

# HEALTH FORUM

# **Appendices**

- Methodological details (Appendix 1)
- Details about each identified synthesis (Appendix 2)
- Details about each identified single study (Appendix 3)
- Documents that were excluded in the final stages of review (Appendix 4)

Appendix 1: Methodological details

• <u>References</u>

# Rapid Evidence Profile

# Strategies for enhancing public-health focused data literacy

# 27 March 2024

[MHF product code: REP 70]

We use a standard protocol for preparing rapid evidence profiles (REP) to ensure that our approach to identifying research evidence is as systematic and transparent as possible in the time we were given to prepare the profile.

### Identifying research evidence

For this REP, we searched Health Systems Evidence, Health Evidence, and PubMed for:

- 1) evidence syntheses
- 2) single studies

We searched <u>Health Systems Evidence</u> with the term "data literacy" in the open search field. For Health Evidence, we reviewed searches based on the term "data literacy" in the open search with a publication date limit from 2014 onwards (the last 10 years). For <u>PubMed</u>, we searched using the following combination of terms and Boolean operators: ((health literacy[Title/Abstract]) AND (data[Title/Abstract]) AND (public health[Title/Abstract])) OR (data literacy[Title/Abstract]) with publication dates from 2014 to 2024.

Each source for these documents is assigned to one team member who conducts hand searches (when a source contains a smaller number of documents) or keyword searches to identify potentially relevant documents. A final inclusion assessment is performed both by the person who did the initial screening and the lead author of the rapid evidence profile, with disagreements resolved by consensus or with the input of a third reviewer on the team. The team uses a dedicated virtual channel to discuss and iteratively refine inclusion/exclusion criteria throughout the process, which provides a running list of considerations that all members can consult during the first stages of assessment. For this REP, we only included evidence documents that explicitly mentioned data literacy.

During this process, we included published and unpublished literature if relevant to the question and meet our criteria (evidence syntheses or single studies with an explicit focus on strategies for enhancing data literacy. We do not exclude documents based on the language of a document. However, we are not able to extract key findings from documents that are written in languages other than Chinese, English, French or Spanish. We provide any documents that do not have content available in these languages in an appendix containing documents excluded at the final stages of reviewing. We excluded documents that did not directly address the research questions and the relevant organizing framework. Based on this, we excluded documents that focused on health literacy or digital health literacy (finding, understanding and/or appraising online health information) without insights about enhancing data literacy.

#### Assessing relevance and quality of evidence

We assess the relevance of each included evidence document as being of high, moderate or low relevance to the question.

Two reviewers independently appraise the methodological quality of evidence syntheses that are deemed to be highly relevant. Disagreements are resolved by consensus with a third reviewer if needed. AMSTAR rates overall methodological quality on a scale of 0 to 11, where 11/11 represents an evidence synthesis of the highest quality. High-quality evidence syntheses are those with scores of eight or higher out of a possible 11, medium-quality evidence syntheses are those with scores between four and seven, and low-quality evidence syntheses are those with scores less than four. It is important to note that the AMSTAR tool was developed to assess evidence syntheses focused on clinical interventions, so not all criteria apply to those pertaining to health-system arrangements or to economic and social responses. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, an evidence synthesis that scores 8/8 is generally of comparable quality to another scoring 11/11; both ratings are considered 'high scores.' A high score signals that readers of the evidence synthesis can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the evidence synthesis should be discarded, merely that less confidence can be placed in its findings and that the evidence synthesis needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. Health Research Policy and Systems 2009; 7 (Suppl1):S8.

#### Preparing the profile

Each included document is cited in the reference list at the end of the REP. For all included guidelines, evidence syntheses and single studies (when included), we prepare a small number of bullet points that provide a summary of the key findings, which are used to summarize key messages in the text. Protocols and titles/questions have their titles hyperlinked, given that findings are not yet available.

We then draft a summary that highlights the key findings from all highly relevant documents (alongside their date of last search and methodological quality).

#### Declarative title and key findings Dimension of organizing Relevance Availability Living Quality Last year Equity of **GRADE** framework rating status (AMSTAR) literature considerations searched profile 10/11Not available Evidence producers can use descriptions and clear visuals High No Not None identified • Focus of strategies that can be to support knowledge use and sharing to manage public available used to enhance data literacy health risks (1) • Support specific skills for • This review examined the use of dashboards for data literacy public health risks. Analyzing or interpreting data Visualizing information using charts and tables are helpful, but many people struggle to interpret this ٠ Who delivers the strategies information. o Evidence producers o Evidence producers can include more information Outcomes • in their products to help individuals interpret o Increased knowledge information and increase knowledge. Increased use of data 0 • Improving the accessibility of dashboards and data can increase data sharing and communication across healthcare professionals to manage public health risks. • Focus of strategies that can be Accessible data representations can benefit a broader High No 3/11 2022 Not available Disability spectrum of disabilities and should be developed with this used to enhance data literacy in mind to ensure that individuals with different abilities Improve knowledge about and requirements can effectively engage and derive data and what it can help meaningful insights from data (2) inform • This review examined data representation papers • Support specific skills for focused on underrepresented disability communities. data literacy Identify reliable • Accessible data representations can be created sources for data through: o prioritizing ability-based design by understanding Analyzing or interpreting data the abilities and barriers users face, especially Visualizing data those with cognitive or motor disabilities Communicating data o integrating accessibility-related data into existing representations • How strategies to enhance • for example, adding details about accessible data literacy can be delivered features (e.g., ramps, in-service elevators) in 0 Community-driven maps could significantly aid those with motor approaches (e.g., building disabilities in navigating the physical world capacity to enhance data o encoding data in multiple modalities (e.g., visual, literacy in communities, auditory, tactile) by adopting multimodal leveraging community approaches leaders as champions) • Target of strategies

## Appendix 2: Key findings from evidence documents, organized by document type, and sorted by relevance

Dimension of organizing framework	Declarative title and key findings	Relevance rating	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations
<ul> <li>People living with disabilities</li> <li>Outcomes</li> <li>Increased knowledge</li> <li>Increased use of data</li> </ul>	<ul> <li>for example, implementing underutilized visualizations like treemaps, bubble charts, glyphs, and other advanced visualizations</li> <li>evaluating accessible data representations through user testing to ensure that data representations are practical and accessible in real-world settings</li> <li>this can include involving disability communities in design workshops, focus groups, usability testing, and field studies.</li> </ul>						
<ul> <li>Focus of strategies that can be used to enhance data literacy         <ul> <li>Improve knowledge about data and what it can help inform</li> <li>Change attitudes about using data</li> <li>Other</li> </ul> </li> <li>How strategies to enhance data literacy can be delivered         <ul> <li>Community-driven approaches (e.g., building capacity to enhance data literacy in community leaders as champions)</li> <li>Outcomes             <ul> <li>Increased knowledge</li> <li>Improved attitudes about using data</li> <li>Increased use of data</li> </ul> </li> </ul> </li> </ul>	<ul> <li>There are many ways that community engagement can be incorporated when developing data visualizations/tools related to the lived experience of community members (3)</li> <li>Some studies took a direct participatory approach in the creative data literacy framework, while others focused on evaluation of the community's ability to understand information from data visualizations made subsequent adjustments to data visualizations to fit the community's preferences/suggestions.</li> <li>Projects that promoted data activism principles by facilitating community involvement encouraged creative data literacy skill-building.</li> <li>A greater investment in research and intervention agendas addressing barriers to community involvement in data visualization work is recommended by the authors.</li> </ul>	High	No	3/9	2022	Not available	• Race/ ethnicity/ culture/ language

#### Dimension of organizing Relevance Study Equity considerations Declarative title and key findings framework rating characteristics Focus of study: To Some Canadians reported that data literacy was not a familiar term to them and Medium • Place of residence • Focus on strategies that can be that strategies need to be developed to ensure data access to different equitymeasure used to enhance data literacy Race/ethnicity/culture deserving populations (4) Canadians' • Improve knowledge about knowledge related • The multi-method study conducted surveys and online focus groups to data and what it can help language to data literacy understand the baseline of health data literacy among Canadians across the inform • Gender/sex and attitudes different provinces and territories, including people from equity-deserving Personal characteristics regarding health groups such as racialized populations, Indigenous peoples, newcomers to associated with data to inform Canada, those living with physical disabilities, and members of the discrimination (e.g., health data LGBTQ2IA+ community. age, disability) literacy programs One in 10 survey respondents were familiar with the term 'health data,' with close to 40% reporting that they were somewhat prepared to have Publication date: discussions about health data. 2023 • Indigenous participants reported that they were sensitive to sharing their health information with actors beyond their healthcare professionals, **Jurisdiction** studied: regardless if it was de-identified or not, due to issues of trust and confidence Canada in the government. One-third of the respondents were less inclined to say that health data was Methods used: important for developing health systems. Multi-methods People living with physical disabilities indicated that they would prefer if information sharing was simplified and that many do not have the necessary technology to access health data digitally. • A number of 2SLGBTQ2+ participants expressed a need for strict rules and protections, given their fear of health data being used by policymakers or political decision-makers who had ideological views (i.e., that someone would see this as a condition to be cured). User interface and data dashboard research suggests that data literacy tools and Medium Focus of study: None identified • Focus of strategies that can be strategies should be created in partnership with the intended users and Assessed three used to enhance data literacy monitored or revised continuously for improvement and engagement metrics (5) unique overdose • Support specific skills for data dashboard data literacy • To operationalize public health data literacy in the context of overdose data projects Communicating data dashboards, strategies include: o engaging potential dashboard users with key headlines but also with How strategies to enhance data Publication date: interactive elements such as data visualizations and maps. literacy can be delivered 2024 Some data elements work best when the intended user has some 0 Community-driven exposure to statistical concepts, but data visualizations can quickly approaches (e.g., building Iurisdiction studied: become complex for the intended user. capacity to enhance data Rhode Island. Develop and contextualize the data and present it as a narrative or story, literacy in communities; ٠ U.S.A. outlining key questions the story should answer for optimal user engagement leveraging community leaders as champions) and action.

# Appendix 3: Key findings from single studies organized by relevance

	Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
•	<ul> <li>Who delivers the strategies</li> <li>Public-health regions or units</li> <li>Outcomes</li> <li>Increased use of data</li> <li>Focus of strategies that can be used to enhance data literacy</li> </ul>	The class aimed to explain why visual misinformation is convincing, teach participants to recognize the impacts of data presentation methods, identify out	Medium	Methods used: Mixed methods Focus of study: To educate an	None identified
•	<ul> <li>Improve knowledge about data and what it can help inform</li> <li>Support specific skills for data literacy</li> <li>Identify reliable sources for data</li> <li>Analyzing or interpreting data</li> <li>Visualizing data</li> <li>How strategies to enhance data literacy can be delivered</li> <li>In-person training</li> <li>Who delivers the strategies</li> <li>Trusted individuals (e.g., clinicians, system leaders)</li> <li>Outcomes</li> <li>Increased knowledge</li> </ul>	<ul> <li>of context images, describe the implications of manipulated images, and identify AI-generated visuals (6)</li> <li>The opening discussion of class was followed by an overview of research demonstrating the persuasiveness of visual information (and misinformation) in comparison with text-based information and that visual information on social media tends to spread more effectively and memorably.</li> <li>Most of the class focused on four main topic areas: misleading graphs and charts, imagery with missing/incorrect context, manipulated figures in scientific publications, and AI-generated imagery/deepfakes.</li> <li>The authors believed that allowing learners to practice identifying visual misinformation was ideal for long-term retention of these skills.</li> <li>The development of materials or instruction related to visual misinformation needs to involve a consideration of the audience to ensure the best fit between learners and content.</li> </ul>		academic health sciences audience on visual health misinformation <i>Publication date:</i> 2024 <i>Jurisdiction studied:</i> <i>Pittsburgh,</i> U.S.A. <i>Methods used:</i> Case study	
	O Increased use of data	In the first half of the data internship, the intern received training on research	Medium	Focus of study: To	None identified
•	<ul> <li>Focus of strategies that can be used to enhance data literacy</li> <li>Improve knowledge about data and what it can help inform</li> <li>Change attitudes about using data</li> <li>Other</li> <li>Support specific skills for data literacy</li> <li>Identify reliable sources for data</li> <li>Analyzing or interpreting data</li> </ul>	<ul> <li>methods and ethics related to systematic reviews and meta-analyses, and in the second half the intern developed and led a workshop series (7)</li> <li>The librarian met with and trained the intern for one hour, once a week, over twelve weeks and before each meeting the librarian shared training materials and meeting times were used to answer questions and clarify concepts.</li> <li>The intern developed a three-part workshop series based on a flipped classroom learning model. Participants worked individually and asynchronously to learn the instructional content before coming to class, and synchronous meetings were used for collaborative, problem-solving activities.</li> </ul>	Medium	present the results of a data internship and workshop series on data literacy concepts and data analysis tools <i>Publication date:</i> 2022 <i>Jurisdiction studied:</i> U.S.A.	Tione Identified

	Dimension of organizing framework	Declarative title and key findings	Relevance rating	Study characteristics	Equity considerations
•	<ul> <li>Communicating data</li> <li>How strategies to enhance data</li> <li>literacy can be delivered</li> <li>Distribution of educational materials (e.g., using social media)</li> <li>Virtual training (e.g., webinars)</li> <li>In-person training</li> <li>Community-driven approaches (e.g., building capacity to enhance data literacy in communities, leveraging community leaders as champions)</li> </ul>	<ul> <li>The results from the data intern's pre-and post-self-assessments proficiency on the Data Literacy's <i>Self-Assessment: 17 Key Traits of Data Literacy</i> suggest that the data internship met its learning objectives.</li> <li>Based on post-internship feedback, allowing the intern to design and lead the workshop series provided a sense of autonomy and having a student-led workshop series' marketing campaign added insight into strategies for reaching and engaging students.</li> <li>The flipped classroom model was especially useful in the virtual workshop setting and ensured that participants had access to all the materials before, during, and after the series.</li> <li>Assessment results suggest that, while the workshop series improved participants' data literacy skills, additional data literacy instruction could be beneficial.</li> </ul>		<i>Methods used:</i> Case study	
	<ul> <li>Increased knowledge</li> <li>Improved attitudes about using data</li> <li>Increased use of data</li> </ul>				
•	<ul> <li>Focus of strategies that can be used to enhance data literacy</li> <li>Improve knowledge about data and what it can help inform</li> <li>Change attitudes about using data</li> <li>How strategies to enhance data literacy can be delivered</li> <li>In-person training</li> <li>Outcomes</li> <li>Increased knowledge</li> <li>Improved attitudes about using data</li> <li>Increased use of data</li> </ul>	<ul> <li>Authentic data use in the classroom is limited by the availability of high-quality resources, appropriate instructor training, and research on effective teaching strategies for developing and improving student data literacy (8)</li> <li>Teachers reported several limitations to incorporating data-centric activities in their classrooms, pointing to a need for resource development in this area.</li> <li>Instructors identified not feeling confident in their abilities to lead data-focused discussions with their students, highlighting that instructors will require adequate training to prepare them for teaching with data.</li> <li>Research is needed to define desired learning outcomes of data use in the classroom and, subsequently, future research can determine the best practices for improving data literacy for STEM students.</li> </ul>	Medium	<i>Focus of study:</i> To discuss the data- literacy learning benefits of giving students opportunities to work with authentic data from research <i>Publication date:</i> 2019 <i>Jurisdiction studied:</i> U.S.A. <i>Methods used:</i> Thematic analysis	None identified

	Dimension of organizing	Declarative title and key findings		Study	Equity considerations
•	framework         Focus of strategies that can be         used to enhance data literacy         O Other         Outcomes         O Other	<ul> <li>Cultivating trust in science and improving data interpretation competence through education played key roles in mediating the association between self- efficacy in data interpretation and reasoning (9)</li> <li>The survey involved participants self-assessing their information behaviour practices, self-efficacy, and trust in scientific beliefs in addition to data interpretation of COVID-19 information.</li> <li>The authors defined data literacy as a set of skills or competencies that allow interpretation and reasoning with quantitative results and data visualization.</li> <li>The authors reported that trust in science positively mediated the chances that individuals used data in their reasoning.</li> <li>The authors indicated participants may use other scientific criteria such as economic, social, or ideological criteria when data is disregarded (e.g., participants considered educational continuity and social interactions with peers compared to rates of infection when deciding whether school closures were important during COVID-19).</li> <li>The authors indicated that education is key for individuals to effectively use data, such as understanding ratio and proportional reasoning skills and interpreting data.</li> <li>Overall, the authors recommended that educative efforts and cultivation of trust is asigned bey hey roles in data literacy</li> </ul>	rating Medium	characteristicsFocus of study: Todetermine if thepublic considerdata in theirscientificreasoning andengagementPublication date:2023Jurisdiction studied:IsraelMethods used:QuantitativeSurvey	None identified
•	<ul> <li>Focus of strategies that can be used to enhance data literacy</li> <li>Change attitudes about using data</li> <li>Other</li> <li>Outcomes</li> <li>Increased knowledge</li> <li>Improved attitudes about using data</li> <li>Increased use of data</li> </ul>	<ul> <li>To develop critical data literacies and research skills, ethics should be a central element embedded as a method, guiding research at every stage (10)</li> <li>When designing a curriculum for research methods and data science courses, educators should develop an understanding of ethics and potentially beneficial and harmful uses of data.</li> <li>Data and research literacy should explore participatory and inclusive research design, involving those affected by the research, with attention to vulnerable communities to minimize biases and prejudices.</li> </ul>	Low	<i>Focus of study:</i> To establish the need for and outline a set of action- guiding ethical principles that embed data ethics in teaching data skills <i>Publication date:</i> 2023 <i>Jurisdiction studied:</i> Global <i>Methods used:</i> Thematic analysis	None identified

# Appendix 4: Documents excluded at the final stages of reviewing

Document type	Hyperlinked title
Evidence synthesis	A systematic review of educator-led physical literacy and activity interventions
	A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors
	Assessing the impact of online health education interventions from 2010-2020: A systematic review of the evidence
	Community based health literacy interventions in India: A scoping review
	Complex interventions to improve the health of people with limited literacy: A systematic review
	COVID-19 infodemic and digital health literacy in vulnerable populations: A scoping review
	Cultural and digital health literacy appropriateness of app- and web-based systems designed for pregnant women with gestational diabetes mellitus:
	Scoping review
	Data and information literacy: A fundamental nursing competency
	Data literacy assessments: A systematic literature review
	Data literacy in medical education - An expedition into the world of medical data
	Do chronic obstructive pulmonary diseases (COPD) self-management interventions consider health literacy and patient activation? A systematic review
	Health literacy and health outcomes in diabetes: A systematic review
	Health literacy in people with venous leg ulcers: A protocol for scoping review
	Health literacy interventions among patients with chronic diseases: A meta-analysis of randomized controlled trials
	Health literacy interventions and outcomes: An updated systematic review
	Health literacy interventions in the hospital setting: An overview
	Insufficient evidence on health literacy amongst Indigenous people with cancer: A systematic literature review
	Interventions for enhancing consumers' online health literacy
	Interventions to improve health literacy among Aboriginal and Torres Strait Islander peoples: A systematic review
	Interventions to improve health outcomes for patients with low literacy. A systematic review
	Playful educational interventions in children and adolescents' health literacy: A systematic review
	Promoting sexual health in schools: A systematic review of the European evidence
	The effect of digital health interventions on parents' mental health literacy and help seeking for their child's mental health problem: Systematic review
	The effectiveness of self-management interventions for individuals with low health literacy and/or low income: A descriptive systematic review
	The role of the arts in enhancing data literacy: A scoping review protocol
	Which criteria characterize a health literate health care organization? A scoping review on organizational health literacy
	Creating an understanding of data literacy for a data-driven society
Single study	Data literacy on the road: setting up a large-scale data literacy initiative in the DataBuzz project
	Digital health literacy and web-based information-seeking behaviors of university students in Germany during the COVID-19 pandemic: Cross-sectional
	survey study.
	Health literacy and digital health information-seeking behavior - A cross-sectional study among highly educated Swedes
	Interventions for improving health literacy in migrants
	Public health surveillance and the data, information, knowledge, intelligence and wisdom paradigm
	What must health literacy stakeholders do to build a public health and population health agenda?
	Health literacy policies: National examples from Canada

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