Promoting equity, accessibility, and trust through co-design: shaping a living evidence architecture for South-East Asia and the Western Pacific

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Abstract: Living evidence refers to continual evidence synthesis and dynamic updating of clinical guidelines to support health decision makers with evidence that is up-to-date, reliable and trustworthy. The rapid take up of AI technologies and prevalence of unverified AI-generated medical advice create an urgent need to improve access to trusted, reliable evidence to support clinicians, policy makers and citizens with accurate health guidance. Developing a living evidence platform with South-East Asia and the Western Pacific - a region that includes almost half of the global population - requires a nuanced understanding of the diverse needs of clinicians, consumers, and policymakers across countries and contexts. Two co-design workshops engaged input from 10 countries, leveraging clinician and policymaker personas to understand experiences of accessing and using health evidence across settings. The process informed design principles for an AI-enabled regional living evidence architecture, and yielded learnings on inclusive regional co-design processes to envisage future technology solutions.

Keywords: regional co-design; living evidence; living guidelines; co-design tools

1. Introduction

Health decision makers globally rely on clinical practice guidelines to inform health decision making. Clinical practice guidelines provide evidence-based recommendations to help clinicians optimise patient care and “summarize and evaluate all available evidence at a point in time on a particular issue, aiming to assist healthcare workers in selecting the best strategies for patient management” (Olayemi 2017, 846). Their development generally follows a standardised process; the scope and clinical questions are set, a search is

conducted for relevant studies, these studies undergo quality assessment and data extraction and analysis, and then recommendations are developed using both the evidence and other important information (such as clinical expertise, patient preferences and values, equity, and feasibility) as a foundation. The guideline is then disseminated and subsequently used to guide health care practice.

Conventional guidelines are generally published in PDF format, either as a single comprehensive document or as a summary of recommendations with links to additional documents that contain further information, such as methods and processes, funding and administration, guideline development group conflicts of interest, etc. Guidelines are often long and technical documents, presenting challenges to accessing and using relevant information to support health decision making (Saluja et al., 2022). Furthermore, traditional guidelines are infrequently updated (every 3-7 years, or less frequently). As a result, new evidence and changes in contextual information are only taken into consideration and reflected in the guideline when it is sporadically updated, often several years later. During this period of inactivity, the currency of evidence underpinning these recommendations is reduced, with previous studies demonstrating that one in five recommendations may be outdated within three years (Martínez García et al., 2014) and half within six years (Shekelle et al., 2001).

Living guidelines overcome this issue through a process of continual evidence surveillance and dynamic updating (Cheyne et al., 2023). As new studies are published, they are assessed for relevance and quality and used to rapidly update the living recommendations. Living guideline processes also allow for adjustments in scope, methods, composition of guideline development panels, and other factors needed to maximise relevance and applicability as the health care paradigm evolves. In addition, unlike traditional guidelines, which have a single public consultation period prior to finalisation of content, the ongoing updating process in living guidelines enables continual input from end users and other stakeholders. Through staying dynamic and maintaining high currency, living guidelines aim to promote both greater trust in the guideline and, more importantly, better care for the patient (Wiles et al., 2024).

Living evidence involves a continuous process of evidence surveillance and appraisal of new evidence to synthesise new research as it becomes available. **Living guidelines** are clinical practice recommendations that are regularly updated in response to new evidence through a multi-stage cyclical process that involves refining questions and priorities, synthesising emerging evidence and drafting recommendations in close partnership with diverse stakeholders. Living evidence informs the development of living guidelines.

There is global interest in supporting research towards an AI-enabled ‘Living Evidence Architecture’, supported by an announcement of funding from the Wellcome Trust in late 2024 and further supported by other global entities and funders (Evidence Synthesis Infrastructure Collaborative, 2025). The Evidence Synthesis Infrastructure Collaborative

(ESIC) was established to support the decision making around how this investment would best be used to meet international needs. One of the primary goals of ESIC is to harmonise efforts globally that make it easier to learn from others around the world and to support national evidence-support systems, with a strong focus on equity and efficiency. However, although ESIC is global in scope, there has been a significant under-representation of voices from South-East Asia and the Western Pacific within this conversation, an area that includes almost half of the global population.

To address this underrepresentation, we developed a regional co-design process to understand the needs, challenges, and expectations of guideline developers and users across South-East Asia and the Western Pacific in accessing and using living evidence across diverse contexts. This process engaged 51 participants from 10 countries (Indonesia, Malaysia, South Korea, Thailand, Philippines, India, China, New Zealand, Australia and Switzerland (WHO)) in two sequenced co-design workshops (Heiss et al., 2025), the first in Melbourne, Australia, and the second in Jakarta, Indonesia. Design tools were developed to understand the regional needs of clinicians, policymakers and other end users in relation to a variety of health contexts and
challenges.

We show how this regional co-design process supported participants to collectively explore the barriers and opportunities experienced by different groups in relation to accessing and using living evidence to inform health decision making and we explore the priorities of this multi-stakeholder group in relation to an AI-supported living evidence platform. The co-design process informed development of eight Living Evidence Design Principles to guide roadmapping of a user-centric, context-aware, and AI-enabled digital platform to support evidence-informed decision-making in health systems, specific to the unique needs of the region.

Our contribution is threefold: (1) providing actionable Living Evidence Design Principles to guide the development of a future technology platform to support equitable access to trusted, reliable evidence to support clinicians, policy makers and other end users with accurate health guidance; (2) advancing methodological approaches to engaging diverse regional stakeholder groups in co-design processes through the use of design tools and processes; and (3) demonstrating how such processes enable diverse stakeholders to contribute to complex discussions on development of a living evidence platform and to understand challenges from multiple perspectives.

We commence by exploring the need for a living evidence platform and discuss the potentials and pitfalls of AI in relation to evidence synthesis and guideline creation. This is followed by an exploration of key literature in relation to design principles and the role of co-design methods and tools in engaging multi-stakeholder communities in regional and global health contexts. Our methods section details our regional co-design process and the design tools we have developed to engage stakeholder participation. The findings section outlines

10 interrelated opportunities and 12 barriers to using living evidence that were revealed through our thematic analysis. In our discussion we share our eight Living Evidence Design Principles and discuss how these can inform roadmapping for a future living evidence platform to ensure it is accessible, inclusive, equitable and suited to the needs of the region.

2. Dynamic guidelines require a dynamic platform

The digital-first format of living guidelines requires a more dynamic publication format to communicate evidence and recommendation changes in near real time. Current online guideline publication platforms, developed to address issues of providing up-to-date access to living evidence, have been used to publish numerous living guidelines, including the Australian COVID-19 living guidelines (National Clinical Evidence Taskforce, 2023) and the Australian pregnancy and postnatal living guidelines (Living Evidence for Australian Pregnancy & Postnatal Care, 2025). Although these platforms currently present the best option for developing and publishing living guidelines, studies have revealed limitations in relation to usability, adaptability, accessibility, formatting and presentation, particularly in low-resource settings and regional areas (Meteku et al., 2025B). Further, research conducted by Wiles and fellow researchers (2024) on the benefits and challenges with existing living evidence platforms highlight the need to better integrate these platforms with other software and improve functionality and usability.

The rapid take up of AI technologies has the potential to improve access to health information to inform decision making (Alowais et al., 2023) though it comes with both challenges and opportunities. Improvements in the efficiency of systematic review processes have been demonstrated with machine learning approaches (Marshall et al., 2018). Indeed, AI can support many aspects of guideline creation, minimising administrative processes, supporting planning and adaptation, and streamlining dissemination (Sousa-Pinto, 2025). Yet, the use of AI in relation to health decision making raises issues including algorithmic biases (Huang et al., 2025), lack of transparency, and questions about privacy and data ownership (Malik and Singh, 2024). Further, the prevalence of unverified AI-generated medical advice creates an environment of mistrust (Joseph et al., 2025). To counter such challenges the Guidelines International Network has developed Responsible Principles for AI Use in Health Guidelines (Sousa-Pinto et al., 2025), suggesting that consideration of transparency, preplanning, additionality, credibility, ethics, accountability, compliance, and evaluation should be central to the use of AI in guideline development and implementation.

3. Co-designing design principles to support a future living evidence platform for South-East Asia and the Western Pacific

Understanding regional needs for a living evidence platform requires a flexible approach that provides a nuanced understanding of diverse stakeholders and the contexts in which health decisions are made. Participatory design approaches provide a mechanism to collaboratively identify challenges and possible solutions (Chauhan et al., 2021), support the ongoing engagement of multi-stakeholder groups (Heiss et al., 2025), and enable knowledge sharing across disciplinary boundaries (Bødker et al., 2004). The co-design process described here builds on previous research in co-designing health systems through sequenced processes (Heiss et al., 2025), development of co-design tools to understand and engage stakeholder experiences (Heiss and Kokshagina, 2021; Page and Heiss, 2023), and co-designing for global health (WHO, 2022; WHO 2023; Thiessen et al., 2023). However, scaling co-design and participatory processes to adequately represent the needs of a region as diverse and

populous as South-East Asia and the Western Pacific, presents challenges. To further complexify this, in the realm of healthcare, design approaches have been maligned as not being sufficiently evidence-informed (Chauhan et al., 2021), in part due to the lack of publications that systematically analyse design for health outcomes (Jagtap, 2022) or that document a full global health design process from conception to implementation and evaluation (Bazzano et al., 2017).

The design of technology systems in global health is an area that has received much attention, with a promise of "coordinating, decentralizing and expanding the quality and equity of care" (Holeman and Kane, 2020, 477), yet digital technologies in multi-country health contexts often falter due to unrealistic or unfounded assumptions about user preferences, and a lack of end-user engagement. Further, as Holeman and Kane (2020, 477) point out, "Digital technologies evolve even as they are implemented, as does the process by which they are delivered. This is not only because technologies advance rapidly, but also because stakeholders often reasonably demand changes in order to integrate multiple health programs or to accommodate local infrastructure and health worker routines." This statement highlights the need to engage multi-stakeholder groups early in the design process, and ideally to build in their continued input throughout development, implementation, evaluation and ongoing iterative adaptation.

Designing a living evidence platform suitable for the needs of diverse regional stakeholders is a multi-year, multi-stakeholder challenge, requiring regional and global coordination, and multi-country and multi-lateral funding structures. Understanding regional needs for such a system was the focus of our co-design process that engaged 51 participants across two workshops to understand the barriers and opportunities presented by living evidence access and use. Yet simply unearthing barriers and opportunities is not sufficient, they need to be encapsulated in a form that both stakeholder groups and software developers can respond to. This is where design principles are helpful. Design principles have been shown to support technology development (Jones, Gouge and Crilley, 2017; Farage et al. 2012) by codifying information into a form that is "readily accessible as prescriptive statements" (Kruse, Purao and Seidel, 2022, 39), and "which provides design process guidance to increase the chance of reaching a successful solution" (Fu, Yang and Wood, 2016, 3).

The Living Evidence Design Principles build upon previous work in co-designing the WHO Design principles to improve use and impact of WHO guidelines (Figure 1; WHO 2024; WHO 2023; WHO 2022), an iterative process that engaged input from 15 countries to develop five design principles, Design for Empathy, Design for Living Guidelines, Design for Accessibility, Design for Usability and Design for Translation. Building on our experiences from conducting this multi-country multi-stakeholder co-design process, the regional co-design process discussed in this article supported diverse stakeholders to contribute to conversations on opportunities and barriers to accessing and using living evidence. These insights formed the development of eight Living Evidence Design Principles (see 5.1), to guide development of a future technology platform, supporting equitable access to trusted, reliable evidence to

support clinicians, policy makers and other end users with accurate health guidance. Thus, our research questions:

- How can regional co-design processes support diverse regional stakeholder communities to contribute to identifying barriers and opportunities to living evidence uptake and use? What tools and processes enable these communities to contribute to the co-design process?
- How can insights surfaced through the co-design process inform the development of design principles to support technology roadmapping for a living evidence platform responsive to the needs of South-East Asia and the Western Pacific?

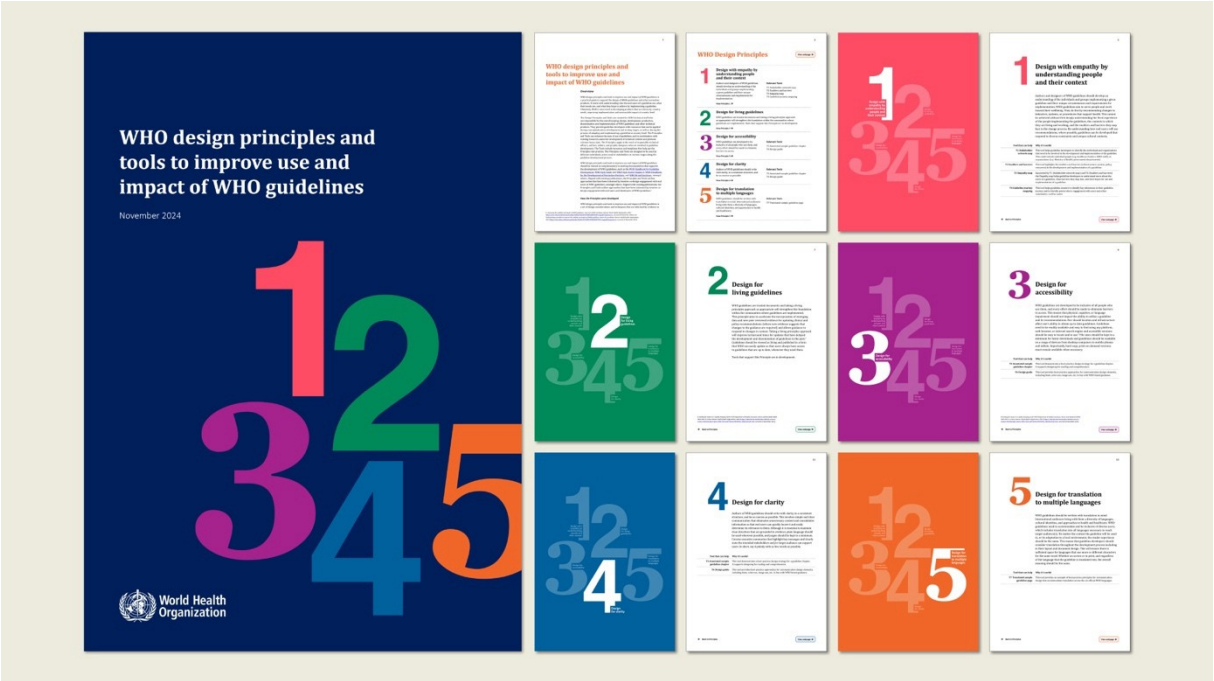

Figure 1 The WHO design principles and tools to improve use and impact of WHO guidelines. For downloadable toolkit: https://www.who.int/publications/m/item/design-principles-and-tools-to-improve-use-and-impact-of-who-guidelines

4. Methods

To understand the needs of South-East Asia and the Western Pacific regarding systems and approaches to generating and using living evidence to support health decision-making, we developed a regional co-design process that engaged 51 participants from 10 countries in two workshops, the first in Melbourne, Australia and the second in Jakarta, Indonesia (Figure 2).

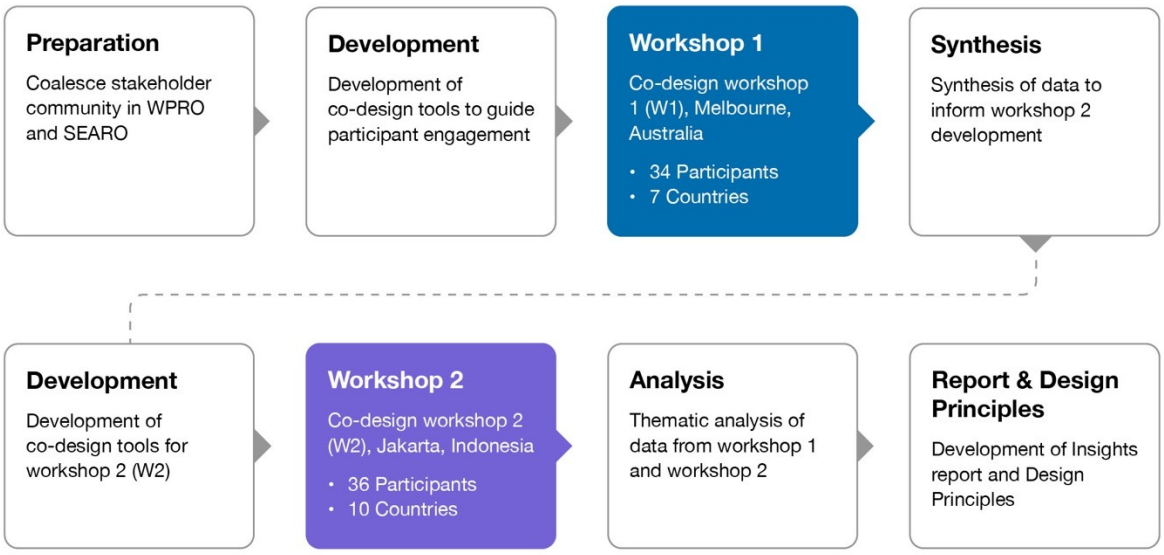

Figure 2 The Living Evidence Architecture design process

4.1 Workshop 1: Understanding challenges and opportunities of current systems and ideating for a future platform

The first co-design workshop was a one-day event held at Monash University, Melbourne that brought together 34 stakeholders involved in the development or use of clinical guidelines to critically examine the challenges and opportunities related to accessing and using existing evidence systems and commenced ideation for a future living evidence platform.

Table 1 Workshop 1 participants and co-design tools

Participant sectors and organisations	Academic institutions, governmental bodies, and health research networks. Including the Australian National Health and Medical Research Council (NHMRC), Cochrane (Indonesia, Malaysia and Thailand), WHO Western-Pacific Regional Office (WPRO), WHO South-East Asian Regional Office (WHO SEARO) and WHO Headquarters, Geneva (WHO HQ).
Countries	Australia, Indonesia, Malaysia, Thailand, the Philippines, India and Switzerland.
Co-design tools	**Current state canvas** that prompted groups to identify the opportunities and challenges of moving towards living guidelines, and to discuss strengths and weaknesses of existing living evidence platforms, in their context. **Evidence futuring canvas** (Fig. 3) that prompted groups to imagine they were looking back from 2030 on the successful development and implementation of a living evidence architecture and to identify key features, needs, important elements and stakeholders involved in this

development process.

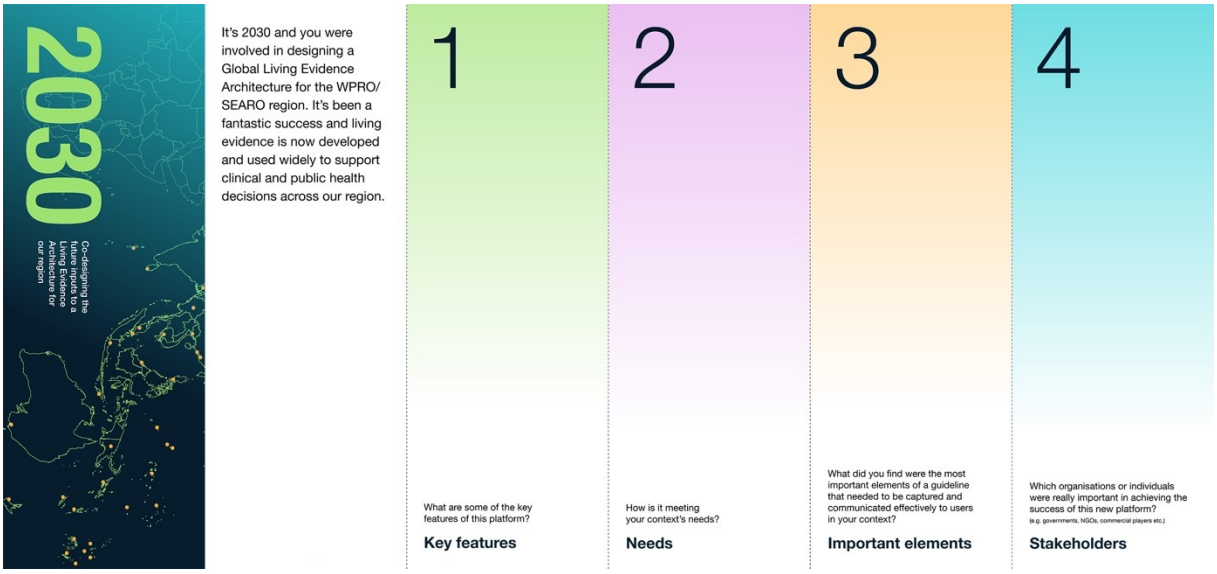

Figure 3 Evidence Futuring Canvas from workshop 1

Figure 4 Evidence Futuring Canvas in use at workshop 1. Photographs by Michelle McFarlane

4.2 Workshop 2: Understanding the needs of our region

The second workshop was a two-day event held at Monash University, Jakarta, Indonesia and brought together a diverse group of 36 evidence users. The aim of the workshop was to understand how people in the region access and use living evidence, to interrogate what types of technologies could support better access to evidence, and to understand regional attitudes to AI-enabled approaches.

Table 2 Workshop 2 Participants and co-design tools

Participant sectors and organisations	Clinicians and healthcare providers, policymakers and Ministry of Health officials, public health practitioners and program implementers, digital health professionals and technology developers, academic institutions, WPRO, SEARO, WHO HQ, WHO Country Office (Indonesia),

	and AMSA (Asian Medical Student Associations).
Countries	Australia, Indonesia, Malaysia, Thailand, the Philippines, India, China, New Zealand, South Korea, Switzerland (WHO).
Co-design tools	**Four persona/scenarios**, each detailing realistic challenges in maternal and child health or pandemic response settings: • Dr Joie Coster: A hospital-based obstetrician managing a high-risk pregnancy with multiple comorbidities • Dr Joko Budi: A national maternal health policy advisor evaluating guideline adoption strategies • Dr Anthony Wong: An emergency physician responding to a fast-evolving respiratory outbreak • Ms Faaiza Khan: A regional emergency advisor coordinating cross-country pandemic supply logistics **Three co-design canvases:** (1) Understanding regional needs for evidence; (2) Supporting health decision making in the region; and (3) Ideating on a technology supported platform for the region.

Evidence-informed persona/scenarios of clinicians and policymakers were developed in consultation with clinicians, researchers and people with lived experience, and informed by relevant health guidelines to ensure they were medically accurate (Fig. 6). These persona/scenarios helped participants think about their own decision-making processes and reflect on how digital tools could better support these through access to living evidence. Canvas 1 (Fig. 7) asked participants to consider how people in their context accessed and used living evidence to inform decision making, what the challenges of this were, and how, ideally, information should be delivered. Canvas 2 (Fig. 8) asked groups to consider, through the lens of their persona, what the challenges are to accessing living evidence, how they could ideally access living evidence, and what type of technologies could support this. Canvas 3 (Fig. 9) focused on the role of technology in supporting access to living evidence, the ideal features of an AI-enabled future platform, and concerns in relation to the role of AI in living evidence access and use.

Figure 5 Canvases in use at workshop 2. Photographs by Ricky Apriyanto

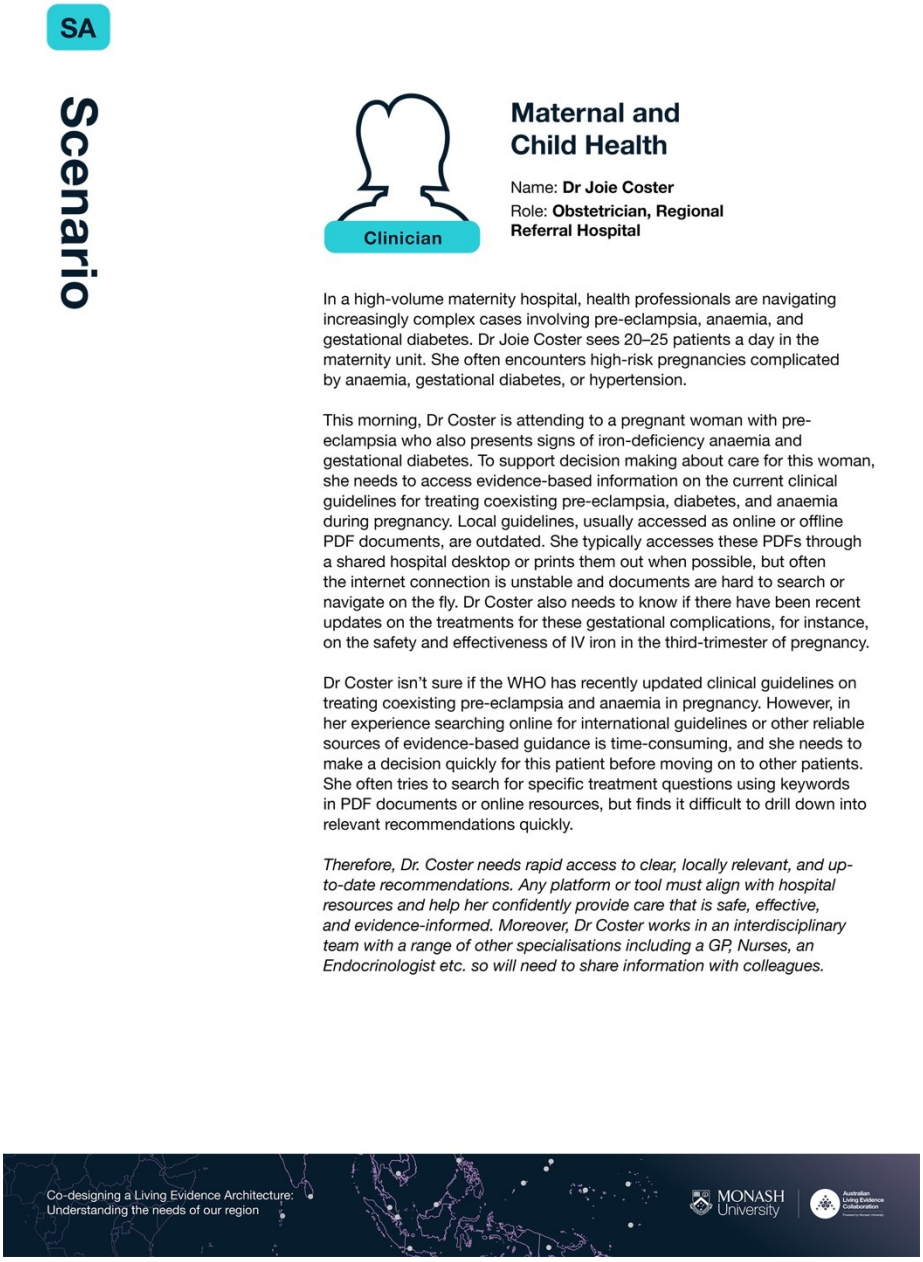

Figure 6 Persona/scenario of Dr Joie Coster

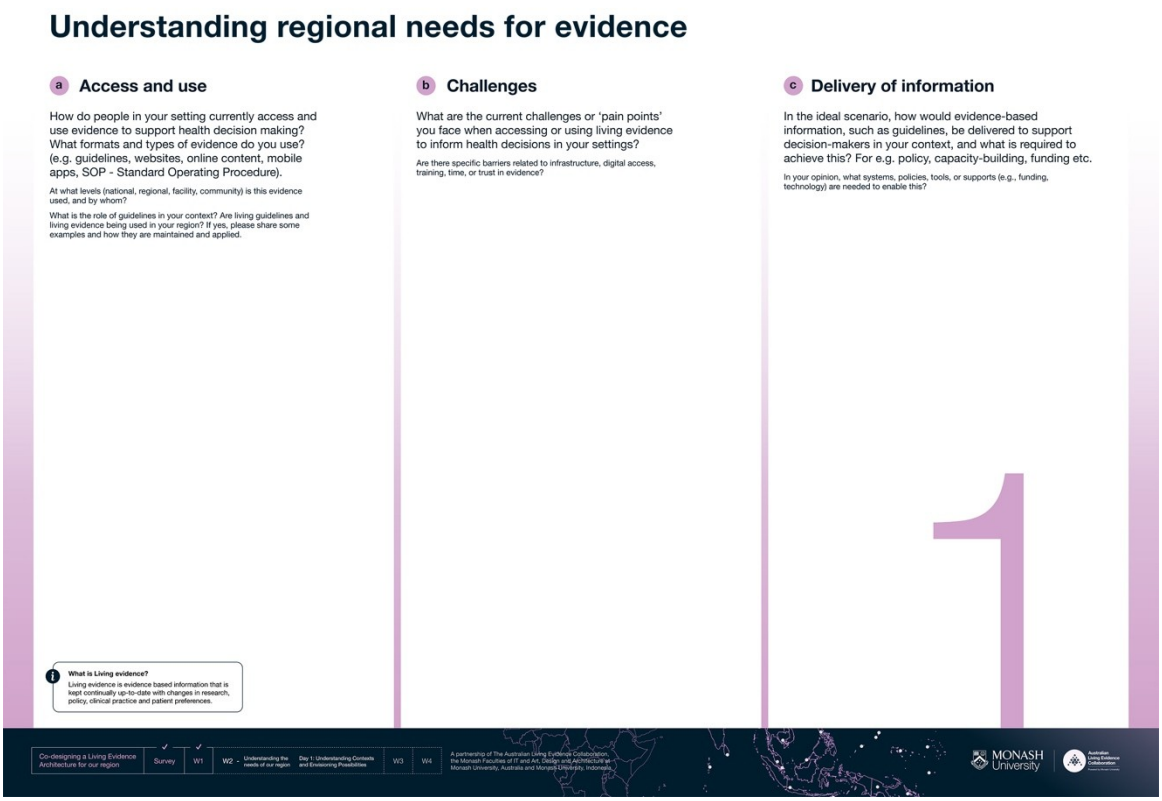

Figure 7 Workshop 2, canvas 1

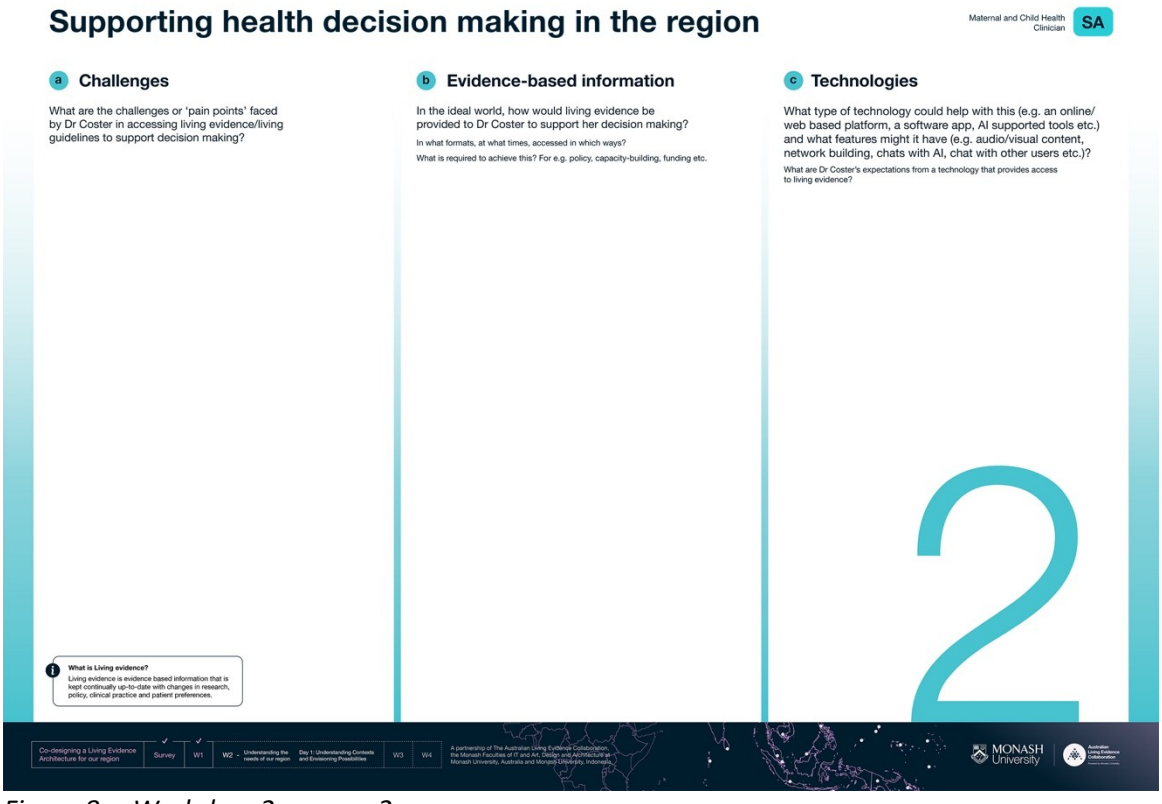

Figure 8 Workshop 2, canvas 2

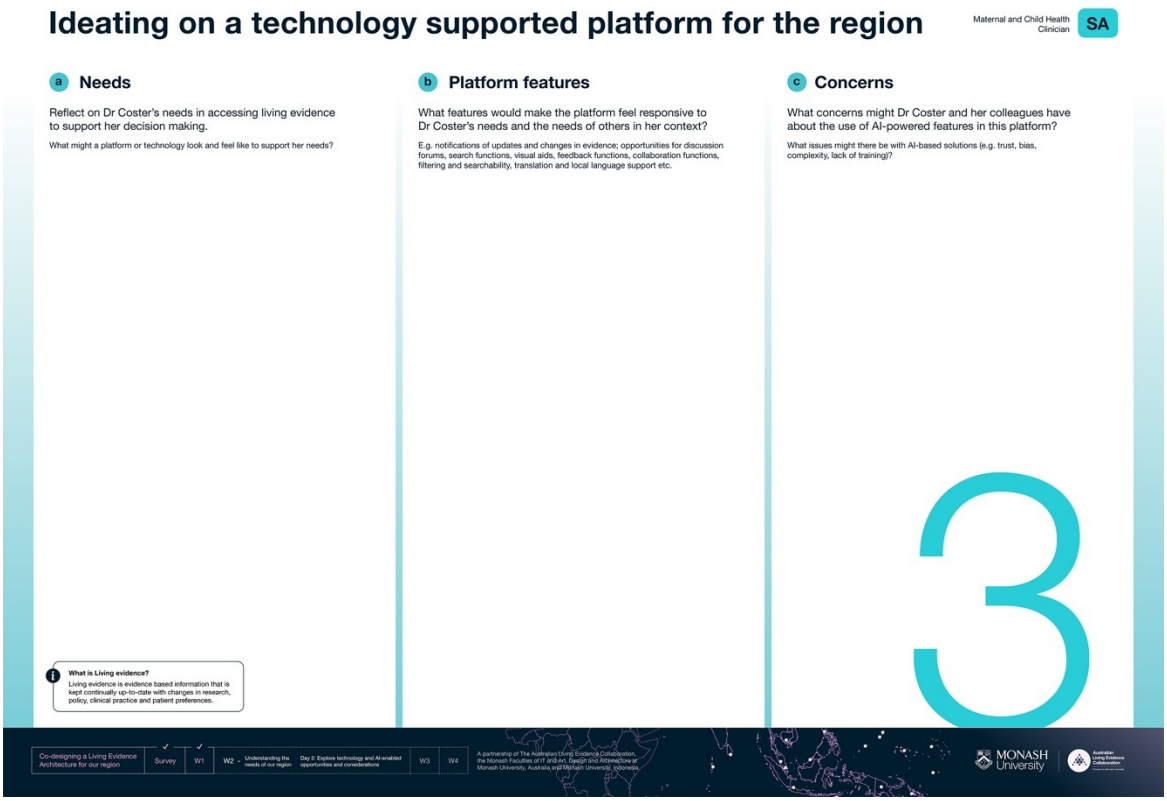

Figure 9 Workshop 2, canvas 3

4.3 Data collection and analysis

Across both workshops, the research team collected qualitative data through multiple channels to ensure depth, diversity, and contextual richness. This multimodal data collection strategy ensured that both verbal and visual contributions were captured and included in the analysis. Data were collected through audio recordings, workshop templates, visual artefacts and facilitator field notes and synthesised using a thematic analysis approach (Braun and Clarke, 2006). The research team cross-verified data and prioritised recurrent themes.

5. Findings

Thematic analysis of the data revealed 10 interconnected opportunities and 12 challenges to uptake and use of living evidence to support informed health decision making. Taken together these opportunities and challenges paint a picture of living evidence as a catalyst for change, technologically, politically, and socially. Far from being just a digital update mechanism, living evidence was envisioned as a new infrastructure for health knowledge, flexible, inclusive, real-time, and rooted in the realities of its users.

5.1 Opportunities for living evidence

Table 3 Opportunities for living evidence

Opportunity	Why it matters	Supporting quotes

Renewed uses of traditional guidelines, dynamic updates and responsiveness.	Conventional guidelines become outdated due to slow update cycles. Living guidelines enable frequent updates, allowing evidence to remain aligned with emerging knowledge and shifting public health priorities. Dynamic updating is critical during health emergencies such as pandemics or outbreaks, where even small delays can compromise effective response.	*"Instead of waiting for the traditional guideline to catch up, you have the information available and presented very quickly, up to date."*
Continuous public consultation and engagement.	Living guidelines offer a structural shift away from episodic expert-driven reviews and enable co-creation and validation by communities, patients, and workers. This approach builds public trust, supports local relevance, and empowers individuals to use evidence in their own decision-making.	*"People are no longer just passive recipients of care, but are empowered to understand and use this information."*
Strengthening regional, global and cross-border collaboration.	Siloed or duplicated guideline efforts across neighbouring countries cause inefficiencies. Living evidence is a mechanism for sharing tools, data, and infrastructure to harmonise responses, pool resources, and foster learning.	*"Why reinvent the wheel? Let's start by sharing what already exists."*
Enhancing real-time decision-making through timely evidence updates.	Rapid access to updated guidance is important, particularly during fast-moving crises or disease outbreaks. Delays in evidence uptake are seen as unacceptable in dynamic contexts. There is a need for systems that integrate real-time surveillance with practical, point-of-care guidance.	*"I want to know today if something has changed."* (Clinician)
Bridging the gap between research and policy.	Traditional guideline development often struggles to translate published research into timely, actionable recommendations. Living evidence is a way to close this gap, through continuous integration of new data, joint interpretation by researchers and policymakers, and iterative feedback loops.	*"We are often relying on papers that are already outdated … living evidence could mean we are always working with the most relevant data."*
Empowering local and community-level decision makers.	National guidelines often fail to reflect the complexities and constraints of facility-level or rural care environments. Living evidence platforms are seen as adaptable tools that can localise content, tailor formats for different literacy levels, and support decentralised application.	*"Sometimes the local context is completely different… it doesn't work on the ground unless it's adapted."*

Embed equity and representation in evidence development.	Power in the evidence ecosystem needs rebalancing, ensuring that historically marginalised voices, such as Indigenous, rural, or low-resource communities, are not only represented but central in the production and validation of guidelines.	*"We can't continue to build systems for people without them."* (Policymaker)
Stakeholder inclusion and co-design.	Living evidence systems are opportunities to involve users throughout the lifecycle, from design and piloting to updating and evaluation. Living platforms incorporating co-design are perceived as more likely to be used, trusted, and sustained.	*"If we don't involve the users, it becomes just another tool people don't use."*
Cost-effective prioritisation.	Coordinated updates and cross-country collaboration are mechanisms to reduce duplication and make better use of limited resources, while aligning guideline revisions with evolving health priorities, especially important in lower and middle-income countries (LMICs), where both time and funding are limited.	*"We can focus on priority questions, not everything needs to be updated all the time."*
Evolving conceptual framing of evidence.	Moving beyond living guidelines, terms like "living recommendations," "living data," and "living registries," signal a shift toward more modular, dynamic, and interconnected architectures that allow for more strategic investments, targeted updates, and integration with existing digital health ecosystems.	*"Maybe the concept is broader than guidelines, perhaps we should talk about living data ecosystems."*

5.2 Challenges in accessing living evidence

Table 4 Challenges of living evidence

Challenge	Why it matters	Supporting quotes
Disconnect between global guidelines and local knowledge systems.	In many LMICs, global evidence often fails to reflect traditional practices, resource limitations, or culturally specific care pathways. Even when guidelines are methodologically sound, their application becomes difficult if they lack contextual adaptation.	*"What applies in Malaysia might not apply in Indonesia… an international guideline might be harmful."*
Information overload.	With the proliferation of evidence sources, clinicians and policymakers struggle to navigate extensive, highly technical documents and	*"There's so much evidence, so many guidelines… which one*

	platforms to locate timely, relevant recommendations, causing cognitive burden.	*are we going to use at the particular time and place?"* (Clinician)
Infrastructure limitations.	Poor internet access, unstable electricity, and lack of compatible hardware continue to limit equitable access to digital platforms, especially for rural and remote users.	*"Some of the island[s], they don't have any internet connection, they will cross two rivers just to attend something in the capital city."*
Fragmentation of platforms and evidence systems.	Guidelines, Standard Operating Procedures (SOPs), and decision tools are scattered across different departments or institutional websites contributing to duplication of effort, confusion among users, and inconsistent implementation.	*"Too many platforms… each department has their own websites and applications."* *"We have to go to five different places to find the same piece of guidance."*
Terminology skill gaps.	Difficulty in locating relevant evidence due to lack of confidence in knowing what terms or filters to use. This is particularly problematic for non-native English speakers or users unfamiliar with evidence platforms.	*"Sometimes people don't know what words to use to find the right information, or even where to start."*
Lack of dedicated training or capacity-building mechanisms.	Training is required, especially for community health workers, junior clinicians, and policymakers working outside evidence generation roles. Even when tools are available, there is little support for uptake and use.	*"We talk a lot about the evidence… but not about whether people know what it means or whether they trust it."*
Status quo bias.	Status quo bias exists amongst decision-makers who assume that existing static systems are adequate slows the adoption of more dynamic, updated approaches.	"*There is a resistance to change, if something is working reasonably well, people don't really want to change it."*
Delayed updates and maintenance.	Many living guidelines are infrequently revised due to time, labour, or funding constraints.	*"We just finished the living guideline… but no funding to maintain it."*

Poor formatting impedes usability.	Static PDF files are difficult to navigate, not searchable, and unfriendly for mobile or point-of-care use.	*"People are used to printed guidelines or PDFs... but they're not helpful when you're under pressure."*
Lack of quality assurance and trust mechanisms.	Guideline users are often expected to accept recommendations simply because they come from an authoritative source. This reliance on institutional trust, without visibility into the underlying evidence or methods, is problematic.	*"You're meant to trust the Ministry as the expert… but that breaks the connection to the evidence."*
High turnover of decision-makers (e.g., in Ministries of Health or WHO offices).	High turnover is a systemic disruption to evidence continuity. When institutional memory is lost, evidence translation efforts often need to be repeated from scratch.	*"The Ministry changed… the new person didn't know anything about the guideline… we had to start again."*

6. Discussion

A vision for an ideal evidence ecosystem, as expressed by participants from diverse contexts, revolves around building a dynamic, inclusive, and sustainable infrastructure that supports continuous access to and updating of living evidence. To support and achieve this vision, and to ensure that the needs of stakeholders across South-East Asia and the Western Pacific are central to this conversation, our research has informed the development of eight co-designed Living Evidence Design Principles to inform the development of a future living evidence platform.

6.1 Design Principles for a regional living evidence platform

To realise the vision of developing a living evidence architecture to meet the needs of South-East Asia and the Western Pacific, the research team collaboratively developed eight Living Evidence Design Principles to guide roadmapping of a future platform.

Table 5 Living Evidence Design Principles

Principle	What is needed	Supporting quotes
1. Centralised and integrated	A centralised and integrated digital platform where guidelines, updates, and published evidence are unified across countries and organisations, reducing confusion caused by scattered sources.	*"At the moment, it's very scattered. You might need to go to one website for national guidance, another for WHO updates, and another for training. It would be better if we*

		had just one place where everything is brought together."
2. Personalised and patient-centric	Enabling healthcare providers to receive recommendations tailored to individual patients and context-specific needs.	*"The platform should personalise recommendations. It's not just about giving data–it's about giving the right data for the right patient at the right time."*
3. Dynamic and in real-time	Enabling automatic notifications and updates that reflect emerging evidence promptly, especially in fast-moving scenarios.	*"During COVID, updates were happening so fast that even national guidelines struggled to keep up. We need systems that push those changes in real-time."*
4. Transparent	Providing transparency in evidence traceability, so users can develop trust based on the source, process and data behind the recommendations.	*"Every recommendation should be linked to its underlying sources, allowing users to drill down into the evidence base to validate claims and foster trust."*
5. Collaboratively validated	Enabling regional actors to review and validate evidence to enhance relevance and ensure that it is credible and meaningful.	*"We must validate evidence together; peer input from other countries helps build confidence and relevance."*
6. Locally adaptable	Supporting systematic incorporation of local context and data and acknowledging that epidemiology, cultural norms, and resource levels vary widely.	*"The best evidence is useless if it can't be applied locally. Localisation is non-negotiable."*
7. Feedback loops and learning systems	Built in feedback loops that collect real-world user insights and implementation data to iteratively improve guidance.	*"Every time someone uses a guideline, their experience should feed back into the system. That's how we learn and improve."*
8. Trusted AI tools	Incorporation of trusted, transparent and ethically governed AI tools that support predictive, personalised, and scalable delivery of living evidence.	*"If we ban AI, people will still use their phones anyway. Instead, we should focus on ethical, validated AI systems that clinicians can trust."*

Together, these eight Living Evidence Design Principles form a cohesive vision for an equitable and efficient evidence ecosystem, one that moves beyond static dissemination to embrace collaboration, localisation, digital innovation, and sustainability. As one participant summarised, "We want evidence to be international, but it has to be localised. We need an ecosystem that leverages existing tools and expertise without reinventing the wheel."

6.2 Regional co-design supports multi-stakeholder communities to contribute to future technology platforms.

Responding to Holeman and Kane's (2020) assertion that technology developers in the global health context do not often understand end user needs, this project has developed a regional co-design process that engaged diverse stakeholders from 10 countries to understand end user needs for a living evidence platform to support health decision making. Aligning to Chauhan et al. (2021) the co-design process enabled participants to collaboratively identify challenges and ideate towards possible solutions, while design canvases supported participants to engage with stakeholder experiences and supported collaborative meaning making (Heiss and Kokshagina, 2021; Heiss et al., 2025). Persona/scenarios supported participants to imagine the challenges and opportunities facing clinicians and policymakers in accessing and applying health evidence in high-stakes situations, aligning to the prior work of Heiss and Kokshagina (2021), and addressing Norris and Ford's (2017) view that guidelines, and the information they contain, need to be responsive to end users.

The research has undertaken to address the critique of Chauhan et al. (2021) that design processes in global health lack a robust evidence base by employing design approaches tested and refined in prior multi-lateral work with the WHO, especially in convening multiple countries to develop design principles (WHO, 2024; WHO, 2023; WHO, 2022). Thus, our work contributes to an evolving understanding of the ways that co-design practices can be scaled in the context of global health. Reinforcing the insights of Kruse, Purao and Seidel (2022) we show how the opportunities and barriers surfaced through the co-design process were codified into design principles to guide future development of a living evidence platform. Finally, by developing a regional co-design process, centred on the experiences of clinicians and policymakers, our work demonstrates how co-design enables diverse stakeholders to contribute to complex technology discussions without requiring software expertise.

7. Conclusion, limitations and next steps

Our regional co-design process collaboratively identified opportunities and barriers to living evidence uptake and use and highlighted relevant features of an AI-enabled living evidence system for South-East Asia and the Western Pacific. Design tools were leveraged to support participants to engage with experiences of clinicians and policymakers tasked with accessing and applying evidence in high-stakes decision-making environments. The outcomes of our regional co-design process informed the development of eight Living Evidence Design Principles. Building on the insights from this regional co-design process, the research team is working with partners to co-develop a technology roadmap for a living evidence system,

informed by the eight design principles. This roadmap will reflect regional consensus on diverse user needs, design features, and implementation considerations, with the goal of providing a foundation for shaping the future design and implementation of a regionally informed living evidence system.

While our regional co-design process aimed to include as many voices as possible from the region and coalesced a stakeholder group of 51 people from 10 countries, voices were still missing. South-East Asia and the Western Pacific are hugely diverse, populated and distributed. Participation from many countries was absent, as was a good balance of urban, regional and rural participants, and healthcare advocates and consumers, all factors that may skew our findings.

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8. References

Alowais, S. A., Alghamdi, S. S., Alsuhebany, N., Alqahtani, T., Alshaya, A. I., Almohareb, S. N., Aldairem, A., Alrashed, M., Bin Saleh, K., Badreldin, H. A., Al Yami, M. S., Al Harbi, S., & Albekairy, A. M. (2023). Revolutionizing healthcare: the role of artificial intelligence in clinical practice. *BMC Medical Education*, *23*(1), Article 689. https://doi.org/10.1186/s12909-023-04698-z

Bazzano, A. N., Martin, J., Hicks, E., Faughnan, M., & Murphy, L. (2017). Human-centred design in global health: A scoping review of applications and contexts. *PloS One*, *12*(11), e0186744. https://doi.org/10.1371/journal.pone.0186744

Bødker, K., Kensing, F., & Simonsen, J. (2004). Participatory IT design: Designing for business and workplace realities. Cambridge, Mass: The MIT Press.

Boslaugh, S. (2011). Participatory Technology Development. In D. Mulvaney (Ed.), *Green Technology : An A-to-Z Guide* (pp. 319–322). SAGE Publications, Inc. https://doi.org/10.4135/9781412975704.n84

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.

Chauhan, A., Donaldson, K., Santos, A., & Ngigi, M. (2021). What's Next in Design for Global Health? How Design and Global Health Must Adapt for a Preferable Future. *Global Health Science and Practice*, *9*(Supplement 2), S283–S294. https://doi.org/10.9745/GHSP-D-21-00280

Cheyne, S., Fraile Navarro, D., Buttery, A. K., Chakraborty, S., Crane, O., Hill, K., McFarlane, E., Morgan, R. L., Mustafa, R. A., Poole, A., Tunnicliffe, D., Vogel, J. P., White, H., Whittle, S., & Turner, T. (2023). Methods for living guidelines: early guidance based on practical experience. Paper 3: selecting and prioritizing questions for living guidelines. Journal of Clinical Epidemiology, 155, 73–83. https://doi.org/10.1016/j.jclinepi.2022.12.021

Evidence Synthesis Infrastructure Collaborative (ESIC): About ESIC. URL: https://evidencesynthesis.atlassian.net/wiki/spaces/ESE/pages/348094465/About+ESIC accessed 29 August 2025

Farage, M. A., Miller, K. W., Ajayi, F., & Hutchins, D. (2012). Design Principles to Accommodate Older Adults. *Global Journal of Health Science*, *4*(2), 2–25. https://doi.org/10.5539/gjhs.v4n2p2

Fu, K. K., Yang, M. C., & Wood, K. L. (2016). Design Principles: Literature Review, Analysis, and Future Directions. *Journal of Mechanical Design (1990)*, *138*(10). https://doi.org/10.1115/1.4034105

Heiss, L., Hamilton, O., Coombs, G., McGee, T., & O'Kane, C. (2025). Sequenced co-design with stakeholder communities to support the development of spaces for mental health recovery and healing. *The Design Journal*, *28*(2), 279–299. https://doi.org/10.1080/14606925.2024.2420156

Heiss, L and O. Kokshagina. (2021). Tactile co-design tools for complex interdisciplinary problem exploration in healthcare settings. Design Studies, 75. doi.org/10.1016/j.destud.2021.101030

Holeman, I., & Kane, D. (2020). Human-centered design for global health equity. Information Technology for Development, 26(3), 477–505. https://doi.org/10.1080/02681102.2019.1667289

Huang, Y., Arora, C., Houng, W. C., Kanij, T., Madulgalla, A., & Grundy, J. (2025). Ethical Concerns of Generative AI and Mitigation Strategies: A Systematic Mapping Study. https://doi.org/10.48550/arxiv.2502.00015

Jagtap, S. (2022). Codesign in resource-limited societies: theoretical perspectives, inputs, outputs and influencing factors. *Research in Engineering Design*, *33*(2), 191–211. https://doi.org/10.1007/s00163-022-00384-1

Jones, J., Gouge, C., & Crilley, M. (2017). Design principles for health wearables. *Communication Design Quarterly Review*, *5*(2), 40–50. https://doi.org/10.1145/3131201.3131205

Joseph, J., Jose, B., & Jose, J. (2025). The generative illusion: how ChatGPT-like AI tools could reinforce misinformation and mistrust in public health communication. *Frontiers in public health*, *13*, 1683498. https://doi.org/10.3389/fpubh.2025.1683498

Kruse, L. C., Purao, S., & Seidel, S. (2022). How Designers Use Design Principles: Design Behaviors and Application Modes. *Journal of the Association for Information Systems*, *23*(5), 1235–1270. https://doi.org/10.17705/1jais.00759

Living Evidence for Australian Pregnancy & Postnatal Care (LEAPP) – Australian Pregnancy Care Guidelines, version 7.0. URL: https://app.magicapp.org/#/guideline/jm83RE/section/jWQoM1, Accessed 23 July 2025, last updated 19 June 2025.

Malik, V. S., & Singh, M. (2024). Machine Learning and Artificial Intelligence in Evidence Generation and Evidence Synthesis. *Journal of Medical Evidence*, *5*(2), 93–95. https://doi.org/10.4103/JME.JME_95_23

Marshall, I. J., Noel-Storr, A., Kuiper, J., Thomas, J., & Wallace, B. C. (2018). Machine learning for identifying Randomized Controlled Trials: An evaluation and practitioner's guide. *Research Synthesis Methods*, *9*(4), 602–614. https://doi.org/10.1002/jrsm.1287

Martínez García L, Sanabria AJ, García Alvarez E, Trujillo-Martín MM, Etxeandia-Ikobaltzeta I, & Kotzeva A. The validity of recommendations from clinical guidelines: a survival analysis. (2017). Canadian Medical Association Journal (CMAJ), 189(1), E33–E33. https://doi.org/10.1503/cmaj.161414

Meteku, B. T., De Silva, K., Green, S. E., & Turner, T. (2025). Guideline developers in low- and middle-income countries want to develop and use living guidelines, but are currently limited by important

barriers: findings from a qualitative study. Journal of Clinical Epidemiology, 180, Article 111707. https://doi.org/10.1016/j.jclinepi.2025.111707

National Clinical Evidence Taskforce – Australian guidelines for the clinical care of people with COVID-19, version 74.1. URL: https://app.magicapp.org/#/guideline/7252. Accessed 29 July 2024, last updated 30 May 2023.

Norris, S. L., & Ford, N. (2017). Improving the quality of WHO guidelines over the last decade: progress and challenges. *The Lancet Global Health*, *5*(9), e855–e856. https://doi.org/10.1016/S2214-109X(17)30253-X

Olayemi, E., Asare, E. V., & Benneh-Akwasi Kuma, A. A. (2017). Guidelines in lower-middle income countries. British Journal of Haematology, 177(6), 846–854. https://doi.org/10.1111/bjh.14583

Page R. and Heiss, L. (2023). Making Design Thinking Tactile: Unlocking Meaning and Experiences with Tactile Tools and Generative Prototypes. In K. Straker and C. Wrigley (Eds.), Research Handbook on Design Thinking. Cheltenham, UK: Edward Elgar Publishing.

Saluja, K., Reddy, K., Wang, Q., Zhu, Y., Li, Y., Chu, X., Li, R. Hou, L. Horsley,T., Carden, F., Bartolomeos, K., and Hatcher Roberts, J. (2022).Improving WHO's understanding of WHO guideline uptakeand use in Member States: a scoping review. Health ResearchPolicy and Systems, 20(1), 98. https://doi.org/10.1186/s12961-022-00899-y

Shekelle, P., Eccles, M. P., Grimshaw, J. M., & Woolf, S. H. (2001). When should clinical guidelines be updated? *BMJ*, *323*(7305), 155–157. https://doi.org/10.1136/bmj.323.7305.155.

Sousa-Pinto, B., Marques-Cruz, M., Neumann, I., Chi, Y., Nowak, A. J., Reinap, M., Awad, M., Nothacker, M., Trucl, M., Brozek, J., Alonso-Coello, P., Wiercioch, W., Qaseem, A., Akl, E. A., Schünemann, H. J., Munn, Z., El-Ansary, L., Kopp, I., Langendam, M., … Alam, M. (2025). Guidelines International Network: Principles for Use of Artificial Intelligence in the Health Guideline Enterprise. *Annals of Internal Medicine*, *178*(3), 408–415. https://doi.org/10.7326/ANNALS-24-02338

Thiessen, M, Heiss, L, Mcgee, T & Bawden, G. (2023). The Future is Participatory: Collaborative Communication Design for Global Health Initiatives. Visible Language, 57 (1): 14-35.

Wiles, L., Hibbert, P. D., Zurynski, Y., Smith, C. L., Arnolda, G., Ellis, L. A., Lake, R., Easpaig, B. N. G., Molloy, C., Middleton, S., Braithwaite, J., Hill, K., & Turner, T. (2024). Is it possible to make 'living' guidelines? An evaluation of the Australian Living Stroke Guidelines. BMC Health Services Research, 24(1), Article 419. https://doi.org/10.1186/s12913-024-10795-6

World Health Organization. (2022). Improving the usability and impact of WHO guidelines: report of a WHO workshop. Geneva: World Health Organization; https://apps.who.int/iris/handle/10665/365229

World Health Organization. (2023). Testing design principles to improve the usability and impact of WHO guidelines: report of a workshop. World Health Organization. https://iris.who.int/handle/10665/372409.

World Health Organization. (2024). The WHO design principles to improve use and impact of WHO guidelines. World Health Organization. https://www.who.int/publications/m/item/design-principles-and-tools-to-improve-use-and-impact-of-who-guidelines

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