

# Critical Review of Data Visualization Tools for Women's, Children's & Adolescents' Health and COVID-19 Response



Prepared by

Development Gateway  
[www.developmentgateway.org](http://www.developmentgateway.org)

**December 2020**

## Final Report

# Critical Review of Data Visualization Tools for Women's, Children's & Adolescents' Health (WCAH) and COVID-19 Response

### Submitted by

Development Gateway, Inc.  
1110 Vermont Avenue NW Suite 500  
Washington, DC 20005 USA

### Contact

Ms. Lindsey Fincham  
[lfincham@developmentgateway.org](mailto:lfincham@developmentgateway.org)

### Submission Date:

December 31, 2020

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## Executive Summary

Data visualizations and data visualization tools (DVTs) are increasingly common as the use of data for development continues to rise. Along with the increase in production of DVTs are questions about use and good practices, specifically for women's, children's, and adolescent health (WCAH). Mainly, how can we ensure that DVTs are more effective and both more usable and more used?

Through this study, Development Gateway (DG) examined good practices in DVT production for WCAH by analyzing 25 WCAH DVTs and five COVID-19-specific DVTs, conducting key informant interviews with 36 WCAH DVT producers and users at 23 organizations and institutions, and surveying nine additional country-level users. In addition, we reviewed four COVID-19-related dashboards, and two of the 23 interviews were with COVID-19 DVT producers. The goal was to identify good practices for WCAH DVTs, understand good practices for developing DVTs in an emergency environment, and provide recommendations for improving DVT development processes.

Some of the key findings include that few DVT producers are measuring DVT use, and many shared that they struggled to know how to visualize data in the right way. Once they did decide on the right type of visualization, many felt they were tied to current platforms by organizational license, cost, or their own skill level, which limited the types of visualizations they could produce.

Data users shared concerns over data quality, which impacted trust and use of DVTs. There was a preference for simple charts and tables, and challenges with capacity to interpret charts. Internet bandwidth was a blocker for DVT use as well. Users also shared feeling overwhelmed by the number of DVTs available and knowing when to use which one.

Good practices range from very granular to much larger systematic suggestions. The top-level good practices that were highlighted are:

- Develop DVTs with the intended user to meet specific decision-making needs
- Plan for dissemination, feedback, and messaging early in the DVT development process
- Consider sustainability; from partnering with other producers to designing the DVT for regular updates

Our recommendations are focused on increasing the use of good practices in DVT development, specifically as a means of addressing the noted gaps. These recommendations focus on:

**Audience** – Design for user needs and increase audience involvement throughout the development process

**Indicators** – Select indicators that support decision-making goals sourced from existing data

**Visualization** – Create simple, accessible, and interactive visuals that include context in addition to data visualization. This could include time series, regional comparisons, and information on how to interpret the data

**Technical** – Develop DVTs for low internet connectivity, provide downloadable datasets, and build responsible design

**User Needs** – Prioritize context, local language, subnational data, and guides for usage

**Emergency DVTs** – Build DVTs that meet the immediate need, plan for future growth during or pivot after the emergency

**Sustainability** – Plan for dissemination early, invest in measuring DVT usage, increase partnerships among DVT producers to avoid duplication and work towards unified approach rather than using DVTs to compete

Additionally, we recommend creating a rubric to measure DVT quality against the existing gaps and in line with good practices.

## Introduction

### Purpose and Intended Use

This landscaping assessment seeks to provide an overview of DVTs for WCAH – specifically how DVTs are used to support monitoring of global and regional WCAH commitments. In particular, this work seeks to understand the breadth and utility of existing dashboards; and to develop good practice recommendations for better design and targeting of DVTs on WCAH for the needs of governments, regional organizations, civil society, development partners, and other decision-makers.

In addition, this work seeks to provide an understanding of and recommendations for DVTs produced in emergency scenarios that draw upon examples and experience of DVTs produced in response to COVID-19.

For the purposes of this report, we define dashboards and data visualization tools, as:

*a visual presentation of data that aims to improve users' understanding of complex information through one or more dynamic or static representation(s) of indicator(s).*

This report is intended to support current and future DVT producers both through understanding of good practices and with recommendations and guidance for designing with sustainability and the user in mind.

### Methodology

This work included a mix of desk research, key informant interviews, and a survey in an effort to understand the current global level DVT landscape for MNCAH and to identify good practices.

#### Metadata analysis

The desk research focused on a metadata analysis of WCAH dashboards using approximately thirty criteria. These criteria included DVT purpose, region, features, indicators, visualization types, and speed – in addition to others. The full metadata analysis is available in Annex 2. UNICEF and WHO worked with Development Gateway to select 25 WCAH-focused DVTs for analysis.

In addition to the WCAH metadata analysis, four COVID-19-related DVTs were selected for analysis. While many of the same criteria were used to analyze these DVTs, several contextual factors were captured as well.

#### Key Informant Interviews

UNICEF identified 23 organizations, agencies, and institutions producing or using WCAH DVTs for key informant interviews (KIIs). These interviews followed a semi-structured approach with pre-approved questions creating an interview framework. Questions asked during each interview varied, depending on the role of the interviewee and the tools and experiences they have.

During the interview process, we also identified a third category of “infomediaries” – those who use DVT or data with the primary objective of helping others understand and use the information. The bulk of the interviews (23) focused on WCAH-specific DVTs, and two interviews were held with COVID-19-specific producers. In addition to the two COVID-19-specific interviews, six interviewees also shared information about COVID-19-related DVTs they have used or produced.

### Breakdown of interviewees by organization type

Organization Type	Number
NGO	8
UN Agency/Group	9
Country Government	2
Academic	2
Development Agency	2
Total	23

### Survey

A survey was added to this work in an effort to capture more user responses, specifically those at the country level. The survey followed a similar line of questioning to the KIIs, but was less time intensive for the respondent and provided more quantifiable results. The survey yielded nine regionally diverse responses which are included with the KII sections of this report.

### Limitations

While we made every attempt to be thorough, there are some limitations to this report. First, a number of the dashboards we intended to analyze were not publicly available. Similarly, in the case of some COVID-19, dashboards were either not available or in some cases were not yet finished. In these cases, our analysis is based on documents shared by the DVT producers, key informant interviews, and in one case (ALMA) where DG was given access to a permissioned DVT.

Additionally, while our intention was to interview a larger number of DVT users, the ongoing COVID-19 pandemic created a challenge for interviewing country level users, specifically those at the Ministry of Health. In place of interviews, we surveyed the Country Engagement Working Group through PMNCH. Nine individuals responded to this survey.

## Overview of Good Practices in DVT Development

This landscaping assessment intends to surface good practices in DVT creation to provide examples and recommendations for future DVT producers. For our purposes “good practices” are defined as *a method or action that has been proven effective or is the generally accepted norm*. The existing body of guidelines and good practices is a useful starting point for DVT producers. We aim to identify if and how WCAH DVT producers are currently following, or not following, known good practices, and identify additional good practices specific to WCAH DVTs that should be considered.

Known guidance for DVT production include the Principles for Digital Development<sup>1</sup> a set of nine guidelines aimed at standardizing best practices for technology solutions, specifically in an international development context. Endorsed by over 100 organizations, these nine guidelines are:

1. Design with the User
2. Understand the Existing Ecosystem
3. Design for Scale
4. Build for Sustainability
5. Be Data Driven
6. Use Open Standards, Open Data, Open Source, and Open Innovation
7. Reuse and Improve
8. Address Privacy & Security
9. Be Collaborative

Additionally, the Alliance for Useful Evidence, Oxford University, and Reuters Institute for the Study of Journalism identified the following 11 guidelines to support data visualization:

1. Start early: think about data visualization as an exploration *and* dissemination tool that should be used throughout a project, not only at the end.
2. Know your audience and understand their needs: Provide information that is relevant to people, and, when possible, make it personal.
3. Consider whether your data would be better understood if summarized visually. Ask yourself: Do I have a lot of data that need to be summarized? Or are my data structurally complex? Do I have a story to tell?
4. Identify the appropriate type of chart to use. Ask yourself: What is the story I want to tell? What do I want to show: hierarchies, distributions, processes, trends, correlations, etc.?
5. Display relationships in a simple manner, which include: Difference (same–not the same; alike–different), Sizes, Positions/locations, Sequences (order; pattern; continuity), Time and timelines, Series (grouping; arranged; occurring in a certain order).

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<sup>1</sup> Principles for Digital Development, “About” <https://digitalprinciples.org/about/>



6. Present data in categories that are meaningful to your audience. For example: Choose between metric system or US customary units depending on where you are presenting
7. Properly label all axes in simple language and ensure that scales are correctly illustrated.
8. Provide clear, interesting titles to graphics.
9. Unclutter: get rid of different fonts, colors, and information that may detract from your main 'story'.
10. Illustrate how data disaggregates throughout different levels of analysis (micro and macro), when possible.
11. Always provide underlying data, as a means of allowing validation and replication.<sup>2</sup>

Other institutions have narrowed best practices down to their top five<sup>3</sup>, or created their own guidance such as UNICEF-WHO.<sup>4</sup> Several resources help DVT producers understand when to use different types of charts and graphics based on the goals and type of data<sup>5</sup>, including in comic form.<sup>6</sup>

In addition to general data visualization best practices, specific consideration should be taken to make data visualization more accessible for people with disabilities. While disability accessibility was not mentioned by any interviewees, it is an important part of DVT development. The UK Home Offices' guide to *Designing for Accessibility*<sup>7</sup> and a recent blog on *Designing for Accessibility is not that hard*<sup>8</sup>, provide some good pointers for designing for DVT users with a variety of impairments. These include using strongly contrasting colors; using a linear, logical layout; methods to support keyboard navigation; adding alternative text for images; make clickable areas large rather than precise; and many others.

## WCAH DVT Trends: Goals & Audiences

The most common theme that emerged across the key informant interviews was the importance of identifying the audience for information and accompanying DVTs. Our metadata analysis of the dashboards also revealed insights into the goals and audiences for DVTs, based on dashboard type and geographical coverage.

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<sup>2</sup> Gatto, Malu A.C., *Making Research Useful: Current Challenges and Good Practices in Data Visualisation*. Reuters Institute for the Study of Journalism. May 2015. <http://www.alliance4usefulevidence.org/assets/Making-Research-Useful-Current-Challenges-and-Good-Practices-in-Data-Visualisation.pdf>

<sup>3</sup> GoodData, *5 Data Visualization Best Practices*. December 2018. <https://www.gooddata.com/blog/5-data-visualization-best-practices-0>

<sup>4</sup> WHO Collaborating Center for Research Evidence for Sexual and Reproductive Health. April 2020. *Data Dashboard Best Practices and Guidelines*.

<sup>5</sup> Development Gateway's Data Visualizations Best Practices. [go.developmentgateway.org/DataViz-Best-Practices](http://go.developmentgateway.org/DataViz-Best-Practices)

<sup>6</sup> <http://eolay.tilda.ws/diagrams/en>

<sup>7</sup> <https://ukhomeoffice.github.io/accessibility-posters/posters/accessibility-posters.pdf>

<sup>8</sup> <https://uxdesign.cc/designing-for-accessibility-is-not-that-hard-c04cc4779d94>

## Target Audience

Understanding the target audience and their needs is necessary for defining the vision and goals of the DVT, and contributes to the selection of data and indicators and the approach to technology and visualizations. Some interviewees highlighted that identifying the audience should happen before the data is even collected.

All dashboards reviewed targeted more than one audience. Examples of target audiences included the Ministry of Health, district level health officials, and in many cases a global audience interested in monitoring progress towards the development agenda. Twenty percent specifically mentioned government as one of the target audience, and CSOs/NGOs and development partners were both mentioned as an audience for 15% of DVTs. Interviewees varied on how the audience was involved in developing DVTs and providing feedback, but most do tend to focus on developing DVTs to support an existing constituency rather than building a new audience. Eighty four percent of DVTs analyzed had a mechanism for user feedback – usually through contact forms or email addresses provided for the purpose.

For COVID-19-related DVTs, the target audience tends to be narrower. The target audience is generally of the Ministry of Health for planning, monitoring, and public health communications. Although, producers mentioned a broader audience as well.

A common use case found in DVT creation was to help one or more of these audiences incorporate the use of data and evidence into routine business practices, for example planning and prioritization, monitoring, reporting; and to automate responses to frequent information requests. We found that a leading priority for WCAH DVTs is use across governance levels, specifically in accountability and advocacy purposes. In this scenario, while the target audience is policy-makers, the DVTs are designed to be used by CSOs, advocacy groups, and other stakeholders as evidence when speaking to policy-makers. Many interviewees described multiple audiences for their tools. Several audience and goal types recurred regularly as pairs.

### Recurring pairs of audience types and goals

Audience Type	Audience Goals
Community members	Advocacy, accountability
Country/district level decision makers	Policy making, planning, M&E, reporting
Global organizations & development partners	Prioritization of investments, planning, monitoring progress toward development agenda

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“It’s important that you understand and target the audience well. If the audience is very engaged with digital spaces like social media, we need to develop tools that integrate with that – smaller things that you can use on Facebook or Twitter. With community groups you may want to look at ways you can visualize the data. Use characters or cartoons, and traditional means of communication. Considering where you can have video with these tools. What is critical is looking at the audience, how you can communicate and how much time they have.”  
– NGO

“Before we begin to design the scorecards, we have a small stakeholder group to engage on a regular basis. We try to showcase if you have a stakeholder, finance expert, or civil society leader, if we are going to engage you in advocacy what kind of messages would you prioritize? We do some small presentations with our target audience to understand what would make the most sense. From there we develop our data tool to showcase. Before we organize a wider dissemination, we also pilot the scorecards to a smaller audience for feedback before we finalize.”  
– NGO

“The tools that we have are overly sophisticated for an advocacy audience, [and are] not tailored for an audience (policy makers, Ministry of Health, etc.) who can move the agenda forward with the policy makers. There are issues of accessibility, fit-for-purpose, packaging, and dissemination.”  
– UN Agency

## Dashboard Types

Connected to the overarching goal of a DVT, our metadata analysis identified each of the 25 DVTs as one of four types:

- Analytical – DVTs with large streams of data, that require some expertise to analyze and extract insights for executive level consumers
- Strategic – DVTs focused on monitoring long-term strategies by analyzing and benchmarking a wide range of trend-based data

- Operational – DVTs that can be used to monitor, measure and manage processes/operations with an immediate time scale
- Tactical – DVTs that can help formulate strategies based on trends, strengths, and weaknesses

**Count of DVTs by Type**



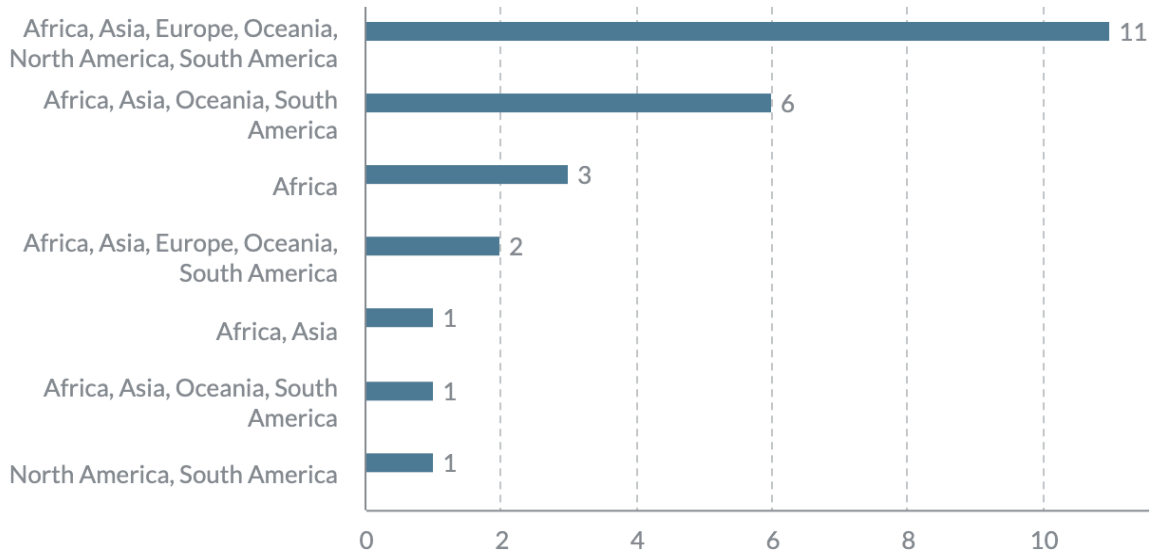
Of the 25 DVTs reviewed, eight were identified as strategic, eight as analytical, five as operational, and four as tactical.

In addition, of the four COVID-19-related dashboard responses that were reviewed, two of these were tactical, while the remaining two included one operational and one analytical. The fact that none were strategic points to the need for a short-term, accelerated focus to respond to COVID-19.

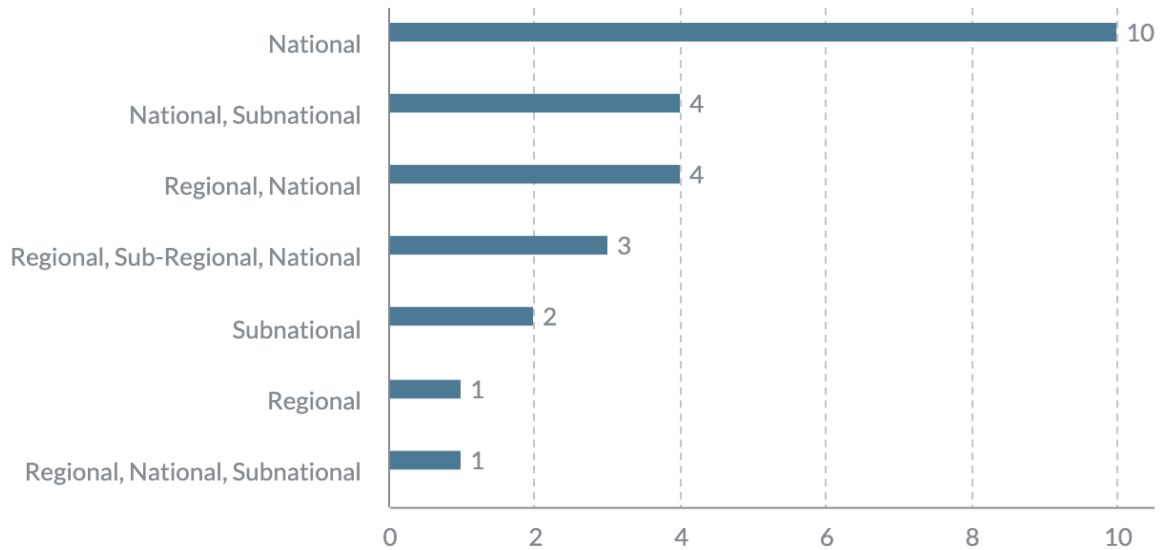
### **Geographical Focus**

The geographic reach of the DVTs analyzed was broad, with many focused globally while allowing users to go deeper in the regions of their choosing. Ten out of 25 DVTs analyzed (40%) focused on Africa, Asia, Oceania, South America, Europe and North America. Africa was the only continent to have stand-alone DVT focus, the remaining were a mix of geographic regions. The vast majority of dashboards analyzed (40%) were strictly nationally focused. The next most common were dashboards with both regional and national focus, and ones with both national and subnational focus, with four each (16%).

### Count of DVTs by Geographic Area



### Count of DVTs by Geographic Level of Focus



### DVT Indicator Selection

After defining the target audience, indicator selection for most interviewees was the second step in DVT creation. The majority described indicator selection as an iterative and consultative process between the team creating the DVT and the intended audience or other stakeholders. Selecting indicators in coordination with stakeholders or end users was noted as a time intensive, but valuable, process. For many DVTs, selecting indicators started with an existing list of indicator options derived from the SDGs or other global indicators, a

country's strategic goals, existing program indicators, or other predefined targets. Other interviewees describe starting with a wishlist of indicators (sometimes based on predefined targets) that are based on good practice in WCAH or as identified by stakeholders. Often the process of narrowing indicators is based on data availability, data quality, or both. In some cases, collecting additional data is necessary; however, using data already available is good practice, as it does not increase the reporting burden for healthcare providers. To know when it is necessary to collect additional data, DVT producers should work with decision makers to understand what critical decisions they make, and check if the available data can meet those needs.

Several trends emerged, including the desire to select indicators that are already being collected, for example within DHIS2. Another trend is the importance of comparable indicators, specifically making sure information is asked for and collected in a uniform way. The third trend we observed around indicator selection is a recommendation that DVTs start simple with a few indicators, and grow when necessary to ensure the DVT remains focused on the needs of the users and reports quality information.

The 25 dashboards analyzed had a median of 33 indicators, a mean of 63, and an overall range of 8-422 indicators. The DVTs that included information about the indicator selection process tended to cite global frameworks (SDGs, Agenda 2063, EWEC) or a consultative process with selection criteria specific to the organization.

## 8-422 The range in number of indicators displayed by DVTs

The additional four COVID-19 dashboards reviewed had on average a much higher number of indicators, with a median of 102 and a mean of 100. They ranged from having 71 to 125 indicators. From the interviews, we learned that each dashboard had a different method for selecting indicators. While one was based on guidance from the WHO, another was based on questionnaire responses. The two national COVID-19 dashboards were based on their own framework.

### DVT Visualization Selection

Many interviewees were grappling with how best to present information in visualizations. One of the more universal findings was the importance of considering the audience, and the goals of the visualization. During the interviews, several visualization types were mentioned repeatedly as both visualizations often produced and those users requested. These visualization types include visualizations that show:

- Show trends overtime or trends benchmarked with targets
- Rankings or comparisons between countries or regions
- Either of the above combined with geographic mapping

Trends for audience preference for visualization types emerged as follows:

- Policy makers – visualizations that are easily and quickly understood, and visualizations that show comparisons or trends over time
- Program Officers at the Ministry of Health or regional levels – visualizations can be more detailed, these DVT users are more experienced with traditional charts and graphs
- Community Members/Advocates – Visualizations often include infographics or have more narrative features.

Feedback and user testing were also cited as an important way of identifying what worked best. Several interviewees mentioned looking at what other types of visualizations are used within and outside of the WCAH context as a starting point, then creating mock ups to share with stakeholders, and refining through user testing. Additionally, a number of interviewees mentioned hiring technical experts to support and advise on the types and methods to best visualize data.

Nearly all interviewees emphasized the importance of simple and easy to digest visualizations. Further, several explained that it is important to create simple visualizations that convey a clear message, while also providing technical/expert users the ability to drill deeper into the data as needed. Additionally, interviewees cited a need for DVTs to be interactive and engaging, while also customizable (including the ability to filter by years, topics, or regions, for example).

Visualizations in many cases were limited more by the platform than by any other factor. Producers noted that they were tied to their current platforms by organizational license, cost, or their own skill level. These restrictions limited the types of visualizations producers could create, or created “clunky” visualizations. There is a growing trend toward mobile friendly visualizations, and designing with multiple platforms in mind. Many DVT users also noted that some visualizations are too bandwidth intensive for their internet connections to load, and others noted the need to print visualizations.

Many interviewees said that visualizations and DVTs should include more context. Several mentioned the need for a pre-packaged narrative (specifically for advocacy), some suggested including recommendations for action or policy, and others a guide for using the tool.

From the metadata analysis, several visualization types emerged as somewhat standard. These visualization types included tables in 21 of 25 DVTs (84%), graphs/charts in 19 of 25 DVTs (76%), and maps in 18 of 25 DVTs (72%). The use of contextual factors in DVTs varies, but the analysis showed that 10 out of 25 DVTs (40%) included some form of trend analysis (change over time), and nine of 25 (36%) allowed for visualization of comparisons against targets or benchmarks.

**84%** of DVTs included tables. This was the most common format used.

Designing visualizations for COVID-19-specific DVTs relied on many of the same factors as the WCAH DVTs. Mapping, specifically at the subnational level, and displaying trends over time are two of the most common types of visualizations. For the four COVID-19 DVTs, only the two with a regional and national focus had maps, while the other two with a national and subnational focus relied completely on charts/graphs.

“[We have a] really data heavy report, that is the point, it is so complicated. We held a meeting and asked [users] if they were familiar with the report and the data and one of the [users] said “oh yeah we have that, it’s so big and thick we use it to prop the door open when it’s really hot in our office.” That’s not what we mean by effective utilization of the report and the data. We created this advocacy toolkit to help [users] themselves be able understand and use that data. We lifted the kind of graphics and maps, and did not change them, it was more about explaining how to read and understand so that [users] could actually be advocates in their own countries. Most of that is sort of data visualization around the situation in-country. It is helping to drill down a little so you can see those differences. It can sometimes be helpful to compare countries, sometimes policy makers respond well to that. The data stays hidden in those kinds of documents unless you can do visualizations that help people grasp what it means and use it.”

– NGO

## Dissemination Strategies

Dissemination strategies identified in the key informant interviews were very consistent. Most interviewees said their dissemination strategies centered around annual meetings (UNGA, World Bank Meetings) and other inflection points for advocacy opportunities. This specific strategy aligns with the existing audiences of global organizations and development partners.



Interviewees also cited word of mouth and networking as a strategy, specifically in combination with social media and increasing search engine optimization. Several producers referred to high levels of partner engagement and/or engagement from high-level officials as strengths of their DVTs and dissemination strategies. For a number of producers, specifically of internally facing DVTs, internal networks and intranets were the top source of traffic. Six out of seven survey respondents (86%) said they learned about DVTs from internal guidance.

Two gaps were identified through the interviews. The first trend that emerged was that, given the volume of existing and overlapping DVTs, the tools and portals could do more to reference one another. Secondly, many interviewees cannot and/or do not measure the effectiveness of their DVTs or dissemination methods.

One emerging theme was DVT overload – that is an overwhelming number of DVTs being produced, without a clear metric for measuring quality or understanding when to use each. This theme was noted by both users and producers. DVT overload ties to larger issues of sustainability, pressure to produce DVTs, understanding and measuring DVT use, and the desire to prioritize partnerships in DVT creation.

Some DVT producers have a broader, non-public facing toolset, which means there may be a gap in what global DVT communities see and can use. Additionally, there is a similar gap between publicly available and internally restricted DVTs at the country-level, where there is also a discrepancy between what exists and what is used. As a result, there may be significant duplication of efforts, specifically where country-level coordination is weak.

COVID-19-related DVTs follow a different dissemination path as these tools are often developed for inter-ministerial or presidential task forces, in an existing DHIS system, or for a specific internal monitoring process. Since the vast majority of COVID-19 DVTs are produced for a specific audience and purpose, dissemination beyond this audience is not a priority, even in the scenario where a public link is available.

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“We could issue many reports every week or month on similar topics. The technical work is critical. We are not making the communications work. It isn’t making the impact because it is just too much. Between August and October, we have launched 4-5 reports with comms, etc. Each is important on its own. But It would be great if it could come together as one picture at once under the [agency] umbrella so that we have a report that brings the full picture.”  
– UN Agency

## WCAH DVT Trends: Technical Features

### Technology

Several tools and platforms were mentioned throughout the interviews. In addition to DHIS platforms, three others were heavily cited: Power BI, Tableau, and Excel. Platform selection for DVTs is influenced by institutional licenses, staff familiarity, and cost. Two out of 25 dashboards analyzed were built using Tableau, and a number of producers mentioned Tableau during interviews as well. The remaining dashboards analyzed were custom built and used various tech stacks.

While open source tools are noted as a good practice, the KIIs revealed that open source is not always the “default” among those interviewed. Reasons for this included the many staff hours, development and training time in order to modify and scale up systems, which increase the cost and act as barriers to using open source tools. Using Software as a Service (SaaS) such as Tableau can be appropriate for certain needs, such as quickly creating data visualizations, constantly changing needs, when a custom look and feel is not needed, and when the institution can consistently afford ongoing fees. Custom solutions on the other hand make sense when a certain look and feel *is* required, and when changes are expected to be less frequent (though may still be needed). Custom solutions often cost more up front, but typically don’t require licensing fees. They do however require the supplier to host the system (either locally or through cloud services) and as interviewees mentioned, making changes requires either in-house technical skills, or paying to make those changes. Making sure custom solutions are open source means that others could re-use tools, and allows others to expand on the tool and is a general good practice. There are scenarios where each option makes the most sense.

### Development

For many producers and infomediaries, ongoing stakeholder engagement and iteration was a key priority. Incorporating feedback has implications for implementation and maintenance budgets as needs change over time. Similarly, several producers suggested that they found success by starting simple and scaling as needed. On average, DVTs were developed over six months to a year. A majority of interviewees also noted that the development process took longer than expected, often relating to communication difficulties or other non-technical delays.

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“When we started on this work, we thought it would be manageable within a year, but it has proven to be a much longer-term process. By collecting the data, you are also surfacing issues with the data. Once you visualize the data it becomes much more apparent. For these tools to make sense for planning it has to be at a certain level of quality, or you lose faith. Quality control on data is a long-term agenda item. We’ve done this very much with the government which requires a lot of time. Specifically, some of the ways that we present data is different than what they are used to. Helping everyone understand methodology [is important]. It takes time and is a continuous process to make it work. You need to invest in it for the long term. That’s not building the visualizations, it is making sure the data makes sense.”

– UN Agency

## **COVID-19 DVT Development**

From our small sample size, it appears that setting up COVID-19 related DVTs can take a similar amount of time, with around 3 months being the average. In scenarios in which DVTs were created from existing data or on existing platforms, this timeline could be much shorter. One challenge mentioned when using existing data sources was ensuring the DVT continued working as indicators or data changed. In one example, a DVT build using an API crashed when new updates were made to the original data source.

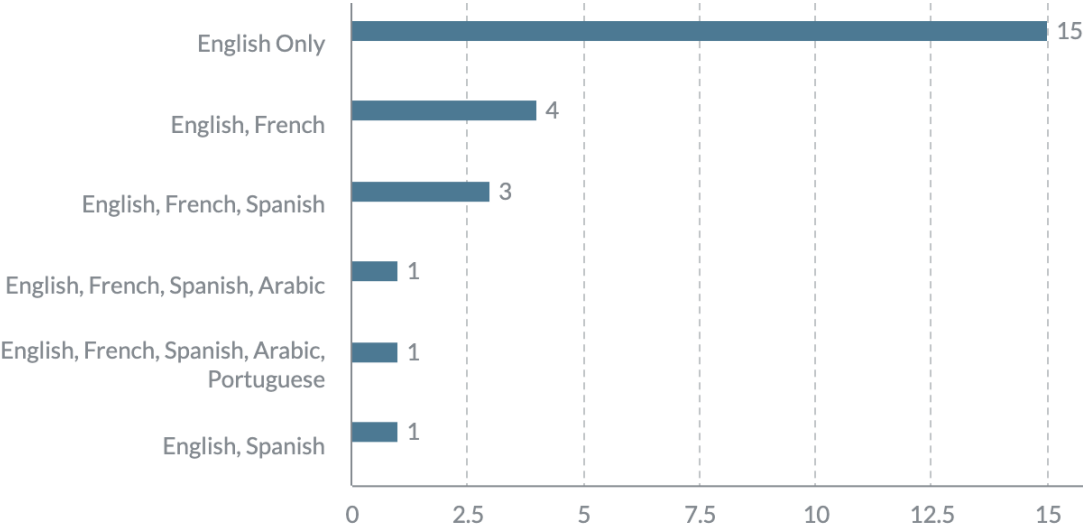
## **WCAH DVT Trends: User Needs**

### **Technical Considerations: Format & Usability**

A wide range of interviewees, specifically users, infomediaries, and individuals with limited internet connectivity cited the importance of being able to download data in Excel formats – which was also highly cited as a platform interviewees felt comfortable using. Additionally, a number of interviewees mentioned that DVTs can be inaccessible due to connectivity issues. For many, automatic uploads/downloads upon reaching a stable internet was noted as an important feature. Additionally, users and infomediaries explained the need for information to be downloadable as well as printable. A number also noted the need for local language translation.

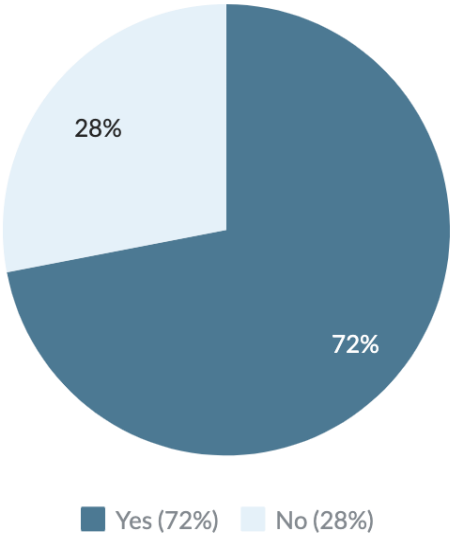
The dashboard analysis showed that 15 out of 25 DVTs (60%) were only available in English. DVTs with other language options included 9 of 25 DVTs in French (36%), 6 of 25 in Spanish (24%), 2 of 25 in Arabic (8%), and 1 of 25 in Portuguese (4%). This shows a likely need to expand the number of languages most dashboards are available in.

**Count of DVTs by Language**



Data was available for download in Excel or CSV for 17 of the 25 DVTs (68%) and as print-ready PDFs in 13 of 25 (52%). Fourteen of 19 online dashboards (74%) featured responsive design so the DVT can be easily used on devices with various screen sizes.

**Percent of DVTs with print-ready and/or PDF exports**



Load time can have a big impact on usability. On average the dashboards reviewed took 2.16 seconds to load, with a range of .426 seconds and 5.48 seconds.

Of the four COVID-19 DVTs, two had the capability to export data into Excel or CSV, and three out of four can export into PDF, PNG, and PPT. Only one of the dashboards is responsive to different screen sizes. The load time range was measurable for only three of the dashboards, and had a range from .285 to 7.47 seconds, for an average of 2.95 seconds.

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“The first [recommendation] that comes to mind is to make it available in languages other than English. I find it so disappointing and challenging in my work across 40 countries to just assume that the visualized data should only be accessible to English speakers. That reflects a lot of where it’s coming from.”

– NGO

“For COVID-19, we have a dashboard that is providing data on positive cases, deaths, recovery, and facilities. But sometimes there are issues with the platform, it is heavy and not easy to load with slow internet. If there is no data in a dashboard, finding data from papers and documents takes longer than the dashboards.”

– Ministry of Health

## Data Quality

Data quality was a recurring theme along with building capacity for data use, with 100% (nine out of nine) survey respondents noting that data quality was a consideration when selecting or using data. Many interviewees also cited the importance of data quality in designing a DVT; first because data gaps become more obvious when visualized and, more importantly, to prevent users from losing confidence in the tool overall.

Data found in the DVTs came primarily from national or international surveys in 21 of 25 DVTs, from international data repository/secondary source in 13 of 25 DVTs and from a national administrative system in 5 of 25 DVTs. A related theme is the conflicting figures provided by global level data and DVTs versus nationally-sourced data and DVTs from surveys or HMIS, which can lead to concerns about which source to trust and use. In some cases, the cause may be from collecting data at different times or through slightly

different methods. However, it is a somewhat contentious issue, with some interviewees making note of issues with DHIS data quality, and others noting a disdain for global estimates. This divergence also speaks to the difference in audience and goals of each type of DVT. Additionally, while many interviewees described the desire to use existing data, one often cited barrier is the varying levels of access to HMIS, and strong interest for greater access amongst donors. Comparable data was also mentioned a number of times, specifically in making similar indicators more universal rather than specific to each reporting requirement. Six out of nine survey respondents noted that comparability was a consideration when selecting or using data.

Timeliness of data was another consideration for six out of nine survey respondents (67%). Fifteen out of 25 dashboards (60%) were only updated annually and only one dashboard (4%) updated on a quarterly basis. The rest were updating at another frequency that wasn't clear.

## **Data Disaggregation**

There is a growing interest in subnational data, specifically where nationally aggregated data is a less useful for identifying issues and interventions. Seven out of nine survey respondents (78%) mentioned geographic disaggregation as a consideration when selecting or using data. This could reflect devolution/evolution of service delivery, greater commitment to "leave no one behind," and/or focus on intervention efficacy.

The interest in subnational data is combined with the visualization trends of geographic mapping and trend analysis tied to benchmarks or time series data, although these data needs are also more broadly shared.

Disaggregation by gender (67%) and age (44%) were also noted by survey respondents as key considerations for selecting or using data. Two respondents also specifically mentioned a challenge with how midwives are often combined with nurses or other health professionals, and disaggregating to a more specific profession level for monitoring and evaluating health care.

From the dashboard analysis, the most common population stratification measures (multiple possible) are age in 18 of 25, sex in 14 of 25, location-related in 10 of 25, and wealth in eight of 25 DVTs. At the geographic level, the most common data disaggregated are national level in 24 of 25 DVTs, regional in nine of 25, and the subnational level in eight of 25 DVTs.

Interviewees also cited growing interest in and concern about data privacy and the need for ethical data sharing – specifically when it comes to HMIS/DHIS data. While no specific recommendations or needs were noted by the interviewees, this is an emerging theme.

## **Use Preferences**

Several interviewees identified a broad opportunity to further coordinate WCAH-related communications using DVTs. Additionally, there is a larger concern of data fatigue or oversaturation amongst DVT constituencies, specifically among the media and politicians. Further, several interviewees noted the

challenges associated with knowing what DVTs exist and in analyzing the existing DVTs for both quality and use cases. Finally, competition between constituencies for attention and resources – between advocates focused on tuberculosis and those focused on malaria, for example – was noted as a challenge to further partnership and collaboration.

For many interviewees, guides for analysis are important. “Super users” and infomediaries were a large portion of those interviewed, but not necessarily representative of target users (senior officials at global or national levels.) For those in a time crunch or without a high capacity for data use, combing through the existing tools to understand which to use is a time-consuming process.

There are also more forward-looking needs identified. Currently DVTs help point out challenges and successes within WCAH; the next step is creating DVTs that are more solution-oriented, and can help point to what action should be taken next. This was specifically highlighted by those developing DVTs for an advocacy audience, where the existing DVTs can be overly sophisticated and not tailored to an audience that can move an agenda forward.

Finally, producers are also thinking about more interactive ways to display information, specifically on social media networks. Zero out of nine survey respondents mentioned social media as a source for learning about DVTs, which might be due to a lack of dissemination through this method.

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“... it is so disgusting when data is pitted against each other. Pneumonia is the leading cause of infections, but premature birth is actually the leading cause of death. This isn’t useful to the midwife who has to save both children. To the policy maker who is trying to decide if they should fund pneumonia or the NICU. We need to make the message better, having the data is critical, but we need to stop pitting the data against itself.”

– NGO

“Look at the whole data value chain. The data that feeds the tools is static, so to use it for decision-making, it is dated. The tools are not useful because you don’t see what has changed from A to B. We also need better support for decision making. Tools need to move beyond “this is the issue” to “this is the [solution].” If you do X you move from yellow to green. These tools can be triggers for learning, but are often hidden.”

– NGO

## WCAH DVT Recommendations

Across DVT producers and types there are areas for improvement. For some gaps there are simple fixes, for others we recommend larger, more systematic shifts. While the goal of this work is to support producers developing DVTs on women's, children's and adolescents' health, we found that the challenges are not necessarily unique to these specific producers. As a result, the following recommendations support DVT producers more broadly.

### Indicators

Broadly speaking, indicators – much like the full DVT development process – should be identified in conjunction with stakeholders, and ideally using data that is already being collected. In developing indicators, producers should consider:

- **Goals** – what specific decisions or actions is the DVT going to support. Where possible, indicators should be tied to existing processes, data use, and action.
- **Feedback** – not only how to incorporate feedback into the project, but how to include feedback in the longer term. This be through a built-in form, stakeholder meetings, or existing business practices.
- **Simplicity** – select a few indicators that can be visualized well and that provide value in decision making, then scale from this base as needed.

### Visuals

A DVT's visuals should be selected based on the audience needs, the data to be visualized, and the overall goals. The following should be considered to develop DVTs that are more likely to be used:

- **Simplify** – visuals that are easy to understand should be prioritized. Complex or innovative visualizations should be included only when designing DVTs for a highly technical audience, or where the end users are highly engaged in the indicator and visualization selection process. To ensure the DVT will be useful, gather feedback from users, specifically for audiences less comfortable with data visualizations.
- **Interactive and Engaging** – While simplicity is prioritized, visualizations should still be engaging and interactive where possible.
- **Levels of Granularity** – Users should be able to select variables and drill down to the specifics of the information they need. When disaggregated data is available, users should be able to see the data disaggregated.
- **Usefulness** – The most useful types of visualizations show: trends over time, regional/country comparisons, and geographic mapping.
- **Color & Accessibility** – Make adjustments for users with disabilities, such as those who are visually impaired or those with dyslexia, physical/motor impairment, etc. This could include size



modifications, zoom capabilities, hover text, large clickable areas, and color selection. Color should also be considered in terms of pre-existing associations with the audience.

## Technical

Technical specifications for DVT systems are broad and highly dependent on the budget, time available, and goals. Across the board, DVTs should include:

- **Low-Bandwidth Considerations** – Include offline options like print-ready PDFs or a basic HTML page. The basic HTML page would include the same information, but with the bandwidth intensive components stripped or reconfigured. Load times should be decreased as much as possible.
- **Downloadable Datasets** – For both users in low-connectivity environments and users who want to work with the data directly, datasets for DVTs should be available for download. Producers should de-identify data prior to making it available.
- **Responsive Design** – Users are not accessing DVTs exclusively by desktop. DVTs should be built to use on desktop and mobile and user tested on a variety of browsers and screen sizes.

## User Needs

DVT producers should consider the end user throughout the process, but specific attention should be given to the following considerations:

- **Context** – In addition to providing visualizations, DVTs should provide context that helps frame the information for the user. This could include information with the visualizations, for example, adding a description of what the chart is saying could help users who struggle to interpret it on their own. In addition, adding an “about” section, or completed communications materials like reports, one-pagers, or a social media package could be useful. Pulling out key messages is important, particularly for an advocacy audience, as is user testing at this stage.
- **Guides for Use** – Specifically for interactive DVTs, a guide to what is included and how to best use the information should be included either in a “help” section or as a popup when the user first visits.
- **Language** – DVTs should be available in the languages used by the audience. Specific consideration should be given to DVTs targeting multiple user types or those at the community or country level.
- **Prioritize Subnational** – Local level data is becoming increasingly important in understanding and addressing development needs. Priority should be given to producers visualizing subnational data.

## DVTs in an Emergency

Designing DVTs for an emergency, the COVID-19 pandemic for example, requires slightly different considerations that include:

- **“Good Enough”** – When building in an emergency the goal is to get information available to users as quickly as possible. Consider what “good enough” or a minimum viable product looks like, then modify or scale as needed.
- **Open Data & Available Visualizations** – Throughout the COVID-19 pandemic, there have been a wealth of available, open, and trusted data sources. Take advantage of existing data through APIs to build a DVT specific to your users’ needs. Exploring existing visualizations, specifically popular indicators like reported cases, can provide inspiration and keep producers from recreating the wheel.
- **Mind the Gaps** – For some DVTs, the missing data may not impact the messaging or usefulness. For other producers, missing data (for example data disaggregated by gender in the case of COVID-19) could have serious impacts. Be aware of data quality as well as data gaps in the underlying data sources.
- **Build to Repurpose** – During development, consider how the DVT could be repurposed after the emergency. Build the tool or template to be adaptable to new data or indicators in the future.

## Sustainability

One of the biggest challenges in DVT development is sustainability. This challenge covers a range of sustainability measures, from individual use to data overload. Considerations for sustainability include:

- **Dissemination** – Dissemination is highly dependent on the audience, and dissemination and messaging should be a consideration before or in tandem with DVT development. Producers should work with users and partners to build relationships and to cultivate networks for dissemination.
- **Measure Use** – Measuring use is one of the most important aspects of sustainability. Often seen as an afterthought, it should be included early in the design process, specifically where use measures need to be built into a platform. Measuring use does take staff time, but could be built into existing tasks. Some ways to measure use include tracking data downloads, website views and time spent on a site, or in some cases uploads. Other methods include tracking feedback from automated forms, social media engagement, or sources citing the DVT.
- **Plan for the Future** – Design DVTs as templates or in formats that can incorporate new data sources, new indicators, and/or new visualizations possible as the tool is scaled or modified. Planning for costs and time to make changes should also be considered upfront.
- **Coordinate and Streamline Efforts** – DVT overload is a commonly noted problem. Streamlining efforts and reducing duplication should be a priority. This could include efforts to pull data from existing APIs, sharing tools, and working to harmonize global data and HMIS data rather than

creating new DVT. In some cases, supporting improved data quality or increased data use should be prioritized.

- **Create a Rubric** – Many organizations have created guidelines for DVT development, but comparing a tool against guidelines does not necessarily show a producer where or how to improve. Creating a one through five scale that assesses a DVT along a set number of key criteria would help users and producers think through DVT quality. Reflections on what to include are listed below.

### Draft Rubric Considerations

Component	Considerations
Audience	<ul style="list-style-type: none"> <li>● Is the DVT being designed for a specific audience and need?</li> <li>● Is there a specific decision-making purpose?               <ul style="list-style-type: none"> <li>○ Does an existing DVT already fulfill this need?</li> </ul> </li> <li>● Is the audience engaged throughout the development process?</li> </ul>
Indicators	<ul style="list-style-type: none"> <li>● Do the indicators tie to decision making goals and/or action?</li> <li>● Are indicators comparable with related DVTs?</li> <li>● Do indicators visualize an existing data source?</li> </ul>
Visualizations	<ul style="list-style-type: none"> <li>● Are the visualizations easy to understand?</li> <li>● Are the visualizations accessible to people with visual disabilities?</li> <li>● Do visualizations follow best practices for design and usability?</li> </ul>
User Needs	<ul style="list-style-type: none"> <li>● Is the DVT available in needed languages?</li> <li>● Is context included?</li> <li>● Is the data downloadable and/or is the DVT available offline?</li> </ul>
Sustainability	<ul style="list-style-type: none"> <li>● Have plans for dissemination and use measurement been included in the initial development process?</li> <li>● Would partnering with an existing DVT producer support your goals?</li> <li>● Can the DVT support new data, indicators, and/or visualizations?</li> </ul>
In an Emergency	<ul style="list-style-type: none"> <li>● What is the minimum viable product that will meet user needs?</li> <li>● How could the DVT be repurposed to fulfill a different user need after the emergency?</li> </ul>

## Annex 1: Desk Review of Documents and References

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## Annex 2: List of Stakeholders Consulted (KIIs)

	Organization	Individual	Title
1	Global Financing Facility/World Bank	Kimberly Boer John Borrazzo Jessica Rae Brown	Senior Health Advisor Senior Health Specialist Data Analyst
2	African Leaders Malaria Alliance	Melanie Renshaw	Senior Malaria Advisor
3	US Agency for International Development	William Weiss	Senior Monitoring & Evaluation Advisor
4	United Nations Population Fund	Petra ten Hoope-Bender Jean-Pierre Monet	Technical Adviser Sexual and Reproductive Health & Rights Technical Specialist Health System and Reproductive Health
5	African Budget Network	Aminu Magashi Garba	Coordinator & Founder
6	Save the Children	Mary Kinney	Researcher and Doctoral candidate
7	White Ribbon Alliance	Kristy Kade Diana Copeland	Deputy Executive Director Senior Communications Officer
8	The Partnership for Maternal, Newborn & Child Health	Helga Fogstad Vanessa Brizuela Lori McDougall	Executive Director Technical Officer Team Coordinator
9	UNICEF – Division of Data, Analysis, Planning and Monitoring	Savjeet Brar Samuel Chakwera Tyler Porth Lauren Francis Xinhu Wang Chibwe Lwamba	Statistics Officer, HIV/AIDS Consultant - Data & Analytics Section Statistics Specialist, Health Statistics Consultant Statistics Consultant Statistics Specialist, HIV
10	London School of Hygiene & Tropical Medicine	Joy Lawn	Professor
11	Federal University of Pelotas	Aluisio J D Barros	Professor
12	UNAIDS	Taavi Erkkola	Workstream lead, Monitoring and reporting
13	WHO – MNCH and Aging Department	Theresa Diaz	Unit Chief Epidemiology and Monitoring and Evaluation Unit
14	Every Woman Every Child Secretariat	Vivian Lopez	Executive Coordinator
15	Options-Evidence for Action	Esther Agbon	Deputy Country Lead & Senior Health Financing Advisor
16	UNICEF Eastern & Southern Africa Regional Office	Braeden Rogers	Health Specialist

17	CORE Group	Lisa M. Hilmi	Executive Director
18	African Population and Health Research Center	Patterson Siema Catherine Kyobutungi	Director, Policy Engagement & Communications Executive Director
19	Management Sciences for Health	Amy Boldosser-Boesch	Senior Director, FCI Program of MSH & Women's, Children's, & Adolescents' Health Practice Area Lead, Health Policy, Advocacy & Engagement
20	UNICEF- Division of Data, Analytics, Planning & Monitoring	Jan Beise	Statistics Specialist
21	Ministry of Health - India	DK Ojha	Deputy Director General in Statistics Division
22	Ministry of Health - Afghanistan	Mohammad Saber Perdes	Senior advisor to the minister of Health
23	UNICEF - Implementation Research & Delivery Science Unit, Health Section	Rocco Panciera	Health Specialist - Geographic Information Systems

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Development Gateway  
1110 Vermont Ave NW, Suite 500  
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+1 (202) 572-9200



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