Landscape of Digital Enablement of Community Health Workers

Chidozie Declan Iwu, Abigail Mulugeta, Erin Ingle, Akhtar Badshah

October 03, 2023

START CENTER

STRATEGIC ANALYSIS, RESEARCH & TRAINING CENTER

Department of Global Health | University of Washington

AGENDA

01 Project overview

02 Approach

03 Findings

04 Synthesis

05 Conclusions and next steps

PROJECT TEAM

Chidozie Declan Iwu, MPH, MSc

PhD Student, Epidemiology

Project Manager

Abigail Mulugeta

MPH Student, Global Health

Research Assistant

Erin Ingle, MPH

Global Health

Research Assistant

Akhtar Badshah, PhD, MS

Public Policy, Business

Faculty Lead

START CENTER

START OVERVIEW

Leverages leading content expertise from across the University of Washington

Provides high quality research and analytic support to the Bill & Melinda Gates Foundation and global and public health decision-makers

Provides structured mentorship and training to University of Washington graduate research assistants

PROJECT OVERVIEW

BACKGROUND

This project seeks to explore the potential of digital enablement to alleviate barriers to productivity of community health workers including:

- Long lead times for initial contact with the health system
- Lack of digitized systems for care plans and patient information
- Difficulties in tracking patient journeys

OBJECTIVES

To enhance understanding of the existing landscape of digital-enabled CHWs deployments and the accompanying evidence base that exists on its potential for impact by:

Create a framework for landscape analysis of digital enablement of CHWs in LMICs

Apply framework to assess the archetypes of digital tools and dimensions of impact of digital tool deployments

SCOPING

Research Questions Used to Assess Digital Tool Enablement of CHWs

1. What are the settings and prominent geographic areas for implementation of digital tool enablement?

2. What are the **digital tool characteristics**?

3. Which health programs and/or disease do these interventions focus on?

4. What are the different **dimensions of impact** or outcome of digital tool enablement?

5. What are the facilitators, barriers and gaps to digital tool enablement in CHWs?

PROPOSED DELIVERABLES

1

Methodology on the research process and framework with which evidence was documented.

2

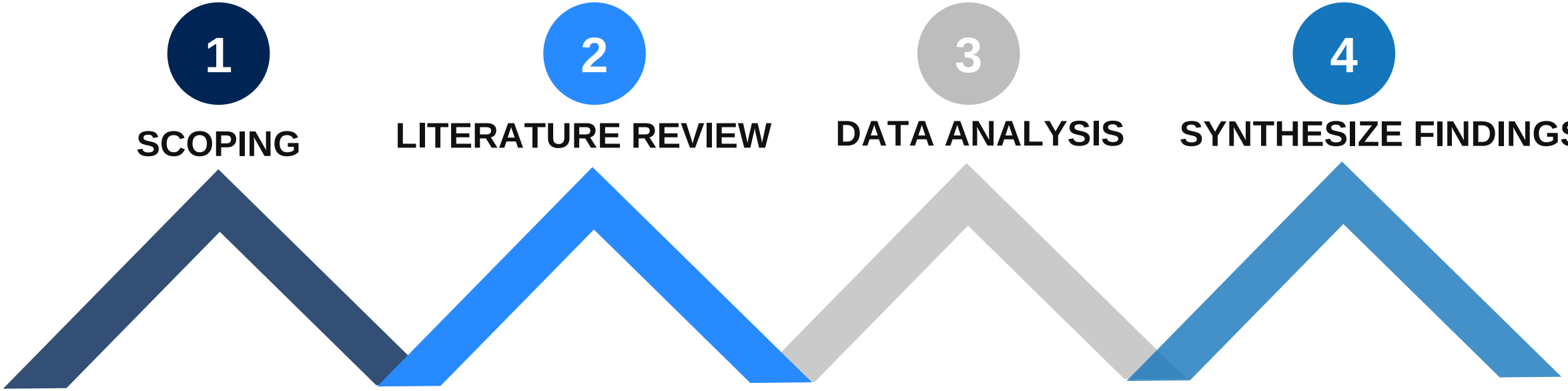
PowerPoint slide deck outlining:

1. Landscape summary of CHW digital deployments by important categories (geography, tool archetypes, health programs covered, quality of evidence, maturity, facilitators and barriers).

2. Synthesis of the existing landscape of evidence of impact of these deployments, with gaps identified.

PROJECT APPROACH

PROJECT PLAN



- In-take call
- Review research request
- Facilitate scoping meeting
- Finalize research questions and geographies of interest

- Desk research
- A rapid review approach using the Participant, Concept, Context (PCC) framework

- Analyze retrieved data based on the research questions
- LMIC regional level landscape analysis

- Synthesize findings using agreed framework
- Share slide deck of landscape findings with the clients

LITERATURE REVIEW

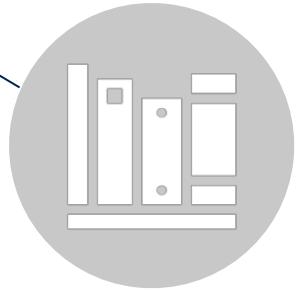
Desk Research and Data Sources

Rapid review of the literature

- Searched PubMed/MEDLINE with search strings (Appendix)

Inclusion criteria

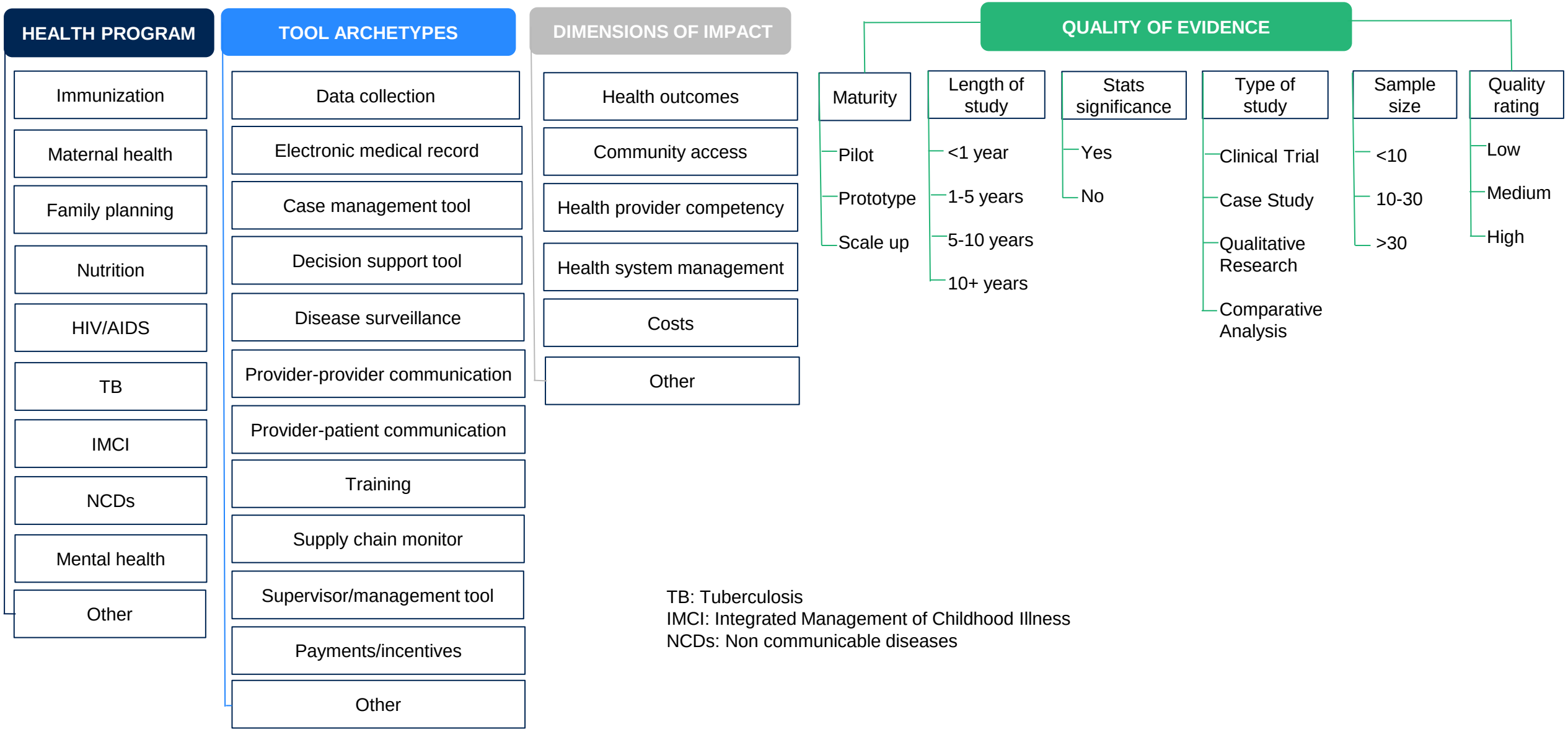
- Publications in English language
- Recent publications between 2013-2023
- Programs that involve CHWs
- Studies based in LMICs



Exclusion criteria

- Publications not in English Language
- Publications before 2013
- Programs that do not involve CHWs
- Publications based in High income countries

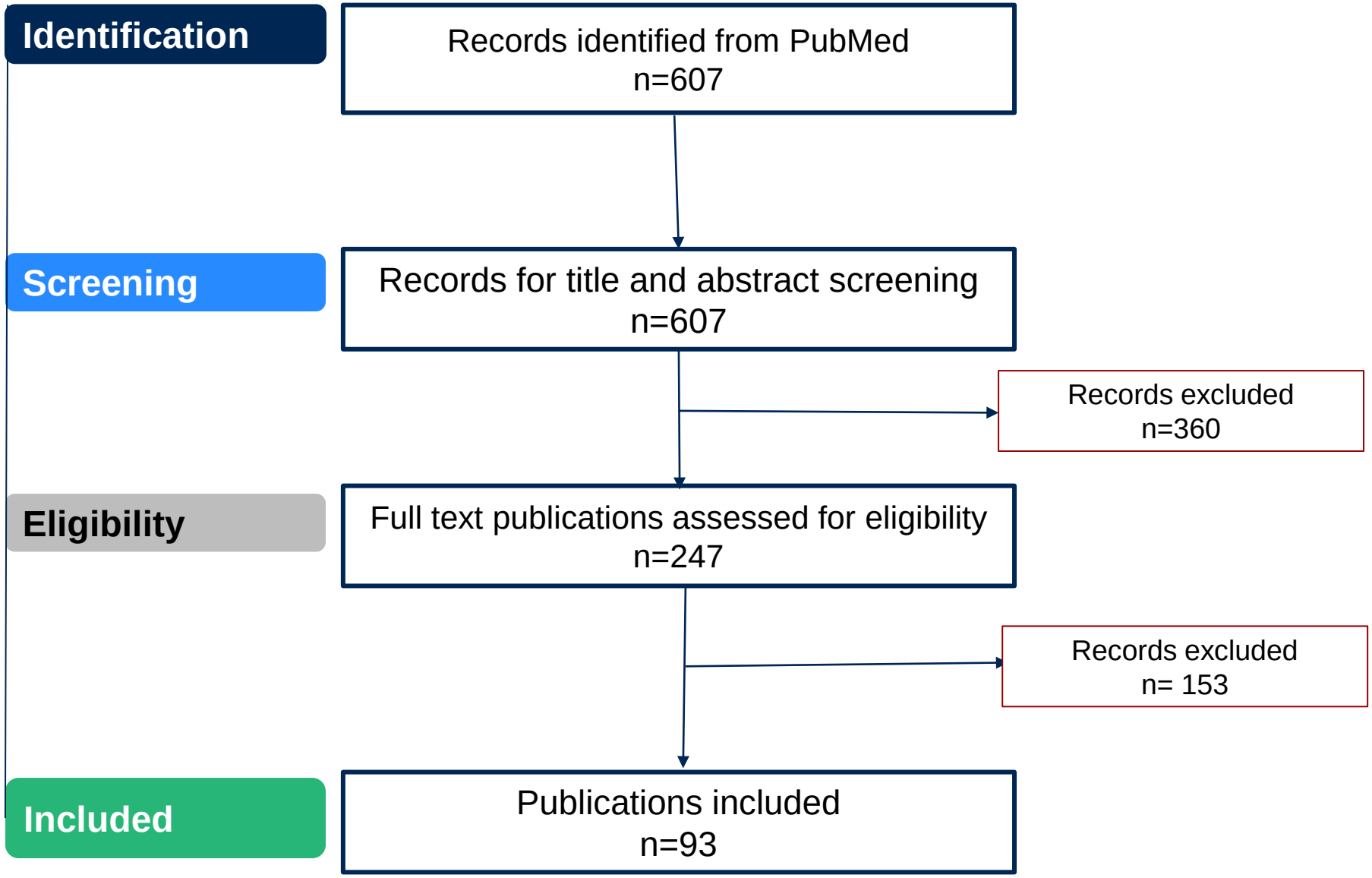
FRAMEWORK FOR LANDSCAPE ANALYSIS



TB: Tuberculosis
IMCI: Integrated Management of Childhood Illness
NCDs: Non communicable diseases

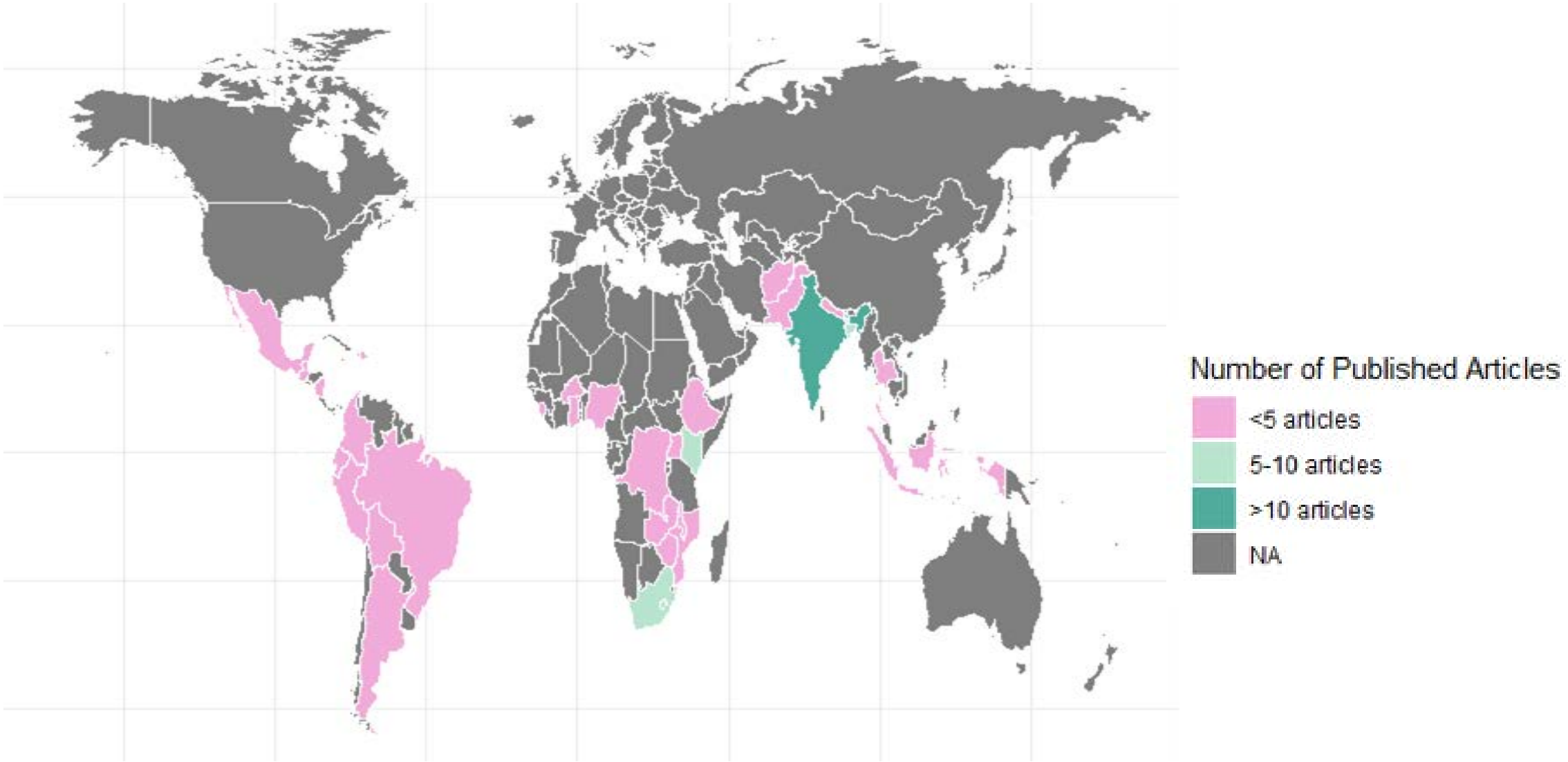
FINDINGS

DATA FLOW

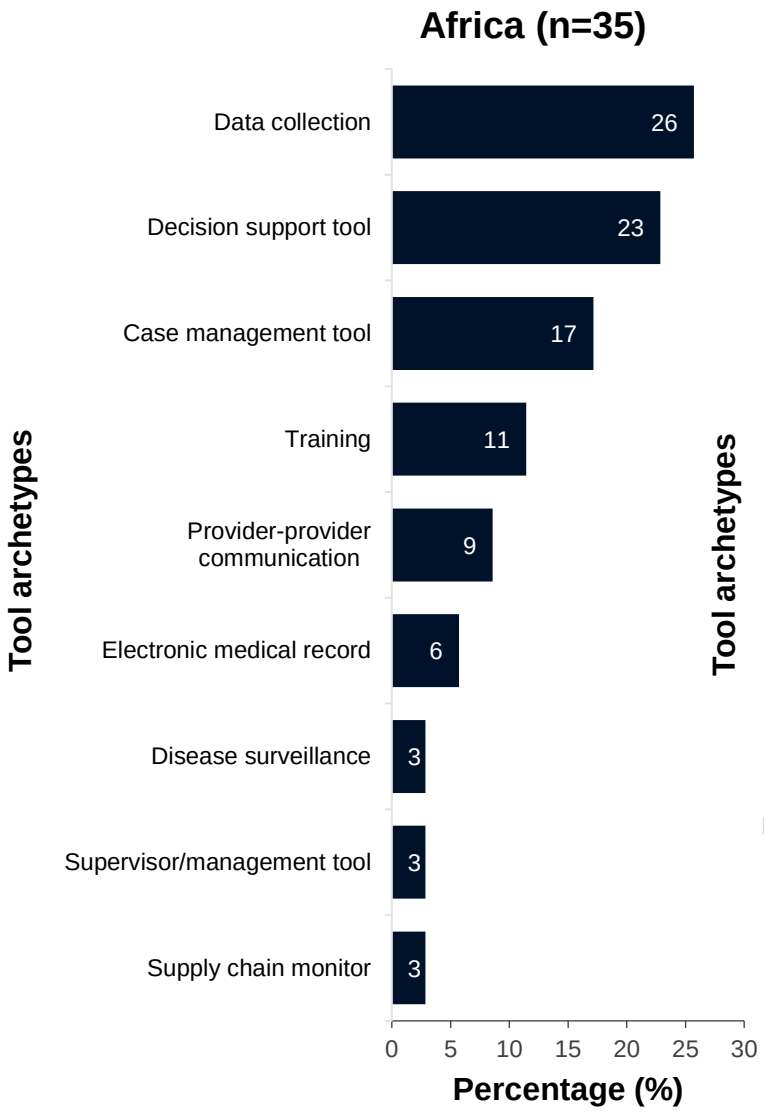


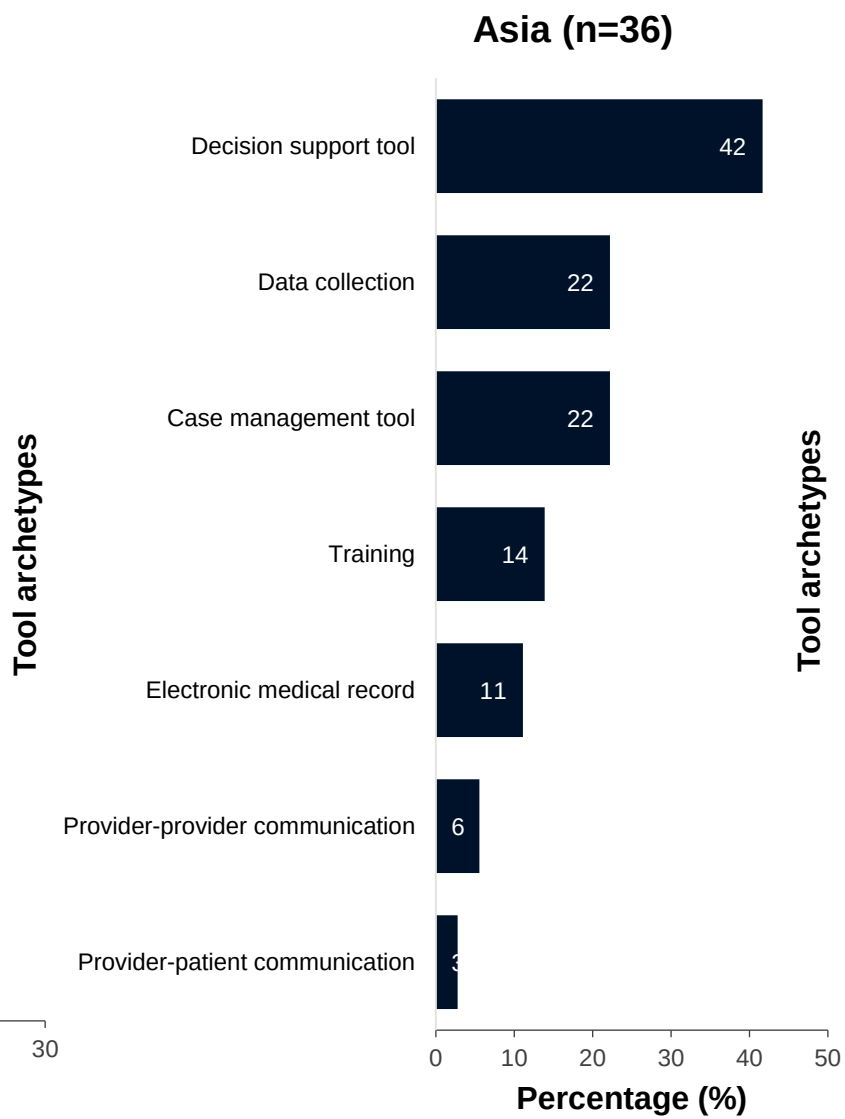
START CENTER

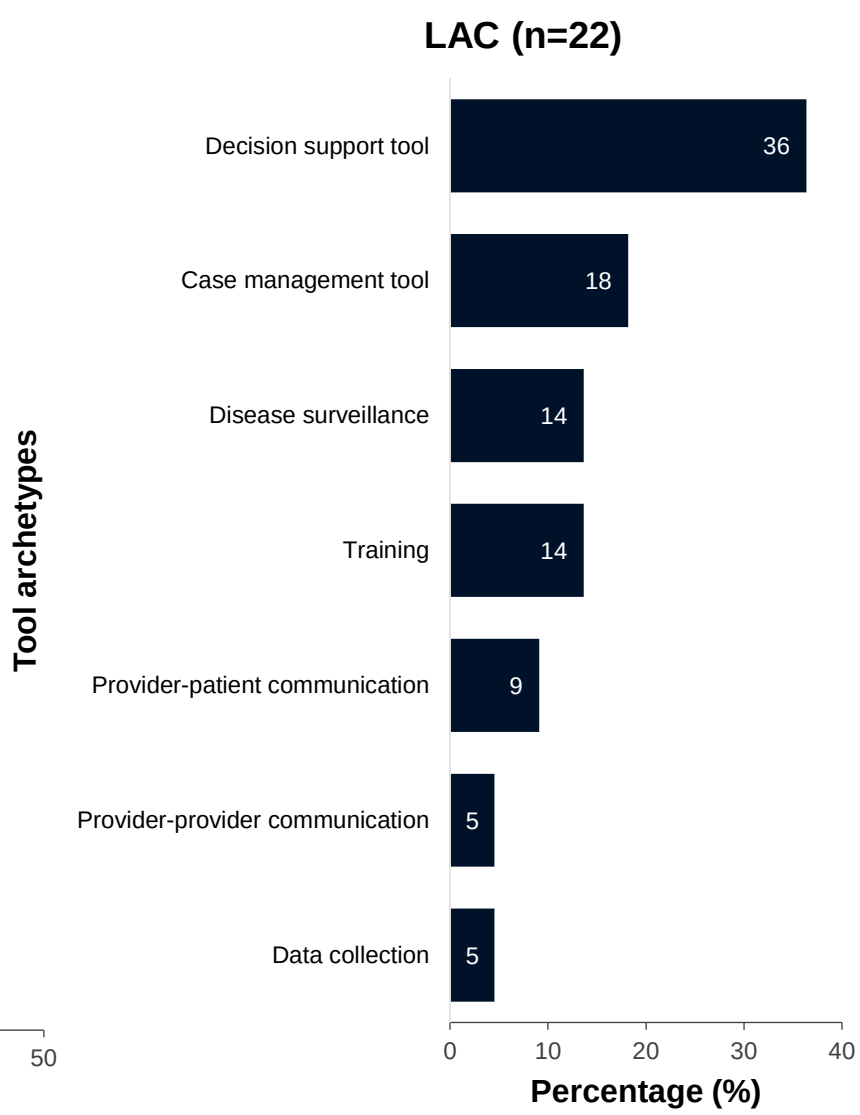
GEOGRAPHICAL DISTRIBUTION OF PUBLICATIONS



DISTRIBUTION OF TOOL ARCHETYPES

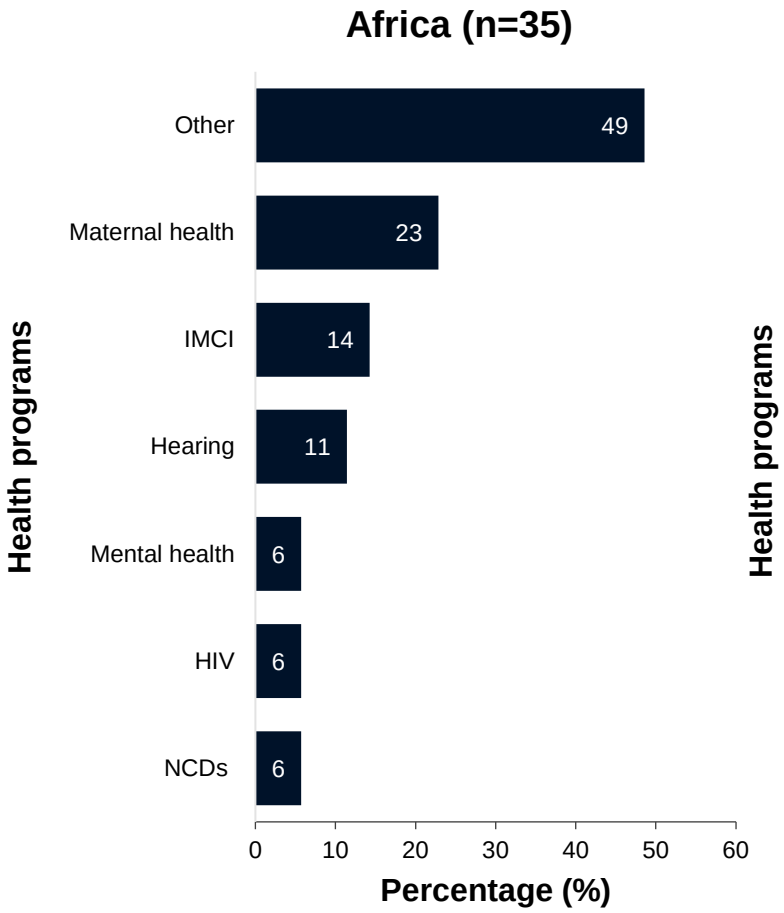




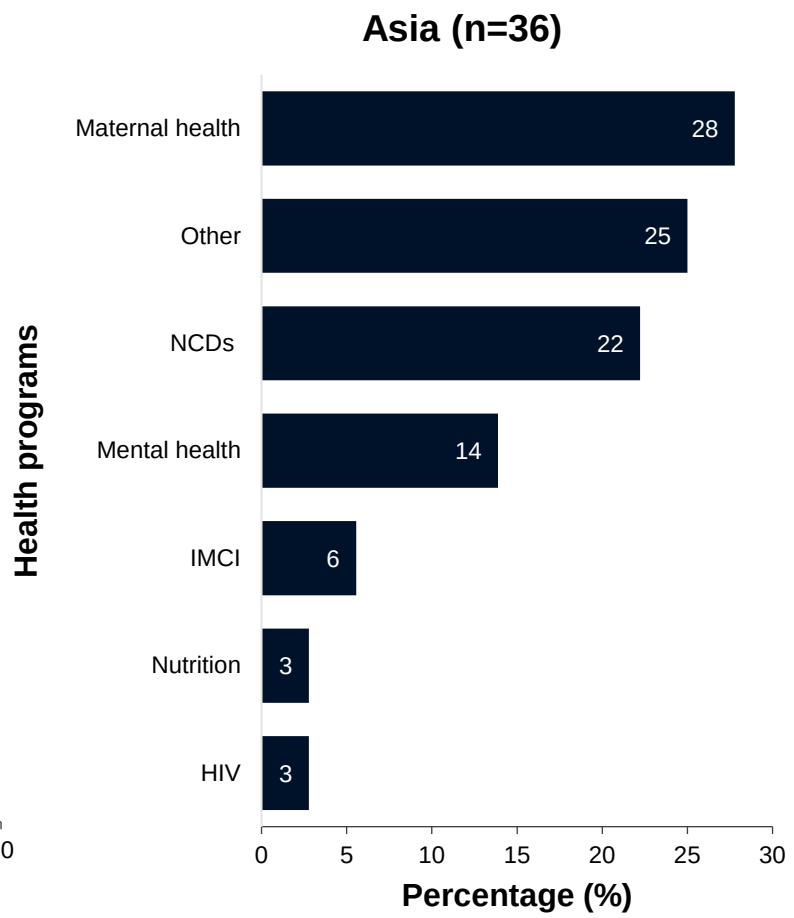


*LAC: Latin America and the Caribbean

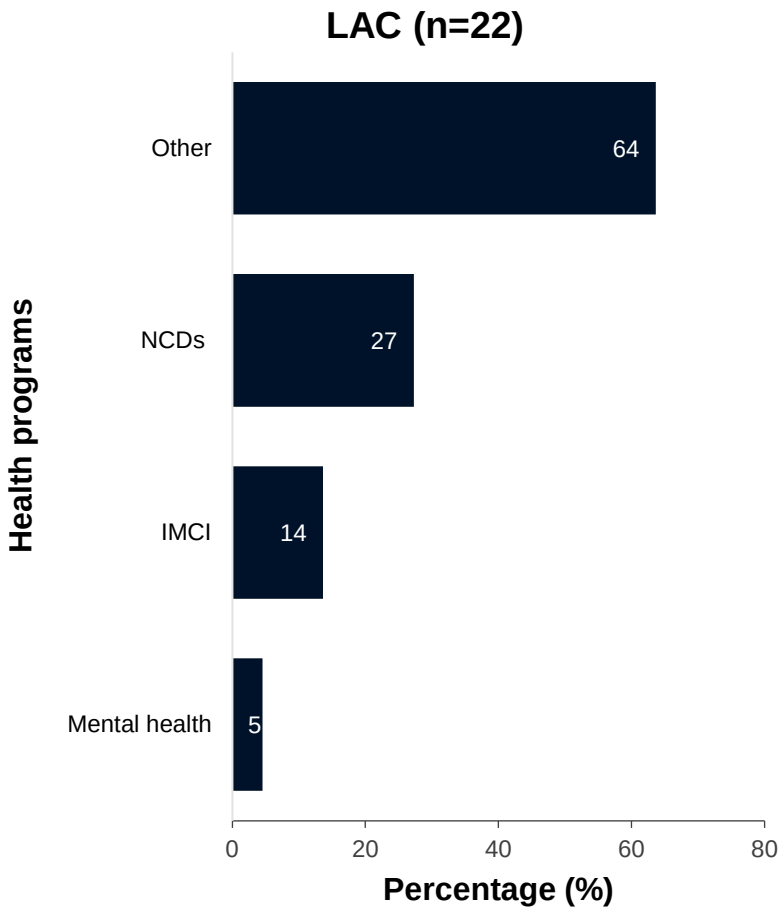
DISTRIBUTION OF HEALTH PROGRAMS



Other: COVID-19, clinical risk assessment, sexual violence, palliative care, Ebola preparedness, alcoholism, Ear, Nose and Throat (ENT), primary health care



Other: primary health care, medical advice on blood on-call services, MNCH, palliative, geriatric health

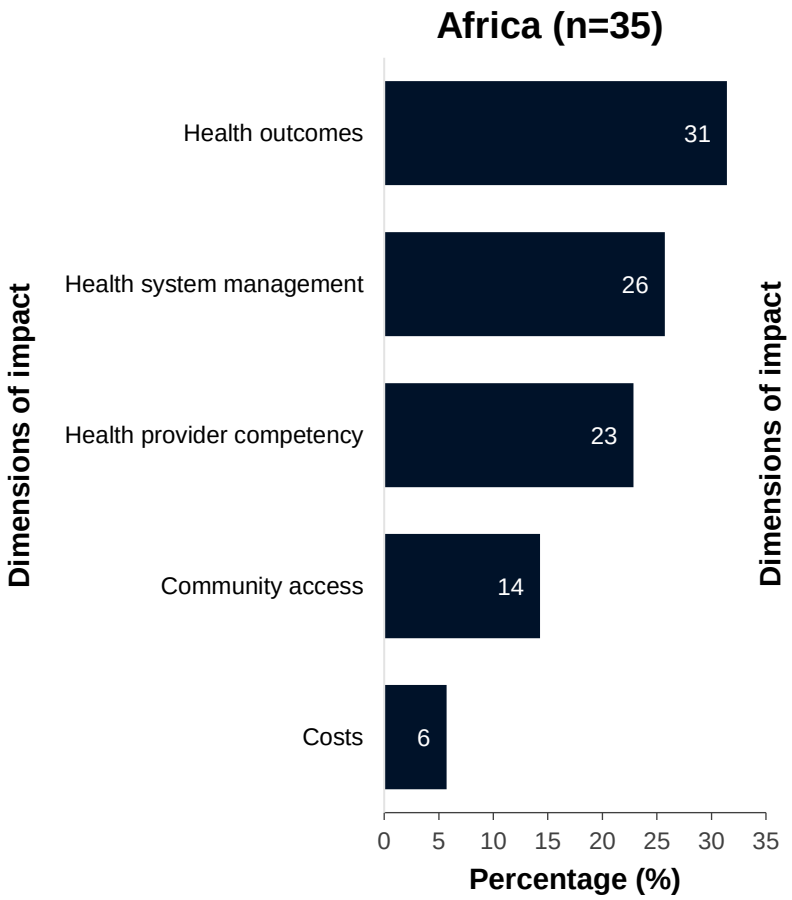


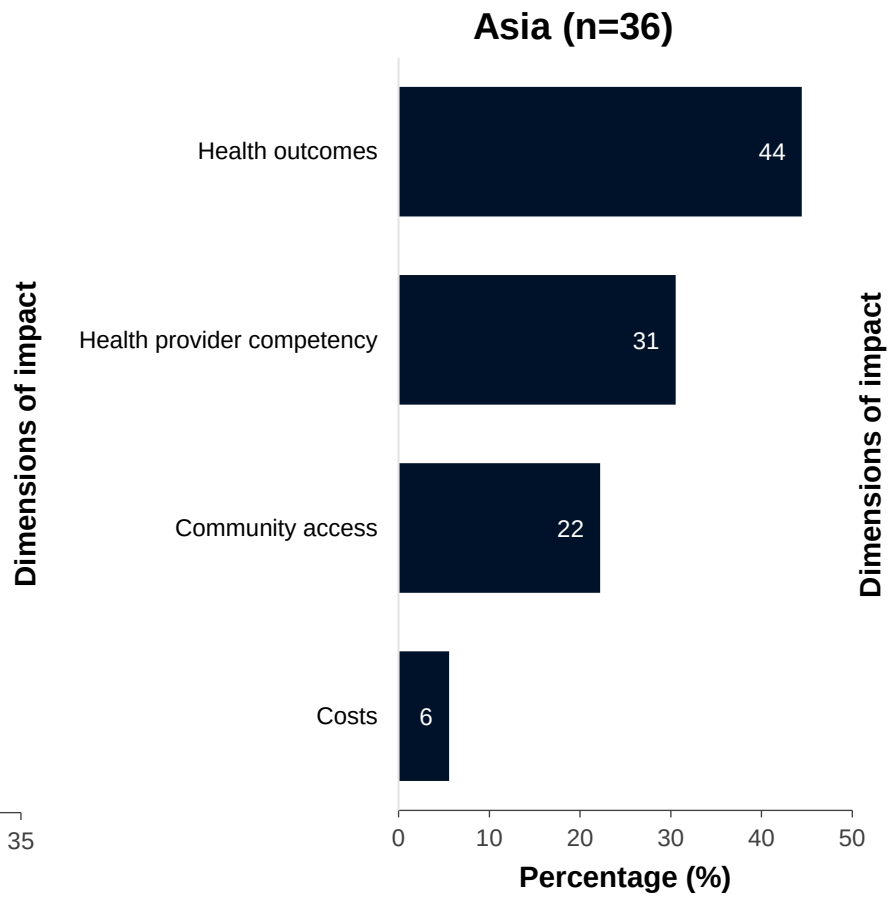
Other: Screening for hearing loss, exclusive breast feeding, Cutaneous leishmaniasis, HPV, continuing health education for primary care workers, bone health

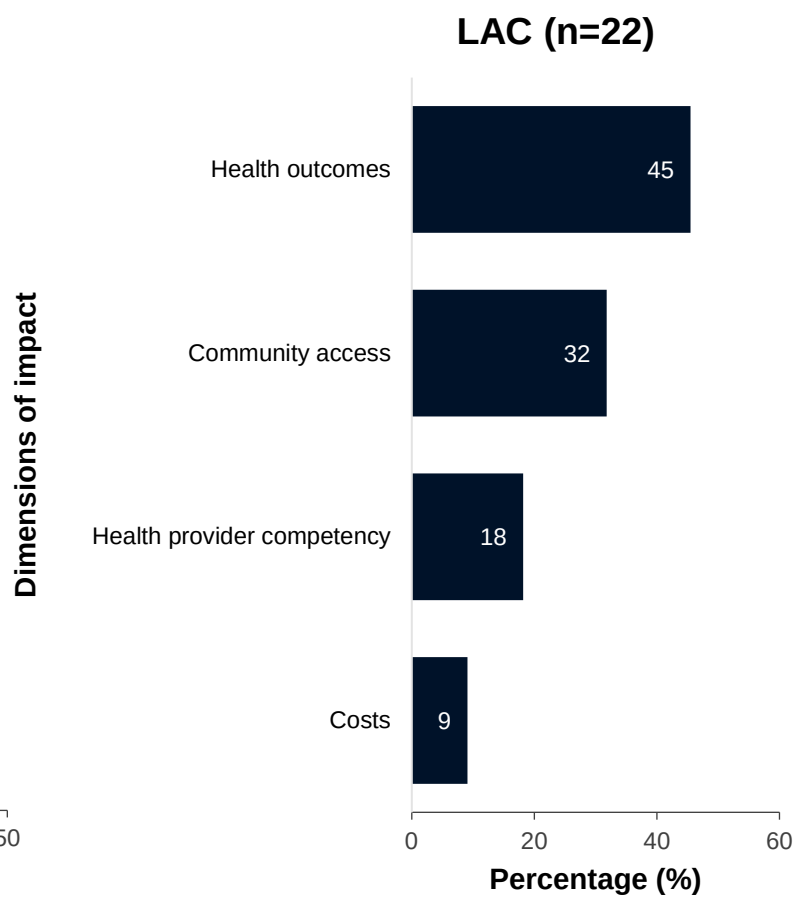
*IMCI: Integrated Management of Childhood Illness

*LAC: Latin America and the Caribbean

DISTRIBUTION OF IMPACT DIMENSIONS







*LAC: Latin America and the Caribbean

SYNTHESIS

START CENTER

AFRICA: DATA COLLECTION TOOLS

9 out of 35** articles in Africa focused on **Data Collection

GEOGRAPHY

HEALTH PROGRAMS

IMCI
HIV
MNCH

Other category (5)

- Sexual violence
- Hearing
- Polio
- Covid-19

IMPACT

Positive
5

Ex: Health system management Ethiopia

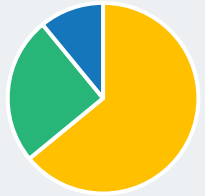
Increases were observed in the number of pregnant women identified, presumptive cases referred, and TB cases detected over time, resulting in improved follow-up and increased service uptake.

No Impact
4

Ex: mHealth intervention for peer health workers on AIDS care

No significant differences between study arms in virologic, adherence, mortality, or retention outcomes. Qualitative results demonstrated improved health communication and patient care, and found broad and deep support for the mHealth intervention.

QUALITY OF EVIDENCE



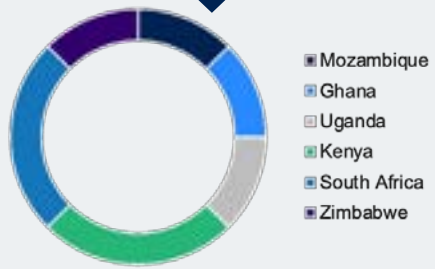
7 low
1 medium
2 high

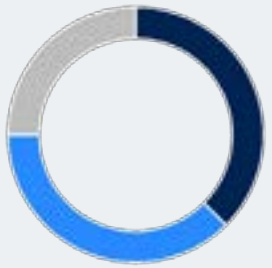
- 8 case studies, 1 clinical trial
- More ‘Other’ health categories in data collection
- The impact is harder to measure and has lower quality of evidence

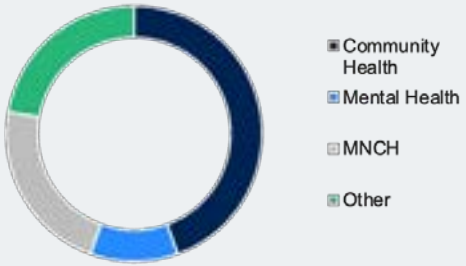
AFRICA: DECISION SUPPORT TOOLS

8 out of 35** articles in Africa focused on **Decision Support

GEOGRAPHY







HEALTH PROGRAMS

MNCH (2)

- Asphyxia, neonatal jaundice and cord sepsis

Mental Health (2)

- Depression

Other (4)

- Screening for hearing loss (2)
- Palliative care (2)

IMPACT

Ex: Electronic Mental Wellness Tool

Trained providers began using the mobile applications and appear to identify cases and provide appropriate treatment (no statistical data)

Ex: mhealth clinical decision-making support system

Nonsignificant improvement in protocol adherence in the intervention clusters but significant improvement in protocol adherence in the control clusters.

QUALITY OF EVIDENCE

4 High
4 Low

6 tools in **pilot** stage

1 **prototypes**

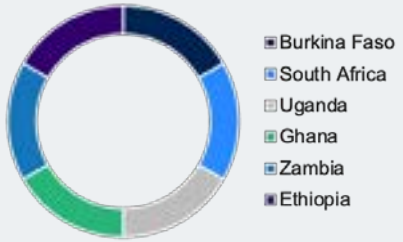
1 **scale-up**

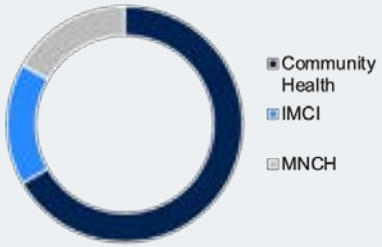
- 2 studies ongoing
- Many impacts in this category were anecdotal or has confounding factors therefore quality is low

AFRICA: CASE MANAGEMENT TOOLS

6 out of 35** articles in Africa focused on **Case Management

GEOGRAPHY





HEALTH PROGRAMS

Integrated Management of Childhood Illness (IMCI)

- Pneumonia, diarrhoea, and malaria

Maternal Health

Other

- Hearing Screening among people living with HIV

IMPACT

Positive
4

Ex: The Last Ten Kilometers 2020 Project (L10K 2020) Ethiopia

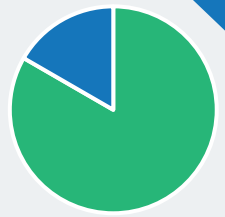
It improved the timely identification and registration of pregnant mothers. Adherence to treatment protocols also increased in all domains across the pregnancy continuum of care.

No Impact
2

Ex: mHealth for ICMI of children in Zambia

18.0% improvement in supportive supervision and 21.0% increase in appropriate treatment for pneumonia; these changes were not statistically significant.

QUALITY OF EVIDENCE



5 high

1 medium

1 tool in **pilot** stage

3 **prototypes**

2 **scale-up**

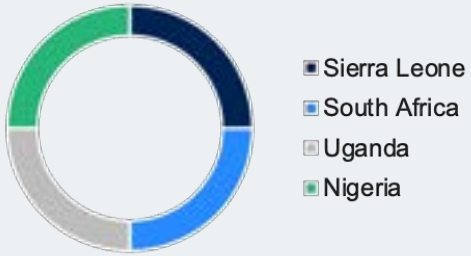
- The mature tools were DHIS2 platform in Zambia and The Last Ten Kilometers 2020 Project (L10K 2020) in Ethiopia which are both integrated with MOH

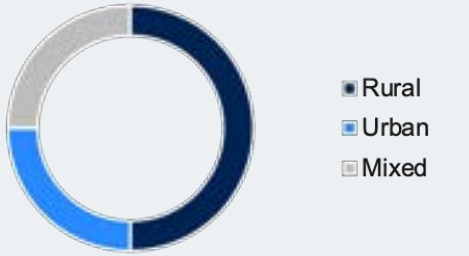
- All had large sample sizes

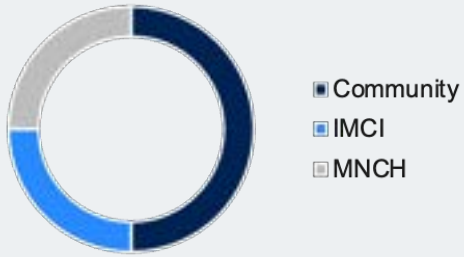
AFRICA: TRAINING TOOLS

4 out of 35** articles in Africa focused on **Training

GEOGRAPHY







HEALTH PROGRAMS

Integrated Management of Childhood Illness (IMCI) <5YO

HIV

- Delivering ART counseling

Ebola Preparedness

IMPACT

Positive 3

Ex: Health Provider Competency- MNCH program

FHWs achieved a mean pretest score of 51% (95% CI 48%-54%) and mean posttest score of 69% (95% CI 66%-72%)

No Impact 1

Ex: Health Provider Competency

In training CWs to identify and treat pneumonia there was no statistically significant difference in the improvement between groups ($t = 1.15$, $p = 0.254$)

QUALITY OF EVIDENCE

High

- ¾ tools in **pilot** stage and ¼ are **prototypes.**
- All sample sizes over 30
- All case studies with statistical analysis

AFRICA: OTHER TOOLS

Provider- Provider Communication

Positive

Health Systems Management

- mHealth intervention improved the documentation of pregnancy outcomes in both the treatment (OR 1.31, 95% CI: 1.10-1.55, p<0.01) and control (OR 1.46, 95% CI: 1.11-1.91, p = 0.01) groups relative to the baseline period, despite differences in SMS content between groups.

Electronic Medical Record

Positive

Health Outcomes

- Qualitative feedback from the CHWs indicated that the AFYACHAT mHealth tool was simple to learn, easy to use in the field, provided timely responses (CVD risk stratification), and was well accepted by the target population.

Disease Surveillance

Positive

Health Outcomes

- Our modeling (CHWs equipped with mobile phone combined with improved treatment rates) would increase the number of deaths averted from 15,000 to 110,000, compared to standard care.

START CENTER

Supervisor/ Management Tools

Positive

Health Systems Management

- Provider-facing technology shows promise in supporting task-shifting models that can expand alcohol intervention services and increase access to care in low- and middle-income countries.

Supply Chain Monitor

Positive

Health Systems Management

- cStock (an mHealth technology), combined with Enhance Management worked better at making sure medical supplies were available and the supply chain ran smoothly.

AFRICA: FACILITATORS, BARRIERS AND GAPS

FACILITATORS	BARRIERS	GAPS
• Background Research • Stakeholder Involvement (including governments) • Leveraging Existing Frameworks • Integration • Routine technical support and troubleshooting • Backup solar energy or alternate manual documenting in case of power issues • Standardized data collection tools, reliable health surveillance networks, and smart diagnostic algorithms, real-time data transfer and improved communication channels • Ease of Use • Training Sessions	• Using personal phones • Wireless data availability, coverage, and network access • Inadequate Technological Competence • Poor Power Supply • Product Design Challenges • Lack of training on new digital tools • Weak technical support • Internet connectivity • Health system readiness for training CHWs • Digital divide	• Most studies have been short term • Accounting for concurrent tools • Further opportunity for research is to compare who is conducting these studies (universities, NGOs, MOHs) to compare impact

AFRICA: KEY FINDINGS

- Ethiopia and Zambia, countries that have high integration of tools with MOH and length of time, have more positive impacts reported and higher quality of evidence
- Decision support and Data collection tools quality of evidence is low and mostly anecdotal
- In some case studies, there were other mHealth tools being tested at the same time that may confound results
- Impact on health outcomes would likely need longer studies
- Most tools in pilot stage


ASIA

ASIA: DECISION SUPPORT TOOLS

15 out of 36 *articles in Asia focused on* ***decision support.***

GEOGRAPHY

86.7% of studies done in **India** (n=13)

93.3% focused on **rural regions** (n=14)

80% tested in **community** health settings.

HEALTH PROGRAMS

Maternal Health & ICMI <5 Years Old (n=8)

- Neonatal Danger
- Antenatal Care
- Utilization of Services

NCDs (n=3)

- Cardiovascular Disease
- Oral Cancer

IMPACT

Positive

86.7% (n=13) of tools reported **positive** impact of digital decision support tools.

Key Dimensions of Impact

- Health outcomes
- Community access
- Health Provider Competency

QUALITY OF EVIDENCE

Medium

(N=8)

- **46.7%** (n=7) of tools in **pilot** stage.
- **93.3%** of studies had sample sizes **>30.**
- **46.7%** of studies took **<1 year,** while another **46.7%** took between **1-5 years.**

ASIA: DATA COLLECTION TOOLS

8 out of 36** articles in Asia focused on **data collection.

GEOGRAPHY

50% of studies done in **India** (n=4)

87.5% focused on **rural regions** (n=7)

75% tested in **community** health settings.

HEALTH PROGRAMS

Maternal Health & ICMI <5 Years Old (n=3)

- Maternal and Newborn Care Quality
- Early Indication of Maternal Risks
- Pregnancy and Under 2 Screening

NCDs (n=3)

- Breast Cancer
- Cardiovascular Disease
- Oral Disorders

IMPACT

Positive

62.5% (n=5) of tools reported **positive** impact of data collection tools.

Key Dimensions of Impact

- Health Provider Competency
- Health outcomes
- Community access

QUALITY OF EVIDENCE

High

(N=4)

- **37.5%** (n=3) of tools in **pilot** stage, as well as **scale up** stage.
- **62.5%** (n=5) of studies had sample sizes **>30.**
- **62.5%** (n=5) of studies took **<1 year**.

ASIA: CASE MANAGEMENT TOOLS

8 out of 36** articles in Asia focused on **case management.

GEOGRAPHY

37.5% of studies done in **Bangladesh** (n=3)

100% focused on **rural regions** (n=8)

87.5% tested in **community** health settings.

HEALTH PROGRAMS

Maternal Health & ICMI <5 Years Old (n=6)

- Identification and Management of Sick and Small Infants
- Pregnancy Counseling
- Clinical Risk Assessments of Children <5 Years Old

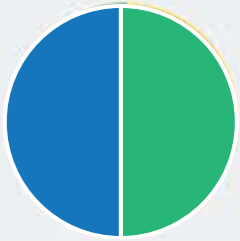
IMPACT

87.5% (n=7) of tools reported **positive** impact of data collection tools.

Key Dimensions of Impact

- Health Outcomes
- Community Access
- Costs

QUALITY OF EVIDENCE



4 medium, 4 high

- **50%** (n=4) of tools in **pilot** stage.
- **100%** (n=8) of studies had sample sizes **>30.**
- **62.5%** (n=5) of studies took **1- 5 years.**

ASIA: TRAINING TOOLS

5 out of 36 *articles in Asia focused on* ***training.***

GEOGRAPHY

100% of studies done in **India** (n=5)

60% focused on **rural regions** (n=3)

60% tested in **primary** health settings. (n=3)

HEALTH PROGRAMS

Maternal Health & ICMI <5 Years Old (n=2)

Mental Health (n=2)

- Schizophrenia
- Common Mental Disorders
- Substance Abuse

IMPACT

Positive

Overall beneficial impact reported in **health provider competency** across all studies.

- Improved health literacy
- Task-shifting away from physicians
- Improved case identification

QUALITY OF EVIDENCE

Medium

(n=3)

- **60%** of tools in **pilot** stage.
- **60%** had sample sizes between 10-30. **40%** had sample sizes >30.

ASIA: OTHER TOOLS

ELECTRONIC MEDICAL RECORDS (3)

Positive

Key Dimensions of Impact
Health Outcomes

Ex. an mHealth database used to screen 8686 people for oral cancer in India. Positivity rates were 28% for cervical screening, (which then had a 37% follow-up rate) and 5% for oral cancer screening (which had a 31% follow-up rate).

PROVIDER- PROVIDER COMMUNICATION (2)

Positive

Key Dimensions of Impact
Community Access

Ex. the Health Information Helpline, which offers specialist medical advice to community-based health workers is one of the largest mHealth initiatives in India to date. Over 48 months, the helpline serviced 669,265 calls.

PROVIDER- PATIENT COMMUNICATION (1)

Positive

Key Dimensions of Impact
Health Outcomes

Ex. control of BP and blood sugar was achieved in 54.0% and 34·1% of individuals with hypertension and diabetes. Blood pressure control rate improved by 12% in hypertensive individuals over the intervention period.

ASIA: FACILITATORS, BARRIERS, AND GAPS

FACILITATORS	BARRIERS	GAPS
• Reliable Network Connectivity • Continuous Training • Increased Support • Reduced Burden of Work • Ease of Technology Use • Task-Shifting to CHWs • Cost- Effectiveness of Interventions • Remote Consultations from Physicians	• Low Health Literacy • Low Technological Literacy • Lack of Behavior Change Communication • Lack of Government and Systematic Support • Lack of Incentive for CHWs • Network Connectivity Issues • Challenges in Accessing Medications • Data Privacy Concerns • Fear of Technology Replacing Human Interaction	• Short Study Durations • Small Sample Sizes • Limited Generalizability • Maturity of Tools • Inaccuracies in Self-Reported Health Conditions and Events

ASIA: KEY FINDINGS

Majority of research on digital tool enablement of CHWs in Asia done in **India**, in **rural** regions, and in **community** health settings

The digital tool landscape of CHWs in LMICs within Asia is largely concentrated in health programs targeting **maternal and under- 5 health**, followed by **NCDs** and **mental health**

Most prominent tool archetypes are **decision support**, **data collection**, and **case management**. Little to no research found on digital tools deployed for supply chain management, supervision of CHWs, or payment of CHWs

Majority of tools studied are in **pilot** stage

Overall, most studies reported **benefits**, particularly in the impact dimensions of **health provider competency** and **health outcomes**, in implementing digital tools into the practices of CHWs throughout Asia

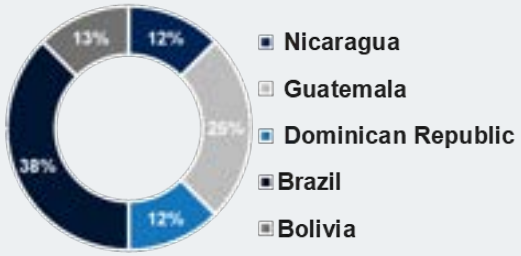
LATIN AMERICA AND THE CARIBBEAN

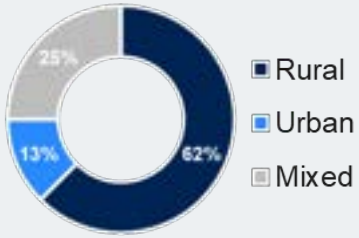
START CENTER

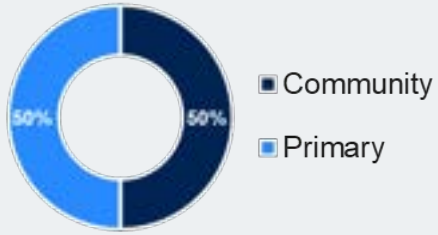
LAC: DECISION SUPPORT TOOLS

8 out of 22** articles in Latin America focused on **Decision Support.

GEOGRAPHY







HEALTH PROGRAMS

NCDs (n=3)

- Diabetes
- Uncontrolled hypertension

Mental Health (n=1)

- Depression

Other (n=4)

- Hearing loss
- Exclusive Breast feeding
- CHWs' daily work
- Health education

IMPACT

Positive

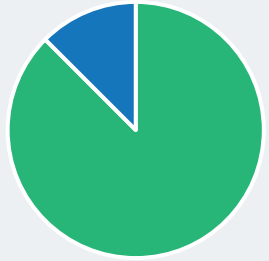
- All programs reported positive impact

Health Outcomes
- Improves disease symptoms*
- Breastfeeding promotion*

Community Access
- Self-monitoring of depression by reception of tailored feedback for self-management
- 75.2% increased follow-up compliance for families receiving mHealth reminders for hearing screening

Health provider competency
- Facilitate the work of CHWs*

QUALITY OF EVIDENCE



7 high

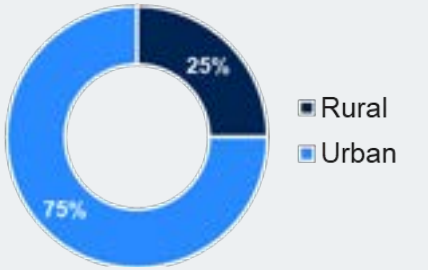
1 medium

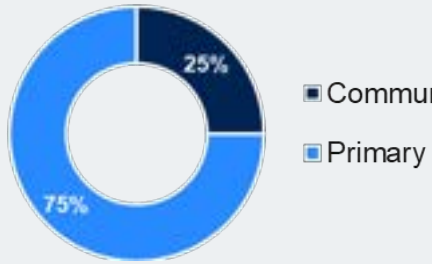
- 50% of tools in pilot stage and 50% are prototypes
- All had sample sizes >30

LAC: CASE MANAGEMENT TOOLS

4 out of 22** articles in Latin America focused on **Case Management

GEOGRAPHY





HEALTH PROGRAMS

NCDs (n=1)

- Cardiovascular Disease

Other (n=3)

- Screening for hearing loss (HL)
- Cutaneous leishmaniasis (CL)
- Human papillomavirus (HPV)

IMPACT

Positive

- All programs reported positive impact

Health Outcomes

- High accuracy of remote assessment of therapeutic response in patients with CL
- HL clinical assessments by CHWs using MEDSINC had a specificity correlation between 84% and 99% to health-care providers

Community Access

- Self-monitoring of depression by reception of tailored feedback for self-management
- CVD intervention participants were more likely to complete baseline visits (49.4% vs 13.5%) and follow-up visits (31.9% vs 7.7%).
- HPV mHealth protocol aims to increase adherence to triage among HPV+ women

QUALITY OF EVIDENCE

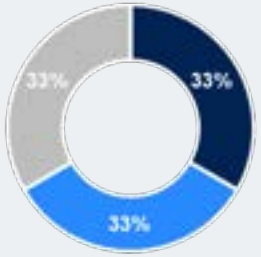
High **(n=4)**

- 50% of tools in pilot stage and 50% are prototypes
- All had sample sizes >30

LAC: DISEASE SURVEILLANCE TOOLS

3 out of 22** articles in Latin America focused on **Disease Surveillance

GEOGRAPHY



100% of studies done in rural settings

100% of studies done in community settings

HEALTH PROGRAMS

NCDs (n=2)

- Cardiovascular Disease Screening by Community Health Workers (CVD)

Other (n=1)

- Early detection of Cutaneous leishmaniasis (CL)

IMPACT

Positive

- All the mHealth programs reported positive impact

Health Outcomes

- Sensitivity to detect parasitologically proven CL with mobile application was >95%

Cost effectiveness

- CVD mHealth screening by CHW, resulted in incremental cost-effectiveness ratios of $195, and $1,890 per QALY gained in Mexico, and Guatemala, respectively

QUALITY OF EVIDENCE

1 high

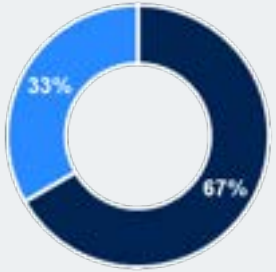
2 medium

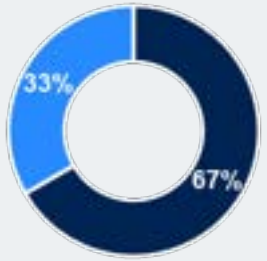
- 33% of tools in pilot stage and 67% are prototypes
- All had a sample sizes >30

LAC: TRAINING TOOLS

3 out of 22** articles in Latin America focused on **Training

GEOGRAPHY





100% of studies done in community settings

HEALTH PROGRAMS

Integrated Management of Childhood Illness (IMCI) (n=2)

- Early childhood development (ECD) scores, anemia , and chronic malnutrition (Pilot study)
- Early childhood development and nutrition status of children 6 to 36 months old (Prototype)

Other (n=1)

- Bone Health

IMPACT

Positive

- All programs reported positive impact

Health Provider Competency

- ECD study aims to evaluate the impact of an mHealth to improve the performance of CHW to improving child health
- ECD Pilot: The group of caregivers that received home visits with the mHealth tool (N = 48) had significantly higher knowledge scores (+1.26 standard deviations)
- Bone Health ECHO aims to improved osteoporosis care through tele-mentoring

QUALITY OF EVIDENCE

High **(n=3)**

- 1/3 of tools in pilot stage and 2/3 are prototypes.
- The pilot had a sample sizes >30

LAC: OTHER TOOLS

Provider- Patient Communication

Positive

Community Access

- Satisfaction survey in 2014 (n=571) showed that teleconsultations avoided patient referral by 78%.
- The study showed the potential of telehealth to provide support to primary care practitioners in remote cities.

Provider- Provider Communication

Positive

Community Access

- Health decision-makers and health-care providers had a positive perception regarding implementation of the multicomponent mHealth intervention designed to increase adherence to triage among women with HPV self collected tests.
- This increases the potential for a successful scaling-up of the intervention, with great implications not using mHealth interventions to enhance the cervical screening/follow-up/treatment process.

START CENTER

Data Collection

Positive

Health outcomes

- This study estimated that a group of seven trained CHWs could gather formal audiologic and otologic data points for 100 children per hour using a mobile platform, facilitate early diagnosis and management of disabling hearing loss in low-resourced settings.

LAC: FACILITATORS, BARRIERS, AND GAPS

FACILITATORS	BARRIERS	GAPS
• Training and Education • Affordable and Robust Technology • Data Privacy Measures • Community Engagement • Technical Support	• Perceived cost and perceived loss of privacy related to use • Technical barrier in terms of: o inefficiency o signal o device • Social barrier in terms of: o community member perceptions o safety • Digital illiteracy	• Limited information on tools that focus on supply chain monitor, supervisor/management tool and payments/incentives. • Insufficient information on cultural and contextual factors that may influence the acceptance and adoption of digital tools.

LAC: KEY FINDINGS

Majority of research on digital tool enablement of CHWs in LAC done in **Brazil and Argentina**, in **rural** regions, and in **community** health settings.

The digital tool landscape of CHWs in LAC is largely concentrated in health programs targeting **non-communicable diseases** including diabetes and hypertension.

Most prominent tool archetypes are **decision support**, **case management, disease surveillance** and **training**. Little to no research found on digital tools deployed for supply chain management, supervision of CHWs, or payment of CHWs.

Majority of tools studied are in **pilot** stage.

Overall, most studies reported **benefits**, particularly in the impact dimensions of **health provider competency** and **health outcomes**, in implementing digital tools into the practices of CHWs throughout LAC.

OVERALL KEY FINDINGS

OVERALL KEY FINDINGS

01 Majority of research concentrated in countries with an existing strong digital infrastructure, such as Kenya, India, Brazil, and South Africa.

02 Measurement of impact of the digital tools is limited by barriers to the digital infrastructure of where the tool is being implemented.

03 Across all geographies, the impact of digital tools were anecdotal, most tools were in pilot stage, and the quality of evidence is low and widely assessed based on their impact on health outcomes within the population.

04 Across regions and tool archetypes, 68 reported positive impact, 22 reported no impact and only 1 tool reported negative impact.

LIMITATIONS AND OPPORTUNITIES FOR FURTHER RESEARCH

LIMITATIONS & OPPORTUNITIES FOR FURTHER RESEARCH

- Rapid review approach
- Exclusion of unpublished digital tool deployments
- Broad scope and limited timeline
- Research on the source of articles or tools, e.g. NGOs, government, Universities, etc.
- More research that quantifies the impact of digital tool deployment in LMIC

WHERE TO INVEST?

Invest in **decision support**, **case management**, **training** and **data collection** tools, as they have shown to have positive impacts across different health programs and all geographies.

Invest in digital tool capacity-building initiatives and research efforts in countries with emerging or underdeveloped digital infrastructure, e.g., Madagascar, Rwanda, Cambodia, Myanmar, Honduras, El Salvador.

Since most of the evidence was anecdotal, invest in research that relies on rigorous scientific methods, systematic data collection, and larger sample sizes to obtain reliable and comprehensive insights in key geographic areas.

QUESTIONS?

start@uw.edu

APPENDIX

SEARCH STRINGS USING THE PCC FRAMEWORK

Search #	Search Texts and Syntaxes	Results
#1 (Participants)	"community health worker*" OR "CHWs" OR "Primary healthcare worker*" OR "Primary care provider*" OR "Primary care practitioner*" OR "lay health worker*" OR "lay worker*" OR "basic health worker*" OR "Community health agent*" OR "Community health promoter*" OR "Community health representative*" OR "Community health volunteer*"	
#2 (Concept)	"Digital tool" OR "digital health tool" OR "Digital enablement" OR "Digital support" OR "mHealth" OR "mobile health" OR "eHealth" OR "Telehealth" OR "Digital health" OR "Health information systems" OR "digital technology" OR "mobile technology" OR "Health technology" OR "Health workforce"	
#3 (Africa)	Africa OR African OR Algeria OR Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR "Canary Islands" OR "Cape Verde" OR "Central African Republic" OR Chad OR Comoros OR Congo OR "Democratic Republic of Congo" OR Djibouti OR Egypt OR Eritrea OR Eswatini OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR "Ivory Coast" OR "Cote d'Ivoire" OR Jamahiriya OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Mayotte OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Principe OR Reunion OR Rwanda OR "Sao Tome" OR Senegal OR Seychelles OR "Sierra Leone" OR Somalia OR "St Helena" OR "sub-Saharan Africa" OR Sudan OR Swaziland OR Tanzania OR Togo OR Tunisia OR Uganda OR "Western Sahara" OR Zaire OR Zambia OR Zimbabwe OR Egypt OR Morocco OR Tunisia	
#4 (Asia)	Kazakhstan OR Kyrgyzstan OR Tajikistan OR Turkmenistan OR Uzbekistan OR "Eastern Asia" OR "China" OR "Democratic People's Republic of Korea" OR "North Korea" OR Mongolia OR Cambodia OR Indonesia OR "Lao People's Democratic Republic" OR Malaysia OR Myanmar OR Philippines OR Thailand OR "Timor-Leste" OR "Viet Nam" OR Afghanistan OR Bangladesh OR Bhutan OR India OR Iran OR Maldives OR Nepal OR Pakistan OR "Sri Lanka" OR Armenia OR Azerbaijan OR Georgia OR Iraq OR Jordan OR Lebanon OR "State of Palestine" OR "Syrian Arab Republic" OR Türkiye OR Turkey OR Yemen	
#5 (Europe)	Belarus OR Bulgaria OR "Republic of Moldova" OR "Romania" OR Ukraine OR Albania OR Bosnia OR Herzegovina OR Montenegro OR "North Macedonia" OR Serbia	
#6 (Latin America and the Caribbean)	Cuba OR "Dominican Republic" OR Grenada OR Haiti OR Jamaica OR "Saint Lucia" OR "Saint Vincent and the Grenadines" OR Belize OR "Costa Rica" OR "El Salvador" OR Guatemala OR Honduras OR Mexico OR Nicaragua OR Argentina OR Bolivia OR Brazil OR Colombia OR Ecuador OR Guyana OR Paraguay OR Peru OR Suriname OR Venezuela	
#7 (Oceania)	Fiji OR "Papua New Guinea" OR "Solomon Islands" OR Vanuatu OR Kiribati OR Micronesia OR Samoa OR Tonga	
#8	#1 AND #2 AND #3	
#9	#1 AND #2 AND #4	
#10	#1 AND #2 AND #5	
#11	#1 AND #2 AND #6	

FRAMEWORKS FOR ASSESSING DIGITAL TOOL

Frameworks	Function	Advantages	Limitations
• The Digital Health Assessment Framework (DHAF)	• Assesses digital health technologies, including mobile apps and web-based tools used by healthcare providers and consumers. • The Framework includes components to assess **privacy and security**, **clinical assurance and safety**, and **usability and accessibility** and **Technical Security and Stability**.	• Open, objective framework, accessible for anyone to use. • Support the adoption of high-quality digital health technologies. Help healthcare professionals and consumers make better-informed decisions.	• The framework was crafted to support U.S.-specific guidelines, regulations and best practices for digital health technologies.
• The Performance of Routine Information System Management (PRISM)	• Assesses health information systems (HIS) performance, considering **technical**, **organizational,** and **behavioral factors**.	• The application of the PRISM framework and its tools in various countries has shown that they produce consistent and valid results.	• Needs additional skills and its time consuming
• mHealth Assessment and Planning for Scale (MAPS) Toolkit	• Comprehensively assesses and plan the scale-up of mHealth interventions in LMICs. It covers six major areas: **Groundwork**, **Partnerships**, **Financial health**, **Technology & architecture**, **Operations**, and **Monitoring & evaluation**, providing a baseline assessment, guiding progress tracking, and enabling adjustments throughout the scaling-up process.	• Its holistic framework ensures that all relevant dimensions, such as user needs, technology, operations, and monitoring and evaluation, are considered.	• Its comprehensiveness can lead to complexity, requiring substantial resources and expertise for full implementation.
• The American Psychiatric Association's app (APA) evaluation model	• Assesses mobile health apps by considering accessibility, privacy and security, clinical foundation, engagement, and interoperability. The five levels of the APA framework are: (1) **Background and access**, (2) **Data safety and privacy**, (3) **App effectiveness and clinical foundation**, (4) **User engagement**, (5) **Data integration towards therapeutic alliance**.	• The framework is flexible to allow clinicians and providers to tailor app recommendations to their specific needs.	• The framework is flexible to allow clinicians and providers to tailor app recommendations to their specific needs.

FRAMEWORKS FOR ASSESSING DIGITAL TOOL

Frameworks	Function	Advantages	Limitations
• MARS (Mobile App Rating Scale)	• The framework is a widely used tool for assessing and evaluating mobile health (mHealth) applications or digital health tools. The components of the MARS framework include **engagement**, **functionality**, **aesthetics**, **information quality**, **App subjective quality**	• It provides a structured approach and a comprehensive assessment of various aspects of mobile apps, ensuring a thorough evaluation.	• MARS framework primarily focuses on the user perspective and may not capture all aspects of clinical effectiveness or impact.
• System Usability Scale framework for assessing digital health tools (SUS)	• Widely used framework for assessing the usability of various systems, including digital health tools. SUS provides a standardized questionnaire-based approach to measure users' perceived usability of a system.	• The SUS framework is known for its simplicity, efficiency, and ease of administration.	• It primarily focuses on user perceptions and subjective assessment.
• Task, User, Representation and Function (TURF)	• TURF stands for task, user, representation, and function, which are the four components that determine the usability of an Electronic Health Record system.	• Comprehensive evaluation approach, promoting user-centric design, effective task support, and clarity in information presentation.	• Has complex evaluation process, subjective nature, potential lack of explicit interplay between components, and the need for adaptation to specific contexts or domains.
• The Digital Health for CHWs Maturity Model and Toolkit	• Useful in assessing, planning and implementing digital health services.	• Can be applied globally	

THANK YOU

START CENTER
STRATEGIC ANALYSIS,
RESEARCH & TRAINING CENTER