizations and educational associations, suggesting that those working for humanitarian NGOs such as Relief International and the International Federation of Red

Cross and Red Crescent Societies (IFRC) could use expert-reviewed pandemic preparedness practices to inform pandemic or disaster response management or preparedness capabilities in four areas: models for care, communication, mitigation, and at-risk groups (LaFrance et al., 2010).

Service level

A number of the included papers suggest that clearinghouses are intended to facilitate the availability of research evidence that could be used by stakeholders (e.g., health professionals) to inform health services delivery. For example, McMaster PLUS provides high quality, relevant clinical information to physicians, and it has led to increased utilization of clinical evidence by practicing physicians (Haynes et al., 2006). As well, we found that the Primary Care Office InSite provides clinical practice guidelines, educational materials, drug prescriptions, cost information, and referral information to practicing physicians. It has had the intended effects of enabling health care providers “to know what are the key diagnostic, treatment or referral actions appropriate for a given problem” (Barnett et al., 2004 p.3). It is expected that healthcare professionals could use the information to inform health services delivery.

In addition, the HIV-related clearinghouses provide credible, up-to-date prevention and treatment information that could be used by health providers to improve services delivery and provide quality care for HIV-infected persons (Horvath et al., 2012). Moreover, we found that Rx for Change and the HIV Case Manager Portal provide available information on strategies to improve drug prescription and use, drug assistance programs, formularies, and social services (i.e., services and benefits) to health care professionals, case managers of HIV-infected persons and other health providers (Mendias et al., 2011). Lastly, the NHS portal provides implementation tools, practice guidelines and policy documents that health professionals and social workers could use to inform health care and social services delivery decisions (Ford 2009; Weir et al., 2010). Overall, it is expected that HIV service providers, other health care professionals, peer educators, social workers, and those working at community health agencies, health centres, and hospitals could use the information from the aforementioned health and social services related clearinghouses to inform health and social services delivery improvement strategies or decisions.

Government level

At the government level, clearinghouses are intended to facilitate the availability of research evidence that could be used by policymakers as an input to policy decision-making. Based on the reviewed literature, the intended effects of a clearinghouse in relation to the use of research evidence at the government level in policy development/policymaking could take three forms:

Use of research evidence to inform guideline development

At the government level, it is expected that policymakers and stakeholders could use research evidence from the clearinghouse to inform guideline development (Ford 2009). One of the papers stated that a clearinghouse on pandemic influenza preparedness provides expert-reviewed, internationally “promising practices” in managing pandemic influenza, including “promising practices specific to H1N1 response” (LaFrance et al., 2010, p.8). It is also worth noting that the National Guidelines Clearinghouse provides clinical practice guidelines that could be used by health professionals and policymakers to inform a country’s guidelines development (Fitzpatrick 2007).

Use of research evidence to assess trends and inform programmatic decisions and planning

At the government level, it is expected that policymakers and stakeholders could use research evidence from the clearinghouse to assess trends as part of problem identification and for planning. For example, three of the reviewed articles suggested that policymakers and stakeholders could use data from the clearinghouses to assist in evidence-based planning on cancer control programs, maternal and child health, and to reveal the status and trends in the progression or decline of a disease at the country level (Khanna et al., 2013; Sanchez et al. 2012; Xie et al., 2012).

Use of research evidence to inform policy development/policymaking

A number of the articles suggested that the clearinghouses are intended to provide up-to-date relevant information that could be used by decision-makers to inform decision-making. A paper on social services clearinghouses stated that they are intended to provide evidence on what works in social work interventions and services to policymakers and stakeholders to inform decision-making on current and planned practice (Soydan et al., 2010 p.9). A paper on a public health clearinghouse stated that it has been used by public health decision-makers in Canada and abroad, and stressed the need to evaluate its impact on policy, which suggests that it is intended to inform policy development at the government level (Dobbins et al., 2010). A paper on the HEVINET clearinghouse explicitly states that it is intended to provide Decision Support Tools (DSTs) to be used by decision makers to support policymaking on environmental health, and stated the number of DSTs users by administrative levels (i.e., regional, municipal/urban level and national levels) and by health authorities (Liu et al., 2012 p. 10).

Disagreements in the evidence

We found disagreements in the evidence on key issues about the design features in some of the papers. First, there were disagreements among HIV website-managers on the use of graphics and imagery and interactive features such as message boards or chats (Horvath et al., 2012). On the one hand, managers of HIV websites targeted at users from developing countries preferred to limit the use of graphics, and argued that users from low-and middle-income countries with slower bandwidth would not be able to access

information with more graphics; on the other hand, HIV website managers in the USA whose target audiences are in the USA, did not have this concern because bandwidth speed is comparatively much higher in the USA (Horvath et al. 2012). In addition, Moyes and colleagues on the Malaria website argue that “the entire site, including the data explorer and resource browser, has been designed to be accessible from low bandwidth environments and in its first year the site has been accessed by visitors from each country in the malaria-endemic world with the exception of the Central African Republic” (Moyes et al., 2013), suggesting that technological design and not slower bandwidth has an impact on access. Second, HIV website managers in the USA had a concern about having interactive features such as message boards, messaging or chats on grounds that they do not have the infrastructure to support their use (Horvath et al., 2012), and argued that it requires a significant time investment to moderate the discussions, to ensure that information posted is accurate, and to make sure that some users do not exploit other website users (Horvath et al., 2012). Again, this conflicts with findings in some of the empirical papers, where participants stated that features such as online discussion forums, chat rooms, and blogs are needed to promote dialogue among users and health care providers in order to share experiences and to obtain feedback about the websites (Nordfeldt et al., 2012; Xie et al., 2013). Notwithstanding the disagreements, it suggests that user bandwidth and the resources of website managers are two important factors to consider when deciding how the clearinghouse content should be presented (Horvath et al., 2012).

Discussion

Clearinghouse managers and those who want to develop a clearinghouse need to know those design features that are relevant to their targeted users and can facilitate the use of research evidence by policymakers and stakeholders for policymaking. This review culminated in the development of a theoretical framework to show how a clearinghouse can serve as a knowledge translation strategy. First, the review addressed the key features that are generally present in a clearinghouse: (1) free accessible information; (2) provision of relevant information; (3) provision of user-friendly summaries; (4) quality ratings; (5) provision of search tips; (6) timely access to up-to-date information; (7) notification of recent updates (alerts); and (8) partnerships and promotional efforts. Second, the review identified three intended effects of a clearinghouse aimed at facilitating the availability of research evidence, which can be used by: (1) those working in health-related NGOs for advocacy, and for informing managerial decisions; (2) health professionals to inform health services delivery; and (3) policymakers and stakeholders in government to inform decision-making. Third, the review identified the concept of health information literacy as an overarching synthetic construct that can serve as a link to facilitate the utilization of research evidence from the clearinghouses by policymakers and stakeholders.

Value added and comparison with other studies

This study adds value in two respects. First, the reviews provides a theoretical framework that explains the key features of a clearinghouse and their intended effects in

relation to the utilization of research evidence by policymakers and stakeholders, which had not previously been identified. Second, it contributes to addressing some of the barriers to research utilization. For example, we identified user-friendly summaries as an essential key feature of a clearinghouse that can facilitate access to and use of research evidence. This feature can address the fourth challenge to research utilization (i.e., research evidence is not easy to access or use), by ensuring that research evidence is presented in user-friendly formats (i.e., in plain language) that enables better comprehension. Third, we identified relevant content as an essential key feature that can address the second challenge (i.e., research evidence is undervalued by policymakers as an information input), and facilitate the utilization of research evidence.

The theoretical framework complements other theoretical frameworks related to knowledge translation (Graham et al., 2006; Lavis et al., 2006; Lavis et al., 2005). Graham and colleagues' knowledge-to-action cycle begins with knowledge creation, which is composed of three phases: knowledge inquiry (i.e., the production of primary research), synthesis of knowledge (i.e., systematic reviews), and creation of knowledge tools (i.e., practice guidelines) that become useful to end users (Graham et al., 2009). In Graham and colleagues' knowledge creation cycle, emphasis is laid on working with stakeholders to establish an explicit process related to prioritizing activities on knowledge creation, and is consistent with our finding on establishing partnerships and promotional efforts for content creation/co-production and dissemination of research evidence to end users.

More importantly, the partnership and promotional efforts feature is consistent with a previous study which found that a higher level of engagement between researchers and policymakers is associated with an increased prospect of research evidence being used (Lavis et al., 2005), and the linkage and exchange efforts to link evidence to action (Lavis et al., 2006). The identification of health information literacy as a synthetic construct is consistent with previous studies which show that barriers to the utilization of health information included users' inability to understand and appraise the information, and their inability to independently find reliable and relevant information (Austvoll-Dahlgren et al., 2013). It thus suggests that strategies should be undertaken to provide users with the capacities and skills to acquire, assess, adapt, and apply research evidence to action (CHSRF 2005).

Strengths and limitations

This study has three strengths. First, it is the first study that explores the key features of a clearinghouse and its intended effects as a knowledge translation strategy in the field of health and social care sectors. Second, we included both empirical and non-empirical papers in our synthesis in order to obtain a richer data, and identify what are known empirically and theoretically as the key features and intended effects of clearinghouses. Third, this study is methodologically rigorous in that it follows the method of conventional systematic review by using, for example, a clear inclusion and exclusion criteria, and a search strategy that can be replicated by others, but also uses purposive sampling to fill gaps.

There are two weaknesses to this study. First, we limited the inclusion of articles dated between 2000 and 2013, and it could be the case that we have omitted some relevant articles written before that period. However, our additional purposive sampling did not have any publication date limits, and we included an article written before 2000. Second, we did not seek papers written about clearinghouses outside the health and social care sectors, which could have provided additional insights about the key features of a clearinghouse and its intended effects as a knowledge translation strategy.

Implications for policy and practice

The theoretical framework that we have developed has several implications for policy and practice. First, it can be used to guide the development and evaluation of clearinghouses that seek to promote the use of research evidence to inform decision-making. In particular, some of the key features identified are actionable. For example, user-friendly summaries have the potential to facilitate access to and use of research evidence by policymakers and stakeholders, and this suggests that clearinghouse developers should consider providing user-friendly summaries for documents uploaded into the clearinghouses, and which show how the study can be translated into policy and practice.

Next, clearinghouse developers should understand that timely posting of new research evidence and its dissemination via alerts and promotional efforts (i.e., announcement of the site, and public presentations) is needed if it is to be used by policymakers as an input into policymaking. Policymakers need relevant research evidence that can guide them in the policy development decision-making processes, and clearinghouse providers should provide relevant documents to policymakers and stakeholders. Promotional efforts could influence the uptake of research evidence, suggesting that there is a need for clearinghouse developers to collaborate and continually interact with policymakers and stakeholders.

Lastly, although clearinghouses can address some barriers to research utilization and equip targeted users with some health information literacy, supplementary interventions are needed in order to maximise their usage. Therefore, funders for clearinghouses should consider providing clearinghouse developers with more funds to enable them to undertake periodic skill building workshops with policymakers and stakeholders to orient them about how to use the clearinghouses and how to contextualize the information to inform policy decision-making. Clearinghouse developers and their staff could train workers at ministries of health and civil society organizations on how to use research evidence from the clearinghouse to inform policy decisions. These interventions are needed in order to maximise usage of the clearinghouses to achieve their intended effects.

Implications for future research

The study has two implications for future research. First, although we have developed a theoretical framework highlighting the key features of a clearinghouse and its intended effect as a knowledge translation strategy based on the evidence in the included

papers, it has not been empirically tested. As such, future research could evaluate the key features of a clearinghouse and the construct of health information literacy in order to confirm these findings. Second, the long term goal of clearinghouses is to support change in health systems and impact on policy and practice, and further research is needed to evaluate how clearinghouses can contribute to these programmatic objectives and policy outcomes, ideally through case studies that involve conducting interviews with policymakers, and undertaking documentary analysis, to determine whether and how research evidence from the clearinghouses were used to inform policy decisions and which clearinghouse features affected usage patterns. As well, the study has the potential to open a new research agenda that could explore how to reliably measure the use of research evidence from the clearinghouses.

Conclusion

We have developed a theoretical framework to illustrate how certain key features of a clearinghouse can facilitate access to and use of research evidence by policymakers and stakeholders. Our theoretical framework indicates that if clearinghouses are developed with the identified design features and users have an adequate level of health information literacy, we should see greater access to and use of research evidence by policymakers and stakeholders. This implies that in addition to building in the identified design features, clearinghouse developers could undertake periodic training, short courses, and skills development programs in evidence-based decision-making to enhance the skills of their users to find and appraise research evidence, and link research evidence to action. Current and prospective clearinghouse developers should consider the key features and intended effects of a clearinghouse identified in this review, and consider ways to equip their target audiences with health information literacy in order to facilitate the use of research evidence from the clearinghouses.

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Appendix 1: Search strategy

The following search terms (Ovid Medline(R) In-Process and Other Non-Indexed Citations and adapted with other databases) are to be combined (terms within columns combined with “OR” and terms within each cell combined with “AND”

Synonyms used for clearing houses	AND	Synonyms used for use of research evidence	AND	Synonyms used for target audience	AND	Synonyms used for where research evidence may be used
<u>Clearinghouses</u>		<u>Evidence</u>		<u>Policymakers and Stakeholders</u>		<u>Policy</u>
Clearinghouse*		Use of research evidence		Policymaker*		Policy
One-stop shop*		Evidence-based		Policy-maker*		Policies
Health portal*		Evidence-informed		Policy maker*		Policymaking
Web-based portal*		Evidence-based- policy		Stakeholder*		Policy making
Knowledge portal*		Knowledge-translation		Decision-maker*		Policy-making
Knowledge portal*		Evidence uptake		Decision maker*		Policymaking process
Knowledge summar*		Evidence-based-decision-making		Researcher*		Policy-making process
Online repositor*		Evidence-based policy-making		End-user*		Decision-making
Online database*		Evidence-informed policymaking		End user*		Decision making
Website*		Evidence-to-policy		User*		Decision-making process
		Information-utilisation				Decision*
		Information-utilization				
		Knowledge-utilization				
		Knowledge-utilisation				
		Knowledge-broker				
		Knowledge-transfer				

		Knowledge-exchange Knowledge-mobilisation Knowledge-mobilization Knowledge-to-action Research-dissemination Research-utilisation- Research-utilization Research-to-policy Research transfer Research-translation				
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Appendix 2: Assessing the methodological qualities of empirical papers

	Barnett et al (2014)	Dobbins et al. (2010)	Foster et al. (2005)	Gulmezoglu et al. (2006)	Haynes et al. (2006)	Horvath et al. (2012)	LaPelle et al. (2005)	Liu et al. (2012)	Mendias et al. (2011)	Nordfeldt et al. (2012)	Weir et al. (2010)	Xie et al. (2013)
Methodological quality												
Are the aims and objectives of the paper clearly stated?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the research design clearly specified and appropriate for the aims and objectives of the research?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do the researchers provide a clear account of the process by which their	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

findings were
produced?

Do the
researchers
display enough
data to
support their
interpretations
and
conclusion?

Is the
analytical
approach
appropriate
and
adequately
explicated?

Total score &
percentage

Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5/5 (100%)	5/5 (100%)	5/5 (100)	5/5 (100%)	5/5 (100%)	5/5 (100%)	4/5 (80%)	5/5 (100%)	5/5 (100)	4/5 (80%)	5/5 (100%)	5/5 (100%)	5/5 (100%)

Appendix 3: Assessing the methodological qualities of non-empirical papers

	Booth and Wright (2010)	Bracke et al. (2008)	Dearness and Tomlin (2001)	Dong and Mondry (2004)	Fitzpatrick (2007)	Ford (2009)	Soydan et al. (2010)	Tuturs et al. (2012)	Zimmeren et al. (2006)
Methodological quality									
Is the purpose of the paper clearly stated?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the rationale or background of the paper provided?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Does the paper provide adequate information and/or argumentation to support its claim or conclusion?	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Total score & percentage	2/3 (67%)	3/3 (100%)	3/3 (100%)	3/3 (100%)	2/3 (67%)	3/3 (100%)	3/3 (100%)	3/3 (100%)	3/3 (100%)

Appendix 4: Characteristics of included studies identified through the initial searching process

Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re- sults/finding	Quality Rating	General fea- tures of a clearinghous- e	Key fea- tures	Intended effects of a clearing- house
Barnett et al. (2004) (USA)	To describe the important characteristics of the Primary Care Office InSite (PCOI), and the specific functions that improve the workflow of practicing clinicians. and outlines the limitations of the current implementation	Descriptive paper, sample size not given.	Primary health care	Health care professionals, primary care physicians	Authors found that “over 1600 logged in 60,000 separate sessions in the past year” and the website “contains information on clinical practice guidelines, patient education materials, drug prescription, cost information and referral information.” Anecdotal evidence suggests that the PCOI has been able to achieve its objective of improving patient care.	5/5 (100%)	Search engine Links to re- sources Practice Alert Feedback section Timely access Partnerships & Promo- tional efforts	Timely access to up-to-date informa- tion Relevant, accurate informa- tion/conte nt Partner- ships & promo- tional ef- forts	Health Sys- tem/health ser- vice delivery level The PCOI pro- vides clinical practice guide- lines, patient education mate- rials, drug pre- scription and cost and referral information to be used by phy- sicians during routine patient care activity. (delivery ar- rangement) of health systems

Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General fea- tures of a clearinghous- e	Key fea- tures	Intended effects of a clearing- house
Bracke et al. (2008) (USA)	To describe “the devel- opment of a tool by the Arizona Health Sci- ences Library (AHSL) for searching clinical evi- dence that can be customized for different user groups.”	Qualitative paper	Evi- dence- based medi- cine (EBM)	Health care pro- fessionals(physi- cians) Sample size not stated	Authors found via anecdotal feedback from physicians that the portal is a potential tool in teaching evi- dence-based decision-mak- ing, and has provided phy- sicians with a useful tool to quickly access evidence.	3/3 (100%)	Search engine that federates clinical evi- dence in a single result set Search tool incorporated with librarian design hedges Filters to customize re- sults	Not stated	Health Sys- tem/health ser- vice delivery level Given that it is targeted at phy- sicians, it is in- tended to facili- tate use of evi- dence to inform clinical decisions at hospital set- ting.
Dearness and Tomlin (2001) (UK)	To describe the develop- ment of the National Electronic Li- brary for Mental Health (NeLMH)	Descriptive paper	Health services (mental health policy)	Mental health pro- fessionals, primary care pro- fessionals and health policy personnel	The portal has the potential to become “the first port of call for health re- lated enquir- ies”, whether “from physi- cians, patients, carers, clini- cians or librari- ans” and “act	3/3 (100%)	The NeLMH has a number of features: 1) links to full text articles; 2) non-peer reviewed materials such as commentaries ;3) making the abstracts	Partner- ships and promo- tional ef- forts (en- gagement with tar- geted us- ers and organiza- tions rep- resenting	Health System/ health service delivery level “The aims of the NeLMH are to: provide easy ac- cess to best cur- rent knowledge, improve health and health care, clinical practice

					as a gateway to the best available evidence in a summarized and understandable form.”		available for a wider variety of internet devices; and 4) translating materials into other languages	those users for content creation led to its acceptability and use)	and patient choice” (p.2), hence its intended effect could occur at health systems/health service delivery level.
Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main results/finding	Quality Rating	General features of a clearinghouse	Key features	Intended effects of a clearinghouse
Dobbins et al. (2010) (Canada)	To describe the “health-evidence.org, a knowledge management tool, which is one component of a more comprehensive knowledge management strategy being developed to facilitate evidence-informed public health deci-	Systematic review	Public health	Public health professionals Policy-makers and health promotion workers. Sample size not stated	There were “1913 reviews in the health evidence.org registry in 21 public health and health promotion topic areas,” and “78% have been assessed as being of strong or moderate methodological quality.” It “receives	3/3 (100%)	Free user registration A free –text search system Timely access/up-to-date information Provision of search tips A built-in feedback mechanisms	Timely access to up-to-date information	NGO, health system/health service delivery & Government levels “The goal of evidence.ca is to promote evidence-informed public health decision-making through facilitation of decision maker access to, retrieval, and use of best available synthesized re-

	<p>sion in Canada.”</p>			<p>approximately 35, 000 visits per year, and 20, 596 were visitors, representing approximately 100 visits per day.”</p> <p>“The majority of the users (67%) access the website from direct traffic (e.g., via the health-evidence.org bookmarked, or type it directly into their browse).”</p> <p>There has been increasing consistent use of the portal by public health decision makers, and it has the potential to strengthen evidence-informed public health decision making.</p>		<p>Links to full-text articles</p> <p>Quality ratings (an assessment of the methodological qualities of each review in evidence.ca (strong, moderate & weak)</p> <p>A standardized short summary template (2-4 pages) for each review</p> <p>A sorting (filter) system that allow users to narrow search</p>	<p>search evidence in evaluating the effectiveness of public health interventions.”</p> <p>Authors state that “Public health nurses, program managers, health promotion workers, researchers and program coordinators are the largest groups of users, followed by dietitians, medical officers of health & nutritionists.”</p>
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General features of a clearinghouse	Key features	Intended effects of a clearing-house
Dong and Mondry (2004) (USA)	To describe “a one-stop shop and download site that allows access to multiple Critically Appraised Topics (CAT) libraries” by physicians.	Descriptive paper/theoretical	Health services (evidence-based medicine and critically appraised topics (CAT) for clinicians	Health professionals (physicians) No sample size stated.	The CAT provides a common platform that allows access to multiple libraries, and enables physicians to retrieve clinical information to inform their decisions.	5/5 (100%)	Topic areas : cardiology, emergency, medicine, and endocrinology Search options Filters to eliminate irrelevant topics Links to original full-texts articles and which can be retrieved and extracted into PDA Coding scales	Not stated	Health system/health services delivery level The one-stop-shop seeks to provide relevant clinical topics from multiple critically appraised topics (CAT) libraries to physicians to inform clinical decision making in relation to patient diagnosis and treatment, hence its intended effects could occur at health services delivery level.
Fitzpatrick (2007) (USA)	To describe the development of the	Descriptive paper	Health services (evidence-based medicine and critically appraised topics (CAT) for clinicians	Health care professionals,	The article provides a description of the	2/3 (67%)	Search engine; “structured	Not stated	Health System/health services delivery

	National Guideline Clearinghouse		dence- based clinical practice guide- lines and re- lated docu- ments)	health care providers, clinicians, physicians , health plans, in- tegrated delivery systems, and pur- chasers	key features of the National Guidelines Clearinghouse, and concludes that it has the potential to provide a one- stop-shopping links for clini- cal practice guidelines for librarians and health practi- tioners.		abstracts or summaries of each guide- line”; “links to full text guide- lines and/or ordering in- formation for available print copies” “Palm OS versions of downloadable summaries for all guidelines in the NGC.” “Guidelines syntheses, which are comparisons of guidelines covering similar top- ics.”		level Authors state that “It is in- tended that the database content be used by health care pro- fessionals to obtain objective, detailed infor- mation on clini- cal practice guidelines, and to further their dissemination, implementation, and use.” (p.2) It also falls within the pro- vider-targeted strategy of im- plementation ar- rangement.
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re- sults/finding	Quality Rating	General fea- tures of a clearinghouse	Key fea- tures	Intended effects of a clearing- house
Ford (2009) (UK)	To “outline how nurses can make best use of the” NHS Evi- dence Web portal and “explain its features.”	Descriptive /theoretical paper	Health and so- cial care	Health profes- sionals and poli- cymakers (nurses, healthcare workers, and poli- cymakers working on training and policy develop- ment in clinical and non- clinical evidence and best practice	NHS is benefi- cial to nurses as: (i) it pro- vides quick ac- cess to evi- dence-based information; (ii) saves nurses’ time in accessing rele- vant, up to date materials; and (iii) provides teaching aids.	3/3 (100%)	Regular alerts through RSS Monthly bul- letin Content/topic area Free sub- scription Search en- gines to direct users to six topic areas: clinical re- search; com- missioning; drugs and technologies; social care, education and learning tools. Filters to rapidly filter results and to allow users to	Timely access to up-to-date informa- tion Search tips	NGO, govern- ment. social and health services delivery levels NHS provides up-to-date clini- cal and non- clinical informa- tion and best practices on health and social care; hence it could be used by health profes- sionals, and so- cial workers in NGOs. It can also be used by policymakers as it contains “im- plementation tools, guidelines and policy documents” (p.2). “NHS evidence

							<p>refine and navigate into topic areas displayed by relevance and date of publication</p> <p>NHS Introductory Guide to Searching</p> <p>Formally accrediting sources of information or guidance</p>		<p>can also benefit those working on policy development...many policy makers tend to rely on resources from hospital websites or their own experience.”“Using NHS now means they do not have to start from scratch in compiling and assessing information” (p.2), hence its intended effects could occur at the levels of government, NGOs, and social and health services delivery.</p>
Foster et al.(2005) (Canada)	To examine emergency contraception website use and user pro-	Descriptive paper	Health services (reproductive health	Health service providers and potential	For the 19-month period, “the Arabic website received 39, 217	5/5	Homepage, FAQ pages	Education outreach and collaboration (partner-	Health systems/health service delivery and NGO and government

	files over a 19-month period		and emergency contraception)	user of the EC throughout the Arab world	visits, with a monthly average of 2064 visits.” Over the 19-month period, “average visits consisted of 2 pages, average visit duration was 8 minutes and 37 seconds.” Websites was assessed by “an average of 449 different organizations in a month”, with “approximately 24% of the organizations registered in the United States and Canada, and 9% of the organizations were international.”			ships and promotional efforts)	<p>levels</p> <p>Authors state that the website has been used by some international organizations which could be NGOs & government.</p> <p>Also, given that the website provides guidance on contraceptives, it could be used by health professionals; hence its intended effect could occur at the health system/health services delivery level.</p>
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General features of a clearinghouse	Key features	Intended effects of a clearing-house
Gulmezoglu et al. (2006) (Mexico and Thailand)	“To evaluate the effects of an active, multifaceted educational strategy to promote the use of the WHO Reproductive Health Library (RHL) on obstetric practices”	RCT (n = 1000 in Thailand and n = 1022 in Mexico). Doctors, midwives, physicians. 22 hospitals in Mexico and 18 hospitals in Thailand participated	Sexual and Reproductive Health	Health professionals (doctors, midwives, physicians)	The multi-educational intervention did not affect significantly affect four of the ten targeted practices. However, for the remaining six practices, selective policy increased in the intervention group in Thailand, and increased use of caesarean section in Mexico “but no differences in labour companionship, magnesium sulphate use for eclampsia, corticosteroids for women delivering before 34	5/5 (100%)	Short practical guidance documents Implementation aids (educational videos) Published in English French and Spanish Topics areas	Partnerships and Promotional efforts	Health System/health service delivery level The intervention was targeted at providing health workers in two hospitals in Mexico and Thailand with the skills to search for and use evidence from the RHL to improve practice in obstetric care. It falls within the provider-targeted strategy of implementation arrangement.

					<p>weeks and vacuum extraction.”</p> <p>Awareness of the Reproductive Health Library (RHL) in both Mexico and Thailand led “to increased access to and use of the RH.”</p>				
Haynes et al. (2006), (Canada)	To evaluate “a cluster-randomized control trial of 203 participating physicians in Northern Ontario comprising a Full-Serve version (that include alert to new articles and a cumulative database of alerts) with a	RCT/Quantitative/empirical N= 203 Physicians in Northern Ontario.	Evidence-based information	Health professionals (physicians in Northern Ontario)	“Mean logins to the library rose from 0.77 logins/month/user (95% CI, 0.43, 1.11) in the Full Service group compared with the Self-Serve group.” Proportion of Full-Serve participants who used the service during each month did in-	5/5 (100%)	<p>Scientific appraisal</p> <p>Links</p> <p>Search engine</p>	<p>Alerts</p> <p>Quality ratings</p> <p>Search tips</p> <p>Timely access to up-to-date information</p>	<p>Health system/health service delivery level</p> <p>Given that McMaster Plus seeks to provide free digital library service for all physicians in Northern Ontario to inform clinical decisions, its intended effects could occur at health system /health service delivery level.</p>

	Self-Serve version (that include a passive guide to evidence-based literature)."				crease during the intervention period, "a relative increase of 57% (95% CI 12, 123) compared with the Self-Serve group." Authors found that "a quality online rated literature services increased utilisation of evidence-based information from a digital library by the practicing physicians."				
Horvath et al. (2012) (USA)	To describe managers' experiences of the decision-making process of developing the content of HIV-related websites.	Descriptive paper Empirical paper n = 21 Managers of HIV-related websites	HIV policy	Managers of HIV-related websites , NGO workers and policymakers	Providing up-to-date information and presenting information in low reading level increased use of evidence from the clearinghouse.	4/5 (80%)	Support summaries Feedback option Writing published articles in plain language or	Timely access to up-to-date information User friendly-summary	NGO, health system and Government level According to page 6, the target audiences are managers of HIV NGOs, AIDS Service Organizations (ASO), or

		were interviewed via semi-telephone interview			<p>Websites were developed to provide HIV information to patients, researchers, clinicians and to meet certain demographic needs. Content development was determined by the purpose of the organization, HIV expertise, availability of resources and user bandwidth.</p> <p>Providing more graphics and features may hinder access and use for those with slow internet.</p>		<p>lower grade level</p> <p>Provide mechanism for feedback</p> <p>Instant messaging</p> <p>A message board and a chat room</p> <p>Have a higher internet bandwidth to ensure that technology allows users to access the website</p>	ries	<p>Community-Based Organizations (CBOs); six participants had the title editor-in-chief, four had the title president or founder of their organization, three had the title of director or coordinator of education, three had the title of director of communication or operations, and three had the titles of project manager, analyst and specialist. And authors state that “6 of them were created for persons living with HIV, two for physicians, one for policy makers and one for persons working for ASOs/CBOs.”</p>
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General fea- tures of a clearinghouse	Key fea- tures	Intended effects of a clearing- house
LaPelle et al. (2005) (USA)	To discuss and charac- terize the in- formation needs of pub- lic health pro- fessionals, identify in- formation seeking be- haviours, and assess barriers to information access	Qualitative study n= 19 indi- vidual in- terviews and focus group in- terviews with public health pro- fessionals in the areas of commu- nicable disease control and community health promotion.	Public health	Public health pro- fessionals in the ar- eas of communi- cable dis- ease con- trol and commu- nity health promotion .	Informants in- dicated the need for improved information access and the establishment of a single web portal with a good search engine, alert features, inclu- sion of grey literature and better ways to archive infor- mation. Feedback from informants was used to develop a hypothetical ideal model of information organization and delivery, and was endorsed by subjects who re- viewed it.	5/5 (100%)	A good search engine Access to best practice in- formation in many areas of interests that extend beyond biomedical subject matter Improved ac- cess to grey literature as well as sys- tematic re- views, sum- maries and full- text articles Better methods of indexing, filtering and searching for information Effective ways to archive information ac- cessed	Timely access up-to-date infor- ma- tion Auto- matic no- tification of newly available infor- ma- tion (alerts)	Government level The article sought the views of government employees in communicable disease control and community health promotion about accessing information from a number of da- tabases; hence its intended effect will occur at the government level.

Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General fea- tures of a clearinghouse	Key fea- tures	Intended effects of a clearing- house
Liu et al. (2012) (Belgium)	To provide an overview of the Health and Environ- ment Network (HENVINET) Decision Support Tools (DSTs) Meta Database (MDB) of the HENVINET portal. It aims to encourage and facilitate additional ef- forts in mak- ing DSTs better known, more used, and therefore, more useful.	Qualitative studies Empirical	Envi- ron- mental health in “four priority areas: asthma and al- lergies, cancer, neuro- devel- opment disor- ders, and en- docrine disrup- tors medi- ated- diseases .”	Policy- makers, health pro- fessionals	The DSTs are designed to ad- dress most common pol- lutants found in the atmosphere. The four prior- ity issues: asthma and al- lergies, cancer, neurodevel- opment disorders and endocrine disruptors are addressed by the DSTs, and most DSTs are designed to ad- dress the most common deci- sion-making area in envi- ronment and health, public health protec- tion and air quality man- agement.	5/5 (100%)	Free compul- sory registra- tion Add informa- tion on new DSTs Editing ex- isting DSTs and guideline provided to new users on how to do that. A free text space for pro- viding re- views and comments on new DSTs for improvements of tools Provide two search en- gines for	Note stated	Government level The article ex- plicitly states that the clear- inghouse pro- vides Decision Support Tools (DSTs) to sup- port policymak- ing; outlines policymaking areas that DSTs can be applied to (p.9); and number of DSTs users by administrative levels (i.e., European level, municipal/urban level; national authority; pri- mary health care; regional authority; secon- dary health care;

					<p>The most common user of the DSTs is the level authority and 60% of the DSTs cover one or two decision-making levels. Authors found that the DSTs are pre-dominantly used by environmental scientists and researchers compared to administrators and health professionals. As such, the authors suggest a need to develop DST for wider application, relevant to more decision-making areas, and more suitable for use by administrators and health professionals.</p>		<p>searching by user's own words and search by fixed categories</p>		<p>and sectoral authority” (p. 10). Therefore, it intended effect would occur at government level.</p>
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General fea- tures of a clearinghouse	Key fea- tures	Intended effects of a clearing- house
Mendias et al. (2011), USA	To present an overview of the HIV Case Manager portal, summary of the review, and discussion.	Descriptive study. A theoretical paper.	HIV policy	Nurses and social workers, case managers, HIV service providers, peer educators, community health agencies with HIV-infected patients and/or clients.	Reviewers like the portal and view it as having potential benefits to both experts and novice case managers, clinicians, health care providers and clients. Features liked most by reviewers were resources and educational materials, videos, content and language, and the HIV/AIDs Training Module.	4/5 (80%)	Registration of a username and password and to complete a short user-profile Feedback option provided via the “contact us” button on the website Client Tools Case manager Tools (forms, accessing social services, a continuing education (CEU) tracker, upcoming events/conferences, and locating other	Timely access to up-to-date information Search tips	NGOs, gov- ernment, and health services delivery levels The authors state that the HIV Case Manager Portal (www.hivcase-manager.com) is a one-stop, online resource targeted at “community health agency personnel and health care professionals providing services for persons with HIV” (P. 3), including case managers for HIV-infected persons and HIV service organizations. As such,

							case workers. Resources (video shows) and available in both Span- ish and Eng- lish Search tips via video materials HIV/AIDS 101 Training Module		its intended ef- fect would occur at NGO and health systems. /health services delivery levels.
Nordfeldt et al. (2012), (Sweden)	To “explore practitioners’ perception of using an open-access interactive web-portal tailored to young diabe- tes type 1 pa- tients and their guardian or significant others.”	Qualitative study n= 18 Interviews with 18 profession- als on dia- betes team and essay writing Content of essay were then ana-	Diabe- tes care and paediat- ric care	Health care pro- fessionals	Practitioners expressed positive evaluation of the web-portal	5/5 (100%)	Discussion forums Blog tools Links to blogs created by patients with diabetes and guardians Self-care treatment in- formation	Partner- ships and promo- tional ef- forts	Health Sys- tem/health ser- vice delivery level The article fo- cuses on the per- ception of health professional on paediatric dia- betes care teams (i.e., skill mix- multidisciplinary team) towards a diabetes web

		lyzed					<p>Research up- dates</p> <p>News from local practi- tioners</p> <p>Partnerships among practi- tioners, users, and clearing- house devel- opers</p>		<p>portal.</p> <p>Authors reported that practitioners use the portal on a daily basis to inform practice, and adapt to pa- tients’ needs, hence its in- tended effect would occur at health system /health services delivery level, where health services are pro- vided.</p>
Soydan et al. (2010) (USA)	“To describe several evi- dence-based clearing- houses fo- cused on so- cial work and related inter- ventions, placing them in the context of how such clearing-	Descriptive study Description of four clearing- houses	Social services (social work and Child welfare)	Profes- sionals, social workers, and decision makers	The key fea- tures of the websites are promising and future research is needed to evaluate how the impact policy and practice.	3/3 (100%)	<p>“Target groups”</p> <p>“Rating Scales”(Quali- ty ratings)</p> <p>“Topic areas”</p> <p>“Transpar- ency”</p> <p>“User friend-</p>	Quality ratings	<p>NGOs and Government levels</p> <p>Authors state that the clear- inghouses seek “to support real- time decision making” by policymaker practitioners, and citizens, and</p>

	houses can contribute to research dissemination to foster evidence-based practice.”						liness” “Cutting edge information” “Sustainability”		since the clearinghouses focuses on social services interventions, its intended effects occur at government & NGO levels.
Tuters et al.(2012) (Canada)	To describe the content development of the Ontario Education Research Exchange (OERE), “an online hub hosting research summaries and facilitating community building between education stakeholders ... and members of educational organizations across Ontario.”	Descriptive study	Social policy/social section (education policy)	Educators and education organizations and education professionals	The number of peer reviewers required to conduct an efficient peer reviewed process is daunting; timeliness and regular follow up with reviewers is necessary; managing data and tracking summaries through the review process all benefited from the systematic strategies	3/3 (100%)	Plain language research summaries of 2-4 pages Provision of information free of charge Inclusion of grey literature Maintaining up-to-date information Provision of user summaries Partnerships and promotional efforts	Timely access to up-to-date information User-friendly summaries (plain language) Partnerships and promotional efforts	Government level Authors state that “the OERE “is intended to inform the work of Ontario Education stakeholders,” and facilitate the exchange of applied research knowledge “between researchers, practitioners, policy makers, and education organizations across Ontario” (p.24).

Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/finding	Quality Rating	General features of a clearinghouse	Key features	Intended effects of a clearing-house
Weir et al. (2010) (Canada)	To describe the method for developing RX for Change database and highlight its key content and the significance of the database for health care policymakers, researchers, professionals and consumers	Systematic review, Systematic review, n= 218 included studies.	Drug policy	Health care policymaker health professionals	It synthesizes current research evidence about the effects of interventions to improve drug practices and medicine use. Collaboration with organizations that have strong links with health care decision-makers to promote the use of research evidence and ensure that the data is available to the general public, health care professional and policymakers	5/5 (100%)	Provision of useful summaries that are relevant to decision makers Feedback loop for receiving feedback Search engine USE AM-STAR rating scale to determine the eligibility of reviews Content	Partnerships and promotional efforts	Health System/health services delivery level Authors state that “Our goal for the RX for Change database is to provide an overall synthesis of the evidence from systematic reviews on the effectiveness of interventions for improving prescribing by healthcare professionals and medicine use by consumers” (p.2), hence its intended effects could occur at the health services delivery level.
Xie et al. 2012	To describe the technical	Descriptive paper	Primary health	Policy-makers at	Since its establishment in	5/5	Collaborative access to data	Partnerships and	Government and health sys-

(China)	details of the design and implementation of a web-based national renal registry system in Mainland China, and to assess “prevalence, mortality rates and trends of renal disease over time by primary diagnosis, treatment modality and other socio-demographic variables.”		care policy (renal disease registry)	provincial health departments and provincial quality control centers, nurses, health professionals and physicians in hospitals	2010, about “3699 dialysis centres submitted their data to the registry.” “Over 270,000 patients were enrolled and the number is increasing.” The results show that “59% were male, and the average age at initial dialysis was 51.2 years.”		across multiple dialysis centres and hospital with user authentication and role bases security (partnerships) Intuitive electronic case report reform (CRFs); real time data validation; online; data audit capabilities; document storage and sharing, central database and backups; data export function for statistical purposes; data exchange interface for	promotional efforts	tem/health services delivery levels Authors state that, “The CNRDS plays a role as an online clinical information system, as well a health administration database. Nephrologists can use the system to reorganize the process of care delivery, and establish a renal database to manage, track, and analyze large amount of clinical information to improve decision-making.” (P.8) At the government level, “The database
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							bulk import of data from other regional registries, two social networking features (online discussion and messaging).		can also potentially be used for clinical research and administrative statistics” (P.8), and may be used to reveal the status and trends of renal disease in Mainland China.
Zimmeren et al. (2006) (Belgium)	To explore the clearinghouse model in the field of genetic diagnostic, describe the concept of a clearinghouse, types, their functions, features, advantages and disadvantages in genetic diagnostic testing	Descriptive study	Health services (genetic diagnostic testing and the provision of clinical diagnostic testing services)	Health care providers and stakeholders (patent holders, clinical geneticists , laboratories or clinics)	Authors argue that: (1) negotiations between patent holders and licensee will lead to access to the patented intervention; (2) continuous and ongoing demand of information from the clearinghouse will facilitate access to and use of information from the clear-	3/3 (100%)	Free text searchable database Information service that lists available information Provide partnering, mediating and managing facilities.	Access to information Free of charge accessible information Partnerships and promotional efforts	Health System level Given that the clearinghouse focuses on patented genetic inventions, it falls with the patent and pricing subcategory of the commercial authority category within the governance arrangements of health system, hence its intended effects could occur at

					<p>inghouse; (3) the participation of industries or patent holders; (4) removal of fees for users to access information; and (5) matching licensees and the patented interventions could facilitate access to and use of information from the clearinghouse. Authors conclude that the Royalty Collection Clearinghouse could be useful in providing access to and use of patented interventions in genetic diagnostics. However, its establish-</p>				health system level
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					ment at the national or regional level, supported by an international umbrella organization will be complex, time-consuming, and expensive.				
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Appendix 5: Characteristics of included studies identified through purposive sampling

Author(s) & country of focus	Purpose of the study	Study design	Policy field	Setting and target audience	Main results /finding	Quality Rating	General (common) features of a clearinghouse	Key features of a clearinghouse	Intended effects of a clearinghouse
Achtenberg et al. (2008) (European countries)	To describe the European Union Public Health Information System (EUPHIX)	Descriptive paper (non-empirical)	Health monitoring and reporting	Policy makers, public health experts. Educated lay people in the European Union (EU), and Health professionals	Descriptive piece. Authors describe the development of the EUPHIX model.	3/3 (100%)	<p>The features of the EUPHIX include: search options, links to Health-EU Portal, and reference links to other websites.</p> <p>The presentation of the EUPHIX is divided into 5 parts: (1) regularly filled with new information; (2) easy-to-browse knowledge and data; (3) functional tables, graphs and maps; (4) interactive references and links; and (5) developed and reviewed by public</p>	Not stated	<p>NGO, health system and Government level</p> <p>Authors state that, “The EUPHIX project focused on various target audiences: policymakers at European, national and regional level, including the Commission’s services; public health professional and academia; the media and the better informed general public (p.3)</p>

							health experts.		
Fitzpatrick (2008) (Australia)	To provide the background of the PEDro clearinghouse and highlights the basics for searching its content	Descriptive piece (non-empirical)	Health services (evidence-based-decision making in Physiotherapy)	Health professionals Conceptual framework No sample of participants stated	Descriptive piece. Author only provided a description of the key features of the PEDro clearinghouse and has not evaluated them or discussed their effects.	3/3 (100%) 3/3	Basic and advanced search functions Abstracts and links to full versions of documents Provision of monthly updates PEDro scale to rate randomized controlled trial Navigation bar at the top with links to home, search, question, tutorial, and links to resources, supporters and search help	Not stated	Health System/health service delivery Level Given that PEDro clearinghouse provides access to randomized controlled trials, systematic reviews, and evidence-based practiced guidelines in physiotherapy, its use will occur at health system level. It occurs within by whom care is provided domain of the delivery arrangement of health system, and within the sub-category of skill mix-multidisciplinary teams.
Gosine-Boodoo et al. 2013	To evaluate the usability of	Survey of 122 persons.	Evidence-based in-	Health care personnel, li-	The TTVHL is viewed	5/5 (100%)	Full-text materials	relevant content	NGO, and health system/health services

(Trinidad and Tobago)	the Trinidad and Tobago Virtual Health Library (TTVHL) website among employees, students and ‘walk-ins’ in health care environments	Empirical paper	formation	brary/information personnel, persons outside the biomedical and library/ information fields	positively by users. User identified relevant content as the most useful feature of a website. The survey led to a majority of participants’ awareness of the site and visit to the site. However, the finding suggests that health care professionals in Trinidad and Tobago are unaware of the clearing-		Hypertext and numerical data Indexes Website functionality (i.e., easy to navigate) Bibliographic databases Dictionary Products for teaching, learning and decision – making in health care	Timely access to up-to-date information	delivery level Given that it is targeted at health personnel and those outside the biomedical, its intended effects could occur at NGO and health system/health services delivery levels.
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					house.				
Jetha et al. (2008) (Canada)	To present an overview of the development of the Canadian Best Practices Portal and outline how an evolution of best practices methodology and evidence will contribute to health promotion and chronic disease prevention policy, practice, and research	Qualitative paper	Health services (health promotion and chronic disease prevention)	Health promotion practitioners, health professionals and Policy-makers	The article provides a background leading to the development of the Canadian Best Practices Portal, highlights its key features and potential for enhancing evidence-informed policy-making on health promotion and chronic disease prevention	3/3 (100%)	Search tips Short summary of interventions listed in the portal Invitation for researchers, practitioners and policymakers to nominate interventions, resources, and partners for consideration for potential inclusion on the site	Not stated	Government level Given that the portal is targeted at public health practitioners and policymakers in chronic disease prevention and health promotion, it intended effects could occur at the Government level.

Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re-sults/findi ng	Quality Rating	General fea- tures of a clearinghouse	Key fea- tures	Intended effects of a clearinghouse
Johnson et al. (2008) (USA)	To de- scribe the system ar- chitecture and user accep- tance of a suite pro- gram that delivers infor- mation about newly up- dated re- sources to clinicians' personal digital as- sistants (PDAs)	Quan- titative (sur- vey), em- pirical paper	Health services - evidence- based medicine (EBM) or infor- ma- tion	Health profes- sionals (physi- cians/clinicians) Sample size not started	The article reported that of the 816 head- lines alerted to the 16 study partici- pants from National Guidelines Clearing- house, Cochrane Reviews, the Na- tional In- stitute of Health, Up- date, and Scientific American Medicine, Scientific Medicine American generated	5/5 (100%)	Free open access application Filters to custom- ize results	Alerting users to newly updated content	Health system/health service delivery level Given that the PDA alerts provide up-to-date evidence to health professionals to inform clinical practice, its in- tended effects could occur at the health sys- tem/health services delivery level.

					the highest proportion of head-lines request (35%) and physicians indicated that use of the PDA alerts enabled them to learn new development in the field				
Khanna et al. (2013) (India)	To describe a health portal in India aimed at providing a one-stop access to efficiently searched, organized, and shared maternal and child	Empirical paper	Maternal and child health	Primary care professionals and health policy personnel Sample size not stated	The portal was launched in 2010 and provided free access to full-text of 900 resources materials categorized under specific topics and	5/5 (100%)	Open and advanced search Glossary Links to other websites No registration required Video and audio files Multi-lingual	Search tips Alerts of new updated information Free access to full-text available Partner-	Government, NGOs and health system/ services delivery level The authors state that information from the portal was used by those working at the Ministry of Health and Family Welfare (MOHFW) and Government of India (GOI). Authors state in the conclusion that “The

	health information from relevant public health perspective in the country				themes. During the first 18 months after it was launched, 52, 798 visits were registered from 174 countries across the world, and more than three-fourth visits were from India alone. Nearly 44,000 unique visitors visited the website and spent an average time of 4 minutes, 26 seconds.		support	ships and Promotional efforts	portal contains a variety of resources for a wide range of stakeholders” (p.9) and these could include those working in government, NGOs and health systems/health service delivery; hence its intended effect could occur at all 3 levels.
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main results/finding	Quality Rating	General features of a clearinghouse	Key features	Intended effects of a clearinghouse
LaFrance et al. (2010) (USA)	To describe the efforts to create, share, and sustain an online clearinghouse of expert-reviewed “promising practices” in pandemic influenza preparedness	Qualitative method (key information interviews with 16 public health experts nationwide), Empirical paper	Health services (Promising practices on pandemic preparedness)	Public health professionals. Sample size (n = 16) comprising: (1) three federal officials; (2) four state officials; (3) five local officials; (4) three leaders or high-ranking members of national public health organization, and (5) one university	The database has been used by international agencies and a variety of U.S.A organizations. Since December 2008, materials and description for 181 expert-reviewed practices has been posted in a public online database, and these practices		Registration/subscription for ongoing notification at no charge Email alerts about outdated new practices Tips on how the materials are being used Links to other databases Timely update of information on promising practices Promotional efforts	Timely access to up-to-date information Alerts Partnerships and Promotional efforts	Government and NGO levels Authors state that, “site users included numerous state and local public health agencies and a variety of other organizations such as international and non-U.S. based national health organizations, community and faith-based organizations, and educational associations” (p. 7). Hence its intended effects could occur at government and NGO levels.

				expert	were available in four areas: models of care, communication, mitigation, and at risk-groups.				
McNairy et al. (2012) (USA)	To access the feasibility, provider acceptability and uptake, and topics selection of UpToDate	Survey of 64 Health Care Workers (HCWs) in Malawi, South Africa and Rwanda, using the UpToDate internet-based	Health services (evidence-based information or decision-making)	Health care workers in Africa	The study found that Health Care Workers (HCWs) in Africa searched for a variety of topics, and about 78% of the HCW reported daily or weekly use of the internet-based	5/5 (100%)	Free access to UpToDate information via the internet A designated UpToDate training leader offered search tips on how to search information from UpToDate to clinicians (doctors, medical officers, nurses) and support providers (pharmacists and lab technicians)	Search tips	Health system/health service delivery level The paper discusses training offer to clinicians (doctors, medical officers and nurses) on how to use the UpToDate clearinghouse, hence its use could occur at the health system/health services delivery level.

		tool			<p>medical resource, and for which 70% felt the tool was useful for teaching. Users of the study reported the tool increased their clinical knowledge. Factors identified as barriers to the utilization of internet-based tools include lack of computers, unreliable internet access and lack of time.</p>				
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Author(s) & country	Purpose of the study	Study design	Policy field	Target audience	Main re- sults/findi ng	Quality Rating	General fea- tures of a clearinghouse	Key fea- tures	Intended effects of a clearinghouse
Moat and Lavis (2011) (Canada)	The article describes Health Systems Evidence clearing-house and outline its features	De-scrip-tive piece or guide	Health policy and health systems	Policy-makers and stake-holders	This article is a descriptive guide about the Health Systems Evidence (HSE), its key fea-tures, they type of syntheses that are in-cluded on the reposi-tory and its relevance and not findings per se.	2/3 (67%)	<p>An open-search function</p> <p>Links to user friendly sum-maries, abstracts and freely full-text reports that are available</p> <p>Provide countries in which studies were conducted</p> <p>Rating the quality of synthesis</p> <p>An expandable ‘closed’ dic-tionary of health systems topics (governance, financial, de-livery, im-plementation) can be used to retrieve available reviews</p>	Not stated	<p>Health system, NGOs, and Government levels</p> <p>Given that the target is policymakers and man-agers, and focuses on health system arrange-ment and implementation strategies, its intended effects could occur at health system/health ser-vice delivery, government, and NGO levels.</p>

							Options for searching for specific type of synthesis and specific type of question		
Moyes et al. (2013) (UK)	To describe the results of a project set up to release data gathered, use and generated by Malaria Atlas Project (MAP) website	Descriptive paper	Malaria	Malaria control programme managers, global health policy advisor	A total of 42, 090 geo-positioned parasite and vector survey results are now available for download from the MAP website plus 3, 175 geopositioned survey results for human genetic variants. Resource	3/3	<p>The website contains three sections: (1) Tables that describe the site; (2) a set of bibliographic tables and sources; (3) survey data and field included; and summary display</p> <p>Free registration</p>		<p>NGO and Government levels</p> <p>Authors state that data are “for use in advocacy, education, further research and to help parameterize or validate other mathematical models,” hence its intended effects could occur at NGO and government levels.</p>

					Browser, has been designed to be accessible from low bandwidth environments, and in its first year the site has been accessed by visitors from every country in the malaria endemic world” (p.4)				
Nielson & Wilson (2011) (Canada)	To undertake website usability testing of the Saskatchewan Health Information Re-	Descriptive, empirical qualitative paper	Health services (digital library with health information resources to support the	Health care providers in Saskatchewan N = 13	A usability testing conducted with 13 volunteers across 4 locations in the province. Data were	5/5 (100%)	Handouts used in training sessions Search tips in the form of video tutorials Links to e-journal list and the databases page and	Not stated	Health system/health service delivery and Government levels The paper states that the SHIRP is intended “for use by all employees of Saskatchewan’s 13 health regions, all health care providers in the prov-

	source Partner- ship (SHIRP) online li- brary, and to deter- mine whether the SHIRP website is intuitive for health- care prac- titioners to use		educa- tion, evi- dence- based practice, and re- search needs of Sas- katche- wan's health care providers & related provin- cial gov- ernment depart- ments)		analyzed and the identified themes were used to redesign the SHIRP website. A relatively low num- ber of par- ticipants completed the tasks on the first try during the user- testing; hence, the SHIRP website was de- termined to be un- wieldy and not com- pletely intuitive. Time available to health		articles		ince...and all Sas- katchewan provincial government departments related to health.” (p.1)
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					care providers is always limited and the site should always be simple, clean, and fast to use				
Sanchez et al. (2012) (USA)	To summarize the evolution of Cancer Control P.L.A.N.E.T and describe effective and innovative web 2.0 strategies to help guide dissemination and implementation of evidence-	Descriptive paper	Cancer control	Cancer control practitioners and public health practitioners	Partnership and promotional efforts attracted considerable interests from users. Visits to P.L.A.N.E.T have increased from 13,516 in 2003 to 85,587 in 2010	2/3 (67%)	Free access to materials Links to local, state and national level surveillance data An online community of practice Research reviews and recommendations Evidence-based information and program materials	Partnerships and promotional efforts	Health System/health service delivery level Authors state that “P.L.A.N.E.T. (Plan, Link, Act, with evidence-based Tools) is a web-portal (http://ccplanet.cancer.gov), designed to provide cancer control practitioners with step-wise access to data, programs, and resources to assist in planning evidence-based programs” (p.2).

	based information						Resource for planning, implementing, and evaluating comprehensive cancer control programs		
Sinnock et al. (1991) (USA)	To describe the background and work of the National AIDs clearing-house	Descriptive paper	HIV/AIDs	Health care professionals educators, social service workers, clergy, employers, human resource managers, and others working in a variety of setting, such as AIDs programs, community-based organizations, AIDs service or-	The article merely describes the National AIDs clearing-house and offers a detailed description of its four databases: (a) a database of resources and services; (b) a database of hard-to-find educational materials; (c) an access sys-	3/3 (100%)	<p>Access to timely, relevant, accurate, free of charge available information: brochures, posters, print ads</p> <p>The presentation of the clearing-house includes: (1) a database of resources and services; (2) a database of hard-to-find educational materials; (3) an access system for references and referral and (4) a system of distribution.</p> <p>Partnerships</p>	<p>Partnerships and promotional effort-s</p> <p>Free of charge accessible information</p>	<p>Health System/health and social services delivery, NGOs and government levels</p> <p>Authors state that National AIDs clearing-house "... are served by information specialists to respond to more than 45,000 requests annually from a variety of health professionals, organizations, and the general public" (p.2).</p>

				ganiza- tions, hotlines and in- stitutions	tems for references and refer- ral and (d) a system of distribu- tion				
Turner et al. (2002) (UK)	To pro- vide a back- ground of the devel- opment of the Na- tional Electronic Library for Health (NeLH)	De- scrip- tive paper	Infor- mation resources to sup- port evi- dence- based decision- making	Health profes- sionals, practitio- ners, and managers	Over 70 informa- tion re- sources, including biblio- graphic databases, and full text pub- lications are acces- sible free of charge via the NeLH.	2/3 (67%)	Full text publi- cations Information re- sources Bibliographic databases Glossary of terms Partnerships	Partner- ships and promo- tional ef- forts	Health system/health service delivery, NGOs and government levels It provides information to health professionals. Table 2 and 3(p.6) list the various topics and health professionals using those topics.

Appendix 6: Quotes and notes on health information literacy and the mechanism in which it is conceptualized

Quotes and summarized notes on health information literacy	Mechanisms in which health information literacy is conceptualized	Sources
“The main barriers to the implementation of evidence-based management (EBM) and evidence-based health care (EBHC) are: (1) the lack of access to high-quality evidence and (2) the limited skills of clinicians and policymakers in evidence-based practice.”	Lack of health information literacy affecting evidence utilization	Dearness and Tomline (2001)
Evidence-based management (EBM) has proved highly popular and influential. However, successful practice of EBM has been limited because it requires physicians to acquire skills in using IT and assessing evidence.	Lack of health information literacy impacting evidence utilization	Dearness and Tomline (2001)
“A second challenge identified by public health decision makers at the time was a lack of skill in critically appraising reviews and the desire to have a credible resource conduct the appraisal for them.”	Lack of health information literacy impacting evidence utilization	Dobbins et al. (2010)
The National Guidelines Clearinghouse provides information to users but it requires a willingness to read and to take some time to familiarize with its structure and numerous ways to search for information.	Health information literacy is needed in order to aid the utilization of research evidence from the clearinghouse	Fitzpatrick 2007
The National Health Service (NHS) portal provides teaching aids such as presentations, leaflets, guides to searching, and search tips to help users in searching for information from the portal.	Search tips from the clearinghouse can aid users in searching for information from the NHS	Ford 2009
Educational interventions in the forms of skills or	Workshops aimed at equipping health workers	Gulmezoglu et

interactive workshops on evidence-based decision making and presenting the content of the reproductive health library (RHL) and how to implement change to health workers in Mexico and Thailand, led to increased access to and use of the RHL.	with health information literacy or research uptake skills. It serves as a supplementary resource to help users use the clearinghouse, and as a way to address low health information literacy	al. (2006)
“Reviewers would highly encourage others to explore the web site and experiment with the materials. Low health literacy is a serious problem.”	Health information literacy is needed in order to use the website.	Mendias et al. (2011)
“The HIV/AIDS 101 Training Module” equip clients and health professionals with knowledge on how to use the portal.	Materials from the clearinghouse aid target users with health information literacy	Mendias et al. (2011)

Appendix 7: kappa assessment done by two independent raters

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
rater1 * rater2	65	100%	0	0%	65	100%

rater1 * rater2 Cross tabulation

Count

		rater2		Total
		Yes	No	
rater1	Yes	21	2	23
	No	5	37	42
Total		26	39	65

Symmetric Measures

		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Measure of Agreement	Kappa	.771	.081	6.248	.000
N of Valid Cases		65			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

95% C.I = estimated kappa \pm 1.96 (SE), where estimated kappa = .771, and standard error (SE) = .081

Confidence intervals (CI) = .771+1.96 (.081) = 0.93 (upper interval)

CI = .771-1.96 (.081) = 0.61 (lower interval)

Therefore, Kappa = 0.77 (P< 0.000), 95% CI (0.61 - 0.93)

Chapter 3: User-testing of Health Systems Evidence and the EVIPNet Virtual Health Library among health system policymakers and stakeholders in Uganda and Zambia: a qualitative study

Introduction

This chapter – the second of three substantive chapters – utilizes a qualitative approach to explore Ugandan and Zambian policymakers' and stakeholders' views about and experiences with two 'global' clearinghouses – Health Systems Evidence (HSE) and the Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL), and provides suggestions, based on these views and experiences, on how to improve them. This chapter relates to and builds on chapter 2 in two respects. First, the chapter provides an empirical analysis of policymakers' and stakeholders' views about and experiences with two specific cases of the phenomenon explored in the theoretical framework – HSE and the EVIPNet VHL – which are both clearinghouses that focus on the governance, financial and delivery arrangements of health systems, and about implementation strategies within them. Second, the evaluation of the features of HSE and the EVIPNet VHL, and the user-testing of the two clearinghouses, complements the theoretical framework by providing users' insights about the features of two specific clearinghouses. This chapter does not, however, directly assess the key features that were incorporated into the theoretical framework because the study was not designed as an explicit test of the framework (but this should be the focus of future research).

I conceptualized and designed this study in collaboration with my supervisor, Dr. John Lavis. I was responsible for obtaining ethics approvals and collecting data for this study through a 4-month period of field work in Uganda and Zambia where I conducted interviews and user-testing of the clearinghouses with policymakers, stakeholders and researchers. I prepared and organized the data for analysis and executed all of the data analyses. I drafted the chapter and received comments and suggestions on the initial and later drafts from my supervisor, Dr. John Lavis, which were incorporated into subsequent drafts. I also received comments and suggestions from the other thesis supervisory committee members (Dr. Lisa Schwartz and Dr. Fadi El-Jardali) that were included into the version presented here.

Abstract

Background: User-testing of clearinghouses is an important evaluation tool to assess the perspectives of targeted users about clearinghouses' utility, and targeted users' satisfaction with the clearinghouses. This study investigated the views and experiences of policymakers and stakeholders in Uganda and Zambia with regard to Health Systems Evidence and the Evidence-Informed Policy Network Virtual Health Library.

Methods: A qualitative approach using in-depth interviews with 50 health system policymakers and stakeholders was carried out in Uganda and Zambia. The study assessed, via user-testing, policymakers' and stakeholders' ability to search for research evidence on past policy issues they had worked on as well as on three demonstration topics: skilled birth attendance; maternal and child health; and prevention of mother-to-child transmission (PMTCT) of HIV. It also elicited their perspectives on the clearinghouses using the seven facets of Morville's framework: accessibility; findability; usability; usefulness; credibility; desirability; and value.

Results: The 50 participants interviewed were a mix of highly educated senior, mid-level and junior professionals. Among these participants, 15 participants (30%) were senior professionals aged 50 and above; 22 participants (44%) were mid-level professionals aged 40-49; and 13 participants (26%) were junior professionals aged 30-39. During the user-testing sessions, some participants were able to search and retrieve documents on the demonstration topics and policy issues they had worked on in the past. However, some participants had difficulties in doing so. Participants had positive first impressions about the clearinghouses; they thought the clearinghouses were accessible, findable, usable, useful, credible, desirable and valuable. Participants were generally satisfied that the clearinghouses can provide them with relevant research syntheses on health systems to inform advocacy, programming, and to aid guidelines development and evidence-informed policymaking.

Conclusions: The clearinghouses are viewed by policymakers and stakeholders in Uganda and Zambia as useful resources to support access to and use of research evidence for advocacy, planning, programming and policy development in order to strengthen health systems. Suggestions for improvement include: populating the content with more regional and local data and making full-text documents of systematic reviews from the EVIPNet VHL accessible to policymakers and stakeholders from Africa.

Background

The internet is a powerful technological tool for providing research evidence to policymakers and stakeholders to inform sound policy decision-making about health systems. In recent years, there have been a number of strategies undertaken by some organizations to improve the uptake of research evidence by policymakers and stakeholders, which is variously referred to as evidence-based health care (EBHC) and evidence-informed health policymaking (EIHP) (Dearness and Tomlin (2001).

One of the key strategies is the establishment of clearinghouses. A clearinghouse can take the form of a website, database or virtual health library, which is populated with information in a particular policy field, content or subject area, targeted at particular groups, and with a geographical focus at the regional (i.e., sub-national), national and/or international levels.

Two recently developed clearinghouses that have been established to promote EIHP in low- and middle-income countries are Health Systems Evidence (HSE) and the Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL). HSE is the world's most comprehensive free access point for evidence to support policymakers, stakeholders and researchers interested in strengthening or reforming health systems, and in getting cost-effective programs, services, and drugs to those who need them (Moat and Lavis 2011). HSE provides information about governance, financial, and delivery arrangements, and about implementation strategies, in health systems to policymakers (Moat and Lavis 2011). It contains information in the form of evidence briefs for policy, systematic reviews, systematic review protocols, registered systematic review titles for which a protocol has not yet been written, economic evaluations, health system reform descriptions, and descriptions of different health systems. It was developed as a clearinghouse with an emphasis on policy and management-related systematic reviews, and it became available online in late 2008 (Moat and Lavis 2011). Documents that are included in HSE are identified by: (1) annual searches of Medline; (2) reviews of each monthly issue of the Cochrane Database of Systematic Reviews; (3) reviews of each weekly update from the Database of Abstracts of Reviews of Effects; (4) reviews of each update of the Cochrane Qualitative Research Methods Groups' database of qualitative reviews; and (5) regular scanning of listservs and websites (Moat and Lavis, 2011).

EVIPNet is a global network of researchers and policymakers in the Americas, Africa, Pacific Asia, Europe, Latin America and Mediterranean regions that seek to promote evidence-informed health policymaking in LMICs (Panisset et al., 2012). The EVIPNet VHL is a clearinghouse sponsored by the World Health Organization (WHO) and launched in May 2013 with the support of the Evidence-Informed Policy Network (EVIPNet). The EVIPNet VHL provides access to evidence briefs, systematic reviews, and other types of research evidence (e.g. rapid response summaries) and policy-relevant documents (e.g. policy dialogue summaries). In addition, it has a section on resources for evidence-informed policy that include materials such as the Supporting Policy Relevant Reviews and Trials (SUPPORT) tools and sections on EVIPNet regions (Africa, America, Asia, and the Eastern Mediterranean). The EVIPNet VHL contains the content of BIREME and HSE, and participants can effectively search for information from the HSE

when they are searching the EVIPNet VHL provided they click the HSE search box embedded on it. The EVIPNet VHL was launched shortly before the commencement of fieldwork and its full value in terms of full-text access systematic reviews can only be realized in Latin America and the Caribbean because that region has purchased full-text access to resources like the Cochrane Library.

Despite the potential shown by these clearinghouses to foster evidenced-informed health policymaking to strengthen health systems and to improve health outcomes, not enough empirical work has been undertaken about policymakers' and stakeholders' views about and experiences with the clearinghouses. This study was undertaken to fill this knowledge gap.

Objectives

Our broader objective for this study was to conduct user-testing of HSE and the EVIPNet VHL among policymakers and stakeholders in Uganda and Zambia. The specific objectives for this study were: (1) to understand policymakers' and stakeholders' views about and experiences with the clearinghouses; and (2) to seek feedback and suggestions on how to improve them.

Design and methods

An exploratory qualitative approach was used to elicit the views and experiences of policymakers and stakeholders in Uganda and Zambia with regard to HSE and the EVIPNet VHL. This method was chosen for two reasons. First, it enables an in-depth description of peoples' experiences, perceptions, and understanding of a phenomenon (Thone 2008). Second, a qualitative method permits the use of purposive sampling, open ended questions, and content analysis to answer research objectives and is consistent with our research objectives (Miles and Huberman 1994; Sandelowski 2000; Hsieh and Shannon 2005).

Sampling strategy for countries

A purposive criterion sampling was used to select two countries of the 11 African EVIPNet partners in order to provide information-rich cases for an in-depth study (Patton 1990). We focused on Africa as EVIPNet was the most active in this region at the time, and dedicated resources through a European Commission grant (i.e., European Commission's Seventh Framework Programme (FP7) of Supporting the Use of Research Evidence (SURE) for Policy in African Health Systems project (Basaza et al., 2014). The selection of Uganda and Zambia was based on two criteria. First, the selection was guided by the "most similar systems design" logic that focuses on choosing countries with similar characteristics and identifying factors that explain differences among them (Przeworski and Teune 1970). Uganda and Zambia are both confronted with a similar HIV burden, high maternal and child mortality rates, and other health system and implementation challenges which could be informed by similar types of research

evidence (Morisset et al., 2013; UAIS 2011; Zambian Demographic Health Survey 2007; Zambian Ministry of Health National Health Policy, 2013).

Second, the two countries were selected based on strategic pragmatism in that both countries are politically stable and had at the time particularly vibrant knowledge translation (KT) platforms (REACH Uganda and ZAMFOHR, which are described further below) and research teams in the health field who were interested in promoting the use of research evidence by policymakers and stakeholders; hence, it is easier to collect data in these countries. The Regional East African Community Health (REACH) Policy initiative is an East African knowledge brokerage mechanism that links research to policy and action (Van Kammen et al. 2006; Nyikal et al. 2006). The REACH Uganda team has produced five evidence briefs for policy and nine policy dialogues on topics as diverse as increasing access to skilled birth attendance, task shifting of health workers to improve the delivery of maternal and child healthcare, palliative care, a national framework for KT sustainability in Uganda, and improving patient safety for better quality care (Nabudere et al., 2010; Nabudere et al., 2011; Nabudere et al., 2012; Nabudere et al., 2013; Basaza et al., 2014). In addition, REACH Uganda established a rapid response unit (RRU) to provide quick summaries of research evidence to policymakers, thereby addressing the barriers of timeliness and relevance of research evidence at the time that it is needed, and meeting policymakers' urgent needs for research evidence about health systems in Uganda (Mijumbi et al. 2014). REACH Uganda has mentored Zambia to establish an RRU too.

The Zambia Forum for Health Research (ZAMFOHR), a Zambian knowledge-translation platform, also seeks to promote the use of research evidence for policymaking (Kasonde 2009, Kasonde and Campbell 2012). ZAMFOHR's team has created three Research-to-Action Groups (RAG), and these groups have focused on three policy issues: human resources for health; mental health; and reproductive health (Kasonde 2009; Kasonde and Campbell 2012). The team has produced evidence briefs for policy, and convened policy dialogues to enhance mental health in Zambia as well as implement health worker retention strategies (ZAMFOHR 2011; Mwape et al., 2012; Kasonde and Campbell 2012). They also created a Rapid Response Service (RRS) in 2011, which was designed to encourage policymakers to ask a specific health policy question, and which uses ZAMFOHR's research team to do a quick scoping review in order to synthesize the best available research evidence to answer the question (Kasonde 2009; Kasonde and Campbell 2012).

The existence of the aforementioned research networks and the countries' political stability aided the conduct of this research in Uganda and Zambia in two ways. First, through the networks, we were able to obtain a list of participants in policy dialogues conducted in Uganda and Zambia, and contacted them for interviews. These participants were selected based on maximum variation strategy to ensure that they represent a range of policymakers and stakeholders in the health care sector. Moreover, political stability in both countries made it possible to conduct research. In both Uganda and Zambia, there were no violent conflicts or threats to human security in the areas where fieldwork was conducted, and all offices were working with a functional, democratically elected government, and with the active involvement of donor agencies, NGOs, civil society

organizations and universities in health systems research and implementation. As such, it was easier to apply and obtain research ethics approvals, and to meet these diverse actors and respondents in their offices to conduct interviews in an atmosphere of peace, tranquility, and freedom of movement. Our data collection could not have happened in countries that are politically unstable or those without the appropriate networks, such as those that exist in Uganda and Zambia.

Sampling strategy for policymakers and stakeholders

Both maximum variation and respondent-driven sampling strategies were used to select policymakers and stakeholders for interviews (Patton 1990). We did not seek a definite sample size in our sampling. As Patton argues, “there are no rules for sample size in qualitative inquiry. Sample size depends on what you want to know, the purpose of the inquiry, what’s at stake, what will be useful, what will have credibility, and what can be done with available time and resources” (Patton 1990). An initial list of participants identified from previous policy dialogues convened, in Uganda and Zambia, was compiled by the REACH and ZAMFOHR teams and used to contact participants for interview. In addition, a respondent-driven strategy was used to recruit additional participants. After each interview, participants were asked to identify persons who could be contacted for additional interviews. We initially selected 15 policymakers and stakeholders (researchers are included as stakeholders) in each country making up a total of 30 policymakers and stakeholders as a tentative sample size. However, after reaching the initial 15 participants in each country, we thought breadth and theoretical saturation requirements were not yet reached. Hence, through respondent-driven sampling, we continued to collect data until there were no additional insights to be derived from the interviews. To obtain additional insights, we interviewed ten more key informants in each country and broadened our participants to include researchers at universities, health managers, policymakers, and health staff working in health-related NGOs and in civil society organizations (CSOs), journalists reporting on health, and WHO country officers and development agency staff involved in health.

Data collection methods

Data were collected from June 2013 to August 2013. An interview guide (Appendix 1) was developed based on the research objectives for this study, piloted with nine researchers at McMaster University, and found to be appropriate and feasible to meet the research objectives. The questions included in the interview guide were developed in substantively meaningful clusters. First, questions were developed around participants’ conventions around research use, their knowledge of systematic reviews, and their experience in assessing both the quality and local applicability of systematic reviews. Questions were developed about these issues because Health Systems Evidence and the EVIPNet VHL are predominantly populated with systematic reviews, including other policy-relevant syntheses, and these questions helped unearth whether or not participants would understand and use these types of evidence in the first place. Second, questions were developed around awareness of the sites, registration for them, and support for

preferred languages in order to determine whether or not participants are aware of, registered for or visited the clearinghouses and whether or not they can access information from the clearinghouses in a language they understand. Third, questions were developed asking participants about their first impressions of the clearinghouses to gauge their views about the clearinghouses. Further, we developed questions on policy issues that they have worked on in the past using research evidence in order to understand whether or not information about these issues is available in the clearinghouses, and to give us insights on whether or not the clearinghouses could meet their information needs.

Demonstration questions were also developed on three policy issues (skilled birth attendance, maternal and child health, and strategies for preventing mother-to-child transmission of HIV (PMTCT)). The demonstration topics were selected because they are among the top health priorities of the governments, health ministries, and NGOs in Uganda and Zambia (UNHRO Research Priorities, 2005-2010; Status of Health Research in Zambia Report, 2000; Zambia MOH, National Health Policy, 2013). They are also among the health priorities of African leaders and world leaders, as demonstrated in the African Union initiative for the Campaign for Accelerated Reduction of Maternal Mortality in Africa (CARMMA), and the Muskoka Initiative on Maternal, Newborn and Child Health, launched in 2010 by the G-8 under the leadership of Prime Minister Stephen Harper (Christie 2010; Sambo et al., 2011). Uganda and Zambia are making crucial efforts to address maternal and child mortality and HIV, where scientific evidence is needed for programming, planning, policy and guideline development, policy implementation, monitoring and evaluation around these issues, and for which the clearinghouses could provide them with highly relevant information on these issues.

Furthermore, questions were developed around the Seventh dimensions of Morville's framework because it is a good user-testing framework that captures the various aspects of the clearinghouses that were investigated – functionality of the websites, features of the websites, and the relevance of their content. The questions on accessibility, findability, usability, usefulness, credibility, desirability and value address all these areas. Lastly, questions were developed that asked for participants' suggestions for improving the clearinghouses in order to draw target users' perspectives on improving the design and content of the clearinghouses to meet their information needs.

A face-to-face interview was conducted using both open-ended and close/ directed questions. We used open-ended questions in order to provide more options for respondents to respond, minimize biases, and obtain richer qualitative data to capture the breadth of perspectives about the clearinghouses. In addition, closed or directed/purpose-driven questions were used in order to: observe how respondents perform tasks using parts of the clearinghouses (i.e., open and advanced searches with real search topics); obtain feedback about the functionality of the clearinghouses; test the ability of respondents to do some of the tasks and retrieve results; and elicit their reaction to certain features of the clearinghouses.

The data collection was mainly based on elite interviews, and participants in Uganda and Zambia were contacted via email or telephone and invited to participate in the study. A written informed consent was obtained before interviewing each participant. The interviews were audio-recorded with the consent of the interviewee. When the

interviewee did not want to be audio-recorded, notes were taken for the interview. There were only three participants who did not want to be recorded. Each interview lasted between one hour and one-and-a-half hours.

Data analysis

A direct thematic content analysis approach (Sandelowski 2000; Hsieh and Shannon 2005; Graneheim and Lundman 2004) was used for the analysis. Both deductive and inductive thematic analyses were performed. A deductive thematic analysis was used for categories or attributes developed a priori from the seven facets of the user experience model (Morville 2004). An inductive thematic analysis was used to integrate new themes as suggested by the data and derived from answers to scenario questions, as well as factors that fell outside the user experience model. Using both approaches provided a richer understanding of policymakers' and stakeholders' views about and experiences with HSE and the EVIPNet VHL. To analyze these data, interview field notes were transcribed and written notes were analyzed, and codes were stored in working tables. Patterns and themes were noted, along with frequency of quotes and relations among variables in tables to build a logical chain of evidence and make contrasts and comparisons between the two websites (Miles and Huberman 1994), and some of the qualitative data were quantified. Finally, an analytic matrix of the synthesized findings was displayed in tables for comparison. This matrix included a side-by-side comparison and analysis of the two sites using the comments and (where appropriate) yes/no answers. A constant comparative method was used to identify emerging themes, to catalogue verbatim quotes into essential concepts or codes, and to compare those quotes with other findings (Miles and Huberman 1994).

Ethics approval

Ethics clearances to conduct the study were obtained from three different institutions: McMaster University via the Hamilton Integrated Research Ethics Board (HIREB) (Ref HIREB 13–106) in Canada; Makerere University College of Health Science, School of Medicine, Research Ethics Committee (IRB # REC REF 2013 – 67) in Uganda; and Eres Converge Institutional Review Board (Ref. No. 2013-June-012) in Zambia.

Results

Demographics

Fifty participants were interviewed. Participants were a mix of highly educated senior, mid-career, and junior professionals: 15 participants (30%) were senior professionals aged 50 and above; 22 participants (44%) were mid-level educated professionals aged 40-49; and 13 participants (26%) were junior professionals aged 30-39 (Table 1). There were no participants within the age group of 20-30. In terms of educational qualifications, 3 participants (6%) had PhD degrees; 41 participants (82%)

had a master's degree; 1 participant (2%) had an MD degree; and 5 participants (10%) had a bachelor's degree. In terms of gender representation, 27 participants (54%) were female. The mean number of years worked by participants was six years. In terms of organizational representation, 14 were from the Ministry of Health; 14 were from NGOs; 7 were from universities and research institutes based at universities; 6 were from WHO country offices, 6 were from development/donor agencies involved in health such as the UNDP, UNICEF, and UNFPA; and 3 were journalists.

Among the 50 participants, 2 identified their role solely as a policymaker; 3 identified themselves solely as researcher; 13 identified themselves both as a stakeholder and a researcher (i.e., they influence policy decisions and engage in research as well); and 9 identified themselves both as a policymaker and as a stakeholder (i.e., they make policy decisions and influence policies). In addition, 2 identified themselves as a donor and stakeholder (i.e., they provide grants and influence policies); 3 identified themselves as a donor, policymaker and stakeholder (i.e., they provide grants, make policy decisions and influence policies); and 18 identified themselves as a policymaker, researcher, and stakeholder (i.e., they make policy decisions, influence policies, and engage in research as well).

Current practices and conventions in searching for and using research evidence

As Table 1 shows, 50 participants (100%) indicated that they used research evidence in connection with their work. Furthermore, 42 participants (84%) reported searching for research evidence on health system arrangements and implementation strategies as opposed to public health or clinical topics. Only 18 participants (36%) reported experience in assessing the quality of systematic reviews, suggesting that some users' may not be able to assess the quality of systematic reviews which are predominantly available in HSE and the EVIPNet VHL. In addition, only 21 participants (42%) reported knowing how to assess the local applicability of systematic reviews. Twenty participants (40%) did not appear to understand what a systematic review of research evidence is, as they could not define or explain it. In aggregate, 30 participants (60%) provided an explanation that included at least 1 of the key elements of a systematic review of research evidence: (1) an explicit research question on a topic that aims for a comprehensive search for relevant studies; (2) an explicit description of the search strategy used to retrieve data; (3) an explicit description of the inclusion and exclusion criteria; (4) a critical appraisal of the quality of included studies in the review, and (5) data extraction and a synthesis of the findings/results of the various studies included in the review (Cook et al., 1997; Klassen et al., 1998; Pai et al., 2004; Sackett et al., 1996; Sweet and Moynihan, 2007). There were minor variations in findings in Uganda and Zambia pertaining to conventions around research use. A greater number of participants in Uganda reported searching for research evidence on health systems than Zambia (24 of 25 compared to 18 of 25). More participants in Zambia reported having experience in assessing the quality of systematic reviews than Uganda (12 of 25 compared to 6 of 25). And more participants in Zambia reported having experience in assessing the local applicability of systematic reviews than those in Uganda (12 of 25 compared to 9 of 25).

General sources of use of research evidence

The responses of participants about the sources they used to search for research evidence about health system arrangements and implementation strategies could be grouped into ten broad categories: contacts with experts/consultants; electronic databases; fact-finding missions; Google; institutional documents; journals; network evidence updates; pilot test results; survey results; and university online libraries (Table 7). In terms of variations in findings between the two countries, fact-finding missions and contacts with experts/consultant were mentioned only by interviewees in Zambia.

The use or non-use of research evidence to inform policy development

To determine whether participants use or do not use research evidence to inform policy decisions, participants were asked to provide two policy issues that they have worked on in the past using research evidence, and two policy issues that they have worked on without using research evidence but for which research evidence might have been relevant. The results indicate that participants in both Uganda and Zambia reported having used research evidence to inform the development of a broad number of similar health policy issues, including health financing, male circumcision, palliative care, mental health, alcohol policy, community health assistants (CHA) policy, malaria, midwifery training, reproductive health, immunization, and HIV/AIDS (Table 8). For example, respondents in both countries reported having used research evidence from WHO guidelines, PubMed, and local data to inform the decision to shift from option A (the initiation of antiretroviral drugs (ARVs) by an HIV-positive pregnant woman from gestation until labour using nivarapine) to option B+ (life-long treatment for HIV-positive pregnant women).

Only three policymakers mentioned policy decisions or programs that were introduced without using research evidence (Table 8). These policy issues varied between the two countries. In Uganda, a participant mentioned two policies or programs that were introduced without the use of research evidence. The first was the enrollment of Village Health Teams (VHTs) to help with the integrated management and treatment of malaria, pneumonia, and diarrhea at community centres. These were implemented without local evidence about their effectiveness. The second was a draft policy on non-communicable disease which was developed because policymakers felt that many people were dying of non-communicable diseases, however, they could not identify scientific evidence on the best approach to solving this problem. In Zambia, a policymaker mentioned that as part of addressing mental health issues, a Master's program in psychiatry was introduced at the University of Zambia (UNZA) and a policy decision made to have in-house training of psychiatry. Its introduction was not based on research evidence per se, but on an observation that there were no psychiatrists in Zambia.

Awareness, registration, visitation, sign up, and support for preferred language

The results indicate that 16 participants (32%) were aware of both clearinghouses and of those who were aware, 7 participants (14%) and 9 participants (18%) had visited HSE and the EVIPNet VHL respectively (Table 2). In addition, 10 participants (20%) had registered for HSE, and indicated that it was a very simple process and straightforward to register with HSE, while 11 participants (22%), in addition to registering, had signed up for monthly HSE service on topics of interest. The EVIPNet VHL does not require registration and sign up. All the participants were comfortable searching for information in both clearinghouses in English, and indicated that both have support for their preferred languages.

First impressions about the clearinghouses

First impressions of Health Systems Evidence (HSE)

Participants gave positive reactions in relation to their first impressions of HSE. A number of the participants thought it was well laid out with its thematic areas. Other participants thought it was well-organized and comprehensive. There were some policymakers and stakeholders who were particularly impressed about HSE because it could serve as a good site from which to draw evidence to inform policy and guidelines:

The clearinghouse will be very useful; it is a good site to make reference to. For example, when we are working on policy, guidelines etc, it must be based on evidence, so this is a good reference point” (Interview 33).

In addition, some participants thought HSE had important, useful documents to aid evidence-informed decision-making. One participant highlighted this viewpoint:

For us in NGOs, people are looking for us to provide them with evidence on what works or not, so when we are able to have meetings, we can use it to discuss agendas. We can implement programs without waiting for governments to provide the leadership, because we would have gotten the evidence. For us in NGOs, once we settled on something, we can use the evidence for interventions which can be shared with government or advise the government on the best way forward” (Interview 31).

Some participants felt that that it was user-friendly and quite informative but needed to include regional papers, local data, and grey literature.

First impressions about the EVIPNET VHL

An impression of the EVIPNet VHL was that it was credible since it was associated with WHO, a reputable organization charged with setting standards and norms on health, and which acts as a global advisor on health issues. Some participants felt that the EVIPNet VHL provided interesting information on regions and noted that it included links to the SUPPORT TOOLS. As one participant commented:

“It looks interesting. I was impressed to find that you can get information on Africa, the Americas, and Asia, and SUPPORT TOOLS” (Interview 35).

Furthermore, a number of participants said the clearinghouse provided useful information for decision-making, given it has information on health systems and tools which could be used to aid policy development, guidelines and implementation. One participant highlighted a point that was also expressed by other participants:

“I think it is a useful tool to help with policy development, guidelines, and implementation. This gives you the tools to make better policy. It is nice to have it at your fingertips and it is user-friendly” (Interview 41).

User-testing of HSE and EVIPNet VHL on policy issues worked on and on three demonstration topics

There were variations in the findings in Uganda and Zambia in terms of searches performed and information retrieved both in the policy issues worked on in the past and in the three demonstration topics (skilled birth attendance, maternal and child health, and PMTCT). The average number of documents obtained across the domains by users of both HSE and the EVIPNet VHL in Zambia were higher than their counterparts in Uganda (Table 2). For instance, 10 participants (40%) in Uganda and 21 participants (84%) in Zambia obtained search results in both clearinghouses across four domains, while 11 participants (44%) in Uganda compared with 13 participants (52%) in Zambia obtained search results in both clearinghouses on only three domains. As well, 12 participants (28%) in Uganda compared with 2 participants (8%) in Zambia obtained zero results in all four domains. Lastly, 9 participants (36%) in Uganda compared with 6 participants (24%) in Zambia obtained search results using both clearinghouses in two domains.

Evaluating views about the features and content of HSE and EVIPNet VHL using Morville’s framework

Peter Morville, information architect and user experience expert, has developed a model for analysing users’ experience with a particular phenomenon. His model has been used as a framework for the usability analysis in this study. Morville’s framework was selected because it is the only good usability framework that we found suitable to the evaluation of the clearinghouses on two grounds. First, its seven dimensions or facets of user experience -- accessibility, findability, usability, usefulness, credibility, desirability, and value -- which are described in table 4, touch on the various aspects of the clearinghouses evaluated (Morville 2004). Second, it has been used before on a similar health services and research project to conduct user-testing of the Cochrane Library (Rosenbaum, Glenton and Cracknell 2008).

Accessibility

When asked if they have access to a computer or other device with internet access while at work so that they can access HSE and the EVIPNet VHL during working hours, 50 participants (100%) expressed that they did (Table 2). One participant commented on this clearly:

“My organization is evidence-based where staff do wide reading to provide reliable technical advice; it is a technical agency so you must have access to internet to read written documents and provide evidence” (Interview 3).

Findability

When asked if they are looking for HSE and the EVIPNet VHL, they can find them easily, 50 participants (100%) indicated that they could find HSE without difficulty while 48 participants (96%) indicated the same for the EVIPNet VHL (Table 4). Some of the participants indicated that they could find it via Google search. As one participant stated:

“I put the title health systems evidence on Google engine search and it came out, so it is easy to find” (Interview 15).

Usability

In terms of usability, 23 participants (46%) mentioned they found HSE usable (Table 2). They thought the instructions were clear and it was easy to use. Other policymakers and stakeholders thought it was well-structured and pretty straightforward to use. There were participants who found it usable because it provides options to perform searches using the open and advanced search menu (Table 6). For the EVIPNet VHL, 28 participants (56%) thought it was usable. These participants said it was user-friendly, straightforward, and easy to use. Other participants felt it was easy to navigate and functions well (Table 4). However, some participants indicated that it was not comprehensive, while others thought that, even though it was easy to use, they were not getting information on some of their searches, and this was elaborated on by two participants:

“I think it is not giving me the information I want; when you put in a keyword, it is not giving me anything” (Interview 31). “It is okay but not comprehensive. This is supposed to be a one-stop shop but I don’t think it reaches that stage yet. It is fairly new, so maybe we are yet to see the best of the site. HSE is a one-stop shop because there is evidence to show that. When you search on HSE, you are able to find what you are looking for” (Interview 36).

Usefulness

When asked whether HSE and the EVIPNet VHL are useful to them in relation to their work, 45 participants (90%) and 48 participants (96%) thought HSE and the EVIPNet VHL were useful, respectively (Table 2). Participants thought both were useful because they provided them with relevant information about health systems. Some thought they were useful in providing them with systematic reviews as well as relevant information on health system strengthening and other topics that could empower them at health policy forums. Participants viewed the clearinghouses as useful in providing them with tools and information that could strengthen evidence-informed policy development. Some participants found the categorization and themes in HSE very useful. Another participant indicated that she is a team leader in an NGO with a mandate for the prevention and treatment of HIV, and that evidence is needed to inform decision-making; she was confident this information could be obtained from the clearinghouses. One participant was optimistic about the usefulness of HSE and indicated that he could find relevant information on maternal health:

“I have identified a number of topics and documents which are relevant to my work: skilled birth attendance and maternal mortality. Our objective is to reduce maternal mortality and one major strategy is to increase access to skilled birth attendance. I have seen a number of articles on policy briefs, economic evaluation, and costing and cost effectiveness on them. These are what we need for programming” (Interview 9).

Credibility

When asked whether they find the information on HSE and the EVIPNet VHL credible, 46 participants (92%) confirmed that they did (Table 2). Most participants trusted and believed they were credible because they were affiliated with reputable institutions. For HSE, most participants believed it was credible because it was associated with McMaster University. Some thought information on HSE were credible because quality assessments are conducted. In relation to the EVIPNet VHL, a number of participants said it was credible because it was associated with WHO. Some participants thought the information from both clearinghouses was credible because they are peer-reviewed (although not all documents in HSE and the EVIPNet VHL are peer-reviewed). Some participants believed and trusted the information because it was pulled from publications. Some of the participants said the articles on them were credible because their sources were stated while others attributed the credibility of information on the clearinghouses to joint or co-authorship. Finally, some participants said the information from the clearinghouses was credible because they were systematic reviews, and this was highlighted clearly by two participants:

“Most of the documents are systematic reviews, and of course, systematic reviews come with superior evidence, unlike other types of studies” (Interview 18). *“It is obtained from the Cochrane systematic reviews, which is a well-renowned system of research evidence”* (Interview 31).

Desirability

When asked whether users like HSE and the EVIPNet VHL both in terms of the look and feel of the site and in terms of its content, 49 participants (98%) indicated a positive response for both clearinghouses (Table 2). Some participants thought the configuration for HSE was user-friendly and readable, and the content was highly relevant. In respect to the EVIPNet VHL, those who gave positive responses thought the design and content were good and the updates very readable. However, some participants said the design for the EVIPNet VHL was dull and the content was crowded and limited. One participant highlighted this point well:

“I don’t like the look and feel. It is dull. It is something which discourages the user. As for the content, it has a lot of texts on the homepage competing for your attention, and you are distracted. It is not a sort of place you can go and start searching immediately. The sections on resources for evidence-informed policies, news, and upcoming events waste one’s time trying to read those headings and trying to read who is doing what rather than allowing the user to do a quick search” (Interview 16).

In addition, the majority of the participants expressed a concern that they could not open the systematic review articles found on the EVIPNet VHL. When they found articles they liked and enthusiastically tried to open them, they felt disappointed as they got a reply message stating the material “is restricted to registered institutional networks from Latin American and Caribbean Region.”

Value

When asked whether HSE and the EVIPNet VHL are valuable, 48 participants (96%) indicated yes for HSE, and 49 participants (98%) said yes for the EVIPNet VHL (Table 2). In relation to HSE, some participants thought it was valuable in providing information that could be used for programming. As one participant expressed:

“In terms of programming, it has to be evidence-based. To convince policymakers to change their attitude and support the program, they need to be convinced that the evidence works. Herein lies the value of this website” (Interview 2).

Some participants thought it was very useful but the content had limited regional information and localized data, and that information needs to be disseminated:

“It has limited regional information; and also you need to promote its dissemination” (Interview 3). *“Somewhat. It provides the information, but for policymakers, they will need localized data. It provides broad information. It needs to provide specific countries’ data to help policymakers develop policy options”* (Interview 4).

With respect to the EVIPNet VHL, participants indicated that it could be valuable in providing them with research evidence to advocate for policy and programmatic decisions on health. However, participants expressed concerns about awareness, accessibility, and improvements issues that need addressing. Some participants said it was valuable but there was a lack of awareness about it. Two participants noted that it was valuable for programming but its appearance and data need to be improved:

“If it is improved in terms of its outlook, the way it is looking now, it is crowded. (Interview 31). “I hope so, certainly if this is something that I am able to access, I will use it because there is a lot of information that I will get from it for programming based on existing evidence” (Interview 42).

Assessing understandability, barriers, and affiliation to the clearinghouses

When asked whether there were parts of either site or its content that they felt they did not understand, 12 participants (24%) and 6 participants (12%) answered yes for HSE and the EVIPNet VHL respectively (Table 2). For HSE, participants did not understand what the digital object identifier (DOI) field in the default section of the advanced search box and a measurement tool for the “assessments of multiple systematic reviews” (AMSTAR) (Shea et al. 2007) meant, and suggested that those terms should be defined. For the EVIPNet VHL, participants did not understand what SUPPORT tools and SURE guides meant and suggested that these terms should be defined. When asked whether there were any barriers participants faced in using the site at their workplaces, 32 participants (64%) and 39 participants (78%) indicated yes for HSE and EVIPNet VHL respectively. One of the barriers participants faced in using both clearinghouses in Uganda and Zambia related to the internet and they included intermittent internet connectivity, intermittent power supply and slow internet at workplaces.

When asked whether they felt this site had been designed for them, 50 participants (100%) indicated yes for HSE, while 49 participants (98%) indicated yes for the EVIPNet VHL (Table 2). The overarching reasons identified by participants as to why the clearinghouses were important to them included their role as technical persons and policy advisors, and their need for evidence to inform programming and policy development:

“For us in policy and planning, this is what we need to develop policies and programs, and to present evidence to policymakers, parliamentarians, and other arms of government. These people are interested in what works or does not” (Interview 6). “Because I am working as a technical advisor and having to come out with evidence based on strategies for programming and implementation” (Interview 41).

Ranking the most useful key features of HSE and the EVIPNet VHL

Participants provided rankings for the features of HSE and the EVIPNET VHL (Table 5). About 22 participants indicated that all the features in HSE were very useful, while only 2 participants indicated the same for the EVIPNet VHL. However, in terms of

the participants' preferences, the one-page summary, LMICs focus, advanced search, links to user-friendly summaries, abstract or full-text report, type of documents, and domains were ranked as the top most useful and appealing features of HSE. In respect to the EVIPNet VHL, the African regional focus section, SUPPORT tools, policy dialogues summaries, evidence briefs for policy, rapid response documents, and SURE guides were identified as the most useful features.

Suggestions for improvement

The analysis of the data and suggestions put forward by policymakers and stakeholders calls for improvements in both the design and content of the clearinghouses. For HSE, suggestions for improving the clearinghouse include: 1) making the default section in the advanced search to be the title, abstracts, and synonyms fields to maximize search output, as some participants maintain title as the default section and get fewer results; and 2) making available all full-text articles accessible to users. For the EVIPNet VHL, suggestions for improving the clearinghouse are: 1) making the search box bigger; 2) writing out the acronym VHL in full; 3) removing the restrictions and making systematic reviews from Cochrane reviews accessible from non-American and Caribbean regions; 4) providing on the homepage a short title and description of both the clearinghouse and the different features and documents available on it; and 5) providing a guide, user manual, and/or search tips and video clips on how to use it.

Users provided the following suggestions and other courses of action to improve the content and influence the use of research evidence from both clearinghouses:

- include more content on regional and local data on Africa in both clearinghouses by connecting with researchers, research institutions, health ministries, other government ministries, NGOs and development agencies involved in health issues to update the clearinghouses' maintenance teams with data; and
- promote awareness of the clearinghouses and orient and train policymakers and stakeholders on how to use them.

Discussion

This study sought to understand policymakers' and stakeholders' views about and experiences with the two clearinghouses, and their suggestions on how to improve them. The results from this study revealed a number of interesting findings. The majority of participants were not aware of the existence of either of the clearinghouses. That said, overall, participants had positive first impressions about them. As well, the majority of the study participants thought the clearinghouses were accessible, findable, credible, desirable, useful, usable, and valuable. They view them as important tools where they can find credible evidence syntheses to inform decision-making relating to health systems that are very useful to their work, and that they see them as important tools to support change in health systems and to support policy development.

There were variations in search results across the two countries. These may be attributable to a number of factors: participants' level of knowledge or familiarity with

the clearinghouses; participants' experiences in searching using appropriate Boolean terms; the use of appropriate keywords for the searches, and the default section chosen in the advanced search menu. However, a reviewed of the data found no significant variability in themes or issues according to country or seniority versus mid-level and junior professionals in relation to the assessment of views about the clearinghouses on the seven dimensions of Morville's framework.

A number of key themes emerged. First, participants had a limited understanding of systematic reviews. Second, few participants had experience in assessing the quality of systematic reviews and the local applicability of systematic reviews. Third, the majority of participants did not have the knowledge and search skills to search for and pull out information from the clearinghouses during the user testing sessions, and admitted that they needed orientation and training to effectively use them.

As outlined before, there were a number of suggestions put forward for improving the clearinghouses by participants which need more elaboration. There was a suggestion to include more content on regional, local data and policy-relevant documents on Africa in both clearinghouses. This was an important suggestion that highlights the importance of local data alongside global evidence (Christine et al., 2011). The literature shows that the appraisal and use of research evidence is context-driven (Christine et al., 2011; Dobrow et al., 2004). Although global evidence can be used to inform judgments about the effects of options, factors that modify those options, and for drawing insights for analyzing and solving problems (Lewin et al., 2009; Oxman et al., 2009), local evidence is needed to inform options about policy decisions that could work given the local context, and given that evidence at the global level may not be applicable to a local context (Lewin et al., 2009). That being said, regional and local data and policy-relevant documents are included in HSE provided they meet its inclusion criteria. As well, the ongoing efforts of the 11 EVIPNet countries in Africa are aimed at providing research syntheses relevant to regional and local contexts to improve the use of research evidence in decision-making about health systems in Africa via partnerships between researchers, civil society and policymakers (SURE 2007). For example, REACH was set up as an institutional 'knowledge broker' to connect health researchers, policymakers, and other research users via joint platforms that promote evidence-informed policymaking processes (Basaza et al., 2014). The REACH Uganda Project Office has established a clearinghouse which provides Uganda-specific evidence documents in the form of evidence briefs, policy dialogues summaries, rapid response summaries, and relevant research syntheses as local data to inform decision-making (Basaza et al. 2014). As well, Zambia and Cameroon have established clearinghouses to provide local evidence which could be used to inform policy decisions and strengthen health systems at the country level (Oxman 2015). Therefore, HSE and the EVIPNet VHL may appropriately wish to stay focused on providing the best evidence in the world while local clearinghouses include local data and evidence. That way, policymakers and stakeholders in Africa can use both global evidence from HSE and the EVIPNet VHL and local data from clearinghouses in their respective countries to inform health policy decision-making.

Findings in relation to other studies

The findings in this study are supported by the existing research literature (Lavis et al., 2006; Mijumbi et al., 2014; Rosenbaum et al., 2008). It was quite surprising to find that participants had assumed documents from the EVIPNet VHL were credible because they were associated with WHO, suggesting that participants attribute credibility on the basis of institutional sponsorship or affiliation, without critically appraising the content of the documents. This finding is consistent with a previous study where participants said they would trust the information on the Cochrane Library because of their familiarity with the Cochrane name, and not the quality of its products (Rosenbaum et al., 2008).

The findings in this study fit in and add to what is known about clearinghouses and strategies such as “producer push,” “facilitating user-pull,” “user pull,” and the “exchange” efforts that have been proposed to link research evidence to decision-makers (Lavis et al., 2006). Our findings that HSE and the EVIPNet VHL provide participants with systematic reviews and other relevant research syntheses in user-friendly formats indicate that the clearinghouses serve as a mechanism to “facilitate user-pull.” They also contribute to “producer push” efforts as policymakers and stakeholders stated that they could provide them with available updates on health systems through email alerts (Table 6). Moreover, our findings from policymakers and stakeholders that the clearinghouses provide them with up-to-date and relevant information, to meet deadlines and to inform evidence-based policy development, add to and are consistent with the demonstrated use of rapid response services as a strategy to provide policymakers with timely access to relevant research evidence that meet policymakers’ urgent information needs to inform decision-making in Uganda (Mijumbi et al., 2014). In addition, clearinghouses complement ‘full-serve’ strategies to promote evidence-informed health policymaking such as those that convene stakeholder dialogues with decision makers for which an evidence brief is used to inform deliberations (Wilson et al., 2014), by serving as a “self-serve” approach that provides research syntheses to decision makers.

Strengths and limitations of the study

This study has a number of strengths. First, this study is unique in that it provides an empirical analysis that fills a knowledge gap about policymakers’ and stakeholders’ views about and experiences with health-related clearinghouses in two resource-limited countries in Africa, and it provides suggestions for improvements. Second, our data collection was not limited to the clearinghouses but also included conventions around research use. We collected data on participants’ use of research evidence in connection with their work, in terms of whether they searched for research evidence on health systems issues as opposed to public health or clinical issues; their understanding of systematic reviews; and their experience in accessing the quality and local applicability of systematic reviews. Such a strategy was an important step in that it has helped us to understand the knowledge deficit and other barriers to the utilization of research evidence from the clearinghouses, and to identify strategies to address these barriers. Third, we conducted the interviews with a wide range of policymakers and stakeholders involved in

health policy decision making in the two countries, and this has the potential to promote the use of research evidence by these policymakers and stakeholders to inform decision-making. Throughout the user-testing sessions, participants came to know and familiarize themselves with the importance of these tools, and expressed enthusiasm for using them and willingness to use them to inform planning, programmatic, and policy decisions. This suggests that a fairly brief introduction to these clearinghouses may be enough to spur their usage, although this would need to be tested empirically. Finally, the face-to-face interviews we conducted with participants, and the user-testing sessions enabled us to observe participants' use of the clearinghouses. These mechanisms could have minimized social desirability biases and shed light on the on-the-ground realities in the two countries.

This study has two limitations. First, the honeycomb model was used to design some of the interview guide, and could have led to leading questions. This could have led to social desirability bias as respondents might have answered the questions positively in order to please the interviewer and feel good about themselves. We addressed this issue by not only recording the yes and no answers, but also by prompting participants to provide the rationale for their answers. Second, we conducted the user-testing in countries where the internet is very slow; participants were frequently frustrated by intermittent power issues and internet breakdown. Some places lacked internet entirely and we had to use a high speed private service internet bundle that was purchased and installed on the principal's investigator's laptop to conduct the user-testing. These issues could have affected their responses. They could also affect the generalizability of these findings to other countries where the technological environment is different.

Implications for policy and practice

The findings from this study have implications for policy and practice. First, the findings show that the clearinghouses can provide policymakers with research evidence to inform decision-making on health systems but there were concerns about the capacity of policymakers to utilize these important tools. This presupposes that training policymakers on how to use the clearinghouses could facilitate their use. Second, participants suggested the provision of local data to be used to inform health policy decisions, and this implies that governments and policymakers could take a course of action to address this. For example, governments could support the establishment of national health clearinghouses that profile systematic reviews and local policy-relevant syntheses for which policymakers could use to inform policy decisions about health systems. Third, the findings from this study suggest that clearinghouses, particularly both HSE and the EVIPNet VHL are a promising knowledge translation strategy. However, there were concerns that systematic reviews on the EVIPNet VHL clearinghouse were not accessible to policymakers from Africa and participants suggested making it accessible to them. It was found that there is an agreement that limits their accessibility only to BIREME (Latin American and Caribbean Center on Health Sciences Information) members. Therefore, in order to maximise the accessibility of systematic reviews to policymakers in Africa, and promote evidence-informed policymaking in the region, funders for EVIPNet and SURE

activities in Africa could consider securing joint agreements with BIREME members to address their accessibility issues.

Implications for future research

This chapter raises a number of issues that further research could explore. First, a majority of the participants were not aware of the clearinghouses, and it is important to conduct further research on the participants who were interviewed and included in the user-testing in both countries to determine whether they have been using the clearinghouses since they were introduced to them. Conducting further research with participants following the user testing could provide insights to clearinghouse developers about how policymakers and stakeholders might use them if they had a proper introduction and some hands-on training with them, and the impact they might have if targeted users were aware of them and knew how to use them. Second, it would be interesting to conduct future research to determine whether building partnerships with decision-makers at ministries, research institutions, and NGOs, and disseminating relevant, up-to-date information from the clearinghouses to them could influence use of research evidence. Third, future research would need to investigate the role that knowledge brokers, information specialists, and data managers could play in influencing research uptake from the clearinghouses.

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Table 1: Characteristics of participants and convention around research use

Characteristics and conventions	Uganda	Zambia	Total
Total No. of participants	25	25	50
Position level			
• No.(%) in senior level position	6 (24%)	9 (36%)	15 (30%)
• No. (%) in mid-level position	11 (44%)	11 (44%)	22 (44%)
• No. (%) in junior level position	8 (32%)	5 (20%)	13 (26%)
Education			
• No.(%) with a PhD degree	2 (8%)	1 (4%)	3 (6%)
• No. (%) with a master's degree	21 (84%)	20 (80%)	41 (82%)
• No. (%) with an MD degree only	1 (4%)	0 (%)	1 (2%)
• No. (%) with a bachelor's degree	1 (4%)	4 (16%)	5 (10%)
Other characteristics			
• Mean number of years worked	6.92	6.24	6.5
• Proportion who are female	14 (56%)	13 (52%)	27 (54%)
Conventions around evidence use			
• Use of research evidence in connection to work	25 (100%)	25 (100%)	50 (100%)
• Searching for research evidence on health systems arrangements	24 (96%)	18 (72%)	42(84%)
• Experience in assessing the quality of systematic reviews	6 (24%)	12 (48%)	18 (36%)
• Experience in assessing the local applicability of systematic reviews	9 (36%)	12 (48%)	21 (42%)
• Proportion unable to define systematic reviews/mentioned none of the key elements of a systematic review	11 (44%)	9 (36%)	20 (40%)
• Proportion that mentioned 1 of the key elements of a systematic review	4 (16%)	7 (28%)	11 (22%)
• Proportion that mentioned 2 of the key elements of a systematic review	4 (16%)	5 (20%)	9 (18%)
• Proportion that mentioned 3 of the key elements of a systematic review	3 (12 %)	3 (12%)	6 (12%)
• Proportion that mentioned 4 of the key elements of a systematic review	2 (8%)	1(4%)	3 (6%)
• Proportion that mentioned 5 or more of the key elements of a systematic review	1 (4%)	0 (0%)	1 (2%)

Note: The key elements of systematic review that were used to assess participants' understanding of systematic review included:(1) an explicit research question on a clinical or non clinical topic that aims for a comprehensive search for relevant studies; (2) an explicit description of the search strategy; (3) an explicit description of the inclusion and exclusion criteria; (4) a critical appraisal of the quality of included studies in the review, and (5) data extraction and a synthesis of the findings/results of the various studies included in the review (Cook et al., 1997; Klassen et al., 1998; Pai et al., 2004; Sackett et al., 1996; Sweet and Moynihan, 2007).

Table 2: Assessing knowledge about visitation, registration, sign up and language support; views about the clearinghouses, and understandability, barriers and affiliation dimensions

Health Systems Evidence		EVIPNet VHL	
Domain	Yes	Domain	Yes
Awareness: Respondent is aware of Health Systems Evidence	8 (16%)	Awareness: Respondent is aware of the EVIPNet VHL	8 (16%)
Visitation: Respondent has visited Health Systems Evidence before	7 (14%)	Visitation: Respondent has visited the EVIPNet VHL before	9 (18%)
Registration*: Respondent has registered with Health Systems Evidence	10(20%)	-	-
Sign up*: Respondent has signed up to receive a monthly Health Systems Evidence Service on topics of interest	11 (22%)	-	-
Support for preferred language: The site has any support for respondent's preferred language	50 (100%)	Support for preferred language: The site has support for the respondent's preferred language	50 (100%)
Morville's framework dimensions			
Health Systems Evidence		EVIPNet VHL	
Domain	Yes	Domain	Yes
Accessibility: Respondent has access to a computer or other device with internet access while at work to access Health Systems Evidence	50 (100%)	Accessibility: Respondent has access to a computer or other device with internet access to access the EVIPNet VHL	50 (100%)
Findability: If respondent is looking for Health Systems Evidence online, he or she can find it easily	50 (100%)	Findability: If respondent is looking for the EVIPNet VHL online, she or he can find it easily	47 (94%)
Usability: Respondent finds it easy to use the various features of Health Systems Evidence like the functionality, searching, or navigating the site	23 (46%)	Usability: Respondent finds it easy to use the various features of the EVIPNet VHL like the functionality, searching, or navigating the site	28 (56%)

Usefulness: Respondent thinks the website is a useful site for her or his work	45 (90%)	Usefulness: Respondent thinks the website is a useful site for her or his work	48 (96%)
Credibility: Respondent finds information in Health Systems Evidence to be credible	46 (92%)	Credibility: Respondent finds information in the EVIPNet VHL to be credible	46 (92%)
Desirability: Respondent likes Health Systems Evidence both in terms of the look and feel of the site and in terms of its content	49 (98%)	Desirability: Respondent likes the EVIPNet VHL both in terms of the look and feel of the site and in terms of its content	49 (98%)
Value: Respondent finds Health Systems Evidence valuable (i.e., it will support the use of health evidence by policymakers and stakeholders to support change in health systems)	48 (96%)	Value: Respondent finds the EVIPNet VHL valuable (i.e., it will support the use of health evidence by policymakers and stakeholders to support change in health systems)	49 (98%)
Understandability, barriers and affiliation dimensions			
Health Systems Evidence		EVIPNET VHL	
Domain	Yes	Domain	Yes
Understandability: Respondent said there are parts of the site, words or content that she or he does not understand	12 (24%)	Understandability : Respondent said there are parts of the site, words, or content that she or he does not understand	6 (12%)
Barriers: Respondent faces barriers in using the site at the workplace	32 (64%)	Barriers: Respondent faces barriers in using the site at the workplace	39 (78%)
Affiliation: Respondent feels this site has been designed for someone like him or her	50 (100%)	Affiliation: Respondent feels this site has been designed for someone like him or her	49 (98%)

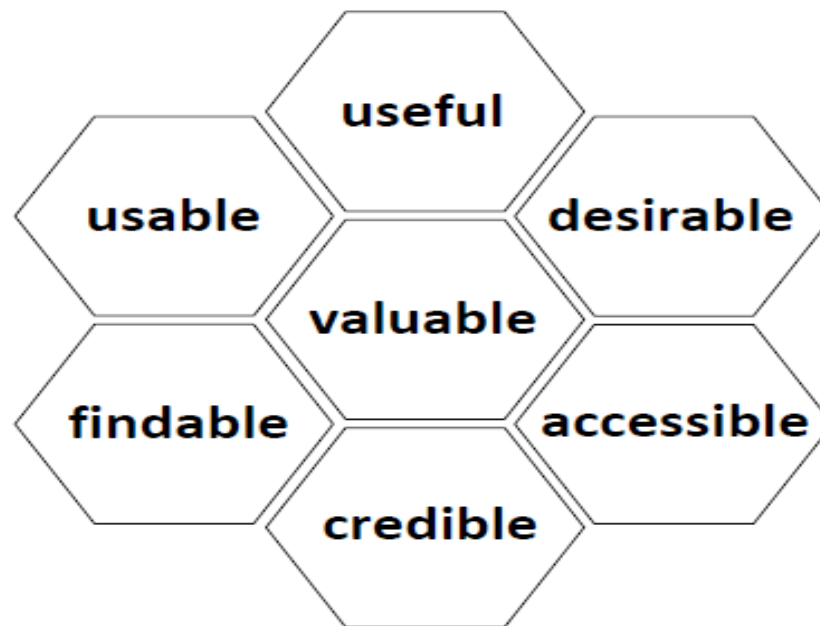
***Note that the EVIPNet VHL does not require registration and sign up**

Table 3: Breakdown of the user-testing on policy issues worked in the past and demonstration topics

Domain	Total and average number of documents obtained by participants for their searches in Uganda			Total and average number of documents obtained by participants for their searches in Zambia		
	HSE	EVIPNet VHL	Total	HSE	EVIPNet VHL	Total
Number of participants	25	25	25	25	25	25
Total number of document obtained for policy issue worked in the past	831	2647	3478	5494	3951	9445
Average number of documents obtained for policy issue worked in the past	33	106	139	220	158	382
Total number of documents obtained for Skilled birth attendance	196	1148	1344	421	1039	1460
Average number of documents obtained for skilled birth attendance	8	46	54	17	42	58
Total number of documents obtained for maternal and child health	458	183	641	1986	2078	4064
Average number of	18	7	26	79	83	163

documents obtained for maternal and child health						
Total number of documents obtained for PMTCT	1505	91	1596	1727	1634	3361
Average number of documents obtained for PMTCT	60	4	64	69	65	134
No.(%) that obtained search results on all four domains	3/25 (12%)	7/25 (28%)	10/25(40%)	11/25 (44%)	10/25 (40%)	21/25(84%)
No. (%) that obtained results on only 3 domains	8/25(32%)	3/25 (12%)	11/25 (44%)	7/25 (28%)	6/25 (24%)	13/25(52%)
No.(%) that obtained results on only 2 domains	5/25 (25%)	4/25 (16%)	9/25(36%)	2/25 (8%)	4/25 (16%)	6/25 (24%)
No. (%) that obtained results for only 1 domain	5/25 (20%)	7/25 (28%)	12/25(48%)	4/25 (16%)	4/25 (16%)	8/25 (32%)
No.(%) that obtained zero in all four domains	4/25(16%)	3/25 (12%)	12/25 (28%)	1/25 (4%)	1/25 (4%)	2/25 (8%)

Table 4: Morville’s Honeycomb model of user experience. Permission was obtained from Peter Morville to use it. Morville, Peter: User experience Design
http://semanticstudios.com/user_experience_design/



Accessibility: The clearinghouse can be accessed by targeted users via internet

Findability: Targeted users can easily find the information they are looking for on the clearinghouse

Usability: Targeted users can use the clearinghouse with ease and satisfaction

Usefulness: The clearinghouse is of practical benefit to the targeted users

Credibility: Targeted users can trust or believe the clearinghouse

Desirability: The clearinghouse is worth having and wanted by targeted users

Value: The clearinghouse is able to advance its goals of promoting the use of research evidence by policymakers and stakeholders to inform health policy decisions and support change in health systems

Table 5: Most useful features of HSE and the EVIPNet VHL identified by participants in brackets

Health Systems Evidence (HSE)	EVIPNET VHL
One page summary (11)	African regional focus (16)
LMICs (9)	SUPPORT Tools (12)
Advanced searched (5)	Policy dialogues (9)
Links to user friendly summaries, abstract or full text report (5)	Evidence briefs for policy (8)
Type of documents (5)	Rapid response documents (7)
Domains (3)	SURE Guides (7)
Open search (2)	Systematic reviews (6)
Country focus/studies conducted (1)	Evidence-informed policies (5)
Evidence briefs for policy (1)	News section (4)
Intergovernmental document (1)	Advanced search (2)
Publication range (1)	Open search (2)
Themes (1)	Knowledge sharing section (2)
Top one-pager accessed by policymakers (1)	Upcoming events (1)
All of them are useful (22)	All of them are useful (2)

Table 6: Key themes of Morville’s user-model framework

Domain	Themes across HSE and the EVIPNet VHL	Themes unique to HSE	Themes unique to the EVIPNet VHL
Accessibiility	Accessibility <ul style="list-style-type: none"> ▪ Access to a computer and internet ▪ Access to internet at workplace 	Accessibility <ul style="list-style-type: none"> ▪ None 	Accessibility <ul style="list-style-type: none"> ▪ None
Findability	Findability <ul style="list-style-type: none"> ▪ Well-organized and easy to locate ▪ Easier to find via Google search using the title 	Findability <ul style="list-style-type: none"> ▪ None 	Findability <ul style="list-style-type: none"> ▪ None
Usability	Usability <ul style="list-style-type: none"> ▪ Easy to use/user-friendly ▪ Instructions are clear ▪ It is pretty straightforward ▪ Easy to navigate and functions well 	Usability <ul style="list-style-type: none"> ▪ Options to perform searches ▪ Well-structured 	Usability <ul style="list-style-type: none"> ▪ Easy to use ▪ Does not require registration ▪ Not getting the information searched for
Usefulness	Usefulness <ul style="list-style-type: none"> ▪ Provides relevant information and tools on health systems ▪ Provides information that could empower users at policy decision forums/workshops ▪ Provides relevant information needed to inform policy decisions and advocacy 	Usefulness <ul style="list-style-type: none"> ▪ Provides available information relevant to user’s work on maternal and child health ▪ Provides relevant systematic reviews 	Usefulness <ul style="list-style-type: none"> ▪ Provides user with information on relevant topics ▪ Provides tools to empower policymakers ▪ Can provide users with information to meet deadlines
Credibility	Credibility <ul style="list-style-type: none"> ▪ Pulls evidence from publications ▪ Associated with reputable researchers and institutions 	Credibility <ul style="list-style-type: none"> ▪ It is associated with a credible university (McMaster University) 	Credibility <ul style="list-style-type: none"> ▪ It is associated with/sponsored by WHO

	<ul style="list-style-type: none"> ▪ Authors of the articles are from prominent universities ▪ Sources of articles/reviews are stated; authors, journals and institutions are credible ▪ Peered reviewed ▪ Contains information on systematic reviews and meta-analyses from Cochrane reviews ▪ Contains scientific data 		
Desirability	<p>Desirability</p> <ul style="list-style-type: none"> ▪ Well-organized and well structured ▪ Information relevant to health systems and health policy 	<p>Desirability</p> <ul style="list-style-type: none"> ▪ Good configuration ▪ Relevant content needed by users ▪ Simple to follow/straight forward ▪ Eye catching and relevant to user's work 	<p>Desirability</p> <ul style="list-style-type: none"> ▪ WHO logos ▪ Information on WHO frameworks and evidence for policy change
Value	<p>Value</p> <ul style="list-style-type: none"> ▪ Relevant information for planning, programming, policy and health systems development and evidence-based decision making ▪ Provides valuable information to policymakers and stakeholders ▪ Aids evidence-based policy 	<p>Value</p> <ul style="list-style-type: none"> ▪ Provides relevant information which could be used to integrate PMTCT and reproductive health ▪ Could provide reference for guidelines development 	<p>Value</p> <ul style="list-style-type: none"> ▪ Associated with WHO ▪ WHO frameworks ▪ A good source for information ▪ Useful data are available ▪ Provides valuable information for advocacy work

Table 7: Sources of evidence disclosure

General source of research evidence	Breakdown of sources	Total of the sources
Google	Google (26)	26
Institutional documents	WHO (22); Ministry of Health (4); UNAIDS (4); Ugandan AIDS Commission (3); UNICEP(3); USAID (3); Demographic and Health Survey of Zambia (2); UNDP (2);AIDSTAR-ONE (1); Centre for Diseases Control (CDC) (1); Global Fund for Malaria, HIV and TB (1); International Atomic Energy Agency (1); Malaria Indicators Survey (1); Plan international online library (1); SURE/EVIPNet's (1); UNFPA (1); World Bank database (1)	18
Fact-finding missions	Social health insurance (field visits to other countries: Ghana, Kenya, Rwanda, and Tanzania (2), visits to hospitals (1)); programmatic information from health centres (1); field visits to other countries for the development of national health strategic plan (1)	5
Pilot studies	Pilot-testing from mission hospitals PMTCT (2);Pilot studies conducted in two districts for community volunteers provision of depoprovera (DMPA) (1); Pilot testing of Mbale district home fortification program (1); pilot demonstration of new vaccine for pneumonia and diarrhea for infants under 0-11 years old (1)	5
Electronic databases	Pubmed (12);Campbell collaboration (1); Cochrane Reviews (1); PDQ-evidence (1),	4
Network evidence update (i.e., email or listerv exchange among members of a scientific community)	World Union on Lung Health via email(1); and AERAS updates on TB (1); African heart network(1); UNDP HIV/AIDS network update on different health systems issues (1)	4
University online libraries	Liverpool University(1); Makerere University School of Public Health (1); Tulane University (1); student theses (1)	4
Contact with experts/consultants	Request information from the International Task Team for Global Elimination of HIV (IATT) (1); contact with colleagues and experts on malaria (1)	3
Journals	British Journal of Medicine and Medical Research &Lancet (3); American Journal of Tropical Medicine and Hygiene(1);	3
Survey	Survey in Zambia (social health insurance) (2)	1

*Note that the numbers in brackets indicate the number of respondents who selected that source

**Note that although Google is ranked 1st, the total number of sources in the column section for Google is 1 because it is the only source and was mentioned 26 times, unlike institutional documents which are ranked 2nd with 18 different institutional sources mentioned.

Table 8: Policy issues worked and the use or non use of research evidence to inform their development and number of participants who mentioned the policy in brackets

Policy issue worked in Uganda using research evidence

1. A policy shift from option A to option B+ PMTCT policy guidelines in Uganda, 2012 (4)
2. Uganda National HIV Prevention strategy, 2011-2015 (3)
3. An adolescent sexual reproductive health strategy (1)
4. An accountability framework for HIV/AIDs delivery was introduced in Uganda/1
5. A change in malaria treatment policy, 2004(1)
6. A policy on integrated community case management (ICCM) for the treatment of malaria, pneumonia and diarrhea was introduced in Uganda in 2010 (1)
7. A Policy shift from comprehensive nurse training to vertical midwife training (1)
8. A safe medical male circumcision policy was introduced in Uganda, 2010 (1)
9. Child protection policy in Uganda (1)
10. Guidelines for mainstreaming HIV/AIDs policy in development planning & budgetary allocation (1)
11. Revision of national resource allocation formula in Uganda (1)
12. Uganda expanded program on immunization (EPI) multi-year plan, 2012-2016,(1)
13. Ugandan national drug policy, 2002 (1)

Policy issue worked in Uganda without using research evidence

14. Draft policy on non-communicable disease (1)
15. Village health teams (VHTs) strategy and operational guidelines was established by the Ministry of Health in 2010 (1)

Policy issue worked in Zambia using research evidence

16. Community health assistant (CHA) policy, 2010 (3)
17. Reproductive health policy of Zambia (2011)(3)
18. A policy shift from option A to option B+ PMTCT policy guidelines was introduced in Zambia in 2013(2)
19. Introduction of social health insurance policy in Zambia (draft) (2)
20. National health strategic plan (2011-2015) (2)
21. A policy for TB and HIV integrated management in Zambia, started in June 2012 and approved for implementation in November 2012 (1)
22. Community volunteers provision of depoprovera (DMPA), a medication to prevent pregnancy in communities (1)
23. A policy shift /change from quinine as first line treatment of malaria to injectible artesunate (1)
24. Male circumcision as a prevention strategy for HIV operational policy of Zambia, 2012/ (1)
25. Pilot demonstration of introduction of new vaccine on pneumonia and diarrhea (1)
26. Policy guidelines on the use of misoprostol for prevention of postpartum haemorrhage in Zambia 2012 (1)

Policy issue worked in Zambia without using research evidence

27. A clinical trial on microbicides gel to prevent HIV was implemented in Zambia in Mazabuka from 2003 to 2009 without using research evidence to know whether it works or not, and was later found to cause HIV infections on the couples who used it, hence it was abandoned (See Ministerial Statement on Microbicides, not dated) (1)
28. MA program in psychiatry at the University of Zambia (UNZA) (1)

Note that the list from 1 to 28 references policy issues worked on in Uganda and Zambia for which research evidence was used and not used to inform their development. The number in bracket in each policy issue represents the number of participants that mentioned the policy.

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20. Source not given
21. Source not given
22. Ministry of Health (MOH), Zambia, Lifelong Antiretroviral Drugs (ARV's) for all HIV positive women in Zambia: Policy Guidelines for Health Facilities in Zambia, January 2013
23. Ministry of Health (MOH), Zambia, Country Operational Plan for the scale-up of voluntary medical male circumcision in Zambia, 2012-2015
24. Ministry of Health (MOH), Zambia, Clinical guidelines on the use of misoprostol for prevention of postpartum haemorrhage in Zambia, 2012
25. Source not given
26. Source not given
27. Source not given
28. Ministerial Statement on Microbicides, Minister of Health, To be presented to parliament by the Hon. Minister of Health.

Appendix 1: Interview guide for chapter 3

The purpose of this interview is to hear your views about and experiences with using or not using research evidence from clearinghouses such as Health Systems Evidence and the recently launched EVIPNet Virtual Health Library.

ID:

Date:

Place:

Time:

Current Practices

1. Is it common for you to search for research evidence in connection with your work? ☐ Yes ☐ No
2. Do you search for research evidence regarding health system arrangements and implementation strategies as opposed to research evidence about clinical or public health programs and services? ☐ Yes ☐ No
3. If yes, where do you search on the internet for evidence about health systems arrangements and implementation strategies?
4. What does the term “systematic review of research evidence” mean to you?
5. Do you have experience in assessing the quality of systematic reviews?
☐ Yes ☐ No
6. Do you have experience in assessing local applicability of systematic reviews?
☐ Yes ☐ No
7. What are the two most recent policy issues that you have worked on using research evidence?
8. What are the most recent policy issues that you have worked on without using research evidence, but where research evidence might have been relevant?

Awareness, registration, use, general views about and experiences with Health Systems Evidence

9. Are you aware of Health Systems Evidence? ☐ Yes ☐ No
10. If no, go to question # 16, “First impressions.”
11. If yes, how did you become aware of this resource?
12. Have you visited Health Systems Evidence before? ☐ Yes ☐ No
13. Have you registered with HSE? ☐ Yes ☐ No
14. Describe your experience when registering for the HSE?
15. Have you signed up to receive the monthly Health Systems Evidence Service on topics of interest? ☐ Yes ☐ No

First impressions about Health Systems Evidence

16. What are/were your first impressions of the Health Systems Evidence site found at (www.healthsystemsevidence.org)?

Tasks

17. Could you please try searching for a topic that you have been working on recently (for instance, one of the policy issues you mentioned earlier). Spend a few minutes and search on this site the same way you would do in your regular work. Please

think out loud, so I will understand what you are looking for and expecting to find when you click or enter search terms.

Specific task 1: Particular topic research

18. Let us say you want to find a particular systematic review about the effectiveness of skilled birth attendance in reducing maternal mortality, demonstrate how you would search for it in Health Systems Evidence.
19. For the first record you retrieved, can you find the last year the literature was searched?

Specific task 2: Broad topic research

20. If you are searching for research evidence about a broad topic such as “policy options for reducing maternal and child mortality in low-and middle-income countries,” how would you search for it in Health Systems Evidence?
21. If you are searching for “strategies for preventing mother-to-child transmission of HIV (PMTCT), how would you search for it on Health Systems Evidence?

Language

22. What is your preferred language for searching for research evidence?
23. Does this site have any support for your preferred language? ☐ Yes ☐ No

Morville’s user experience framework

24. **Accessibility:** Do you have access to a computer or other device with internet access while at work so that you can access Health Systems Evidence during working hours? ☐ Yes ☐ No, Why/why not?
25. **Findability:** If you are looking for Health Systems Evidence online, can you find it easily? ☐ Yes ☐ No, Why/why not?
26. **Usability:** Do you find it easy to use the various features of Health Systems Evidence like the functionality, searching, or navigating the site? ☐ Yes ☐ No, Why/why not?
27. **Usefulness:** Is this website useful for you in your work? ☐ Yes ☐ No, Why/why not?
28. **Credibility:** Do you find the information in Health Systems Evidence to be credible? ☐ Yes ☐ No, Why/why not?
29. **Desirability:** Do you like Health Systems Evidence both in terms of the look and feel of the site and in terms of its content? ☐ Yes ☐ No, Why/why not?
30. **Value:** Do you find Health Systems Evidence valuable (i.e., it will promote the use of research evidence by policymakers and stakeholders to support change in health systems)? ☐ Yes ☐ No, Why/why not?

Other concepts

31. **Understandability:** Are there parts of the site, words or content that you feel you don’t understand? ☐ Yes ☐ No, If yes, provide examples
32. **Barriers:** Are there any barriers that you face in using the site at your workplace? When travelling for work? ☐ Yes ☐ No, if yes, please state examples.
33. **Affiliation:** Does it feel like this site has been designed for someone like you? ☐ Yes ☐ No, Why/why not?

Specific features of Health Systems Evidence

34. Are any of the following Health Systems Evidence (HSE) key features useful for you? Why/why not?
- a. Open search box
 - b. Advanced search
 - c. Links to user-friendly summaries, scientific abstracts, full-text reports, and (if applicable) the studies included in systematic reviews
 - d. One-page summary that describes all available information about the record
35. Do any of the following “limit your search” key features appeal to you? Why/why not?
- a. Domain (e.g., diseases, technologies, sectors, providers))
 - b. Type of document (e.g., systematic review)
 - d. Publication date range
 - e. Low -and middle-income country (LMIC) focus

Others: Recommendation

36. **Changes:** If you could make a change(s) to this website to make it more useful, what change(s) would you suggest?

Demographics

A	What is your educational background?	
	Medicine	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Other health professional	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Research	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Administration	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Finance	Describe:
	Other	
Education: <input type="checkbox"/> PhD <input type="checkbox"/> Masters <input type="checkbox"/> MD <input type="checkbox"/> Undergraduate <input type="checkbox"/> High school		
What is your current position?		

How many years have you been working in your current position?

What is your age?	20-29	30-39	40-49	50+
What is your gender?	Male		Female	
Is your role a policymaker?	Yes		No	
Is your role a stakeholder? (Specify)	Yes		No	
Is your role a researcher	Yes		No	
Is your role a donor?	Yes		No	

Now let us turn to the Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL)

The purpose of the remainder of this interview is to hear your views about and experiences with using research evidence from the EVIPNet VHL, which is a newly created resource.

Awareness, registration, use, general views about and experiences with EVIPNet VHL

1. Are you aware of the EVIPNet VHL? ☐ Yes ☐ No
2. If no, go to question #5, “First impressions.”
3. If yes, how did you become aware of this resource?
4. Have you visited the EVIPNet VHL before? ☐ Yes ☐ No

First impressions about the EVIPNet VHL

5. What are/were your first impressions of the EVIPNet VHL site found at (www.evipnet.org)?

Tasks

6. Could you please try searching for a topic that you have been working on recently (for instance, one of the policy issues you mentioned earlier)? Spend a few minutes and search on this site the same way you would do in your regular work. Please think out loud, so I will understand what you are looking for and expecting to find when you click or enter search terms.

Specific task 1: Particular topic research

7. Let us say you want to find a particular systematic review about the effectiveness of skilled birth attendance in reducing maternal mortality, how would you search for it?

Specific task 2: Broad topic research

8. If you are searching for research evidence about a broad topic such as “policy options for reducing maternal and child mortality in low- and middle- income countries,” how would you search for it on the EVIPNet VHL?
9. If you are searching for “strategies for preventing mother-to-child transmission of HIV (PMTCT), how would you search for it on the EVIPNet VHL?

Language

10. What is your preferred language for searching for research evidence?
11. Does this site have any support for your preferred language? ☐ Yes ☐ No

Morville’s user experience framework

12. **Accessibility:** Do you have access to a computer or other device with internet access while at work so that you can access the EVIPNet VHL during working hours? ☐ Yes ☐ No, Why/why not?
13. **Findability:** If you are looking for the EVIPNet VHL online, can you find it easily? ☐ Yes ☐ No, Why/why not?
14. **Usability:** Do you find it easy to use the various features of the EVIPNet VHL like the functionality, searching, or navigating the site? ☐ Yes ☐ No, Why/why not?
15. **Usefulness:** Is this website a useful site for you in your work? ☐ Yes ☐ No, Why/why not?
16. **Credibility:** Do you find the information from the EVIPNet VHL to be credible? ☐ Yes ☐ No, Why/why not?
17. **Desirability:** Do you like the EVIPNet VHL both in terms of the look and feel of the site and in terms of its content? ☐ Yes ☐ No, Why/Why not
18. **Value:** Do you find the EVIPNet VHL valuable (i.e., it will promote the use of Researchevidence by policymakers and stakeholders to support change in health systems)? ☐ Yes ☐ No, Why/why not?

Other concepts

19. **Understandability:** Are there any parts of the site, words or content that you feel you don’t understand? ☐ Yes ☐ No, If yes, please provide examples
20. **Barriers:** Are there any barriers that you face in using the site at your workplace? When travelling for work? ☐ Yes ☐ No, if yes, provide examples.
21. **Affiliation:** Does it feel like this site has been designed for someone like you? ☐ Yes ☐ No, Why/why not?

Specific features of the EVIPNet VHL

22. Are any key features of the EVIPNet VHL useful for you? ☐ Yes ☐ No
23. If no, why not?
24. If yes, please state which key features are useful to you and why.

Others: Recommendations

25. **Changes:** If you could make a change(s) to this website to make it more useful, What change would you suggest?

Chapter 4: Analyzing usage of Health Systems Evidence and the EVIPNet Virtual Health Library: A mixed methods study

Introduction

This chapter – the third of three substantive chapters – uses a mixed methods approach to look at usage and the determinants of usage of Health Systems Evidence (HSE) and the Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL) among Ugandan and Zambian policymakers and stakeholders. This chapter relates to and builds on chapters 2 and 3 in three respects. First, the chapter provides empirical analysis of policymakers' and stakeholders' usage and the determinants of their usage of two specific cases of the phenomenon explored in the theoretical framework, namely HSE and the EVIPNet VHL as two global clearinghouses. Second, the empirical analysis of usage and its determinants of these two clearinghouses complements the empirical analysis of policymakers' and stakeholders' views about and experiences with the clearinghouses' features. Third, the interviews that informed this study were the same ones as informed the study described in chapter 3: in a single interview, I asked questions relevant to both studies. Again, this chapter does not directly assess the intended effects that were incorporated into the theoretical framework because the study was not designed as an explicit test of the framework (but this should be the focus of future research).

I conceived, designed and implemented this study with input from my supervisor, Dr. John Lavis. I was responsible for collecting primary data for this study. I undertook a 4-month field study in Uganda and Zambia to interview policymakers and stakeholders. I was responsible for executing all of the qualitative data analyses. Usage statistics on Health Systems Evidence, prepared through customized programming, and on the EVIPNet VHL, prepared using Google Analytics, were obtained from the maintenance team led by my supervisor, and I calculated percentage changes and proportions for these data. I drafted the original chapter and subsequent revisions, which were reviewed by my supervisor, Dr. John Lavis, and I also received detailed comments and suggestions from the other thesis supervisory committee members (Dr. Lisa Schwartz and Dr. Fadi El-Jardali) that were included into the version presented here.

Abstract

Background and objectives: Health System Evidence (HSE) and the Evidence-Informed Policy Network Virtual Health Library (EVIPNet VHL) are clearinghouses that were established to support the utilization of the best available research evidence by policymakers and stakeholders to inform health policymaking. This paper analyzes the usage of HSE and the EVIPNet VHL and determinants of their usage.

Methods: A mixed methods design was utilized. Both quantitative and qualitative data were collected from policymakers and stakeholders in Uganda and Zambia via interviews. Aggregated usage statistics on HSE were collected for Africa through customized programming, and aggregated usage statistics from both HSE and the EVIPNet VHL were collected for Africa using Google Analytics.

Results: HSE has been fairly widely used by policymakers and stakeholders in Africa for the last two and half years. HSE recorded a total of 2579 unique visitors, 2324 new visits, 20681 pageviews, and 3624 total visits from users based in Africa. Researchers were the largest group of new registered users, representing 51%, followed by policymakers (38%), and professionals (33%). The much newer EVIPNet VHL received 906 visitors, 809 new visits, 2492 pageviews, and 1153 visits since its launch. Among the 50 interviewees, 2 were users of HSE and 1 was a user of the EVIPNet VHL. These users were satisfied with the clearinghouses as they provided them with information relevant to their work on health system. The major determinants of the clearinghouses' usage included awareness, access to high speed internet and a computer, the availability of time, knowledge and skills relating to how to search for information, and accountability for research use. Strategies suggested to facilitate the use of HSE and the EVIPNet VHL include: linking the clearinghouses to the websites of national ministries of health; promotion and partnerships, including training on how to search for information; provision of high speed internet; and online IT support.

Conclusions: This study shows that the two clearinghouses are fairly widely used by policymakers and stakeholders in African. The results shed light on usage and the determinants of usage, and strategies that can be implemented to maximize the use of research evidence from the clearinghouses.

Background

Evidence-informed health policymaking in LMICs is promoted by WHO and past ministerial summits and resolutions (Mexico 2004, WHO 2000, WHO 2004, WHO 2005). Research evidence can be used by health system managers and policymakers to strengthen the governance, financial, and delivery arrangements of health systems, as well as implementation strategies at the national level (Lavis 2009). Studies conducted over the years have identified timely access to high quality and relevant research evidence as one of the facilitators of research use by policymakers (Innvaer, Vist, Trommald, & Oxman, 2002). In recognition of this, considerable efforts have been undertaken to establish clearinghouses that will sustainably identify, classify and assess systematic reviews and other types of research syntheses about health system arrangements and implementation strategies, and to provide policymakers and stakeholders with highly relevant, timely, and comprehensive evidence to inform health system policymaking (Lavis 2009).

Health Systems Evidence (HSE) and the EVIPNet VHL are two clearinghouses that were created to improve health systems by facilitating the utilization of research evidence among policymakers and stakeholders. They provide systematic reviews and other types of research syntheses to health system managers and policymakers. HSE was launched in 2008 while the EVIPNet VHL was launched in May 2013, just one month before we began our interviews in June 2013. The EVIPNet VHL was also running a beta version that was utilized by some users as early as April 2012, prior to being launched officially.

Although the clearinghouses serve as part of a strategy to influence the use of research evidence, little is known about who uses these important resources or about which policy issues or decisions are researched using these resources. Furthermore, it is also not clear what factors determine the clearinghouses' usage. In addition, considerable efforts and resources have been invested to develop and continuously update these clearinghouses. Therefore, to assess the value of these initiatives, it is important to know whether the evidence provided by these clearinghouses is used by their target audiences to promote evidence-informed policymaking. Lastly, as benchmarks for evaluating progress, it is vitally important that usage trends are assessed. This paper addresses these knowledge gaps through an empirical study conducted in two African countries, and through an analysis of the usage of the two clearinghouses from users based in Africa.

Research objectives

The objectives of this paper are: 1) to analyze the usage of HSE and the EVIPNet VHL in Africa, and 2) to assess the determinants of usage of HSE and the EVIPNet VHL from the perspectives of policymakers and stakeholders in Uganda and Zambia.

Research questions

In order to address the research objective, we carried out empirical research using the following three research questions:

- What do the usage statistics tell us about the usage of HSE and the EVIPNet VHL by policymakers and stakeholders in Africa?
- Do policymakers and stakeholders in Uganda and Zambia reporting using research evidence from HSE and the EVIPNet VHL and, if so, how and why are they using them?
- What are the determinants of usage of HSE and the EVIPNet VHL?

Methods

We utilized a mixed methods design for this study that involved both usage statistics for Africa and both qualitative and quantitative interview data from 50 policymakers and stakeholders in Uganda and Zambia. Pragmatism best describes the philosophical assumption underlying the need for a mixed methods research. Researchers informed by pragmatic traditions are concerned with the practical application of their findings and with seeking solutions to problems (Patton 1990). Rather than focus on the methodology, a pragmatist will focus on the problem being studied and the questions being asked concerning the problem. Mixed methods researchers tend to follow this worldview and choose from several techniques, methods, and procedures that best meet the needs and purposes of the research (Creswell 2010). A mixed methods design was chosen for this study for two reasons. First, it enabled us to use the results of the qualitative and quantitative data in order to achieve our research objectives of assessing usage and determinants of usage of the clearinghouses. Second, the use of both kinds of data allows for a deeper analysis and a more comprehensive understanding of the clearinghouses (Miles and Huberman 1994).

Sampling strategy for country selection

A criterion purposive sampling strategy was used to select Uganda and Zambia for the interviews, both of which provided information rich cases for an in-depth study (Patton 1990). The selection of the two countries was informed by two rationales. First, both countries are ranked by the World Bank as low- and middle-income countries, and are confronted with similar health system and implementation challenges which could be addressed by similar types of research evidence (Morisset et al., 2013; UAIS 2011; Zambian Demographic Health Survey, 2007; Zambian Ministry of Health National Health Policy, 2013). Second, both countries are politically stable and have knowledge translation platforms and research teams that have been actively engaged in producing evidence briefs for policy, convening policy dialogues and using rapid response units as part of strategies to promote evidence-informed policymaking (Van Kammen et al., 2006; Nyikal et al., 2006; Nabudere et al., 2010; Nabudere et al., 2011; Nabudere et al., 2012, Nabudere et al., 2013; Basaza et al., 2014; Mijumbi et al., 2014; Kasonde, 2009; Kasonde and Campbell, 2012; ZAMFOHR, 2011; Mwape et al., 2012). As a result of the political stability and the existing research networks, it was easier to obtain a list of respondents for interviews. As well, due to the relative peace prevailing in both countries, it was feasible to apply and received ethics approval and contact respondents for interviews.

Sampling strategy for the interviewees

Both maximum variation and respondent-driven purposive sampling strategies were utilized to select participants for interviews in order to gain a breadth of perspectives, to identify themes that cut across groups, and to gain meaningful understanding about the phenomenon under study (Patton 1990; Miles and Huberman 1994; Creswell 2007). With the respondent-driven strategy, each participant was asked, after an interview session, for additional contacts for appropriate persons to interview. The sample was comprised of 50 policymakers and stakeholders in Uganda and Zambia, and constitutes the same sample of policymakers and stakeholders who were interviewed for study 2. The interviews for this study were conducted at the same time as study 2 (i.e., same participants and interview sessions), and data were collected between June to September 2013.

Qualitative data collection

To explore whether, why, and how policymakers and stakeholders use or do not use research evidence from HSE and the EVIPNet VHL, participants were asked about their awareness of the clearinghouses and whether they have used them or not. For users, an interview guide was designed to solicit their views about and experiences with the use of HSE and the EVIPNet VHL. Furthermore, they were asked about their purposes for using research evidence from HSE and the EVIPNet VHL (e.g., whether to develop national health policy guidelines, undertake priority-setting exercises, prepare strategic visions, prepare evidence briefs for policy, prepare funding proposals, advocate for a particular health policy issue, or prepare departmental plans and priorities within the ministry of health). For non-users, they were asked why they have not used them and whether it is due to a lack of awareness, and, if not, what prevented them from using the clearinghouses. Last, they were asked about their views about strategies to promote awareness of the clearinghouses, and capacity building needed to aid use of research evidence from the clearinghouses. The study participants and consent procedures were the same as chapter 3 but the questions for chapter 3 were different from chapter 4 in that there were different questions for users (those who indicated during the interviews that they have ever used the clearinghouses before) and non-users (those who indicated during the interviews that they have not used them before). Participants were recruited for the interview via telephone and email correspondence.

Quantitative data collection

To enrich our understanding of trends in usage of the clearinghouses aggregated usage statistics that included policymakers and stakeholders in Africa were collected from HSE and the EVIPNet VHL using Google Analytics and summarized by colleagues who had direct access to the data. The customized usage statistics from HSE were for the period of October 2011 to March 2014 and those from the EVIPNet VHL were for the period of June 2012 to March 2014. Although the EVIPNet VHL was officially launched in May 2013, it had a beta version that was in operation since April 2012 for which data

were tracked and collected. In addition to usage statistics, we collected data based on some questions on the interview guide, which asked non-users about their awareness of the clearinghouses. Part of the quantitative questions asked users whether they were able to find the information searched for, their satisfaction with the use of the clearinghouses, and their rating of the frequency with which they used HSE and the EVIPNet VHL (i.e., daily, weekly, two to three times a month, once a month, every three months, once every six months or once per year). It must be noted that access to the internet was a problem in Uganda and Zambia, yet this was required in order to conduct user testing with participants. As such, the investigator had to purchase internet bundles from a private service provider in Uganda and Zambia to conduct user testing with participants, as they were required to log into the clearinghouses, and do the demonstration exercises but either did not have internet at the workplace or there was an internet breakdown.

Quantitative and qualitative data analysis

We analysed the data in three stages. First, aggregated usage statistics were analyzed by calculating percentage change within and across quarters using an Excel spreadsheet, and by providing interpretations of the usage statistics results in order to profile trends of usage among policymakers and stakeholders in Africa. Next, descriptive statistics (frequencies and percentages) of some of the quantitative data collected via closed-ended interview questions were analyzed using SPSS. Finally, the qualitative data were independently analyzed to identify similar and different themes on the determinants of usage of the clearinghouses.

Ethics approval

Ethics approvals were obtained from three different institutions to conduct this study. Ethics approval was obtained from McMaster University via the Hamilton Integrated Research Ethics Board (HIREB) in Canada. Next, ethics approval was obtained from the School of Medicine, Research Ethics Committee of the College of Health Sciences, Makerere University, in Uganda. Finally, ethics approval was sought and obtained from Eres Converge Institutional Review Board in Zambia. In addition, informed consent was obtained from participants before they participated in the interviews. Each interview lasted between 1 and 1.5 hours; these interview sessions covered the questions for both chapters 3 and 4. The interviews were tape-recorded with the consent of participants.

Definitions of terms

Google Analytics frequently used terms for web analytics which were applied in the definitions or descriptions and analysis of the two clearinghouses' usage statistics. A *user* is someone who has ever used or visited either HSE or the EVIPNet VHL once, even if it was not to search for evidence per se. A user can be new or a returning visitor. *Unique visitors* refer to the number of individual users who visit the website in a given period (i.e., a month or quarter) irrespective of how often they visit it. A *visit* is a session

(i.e., a single time a user comes to a website, engages with it for however many pageviews, and then leaves), whereas visits refer to the number of times that visitors come to the site. A *new visit* refers to someone who created a session with the website for the first time. The *number of new visits* refers to the total number of new sessions created with the website for the first time. A *bounce* is when a user visits only a single page and then leaves the site, whereas *bounce rate* refers to the percentage of users who come to a page on the website and leave without looking at other pages. Finally, *pageviews* refer to the total number of webpages that are viewed on the website.

Results

The results in this section are presented in three parts. First, we present trends in usage indicators of HSE and the EVIPNet VHL. This is followed by a description of the views and experiences of policymakers and stakeholders in Uganda and Zambia about HSE and the EVIPNet VHL. Lastly, based on the analysis of the qualitative data and suggestions by policymakers and stakeholders, we present the determinants of usage of the clearinghouses.

Quantitative results

Trends in usage indicators

Key HSE usage indicators

As shown in Table 1, for the period of October 2011 to March 2014 (i.e., 10 quarters or 30 months), there were a total of 2579 unique visitors, 2324 new visits, 1662 bounces (46% bounce rate) and 3624 total visits to HSE. There was a total of 20,681 pageviews across the ten quarters (October 2011 to March 2014) with an average of 23 pageviews per day. Percentage changes from 2012 to 2013 were assessed. A comparison of quarterly trend analysis of 2012 and 2013 was executed because both years had data for similar quarters; unlike 2011 and 2014 where data were available for only one quarter. Finally, we assessed quarterly trend analysis of the last two quarters (i.e., October–March 2014) in order to assess progress over the last two quarters for which we had data. Turning to trend analysis across quarters, site usage has remained relatively stable from 2012 to 2013 with an increase of 76% in unique visitors, 80% in new visits, 34% in number of visits (total), and 21% in the number of pageviews. A consistent increase in a number of indicators was recorded within the trend analysis for all four quarters of 2012: 9% average increase in the number of unique visitors; 8% average increase in the number of new visits; 12% average increase in the number of visits total; 51% average increase in total time spent on the site in minutes; and 37% average increase in total number of pageviews. As well, there were consistent increases in these indicators within the 2013 trend analysis: 8% average increase in unique visitors, 8% average increase in the number of new visits; 8% average increase in total time spent on site in minutes, and 13% average increase in the number of pageviews. Significant percentage increases in a number of indicators were recorded from the last quarter of 2013 (i.e., Oct.-Dec. 2013) and the first

quarter of 2014 (i.e., Jan.- Mar.2014), with a 20% increase in the number of unique visitors, a 23% increase in the number of new visits, a 15% increase in the number of visits (total), a 3% increase in the total time spent on the site in minutes, and a 15% increase in the number of pageviews, indicating progress in usage trends.

Key EVIPNet VHL usage indicators

For the EVIPNet VHL over the period of April 2012 to March 2014 as shown in Table 2, there were 906 visitors, 809 new visits, 682 bounces (59% bounce rate) and 1153 total number of visits to the EVIPNet VHL. As being done for HSE, percentage changes from 2012 to 2013 in performance indicators and quarterly trend analysis for 2012 and 2013 were assessed. In addition, performance indicators for the last two quarters for which we had data (i.e., Oct-Dec. 2013 and Jan.-Mar. 2014) were assessed in order to determine progress in these indicators. In terms of the trends analysis of usage indicators across the eight quarters, there were significant percentage increases across a number of indicators from 2012 to 2013. These included an increase of 93% for the number of visitors, 103% for the number of new visits, and 78% for the number of visits. As well, there were 228% increase in total time spent on the site in minutes, and 122% increase for the total number of pageviews.

In relation to trends analysis within quarters, there were significant average percentage increases across the six indicators in both years. For 2012, there was a 27% average increase in the number of visitors, an 8% average increase in the number of new visits, a 28% average increase in the number of visits, a 56% average increase in total time spent in minutes, and a 34% average increase in total number of pageviews. For 2013, there was a significant average increase in site usage across indicators, with a 23% increase in the number of visitors, a 26% increase in the number of new visits, a 19% increase in the number of visits, a 26% increase in the total time spent in minutes, and an increase in the total number of pageviews of 34%. Furthermore, there were both significant percent increases and decreases from the last quarter of 2013 to the last quarter of 2014 (i.e., Oct-Dec. 2013 to Jan.-Mar. 2014). For example, there was a decrease of 10% in visitors, 22% in new visits, and 7% in total pageviews, while there was an increase of 13% in bounces, and an increase of 15% in the total time spent in minutes, suggesting mixed progress.

A comparison of the two clearinghouses on usage indicators has not been assessed as the data were from different time periods, and because HSE has data over a longer period than the EVIPNet VHL. Moreover, the integration of HSE with the EVIPNet VHL, which permits users to search for information from HSE, means that it is more utilized than the EVIPNet VHL. While exposure to the EVIPNet VHL leads to exposure to HSE, exposure to HSE does not lead to exposure to the EVIPNet VHL.

Additional Health Systems Evidence usage indicators

An analysis of trends in the use of HSE in the African region across ten quarters from 2011 to March 2014 indicates that the total number of new registered users was 406. The April to June 2013 quarter ranked the highest, with 108 new registered users in total

(Table 3). For the purpose of new registered users by role, the largest group of users were researchers (51%) followed by policymakers (38%). Roughly the same proportion of users were professionals as were students (33% compared to 32%). Lastly, a roughly similar proportion of registered users were managers as were 'other' (20% compared to 16%). In addition, a sum total of the unique open searches performed by users across the ten quarters were 1560 while that of advanced searches was 733.

We assessed trends in usage statistics in health systems topics across governance, financial, and delivery arrangements, as well as implementation strategies (Table 3). The results show that implementation strategies ranked the highest in number of searches using health systems topic limits with a proportion of 44%, followed by governance arrangements (23%), delivery arrangement (20%), and financial arrangements (13%). In addition, the number of searches using document type limits found a higher proportion of searches used systematic reviews of effects (43%) than other document types.

An assessment of the total number of searches using diseases, technologies, sectors, and providers' domain limits revealed that the majority of participants had performed searches using the disease domain limit (67% of searches) followed by sectors domain (33%) (Table 3). Moreover, in assessing the number of searches using country limits (i.e., target of document or at least one study from the country included), target of document had the highest number of searches with a proportion of 57%. A higher proportion of the number of searches used target of document (39%) than the low-and middle-income (LMIC) limits (36%). Analytical assessments of usage statistics of the link features of HSE – user-friendly summary links, scientific abstract links, full-text links, links to an included study, one-pagers accessed by policymakers, and links to related documents – show that the one-pagers accessed by policymakers were a higher proportion of the number of links clicked across the quarters (41%) followed by the proportion of the number of free full-text links clicked (30%).

Qualitative results

From the qualitative strand of the research data, data were differentiated into three types: 1) data from the very few users about what influenced their use; 2) data from participants who were aware of the clearinghouses but did not use them; and 3) data from the majority of people who were not aware of the clearinghouses. The first type of data was analyzed to assess the views of users about HSE and the EVIPNet VHL. The second and third types of data were analyzed to assess the determinants of awareness and determinants of usage of HSE and the EVIPNet VHL. It should, therefore, be noted that themes on the determinants of usage include the evaluation of the experiences of respondents who were aware of the clearinghouses but did not use them and those who were unaware and, therefore, did not use them, except for their limited experiences with the clearinghouses during the user-testing. The analysis of the determinants of usage are grouped into the following themes: awareness, access to high speed internet and a computer, availability of time, duty requirements at work, knowledge and skills relating to searching, lack of information searched for and access to full text documents, interests, reading culture and accountability for research use.

Users' usage and views about HSE and the EVIPNet VHL

We assessed the few users of HSE and the EVIPNet VHL about their usage, policy decisions for which they have used research evidence from HSE and the EVIPNet VHL, issues searched for, and their views of the clearinghouses. We found no policy issue(s) for which they have used research evidence to inform the policymaking process (i.e., agenda setting, policy formulation, policy adoption, policy implementation and policy evaluation). Among the 50 participants, two were users of HSE and one participant had used the EVIPNet VHL. Among the two users of HSE, the purposes of their visits to the clearinghouse were to get information on knowledge translation, and to find information on systematic reviews relating to topics of interest. A key factor that motivated one of the users to use the clearinghouse was the availability of research evidence on the clearinghouse:

I realized that they have a lot of information, evidence and knowledge translation documents and what I wanted was available on the clearinghouse.

The second user indicated that publicity had drawn her to use the clearinghouse and she found it applicable to her research needs on health systems:

I was interested in using it because of EVIPNet team promotion and also because it focuses on health systems.

When asked about their experiences and satisfaction with the use of Health Systems Evidence, the two users had positive experiences about the clearinghouse:

It was good; I was able to find it easily. I was able to find what I want. The web page is well organized, and the experience is good.

They were also satisfied with the use of the clearinghouse as it provided them with relevant publications in their areas of work. The frequencies of usage of the clearinghouse among these two users were once in a month for the first user and bi-weekly for the second user. Finally, four issues for which research evidence from HSE was searched were identified. First, they reported using HSE to look for the best available evidence on topics of interest. Further, they used HSE to prepare an evidence brief for policy on task shifting. Moreover, one of the users used HSE to understand what is known about the benefits, harms, costs, etc., of options to address a problem. Finally, one of the users used HSE to identify implementation considerations for a selected option.

As indicated earlier, only one person among the 50 participants interviewed had used the EVIPNet VHL at the time of the interview. This user was satisfied with the use of the clearinghouse, and was able to find the information she was looking for (i.e., the historical context of EVIPNet). She reported visiting the clearinghouse once every three months but had not used research evidence from it to inform a policy decision yet.

Determinants of usage of HSE and the EVIPNet VHL

Awareness

Forty-five and forty-four participants, respectively, indicated their lack of awareness as a rationale for not using HSE and the EVIPNet VHL (Table 4). In addition, forty-four participants indicated that they will use both HSE and the EVIPNet VHL after being introduced to them. One participant highlighted awareness as a determinant of usage:

Based on the options that are on the website, the precision of searches and the scientific validity, it has the potential to promote the use of research evidence. However, the challenge is how to promote the publicity of the website to potential users. Had it not been my interactions with you, I wouldn't have known it.

Access to high speed internet and a computer

One of the determinants of usage of the clearinghouse is access to a high speed internet connection and a computer at places of work. Throughout the interviews, it was discovered that either there was no internet at all at some workplaces or there were consistent internet connectivity issues or internet breakdowns, as well as power supply problems. This was the case in both Uganda and Zambia. As a Principal Policy Analyst at the Ministry of Health in Uganda stated:

The internet is not stable. You may have 3 days without internet and if it is on, it may be too slow and it discourages you, and you abandon it.

Availability of time

There were four and five participants among the 50 interviewees who were aware of HSE and the EVIPNet VHL but were not using them. Among these participants, two mentioned time factors and busy schedules at work as a rationale for not using the clearinghouses. For example, some participants stated that a lack of time due to competing priorities at work would not permit them to locate and access information from the clearinghouses. The comments for a policymaker at the Ministry of Health highlighted this point vividly:

You need to go and read the information, understand them and apply it to policymaking. If this is the Permanent Secretary (PS), he is very busy. So you need time but competing demands do not allow you the time to use it. Although information may be available, it does not mean that ministers and technical officers will have the time to review it, analyze it and make good use of the information.

Duty requirements at work

Two participants commented that they did not use the clearinghouses because the nature their work does not allow them to search for research evidence. One of the participants articulated this clearly:

My current position does not allow me to search for research evidence. I put concept note and get researchers to do it. I do not have the time to do it myself. The nature of the work is such that we are few and we work on so many issues, so there is no time to do research. When you go through my assignments, you will not find where I am expected to do research. But I am expected to work through people and organizations to have such in place. For example, I have been doing baseline survey on combination of HIV/AIDs prevention in six districts. I am doing another work on socio-cultural norms and values that impact on HIV, maternal and gender based in six cultural institutions in Uganda. How can I have time to draw research evidence myself for all these projects?

Knowledge about and skills for searching

We found that policymakers and stakeholders who have the knowledge and skills in searching for information from the clearinghouses were able to obtain documents. However, those who had difficulties in doing so were not able to get some documents from their searches due to misspelling, entering either wrong or too many terms, lack of skills in using Boolean terms such as AND, OR, and NOT, and not being able to use the important features in the clearinghouses such as the advanced search, health systems topic, document type, domain, and low-and middle-income countries limit features. It became evident that some participants would need training on how to search and find information from the clearinghouses. The importance of having knowledge or skills to search for research evidence was mentioned by one participant:

For policymakers from Uganda, only 1% of them might have the level of skills to use them and less than 1% of them have the time to use them.

Lack of information searched for and lack of access to full-text documents

Among the participants who were aware of the clearinghouses but were not using them, three participants stated that they did not use the clearinghouses because initial searches did not yield any results on their topics. In addition, throughout the interviews, participants were enthusiastic about having full-texts of articles or documents they found that were relevant to their policy issues, and quickly printed them and indicated that they will search for more documents next time. However, where the documents could not be retrieved or were inaccessible, they questioned the rationale for searching for the information. As one policymaker stated:

How available are the full-texts when I get it? If I see the title that I am interested but cannot get the full article, then it is a problem. It has to show that it has credible information that can be downloaded freely.

Interests

Furthermore, we found out that interests are determinants of usage of the clearinghouse. For example, some participants indicated that policymakers and stakeholders are not using the clearinghouses because they are not motivated and willing to use them. As one policymaker stated:

It will be valuable on condition that we are willing and motivated to use it, access it, and be able to use the information or evidence available and translate it to policymaking as policymakers.

Reading culture

An interesting determinant of usage of the clearinghouses that we found from participants is good or poor reading culture. This speaks to the receptivity or otherwise of organizational culture to the use of research evidence. Two participants mentioned that lack of usage of the clearinghouses is due to poor reading culture. The following comments by one participant illustrate this point:

The only problem is that our reading culture is not good enough. I tend to think not many people read. We are very busy and do not have the time to read and apprise ourselves with current scientific research findings.

Accountability for research use

Accountability for research use was found as another determinant of usage of the clearinghouses. A participant mentioned that policymakers are not searching for information from the clearinghouses because there is no accountability for using research evidence from the clearinghouses. This implies that the lack of an accountability framework to enforce evidence-informed policymaking at national ministries of health may explain why policymakers and stakeholders do not use research evidence from the clearinghouses or research evidence in general.

Strategies to facilitate use of research evidence of the clearinghouses

As part of the interview questions for non-users of the clearinghouse, participants were asked about strategies that can be utilized to promote awareness of the clearinghouses. As shown in table 4, the strategies participants gave were grouped into five broad themes. First, 35% of participants indicated that clearinghouse developers and their data managers should disseminate information from the clearinghouses to the doorstep of targeted users. For example, participants suggested sending updates from the clearinghouses to NGOs. This can be done via monthly email alerts. Second, 29% of

participants suggested that the clearinghouses should be linked to the websites of national ministries of health, other health organizations and databases. Participants were optimistic that if the clearinghouses are linked, their awareness could be promoted and serve as a stepping stone towards the use of research evidence by policymakers and stakeholders, including national ministries of health and other organizations involved in health such as NGOs, the United Nations Population Fund (UNFPA), United Nations International Children's Emergency Fund (UNICEF), the World Bank (WB), African Development Bank (AFDB), Bill and Melinda Gates Foundation, Centre for Diseases Control and Prevention (CDC), and the United States Agency for International Development (USAID).

A third strategy, suggested by 20% of the participants, was the need for clearinghouse developers to organize workshops and training/orientation sessions to promote awareness and build capacity of targeted users to use the clearinghouses. Fourth, 8% of participants suggested the formation of partnerships – including with universities, with NGOs doing collaborative interventions, and with managers and staff at key research institutions and health cooperating partners (HCP) – as a strategy to promote awareness and influence the use of research evidence from the clearinghouses. Fifth and finally, 8% of participants recommended the adoption of marketing and communication plans by clearinghouse developers, and suggested the use of media houses, posters, publicity, listservs, web blogs, and social media marketing as a strategy, including communicating with policymakers, health professionals and those interested in health systems globally about the important information available on the clearinghouses as a mechanism to promote awareness and influence use of research evidence from the clearinghouses.

Capacity building and use of the clearinghouses

In recognition of the fact that some users might need assistance in using the clearinghouses, participants who were non-users were asked about the kind of assistance they would need to enable them use the clearinghouses. As shown in table 4, the responses have been synthesized into three broader themes.

Workshops, trainings and orientation

First, about one third of the participants suggested that clearinghouse developers could organize workshops, training, and orientation to teach and guide them on how to use the clearinghouses. In particular, there were suggestions that clearinghouse developers and technical persons such as data managers could directly approach and train policy analysts and policy advisors at the national ministries of health in low- and middle-income countries. More importantly, some participants suggested that they would need orientation, guidance, and training or user manuals on how to locate and use the clearinghouses.

Provision of high speed internet at workplaces

Some participants suggested the provision of high speed internet at workplaces to enable them to access the clearinghouses from work. Participants expressed a concern about either the lack of internet access or the slow pace of the internet at the workplace as being very frustrating and a serious impediment to their efforts to access research evidence from the clearinghouses at their workplaces.

Provision of online user IT technical support

In addition, a participant suggested that clearinghouse developers could provide online IT technical support so that users could either pose a question and get feedback instantly or make a telephone call to an online IT technical person and seek guidance on how to use the clearinghouses.

Discussion

Aggregated usage statistics show that HSE is fairly well used by some policymakers in Africa. The EVIPNet VHL is also used but to some extent. An analysis of the usage statistics about HSE shows that three of its features have been most utilized by policymakers and stakeholders. First, the one pagers was the most utilized, with a proportion of 41% accessing them across the ten quarters, suggesting that policymakers want a rapid overview of the material to gauge its relevance and practicality before assessing the full document. Second, 30% of users clicked on full-text links, and this suggests that HSE provides users with free access to full-text documents. Lastly, the scientific abstract was the third most utilized feature with a proportion of 20%. This speaks to policymakers' and stakeholders' preferences to read the background, results, and conclusions normally contained in a scientific abstract to decide if it meets their information needs before accessing the full document, which thus saves policymakers' and stakeholders' time in accessing documents to inform decision-making.

In assessing the number of searches using document type limits, the systematic review of effects emerged as the most frequently used limit, with a proportion of 43% of searches across the ten quarters. This attests to the advantage of a systematic review. For example, systematic reviews of effectiveness are conducted with explicit scientific methods that have the potential to reduce biases and produce reliable findings of the expected effects of interventions (Lavis et al., 2005; Oxman & Guyatt, 2006; Antman, Lau, & Kupelnick, 1992). An assessment of the usage statistics shows that the open search feature was more utilized than the advanced search feature. The reason for this difference could be that most users do not know how to use the Boolean terms and default sections, or they are more comfortable with using the open search feature, which has only one box. However, for specificity and precision, use of advanced search features would be very useful to targeted users in optimizing searches to generate relevant documents. The results for HSE show that registration of new users fluctuates quarterly across the ten quarters. The fluctuation may be attributable to temporal or seasonal variations in the use

of research evidence from HSE. It may also be due to presentations or other forms of awareness promotion that could have taken place at a conference where participants got to know about the clearinghouses and rushed to look for information from it.

Our analysis of the interview data revealed that users viewed the clearinghouses positively and felt that they provided them with information relevant to their work on health systems, which could strengthen evidence-informed health policy decision-making. Furthermore, we found from the analysis of the data that a number of factors are major determinants of usage, including: access to high speed internet and a computer; the availability of time; knowledge and skills relating to searching for information; duty requirements at work; incentives and interests; access to relevant information and full text documents; reading culture; and accountability for research use.

Strengths and limitations

This study has three strengths. First, it is one of the first attempts to empirically assess the usage of two novel clearinghouses designed to improve the use of research evidence by policymakers and stakeholders in two countries on the one hand, and the analysis of usage patterns within the African region using aggregate data on the other hand. Second, the use of both quantitative and qualitative data is richer than having either data alone. For example, the usage statistics (quantitative data) show that a fair number of policymakers and stakeholders from Africa are using the clearinghouses, and it may be the case that in Uganda and Zambia, there are more users of the clearinghouses than the three participants who reported that they used the clearinghouses during the interviews. However, relying only on the usage statistics (quantitative data) alone would not give us a complete picture of the phenomenon of interest. Therefore, the qualitative data sheds insights on the determinants of usage of the clearinghouses, various strategies for promoting users' awareness of them, as well as capacity-building strategies that could lead to an increase in their usage. Therefore, a combination of the two types of data addresses the limitations of each and enables the achievement of our research objectives. Third, this study is the first attempt to assess the views of some users in Uganda and Zambia about two clearinghouses that focuses on the governance, financial, and delivery arrangements and implementation strategies of health systems.

A major limitation of this study is that, there were a limited number of user respondents. On the grounds of privacy and terms of agreement, we could not identify users of the clearinghouses and follow up with them for interviews. As such, we could only ask participants whether they were users or non-users before the interviews and, through that, we identified only three users (i.e., two for HSE and one for the EVIPNet VHL) among the 50 participants who were interviewed, which means that more users were omitted. For the majority of the participants, this was their first time seeing the clearinghouses. Without a doubt, interviewing more users would have provided a richer understanding of views about the clearinghouses, and their potential impact on policy issues. Thus, on the basis of the omission of some users, and with only three users identified, we cannot be certain or make claims that the views of these users can be generalized to others who have not used the clearinghouses.

Findings in relation to other studies

The findings in terms of performance indicators suggest that the two clearinghouses performed well in those indicators when compared with findings in the literature. For example, the average time spent on a site per day of 42 minutes for HSE and 6 minutes for the EVIPNet VHL, and average total pageviews of 23 per day for HSE and 3 for the EVIPNet VHL, demonstrates good performance. In contrast, a study of the usage of Health Evidence (www.healthevidence.org) in Canada found that the average user spent six minutes and had seven pageviews per visit (Dobbins et al., 2010). A similar study conducted in India on the use of the maternal and child health portal reported that average time spent on the site was 4 minutes and 23 seconds and had an average of 5.54 pageviews per visit (Khanna et al., 2013). In addition, Health Systems Evidence performed very well in the bounce rate indicator, with a bounce rate of 46%, which suggests that HSE is a high quality website with good user engagement. In contrast, a study on the maternal and child health portal in India reported that its bounce rate was 27.6% (Khanna et al., 2013). Another key finding by Dobbins and colleagues is that site usage for Health Evidence remained relatively stable between the 2005 and 2009, with a 25% increase in unique visitors and a substantial increase in average time spent on the site per visit from 35 seconds to 4 minutes (Dobbins et al., 2010). This is consistent with the relatively stable increase in unique visitors and average time spent on the site in minutes, both within and across quarters for our studies.

The findings in this study in regard to determinants of usage and strategies to facilitate usage are also broadly consistent with the literature. For example, similar studies on usage of reproductive health websites in the Middle East, the maternal child health portal in India, and the cancer control web portal in the U.S. attributed an increase in site usage to social marketing, dissemination, partnerships, and promotional efforts (Foster et al., 2005, Khanna et al., 2013; Sanchez et al., 2012). This corroborates the findings of Dobbins and colleagues' study of Health Evidence in Canada where they found that the increase in the use of the clearinghouse occurred following the release of an electronic newsletter and tailored messages (Dobbins et al., 2010). Dobbins and colleagues found that there was more than 500 site visits per two weeks after the release of the newsletter as compared to the previous annual average of 100 site visits per day (Dobbins et al., 2010). Moreover, an evaluation of the cancer control portal found that "outreach activities increased knowledge about the web portal; and planning, priority setting, training, presentations, and obtaining evidence reviews were commonly reported reasons for using P.L.A.N.E.T." (Sanchez et al., 2012). These are consistent with our findings in the use training and orientations, dissemination, partnerships, marketing and communication strategies to facilitate use of the clearinghouses.

In a study on the emergency contraception (EC) website in the Middle East, the authors suggested a need for publicity of the site in order to increase its use (Foster et al., 2005). Moreover, the authors attributed an increase in requests for EC information from organizations in Morocco to "an increase in internet penetration, an increase in inter-website links and/or individual or organizational recommendations" (Foster et al., 2005, p.7). Furthermore, a study of online "promising practices" for pandemic influenza in the

U.S. reported increased use of the database to organizations that posted links to the practices website on their websites (LaFrance et al., 2010), and these are consistent with our identification of faster speed internet, dissemination, and linking the websites to other health organizations as important parts of a strategy to facilitate use of the clearinghouse.

Lastly, a study on interventions to facilitate the use of research evidence in low- and middle-income countries identified individual barriers such as a lack of capacity for accessing evidence, and organizational barriers to research uptake such as unsupportive culture and competing interests (Christine et al., 2011). These are consistent with the lack of capacity, accountability for research use, and interests identified as determinants of a clearinghouse usage in this study. Conversely, the authors found that promoting stakeholder engagement, training, and capacity-building activities work to facilitate the use of research, and are consistent with suggestions for capacity-building identified in this study. Moreover, our finding that the uptake of research evidence is contingent on the timely availability of highly relevant, up-to-date information is consistent with findings in other studies (Lavis et al., 2005).

Implications for policy and practice

This study has three implications for policy and practice. First, two of the determinants of use of the clearinghouses that we identified in this study included a lack of time due to competing priorities in the workplace, and a lack of knowledge and skills to use the clearinghouses. As such, some participants even suggested that clearinghouse developers should train their secretaries to search for research evidence for them (although this particular grade of staff may not be best suited to the task). To address these issues, the implication for policy and practice is that governments, as well as advocates for evidence-informed policymaking, should consider recruiting data managers and health information desk officers at key national ministries of health to promote evidence-informed decision making. National health ministries could also recruit evidence-based specialists, data managers or health information officers whose responsibilities involve managing databases within the ministries, liaising with clearinghouse developers, and helping staff with finding and using research evidence. They could offer periodic training to civil servants on searching, appraising, and using research evidence to inform policy decisions. They could also administer rapid response services by responding to information requests, searching for research evidence, and communicating research findings to policymakers.

Second, some of the determinants of use identified in this paper include the lack of interest and a lack of accountability for not using research evidence. The implication for policy and practice is that to encourage use of the clearinghouses in particular, and evidence-informed policymaking in low- and middle-income countries in general, will require a course of action on two fronts. First, government should institutionalize evidence-based decision making, and enforce accountability requirements mandating policymakers to use research evidence in policymaking. Second, a course of action should be taken, by governments and those funding health care programs and projects, to incentivize policymakers and those involved in health issues to use research evidence. For

example, donor agencies providing funding for health could require that policymakers demonstrate accountability for using research evidence for decision-making and by ensuring that policies and programs are evidence-based before they are funded.

Third, given our finding that either a lack of internet access or intermittent internet connectivity is a barrier to searching for research evidence at the workplace in Uganda and Zambia, governments will need to support and strengthen information and communication technology (ICT) policy at national health ministries in African countries in order to support evidence-informed decision-making. To implement this course of action, governments should provide a sufficient budgetary allocation to provide sustainable high speed internet at the ministries to improve searching for research evidence from the clearinghouses.

Implications for further research

This study has two implications for future research. First, a lack of knowledge and skills in using the clearinghouses led to less clearinghouse use. Future research could design a clustered randomized controlled trial to evaluate whether or not interventions in the form of training provided by data managers or health information specialists to policymakers and stakeholders can address this issue. In this case, the number of logins to the clearinghouses, and intention to use research based on the theory of planned behaviour, could be measured as primary and secondary outcomes. Second, accountability for not using research evidence is one of the determinants of research use. Future research would need to investigate this further in order to examine what accountability policy or framework could be put in place by the governments of Uganda and Zambia, and explore ways in which accountability for using research evidence could be implemented.

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Table 1: Health Systems Evidence usage statistics

Region	Outcome	2011	2012	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014	2011-2014
		Oct-Dec 2011	Jan-Mar 2012	Apr-Jun 2012	Jul-Sep 2012	Oct-Dec 2012	2012 Total	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013	Oct-Dec 2013	2013 Total	Jan-Mar 2014	Grand total
African	Number of unique visitors	170	147	171	193	235	746	288	404	325	293	1310	353	2579
	Number of new visits	163	133	149	161	212	655	257	365	294	264	1180	326	2324
	Number of visits (total)	288	191	331	385	347	1254	356	525	452	349	1682	400	3624
	Number of bounces	166	73	103	89	137	402	186	221	206	222	835	259	1662
	Bounce rate	58%	38%	31%	23%	39%		52%	42%	46%	64%		65%	46%
	Total time on site (in minutes)	1428	2100	6126	6342	3936	18504	2568	6174	5994	1848	16584	1896	38406
	Total number of pageviews	922	994	2682	2870	1808	8354	1599	3862	3599	1090	10150	1255	20681

							Average % change					Average % change	% change from 2012 to 2013	% change from Oct- Dec 2013 to Jan- Mar 2014
% change	Number of unique visitors		-14%	16%	13%	22%	9%	23%	40%	-	-	8%	76%	20%
	Number of new visits		-18%	12%	8%	32%	8%	21%	42%	-	-	8%	80%	23%
	Number of visits (total)		-34%	73%	16%	-10%	12%	3%	47%	-	-	3%	34%	15%
	Number of bounces		-56%	41%	-14%	54%	6%	36%	19%	-7%	8%	14%	108%	17%
	Total time on site (in minutes)		47%	192%	4%	-38%	51%	-35%	140%	-3%	-	8%	-10%	3%
	Total number of pageviews		8%	170%	7%	-37%	37%	-12%	142%	-7%	-	13%	21%	15%

Source: Data provided on 22 May 2014 by John Lavis, Kaelan Moat, Amanda Hammill and Aditya (Dave) Nidumolu; % change calculated by Edward Gariba

Table 2: EVIPNet VHL usage statistics

	Outcome	2012	2012	2012	2012	2013	2013	2013	2013	2013	2014	2012-2014
		Apr-Jun 2012	Jul-Sep 2012	Oct-Dec 2012	2012 Total	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013	Oct-Dec 2013	2013 Total	Jan-Mar 2014	Grand total
African	Number of visitors	70	145	67	282	88	139	228	89	544	80	906
	Number of new visits	70	115	60	245	78	121	214	85	498	66	809
	Number of visits	92	187	97	376	101	184	269	114	668	109	1153
	Number of bounces	58	126	65	249	66	103	145	56	370	63	682
	Total time spent (in minutes)	174	252	421	847	462	562	1349	409	2782	471	4100
	Total number of pageviews	176	411	143	730	281	504	572	261	1618	244	2492
			% change from one quarter to other	Average % change	% change from one quarter to other					average % change	% change from 2012 to 2013	% change from Oct-Dec 2013-Jan-Mar 2014

	Number of visitors		107%	-54%	27%	31%	58%	64%	-61%	23%	93%	-10%
	Number of new visits		64%	-48%	8%	30%	55%	77%	-60%	26%	103%	-22%
	Number of visits		103%	-48%	28%	4%	82%	46%	-58%	19%	78%	-4%
	Number of bounces		117%	-48%	34%	2%	56%	41%	-61%	10%	49%	13%
	Total time spent (in minutes)		45%	67%	56%	10%	22%	140%	-70%	26%	228%	15%
	Total number of pageviews		134%	-65%	34%	97%	79%	13%	-54%	34%	122%	-7%

Source: Data provided on 20 May 2014 by John Lavis, Kaelan Moat and Amanda Hammill; % change calculated by Edward Gariba

Table 3: usage statistics of other features of Health Systems Evidence

		2011	2012				2013				2014	2011-2014	Proportions
		Oct-Dec 2011	Jan-Mar 2012	Apr-Jun 2012	Jul-Sep 2012	Oct-Dec 2012	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013	Oct-Dec 2013	Jan-Mar 2014	Grand total	
Number of new registered users total		52	53	49	27	55	47	72	7	20	24	406	100%
Number of new registered users by role	Policymaker	20	14	10	7	19	13	27	31	9	5	155	38%
	Manager	12	11	8	5	9	8	14	5	5	4	81	20%
	Professional	17	11	19	8	19	14	18	14	7	5	132	33%
	Researcher	25	22	34	12	24	26	21	23	11	9	207	51%
	Student	6	17	15	4	18	20	18	7	9	15	129	32%
	Other	5	11	5	6	8	7	10	8	1	2	63	16%
Average time spent per login (in minutes)		36.18	24.75	35.95	31.13	30.31	25.49	29.86	30	21.63	29.87	295.17	
Number of unique open searches		26	38	182	154	161	149	315	376	76	83	1560	
Number of unique advanced searches		2	17	94	37	34	48	218	261	5	17	733	
Number of searches using health	Governance arrangements	2	2	4	7	0	5	3	6	1	0	30	23%
	Financial arrangements	2	4	2	5	0	3	1	0	0	0	17	13%

system topics limits	Delivery arrangements	1	2	8	10	0	4	0	0	0	0	25	20%
	Implementation strategies	0	2	18	12	12	4	4	2	1	1	56	44%
Number of searches using document type limits	Evidence brief	0	0	2	0	0	1	1	2	0	0	6	6%
	Overview of systematic reviews	0	0	1	1	0	2	2	1	3	0	10	10%
	Systematic review of effects	0	0	14	1	0	9	9	7	3	0	43	43%
	Systematic reviews addressing other questions	0	0	4	0	1	2	1	0	3	0	11	11%
	Systematic review being planned	0	0	1	0	0	0	0	0	0	0	1	1%
	Systematic review in progress	0	0	1	0	0	0	0	0	3	0	4	4%
	Economic evaluation	0	0	3	0	0	0	1	1	0	1	6	6%
	Health system description	0	0	1	0	0	2	1	6	0	0	10	10%
	Health reform description	0	0	5	0	0	1	0	3	0	0	9	9%

		2011	2012				2013				2014	2011-2014	Proportions
		Oct-Dec 2011	Jan-Mar 2012	Apr-Jun 2012	Jul-Sep 2012	Oct-Dec 2012	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013	Oct-Dec 2013	Jan-Mar 2014	Grand total	
Number of searches using domain limits	Diseases	0	0	2	0	0	0	2	2	0	0	6	67%
	Technologies	0	0	0	0	0	0	0	1	0	0	1	11%
	Sectors	0	0	0	0	0	0	2	1	0	0	3	33%
	Providers	0	0	0	0	0	0	0	1	0	0	1	11%
Number of searches using country limits	Target of document	0	0	0	0	0	0	0	3	0	1	4	57%
	At least one study from the country included	0	0	0	0	0	0	1	2	0	0	3	43%
Number of searches using low- and middle-income country limits	Target of document	0	0	0	0	0	9	12	1	0	0	22	39%
	At least one LMIC author	0	0	0	0	0	10	3	1	0	0	14	25%
	At least one LMIC study included	0	0	2	0	0	10	7	1	0	0	20	36%
Numbers of links clicked	Number of user-friendly summary links clicked	2	11	22	26	8	7	21	17	16	5	135	5%

	Number of scientific abstract links clicked	1	1	102	99	83	46	56	80	20	32	520	20%
	Number of free full-text links clicked	6	53	69	132	107	99	111	101	46	47	771	30%
	Number of times a link to an included study clicked	0	0	2	0	3	9	2	3	0	2	21	1%
	Number of 1-pagers accessed	5	48	86	130	67	100	159	247	116	89	1047	41%
	Number of times a link to related documents clicked	0	11	9	16	6	4	5	6	2	3	62	2%

Source: Data provided on 11 April 2014 by John Lavis, Kaelan Moat and Rich Parrish; % proportions calculated by Edward Gariba

Table 4: Awareness, determinants of usage, satisfaction with services, frequency of usage among users, awareness promotion and capacity building strategies

Variables	Health Systems Evidence (HSE)	EVIPNet VHL
Lack of awareness of the clearinghouse	45/48 (93%)	44/49 (89.8%)
Intention to use the clearinghouse after being made aware of it	44/45 (97%)	44/44 (100%)
Determinant of usage of the clearinghouse among those who were aware of it		
No. (%) that mentioned lack of time as a factor	1/4 (25%)	1/5 (20%)
No. (%) that mentioned no expectation in my work to do research	1/4 (25%)	1/5 (20%)
No. (%) that mentioned uses other databases	2/4 (50%)	1/5 (20%)
No. (%) that mentioned could not find the information searched for	-	2/5 (40%)
Satisfaction with services among users (only 2 users for HSE and 1 for EVIPNET VHL)		
No. (%) that felt they obtained information from the HSE	2/2 (100%)	1/1 (100%)
No. (%) that found information on the clearinghouse	2/2 (100%)	1/1 (100%)
Frequency of usage among users (only 2 users for HSE and 1 for EVIPNet VHL)		
No. (%) that used the clearinghouse weekly	1/2 (50%)	-
No. (%) that used the clearinghouse once a month	1/2 (50%)	-
No. (%) that used the clearinghouse two to three times a month	-	1/1 (100%)
Awareness promotion strategies for HSE and the EVIPNet VHL		
No. (%) that suggested dissemination as an awareness promotion strategy	17 (34%)	
No. (%) that suggested links to other health organizations and databases as an awareness promotion strategy	14 (28%)	
No. (%) that suggested workshops and trainings as an awareness promotion strategy	10 (20%)	

No. (%) that suggested that partnerships partnership as an awareness promotion strategy	4 (8%)
No. (%) that suggested that communication as a strategy to promote awareness	4 (8%)
Capacity building strategies	
No. (%) that suggested training/workshops/orientation as a capacity building strategy	16 (32%)
No. (%) that suggested the provision of high speed internet at workplaces as a capacity building strategy	2 (4%)
No. (%) that suggested online IT technical support as a capacity building strategy	1 (2%)

Appendix 1: Interview guide for chapter 4

Health Systems Evidence

General question for users and non-users

1. Earlier in the interview, you indicated that you used/didn't use Health Systems Evidence? ☐ Yes, I use it ☐ No, I don't use
If no, continue from Q# 2 to 6, If yes, go to Q# 7

Questions for non-users

2. Please tell me why you are not using Health Systems Evidence?
Probe: is it due to a lack of awareness? ☐ Yes ☐ No
3. If it is because of a lack of awareness, will you use Health Systems Evidence now that you have been acquainted with this resource? ☐ Yes ☐ No
4. If no, what prevents you from using Health Systems Evidence?Probe: lack of access to the internet; lack of experience in using the internet; lack of experience in using research evidence; lack of organizational culture of research use; lack of access to internet; time constraints and workload?
Please state which apply and give examples.
5. What strategies can we use to promote awareness of Health Systems Evidence?
6. Could you tell me what assistance you would need to enable you to use Health Systems Evidence?

Questions for users

7. What first motivated you to search for information in Health Systems Evidence?
8. Could you describe, in general, your experiences with using Health Systems Evidence?
9. Do you feel you obtained the kind of information that you want from Health Systems Evidence? Please explain if your expectations were met.
10. What was the purpose of your visit(s) to the Health Systems Evidence?
11. Did you find the information you were looking for in Health Systems Evidence?
☐ Yes ☐ No
12. If no to question number 44, what is/are the reason(s) that you did not find the information that you are looking for in Health Systems Evidence?
(a) The website is not well organized
(b) It takes too much time to find information
(c) The search engine shows too many results
(d) Technical difficulty
(e) Other (please specify).....
13. Please rate the frequency with which you use the Health Systems Evidence:

Daily	Weekly	Two to three times a	Once a month	Every three months	Once in 6 months	Once a year
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		month				
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14. Have you used research evidence from Health Systems Evidence for the following?

Please select as many as are applicable:

- a. To prepare a memorandum for a minister
- a. To prepare a policy brief or an evidence brief for policy
- b. To prepare guidelines for a national health policy
- c. To prepare a national health strategic plan
- d. To understand a problem and its causes
- e. To understand what is known about the benefits, harms, costs, etc., of options to address a problem?
- f. To identify implementation considerations for a selected option
- g. To look for the best available research evidence
- h. To find information to help advocate for a particular health policy issue
- i. Others (specify)

15. Could you describe any health policy processes for which you or other policymakers or stakeholders have used research evidence from Health Systems Evidence to aid in the decision-making process?

16. Do you have other sites that you search for research evidence on health systems questions other than Health Systems Evidence? Please specify and indicate how often you use them?

The Evidence-Informed Policy Network Virtual Health Library

General question for users and non-users

1. Earlier in the interview, you indicated that you used/didn't use EVIPNet VHL? ☐ Yes, I use ☐ No, I don't use
 If no, continue from Q# 2-6
 If yes, continue from Q# 7

Questions for non-users

- 2. Please tell me why you are not using the EVIPNet VHL?
Probe: is it due to a lack of awareness? ☐ Yes ☐ No
- 3. If it is because of a lack of awareness, will you use the EVIPNet VHL now that you have been acquainted with this resource? ☐ Yes ☐ No
- 4. If no, what prevents you from using the EVIPNet VHL?
Probe: lack of access to the internet; lack of experience in using the internet; lack of organizational culture of research use; time constraints and workload?
 Please state which apply and give examples
- 5. What strategies can we use to promote awareness of the EVIPNet VHL?
- 6. Please tell me what assistance you would need to enable you to use the EVIPNet VHL?

Questions for users

7. What first motivated you to search for information in the EVIPNet VHL?

8. Could you describe, in general, your experiences using the EVIPNet VHL?
9. Do you feel you obtained the kind of information that you want from the EVIPNet VHL? Please explain if your expectations were met.
10. What was the purpose of your visit(s) to the EVIPNet VHL?
11. Did you find the information you were looking for in EVIPNet VHL? ☐ Yes ☐ No
12. If no to question number 35, what is/are the reason(s) that you did not find the information that you are looking for in the EVIPNet VHL?
 - (f) The website is not well organized
 - (g) It takes too much time to find information
 - (h) The search engine shows too many results
 - (i) Technical difficulty
 - (j) Other (please specify).....
13. Please rate the frequency with which you use the EVIPNet VHL:

Daily	Weekly	Two to three times a month	Once a month	Every three months	Once in 6 months	Once a year
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14. Have you used research evidence from the EVIPNet VHL for the following? Select many as are applicable:
 - a: To prepare a memorandum for a minister
 - b: To prepare a policy brief or evidence brief for policy
 - c: To prepare guidelines for a national health policy
 - d: To prepare a national health strategic plan
 - e: To understand a problem and its causes
 - f: To understand what is known about the benefits, harms, costs, etc, of options to address a problem
 - g: To identify implementation considerations for a selected option
 - h: To look for the best available research evidence
 - i: To find information to help advocate for a particular health policy issue
 - j: Others (specify)
15. Could you describe any health policy processes for which you or other policymakers or stakeholders have used research evidence from the EVIPNet VHL to aid in the decision-making process?
16. Do you have other sites that you search for research evidence on health systems questions other than EVIPNet VHL? Please specify and indicate how often you use them?

Thank you very much for your time and for sharing your expertise with us.

Chapter 5: Conclusion

Introduction

The three studies presented in this thesis contribute to understanding the key features of a clearinghouse and their intended effects in the uptake of research evidence for advocacy efforts, and in facilitating the use of research evidence for policymaking, health services delivery, and programmatic decisions in low-and- middle income countries. The thesis also contributes to analyzing usage of the clearinghouses by policymakers and stakeholders in Africa and the determinants of usage. The studies unearth insights about the key features of a clearinghouse that have the potential to promote the use of research evidence by policymakers and stakeholders, as well as their views, experiences, and usage of the clearinghouses. This chapter recapitulates the main findings and relates them to the use of research evidence for health policymaking and programmatic decisions. Following this, the theoretical, methodological, and substantive contributions of the thesis to the field of health policymaking are discussed. Furthermore, the strengths and limitations of the thesis as a whole, and its implications for policy and practice are discussed. Finally, a discussion of the direction for future research is explored, which is followed by brief concluding remarks.

Principal findings

The three separate chapters presented in this study provide original scientific contributions to knowledge about the linkage between clearinghouses and evidence utilization by policymakers and stakeholders to inform health policymaking and support change in health systems. Data for chapter 2 were obtained via a systematic review of the literature, while qualitative data were used for chapter 3. Lastly, both qualitative and quantitative data were used to inform the analysis of chapter 4.

Chapter 2 used a critical interpretive synthesis (CIS) approach to assess the key features of a clearinghouse and their intended effects in promoting access to and use of research evidence by policymakers and stakeholders. Both empirical and theoretical data were used to develop the theoretical framework that illustrates the potential connection between the key features of a clearinghouse and the synthetic construct of health information literacy, and the importance of this connection in influencing the use of research evidence by these individuals.

Simply put, it posits that clearinghouses are established to achieve three intended outcomes: (1) facilitating the availability of research evidence at the NGO level for advocacy, informing managerial decisions, and influencing policies in health and social services; (2) facilitating the availability of research evidence at the service level to inform health service delivery; and (3) facilitating the availability of research evidence at the government level which could be used for consideration in policy development relating to health policy and health systems. Next, it argues that these outcomes could be achieved if a clearinghouse has the following essential key features: (1) free accessible information; (2) provision of relevant information; (3) provision of user-friendly summaries; (4) quality

ratings; (5) provision of search tips; (6) timely access to up-to-date information; (7) notification of recent updates (alerts); and (8) partnerships and promotional efforts.

Finally, it argues that that health information literacy can be aided by some of these key features (i.e., search tips); it can also be acquired by training targeted users in appraising evidence. A clearinghouse with the aforementioned key features, in combination with health information literacy, has the potential to facilitate access to and use of research evidence by policymakers and stakeholders to promote evidence-informed policymaking and thus contribute to strengthening health systems.

Chapter 3 examined policymakers' and stakeholders' views about and experiences with the use of HSE and the EVIPNet VHL in Uganda and Zambia, and explored their suggestions about strategies to improve them. On the whole, the clearinghouses were viewed by participants as helpful resources that could provide them with systematic reviews and other policy-relevant documents needed to inform policy decisions. Participants suggested the need to promote awareness of the clearinghouses and train policymakers and stakeholders on how to use them.

Chapter 4 focused on an analysis of usage and trends in the use of HSE and the EVIPNet VHL in the African region and the determinants of usage, and identified both promotional and capacity-building strategies that could be implemented to galvanize the prospect of research use from the clearinghouses going forward. Chapter 4 shows that HSE has been fairly well used by policymakers and stakeholders in Africa with a combination of new registered users that includes policymakers, professionals, and managers. It thus suggests it is a valuable resource in supporting evidence-informed health policymaking. In terms of health systems topic limits, the majority of users made searches using implementation arrangements. With respect to the number of searches using document type limits, systematic reviews of effects were the most utilized. Chapter 4 also identified the key determinants of usage of the clearinghouses. These included awareness, access to high speed internet and a computer, the availability of time, knowledge and skills on searching, interests, availability of information and access to full-text documents, reading culture, and the existence of accountability for research use.

Study contributions

This thesis sought to address theoretical, methodological, and substantive gaps in relation to: understanding the key features of a clearinghouse that could enhance access to and use of research evidence for policymaking, planning, and programmatic decisions; assessing a range of views about the value of the clearinghouses and their key features, potential barriers to using them, and suggestions from the perspectives of policymakers and stakeholders on how to improve them, assessing usage trends and determinants of usage of the two clearinghouses.

Theoretical contributions

This thesis offered an important theoretical insight into the fields of health policy and health systems decision-making. Chapter 2 presented a theoretical framework which illustrates how a combination of the key features of a clearinghouse and health

information literacy could facilitate the use of research evidence to achieve their intended effects of: (1) facilitating the availability of research evidence at the NGO level to inform advocacy and managerial decisions, and to influence policies; (2) facilitating the availability of research evidence at the service level to inform service delivery; and (3) facilitating the availability of research evidence at the governmental level, which could be used as an input for consideration in policy development decision-making relating to health policy and health systems. The theoretical framework is intended to demonstrate the role of a clearinghouse as a knowledge translation strategy, and identified a construct (i.e., health information literacy) that can act as an enabler to evidence utilization. Essentially, it argues that notwithstanding the fact that clearinghouses act as a melting pot of ideas and offer policymakers and stakeholders with a lot of research evidence, their utilization depends on whether targeted users have the skills to search for and obtain the information, and use it to inform sound decision-making or programmatic decisions. In a nutshell, the essential features of a clearinghouse alone are not sufficient to influence the uptake of research evidence by policymakers and stakeholders, and that is because health research evidence is a specialized form of information requiring technical expertise and skills in its usage. Therefore, to influence the uptake of research evidence, a clearinghouse needs to be complemented with other interventions aimed at building the skills of policymakers and stakeholders to equip them with the health information literacy they need in order to inform sound decision-making.

Substantive contributions

This thesis makes substantive contributions to the field of evidence-informed health policymaking. First, chapter 2 outlines the key features of a clearinghouse that have the potential to encourage the uptake of research evidence, and identifies a synthetic construct which, together with the key features of a clearinghouse, can facilitate access to and use of research evidence. It provides insights that both clearinghouse developers and advocates for evidence-informed policymaking could consider. For instance, it suggests the need for clearinghouse developers and those desirous of establishing new ones to: (1) form partnerships with policymakers, program implementers and policy advisors in health research organizations and engage in promotional activities to promote awareness and influence use of the clearinghouse; (2) undertake capacity-building activities such as training policymakers and health systems managers on how to search for information from the clearinghouses in order to build their knowledge, skills, and health information literacy; and (3) continue providing periodic alerts, as well as relevant, accessible information in user-friendly formats, which, when supplemented with health information literacy, can influence evidence utilization from the clearinghouses.

Chapter 3 provided substantial insights on the views of policymakers and stakeholders about the usefulness of the clearinghouses, the barriers or gaps to evidence utilization, and the key areas that need improvements. By conducting user-testing of the clearinghouses with policymakers and stakeholders, a number of key insights were gained. First, the clearinghouses are viewed as very valuable and useful to policymakers and stakeholders in Uganda and Zambia. Participants indicated that the clearinghouses

could provide them with research evidence for advocacy, planning, programming and policy development. Other participants indicated that the clearinghouse could provide them with systematic reviews on interventions that work, and relevant documents that they could act on and share with government or use in order to provide advice to the government on the best way forward. Further, some respondents felt that the clearinghouses are meeting their aims as they could serve as reference point for them to consult when working on policy development or guidelines development on health policy and health systems.

Chapter 4 provided substantive knowledge on usage and usage patterns of HSE and the EVIPNet VHL in the geographical region of Africa. It raises key insights on usage and trends in usage of the two clearinghouses by policymakers and stakeholders in Africa. By knowing trends in usage, clearinghouse developers will be able to evaluate progress and bottlenecks in reaching out to geographically targeted users. By also interviewing both users and non-users about why they use or do not use the clearinghouses, the determinants of usage of the clearinghouses were identified. By asking non-users about strategies to promote awareness of the clearinghouses and capacity building efforts that they would need to be able to use the clearinghouse, key promotional efforts and capacity-building strategies were identified. Taken together, the findings in this chapter offer substantial evidence about trends in usage, the determinants of usage, and strategies to build the capacities of targeted users, and, consequently contribute to increased prospects of evidence utilization from the clearinghouses.

Methodological contributions

The thesis presented important methodological contributions. First, it is the first attempt to use systematic reviews methodology (i.e., critical interpretive synthesis) to locate, analyze and synthesize data on the key features of a clearinghouse as a knowledge translation strategy. Although critical interpretive synthesis has been used to examine how contexts and issues influenced the use of policy-relevant research syntheses (Moat et al., 2013), to illustrate how deliberative dialogues act as a knowledge translation strategy (Boyko et al., 2012), to examine the use of morphine to treat cancer-related pain (Flemming 2009), and to examine access to healthcare by vulnerable groups (Dixon-Woods et al., 2006), among other topics, no study has used a critical interpretive synthesis methodology to develop a theoretical framework of the key features of a clearinghouse and their intended effects in facilitating access to and use of research evidence. By following the critical interpretive synthesis (CIS) method, pioneered by others, to generate data and synthesize data on the essential key features of a clearinghouse, this thesis addresses an important theoretical knowledge gap. In addition, the analysis in chapter 2 and parts of chapter 3 evidence the critical role of qualitative methods for understanding a range of views about and experiences with the use of clearinghouses by policymakers and stakeholders, and the determinants of usage of the clearinghouses. Finally, chapter 4 attests to the benefits of using a mixed methods design by using quantitative data to provide a rigorous and better understanding of usage patterns/trends,

and using qualitative data to assess the determinants of usage of the two clearinghouses by policymakers and stakeholders in the African geographical region.

Strengths and limitations

This thesis has a number of strengths. First, little research work has been conducted on the use of clearinghouses as a strategy to facilitate evidence-informed decision-making on health policy and health systems, and the theoretical framework developed in this thesis fills this knowledge gap. It sheds more light on the key features of clearinghouses that could facilitate the uptake of research evidence by policymakers and stakeholders to strengthen health systems. It builds on and supplements other theories of knowledge translation (Lavis et al., 2006; Lavis et al., 2009; Constandriopoulos et al., 2010), and supports recent emphasis on the establishment of clearinghouse functions to promote evidence-informed policymaking in LMICs (Hyder et al., 2011; Panisset et al., 2012).

Further, this thesis used diverse approaches to synthesize documents covering health and social care sectors, and qualitative and quantitative data to examine the key features of a clearinghouse and their intended effects in evidence-informed policymaking. Additionally, through the user-testing via scenario questions, we uncovered understanding about policymakers' and stakeholders' abilities to search for and use information from the clearinghouses; how the clearinghouses are viewed by them, and what features of the clearinghouses are important to them in Uganda and Zambia. This discovery fills an important empirical gap in their perceptions about the clearinghouses.

Moreover, the perspectives of policymakers and stakeholders on why they are not using the clearinghouses, and their suggestions for improvements, provided insights about what further actions clearinghouse managers could take to improve them. Again, the demonstration scenario topics covering skilled birth attendance, maternal and child health, and PMTCT are among the shared health priorities of the two countries where the interviews were conducted, and could galvanize more interest among policymakers and stakeholders who were interviewed to search for information on those topics from the clearinghouses.

Last, the use of a mixed methods design is another important strength of the thesis. Thanks to this method, a combination of interview data and usage statistics were utilized to assess usage and trends analysis and to explore the determinants of usage of the clearinghouses, and thus provided a richer understanding of these issues that neither the quantitative or qualitative data alone could have provided sufficient answers to.

Despite the strengths described above, this thesis, like any other research project, has a number of limitations. First, although the critical interpretive synthesis approach to systematic reviews was rigorously conducted, the key features and the synthetic construct of health information literacy identified in the theoretical framework have not been empirically tested. Additionally, the interviews and user-testing were conducted in office environments in countries with low-speed internet and a lack of internet access in some offices. As such, where there was no internet or internet breakdown occurred, we had to use a high speed MTN internet bundle that was purchased and installed on the principal

investigator's laptop. Thus, because of contextual factors and varied conditions such as level of ICT policy, health information literacy, and computer literacy, we cannot generalize these findings to all other LMICs in a context where the technological environment is different.

A third limitation of this thesis is the limited number of users, and their limited exposure to and experiences with the clearinghouses. Among the 50 participants who were interviewed, few were users of HSE and the EVIPNet VHL. The majority of the people were those who were aware of the clearinghouses but were not using them, and those who were not aware of them nonetheless gave their views about the determinants of usage based on their own limited exposure to and experiences with the clearinghouses. As such, it could be the case that their views could have been more valuable or representative if they have had more exposure to and experiences with the clearinghouses.

Implications for policy and practice

This thesis has implications for policy and practice that need to be considered by clearinghouse developers, policymakers, governments, and advocates for evidence-based decision-making. First, from a policy and practice perspective, this thesis contributes to the understanding of how the key features of a clearinghouse, in combination with health information literacy, could promote the use of research evidence from it. To expand on this point, let us examine each of the identified key features of a clearinghouse and health information literacy in turn, and show how they can do that. First, the provision of free accessible information is a key feature that can facilitate access to research evidence. Literature shows that a lack of access is a barrier to the uptake of systematic reviews (Wallace et al., 2012). The high cost of journal subscriptions is also a barrier to research use in LMICs, as few decision-makers and researchers can afford the cost. An attempt to dismantle these barriers has led to the implementation of several initiatives using internet gateways to give researchers free online access to the full text of health research papers published in journals such as BIREME, which serves researchers in Latin America and the Caribbean, and the Health Internetwork Access to Research Initiative (HINARI) initiative, which provides access to full text articles to researchers in 113 developing countries (WHO 2004). The literature shows that the provision of free, accessible information has led to the use of the maternal clearinghouse in India (Khanna et al., 2013). Using this reasoning, if clearinghouses do not provide information free of charge, not all users could afford the cost, and this could prevent use. Therefore, by providing free, accessible documents, a clearinghouse encourages and enables its targeted users to access the information.

Having made the research evidence available and freely accessible does not lead automatically to its use. The provision of free, accessible research evidence is a necessary condition but not a sufficient condition. The provision of relevant information is needed if research evidence is to be used by policymakers. Literature shows that one of the reasons for non-use of research evidence is because it is often not relevant to the policy issues that policymakers face or is inapplicable to their local contexts (Lavis et al., 2006; Innvaer et al., 2002; Oxman et al., 2009).

It must be noted, however, that policymakers may not be able to use relevant information (relevant content) if it is not presented in user-friendly formats. A recognition of this barrier has led to the production of user-friendly summaries of information deposited in some clearinghouses to aid policymakers with evidence utilization (Dobbins et al., 2010). In addition, policymakers would not use research evidence if it is deemed to be of low-quality. Clearinghouses address this barrier by providing quality ratings for articles so that policymakers could judge their quality (Haynes et al., 2006; Dobbins et al., 2010; Weir et al., 2010; Moat and Lavis 2011).

An important issue arises when clearinghouses provide high quality relevant information yet policymakers do not know how to use them. Clearinghouses attempt to address this issue and aid evidence utilization by providing to their targeted users: search tips in the forms descriptions or search strategies; video materials; and implementation aids on how to use them (Dobbins et al., 2010; Ford 2009; Gulmezoglu et al., 2006; Mendias et al., 2011). As well, the notification of recent updates (alerts) and timely access to up-to-date information could help to promote the use of research evidence. A study has shown that timely availability of research evidence could lead to its use (Lavis et al., 2005), and this has been reinforced by the strong demand for a rapid response unit in Uganda where quick responses to a policymaker's request for synthesized evidence have facilitated the use of research evidence in decision making (Mijumbi et al., 2014). It follows, therefore, that the timely dissemination of relevant research evidence to policymakers could facilitate the incorporation of research evidence into decision-making.

Although clearinghouses could provide easily accessible, highly rated and timely relevant research evidence in user-friendly formats and with search tips available on how to use them, they are unlikely to be used if policymakers are not aware of them. Partnerships and promotional efforts may need to be implemented in order to address this. This implies that clearinghouse developers could promote them to policymakers via advertisements, and sending the clearinghouses' addresses and a short description of the websites to policymakers through listservs. This finding has been supported by the literature (Wallace et al., 2012). In relation to partnerships, clearinghouses managers and their teams could form partnerships with key ministries of health and provide skill-building workshops to policymakers. The nature of the research-to-policy partnerships could take three forms depending on the resources a ministry that want to enter into an agreement with the clearinghouses: 1) engaged consultancy, 2) annual routine evidence-informed policymaking workshops, and 3) monthly dissemination of research evidence (via alerts) to research uptake liaison officers at the ministries of health.

With respect to engaged consultancy, policymakers at ministries of health could work jointly with clearinghouses' teams to develop research questions on programs, services or policy issues they want to develop and implement (i.e., whether it concerns an evidence brief for policy or guidelines development; understanding the benefits, harms and/or costs of implementing a particular program, service or drug; options to address a particular policy problem; or implementation considerations for a selection option). The clearinghouses' teams could then respond to policymakers' demands and develop a search strategy based on the policy issue, perform searches on the clearinghouses to

generate the body of research evidence, and hold face-to-face meetings with policymakers at the ministry of health to discuss and work on assessing and contextualizing the evidence to inform policy decisions on health policymaking process.

In relation to annual routine evidence-informed policymaking workshops, clearinghouses' managers could develop a memorandum of understanding with ministries of health to provide an annual one-week training workshop for staff at the ministries of health. The workshop could address searching for research evidence from the clearinghouses, as well as assessing and contextualizing evidence to inform decision on health policy and health systems.

In respect of implementing a plan for the monthly dissemination of research evidence to research uptake liaison officers, clearinghouses' managers could identify research uptake liaison officers (i.e., influential staff at departments and units of the ministries of health) who will regularly send them health policy priorities and policy research questions of the ministry, and the clearinghouses' evidence team could send monthly research evidence updates on those policy questions to them via email. To maintain these partnerships, two way exchanges with feedback loops (one from clearinghouses' managers to policymakers and another from policymakers to clearinghouses' managers) could occur regularly, with policymakers telling the clearinghouses' team their policy questions and what research evidence they need, and with the clearinghouses' team providing them with timely research evidence based on those policy questions.

Accessing or retrieving the information and determining its relevance in and of itself requires health information literacy. The provision of search tips by clearinghouses partly contributes to health information literacy by guiding users on how to search for and retrieve information on the clearinghouse. As well, judgments about the quality of the information retrieved, its suitability to local contexts, and how to incorporate the information to inform decision-making also entails health information literacy. Consequently, a combination of the key features of a clearinghouse and health information literacy proposed in the theoretical framework could facilitate greater access to and use of research evidence to inform health policy decisions and policymaking.

The identification of health information literacy as a synthetic construct shows that, in addition to the key features outlined in the theoretical framework, capacity building activities such as training policymakers on how to use the clearinghouses in particular, and how to appraise research evidence in general, should be carried out in order to equip them with health information literacy and maximize the use of research evidence to inform decision-making. The findings in this thesis, on the whole, provide practical relevance for clearinghouses developers attempting to link evidence to policy. They provide ideas and lessons to guide the design of clearinghouses in the future, and the complementary intervention needed to equip targeted users with health information literacy, in order to maximize their usage by policymakers with the goal of strengthening health systems.

Information communication and technology (ICT) plays an important role in aiding evidence utilization. The results indicate that either a lack of internet at workplaces or slow speed and intermittent internet breakdown issues in Uganda and Zambia pose

serious challenges to accessing the clearinghouses at places of work. Thus, from a policy perspective, it underscores the urgent need for governments in those countries to do one or two of the following: (1) to implement an ICT policy at national ministries of health; and (2) to adopt a nation-wide free internet policy in order to address bottlenecks occasioned by intermittent power supply, slowinternet, and a lack of internet in some places.

Moreover, the results suggest that interests are a determinant to research utilization, which suggests that policymakers and stakeholders may not use research evidence if they are not motivated to do so. Therefore, from a policy perspective, a course of action could be taken to motivate policymakers to adopt evidence-based decision-making and to encourage the uptake of research evidence to inform-health policymaking, service delivery and programmatic decisions. For example, in order to motivate policymakers' interests in research use, the ministries of health could develop a mandatory annual research use performance criteria that require that policymakers at the various directorates reports to the minister of health on how they have used research evidence to inform the development of programs and policies. These reports could be submitted at the end of each year and be known as Departmental Report on Evidence Utilization (DREC).

Implications for future research

Although this thesis addresses gaps, it nonetheless brings to light directions for future research on issues that are worth investigating. First, given our identification of health information literacy as a synthetic construct that, in combination with the key features of a clearinghouse, can facilitate the use of research evidence, funding could be secured to make it possible to conduct future research using a randomized controlled trial. In this trial, some participants would only be introduced to the clearinghouses as a control group, while the intervention group would be introduced to the clearinghouses and also supplemented with capacity-building measures aimed at equipping them with health information literacy. This could include training participants on how to search for information, how to appraise the quality of the information, and how use to the information to make sound decisions. A number of effects outcomes could be measured. The primary outcomes to be measured could include the number of logins into the clearinghouses and the increased skills in searching for information. The secondary outcome that could be measured is the intention to use research evidence based on the theory of planned behaviour (Wilson et al., 2011; Ajzen 1991).

Second, future research would need to test the theoretical framework in other countries to assess its usefulness for promoting the uptake of research evidence. Third, since context plays a very important role in research uptake, there is a need for future research to conduct more user-testing in other countries to determine whether our findings in Uganda and Zambia can be generalized to other countries. Fourth and finally, a lack of accountability for research use emerged as a major issue impacting research utilization in Uganda and Zambia. Given that citizens need to know that money allocated to programs and services are working and yielding good results in line with a results-based

management framework, there is a need for future research to examine what accountability frameworks have been put in place by governments in those countries in relation to health policymaking, programs, and service delivery on health, and how these accountability frameworks could be strengthened.

Conclusion

On the whole, this thesis provided insights in regard to the key features of a clearinghouse as a knowledge translation strategy, policymakers' and stakeholders' perspectives about the use of HSE and the EVIPNet VHL in Uganda and Zambia, and the usage and the determinants of usage of the clearinghouses. The thesis demonstrate that clearinghouses are a promising knowledge translation strategy. The findings from this study suggest that the clearinghouses are considered credible and valuable to their targeted users as they provide them with systematic reviews and relevant documents which they could use for evidence-based advocacy, planning, programmatic decisions, and policy development on health policy, public health, and health systems. The three chapters provided theoretical, substantive, and methodological contributions to the body of knowledge with respect to the link between clearinghouses and evidence utilization as it pertains to health policy and health systems. Theoretically, it outlines the key features of a clearinghouse and the necessity of health information literacy which are both needed to facilitate the use of research evidence from it. As well, this theoretical framework can apply to other policy fields and disciplines.

Substantively, it raises important insights about the value of the clearinghouses, patterns of use, and the determinants of their usage. These issues are important to clearinghouse developers, funders, and evidence-based advocates. If implemented, they would improve the design of clearinghouses and the use of research evidence from them. Methodologically, it demonstrates that the use of rigorous, multi-methods designs can provide answers about the nuances of a phenomenon (i.e., key features of a clearinghouse and their intended effects as knowledge translation strategies; policymakers' and stakeholders' perspectives of a clearinghouse; usage and trends in usage of a clearinghouse; and determinants of usage of a clearinghouse).

The overall key messages are that, if clearinghouses are developed with the identified key features, if policymakers and stakeholders have adequate level of health information literacy, if those interested in supporting the use of research evidence could leverage on the actionable determinants of health, and implement capacity building strategies required to facilitate use of research evidence from the clearinghouses, we would see greater access to and use of research evidence at NGO, service and government levels, and for the purposes of informing advocacy and managerial, health service delivery and decision-making on health policy and health system.

It is hoped that the findings of this thesis will help clearinghouse managers, prospective clearinghouse developers and other health research organizations in the development of new clearinghouses and the identification of strategies to promote the use of research evidence from existing clearinghouses, in order to strengthen evidence-informed decision-making on health policy and health systems.

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