



# Measuring evidence-informed decision-making processes in low- and middle-income countries

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## Key messages

- The evidence base on the practice of evidence-informed decision-making (EIDM) in international development is limited. Previous work has identified multiple roles that evidence could play; principles and desirable decision-making practices; and individual, interpersonal, organisational and contextual factors thought to influence the interpretation of evidence and decisions. Despite a proliferation of frameworks and guidance, there is a relative dearth of research on the extent to which and how they are applied in practice, at what cost and with what effects.
- EIDM faces measurement challenges, including investigation into largely undocumented and sometimes unobservable processes, multi-finality and equifinality (multiple pathways to multiple outcomes), often along extended time horizons, in addition to difficulties establishing counterfactuals.
- In the health sector, current indicators tend to cluster around two ends of a long change pathway: tracking upstream activities and immediate outputs, and downstream changes in health coverage and outcomes.
- Building on existing systems, future efforts could be directed at the 'missing middle' in measurement, filling notable gaps in defining what constitute quality EIDM processes, minimising biases in measuring these processes and investigating how evidence-informed recommendations make their way through the policy process.

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## Introduction

In recent years there has been increased attention to and investment in evidence-informed decision-making (EIDM)<sup>1</sup> in the international development sector (Baker, 2017; Stewart et al., 2018; Smith and Pearson, 2018) and by some national governments (Head, 2016; Wills et al., 2016a; Pellini et al., 2018).<sup>2</sup> With this investment have come questions about the effectiveness and value for money of such processes and initiatives intended to strengthen EIDM. This brief characterises the evidence base on EIDM, identifies specific measurement challenges and discusses considerations for the design of future assessments. We focus on health policy and resource allocation in low- and middle-income countries (LMICs),<sup>3</sup> supplemented by examples from bilateral initiatives to strengthen EIDM across sectors and from public financial management (PFM). Based on existing monitoring systems, we suggest how further attention could be directed to the ‘missing middle’ in measurement between immediate outputs and downstream development outcomes. The brief is primarily written for donors who are considering investing in EIDM processes. It may also be relevant for programme managers and monitoring and evaluation advisors designing, overseeing and using information from measurement systems.

## The evidence base on EIDM in international development

To date, efforts to systematically assess the effects and cost effectiveness of EIDM processes have been limited. A relatively recent USAID literature review found a lack of clear support that EIDM contributes to improved development results or specific interventions that improve the use of evidence. Rather, the authors characterise existing work as recommendations on how to improve EIDM based on experiences in practice, with contextual and political factors perceived to play a large role (Baker, 2017). Review articles from the health sector have noted similar limitations, that studies are largely descriptive and heavily reliant on perceptions, with little evidence of processes or impact (Herrera et al., 2017; Oliver et al., 2014a, 2014b; Murthy et al., 2012; Flodgren et al., 2012; Orton et al., 2011).

That said, the burgeoning literature on EIDM has made useful analytical distinctions between the multiple roles that evidence could play (Weiss, 1979; Bowen and Zwi, 2005; Nutley et al., 2007; Bossuyt et al., 2014) and individual, relational, organisational and contextual factors that influence the interpretation and use of evidence.<sup>4</sup> Scholars have consistently acknowledged the political nature of these processes and critiqued the field of public health

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- 1 By EIDM we mean the use of information as one consideration when making a judgement, choice or setting priorities.
  - 2 Alongside heightened attention by some countries and agencies there has been retrenchment by others, including some prominent examples in high-income countries, that are financially supporting EIDM and requesting evidence of impact elsewhere.
  - 3 In these settings, there may be fewer domestic resources to gather and analyse data, and international donors often play an influential role in the type of information that is gathered, in the proliferation of multiple, parallel monitoring systems (Biesma et al., 2009; World Health Organization Maximizing Positive Synergies Collaborative Group, 2009), and in some cases, in policy decisions themselves. Indeed directly and indirectly international donors shape the nature and uptake of EIDM through the lens of their own values, constraints and decision processes, which may not embody EIDM principles. International donors have been critiqued for this in the past (McCoy et al., 2009; Friebel et al., 2019) and, although it is not the focus of this brief, further research on decision-making processes within donor agencies and their roles in different LMIC contexts is warranted.
  - 4 These include *individual-level* factors like people’s competencies, values, mental models, identity and past experience; the type and nature of relationships between evidence producers and users; *organisational-level* factors such as the time it takes to access and appraise research, how information is stored and shared, leadership, path dependence, and the negotiation processes through which government decision-makers (re)construct policy and evidence narratives; and broader *contextual* factors like democratic openness, degree of (de)centralisation, academic and media freedom, norms on consultation, and the orientation of interest groups and epistemic communities (Shaxson, forthcoming; Rickinson et al., 2018; Williams et al., 2018; Uneke et al., 2017; Punton, 2016; Oliver et al., 2014a; 2014b; Ellen et al., 2014; Liverani et al., 2013; Orton et al., 2011; Sumner et al., 2011; Brownson et al., 2009; Bowen et al., 2009; Bowen and Zwi, 2005).

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for depoliticising understandings of evidence use (Liverani et al., 2013; Barnes and Parkhurst, 2014; Bruen and Brugha, 2014). Recent work has paid more attention to cognitive processes than in the past (Gilovich and Griffin, 2002; Patel et al., 2002; World Bank, 2015; Parkhurst, 2017), drawing insights from longstanding literatures on behavioural science and management (Festinger, 1962; Mitroff and Betz, 1972; Tversky and Kahneman, 1974; Schwenk, 1989; Eisenhardt and Zbaracki, 1992; Klein et al., 1993). This work acknowledges that how information is sourced and judged is not only an intentional process subject to manipulation, but is also affected by biases that arise as a function of how people process information. There is a growing number of frameworks and guidance (Fielding and Briss, 2006; Brownson et al., 2009; Ciliska et al., 2012; Kapiriri and Martin, 2010; Yost, 2014; Wills et al., 2016b; Moberg et al., 2018; Shaxson, 2019) that attempt to operationalise EIDM principles (Parkhurst, 2016; 2017). However, there continues to be a relative dearth of research on the extent to which and how these are applied in practice, in what contexts, at what cost and with what effects, particularly in LMICs.

Moreover, the inconclusive nature of research that has been conducted to date suggests two interrelated challenges of design and measurement. The field is grappling with design challenges in determining what configuration of inputs and actors in what settings enable evidence-informed processes within the institutional and political systems in which they are embedded. This design challenge is driven in part by a set of measurement challenges, which is our focus here.

## Measurement challenges

EIDM embodies multiple features of what Buffardi et al. (2019) term the ‘hard to measure’ in development, each of which poses specific threats to reliability and validity. *Multi-dimensional concepts and processes*, of which EIDM is an example, often require composite indices and proxies to capture the underlying construct. People may have different understandings or interpretations of what constitutes a sufficiently robust decision-making process.<sup>5</sup> They may value different types and sources of evidence or particular characteristics of the process; for instance, the extent to which the process is transparent or inclusive of specific perspectives. What is being measured and the way that desired outcomes and impact are defined (Hearn and Buffardi, 2016) depend on who is involved in designing these processes and why and for whom they are being assessed.

Furthermore, EIDM, policy and institutional change are characterised by *multi-finality and equifinality*: that is, there may be multiple pathways of change leading to multiple potential outcomes. The recommendations from a ‘quality’ decision process may not necessarily lead to policy change; a policy may be adopted as a result of many factors; the ways in which it is implemented in practice may be different than what was prescribed; and a policy as implemented may not necessarily result in the intended effects or may create unintended consequences. The series of outcomes along the change pathway are reversible and, in many cases, will likely change over time. Policies and budget allocations may change as a result of new leadership or in response to competing demands

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5 Campbell and Knox Clarke (2018) offer a useful classification of how decisions, decision-making and decision-makers are conceived according to four approaches to decision-making. For example, decisions are considered to be ‘good’ if they are in line with known best solutions (classical approach), the procedures (procedures and protocols approach), the situation (naturalistic approach) or if they contribute to the ongoing process (sensemaking approach). Guidance for National Immunization Technical Advisory Groups (NITAGs) reflects the procedures and protocols approach. Each of these approaches could be measured. The more difficult challenge is agreeing which approach is accepted. Campbell and Knox Clarke’s subsequent study (2019) measured decision quality through a composite index of responses on a 6-point Likert scale to the following seven statements: I correctly understood the problem/situation before making this decision; I used relevant information/experience appropriately when making this decision; this decision was made in an appropriate amount of time for the situation; the level to which other people were involved in making this decision was appropriate for the situation; the chosen course of action was appropriate given the original problem/situation; the decision was implemented/followed through; I am satisfied with this decision.

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for resources or reduced revenue. Access to and quality of public services and individuals' health status may improve or decline over time.

Institutional and policy change operate across long time horizons. EIDM is an ongoing endeavour that will never be 'completed' at a single point in time and will require continuous inputs and socialisation, particularly as decision-makers rotate positions. Understanding how decisions make their way through the phases of the policy process involves characterising dynamic relationships among many actors and institutions. As such, it can be difficult to create counterfactuals, what would have happened if a particular EIDM process had not been pursued or if it had been structured in a different way or with a different configuration of actors. These challenges have been recognised for some time, particularly in the advocacy (Fox and Brown, 1995; Davies, 2001; Chapman and Wameyo, 2002; Coates and David, 2002; Pekkanen and Smith, 2014; Buffardi et al., 2017a) and complexity literatures (Hall and Clark, 2010; Rogers, 2011; Copestake, 2014; Mowles, 2014).

In addition to conceptual and methodological challenges, the nature of decision-making renders measurement and data collection more difficult. Although specific decisions may be documented, particularly those which are the result of formal EIDM processes like technical advisory groups, the processes leading up to the decision rarely are. Cognitive processes forming individuals' decisions are unobservable. Self-reports and external observation of group deliberations may introduce biases, including social desirability bias and Hawthorne effects, where people change their responses or behaviour because they are being observed. If interactions involve a few very senior people – a closed-door discussion between the Minister of Health and the Minister of Finance for instance – there will be limited options for triangulation.

## Current measurement approaches

In acknowledgement of critiques about multiple, parallel monitoring and reporting systems, along with competing demands on people's limited time, we take a pragmatic approach, first reviewing specific indicators that are

already being gathered which could contribute to EIDM assessments. We then look at more comprehensive measurement approaches that aim to assess processes and effects, and account for the measurement challenges discussed above. Finally, we examine options to estimate cost effectiveness.

We illustrate current approaches with several concrete examples. We focus on a specific EIDM process in the health sector: National Immunization Technical Advisory Groups (NITAGs), which function in 83 countries (WHO, 2017). The Global Vaccine Action Plan aims for these multidisciplinary groups of national experts who provide independent, evidence-informed advice to policy-makers to be available for all countries by 2020 (WHO, 2013). Many LMICs have received international funding to establish these groups (Adjagba et al., 2015) and recent discussions and analyses have identified ways in which this EIDM process could be further strengthened through national, regional and global efforts, within the context of universal health coverage aspirations, new high-cost vaccines and donor withdrawal from a growing number of countries (Buffardi and Njambi-Szlapka, 2019).

We supplement this example with other measurement approaches used by large, bilateral, donor-supported interventions that aim to strengthen EIDM across multiple sectors, as well as those used to assess the quality of decisions and management of public finance systems (particularly the national budget process). Similar questions have arisen, largely in parallel, in the health sector, finance sector and EIDM scholarship and practice. We draw on each in an attempt to build upon and better integrate these potentially complementary efforts.

## Indicators along extended pathways of change

We first compiled a list of all indicators from: the WHO/UNICEF joint reporting form, NITAG guidelines, regional bodies intended to strengthen national decision-making processes on vaccines (Buffardi et al., forthcoming), and Gavi, the Vaccine Alliance; the Knowledge Sector Initiative (KSI) and Building Capacity to Use Research Evidence (BCURE), funded by the Australian and UK governments, respectively; and Public

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Expenditure and Financial Accountability (PEFA) indicators (see Annex 1 for sources). The WHO/UNICEF joint reporting form includes 231 indicators covering planning and management, system performance, safety, finance, new and under utilized vaccines introduction, vaccine supply, specific diseases and elimination efforts, national advisory mechanisms and vaccine supply and demand, which in itself indicates a large existing reporting burden.

Table 1 presents selected indicators grouped along phases of a long change pathway.<sup>6</sup> Immediate outputs of EIDM efforts often include the number of studies conducted or people trained. Next are proxy indicators that attempt to capture the quality of EIDM processes, including what is considered adequate evidence, transparency and oversight. The latter four subgroups document different types of change that could result from evidence-informed decisions: changes in policy, resource allocation and expenditure, access or quality of healthcare, health outcomes and cost savings. Documenting EIDM processes and outcomes will help to capture the effects of efforts to strengthen EIDM, regardless of whether they are initiated and funded domestically or internationally.

Across the full list, current indicators related to EIDM for vaccines cluster around two ends of this extended pathway. Indicators are more common and better developed to track the upstream activities and immediate outputs of EIDM regional bodies and record downstream changes in access or quality of healthcare and health outcomes, relative to indicators at intermediate stages between the two. They are, unsurprisingly, concentrated in areas that are easier to quantify and document, and that do not face the measurement challenges discussed in the previous section. For EIDM initiatives, the upstream focus reflects their sphere of influence – what they can directly affect – as opposed to policy change and resource allocation, which may be driven by other factors as well. On the other hand, global health institutions commonly monitor indicators at later phases: changes in healthcare and health outcomes.

Attention to more proximate, upstream indicators is also most common among bilateral initiatives to strengthen EIDM, which use both qualitative and quantitative measures. They track outputs across the ‘knowledge ecosystem’, looking at both the supply (i.e. amount and quality of research outputs, income and sustainability of research institutes) and demand sides (i.e. number of policy-makers trained, studies commissioned) of evidence use. KSI in Indonesia also assesses capacities, attitudes and incentives of policy-makers regarding the use of evidence, and tracks the quality of engagement with them and other intended users. One of BCURE’s proximate indicators is the quality of learning among workshop attendees, evidenced through examples of a changed process or product.

Relative to initiatives to improve EIDM in health and other sectors, frameworks to assess finance ministries pay more attention to intermediate phases, including the transparency of a decision-making process and the government’s ability to follow through with commitments in the budget at an aggregate level. Over 45 measurement frameworks are available to characterise how public financial management systems are arranged to allocate and use public resources, and how well they comply with good practices (PEFA, 2018); the most widely used is the Public Expenditure and Financial Accountability framework (PEFA, 2016). Most PFM measures focus on the *process* of spending controls, predominantly from the perspective of the finance ministry, rather than *outcomes* of PFM systems (Hadley and Miller, 2016; Hood et al., forthcoming). They have also been designed to be largely agnostic on political arrangements and critiqued for not considering how national and sector policies are developed, which means they provide little information on more upstream processes used to inform policy decisions and how these are subsequently translated into the budget (Andrews, 2007). In some areas this is changing, but mainly where there has been an aim to shield decision-making from political

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<sup>6</sup> Note that Table 1 is not a proportional sample of indicators from the full list; rather, it presents selected indicators across each phase of an extended pathway of change.

**Table 1 Examples of measurement indicators relevant to evidence-informed decision-making for vaccines**

Indicator		
<b>Outputs of EIDM regional bodies<sup>§</sup></b>		
Participants trained at local workshops <sup>ab</sup>	Direct, proximate	
Number of supported studies completed <sup>ab</sup>		
Number of research findings published <sup>bc</sup>		
<b>Quality of EIDM processes</b>		
Members of the advisory group required to disclose conflict of interest <sup>d</sup>	Intermediate institutional and policy changes	
Clearly defined standard operating procedures <sup>e</sup>		
Recommendations supported by local evidence or contextual information <sup>e</sup>		
Ministry of Health immunisation-related decisions made in consultation with the NITAG		
Average of country composite score for national decision-making, programme management and monitoring (assessments of: Expanded Programme on Immunization management capacity, Inter-agency Coordinating Committee and NITAG functionality rated by Gavi senior country managers) <sup>f</sup>		
Scope of budget scrutiny <sup>g</sup>		
<b>Changes in commitment and capacity<sup>§</sup></b>		
Increased political commitment and buy-in to evidence-informed priority setting <sup>b</sup>		Downstream effects
Strengthened technical capacity for evidence-informed priority setting in the country <sup>b</sup>		
Number of total analyses conducted by national teams that had already completed a previous analysis <sup>a</sup>		
<b>Changes in policy, resource allocation and expenditure</b>		
Number of policy documents and legislation developed <sup>c</sup>	Downstream effects	
% recommendations adopted by policy-makers <sup>b</sup>		
Alignment of strategic plans and medium-term budgets <sup>g</sup>		
Percentage of total expenditure on vaccines financed by government funds <sup>d</sup>		
Ministry of Health aggregate expenditure outturn (the extent to which aggregate budget expenditure reflects the amount originally approved) <sup>g</sup>		
<b>Cost effectiveness of EIDM processes</b>		
Return on investment as a result of delisting Cetuximab and Bevacizumab from Indonesia's benefits package <sup>b</sup>		
<b>Changes in access or quality of healthcare</b>		
Number of countries achieving $\geq 95\%$ coverage for two doses of measles- and rubella-containing vaccine (MRCV) in routine immunisation <sup>h</sup>	Downstream effects	
% of districts with DTP3 coverage (<50, 50–79, 80–89, 90–94, $\geq 95\%$ ) <sup>d</sup>		
Vaccination services interrupted because of lack of vaccine for tetanus <sup>d</sup>		
Percentage of countries sustaining delivery of all recommended vaccines in their routine programmes after transition away from Gavi financing <sup>f</sup>		
<b>Changes in health outcomes</b>		
Under-five mortality rate <sup>f</sup>	Downstream effects	
Future deaths averted as a result of vaccination with Gavi-supported vaccines <sup>f</sup>		
Net Health Benefit of recommended policy implementation compared to counterfactual (either an alternative decision rule or status quo) <sup>b</sup>		

Notes: Institutions using this indicator: <sup>a</sup>ProVac, <sup>b</sup>International Decision Support Initiative (iDSI)/Health Intervention and Technology Assessment Program (HITAP), <sup>c</sup>West African Health Organization, <sup>d</sup>WHO/UNICEF joint reporting form, <sup>e</sup>NITAG guidelines, <sup>f</sup>Gavi, <sup>g</sup>PEFA, <sup>h</sup>Southeast Asia Regional Immunization Technical Advisory Group (SEAR-ITAG). <sup>§</sup>These two subgroups (outputs, commitment and capacity) are particularly relevant for initiatives that aim to strengthen EIDM. The other five subgroups assess EIDM processes and effects themselves, and are also pertinent to EIDM initiatives. \*The Global Fund to Fight AIDS, Tuberculosis and Malaria, another large global health initiative, measures the share of the portfolio that meets expected standards for data systems.

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interference, such as the creation of independent committees to steer public investment choices or guide fiscal forecasts. Although PFM indicators have been underutilised in EIDM and sector-specific research to date, donors have become increasingly interested in linking PFM reforms to service delivery outcomes, particularly in the health sector, and a number of new measurement approaches are currently under development (Hadley et al., forthcoming).

### **Evaluating effects of EIDM processes and interventions intended to strengthen EIDM**

Understanding the effects of EIDM processes and interventions requires looking across individual indicators and examining relationships among multiple components and phases, between specific elements of an intervention and subsequent changes that occur. To date, evaluations of EIDM have usually been in the form of self-assessments and a limited set of qualitative studies conducted by external evaluators.

Single case studies tend to be theory-based, aiming to articulate and evidence the extent to which and how intended changes have taken place to account for multi-finality and equifinality. For example, the evaluation of the UK's health technology assessment (HTA) programme used interviews and document review to construct logic models of the pathways through which HTA systems have impact (Guthrie et al., 2015).<sup>7</sup> They use the payback framework to measure five types of impact: knowledge production, research targeting and capacity building, informing policy and product development, health and health sector benefit, and broader economic benefit (Raftery et al., 2016). This approach attempts to recognise that effective evidence processes have broader effects beyond policy changes, like better submissions from industry, improved public awareness and more refined research products.

Similarly, the International Decision Support Initiative (iDSI) conducts structured country self-assessments based on its overarching theory

of change (Wallach et al., 2017). Acknowledging extended pathways, their theory of change looks across four pillars: (1) effective *partnerships*; (2) *institutionalisation* of evidence-informed priority setting at the country level, including strengthened technical capacity, political buy-in, high quality, relevant evidence products, and the creation of credible and trusted structures for the routine consideration of evidence for policy and resourcing decisions; (3) better *decisions*; and (4) better *health outcomes and impact*.

Comparative case studies of vaccine decision-making have typically involved document review, observation of meetings and key informant interviews to elicit stakeholder perceptions regarding the influence of advisory bodies, with a focus on the more upstream phases presented in Table 1 (Burchett et al., 2012; Makinen et al., 2012; Howard et al., 2018b). A comparative case approach has been applied in other health areas (Woelk et al., 2009; Sumner et al., 2011; Rodríguez et al., 2015; Shiffman et al., 2016) and is much more robust than relying exclusively on stakeholder perceptions; however, the variations in national contexts, issue salience and stakeholder configurations limit the transferability of findings across time and space (Buffardi et al., 2017a).

The recent BCURE evaluation employed a realist evaluation approach (Pawson and Tilley, 1997; Westhorp, 2014) exploring 'context-mechanism-outcome' configurations in six countries to better understand how and why capacity building for EIDM works well or less well, for whom and under what circumstances (Vogel and Punton, 2018). Grieve et al. (2017) propose a mixed method evaluation framework to develop theories on how and why EIDM processes like HTA contribute to change, incorporating a realist evaluation approach.

Although less common than case studies, bilateral initiatives have also used more participatory methods to capture processes and effects. For example, stories of change (Datta and Pellini, 2011) written by researchers, decision-makers and programme staff (Buffardi et al.,

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<sup>7</sup> Health technology assessment is a policy tool for systematically evaluating the properties, effects and impacts of health interventions in order to allocate finite resources and ensure equitable access (WHO, 2016).

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2017b). In what appears to be a rare example of a quantitative evaluation, van Zandvoort et al. (2019) used a Cox proportional-hazards model to measure the time delay between the start of external support and functionality of NITAGs.

### Estimating cost effectiveness

While evaluation of EIDM processes and effects has been relatively infrequent, cost-effectiveness assessments are even rarer, and therefore the methods remain comparatively underdeveloped. Existing approaches typically compare funding decisions that an improved EIDM process would recommend and the associated health outcomes that these choices are assumed to result in, usually in terms of quality-adjusted life years (QALYs) with some form of baseline counterfactual. Rather than using a basic return on investment (ROI) calculation, which would prioritise maximising financial returns, Grieve et al. (2017) recommend using a net health benefit model which accounts for both costs and health effects.<sup>8</sup> The cost savings as a result of these improved health outcomes are then compared with the cost of operating the EIDM process.

iDSI and the University of Strathclyde are further developing a multi-method framework for assessing the value of a national HTA capability. For instance, their simulation spreadsheet models improvements in health benefit/reduction in cost for a collection of projects with randomly generated costs and benefits when this EIDM process is used, compared to other scenarios, like selection on a first come first served basis. As with other applications of mathematical modelling, cost-effectiveness models require setting assumptions about the degree to which recommendations are implemented, the ways in which decisions are made in the counterfactual example, and the attribution of changed funding decisions solely to the EIDM process.

## Strengthening future measurement of EIDM

Taken together, existing approaches suggest a ‘missing middle’ in measurement, where future attention could be directed. There are established reporting mechanisms to track immediate outputs and, in the case of vaccine decisions, downstream health coverage and outcomes.<sup>9</sup> The notable gaps are defining what constitute quality decision processes and investigating how evidence-informed recommendations make their way through the policy process. There are few examples which document and analyse multiple phases of gathering and assessing evidence to produce recommendations, how these recommendations inform institutional processes, particularly budget cycles, how they are altered, how policies are implemented and with what effects. Nor are there examples that explicitly identify and evidence alternative explanations for observed changes.

Understanding decision-making processes and effects could first be improved by bringing together information that is already being reported to international entities, both across health and finance sectors and across phases of the policy process. This information could then be supplemented with measures of key dimensions of the decision-making process and an analysis of the relationships between them, accounting for alternative explanations for change.

### Indicators to capture the missing middle

Of the seven subgroups of indicators in Table 1, further attention to the quality of EIDM processes, changes in commitment and capacity, and changes in policy, resource allocation and expenditures would help to provide a more complete picture of the role and effects of evidence and advisory bodies within broader policy processes. Cost-effectiveness analyses would help to estimate the net health benefit of these investments.

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8 Extended cost-effectiveness analysis (ECEA) and distributional cost-effectiveness analysis (DCEA) also consider equity concerns, such as financial risk protection benefits, distribution of benefits, costs and opportunity costs (Grieve et al., 2017).

9 EIDM initiatives in other sectors should be able to link to comparable implementation and outcome data, particularly for issues where there are established administrative systems and/or when required by external donors, such as existing monitoring systems on student enrolment, attendance and learning outcomes. However, we note that, relative to other sectors, health is a comparative land of plenty in terms of key evidence inputs for decision-making and assessing impact and cost effectiveness (Chalkidou et al., 2019).

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PFM frameworks already capture relevant indicators that directly relate to EIDM, particularly those that assess alignment of strategic plans and medium-term budgets, and the transparency of budget allocations and expenditures, including who makes and oversees these decisions throughout the budget cycle and across levels of government. These and other interim process indicators would complement existing monitoring systems, particularly WHO/UNICEF and Gavi reporting. Reciprocally, the PFM community could draw on these downstream indicators on healthcare access and population health status.

Since evidence, inclusiveness and transparency appear to be key aspects of evidence-informed advisory group models like NITAGs and HTA, supplementary process indicators could relate to the types of evidence used, evidence assessment procedures and steps that are being taken by these groups to facilitate transparency and minimise bias in decision-making. The selection of specific indicators should be tailored to the country context, which would enable stakeholders to discuss and jointly decide how EIDM is being conceptualised and how it is intended to be applied. Taking an incremental approach with realistic indicators relevant to the current situation will provide more meaningful information than recording the total number of outputs, underspecified indicators (i.e. ‘decisions made in consultation with’), long laundry lists of indicators or wildly ambitious targets for countries that are struggling to staff and fund basic public services.

For instance, if an advisory group is currently relying on evidence on the efficacy and safety of a vaccine, and if national budget allocations take place before district-level needs assessments, measuring changes in the types of evidence that are used (i.e. incorporating economic and feasibility considerations), the transparency of the process for weighing different types of evidence to determine recommendations, and the sequencing of planning and budgeting (i.e. the former preceding the latter) would capture important dimensions of EIDM. Similarly, discrete initiatives that aim to strengthen particular aspects of the decision-making process should monitor core intervention components like enhanced capacity or transparency, and their unique contributions to changes in institutional procedures and policy.

## Assessing relationships and evaluating effects

A more balanced set of indicators could then feed into broader assessments of EIDM processes and effects. The theory-based, comparative case study and realist evaluation approaches discussed in the previous section offer examples of methods that could be applied in future EIDM assessments. Other established social science methods have begun to be applied to evaluate development interventions characterised by multi-finality and equifinality and where it is difficult to establish counterfactuals. These methods, including qualitative comparative analysis (QCA), process tracing, Bayesian updating (Befani, 2013; Befani and Stedman-Bryce, 2017; Collier, 2011) and outcome harvesting (Wilson-Grau and Britt, 2013) would also be appropriate to apply for questions related to the influence of EIDM and initiatives to improve it.

Many of the existing case studies on vaccine decision-making have focused on a similar set of countries, but do not appear to be directly linked to one another – a missed opportunity to document changes within each country over time. Following changes over longer periods of time (8–10 years) would help to improve understanding of the evolution and relationship of specific EIDM mechanisms; for example, how National Immunization Technical Advisory Groups, health technology assessment and universal health coverage efforts relate to one another and how prioritisation decisions and resource allocation change over time. In the health sector (and probably others), there is also a clear gap in how decision-making processes in the Ministry of Finance, Ministry of Health and external donors interface with one another. This warrants more attention (Hart and Miller, forthcoming).

Plausibility – what types of changes could reasonably be expected to be observed and when – will be an important consideration for evaluation design (Peersman et al., 2015). The case of vaccine decisions is relatively unique in that it may be possible to track evidence-informed recommendations on new vaccine introduction through health and finance ministry processes to National Immunisation Plans and implementation and incorporate indicators on vaccine coverage and health status from the

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WHO/UNICEF joint reporting form. Evidence-informed decisions on other issues may be much more difficult to follow along these extended pathways of change. For EIDM strengthening initiatives, it will be important to acknowledge what is within their realistic sphere of influence.

When choosing which country cases to assess, there is often a tendency to select early movers and positive outliers, whose experiences may be difficult to apply elsewhere. There is a glaring absence of fragile and conflict-affected settings where the needs and potential options for strengthening EIDM are likely to be quite different to those in environments with stable institutions. Low-income countries also appear to have been less of a focus than low middle-income countries. Given the multitude of factors that can influence policy decisions, ‘most similar’ and ‘most different’ cases can provide more robust analytical comparisons (Gerring, 2007). Larger countries could take advantage of subnational variations in decision-making processes, policy adoption, implementation and development outcomes to identify influential and insignificant factors within the same national context (Suriastini et al., 2019).

## Conclusion

Future measurement of evidence-informed decision-making in the health sector in LMICs can both benefit from and further contribute to the broader fields of EIDM and policy and institutional change. Conceptually and methodologically, the core challenges have been

articulated. There is a small but growing set of examples where social science methods and mathematical modelling techniques are applied to address specific measurement challenges. Existing monitoring mechanisms provide valuable, if incomplete, information.

Given the demands that measurement and reporting place on people’s time, additional data collection and analysis should explicitly link to current measurement systems. Existing and tailored supplementary indicators can address information gaps in the middle of long change pathways related to the types of evidence used, evidence assessment procedures and transparency; and can better link together multiple phases, and sometimes disparate efforts and investments, across ministries and organisations. Collective understanding of EIDM would be advanced by making more evaluations publicly available. This is an ongoing challenge which is compounded by the sensitive and political nature of decision-making. Comparative and longitudinal studies are better suited to research than they are feasible for individual EIDM interventions; however, they are worth investing in for larger initiatives, if undertaken judiciously and in a joined up rather than project by project manner.

Practitioners and scholars involved in EIDM are continuing to experiment with new ways to influence and measure change. There is substantial opportunity to grow the evidence base on decision-making processes in international development; this brief aims to offer pragmatic suggestions as to how to do just that.

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