

State of Art: Digital tools for health measurement and accountability for the post-2015 Era

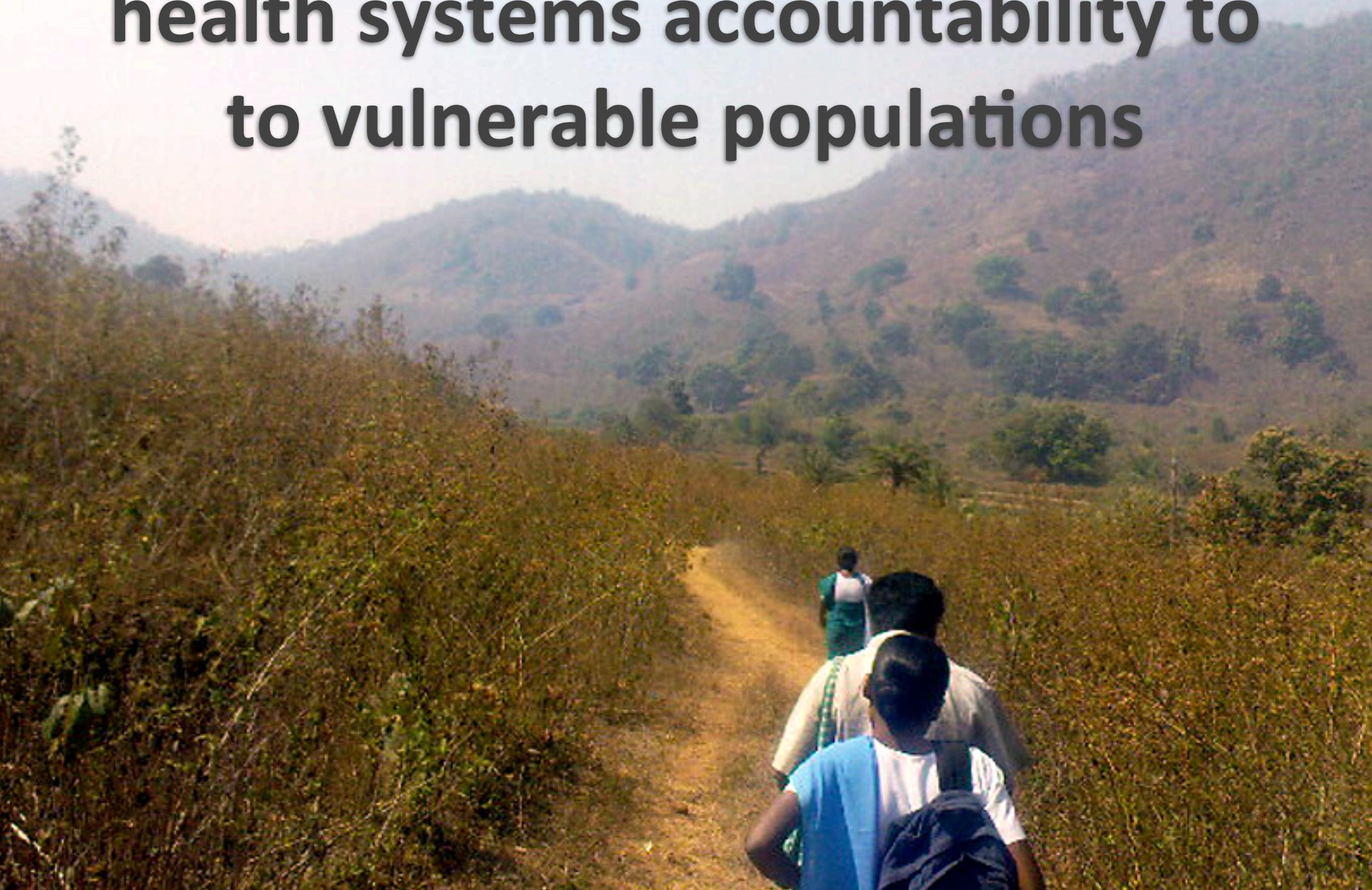
**Dr. Garrett Mehl, Scientist, Department of Reproductive Health
Geneva, Switzerland**



Overview

- Legacy systems persist in environments where formidable challenges remain
- Universal Health Coverage, measurement and Accountability
- The critical role of integrated national-level digital tools to drive quality, coverage, affordability, and accountability

Persistent challenges to ensuring health systems accountability to vulnerable populations



Public Health Interventions of known efficacy exist and are well described



mehlg@who.int



Universal Health Coverage

“All people, irrespective of socioeconomic status, should have access to quality health services they need, without incurring financial hardship.”

Universal Health Coverage Core Principles

Coverage

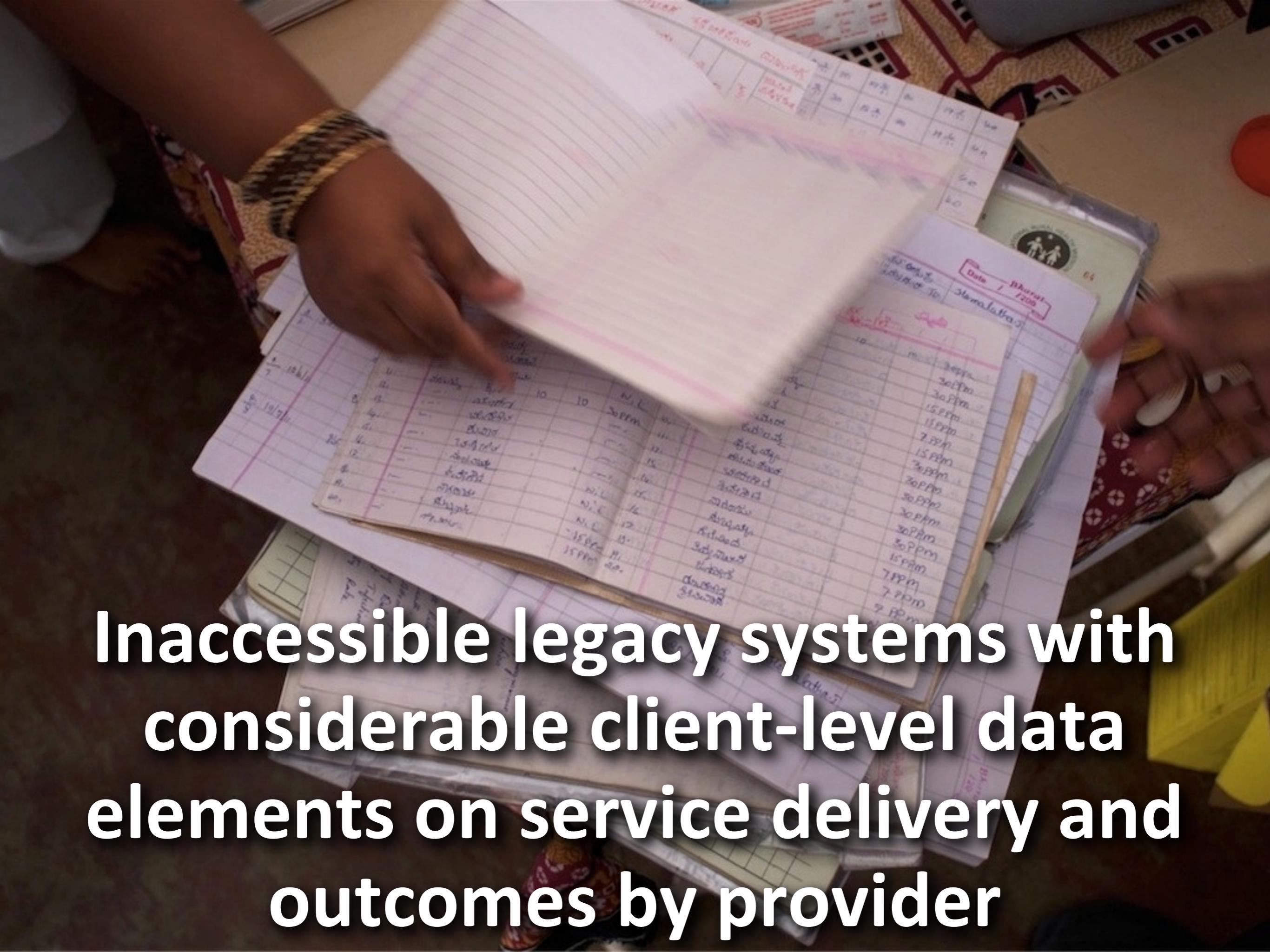
Quality

Affordability

Responsive accountability

Elements critical to success:

- Knowing **who is in need of services**, having the **necessary human resources** and **commodities in adequate supply**, and **connecting these together** at the right time and place.



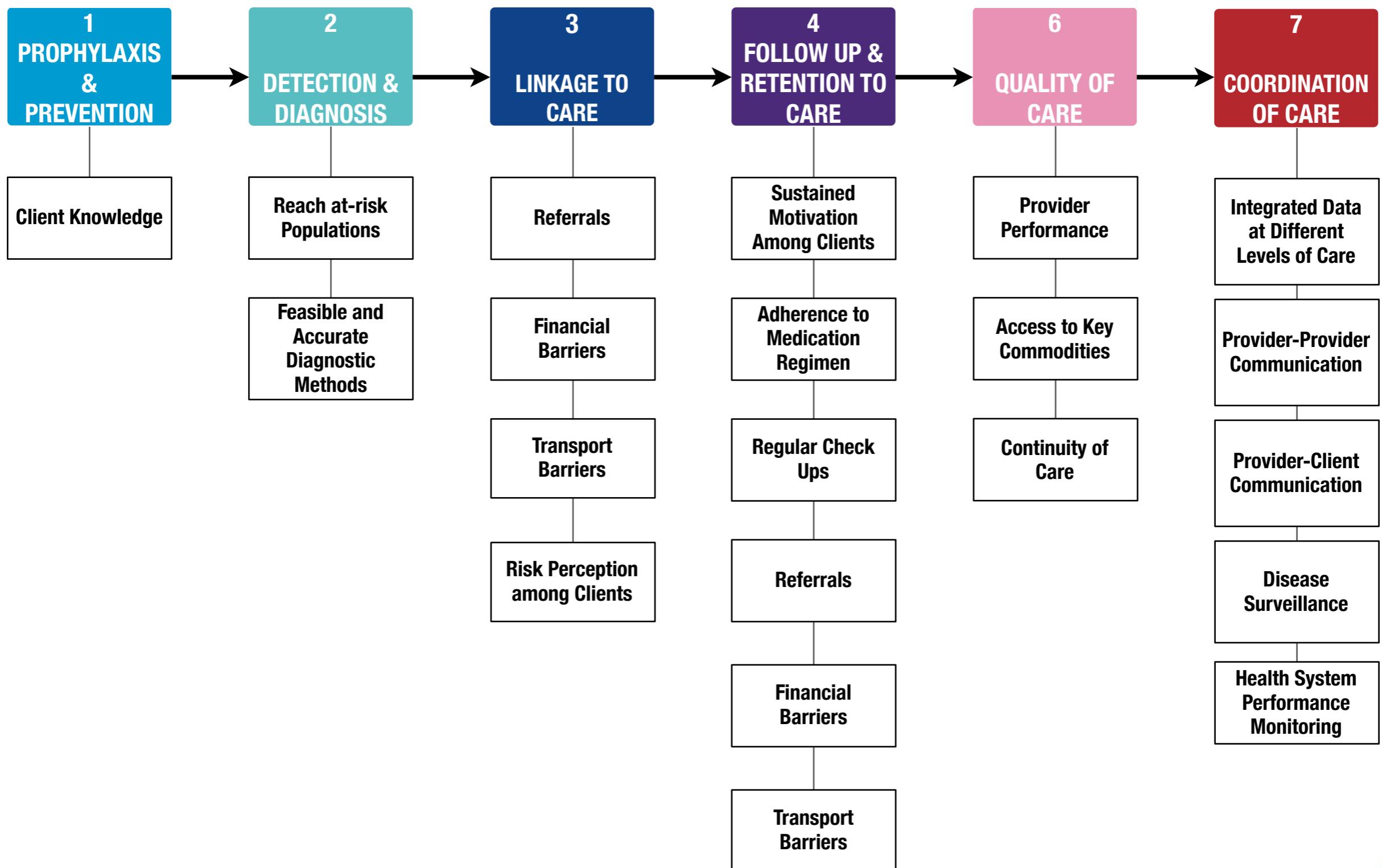
Inaccessible legacy systems with
considerable client-level data
elements on service delivery and
outcomes by provider

Data collection, screening
service delivery and
reporting are four
se pa ra te
functions

Typical Current Situation

- Dominant paper systems are used in a **sub-standard manner**; digital systems still emerging, but uncoordinated
- **Limited access to and usability** of resulting data
- **Data collected** is often not used to guide health workforce point of care care service provision, or decision-maker supervision or planning
- Statistical **modelling** and data estimations are used to **fill gaps for planning and decision-making**
- Most routine digital systems are **not nationally scaled**
- Few digital systems **interoperate** with other tools, or use **common data standards**

Challenge Domains Related to TB/HIV care



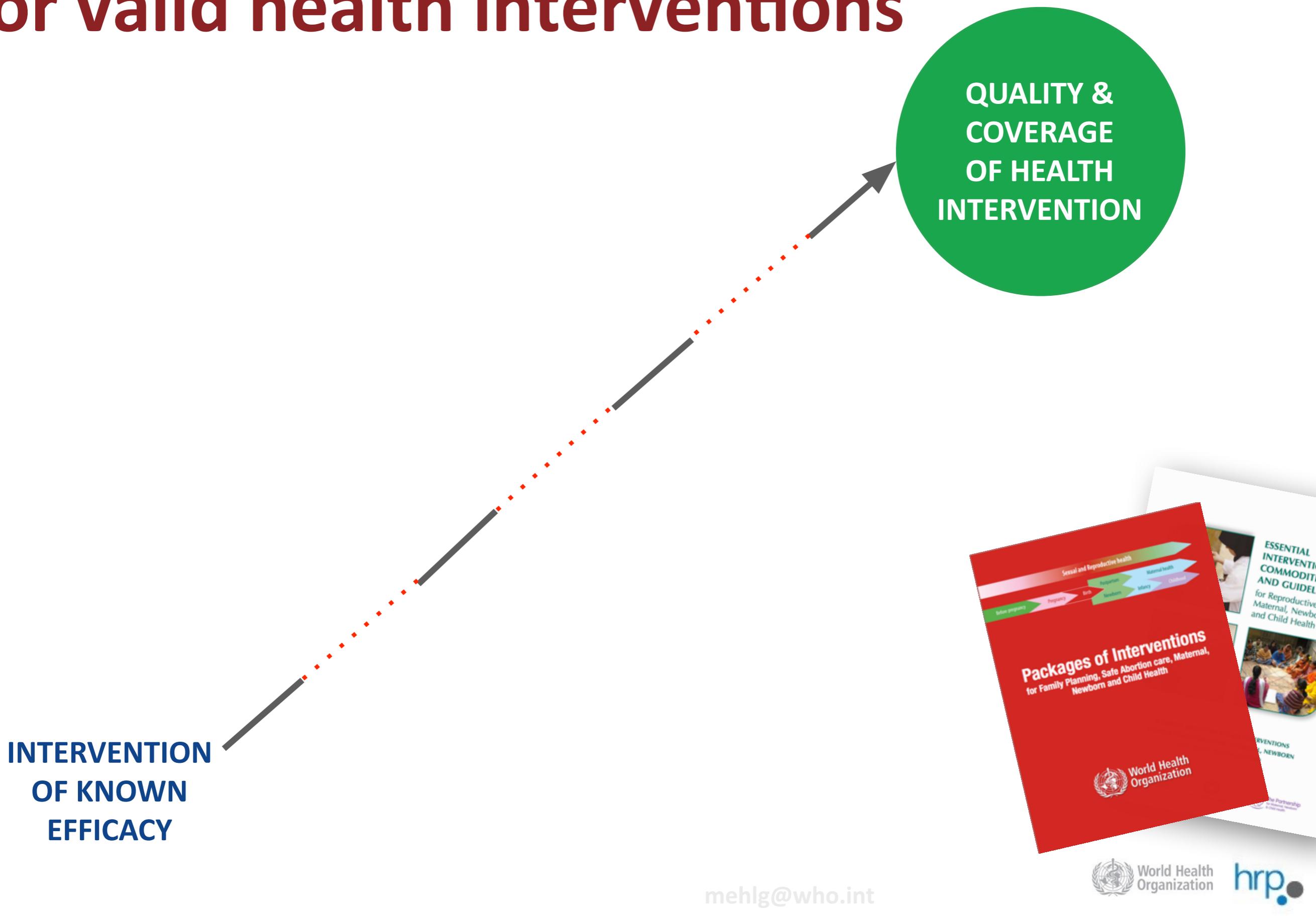
mHealth strategies as catalysts for valid health interventions



mehlg@who.int



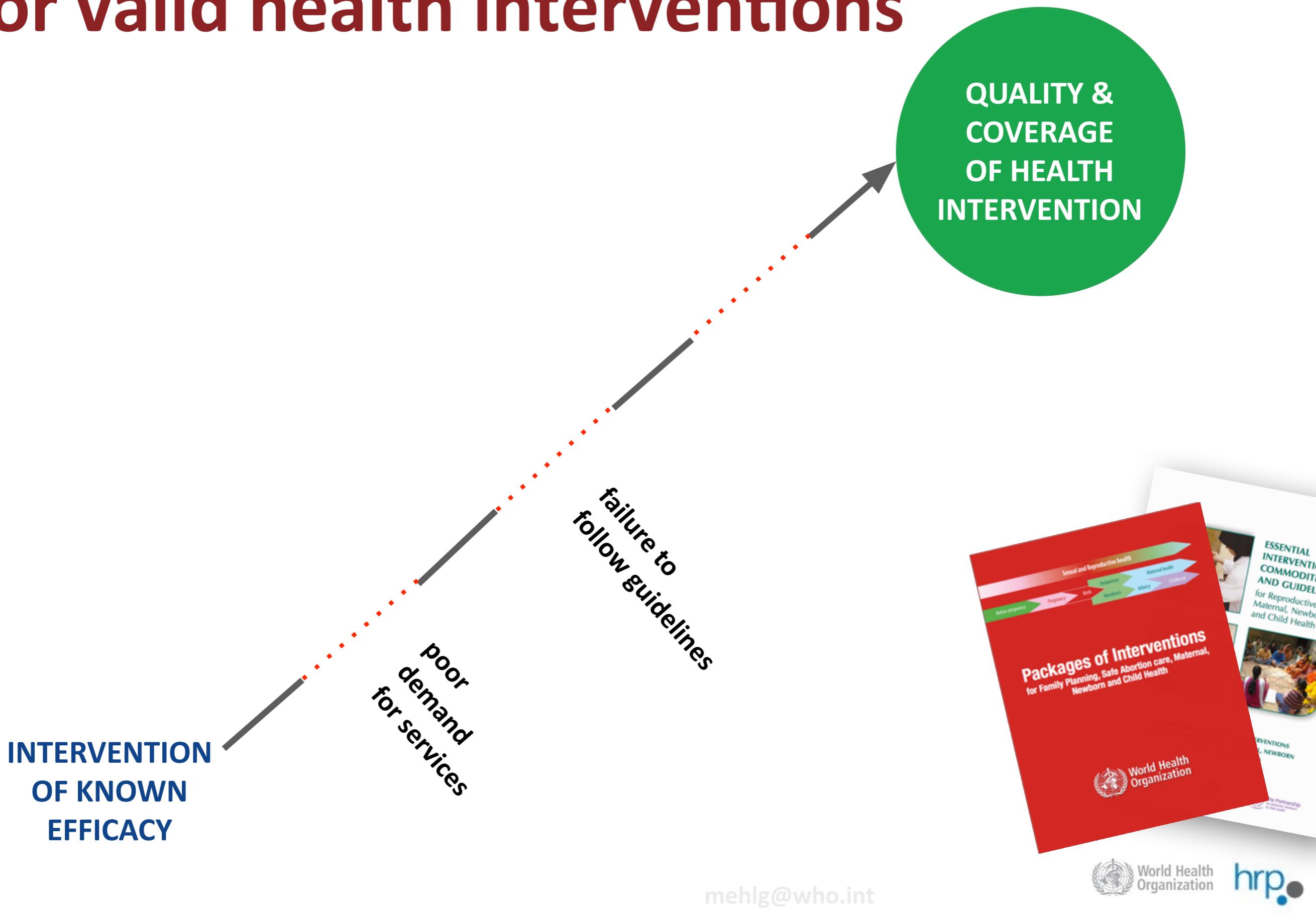
mHealth strategies as catalysts for valid health interventions



mHealth strategies as catalysts for valid health interventions



mHealth strategies as catalysts for valid health interventions



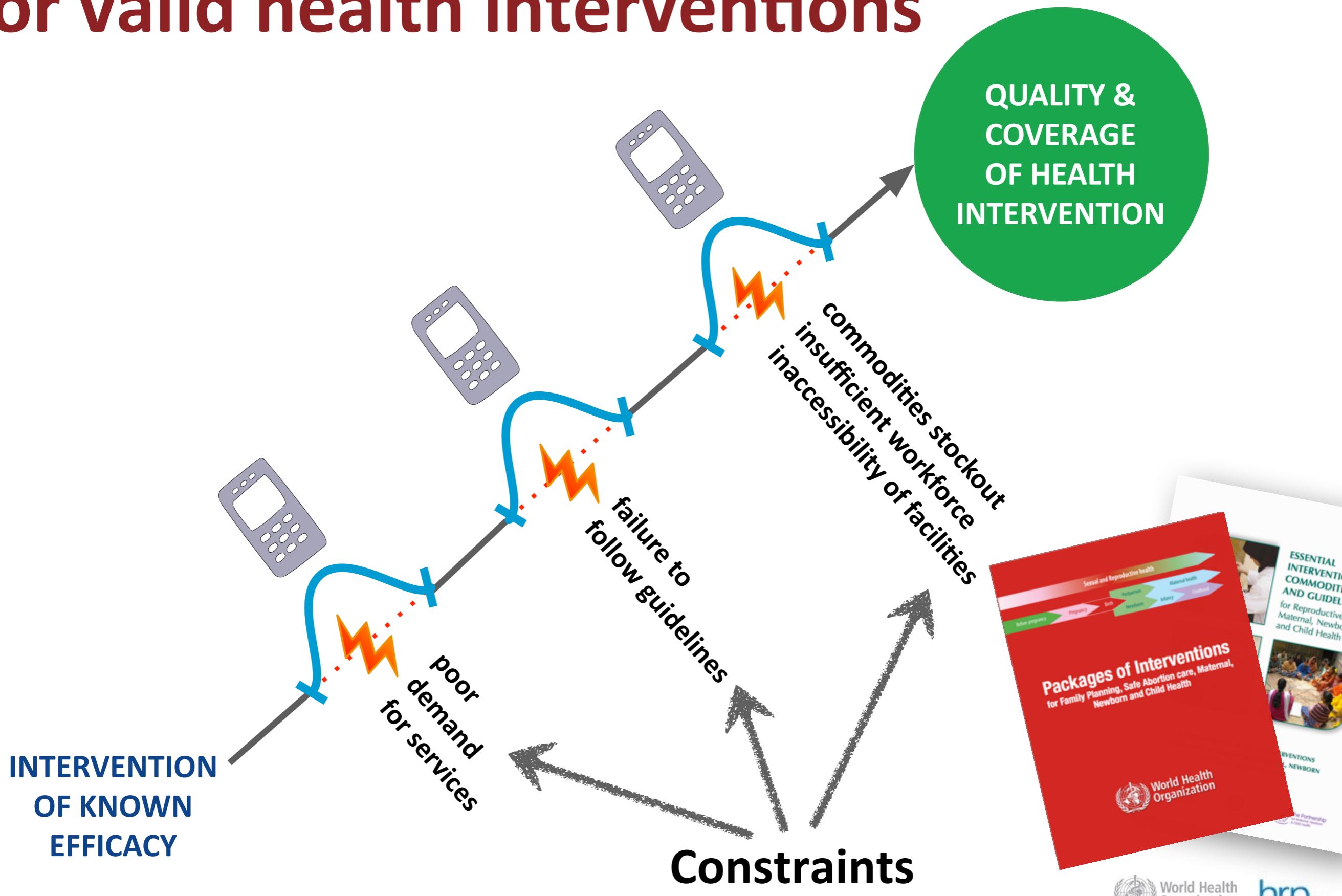
mHealth strategies as catalysts for valid health interventions



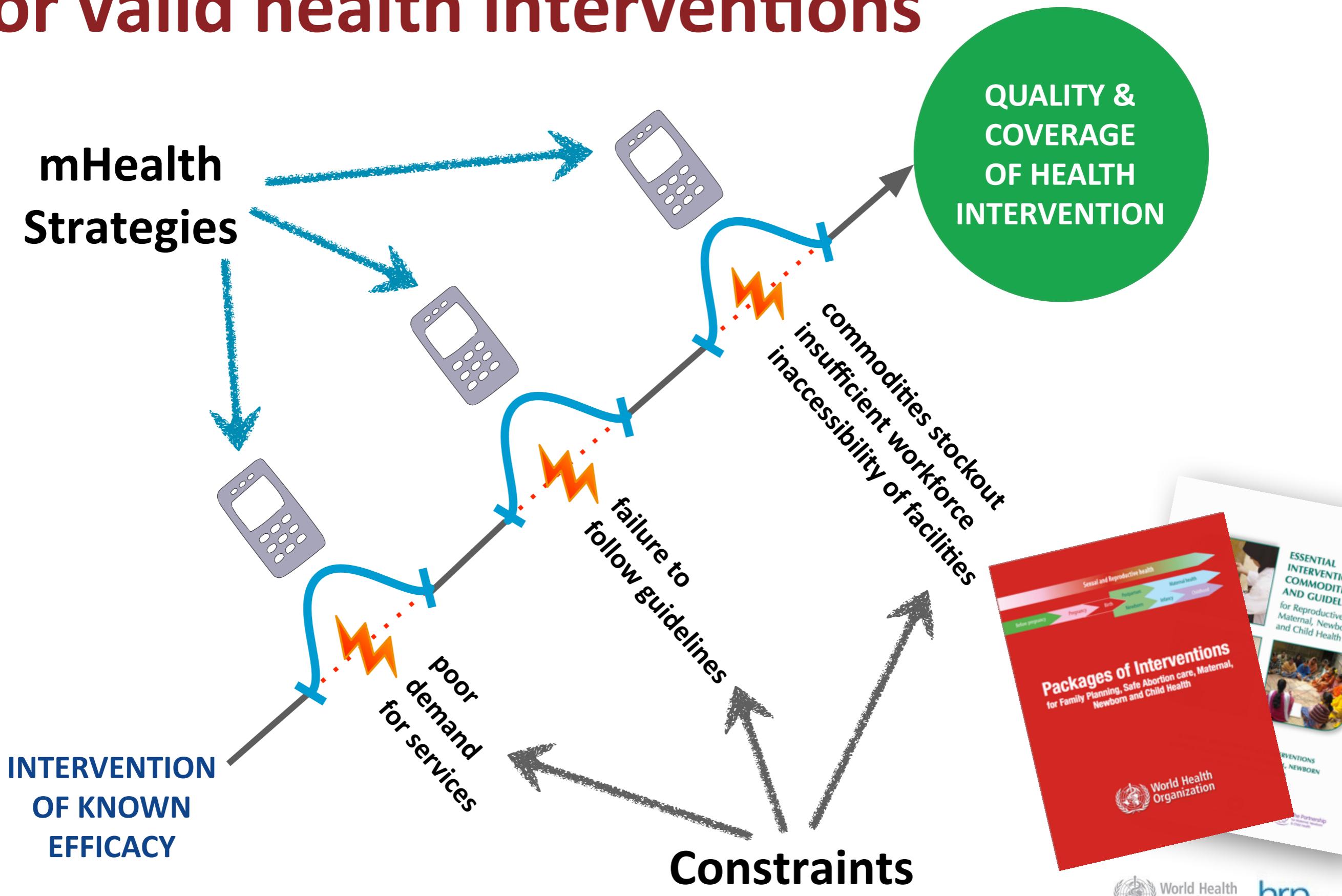
mHealth strategies as catalysts for valid health interventions



mHealth strategies as catalysts for valid health interventions



mHealth strategies as catalysts for valid health interventions



m/eHealth is not Monolithic: 12 domains of mHealth Usage

- 1 Client education & behaviour change communication (BCC)
- 2 Sensors & point-of-care diagnostics
- 3 Registries / vital events tracking
- 4 Data collection and reporting
- 5 Electronic health records
- 6 Electronic decision support (information, protocols, algorithms, checklists)
- 7 Provider to provider communication (user groups, consultation)
- 8 Provider workplanning & scheduling
- 9 Provider training & education
- 10 Human resource management
- 11 Supply chain management
- 12 Financial transactions & incentives

GHSP GLOBAL HEALTH: SCIENCE AND PRACTICE
Dedicated to what works in global health programs
OPEN ACCESS

TECHNICAL CONCEPT

**mHealth innovations as health system strengthening tools:
12 common applications and a visual framework**

Alain B Labrique,^a Lavanya Vasudevan,^a Erica Kochi,^b Robert Fabricant,^c Garrett Mehl^d

This new framework lays out 12 common mHealth applications used as health systems strengthening innovations across the reproductive health continuum.

Global Health Sci Pract Advance Access Article published on August 6, 2013 doi: 10.7455/GHSP-D-13-0031

The rapid proliferation of mHealth projects—albeit mainly pilot efforts—has generated considerable enthusiasm among governments, donors, and implementers of health programs.¹ In many instances, these pilot projects have demonstrated conceptually how mHealth can alleviate specific health system constraints that hinder effective coverage of health interventions.²

Large-scale implementation or integration of these mHealth innovations into health programs has been limited, however, by a shortage of empirical evidence supporting their value in terms of cost performance, and health outcomes.¹⁻⁴ Governments in low- and middle-income countries face numerous challenges and competing priorities, impeding their ability to adopt innovations.² Thus, they need robust, credible evidence about mHealth projects in order to consider mHealth alongside essential health interventions, and guidance about which mHealth solutions they should consider to achieve broader health system goals.² Their tolerance for system instability or failure can be low, even when the status quo may be equally, or more, unreliable.

Current larger-scale effectiveness and implementation research initiatives are working to address the evidence gaps and to demonstrate the impact of mHealth investments on health system targets.³ Other efforts are underway to synthesize such findings.⁵

MHEALTH AS A HEALTH SYSTEMS STRENGTHENING TOOL

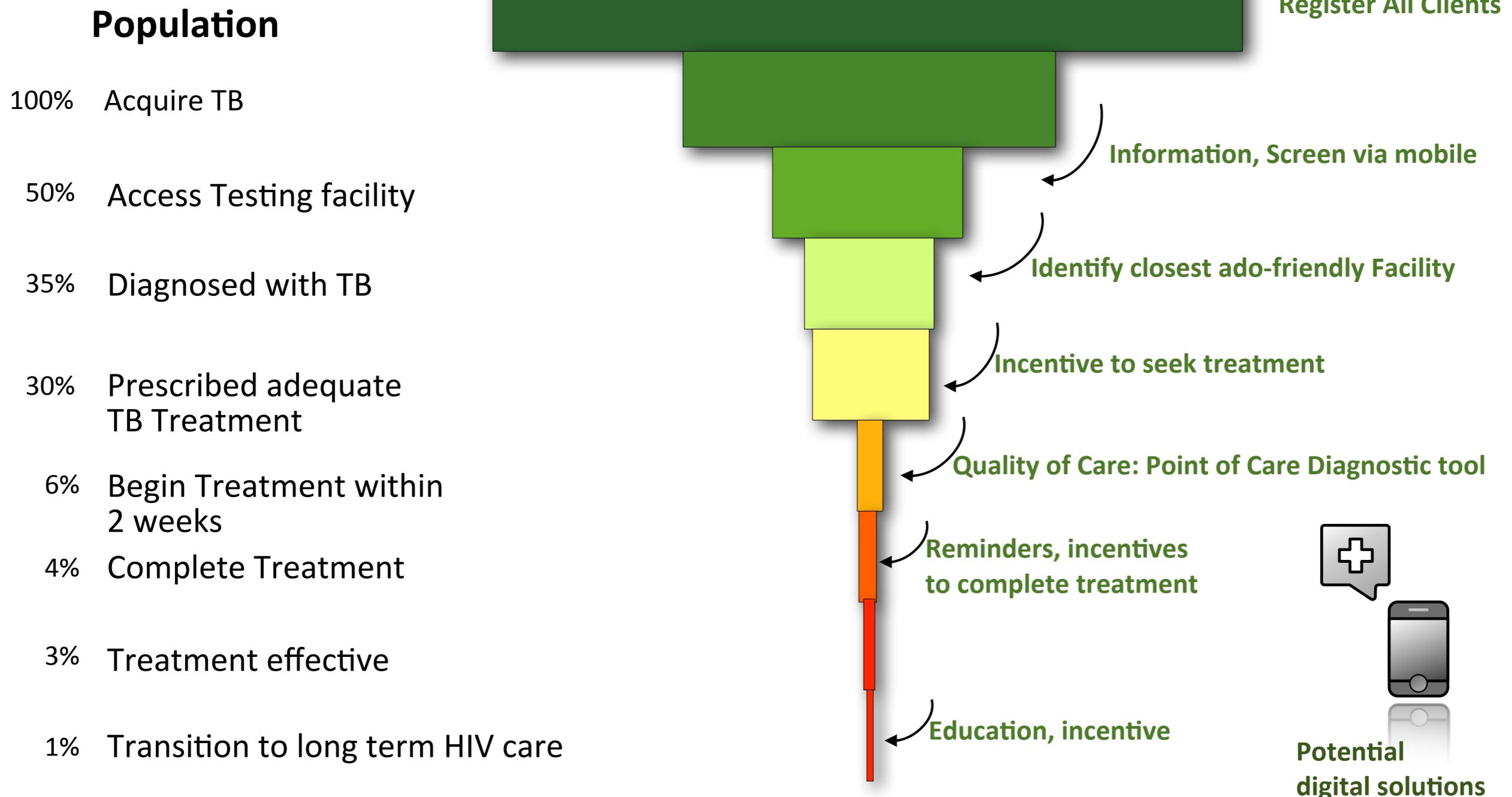
Recent mHealth reviews have proposed that innovators focus on the public health principles underlying

^a Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
^b United Nations Children's Fund (UNICEF), New York City, NY, USA
^c frog Design, New York City, NY, USA
^d World Health Organization, Geneva, Switzerland
Correspondence to Garrett Mehl [mehlg@who.int].

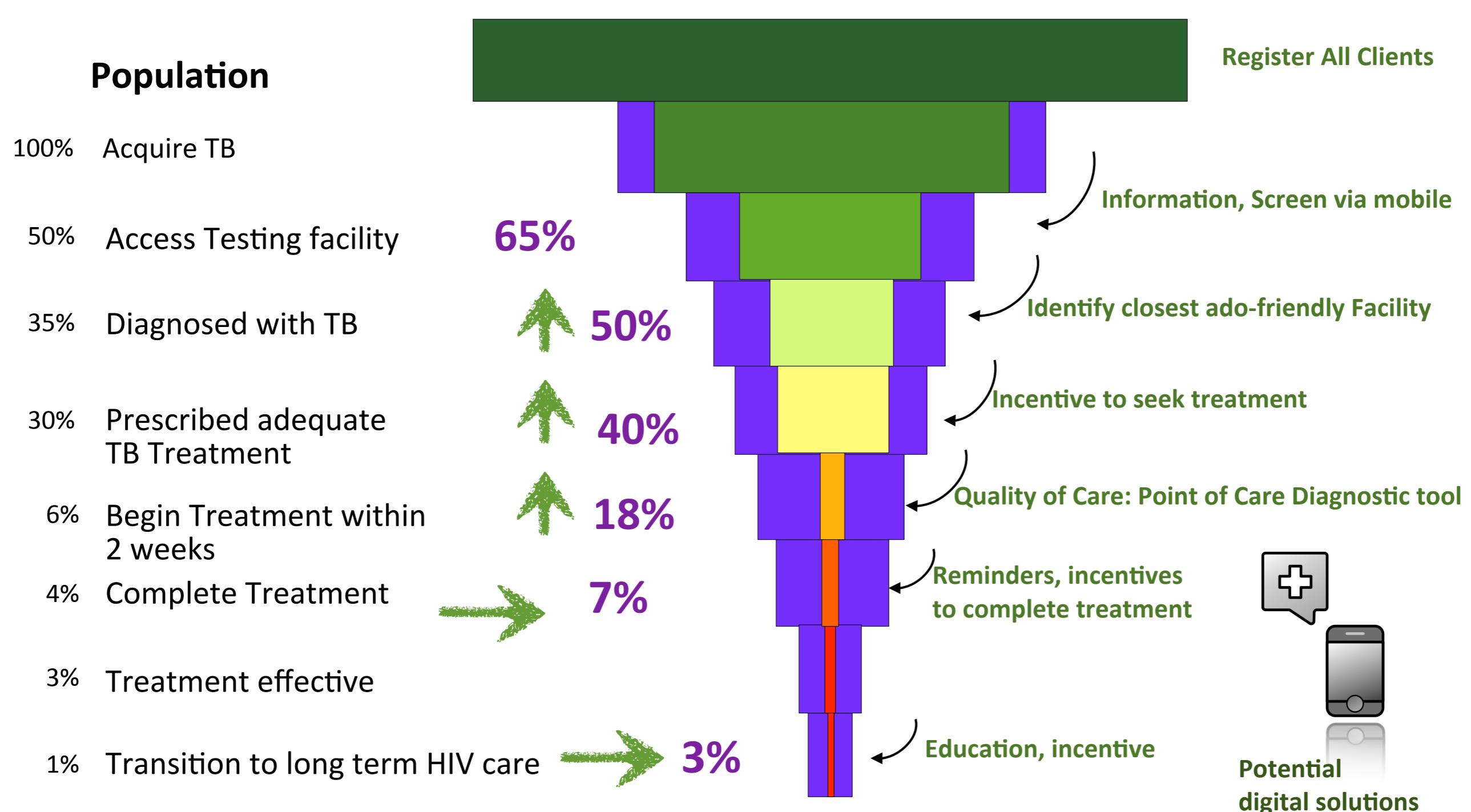
Global Health: Science and Practice

Ref: Labrique AB, Vasudevan L, Kochi E, Fabricant R, Mehl G. mHealth innovations as health system strengthening tools: 12 common applications and a visual framework. Global Health: Science and Practice. 2013 Aug 15;1(2):160–71.

Digital innovations to overcome Health System challenges



Potential intervention improvement resulting from digital strategies



What is needed

- Accurate measurement and effective accountability require strong **integrated information systems**, driven by country needs and uses.
- Robust digital tools that are complementary, offering value at **different levels** and across **health domains** in the health system,
- Digital tools that interoperate through **technical and semantic standards**, and share the same “**denominators**” - to define target populations

Integrated digital systems for Universal Health Coverage

Quality

Coverage

Affordability

Measurement & Accountability

Best practices

- Enumeration of population, with defined criteria for target populations
- health cadre specific digital tools with evidence-based content that reflects domains of health and existing information- and work-flows
- Standardized data elements and indicators, and reporting frameworks
- Use of individual identifiers and records that are persistent and ensure continuity of care
- Systematic and routine screening for identification of disease states and life stages, and mechanisms or referral
- Consistent user interface elements across deployments facilitating replicable training methodology approaches

Illustrative National Digital Health Information System Requirements and example tools



Illustrative National Digital Health Information System Requirements and example tools



Illustrative National Digital Health Information System Requirements and example tools



Illustrative National Digital Health Information System Requirements and example tools



Illustrative National Digital Health Information System Requirements and example tools



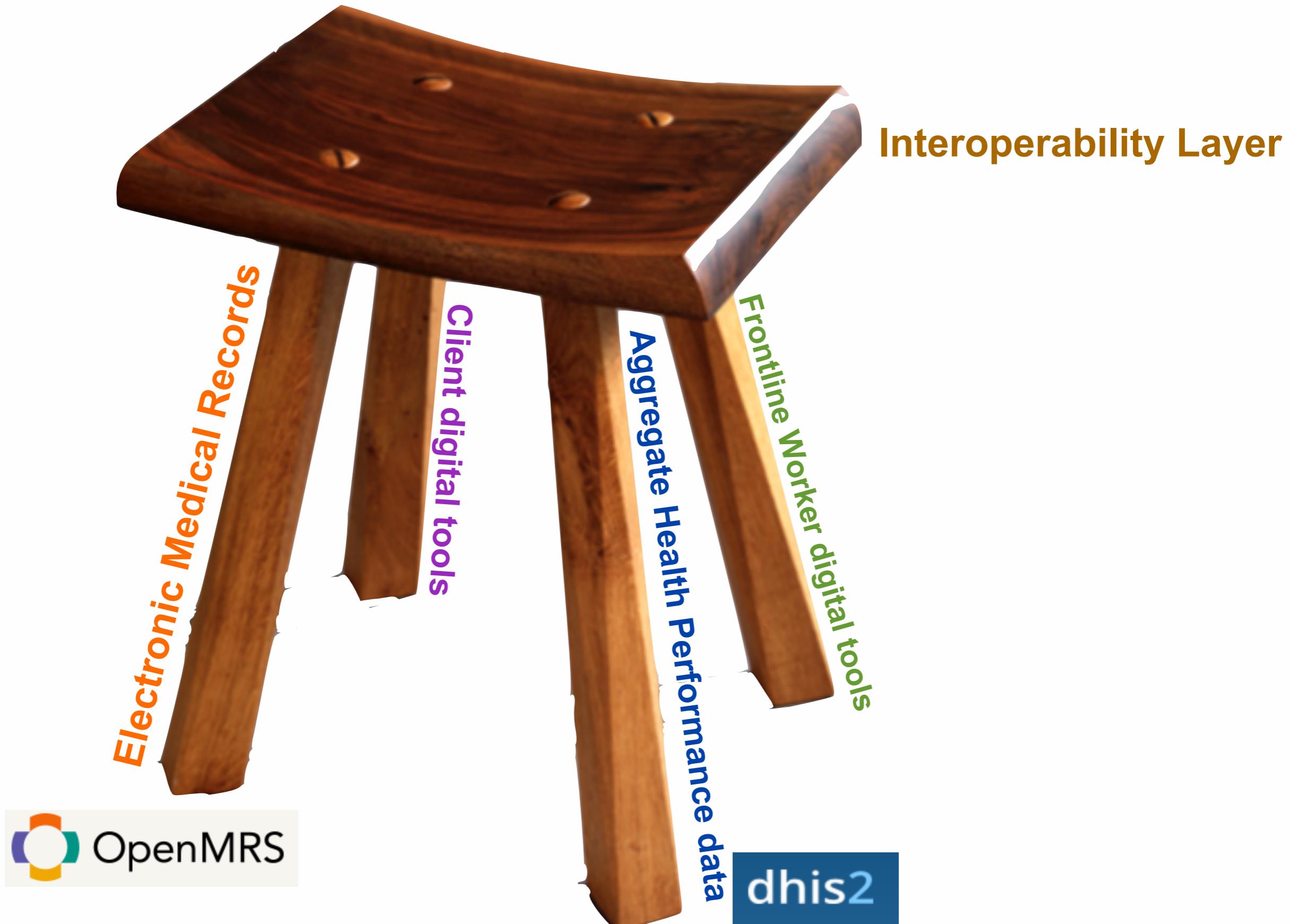
Illustrative National Digital Health Information System Requirements and example tools



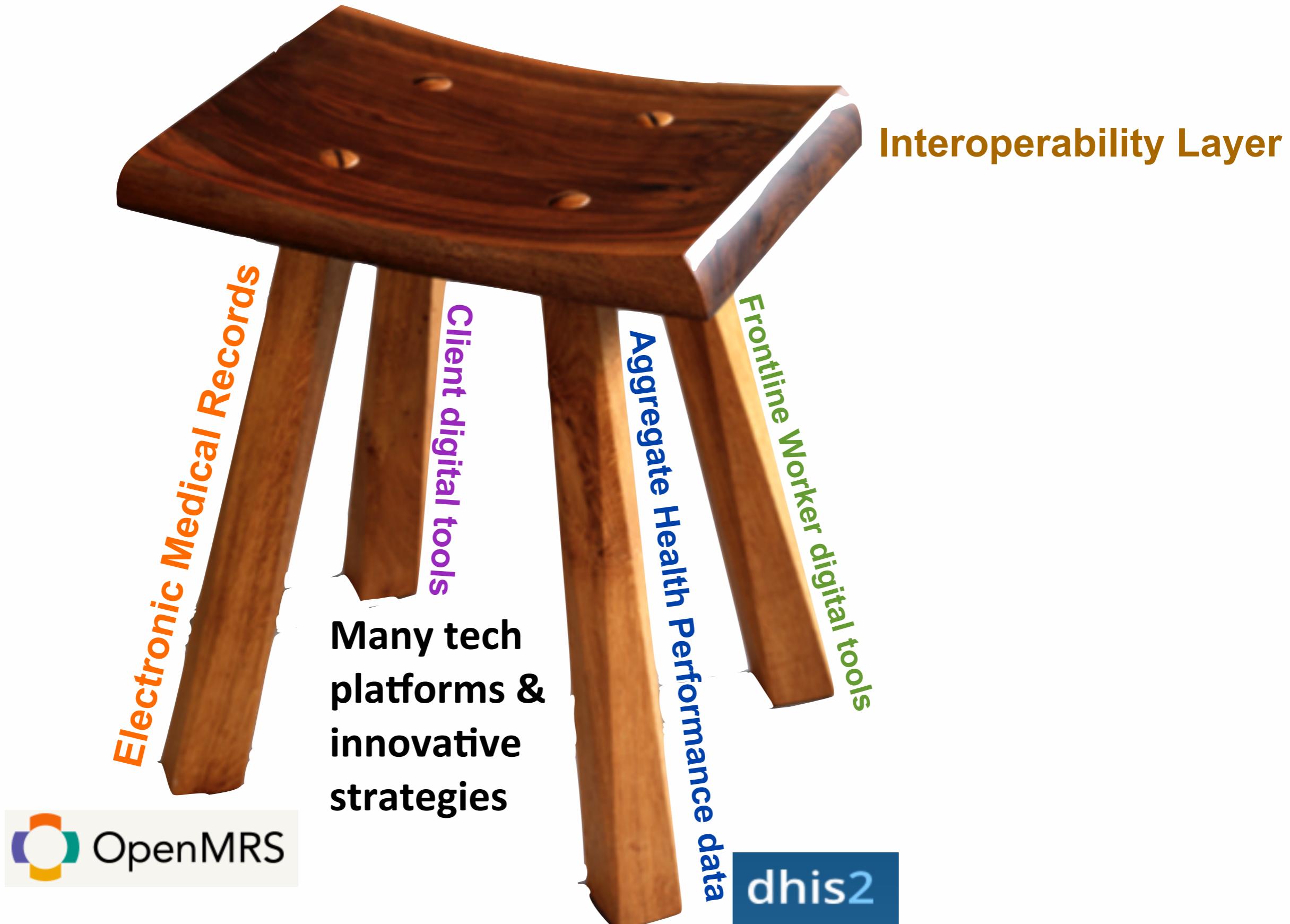
Illustrative National Digital Health Information System Requirements and example tools



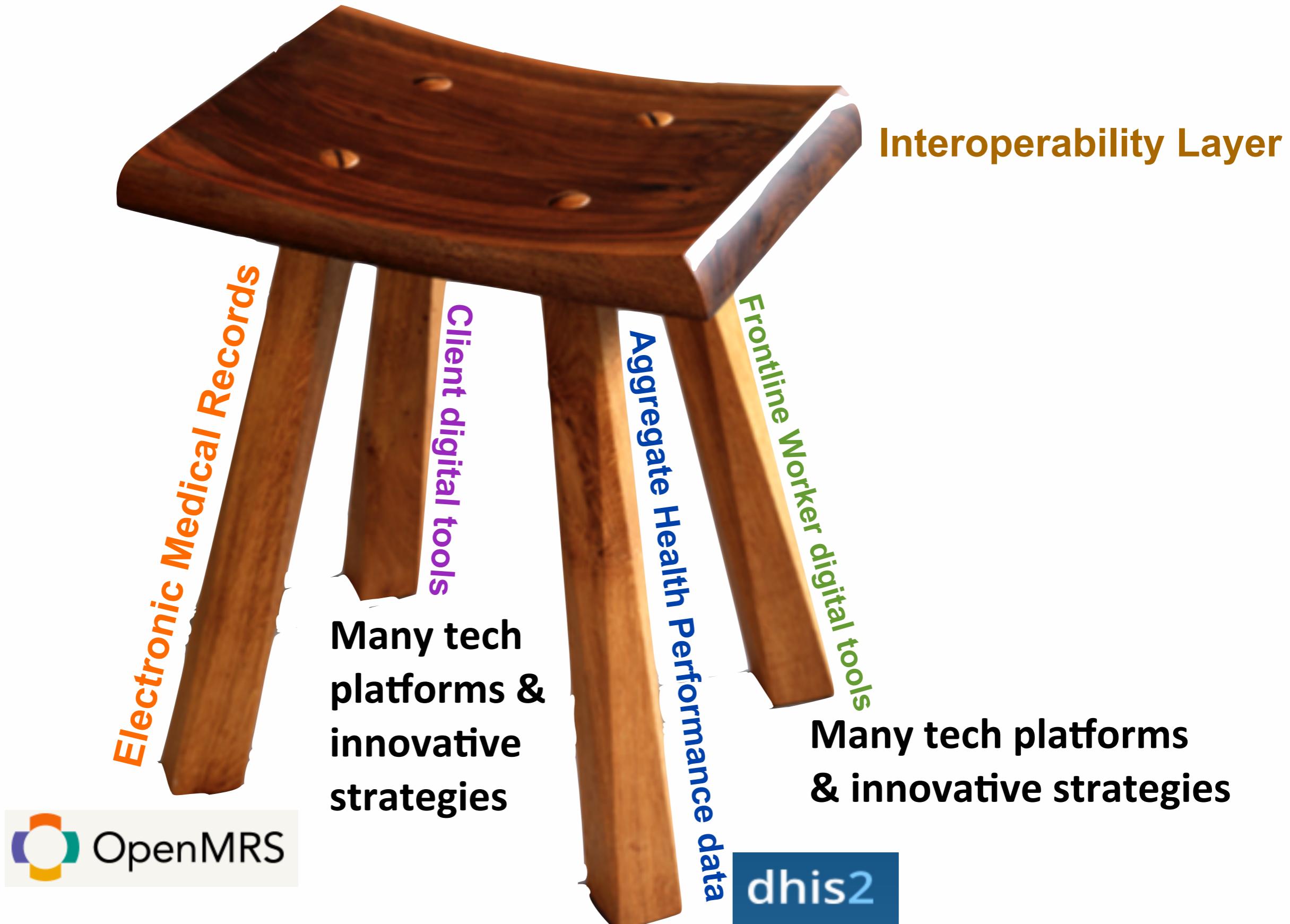
Illustrative National Digital Health Information System Requirements and example tools



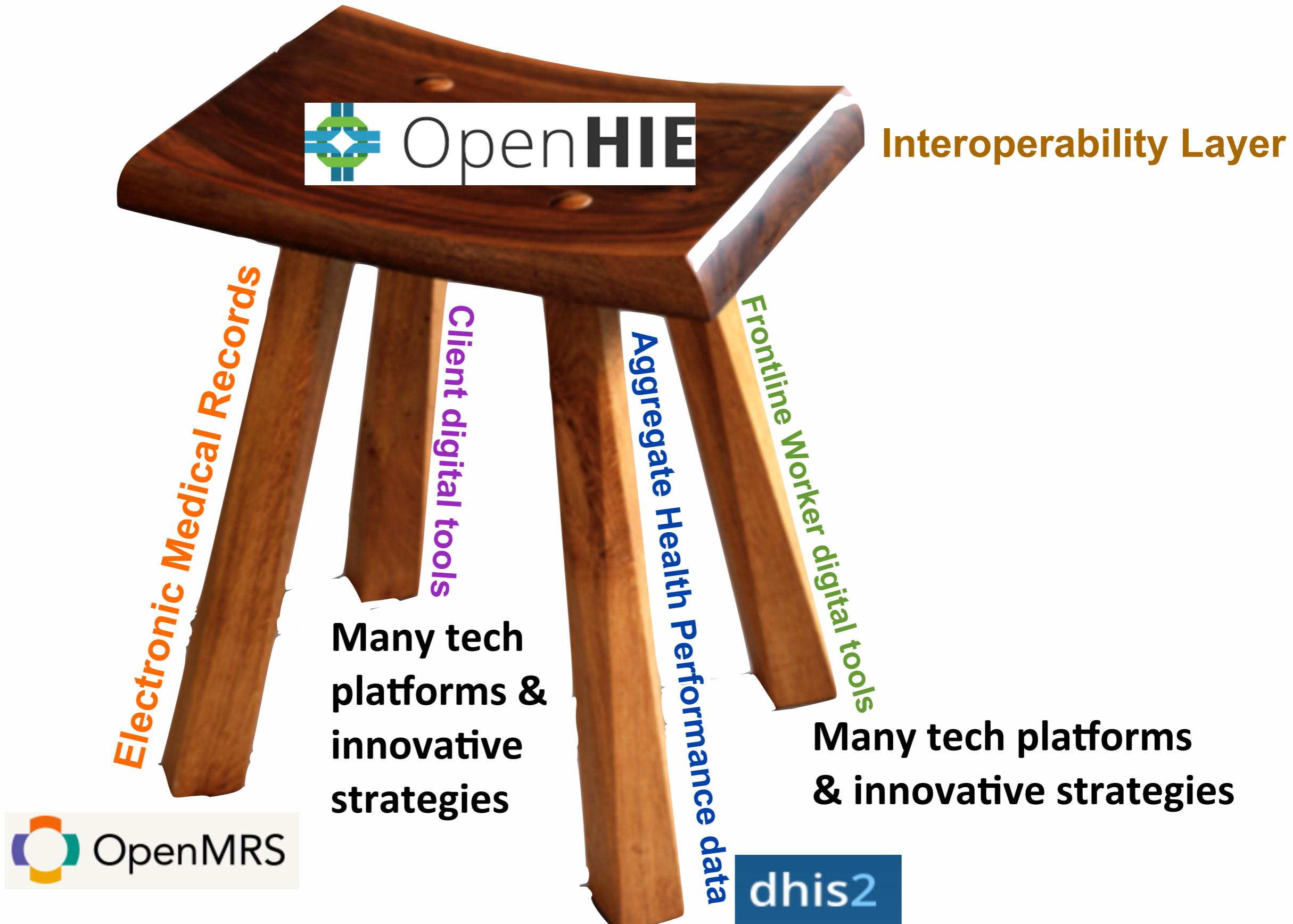
Illustrative National Digital Health Information System Requirements and example tools



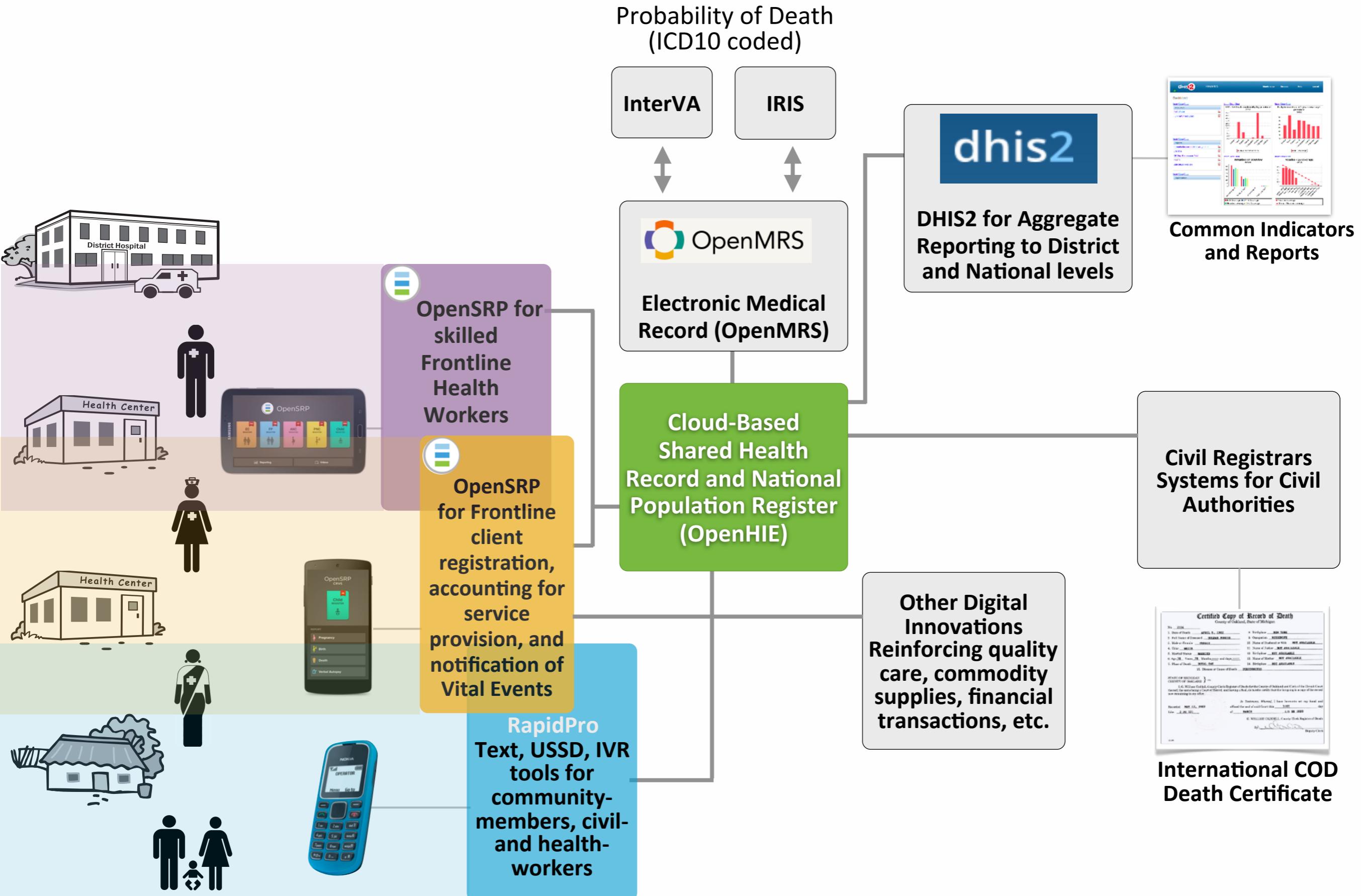
Illustrative National Digital Health Information System Requirements and example tools



Illustrative National Digital Health Information System Requirements and example tools



Illustrative National Architecture Systems: Digitizing Routine HIS to enhance integrated real-time data





OpenHIE Architecture

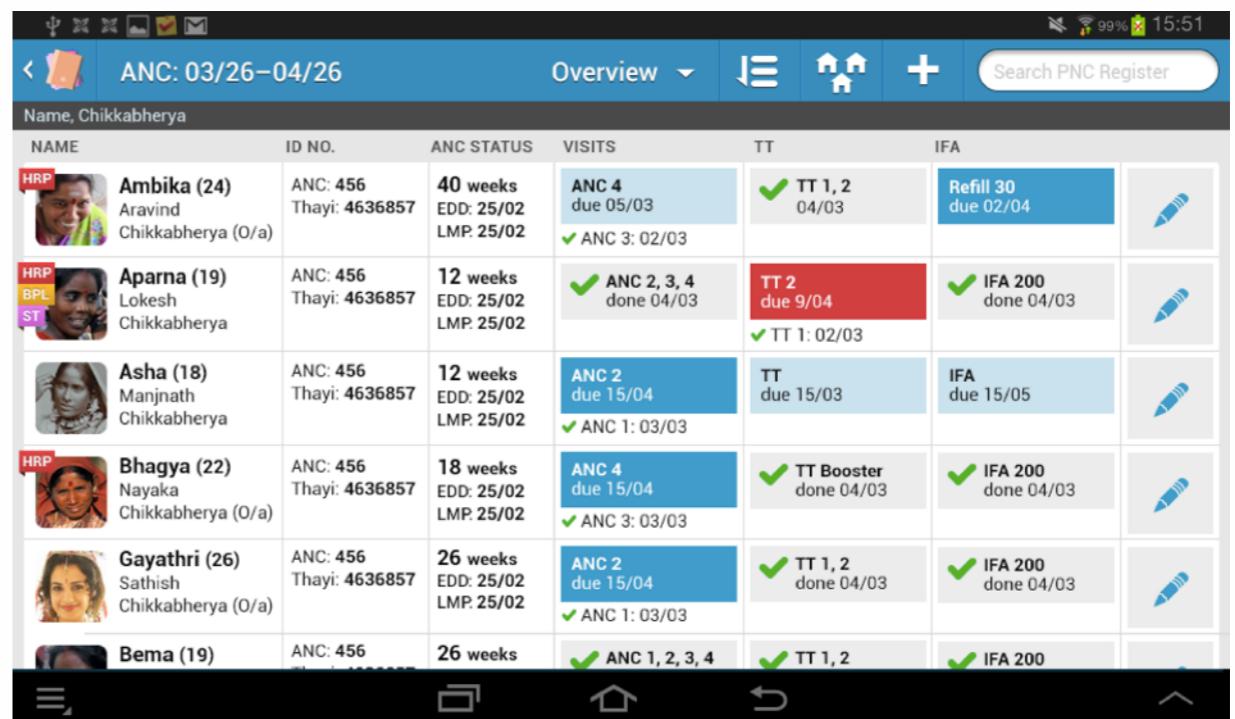
Clinic ID	Health ID	Name	Pregnant	EDD	ANC1	ANC2
5	65295	Oumou	No	13/12/13	8/9/13	
4	26246	Mariam	Yes	10/11/13	10/9/13	10/10/13

Facility Level

Health ID	95241
Name	Fatimata
Pregnant	Yes
EDD	15/11/13
Number Children	3
Husband's Name	Amadou
Mobile	0724 422 4245



Community Level





Open Smart Register Platform

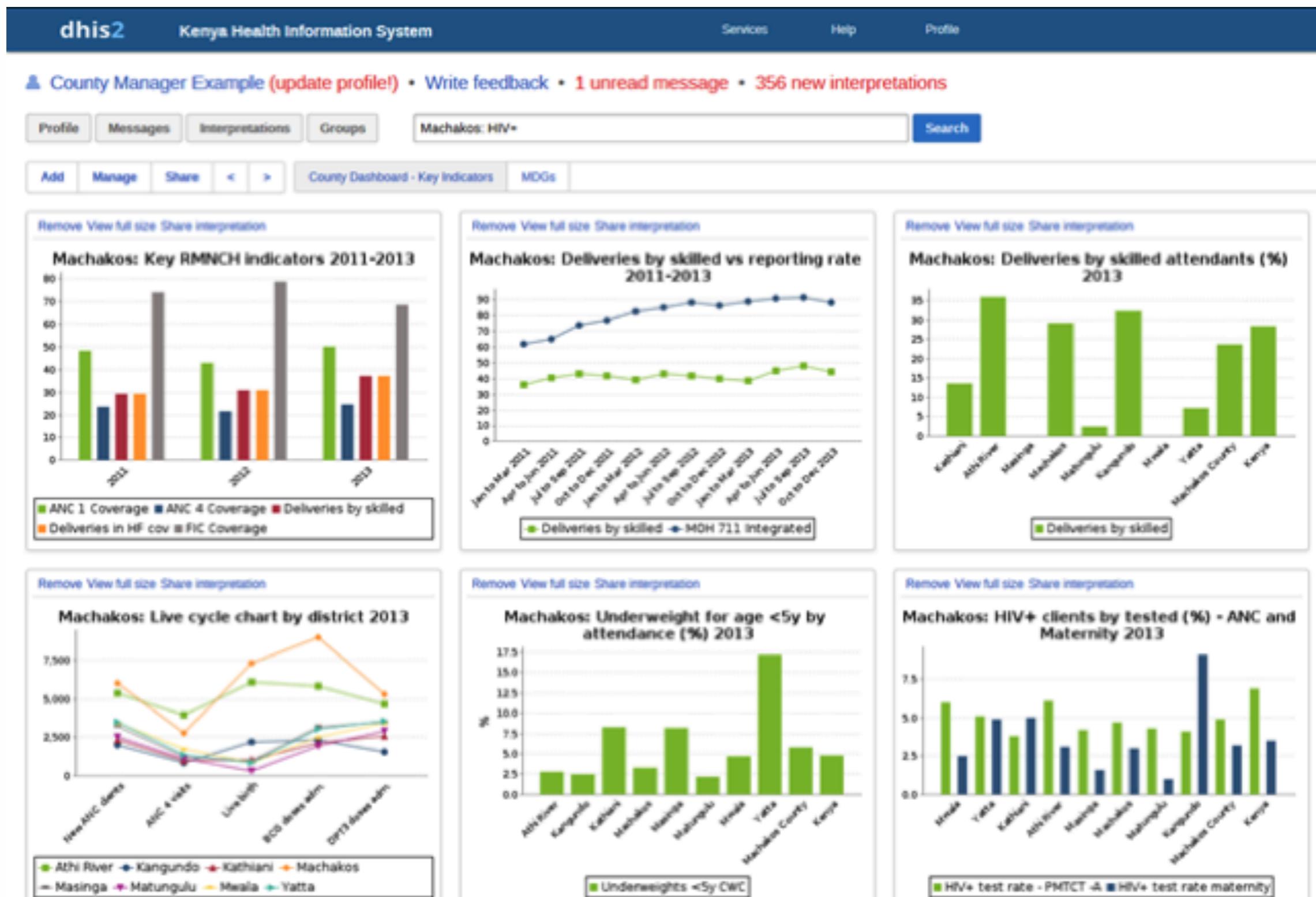
OpenSRP

OpenSRP is an open source mobile health platform that allows frontline health workers to electronically register and track the health of their entire client population.

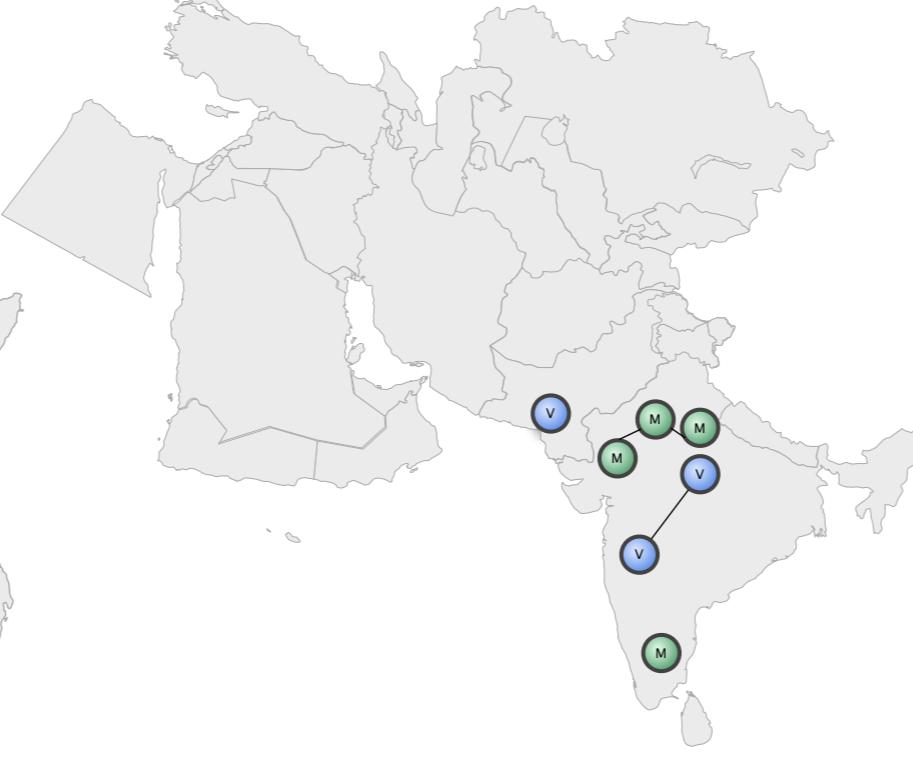
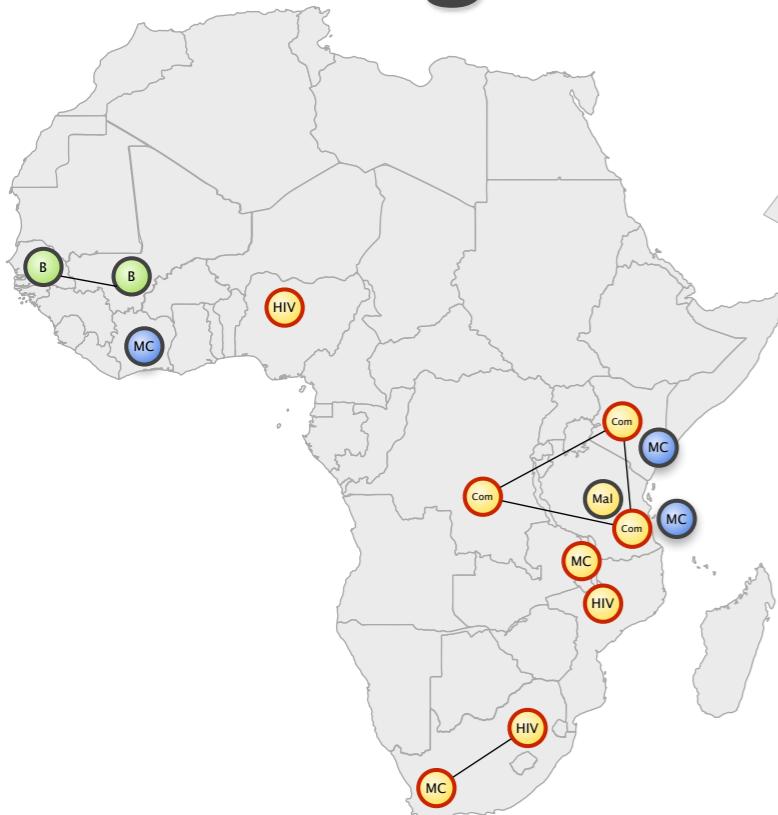


Connecting Frontline Health Workers to National Systems

DHIS2 for Aggregate monitoring



UN IWG mHealth Catalytic Grantee digital innovations for health MDGs



INNOVATE EVALUATE
SCALE UP IMPROVE
LTH RESEARCH
LULATE SCALE
ROVE INNOVATE
LULATE SCALE UP
ROVE HEALTH

INNOVATE EVALUATE
SCALE UP IMPROVE
LTH RESEARCH
LULATE SCALE UP
ROVE INNOVATE
LULATE SCALE UP
ROVE HEALTH

INNOVATE EVALUATE
SCALE UP IMPROVE
LTH RESEARCH
LULATE SCALE UP
ROVE INNOVATE
LULATE SCALE UP
ROVE HEALTH

Innovations CATALYST[®]
Innovate-Evaluate-Scale up-Improve health

Innovations CATALYST[®]
Innovate-Evaluate-Scale up-Improve health

Innovations CATALYST[®]
Innovate-Evaluate-Scale up-Improve health

Supporting treatment of childhood malnutrition in Zanzibar —D-tree International's eNUT

Malnutrition is a disease that threatens the lives of children, especially in developing countries. It is a serious health problem in Zanzibar, where nearly 12% of children suffer from acute malnutrition (1). Acute malnutrition is an entirely treatable condition, but when it becomes severe acute malnutrition (SAM, defined by very low weight for height) it is a life-threatening condition requiring urgent treatment. Sadly, the limited data available in Zanzibar up to 2009 show that 20–30% of children who were admitted with SAM died despite receiving treatment. If children with SAM are treated according to the WHO-UNICEF standard treatment guidelines, case-fatality rates can be reduced to as low as 5% (2). However, implementing the guidelines can be challenging as the process depends on information from health records, which are often incomplete or difficult to interpret.

The nutrition software, eNUT, streamlines the management of information and supports the decision-making needs of health workers, helping them to implement the national guidelines for providing effective treatment to children suffering from malnutrition.

How eNUT works
The eNUT software provides an interactive mobile version of the government-approved treatment guidelines for acutely malnourished children. Used by government health workers (primarily nurses), the application takes them step-by-step through the guidelines using data from past and current visits to assess the child's progress and determine the next steps for effective treatment. The software captures the data that the nurse enters during the patient visit, providing the health service administrators with real-time access to programme data. The software runs on the Android™ operating system and combines on-device electronic medical records with protocol execution, using a password-protected login procedure for data security. Information is drawn from several major parts of the electronic protocol to contribute to the patient record, including: screening and registration, physical examination, treatment, counselling for the caregiver and appointment scheduling. eNUT was developed by D-tree International, a non-profit organization dedicated to improving health care for the world's poor through the use of innovative technology.

Supporting national public health programming
The Government of Zanzibar is working to eradicate malnutrition as a national public health priority, and thus reduce overall morbidity and mortality in the population, especially among children. Towards this goal, the Government is collaborating with UNICEF to develop a cohesive programme for the identification and treatment of malnourished children in the community, using standards of care that have been developed for Zanzibar. eNUT provides an effective delivery mechanism and decision support for these national standards of care. eNUT is a integral component of Zanzibar's national nutrition programme (although not yet fully operational throughout the country) and is fully supported by the Ministry of Health and Social Welfare.

Innovations CATALYST[®]
Innovate-Evaluate-Scale up-Improve health

Preventing stock-outs of antimalarial drugs in sub-Saharan Africa —Novartis's SMS for Life

Malaria is curable. Although highly effective antimalarial drugs are available (up to 96% effective in the case of artemisinin-lumefantrine fixed-dose combinations), widespread stock-outs lead to deaths on a daily basis. Of the close to 2000 people who die from malaria each day, most are children under five years of age in sub-Saharan Africa (1). Having adequate supplies of drugs when and where they are needed is essential. This remains a major challenge, particularly in remote rural communities in low-resource countries where widespread antimalarial stock-outs frequently prevent patients from receiving treatment.

Novartis, in a number of public-private partnerships, has developed a new technology leveraging the availability of mobile phones in remote areas to enhance the visibility of antimalarial stock levels at remote health facilities. This technology helps to ensure that district medical managers have the information they need to get antimalarial commodities to the facilities that need them, when they need them.

How SMS for Life works

The system automatically sends weekly SMS text messages to mobile phones at public health facilities requesting information on their current stock levels. The responses are collected and stored centrally in a database that is accessible via a website. The website provides: (a) current and historical data on stock levels of artemisinin-based combination therapies, quinine injectables and rapid diagnostic tests at the health facility and district level; (b) mapping of district health facilities with stock-level overviews and stock-out alerts; (c) SMS messaging statistics, such as numbers of received messages and errors; (d) usage statistics; and (e) a data extraction function. The relevant data are also summarized in reports, which are delivered by Internet, mobile phone and email to key health-care staff at all levels.

Based on this improved visibility of the stock levels at each health facility, antimalarial drugs can be transferred between facilities in response to any identified stock-outs, and emergency orders can be placed to replenish stocks that are running low. In addition, the SMS for Life system is also used for disease surveillance, reporting data such as numbers of patients, testing rates and test positivity rates.

Any mobile phone can be used to run the system, but to access email and web-based information, a smartphone is required. District medical officers and regional- and national-level users can view the website from any personal computer with Internet access.

Supporting national public health programming

SMS for Life is already operating in all 1500 government health facilities in the United Republic of Tanzania, in 12 districts in Kenya and in 6 districts in Ghana, with country-wide roll-out planned for Cameroon, Ghana and Kenya. While SMS for Life is based on a standardized process supported by proven technologies (cloud-based service, the Internet, mobile telephony and electronic mapping), it is set up in a way that allows the system to flexibly address the priorities of the local ministries of health. These priorities include: better availability of commodities, prevention of stock-outs, better forecasting of drug needs and best practices in disease management.



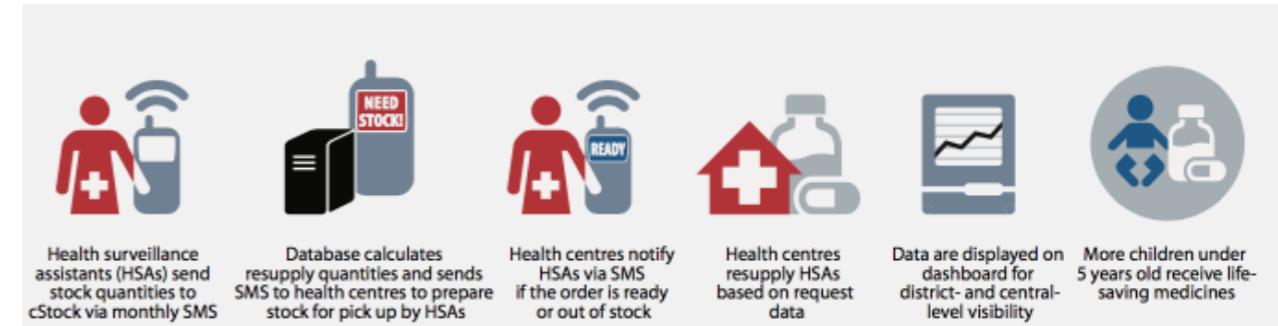
World Health Organization

Digital Innovations to catalyse effective coverage, affordability, measurement & accountability

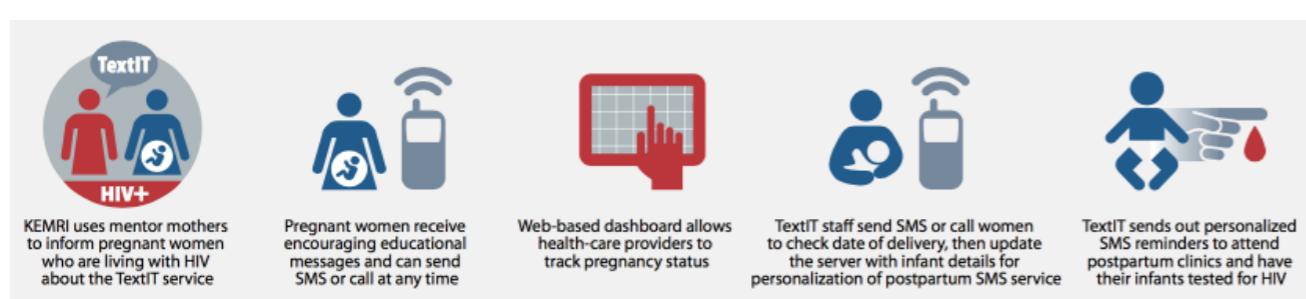
Pathfinder, Nigeria



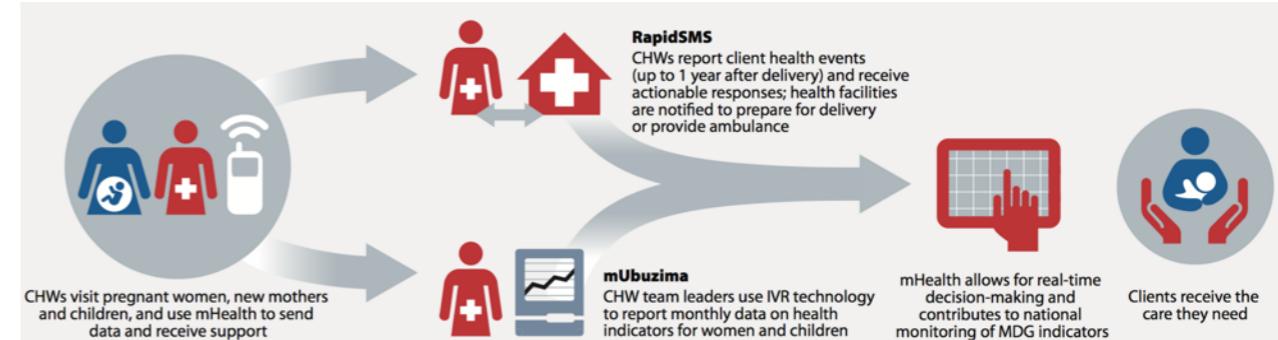
cSTOCK JSI, Malawi



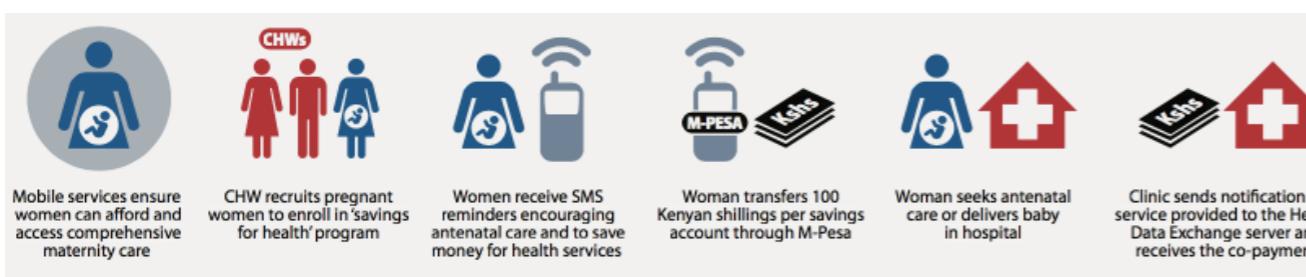
Textit KEMRI, Kenya



RapidSMS, Rwanda



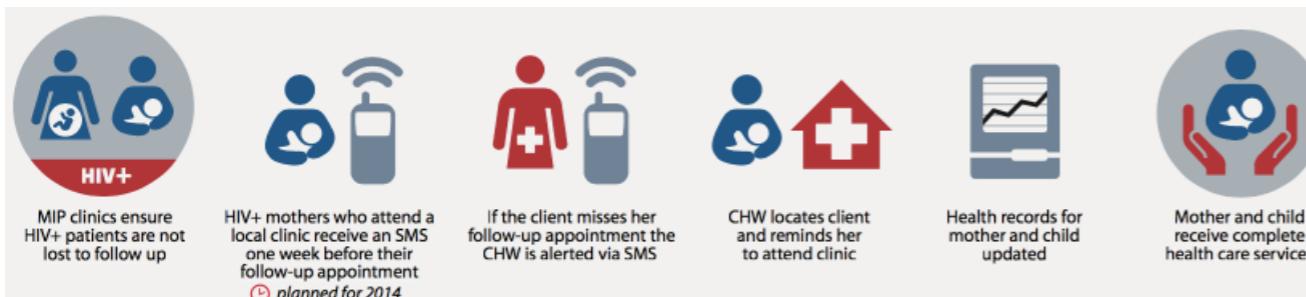
Changamka, Kenya



VillageReach, Malawi



CHAI, Malawi



MAMA, South Africa



Integrated National Digital Systems that selectively incorporate mobile innovations

In an era when accountability under UHC principles becomes paramount to national and global goals, pervasive national-level digital systems that capture denominators and account for interventions delivered or missed are necessary and inevitable, and must be planned systematically and scoped realistically to ensure potential for scale and national institutionalization.

Thank you.

More Information:

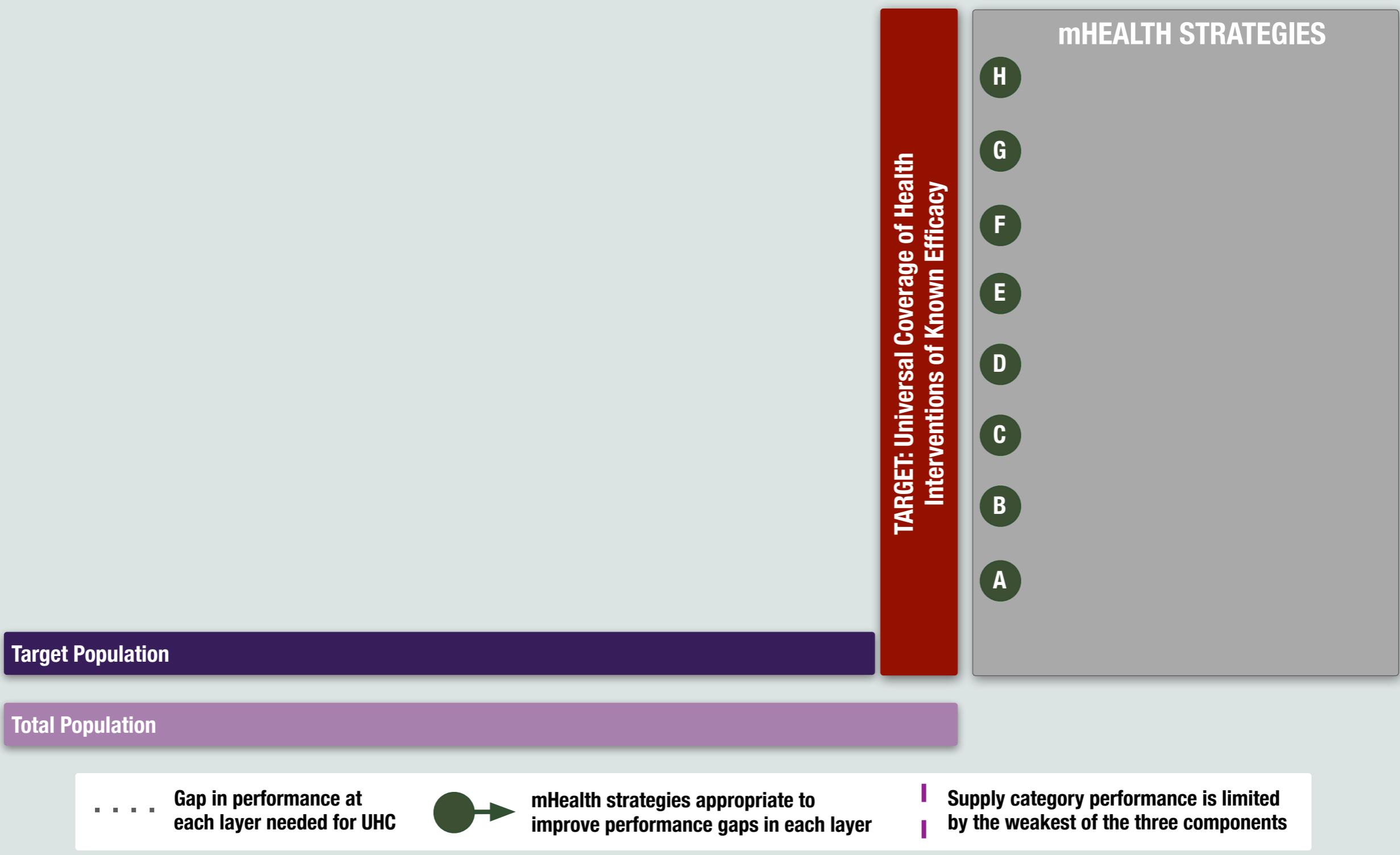
Dr. Garrett Mehl
mehlg@who.int

National Adaptation Process

- 1 Government engaged multi-stakeholder process; **research adaptation site** as complement to process
- 2 **Mapping** of current cadre-specific work- and information-flows, reporting requirements
- 3 **Review** of HIS eco-system; national priorities; system constraints
- 4 Establishment of **functional requirements** needed for adaptation
- 5 Collaborative data **Optimization** Process (reduce data burden); establishment of metrics and necessary aggregate indicators
- 6 Technology **Adaptation Process** (form, register, interventions, schedules, permissions), and development of common concept dictionaries (ICD-10, CIEL) for OpenMRS and OpenHIE
- 7 **Integrations** with other platforms, innovations and technologies in ecosystem (e.g., DHIS2, CRVS) to ensure mutual gain
- 8 **Costed plan** for national institutionalization, support mechanisms

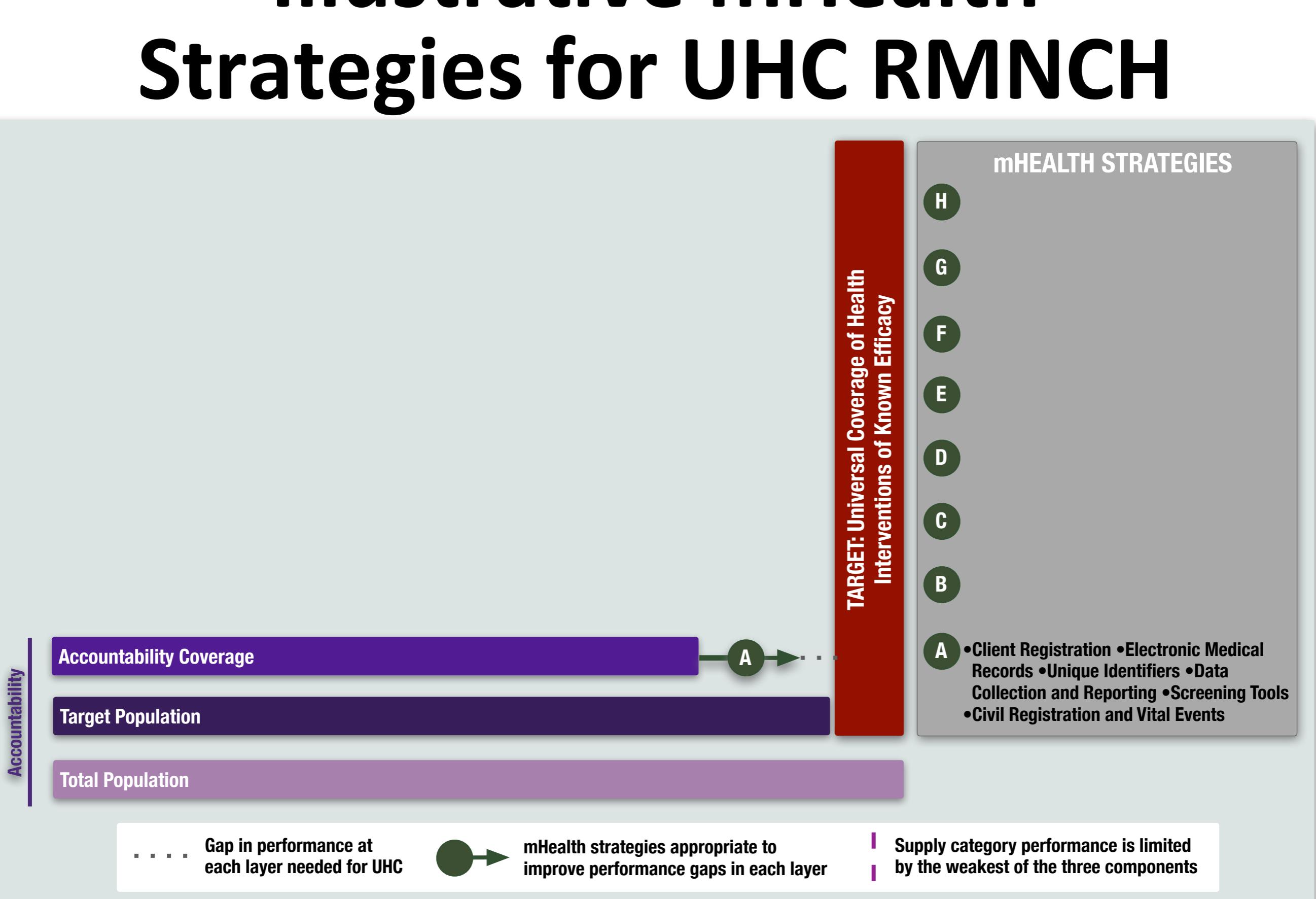
Illustrative mHealth Strategies for UHC RMNCH

D E T T E R M I N A N T S L A Y E R S O F U H C

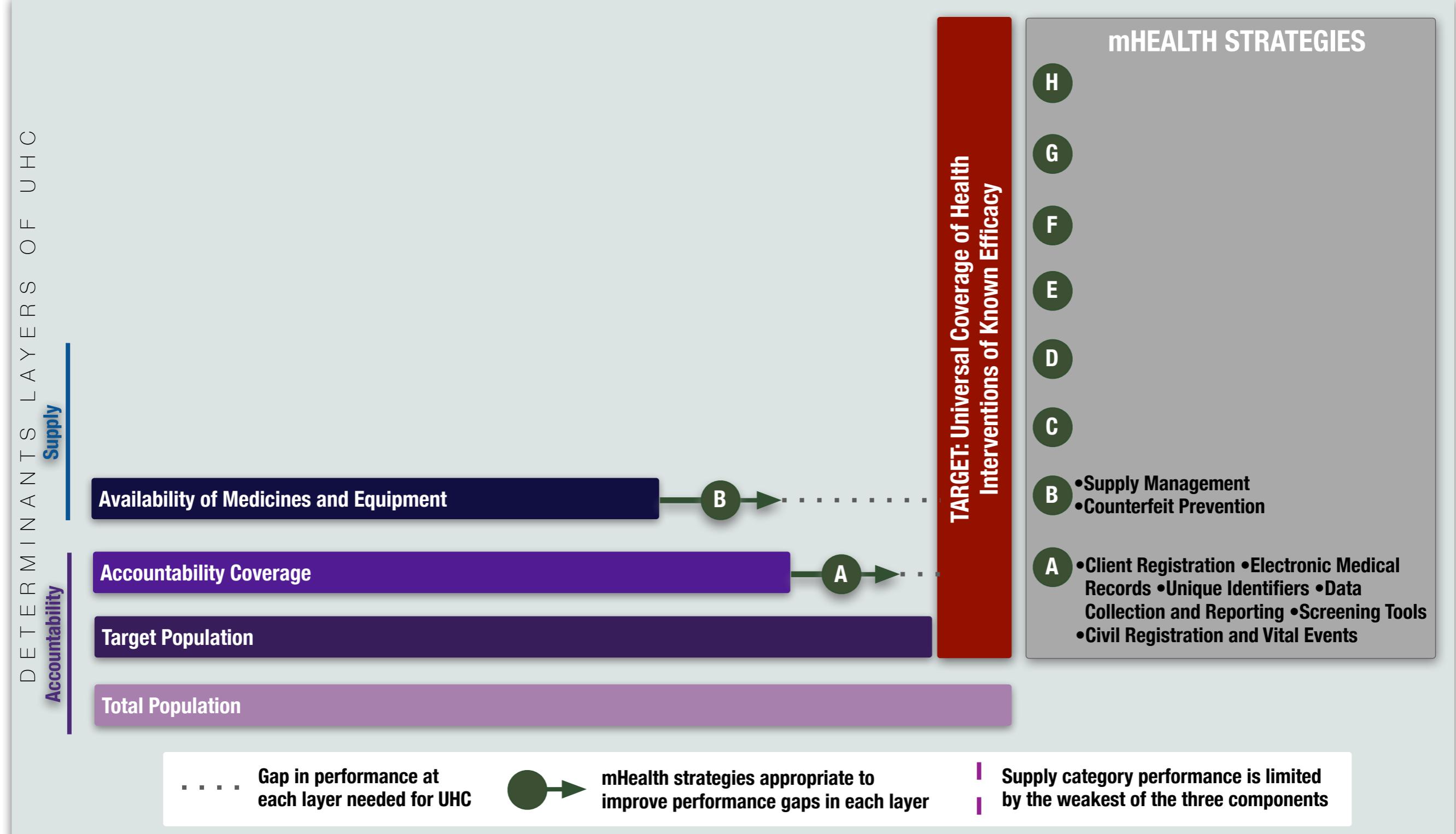


Illustrative mHealth Strategies for UHC RMNCH

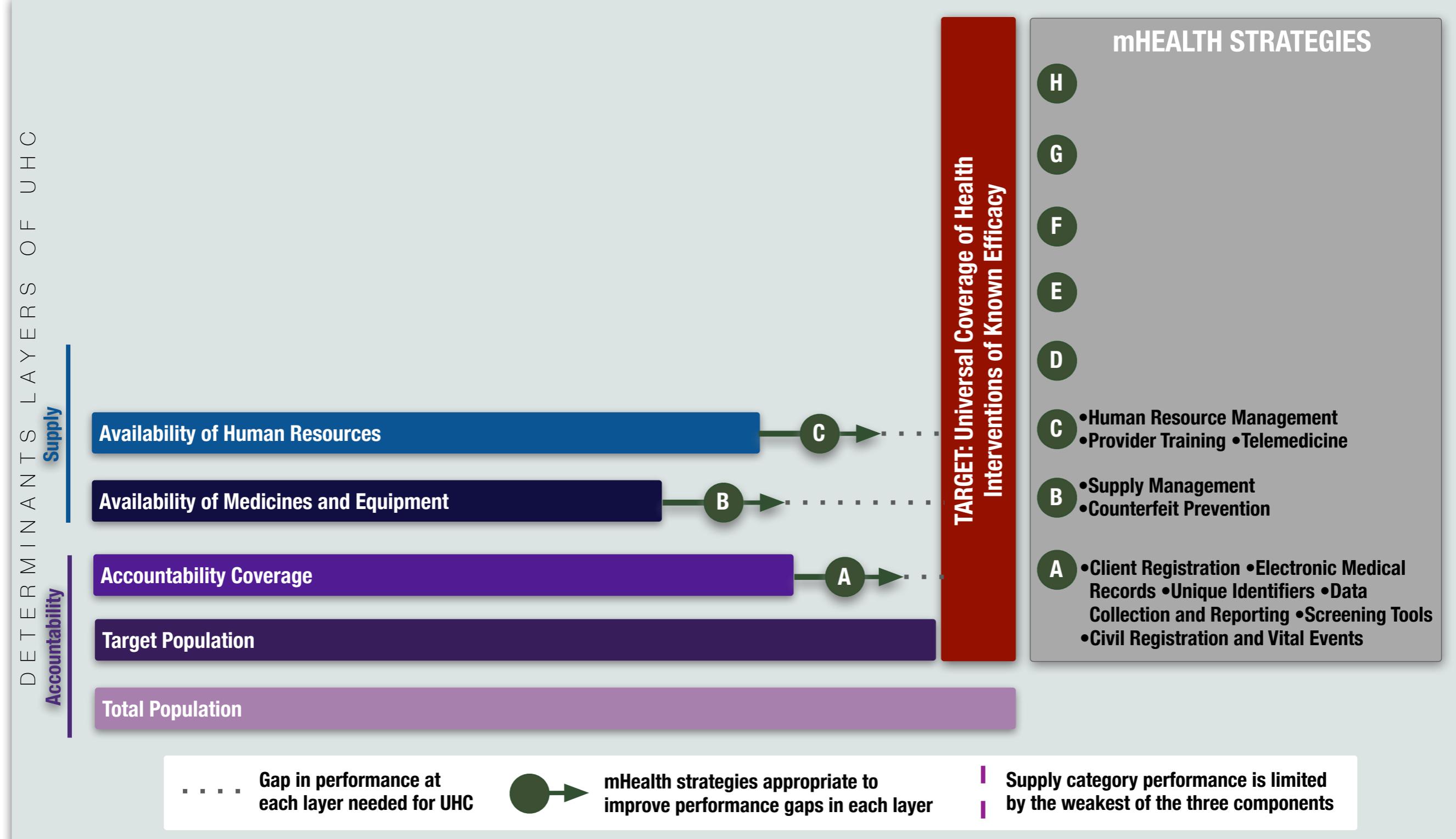
D E T E R M I N A N T S L A Y E R S O F U H C



Illustrative mHealth Strategies for UHC RMNCH

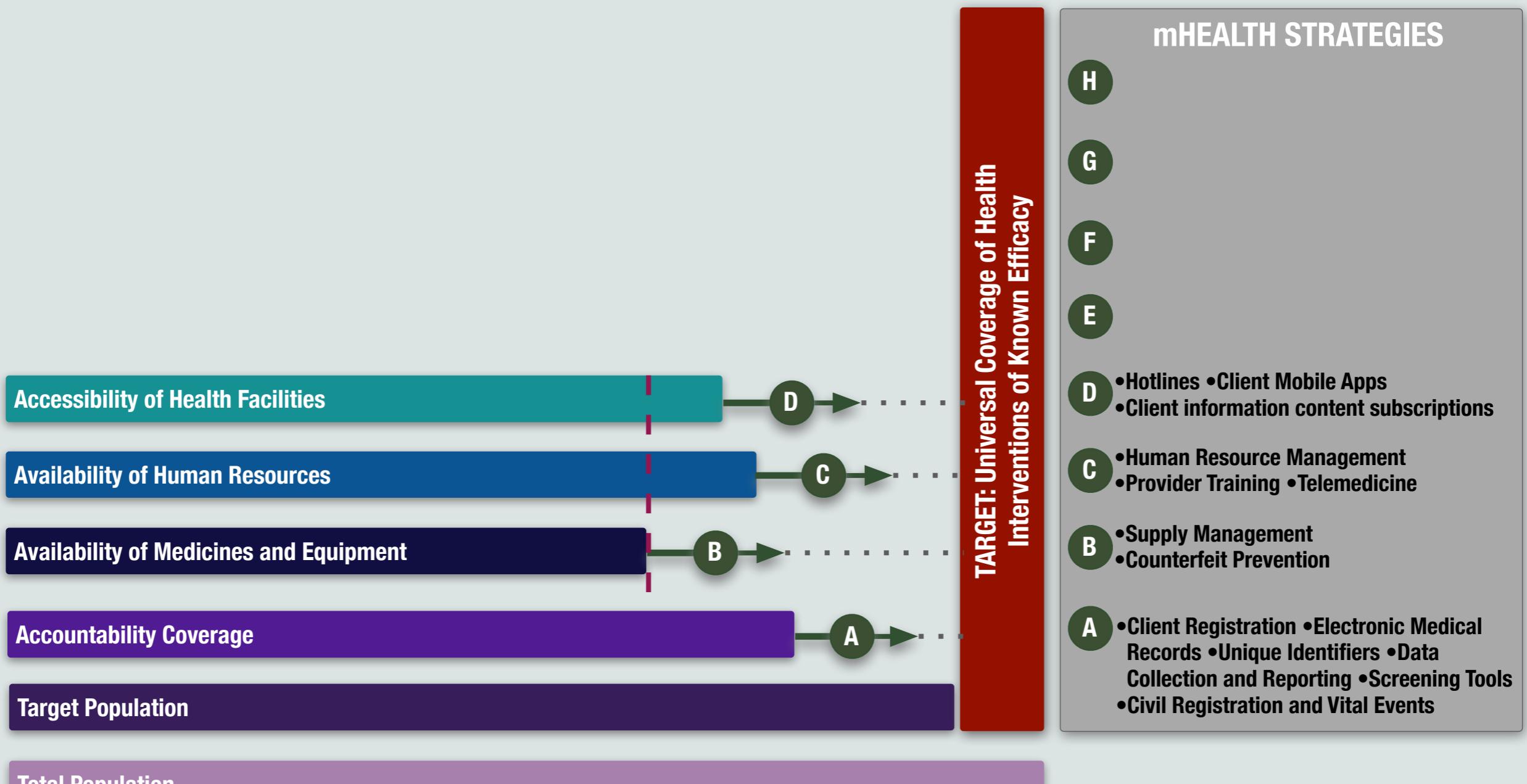


Illustrative mHealth Strategies for UHC RMNCH

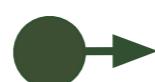


Illustrative mHealth Strategies for UHC RMNCH

D E T E R M I N A N T S L A Y E R S O F U H C
Supply
Accountability



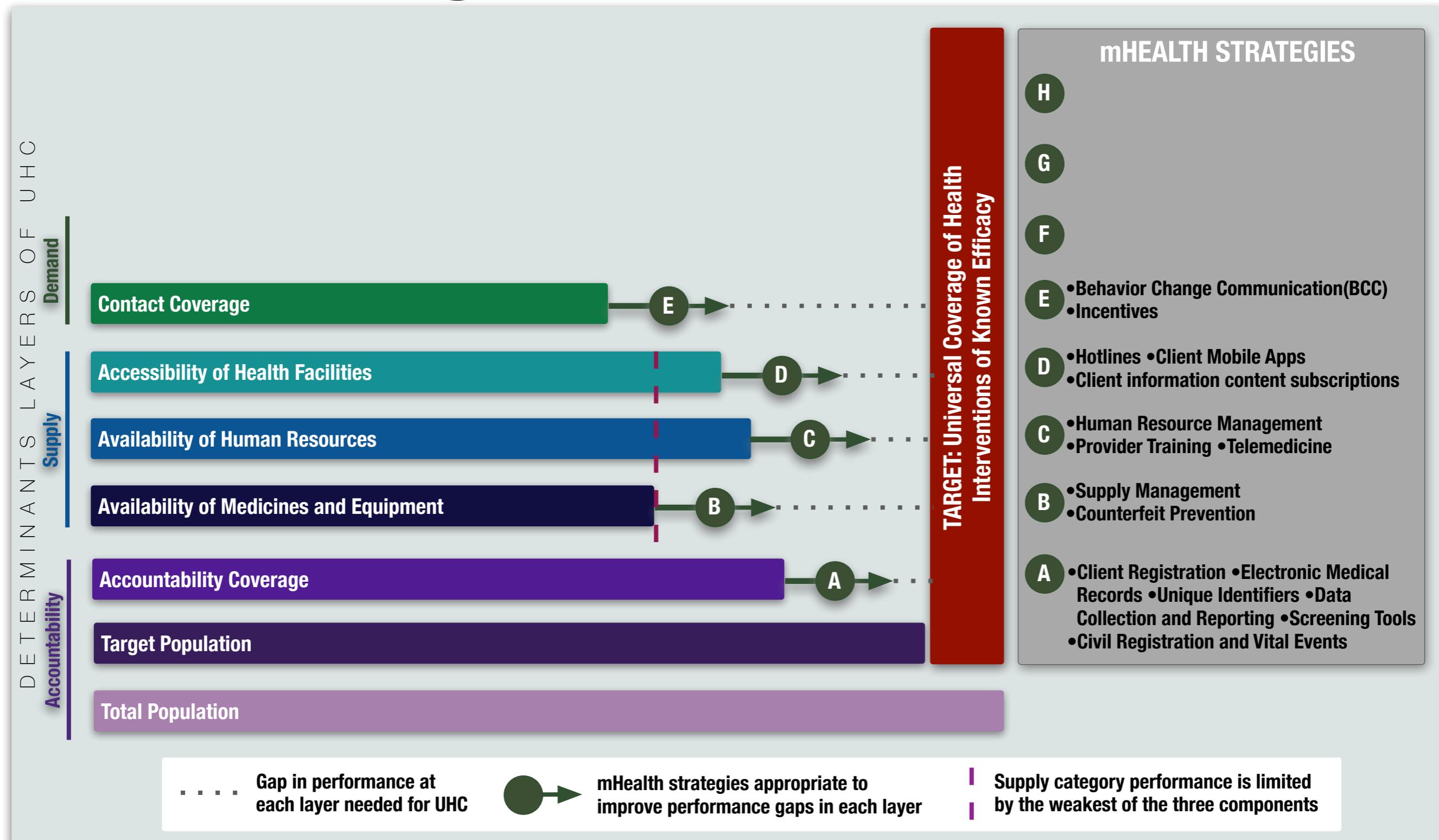
..... Gap in performance at each layer needed for UHC



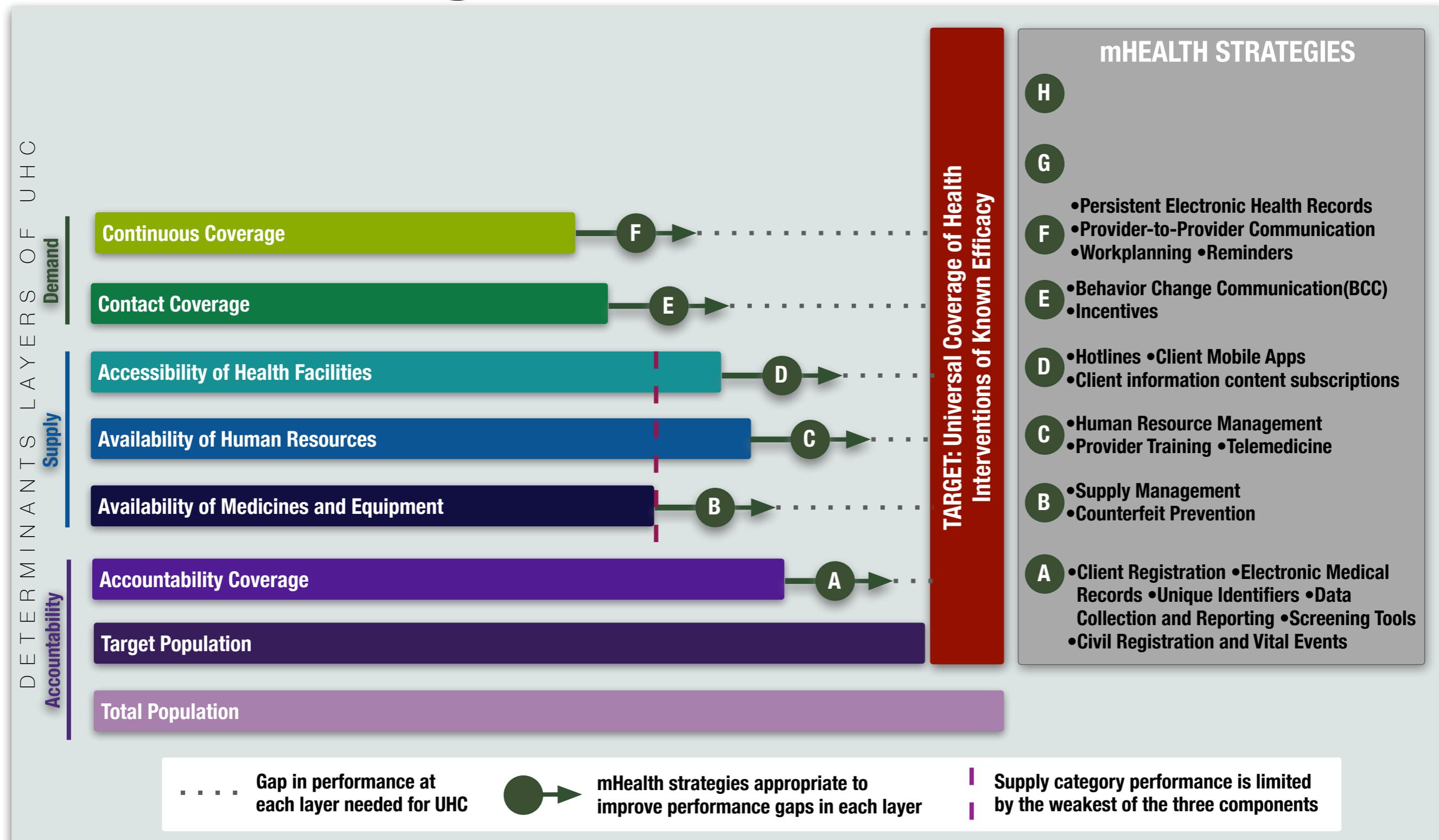
mHealth strategies appropriate to improve performance gaps in each layer

| Supply category performance is limited by the weakest of the three components

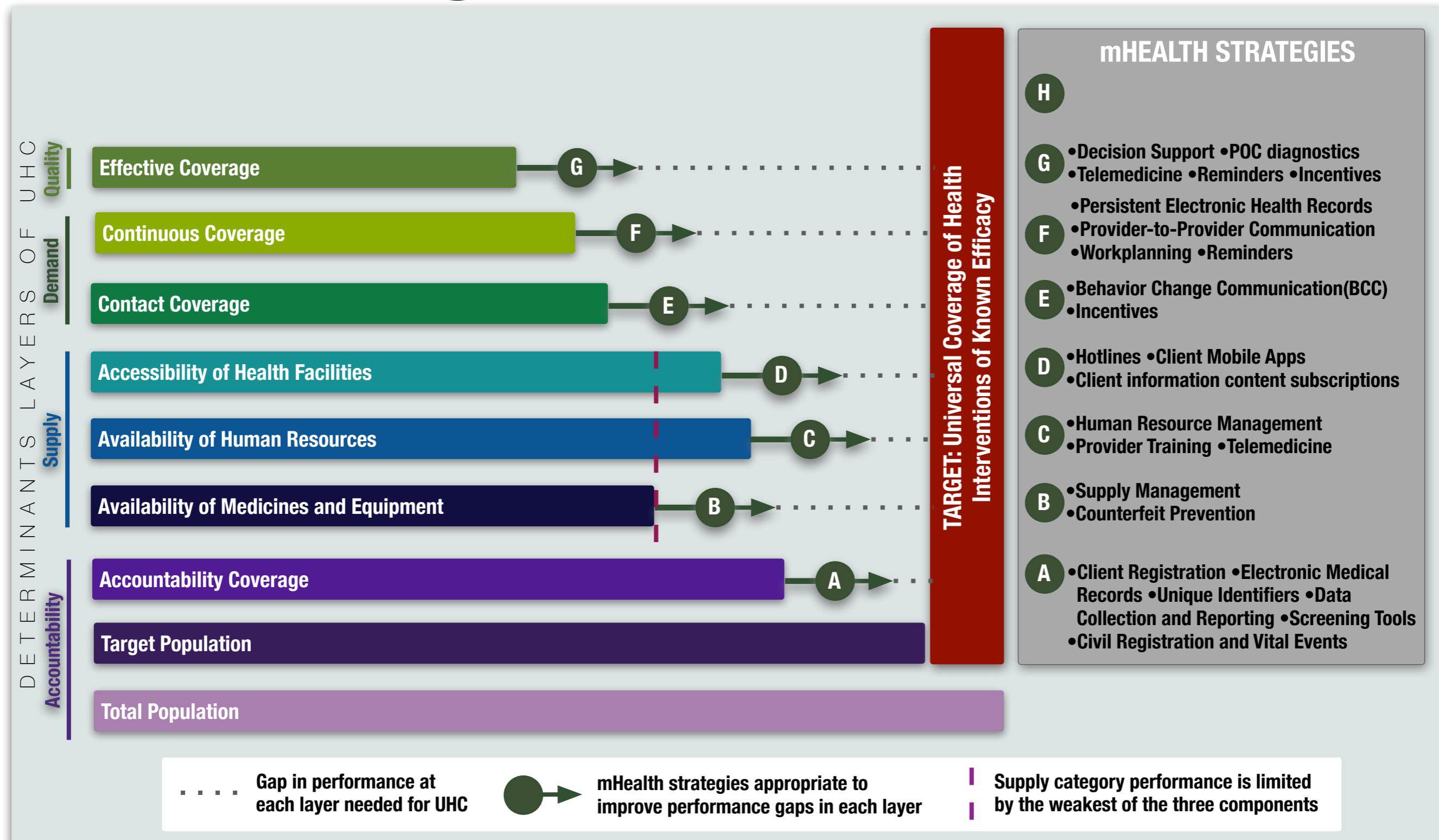
Illustrative mHealth Strategies for UHC RMNCH



Illustrative mHealth Strategies for UHC RMNCH



Illustrative mHealth Strategies for UHC RMNCH



Illustrative mHealth Strategies for UHC RMNCH

