

Landscape Analysis for Severity Assessment, Triage and Home Self-Monitoring AFI Tools for LMICs

IQVIA

September 13, 2021

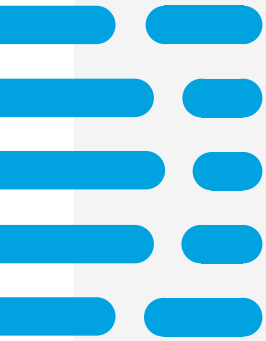


TABLE OF CONTENTS

- + Introduction
- + Project Approach and methodology
- + Research Frameworks
- + Key Findings
- + Recommendation

Project Background and Objectives

BACKGROUND

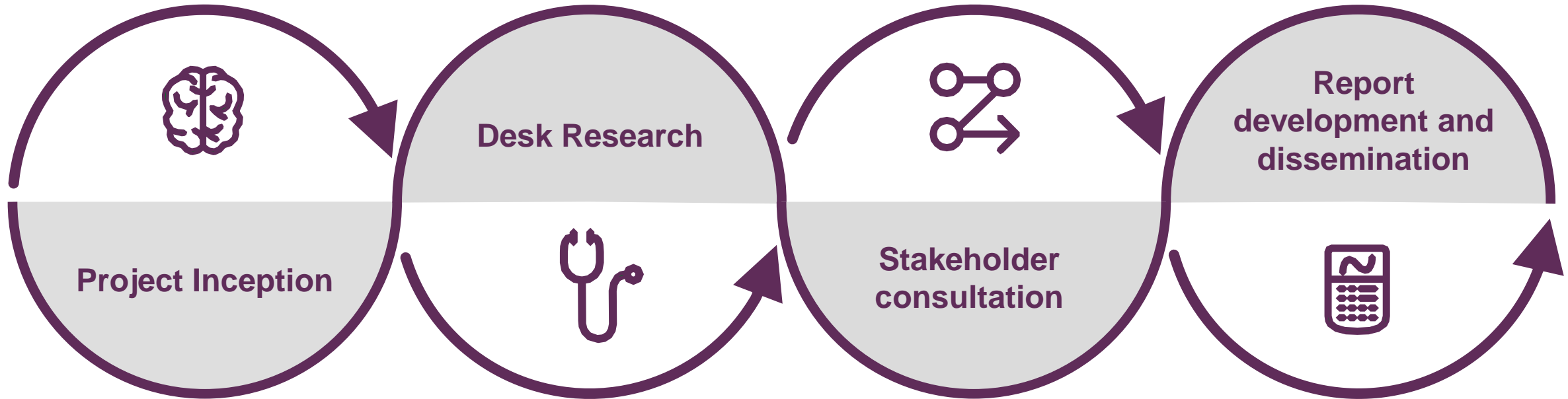
- The overlapping etiologies, makes diagnosis & management of fever which is presented so commonly in LMICs very challenging. Failure to identify the cause often results in increased use of antibiotics, wastage of medicines and increased morbidity and mortality.
- FIND is working on filling this diagnostic gap by facilitating development and validation of tools to support AFI management in LMICs.

PROJECT OBJECTIVE



1. To conduct landscape analysis i.e., comprehensive mapping of existing AFI tools, with focus on digital tools.
 - Tools used by healthcare workers to triage children/ adults presenting with AFI at primary care facilities
 - Tools used by patients/ caregivers for self monitoring and/or screening of clinical signs & symptoms at home.
2. To understand the scalability of tools and identify potential product introduction pathways

Project Methodology



Kick-off meeting to align on the project objectives, approach, and methodology

Secondary research to identify existing AFI tools for HCWs and patients/ caregivers

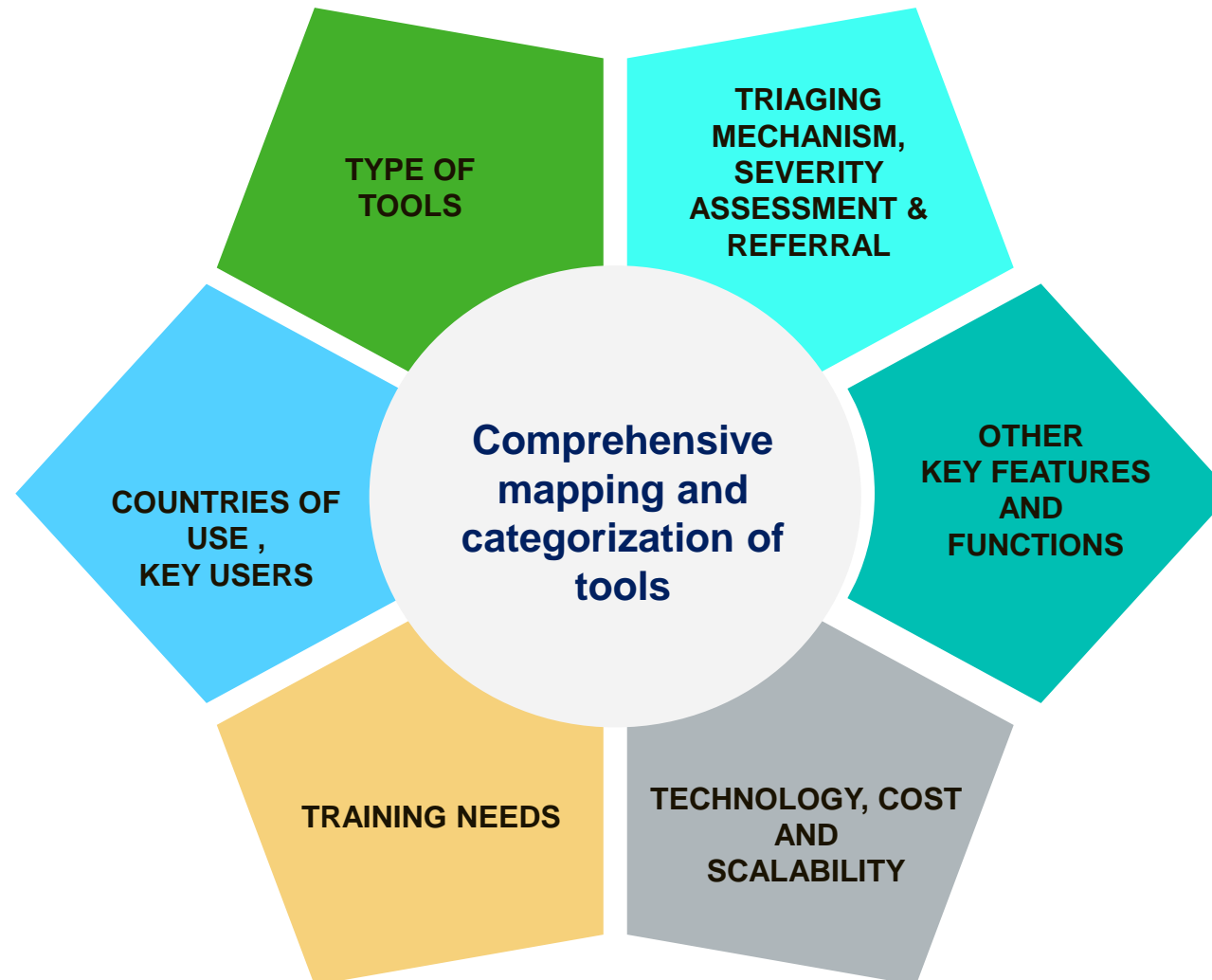
Key informant interviews with stakeholders from selected countries (India, Nigeria, Kenya) and global organizations to -

- Understand enablers and barriers
- Understand potential product introduction pathways

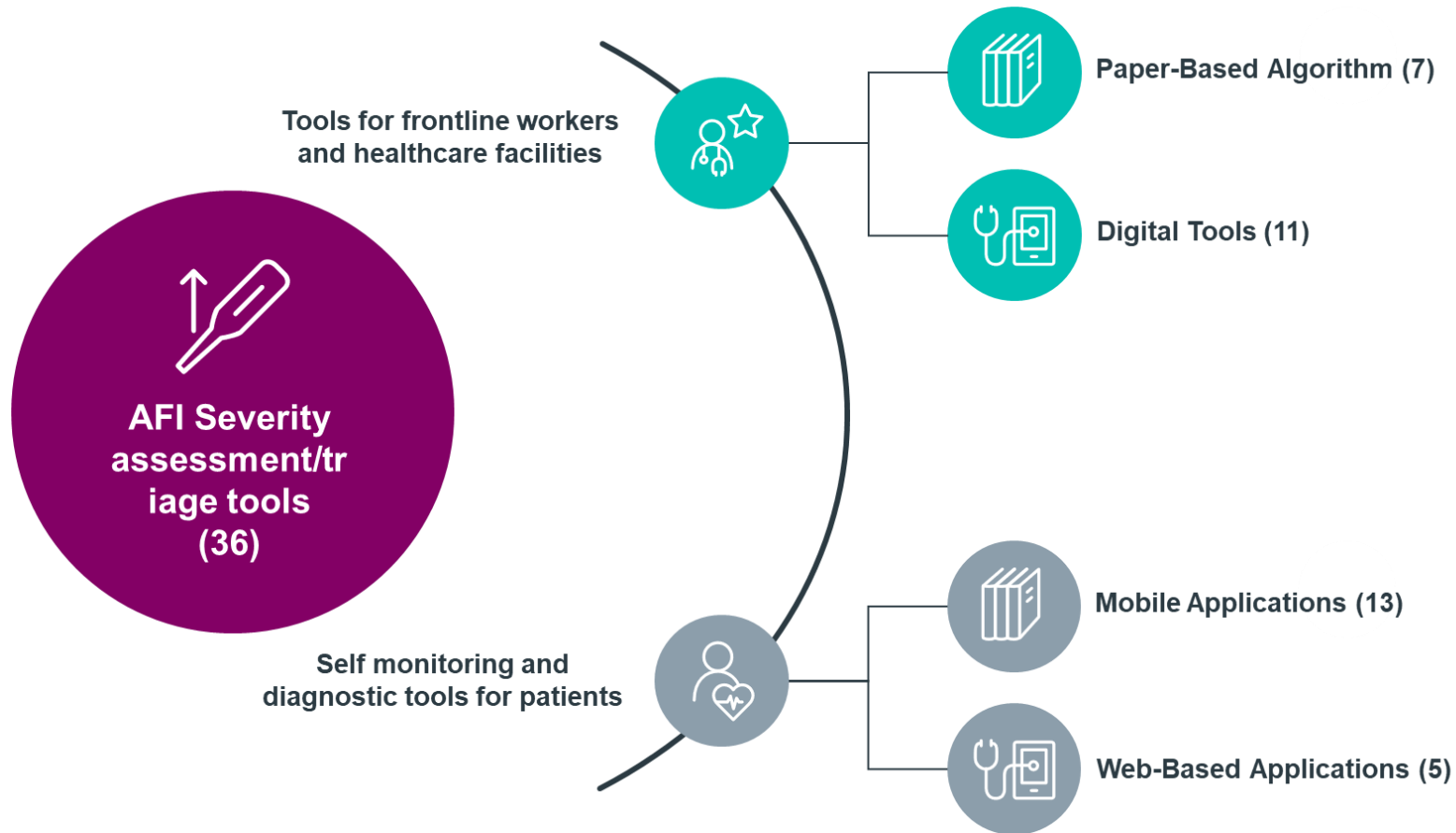
Data analysis and development of final landscape analysis report

Virtual dissemination workshop

Selected AFI tools were categorized and studied comprehensively



Research Framework: Classification of AFI tools



The desk research identified 36 tools for severity assessment/triaging of fever.

Tools are further classified as per users (HCWs and patients) and mode of administration (Paper based or Digital)

Tools were selected based on the following criteria's:-

1. Tools with fever management algorithms:
2. Triaging and severity assessment Functionality

Selection of countries and key stakeholders for primary research

For this study, a Semi-structured discussion guides were designed for each type of stakeholder which included respondents from diverse settings.

Country Selection

Based on the desk research, IQVIA selected 10 LMICs in the regions of **East Africa**, **West Africa**, and **Asia** where maximum number of AFI tools were piloted/implemented and Based on a scoring mechanism consisting of **11 indicators**, three countries were picked for primary research.



India



Nigeria



Kenya

Key indicators used for country selection are:-

1. Number of AFI Tools implemented by each country
2. Malaria incidence per 1000 population as risk
3. Children aged <5 years with Pneumonia symptoms taken to a healthcare provider
4. Existence of health technology (medical device) national policy
5. Unit in the MOH responsible for management of medical devices
6. Health service delivery (hospital beds per 10000 population)
7. Skilled health workers per 10000 population
8. GDP Per Capita (in USD)
9. External resources for health as a percentage of total expenditure on health
10. % of population using internet (2016)
11. Countries of interest for FIND and IQVIA's presence

Selection of key stakeholders for primary research

IQVIA interviewed key stakeholders from global agencies working in AFI's such as UNITAID and ASLM and at least 5-6 respondents from each selected country with a total of 19 interviews. The respondents for the interview were selected purposively.

List of Stakeholders



Global

1. Director of Science and New initiatives- ASLM
2. Technical Officer, Strategy Team- UNITAD



India

1. Co-founder Basic Healthcare Services (NGO/Donor Agency)
2. Consultant (Quality of care) – WHO country office
3. Member – AeHIN and Health Informatics Sectional Committee, BIS, India
4. Consultant- Gates Ventures-Bill & Melinda Gates Foundation
5. Deputy Director- Save the Children-Health & Nutrition unit
6. Leading Pediatrician from a reputed private hospital



Kenya

1. IT & Management Consultant -Ministry of Health- Malaria program
2. Program Manager- Ministry of Health- Newborn Child and Adolescent Health Unit
3. Health Specialist - UNICEF Kenya Country Office
4. Chairman- Kenya Pediatric Association
5. Associate Director- Evidence Action (NGO/Donor Agency)
6. Pediatrician- Kenya Medical Research Institute



Nigeria

1. Program Manager-Ministry of Health- Malaria program
2. Chairman- Association of Community Health Practitioners (Sub-national)
3. Digital Health Expert- WHO country office
4. Member of Pediatric Association of Nigeria
5. Member of e-Health Africa in-country team

Findings from this landscape analysis are organized across these areas

Availability



Available paper based
and digital tools

Features



Basic and advanced
features available in the
tools

Ranking



Ranking and
prioritization from a
LMIC perspective

Feedback



Stakeholder feedback
on desired features,
bottlenecks and
challenges

We identified 36 relevant AFI tools used by HCWs and Patients

Healthcare provider Tools

Paper Based Tools

Emergency Triage Assessment and Treatment (ETAT)	Pocket Book of Hospital Care for Children	IMCI	IMAI
Pediatric early warning system (PEWS)	Queensland Pediatric Guideline	Caring for the sick child, caring for newborns & children in the community	

*The Results of the study indicate that **IMCI** is the most commonly used paper-based guideline*

Digital Tools

ALMANACH	e-POCT	MSFeCARE	Niger Electronic iCCM
APE app	e-POCT+	Fever Dx	Malawi iCCM. App
SL eCCM App	MEDSINC	Integrated e-Diagnosis Approach (leDA)	

Patients/ Caregivers Tool

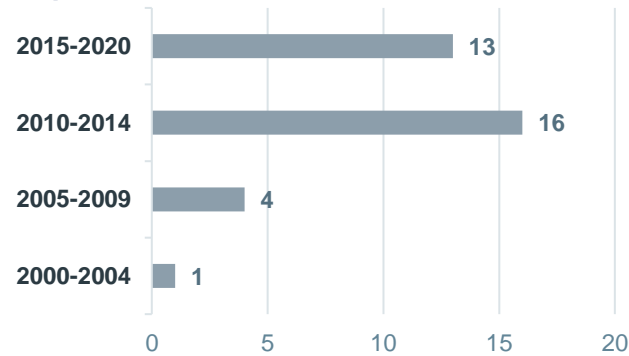
Mobile Based Tools

Ada Check your health	Babylon	Healthily with Dettol	Kids Doc Symptom Checker	Everyday Health-Symptoms Checker
Mediktor	Symptomate	WebMD Symptom Checker	Doctor31	
Fever App	Avey	Fever Coach	Doctor Diagnose (USA)	
Buoy's API	Thermia	Isabel Symptom checker	Doctor Ai	Symptify

Key features of the AFI tools

YEAR OF IMPLEMENTATION

Most of the tools were implemented during the period 2010-2014.



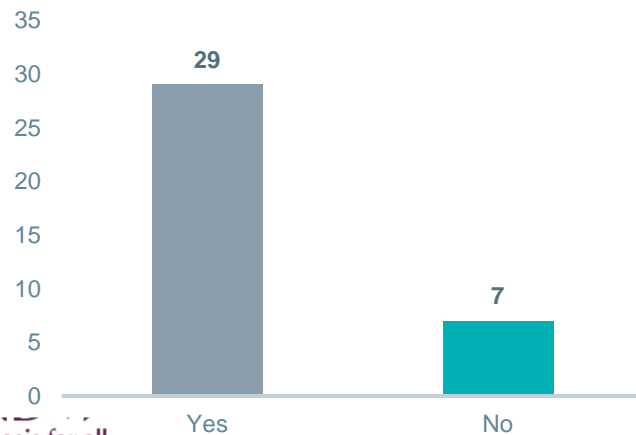
COUNTRIES OF IMPLEMENTATION

- Paper-based tools are widely implemented in LMICs
- The eCDAs selected as part of this study were implemented/piloted in multiple countries across Africa
- Some of the self monitoring tools are available in LMICs, some are currently used in USA but are scalable.

KEY USERS

- Most of the digital tools used by healthcare workers are for both children and adults
- Out of 18 self monitoring tools, 4 focused on children's symptoms, 2 on adult symptoms while 12 can be used for patients of all age groups

AVAILABLE IN LMICs



MOST DOWNLOADED PATIENT/SELF MONITORING TOOL



10+ million users, used across the globe

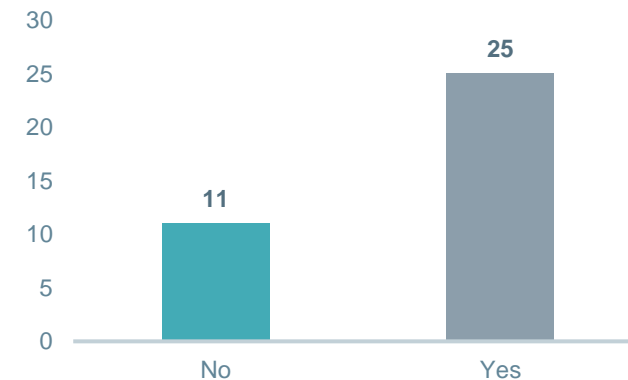


10+ million users, used in USA



50,000+ downloads, used across the globe

TOOLS WITH IMPACT STUDIES



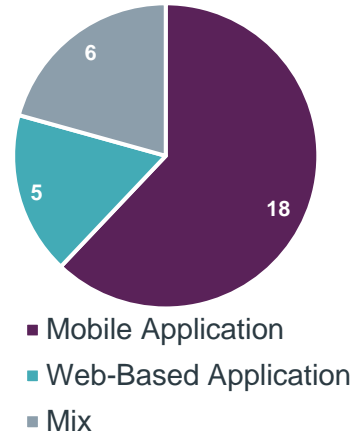
Key features of the AFI Tools

ABILITY TO WORK BOTH OFFLINE & ONLINE (HCF tools)

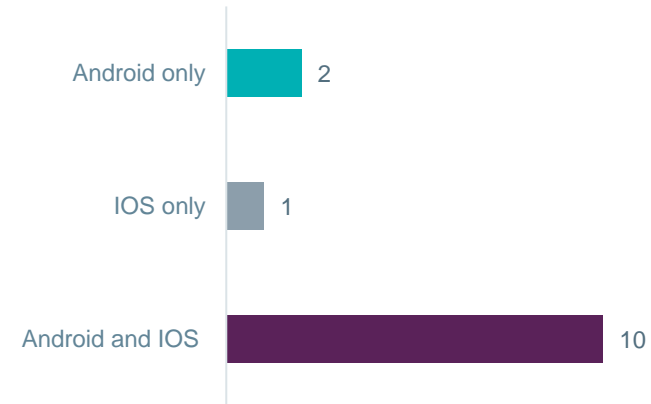
Digital tools that work both online as well as offline are*:

- ALMANACH
- MFeCARE
- Malawi iCCM App
- leDA
- SLeCCM App
- MEDSINC
- Fever Dx

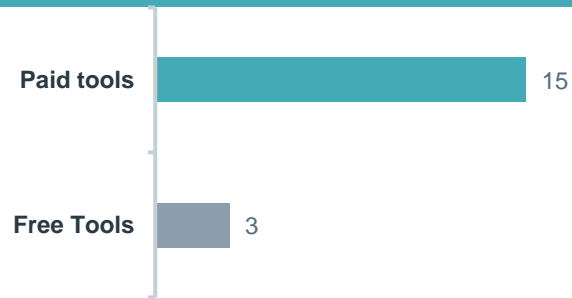
TECHNOLOGY****



OPERATING SYSTEM of Mobile & mix patient tools



COST MODEL (Patient tools)**



STORAGE OF PHR

•**15 tools** have provision to store PHR including **personal details** such as name, DOB, Gender and email address, phone number and address, medical history

•**Clinical information** stored were vital signs***, height, weight and medical history

TRAINING AND CAPACITY BUILDING

• Three eCDAs (ePOCT+, leDA and SL eCCM APP) have in-built eLearning modules.

• Most of the digital tools require training either on the algorithm and how to use them.

*All patient tools (18 tools) are working online only
 ** All HCF tools are Free as it's funded by donors and the tools developers
 *** Vital signs are blood pressure, Body temperature, Pulse rate, Respiration rate, etc
 **** All HCF tools are Android mobile applications (11 tools)

Types of Triageing & severity assessment functionality

All the tools selected under the study have triaging & severity assessment function.

Triage system in eCDAs are based on existing guidelines and algorithms mostly IMCI/iCCM.

	PAPER BASED TOOLS			MOBILE APPLICATIONS											
Type of Triage	DIFFERENT LEVELS OF EMERGENCY	COLOR CODE SYSTEM	MIX OF SCORING SYSTEM AND COLOR-CODE SYSTEM	TYPES OF RECOMMENDATIONS	COLOR CODE SYSTEM										
Triage Level	<ul style="list-style-type: none"> Urgent & requires referral to healthcare Urgent but can be treated Non urgent cases & can be managed at home 	<ul style="list-style-type: none"> Immediate care needed Urgent cases & should be directed to priority ques Non-urgent cases 	<table border="1"> <thead> <tr> <th>SCORE & COLOR CODE</th> <th>STATUS</th> </tr> </thead> <tbody> <tr> <td>0-2</td> <td>No change</td> </tr> <tr> <td>3-4</td> <td>Worse</td> </tr> <tr> <td>5</td> <td>Deteriorating</td> </tr> <tr> <td>6+</td> <td>Quick Intervention</td> </tr> </tbody> </table>	SCORE & COLOR CODE	STATUS	0-2	No change	3-4	Worse	5	Deteriorating	6+	Quick Intervention	<ul style="list-style-type: none"> ✓ Homecare ✓ Seek medical service at earliest ✓ Visit emergency room immediately. 	<ul style="list-style-type: none"> Visit emergency immediately Seek Medical Advice Homecare
SCORE & COLOR CODE	STATUS														
0-2	No change														
3-4	Worse														
5	Deteriorating														
6+	Quick Intervention														
Name of Tools	<ul style="list-style-type: none"> Pocket book of hospital care for children Caring for the sick child, caring for newborns and children in the community, Queensland Pediatric Guideline Integrated Management of Adolescent and Adult Illness (IMAI) 	<ul style="list-style-type: none"> Emergency triage assessment and treatment (ETAT) Integrated Management of Childhood Illness (IMCI) 	<ul style="list-style-type: none"> Pediatric Early Warning System (PEWS) 	<ul style="list-style-type: none"> Thermia Buoy API 	<ul style="list-style-type: none"> Ada Kids Doc Avey Everyday Health Babylon Mediktor Doctor31 Doctor Ai WebMD Fever Coach Symptify Healthily Symptomate Fever App Doctor Diagnose Isabel Symptom checker 										

Additional features identified in the AFI tools

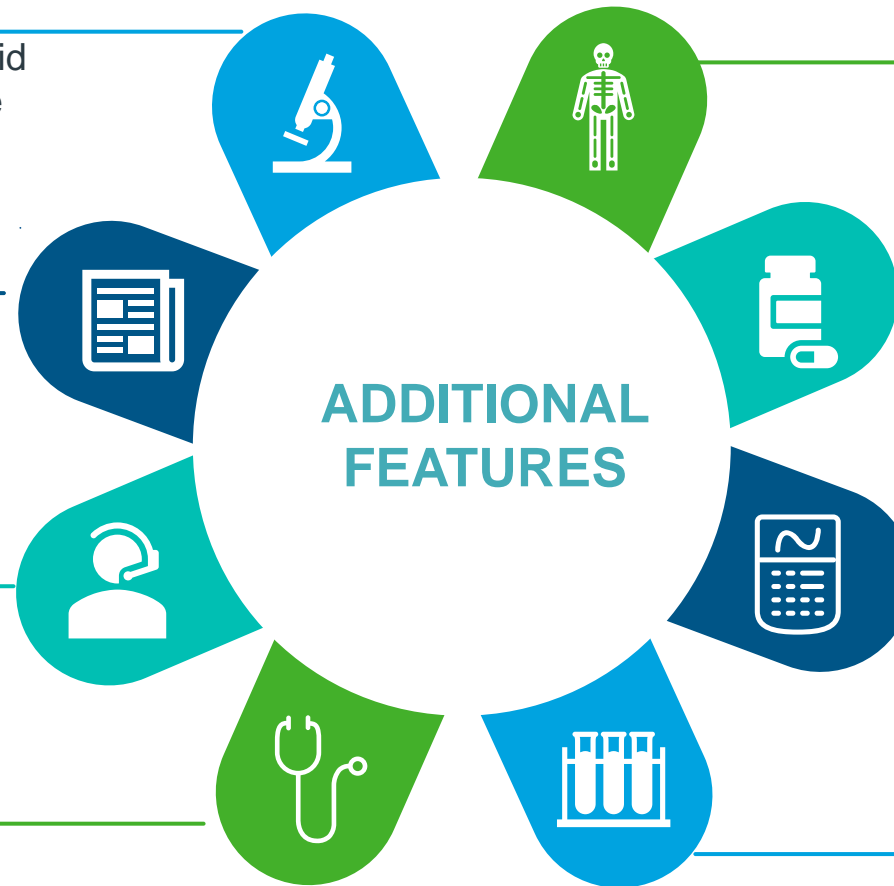
PoCTs (8 tools)

Most eCDAs integrated PoCTs like Hemoglobinometer, Pulse oximeter, Rapid diagnostic tests (Malaria, HIV, C-reactive protein), Urine dipstick

Informative content on medical conditions, Disease database & Nutrition advice (4 tools)

Telemedicine or Video consultation (7 tools)

Locating Nearby GPs and Pharmacies (7 tools)



Body Map Index (4 Tools)

Information on Dosage of drug (3 tool)

Health calculators
 Calculation of Blood Alcohol Content level, Smoking cost and BMI estimation
(1 tool)

Integrating Lab results (1 tool)

Ranking of the AFI tools

To differentiate and select the best suited digital tool, a selection matrix was established to rank these tools based on the parameters that define the ease of implementation of these tools in LMICs

Indicators used for scoring and ranking the digital tools	Healthcare Facility Tool (HCWs)			
	Implemented in LMICs	Specifically for fever management	Works both offline and online	
	Implemented in multiple countries	Availability of e-learning module	Currently in use	
	Available in open source	Integrating POCTs	Following IMCI/ICCM guidelines	
		Years of existence		
	Self-Monitoring patients' tools			
	Implemented in LMICs	specifically for fever management	Free to use	Multiple Languages
	Provide Educational information	Technology Platforms	Operating systems (Android/iOS)	Telemedicine

Results of tools scoring and ranking	Top 3 Healthcare Facility Tools	
	1 <i>leDA</i>	2 ALMANACH
	3 APE App	
	Top 3 Self-Monitoring patients' Tools	
	1 <i>Symptomate</i>	2 Mediktor
	3 Ada Check your health	

Brief profiles of the top three tools for healthcare providers

1 leDA

Brief: Developed by Terre Des Hommes (2014) for providing quality care to children under-five by supporting HCWs through a digital job aid called REC as well as integrating data with the health information system and providing coaching and skill development services through e-learning module. The algorithm is based on IMCI guideline

Location: Burkina Faso, Mali, and Niger

Technology: open access CommCare software. **Both Android and IOS application.** works both online and offline

POCT: intergrade mRDT

Impact Study: 200.000+ consultations recorded with leDA each month with a total of 10M+ consultation since 2014

2 ALMANACH

Brief: Developed as a paper-based booklet and an eCDA by Swiss TPH in 2015. It guides management of children in low-resource settings, for malaria, urinary tract infection, typhoid, and skin diseases. based on IMCI guideline

Location: Tanzania and Afghanistan (Not currently in use), **Nigeria and Somalia** (currently in use)

Technology: open access CommCare software **Only Android.** works both online and offline

POCT: Intergrade mRDT and urine dipstick

Impact Study: According to study in 2018 in Nigeria, ALMANACH has contributed to increasing the assessment of danger signs in children by 60% and decreasing antibiotic prescription by 8%. Also, in Somalia in 2020, it has helped in reducing antibiotics prescription for upper respiratory tract infections by 15%.

3 APE App

Brief: Developed in 2009 by **Malaria Consortium** as part of inSCALE project to provide mobile application for the use of healthcare workers in disease management of children under five years for assessment of diarrhea, pneumonia, malaria, and malnutrition and can integrate data with the health information system

Location: Mozambique

Technology: open access CommCare software. **Android Only.** works both online and offline

POCT: No

Impact Study: An evaluation study conducted in 2014 showed that 68% of CHWs were using the application, and many stated that it was useful in their daily consultations.

Brief profiles of the top three tools for patients/ caregivers

1 Symptomate

Brief: Developed in 2014 by Infermedica, to assist patients with preliminary diagnosis using AI and guide them to the appropriate medical services. The app has a body map as well as a symptom box option to allow the patient to select the target body part and display the associated symptoms.

Location: Can be used globally and it's free to use

Triaging Mechanism: The recommendations provided by the app are emergency ambulance (calling ambulance), emergency visit (visiting an ER), consultation within 24 hours, and self-care

Technology: A web-based and mobile application and can operate on android and iOS platform

Additional Features: it's available in 19 languages and can provide tele-medicine and COVID-19 Checkup

2 Mediktor

Brief: Developed by TECKEL MEDICAL SL in 2011. The app uses AI algorithm to guide the patient's interrogation in a similar way to how a doctor would do it.

Location: It can be used globally and it's free to use

Triaging Mechanism: It is based on a color-coding level of urgency- Blue: Very low urgency, Green: low urgency, Orange: medium urgency and Red: high urgency. Additionally, it indicates intensity of pain on a scale of Mild (1-2), Moderate (3-4), Intense (5-6), Very Intense (7-8) and Very Worst (9-10) as well as level of occurrence (Common, Frequent, and Infrequent).

Technology: A web-based and mobile application and can operate on android and iOS platform

Additional Features: it's available in 10 languages and can provide paid tele-medicine services

3 Ada Check your health

Brief: Ada uses an AI technology to support users to check their symptoms and generates a set of differential diagnosis for a given clinical case. The application consists of different modules such as: Symptom Checker, Symptom Tracker, and the Condition Library

Location: Used globally and it's free to use

Triaging Mechanism: a color-coding triage system such as red to seek emergency care immediately, orange to seek medical advice within 2-3 days or within the next few hours and green for the cases that can be managed at home.

Technology: A mobile application and can operate on android and iOS platform

Additional Features: it's available in 6 languages and can provide COVID-19 Checkup and educational information for the users through a Condition Library



Demo of Symptomate

Demo of Symptomate

Please Click the Link Below



[Demo of Symptomate](#)

Patient recommendations and triaging process in top three patient/ Care-givers tools

Symptomate



Recommendation

Call an ambulance

Their symptoms are very serious, and they may require emergency care. Do not delay. Call an ambulance right now.

Alarming symptoms:

- Breathing problems after an injury
- Sudden breathing problems after an injury
- Vomiting
- Diarrhea

Summary

People with similar symptoms may require emergency care. If you think this is an emergency the safest thing to do is call an ambulance.

Possible causes

- Broken rib**
 Seek emergency care
 4 out of 10 people with these symptoms had this condition.

[Tell me more](#)

- High blood pressure**
 Seek emergency care
 3 out of 10 people with these symptoms had this condition.

Mediktor

Ada

Assessment report

mediktor



Woman · 30 years

Your answers suggest a reasonable probability of being affected by COVID-19 and requiring medical assistance. Contact the medical emergency phone number and follow their instructions. Should not be able to reach this service, go to a medical center. Share the report of this assessment with your doctor.

Reason for consultation Headache

Main symptom Headache

Risk factors Current tobacco use, High blood pressure, High cholesterol / triglycerides and Diabetes.

Vital signs

Temperature: 39.00 °C

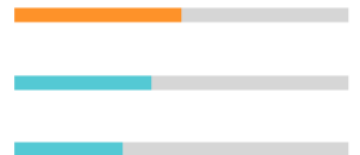
Urgency

Medium urgency









Diseases

- ① **Coronavirus infection - COVID-19**
Emergency Medicine, Family Medicine
- ① **Common cold - Viral respiratory infection**
Emergency Medicine, Family Medicine
- ① **Sinusitis**
Emergency Medicine, Family Medicine



Desired Features of Digital AFI tool

Healthcare Facility Tool

 Easy to use	 Cost effective
 Clinical algorithm	 Support Referral
 Online & offline	 Record Vital signs

The Need of (e-CDA) Tools/Mobile Application

Study participants confirmed there is a need for digital AFI tools to support fever case management at primary healthcare level.

Tool should also educate and guide the community on when to seek timely medical consultation and how to manage fevers at home, especially after COVID-19

Willingness of MOH to implement AFI Tools

Study participants confirmed that the government is willing and open to introduce e-CDA/mobile applications-based AFI tools for managing fever cases.

Self-Monitoring patients' tools

 User-Friendly Interface	 Color-based triage system
 No self-treatment	 Local Language
 Online & offline	 Free of cost

Mapping desired feature of patient tools with the existing features of the top 3 patient tools

Tool Name/ Desired features	User friendly interface	Color-based triage system	No self-treatment	Local Language	Online & offline	Free of cost
Symptomate	Yes	Yes	Yes	19 languages	Online only	Yes
Mediktor	Yes	Yes	Yes	10 languages	Online only	Yes
Ada Check your health	Yes	Yes	Yes	6 languages	Online only	Yes, and has paid Tele-medicine services

Mapping desired feature of patient tools with the existing features of the top 3 Healthcare workers tools

Tool Name	Easy to use	Cost effective*	Clinical algorithm	Support Referral	Online & offline	Record Vital signs
IeDA	Yes	N. A	Yes	Yes	Yes	Yes
ALMANACH	Yes	N. A	Yes	Yes	Yes	No
APE App	Yes	N. A	Yes	Yes	Yes	Yes

*The information about the total cost of the tools was not available

Critical Bottlenecks for Implementation & Scale-up of AFI Tools in LMICs



Poor Regulation and Planning

- Lack of regulatory framework for long term implementation
- No partnership with the relevant stakeholders to support scaling-up and funding



Limited Awareness and Trainings around AFI and digital tools

- Lack of awareness about the tool's usage
- Lack of regular and refresher trainings
- Limited transfer of technical knowledge between the developers and the local IT teams for maintenance of the tool



Data Privacy Issues

- Concerns about patients' data privacy when using digital tools



Lack of workforce and Resources

- Shortage of workforce in remote areas
- Limited availability of smartphones & internet
- Lack of basic services at healthcare facilities (such as: RDT, Point of Care tests)



Limited Access to Healthcare Services

- Limited access to secondary and tertiary care
- Shortage of well-trained HCWs on emergency care



Conventional Community Behaviors

- Patients prefer traditional medicine for immediate care and often present to a clinic when symptoms are severe.
- Unwillingness of the community to use digital tools due to lack of awareness around its actual benefits

Existing Digital Initiatives in the selected LMICs

Each country uses some digital surveillance or data management system as listed below. It would be advisable to develop a tool that can be integrated with the existing system for better acceptance of the tools among the healthcare workers



Nigeria

- Surveillance Outbreak Response Management and Analysis System (SORMAS platform) which is used for the management of infectious diseases in Nigeria to monitor infection outbreaks, follow-up cases and keep a check on the overall numbers and statistics of outbreak responses
- **The SORMAS app was developed at Germany 's Helmholtz Centre for Infection Research in collaboration with international and national partners in response to the Ebola outbreak in West Africa in 2014.** The app was also recognized by United Nations in November 2020 and considered to be relevant in efforts to achieve SDG by 2030.



India

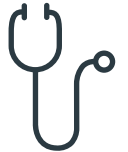
- Integrated Disease Surveillance Program (IDSP) is being used to strengthen the disease surveillance in the country. Under IDSP, a web-based near-real-time electronic information system "Integrated Health Information Platform (IHIP)" is used for data monitoring and managing disease outbreaks. It used by the ASHA and the ANM workers for the report of Malaria and Kala Azar cases.
- **It was launched by Ministry of Health & Family Welfare in 2004 with the World Bank assistance, currently is being funded by the government**



Kenya

- An e-Health strategy supported by e-health Africa has been in place to implement a digital health system DHIS (District Health Information Software) to collect and analyse health data.
- A Community Health information system to support community health workers in collecting and managing of health data.
- **TIMNCI tool which is a digital version of IMNCI guidelines that is developed by the government**

Product Introduction Pathway suggested by the global and country level stakeholders



Scale up and sustainability planning

Develop an action plan to scale up the implementation across the country. Action plan should consider the sustainability of the tool implementation, and funding options,

Building capacity of the local health workforce to use and manage minor technical issues.



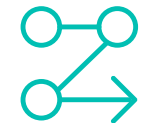
Engage community and private sector

Its important to engage and train traditional healers, pharmacists and private practitioner to increase community reach.



Pilot Study

Test the tool in a mix of urban and rural areas selected based on the epidemiological statistics data to assess and understand the effectiveness of the tool.



Customization of tools as per country needs

Assess the current situation to understand the local needs and challenges. Study existing tools and digital initiatives to understand the existing limitations and real needs of the country. The tool should be customized accordingly



Partnership with multilateral agencies

Engage agencies actively working in fever management in that country or region. They can provide technical support and funding to improve sustainability



Engaging key Stakeholders

Buy-in from MOH (national, sub-national levels), Professional associations & community- level organizations to get insights about the feasibility of implementing the tool

Additional factors stated to ensure success of AFI tool implementation

Stakeholder Engagement

- Engaging with the **private sector** to improve the overall quality of care as private sector caters to large populations
- Engaging with healthcare stakeholders such as WHO Afro, and African CDC to support implementation
- Engaging healthcare provider associations/clinical associations to understand their willingness

Implementation Plan and Location

- Approaching progressive states or regions to model and pilot AFI tools
- Designing open-source tool for the countries to customize as per their needs.

Manpower & Work Resources

- Increasing supportive supervision & training of healthcare workers.
- Integration of tools in the country's healthcare system
- Include the tool/guideline algorithm as a curriculum/courses for undergraduate students

Recommendations

Product Development

- Donors can develop an open-source application that the countries can customize and use as per the requirement
- Select and identify relevant audience for whom the implemented tool will be useful
- Designing simple tools with less dependency on internet connection
- Get the govt buy-in engage health providers while developing home based tool for better acceptance



Implementation

- Engaging health care provider associations/clinical associations working in AFI to endorse the tool
- Approaching fever clinics set up during the COVID-19 to implement digital tools for fever management.
- Sensitizing the front-line workers with real life situations of fever case management using the digital tool and spreading awareness in the community regarding use of home-based tools



Sustainability

- Provide on job trainings and mentorship support to ensure comfort level in using the AFI tool
- Use train-the-trainer model to ensure the sustainability of trainings at the local level
- Include the tool/guideline algorithm as a curriculum/course for undergraduate medical students
- Healthcare providers should be engaged to promote the use of home-based tools





THANK YOU

