Digital Health Information Interventions for Immunisation Demand Generation:

A guide for selecting appropriate tools and technologies

A resource guide developed as part of Gavi, the Vaccine Alliance's Digital Health Information Strategy

September 2022

Developed by Sarah Cunard Chaney and Patricia Mechael, HealthEnabled

health.enabled

Gavi The Vaccine Alliance

Acknowledgements

HealthEnabled and Gavi, the Vaccine Alliance would like to thank the following individuals for their inputs and valuable contributions as members of the small working group, technical reviewers, and key informants whose input made this resource possible.

Smita Singh Meredith Baker Carine Gachen	Gavi, the Vaccine Alliance
Surangani Abeyesekera	UNICEF Headquarters
Tina Purnat	World Health Organization
Elisabeth Wilhelm	U.S. Centers for Disease Control and Prevention
Abhishek Singh Karthik Nagarajan Anjali Barman	Group M India
Sara Chamberlain	BBC Media Action
Anne Sophie Vandamme	GaneshAid
Harriet Blest	UNICEF East Asia and Pacific Regional Office
Siobhan Burnette Iddi Iddrisu	UNICEF Ghana
Jamie Arkin	Alfluence Reach
Varsha Venugopal	Suvita
Matt Berg	Ona / OpenSRP
Danya Arif	IRD Global / Zindagi Mehfooz Electronic Immunization Registry (ZM-EIR)
Mel Miles	Dimagi / CommCare

Cover photo credit: GAVI/2013/Evelyn Hockstein

As part of Gavi, The Vaccine Alliance's efforts to monitor the use of our digital health information resources and to gather recommendations to improve them in future versions, we have set up a dedicated e-mail **DHI@Gavi.org**. Please let us know what you have found useful and what we can do better in the next iteration. Thank you!

Table of contents

Glossary of terms

Demand-side factors	An individual or community's perception, social norms, priorities and ease of access that contribute to their motivation and ability to receive immunisation services
Digital literacy	An individual's ability to access, communicate and understand information through digital media, technology or platforms
Electronic immunisation registry	A computerised data system that collects and consolidates confidential case-based vaccination information at the point of service delivery
Intent to vaccinate	An individual's resolve, willingness or determination to receive vaccination for themselves or their child
Interactive Voice Response (IVR)	An automated phone system allowing callers to select menu options and hear pre-recorded messages by speaking or using a keypad from any mobile or traditional phone
Loss to follow-up	Children who had contact with the health system at one time but failed to complete the recommended schedule of childhood vaccinations (also referred to as "**incomplete immunisation**", "**defaulters**", "**under-immunised**" or "**drop-outs**")
Social and Behaviour Change Communication	The strategic use of communication approaches and other strategies to promote changes in knowledge, attitudes and behaviours based on proven theories and models of behaviour change
Social listening	The regular and systematic monitoring of public discourse and sentiment expressed in any type of media or source of information that represent different populations and geographies. Insights drawn from social listening can be used to inform immunisation programme activities and communications to improve community demand for immunisation services
Social media	A collection of internet-based applications and technologies that allow the creation and exchange of user-generated content
Supply-side factors	The immunisation programme facilities, procedures, policies, logistics, interpersonal communication and quality that influence an individuals' perception, motivation and ability to receive immunisation services
Vaccine confidence	The level of trust that communities and individuals feel towards recommended vaccines and the people and systems that deliver vaccines
Vaccine demand	The actions of individuals and communities to seek, support and/or advocate for vaccines and immunisation services
Vaccine hesitancy	An individual or community's reluctance or refusal to vaccinate despite the availability of vaccines
Short Message Service (SMS)	A text-based message that can be sent and received by most mobile phones
Zero-dose	Children who have not received a single dose of diphtheria, tetanus and pertussis-containing vaccine

Digital Health Information Interventions for Immunisation Demand Generation: A guide for selecting appropriate tools and technologies is a resource that provides a stepwise approach and important considerations for selecting and planning for digital technologies and tools to improve demand for immunisation. National immunisation programme managers, social and behaviour change specialists, and immunisation implementing partners will benefit from the documentation of experiences, challenges and suggestions on how digital technologies can help reduce barriers and enhance opportunities for routine childhood immunisation uptake and access. The guide has been developed to align with **Gavi, the Vaccine Alliance's Digital Health Information Strategy** with lessons and suggestions that are relevant for any decision-maker or implementing partner seeking appropriate solutions to enhance demand for routine childhood immunisation services.

Background

What is immunisation demand?

A successful routine immunisation system depends on more than safe and effective vaccines, supply chains and refrigerators. The target audience for vaccination - communities and individuals - must be willing and able to receive the vaccines for themselves or their children. Individuals may experience geographic or financial barriers that prevent them from accessing vaccine services; they may be concerned about the safety of the vaccines or have had negative experiences with the health system in the past. The health workers themselves may experience pressure at work, are often balancing competing priorities and face their own challenges to effectively deliver high quality vaccination services to the community.

These and other layers of complex factors contribute to successful and complete immunisation status and are broadly referred to as *immunisation demand*. Individuals and communities that demand vaccines have a positive attitude towards vaccines, positive perceptions about the quality of services available to them and actively seek out and advocate for others to utilise these services. Immunisation demand takes place in the context of the local community, health system, the media environment, social norms and individual perceptions that operate in an iterative cycle to influence vaccination service uptake. *Demand generation* strategies and interventions are based on the application of behavioural science to develop, design and implement tailored, evidence-based, measurable interventions to build trust and bridge the knowledge-practice gap to increase uptake of immunisation services.

The Journey to Health and Immunisation

Frameworks and models use visuals and general categories to help us understand the complex interactions that play important roles in immunisation demand. The Journey to Immunisation (see figure below) serves as a guide to understanding the factors that influence the behaviours and

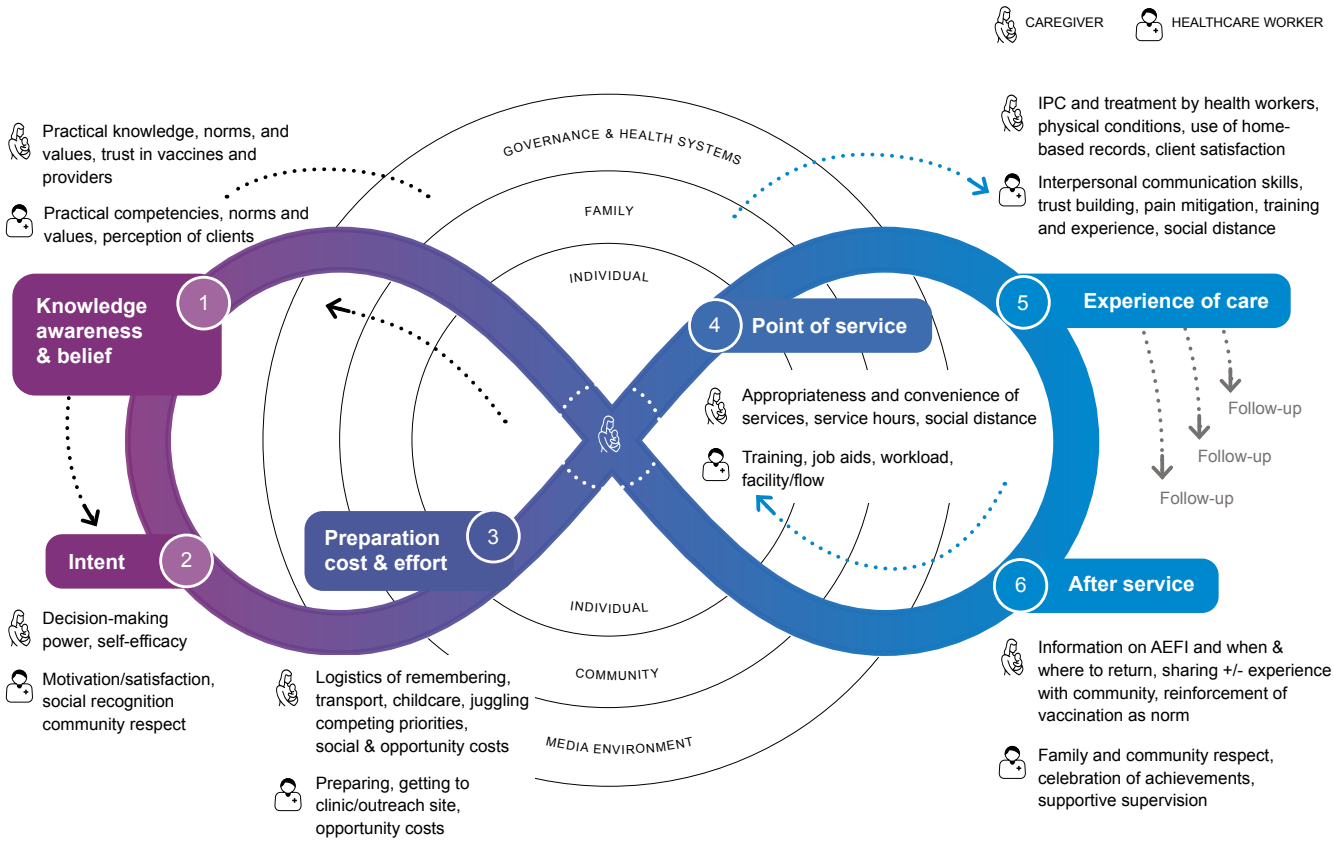
decision-making of both a caregiver and a health worker (adapted from **UNICEF's Human Centered Design 4 Health**). It is intended to help programme planners and implementers think about the unique factors in their own target community, society and local context. The Journey to Immunisation includes key aspects of immunisation supply, demand, service delivery as well as environmental and social determinants of behaviour to help think about potential opportunities and barriers to immunisation demand at each point along the Journey.

The Journey to Immunisation is made up of two connected journeys - one from the perspective of the Caregiver and the other from the perspective of the Health Worker. These two generalised profiles are key to strong immunisation demand, but each one experiences different pressures, opportunities and challenges along their journey.

- **The Caregiver's Journey** involves the behaviours, costs and feelings associated with the decision and actions to seek out vaccination services for their child. These factors are influenced not only by their social and family lives but by past experiences with immunisation services and the health system, in general. The Caregiver's Journey is a cycle that has the potential to change at each immunisation milestone and interaction.

- **The Health Worker's Journey** includes their work environment, training and responsibilities, as well as their interactions with the community, respect and recognition from clients, co-workers and supervisors that contribute to their job satisfaction and motivation. A Health Worker's enthusiasm, support from the health system, skills and experience will impact their interactions with caregivers and, in turn, the community's demand for immunisation services. Health Workers are the face of the immunisation programme and are critical to supporting strong immunisation demand.

Journey to Health and Immunisation



Adapted from UNICEF's Human Centered Design 4 Health

Digital Health Interventions for Vaccine Confidence and Demand

What is digital health for immunisation demand?

The Journey to Immunisation highlights the variety of important factors that can contribute to strong immunisation demand. Each step in the Journey may present barriers and opportunities for immunisation uptake - the solutions and approaches to increase demand will depend on the nature of the challenges and the needs of the community. In some cases a digital health information intervention may be able to help address prioritised demand needs.

Digital technologies and tools provide opportunities to expand the reach of the immunisation system to the caregivers and health workers most in need of support. Digitally-delivered approaches may help enhance opportunities and reduce barriers to immunisation demand by engaging and supporting communities and health workers, improving quality and customer experiences and increasing the accessibility of immunisation services.

State of the evidence

Immunisation demand generation interventions are intended to increase caregiver access and uptake of immunisation services for their children, promote positive opinions and attitudes about immunisation services and providers and ultimately improve immunisation coverage, timeliness and completeness by bridging the knowledge-practice gap. With these outcomes in mind, some digital solutions for immunisation demand are supported with strong evidence and can be adopted with confidence while others are promising or emerging. This guide aims to examine some of the established and developing digital tools to understand how they can contribute to improved immunisation demand so that programme planners can make informed decisions and contribute lessons, experiences and evidence for further development of sound and effective interventions.

Interventions with Strong Evidence

The following interventions are supported with strong evidence, scale and demonstrated success in more than one setting: *Caregiver mobile phone reminders*, *Conditional cash transfers*, and *Social and Behaviour change mobile messages*.

Caregiver mobile phone reminders

Text-based short message service (SMS) or pre-recorded audio messages are sent to the caregiver's mobile phone with information about immunisation. These messages may include personalised information about their child's upcoming vaccination milestone, location, date and times of nearest vaccination opportunity or upcoming campaigns scheduled to take place near-by. Evidence and experiences from a number of settings show that mobile phone reminders and recall messages can have a positive impact on immunisation uptake, vaccination coverage and timeliness[1,2,3,4,5].

Conditional cash transfers

Advances in mobile phone technology and mobile banking services in many countries enable programmes to send small cash rewards or mobile phone credit to help nudge caregivers to follow-up with scheduled vaccination appointments. Programmes may send rewards for successful completion of a vaccination milestone or schedule completion. Conditional cash transfers and other incentive programmes are often coupled with mobile phone reminders, a combination that has demonstrated positive impacts on immunisation coverage in Pakistan, Kenya, India, Mexico and Nicaragua[6,7,8,9].

Social and Behaviour change mobile messages

Text or voice messages are delivered to caregiver's mobile phones to promote behaviour change through targeted health communication, often as part of a comprehensive maternal, neonatal and child health initiative. These are more than just reminders, but include in-depth content supported by research and careful message testing to elicit positive effects on the caregiver's attitudes and knowledge about vaccination. Most mobile behaviour change message programmes target broad maternal, neonatal and child health with messages that provide guidance to pregnant

mothers through the first year of a child's life, including messages on immunisation.

Social and behaviour change communication programmes that are based on strong formative research with co-creation of appropriate content messages have demonstrated improvements in maternal and child health service uptake and knowledge, including knowledge about routine childhood immunisation, increased intent to vaccinate children, and in some studies a significant increase in complete vaccination[10,11,12,13,14,15].

Promising Interventions

Examples and experiences in other health sectors and early learnings from routine immunisation show that the following interventions have potential to improve immunisation demand: *Health Worker eLearning and remote training* and *Health Worker job aids, alerts and reminders*.

Health Worker eLearning and remote training

Skills and refresher training, technical content about new vaccines or health emergencies and targeted capacity building can be provided to health workers remotely with curriculum adapted for mobile phones, tablets or other available digital devices. This can be especially useful for remote locations where opportunities to travel for in-person training is limited or would cause absences and disruption in service delivery. The evidence of effectiveness for eLearning or digitally-delivered health worker training varies depending on the objective, target audience, content and quality of the design and implementation[16,17,18,19]. Recent experiences with the COVID-19 pandemic provided many health systems with the motivation to incorporate blended and remote training approaches for health workers, using IVR-based training in short modules to reinforce simple messages or other combinations of in-person and digital training to reduce service disruption[20,21,22,23]. Remote learning modalities have the potential to improve the quality of immunisation services and may boost a health worker's respect and motivation by providing opportunities for professional growth and development.

Health Worker job aids, alerts and reminders

During an immunisation encounter, mobile phones, tablets or other electronic devices can provide tailored guidance and checklists to help health workers remember tasks, follow counselling prompts and adhere to standard programme guidelines. If the health worker has access to an electronic registry or national health information system, actionable immunisation data at the facility-level can help prioritise actions and focus attention on defaulters. "Just-in-time" access to information, decision-support and reminders for health workers in maternal and child health programmes have demonstrated improvements in quality of care, client satisfaction, adherence to protocols, health worker workflow management and confidence and respect in the community[24,25,26,27,28,29,30]. In addition to these integrated digital job aids, many of which include immunisation topics, early evidence and experiences show that mobile- and electronic-delivered decision support and job aids for health workers can help them correctly schedule routine and catch-up immunisation appointments and reduce missed opportunities for vaccination[31,32].

Interventions with developing and emerging experiences

The following interventions represent new approaches, are being implemented as pilots or interventions that have not been evaluated in the context of demand for routine immunisation.

Call centres, hotlines or automated information menus

Caregivers can access automated information or live support from an agent over the phone. The information may be delivered through a text chat service (SMS or WhatsApp), IVR-activated menu or by speaking to customer service representatives. The caregiver may be seeking information about upcoming immunisation events, general vaccination information, and/or reporting AEFI or providing feedback on their recent service experience. Health workers can also access hotlines to rapidly report AEFI or suspected disease outbreaks.

The technology for call centres and hotlines is well developed and used in many health sectors with documented examples of applications for the COVID-19 pandemic[33,34,35,36]; however, documented experiences and evidence of impact on demand for routine immunisation is limited.

Social media engagement

Social media is used as a form of communication and engagement to supplement traditional or offline community engagement approaches. Social listening has gained attention during the COVID-19 pandemic as a tool to understand community concerns and the increasing spread of misinformation surrounding the COVID-19 vaccine. In response to the lessons and concerns uncovered with social listening, programmes may engage social media influencers or spread official messages through social media platforms or other communication channels to reach communities and individuals who frequently receive information from online sources.

Social media engagement has become an important response to the infodemic surrounding the COVID-19 vaccine over the past couple of years with many international agencies, country immunisation programs and implementing partners documenting experiences and strategies to reach large populations with effective solutions and communication approaches[37,38,39]. However, evidence that social media engagement has a positive impact on vaccine demand, sentiment or intention to vaccinate is still lacking. Experiences generally show that the approach is more promising during emergency situations, new vaccine introduction or periodic special immunisation events with less success for day-to-day routine immunisation service demand.

Service experience feedback

Anonymous caregiver feedback about immunisation service experiences can be facilitated with remote data collection or crowdsourcing apps, automated SMS or IVR mobile phone surveys or free call-centres and hotlines. Opinions and feedback about health system performance and client experiences must then be used to enact targeted improvements to service delivery and quality, supportive supervision and to celebrate and reinforce health worker achievements. Providing a means to give anonymous feedback and then following up on areas of concern shows the immunisation programme's commitment to social accountability, transparency and good governance, and can increase community trust. Clusters of negative client experience reports may indicate a need for more outreach activities, quality improvements, supportive supervision, facility maintenance or supply chain management to improve service delivery and the client's experience and perceptions about the institutions and people providing immunisation services.

Although community scorecards and community-based monitoring of health services is recognised as an important means of promoting community participation, engagement and service improvements[40,41], the use of digital tools to collect or transmit feedback on immunisation services is not well documented. The feasibility and early successes demonstrated in maternal health programs[42] and broader health system governance[43,44,45] may provide a starting point for effective digital approaches for immunisation-specific community feedback and monitoring.

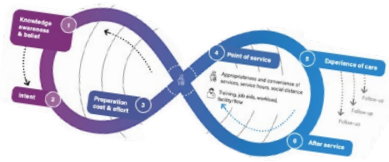
Supportive supervision, coaching and peer support

Supportive and positive coaching and mentoring can help improve health worker motivation and performance[46]. Mobile and digital devices can help facilitate remote supervision and peer-interactions for health workers to feel supported and make improvements in their work. Digital platforms and linkages to learning and performance achievements can encourage self-assessment, problem solving, discussion and quality improvements[47,48]. Communities of practice and peer-support networks through mobile messaging or online social networks can help with stress management and resilience for frontline health workers. A digital Immunisation performance coaching intervention in Senegal is currently ready for phased expansion with positive responses and acceptability among users[49].

AEFI reporting, monitoring and support

Caregivers can be contacted by phone or SMS during the post-vaccination period to assess any adverse events following immunisation (AEFI), provide support for minor reactions and receive immediate care in the case of serious reactions. Digitally-mediated active surveillance systems can provide caregivers with a reliable link to report and receive support in the event of post-vaccination reaction and can boost trust and public confidence in the immunisation programme[50]. Although a handful of mobile technology systems for active AEFI surveillance have been piloted in low- and middle-income countries[51,52,53,54], more documentation, experiences and research is needed to understand how these systems can support vaccine confidence and uptake.

How digital tools can support immunisation uptake and demand



The Journey to Immunisation is a framework to help programme planners understand opportunities and barriers to routine immunisation uptake, access and demand from both the Caregiver's and Health Worker's perspective.

HEALTH WORKER

CAREGIVER

STEP 1
Knowledge, awareness & beliefs

Digitally delivered training and messages provide the health worker with the practical knowledge they need to delivery standardised high quality immunisation services

Digitally delivered content can provide the factual knowledge a caregiver needs to access nearby immunisation services as well as shape opinions and social norms about immunisation to increase vaccine confidence and demand

STEP 2
Intent

Opportunities for remote training and skills development can support a health worker's motivation and respect within the community to provide positive behaviour change messaging to motivate caregivers to vaccinate

Mobile messages and social media can promote positive behaviour change and counter misinformation to help the caregiver make the leap between knowledge and the act of receiving a vaccine

STEP 3
Preparation, cost & effort

Defaulter lists from case management platforms and registries and targeted mobile communications can help health workers better organise and prioritise activities and communications strategies.

Mobile phone reminders and nudges can help the caregivers remember and plan logistics and arrangements for vaccination appointments to increase complete timely immunisation

STEP 4
Point of service

Decision support, case management, and digital job aids, alerts and reminders can help the health worker prioritise and manage workflow and provide quality services

Caregivers have good perceptions of services and are more likely to return where health workers have every opportunity to improve skills and management

STEP 5
Experience of care

Opportunities for remote tracking, training, support and supervision can improve accountability and a health worker's performance, motivation and skills to improve immunisation coverage and the quality of care provided

Digital mechanisms can enable caregivers to share anonymous feedback about their experience to improve accountability and trust

STEP 6
After service

Digital applications to monitor vaccinator activities and deliver coaching and supportive supervision can help identify problems and take corrective action as well as support health worker motivation and job satisfaction

Digital communication can facilitate support for side-effects and AEFI reporting to help the caregiver feel confident and well supported to build trust and confidence in immunisation services.

Considerations for Selection & Planning

Demand generation is an important part of all immunisation programmes. The design of any demand intervention must begin with the immunisation programme priorities and community needs, followed by considerations of the most feasible, appropriate and cost-effective interventions available.

Digital solutions are not always the best answer. They are never a quick fix and will not solve every problem. Successful implementation requires careful planning and pre-development assessment to understand the target audience, the intended users and the true nature of the barriers and opportunities for immunisation demand alongside gender, gender dynamics and access and use of digital technologies.

The quality of any mobile messaging programme is only as good as the content and the people who create them. The digital piece is interesting but it is just a tool that serves as a delivery mechanism. The way you structure all the details in the design will decide whether or not it will be effective.

— key informant

The Roadmap on the next page provides key steps and questions to help decide if a digital tool is appropriate for the local context and can effectively address the known barriers and opportunities to increase demand for immunisation.

In working through the Roadmap process and finding answers to the key questions, in its important to consult local stakeholders, existing information and resources to decide if a digitally-delivered intervention is an appropriate option for your target audience or if other means of demand generation would be more accessible and effective.

Any decision to include digital technology must meet the needs of the prioritised programme areas and be accessible and useful for the intended audience. The digital options described in this document only represent one possible avenue to improve opportunities and access to quality immunisation services. If digitally-delivered interventions are not a good fit for your target audience, prioritise other means to address the demand issue(s) in your programme.

Mufid Majnun photo

Roadmap for digital demand intervention planning and selection

1. Identify programme needs

Identify the main barriers and opportunities for immunisation demand using the Journey to Immunisation to guide the discussion and brainstorming. Any recent national immunisation programme strategy or guidance may also help to to identify prioritised areas for immunisation demand. Any intervention or programme must be driven by demand needs and opportunities, not by technology or solutions.

2. Analyse context and target audience

Determine if a digital tool or technology is appropriate and useful for the target population and prioritised programme needs. There is no such thing as a one-size-fits-all digital intervention - careful consideration, planning and tailoring is necessary to fit each local context.

Key Questions and Considerations

- What are the characteristics of the target audience that impact access and use of digital technologies? (e.g. literacy levels, languages spoken, mobile phone ownership, digital literacy and the culture of technology use)
- Are there channels of digital engagement that are already trusted and used by the target audience?
- How will the digital ecosystem and infrastructure impact the target audience's access and use of a digital intervention? These include mobile network coverage and electricity
- For Health Workers, how are technology and digital platforms already used and perceived in the workplace?
- How will gender norms and dynamics influence access, use and intended outcomes of the intervention?
- What portion of the population would be excluded from a digitally-delivered intervention?

3. Connect and consult with partners, stakeholders and the end user

Determine how the tool will be co-created and build off existing projects, experiences and foundations.

Key Questions and Considerations

- Ensure that end users/target audience will be involved in the design co-creation and development of the intervention from the beginning
- Are there opportunities to partner with existing developers, mobile network operators, implementers, public institutions or civil society organisations?
- Are there existing systems or technology platforms that can be expanded or adapted to meet the needs of the demand intervention?
- Are the relevant government agencies or institutions engaged and on board with the proposed digital intervention?

4. Long-term budget and planning

Determine if the resources, capacity, infrastructure and political will exist to support the design, development and implementation of a digital demand intervention.

Key Questions and Considerations

- What are the costs associated with the design, content development, technology development and testing? How will the tool be marketed and disseminated to the end user?
- What is the plan for roll-out or phased implementation?
- What skills and capacity are needed to support the long-term management of the digital intervention? Will the intervention be transferred to a different agency in the future?
- How will the programme monitor progress, identify necessary changes and measure success?
- What additional costs are required for implementation? How frequently will these elements have recurring costs? (e.g. maintenance and replacement of hardware, software license renewal, data transfer and storage)

PAUSE! YIELD!

WITH ALL OF THE ABOVE ANALYSIS AND ANSWERS, DETERMINE IF A DIGITAL DEMAND SOLUTION IS FEASIBLE AND APPROPRIATE FOR THE NEEDS, LOCAL CONTEXT AND AVAILABLE RESOURCES

Key considerations for design, development and implementation

If the initial planning and analysis shows that a digital demand solution is appropriate for the programme needs and local context, follow the nine **Principles for Digital Development** to optimise the design and implementation process.

1. Design With the User

User-centred design starts with getting to know the people you are designing for through conversation, observation and co-creation.

2. Understand the Existing Ecosystem

Well-designed initiatives and digital tools consider the particular structures and needs that exist in each country, region and community.

3. Design for Scale

Achieving scale requires adoption beyond an intervention's pilot population and often necessitates securing funding or partners that take the initiative to new communities or regions.

4. Build for Sustainability

Building sustainable programmes, platforms and digital tools is essential to maintain user and stakeholder support as well as to maximise long-term impact.

5. Be Data Driven

When an initiative is data driven, quality information is available to the right people when they need it, and they are using those data to take action.

6. Use Open Standards, Open Data, Open Source, and Open Innovation

An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done.

7. Reuse and Improve

Reusing and improving is about taking the work of the global development community further than any organisation or programme can do alone.

8. Address Privacy & Security

Addressing privacy and security in digital development involves careful consideration of which data are collected and how data are acquired, used, stored and shared.

9. Be Collaborative

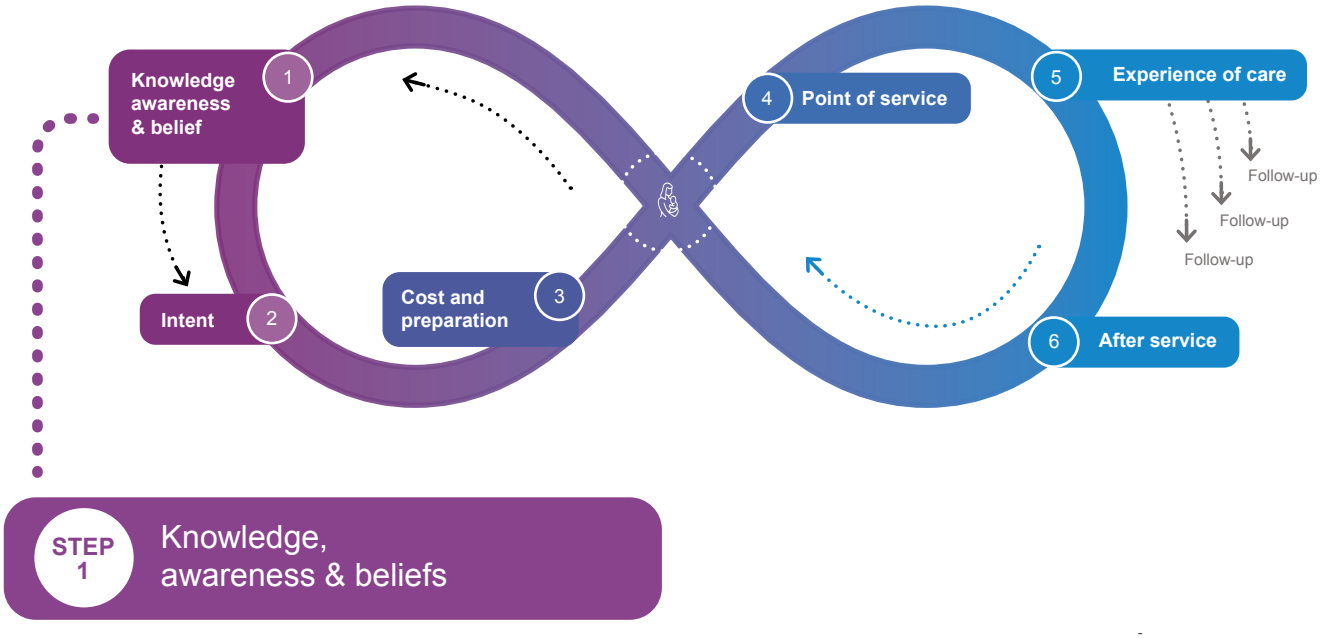
Being collaborative means sharing information, insights, strategies and resources across projects, organisations and sectors, leading to increased efficiency and impact.

Steps in the Journey to Immunisation and relevant digital solutions

Some relevant digital health information interventions that can help address opportunities and barriers in each Step in the Journey to Immunisation are outlined to help programme planners consider options that match prioritised demand needs. The Journey to Immunisation is a framework to help understand the behavioural and social factors that drive immunisation demand but is not intended to be a rigid structure. There are a range of possible interpretations under each step flowing through the figure-eight cyclical path. Use these groupings and ideas to help shape your own understanding of what interventions and approaches may help address immunisation demand in your local context.

GAVI/2017/Frédérique Tissandier photo

Step 1: Knowledge, awareness & beliefs



Factual information about vaccination and available services

Positive social norms

Respect between health worker and caregiver

Positive attitudes, beliefs and past experiences

Demand/caregiver tools and technologies

Digital tools can serve as a delivery mechanism for factual immunisation information through mobile **phone reminder and message delivery** and call centres or hotlines. Social media engagement can help promote positive attitudes and beliefs.

Intersection

Digital tools to aggregate, request and facilitate **service experience feedback** can provide caregivers with an avenue to express opinions and concerns, increase trust and account-ability between the community and the immunisation system

Supply side tools and technologies

Health worker opportunities to improve practical knowledge and competencies necessary to successfully complete their jobs **with remote learning and training**

Call centre and chatbot for child vaccination information in Pakistan

One of the earliest features in Pakistan's comprehensive immunisation registry system *Zindagi Mehfooz* (ZM) was SMS reminders to caregivers with the date of their child's upcoming vaccination appointment. The 2-way system allowed caregivers to respond to these reminders as a way to communicate with the immunisation system, share concerns, questions and complaints.

Eventually a help line was added, a dedicated phone number that caregivers could use to communicate with a small team of live agents. The overwhelming majority of the calls requested the same information: the date of their child's next vaccination and the location and hours of operation for the nearest service vaccination centre.

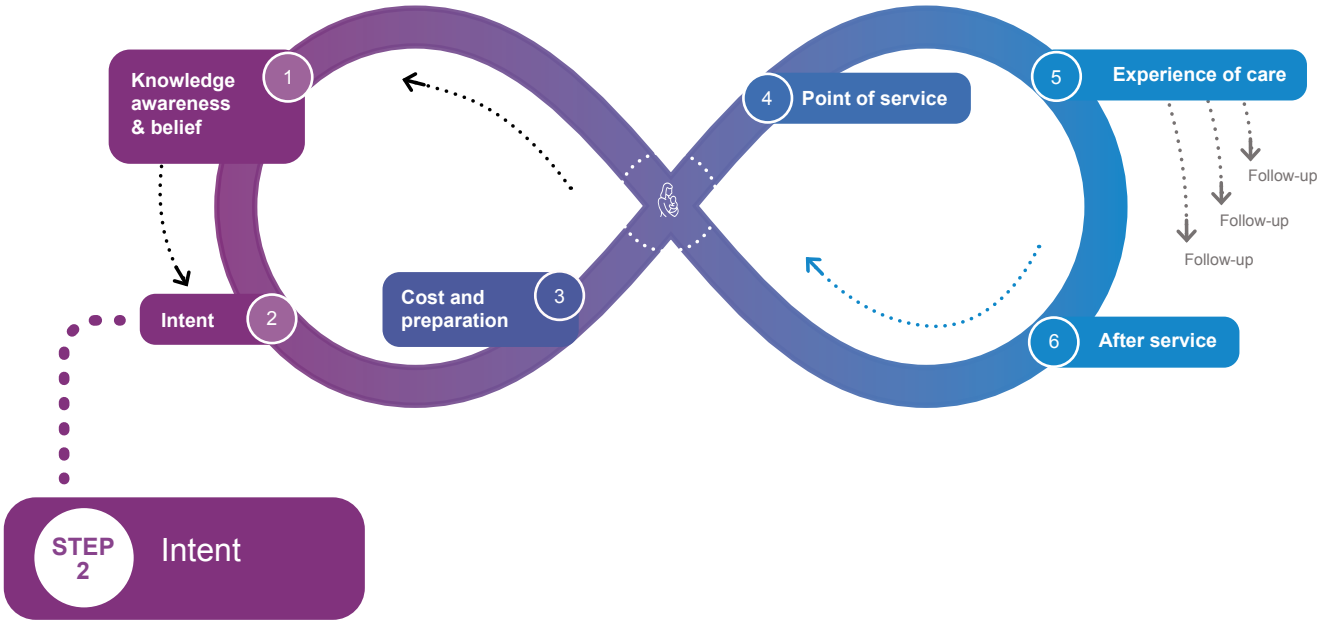
With further advances in technology and taking advantage of the power of the digital immunisation registry system, an artificial intelligence-based chatbot was developed[55]. Caregivers can send a message to the chatbot phone number and receive tailored information in their local language about their child's next vaccination due date, service delivery location and support for side-effects. This automation takes away the burden on the system of addressing routine questions while still providing personalised information.

As artificial intelligence (AI) technology and user comfort interacting with chatbots increases, these tools may become more common for the rapid dissemination of trustworthy and accurate information and to help communities find the practical information necessary to access immunisation services.

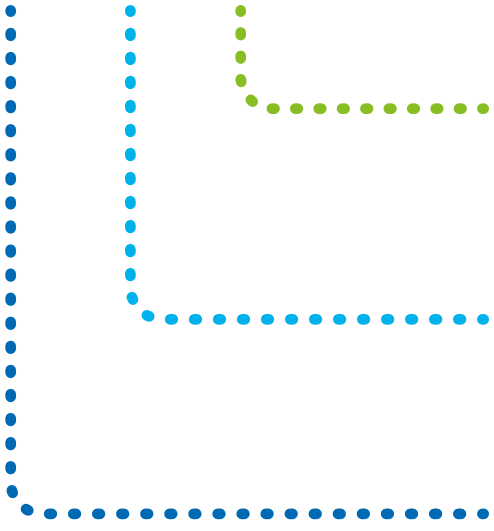
Digital tools as one element of an integrated social and behaviour change programme

In a partnership between Gavi, Unilever and Group M, Safal Shuruaat (*Successful Beginning*) delivers an integrated social and behaviour change programme in Uttar Pradesh, India, encouraging parental behaviours that will make a difference in their child's future success. The comprehensive programme includes key messages and techniques to encourage handwashing with soap, routine childhood vaccinations, nutrition, positive parenting behaviours and the father's involvement in child health. Digital tools were used to aid the extensive formative research that went into the key programme messages as well as mobile reminders and edutainment style mobile-delivered audio messages that are integrated into technology-enabled interpersonal communication sessions in households, school programmes and community centre outreach. The programme has reached over 2.5 million people with demonstrated improvements in knowledge and awareness about immunisation.

Step 2: Intent



Information to support decision-making
Positive messages and rumour/misinformation management
Health worker confidence, motivation and satisfaction



Demand/caregiver tools and technologies

Practical information and answers to common questions can be provided through **call centres and hotlines** while tailored messages to build trust and reinforce social norms may be delivered through **social and behaviour change mobile messaging** and **social media engagement**

Intersection

Service experience feedback mechanisms can provide an opportunity to celebrate health workers achievements, recognise the positive role they play in the community and increase social norms that value immunisation services.

Supply side tools and technologies

Health workers will feel more prepared, confident and motivated with opportunities for growth and effective counselling skills to communicate the importance of vaccination through **eLearning and remote training** and **supportive supervision**

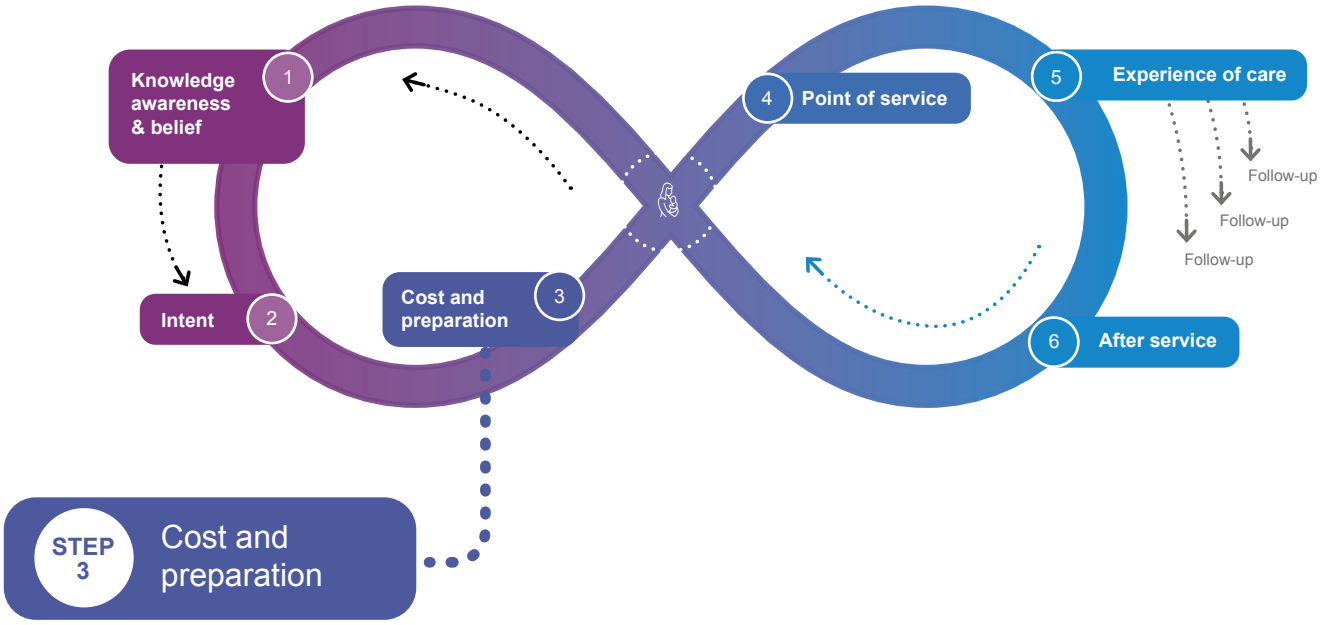
Social listening & social media engagement for COVID-19 in India

The second wave of COVID-19 in India brought renewed hesitancy, concerns and spread of mis-information. In response, the media marketing firm GroupM was asked by the Government of India and the Bill and Melinda Gates Foundation to apply their expertise in social marketing and brand development to the infodemic surrounding the virus and new vaccine. A centralised office analysed the prevalent discussions, concerns and themes circulating on public social media channels using digital social listening tools on a daily basis and then sent messages across seven social media platforms to address the top concerns, promote prevention behaviours and disseminate government guidance and advisories.

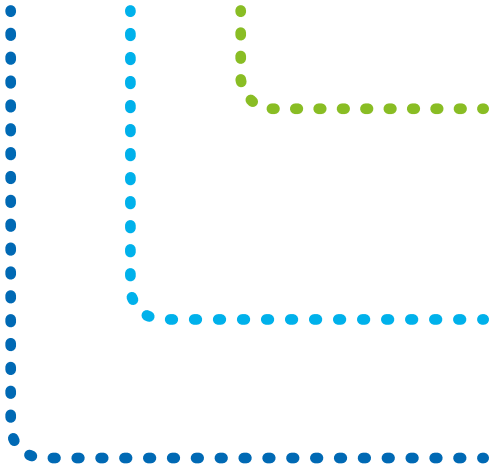
Now that the spread of the virus has somewhat stabilised and the urgent emergency situation has passed, social listening reveals that concerns are turning to booster doses and vaccination for children and adolescents. The messages, approach and content are now geared more to reach teen audiences and present messages that have the potential to change behaviours by leveraging smaller online communities and influencers.

Govind Krishnan photo

Step 3: Cost and preparation



Support to Caregivers to remember vaccination appointments
Reduce financial burden of attending vaccination appointments
Reinforce the value of vaccination as a social priority and norm
Support to Health Workers in task management and prioritisation



Demand/caregiver tools and technologies

Mobile phone reminders can bring an upcoming vaccination event to the top of a list of competing priorities to nudge the caregiver while **conditional cash transfers** can help overcome financial and opportunity costs of attending a vaccination appointment

Intersection

Present vaccination as a social norm that is accepted and encouraged by friends and influencers on **social media** to reduce the social costs of vaccination

Supply side tools and technologies

Cross-cutting synergies made available to Health Workers from case management platforms and registries (defaulter lists, alerts and reminders, for example) can help them organise and prioritise immunisation activities

Using digital technology to harness the power of storytelling

Stories are an integral part of the human experience and can have a strong influence on people's perceptions, actions and choices. First-person advice and storytelling from friends and family are also how many people form opinions about health behaviours. Social media has amplified and expanded an individual's social network and ability to share information and opinions with others. **AIfluence** and other social change organisations are harnessing the potential of social media and peer-to-peer storytelling to change intention, attitudes and behaviours. Micro-influencers on social media (not celebrities or superstars, but regular individuals) are recruited to participate in social behaviour change campaigns using their own voice, ideas and style. Messages are pre-approved but give creative freedom to the creator within the parameters of the key message. This approach engages new innovators and creative content in the local language and style to amplify messages and engage social media followers in a way that will hopefully be more compelling than generic, centrally-curated push messages.

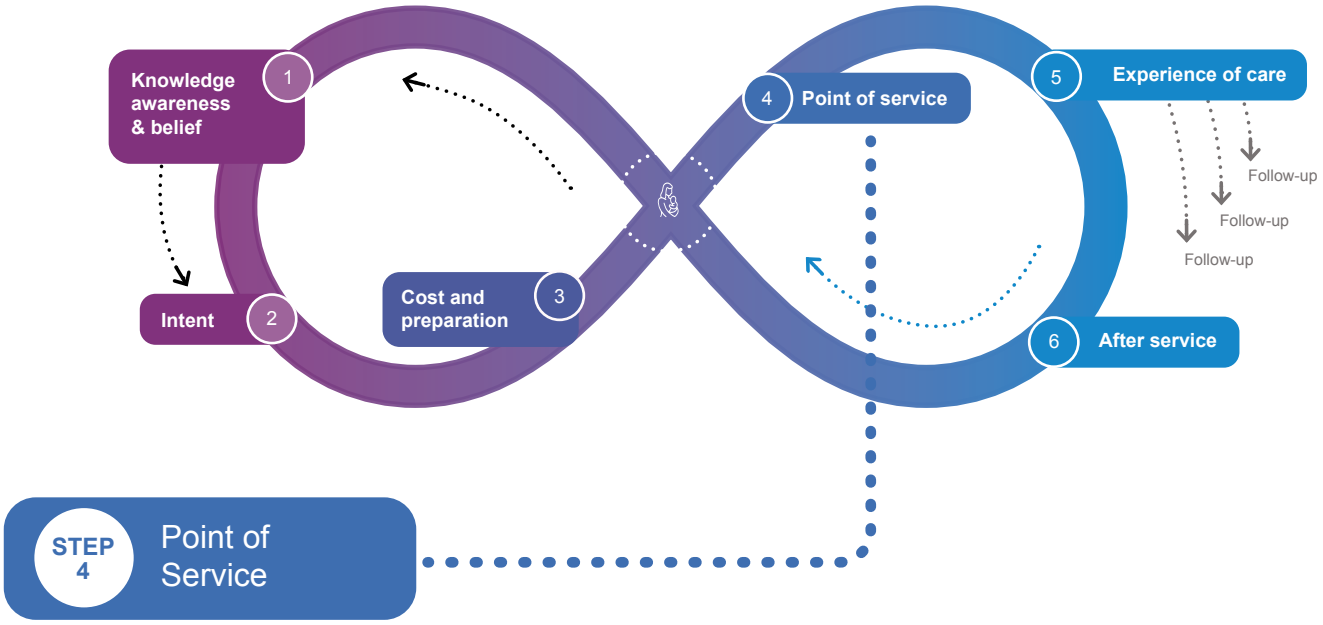
Storytelling and narrative tools are not only useful for social media. IVR with voice-activated audio messages can reach communities with lower literacy rates in local languages and have the advantage of presenting well-known local voices to bring credibility to the messages and engage the audience[56]. In India, audio job-aids for front line health workers bring legitimacy to their counselling efforts with the community by providing supporting messages from a credible figure of authority[57]. **UNICEF's audio job aids** for interpersonal communication use a conversational style to help frontline health workers understand key messages for communicating vaccine information to the community.

Digital approaches for demand generation are not just about sending SMS text messages. Using the power of digital technologies to amplify creative and persuasive storytelling has the potential to establish immunisation messages as a social norm by encouraging positive and organic conversations.

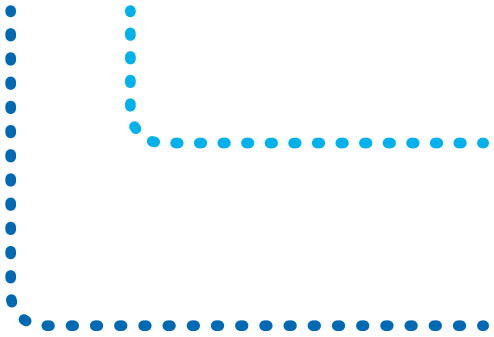
How digital messages can spread by word-of-mouth

Not all communities or caregivers are receptive to digitally delivered immunisation messages – word-of-mouth with friends and neighbours can be more effective in many communities. **Suvita** in India uses the power of mobile messaging to reach immunisation ambassadors, opinion leaders who are nominated by their community because of their reputation as influencers known for spreading information. Successfully recruited immunisation ambassadors receive reminders and prompts regularly through mobile phone messages to share information amongst their friends and neighbours about the importance of child vaccination and encourage new parents to enrol in the complementary SMS reminder programme. They apply their knowledge of the local context to address the most relevant barriers to vaccine uptake with personal connections and in-person communication. To date, Suvita has recruited over 700 immunisation ambassadors in Bihar, all nominated by means of a remote survey and recruited by phone. These ambassadors in turn have reached more than 10,000 children.

Step 4: Point of service



Support the Health Worker to provide the best services possible
Improve the Caregiver's perceptions of the service experience
Present accessible and welcoming services



Intersection

Any tool or intervention to improve the Health Worker's performance, skills and workflow management will raise Caregiver's perceptions about the availability, quality and convenience of services provided

Supply side tools and technologies

Support and opportunities for the Health Worker to boost knowledge and interpersonal skills through eLearning and remote training as well as job aids, alerts and reminders for improved task management and workflow

Mobile-delivered health worker refresher training in India

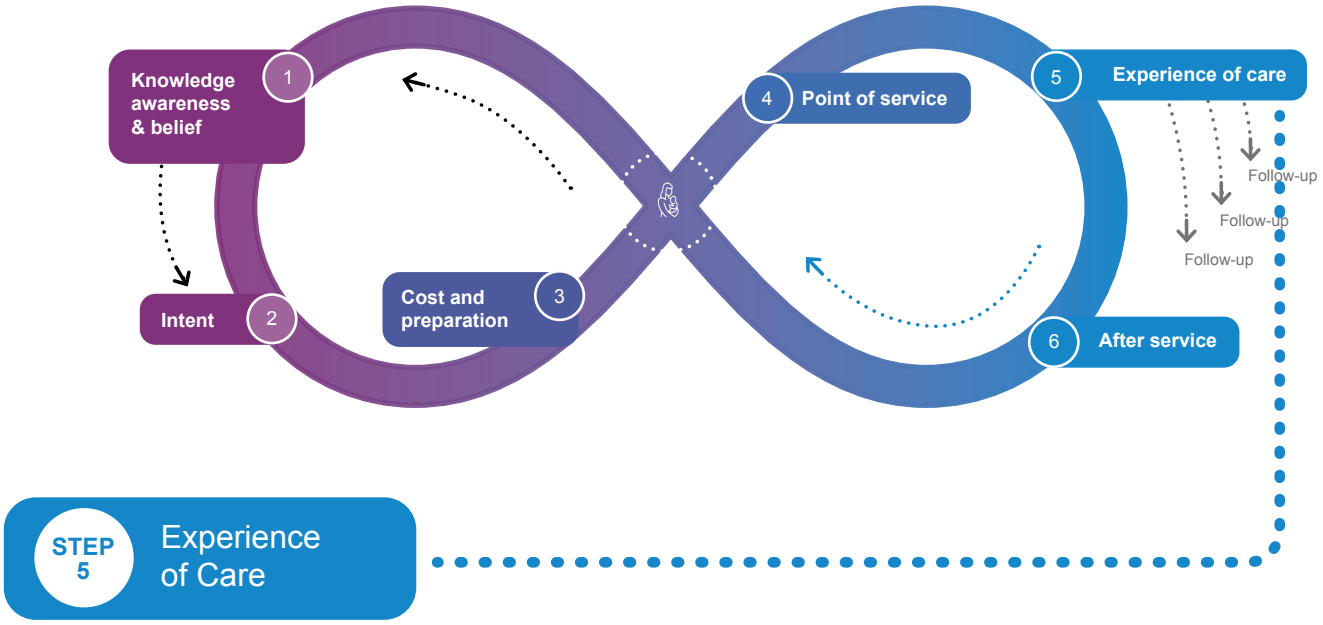
Mobile Academy is an IVR-based distance learning course to provide refresher training for frontline health workers on how to effectively engage families, improve communication skills and promote healthy maternal and child health behaviours, including routine childhood immunisation. It was developed in 2012 by BBC Media Action in response to formative research and human centred design that highlighted frontline health worker's need for more support to manage competing priorities between their own families and their role as extension workers. They were facing challenges gaining trust and recognition in the community and did not have the time nor the resources to attend in-person training to improve their skills. Literacy rates were low but access to a mobile phone was high[58].

The training course includes 11 chapters of pre-recorded audio lessons that the health worker can start, stop and pick up where they left off at any time. After each chapter they complete a short self-assessment quiz which qualifies them to receive a certificate of successful course completion. Overall, 81% of health workers who initiated the programme completed the course and over 99% of those successfully passed the built-in assessments[59].

The programme was taken on by the Ministry of Health and Family Welfare in 2016 and adapted for national scale-up and expansion. Mobile Academy is now implemented in 13 states in India, available in four languages, and is estimated to have reached over 170,000 frontline health workers.

Himanshu Singh Gurjar photo

Step 5: Experience of Care



The interaction between Caregiver and Health Worker results in mutual respect and satisfaction
Shared feedback to target improvements and changes
Support Health Worker with technical and interpersonal skills

Intersection

Digitally-enabled **service feedback mechanisms** provide Caregivers with a means to express concerns and satisfaction with services while Health Workers have the opportunity to respond to community suggestions, improving accountability, community engagement and respect. Caregivers know that their opinions and concerns are valued and important

Supply side tools and technologies

Job aids can help Health Workers effectively counsel Caregivers and manage workflow, while **eLearning and remote training** can improve skills, for improved motivation and job performance, creating better service experiences for Caregivers

Health worker micro-learning on counselling for vaccine confidence in Ghana

When the first COVID-19 vaccines were received in Ghana, the health workers all over the country were faced with the challenge of promoting a new vaccine and answering questions and concerns from the community. They needed skills and more practice on how to boost vaccine confidence, especially with a new and uncertain health emergency.

Since travel was restricted due to the pandemic, it was not possible to provide any in-person training to address these gaps. An existing IVR hotline called *Agoo* was already established as a response to the Ebola emergency in 2015 when it was developed in partnership between the Government of Ghana, UNICEF and a national telecom operator. It has since been adapted and is now widely used to disseminate information to the public on health topics, youth engagement and entrepreneurship with free on-demand audio messages in 6 local languages[60,61]. The *Agoo* platform offered a solution to deliver short micro-learning for health workers on vaccine confidence directly aimed at the COVID-19 vaccine roll-out[62].

The health worker training is delivered in two short 2-minute lessons per week over the course of 5 weeks using UNICEF content that was adapted for IVR delivery by Viamo. Health workers received calls twice a week with the new lesson, but could call back at any time to complete the lessons at their own pace without taking them away from routine health service delivery. Participants who completed the short self-assessment quizzes received over 90% correct scores and health workers demonstrated improvements in knowledge, skills, and perceptions about the COVID-19 vaccine.

One advantage of remote training with digital technology is the opportunity to present the same content on multiple platforms using different media. The vaccine confidence module is available as audio lessons on the Agoo platform and also in text format with embedded audio on the **Internet of Good Things**, the UNICEF-led collection of web-based and mobile-ready resources available at no cost for smartphone or computer.

Community feedback for equitable vaccine roll-out and COVID-19 response in Malawi

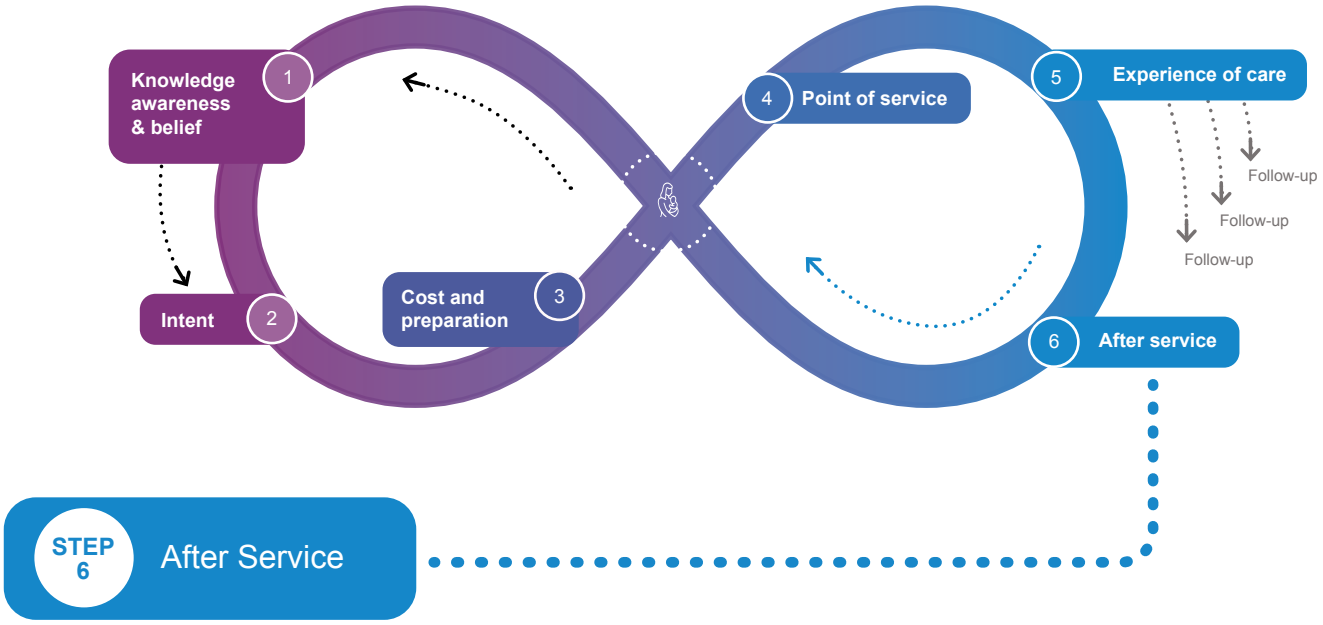
CARE Malawi has years of experience implementing Community Score Cards, a facilitated community engagement process to ensure that public services are accountable and responsive to the communities that they serve. Work had already begun in 2019 to digitise Community Score Card data for real-time data collection, visualisation and sharing, so when the first COVID-19 vaccines arrived in the country, the ability to share real-time feedback, concerns and questions from the community was especially useful[63].

CARE started using SMS and WhatsApp groups to learn about community concerns and hesitancy surrounding the COVID-19 vaccine roll-out. These lessons were developed into a larger programme for efficient and equitable vaccine distribution with community engagement, ownership and accountability. The digitisation of the Community Score Card approach, with technology partner Kwantu, provided real-time feedback on local concerns, gaps and needs among health workers and the community related to vaccine availability, acceptance and wider impacts of the pandemic.

There is still much to be learned about the best ways to leverage digital tools for citizen engagement, including the importance of tracking actions taken that result from citizen feedback. New approaches and central platforms to track reports and subsequent responses can improve accountability and trust between the community and public service providers[64].

Pete Lewis / UK Department for International Development photo

Step 6: After Service



Support for side-effects and concerns
AEFI reporting mechanisms
Supportive supervision and celebration of achievements

Demand/caregiver tools and technologies

Digital communication can provide caregivers with a reliable link to guidance in the event of post-vaccination side-effects for **AEFI reporting, monitoring and support**

Supply side tools and technologies

Job aids and reminders can help Health Workers prompt caregivers to return for the next vaccination appointment and counsel them on AEFI and side effects. Skills improvement and encouragement for the Health Worker can be facilitated through positive and tailored **supervision** and **eLearning**; access to **peer-networks** can promote joint problem solving and emotional support

Digital performance coaching for immunisation teams in Senegal

When the national immunisation programme in Senegal looked at problems with the existing supervision system, it was clear that the standard procedures were costly and not very effective at improving health worker competency or performance. In 2018, they led the initiative with GaneshAid and Gavi to develop a mobile app and platform, Coach2PEV (C2P), to facilitate remote coaching and communication as a supplement to in-person performance appraisals and goal setting[65].

Supervisors, or Coaches, at the district level establish a relationship with providers in the health facility and together set custom performance plans that are guided and monitored with embedded short micro-learning capsules, job aids, self-assessment tools, quizzes or other evidence of achievements. For example, a vaccinator at the facility may be tasked with improving the vaccine storage refrigerator by following a short 7-minute lesson, earning a badge by correctly answering questions after the lesson and then completing a hands-on task in their own facility refrigerator and sending a photo of the re-organised vaccine storage to their Coach. The Coach approves the activity which is then marked as completed in the health worker's performance improvement plan.

The cascading system and technical management is led by a national government team using a central platform where they can follow all activity and progress of Coaches and Coachees throughout the system. Coaches receive training on positive approaches for supporting performance improvements and both health facility staff and Coaches are ranked on a dashboard within their geographic cohort.

The mobile coaching and supportive supervision system brings together regular feedback mechanisms, support for skills development and problem solving tools that have been widely praised by Coaches and Coachees involved in the pilot and replication phase in Senegal. The Ministry of Health and EPI programme have been a driving force since the beginning with full commitment to building the skills and capacity for national management and maintenance of all aspects of the programme. This political will and national buy-in create a promising foundation for the success of future phased expansion to new districts.

Cross-cutting platforms and systems

Although the Journey to Immunisation can be a useful model to identify digital interventions that may be able to address prioritised demand needs, in reality these elements rarely operate alone. The complex and varied nature of immunisation demand challenges means that the simultaneous implementation of multiple features can create a synergy between several approaches that will be more likely to have a noticeable impact on demand and immunisation outcomes. Case management platforms and electronic immunisation registries can form an underlying foundation that has the potential to be *more than the sum of the parts* for digital demand generation.

Comprehensive and cross-cutting platforms have the potential to break down the segregation of supply and demand. It is important to recognise that these are not separate entities but are interdependent and linked at every level. For example, a health worker's motivation and job performance is affected by the supply chain; both the availability of vaccines and interaction with the health worker affects the caregiver's perception of service received and in turn their demand for future vaccination services. A shift in thinking about last-mile delivery where supply and demand are integrated and supported by meaningful community engagement, involving communities in the planning, design, decision-making and delivery of services, will steer immunisation programmes towards more people-centred health services.

Case management platforms and suites of digital health tools are designed to cut across multiple elements in the Journey and provide a link between supply and demand. Implementation of these comprehensive tools require time, dedication and resources but have the advantage of being flexible, agile and able to address health system challenges comprehensively.

The combination is bigger than any individual intervention because of the power of connecting all of these demand side pieces to the supply side. Sometimes we lose the bigger picture that the supply and demand side are linked at every stage.

— key informant

How digital tools and technologies for demand can integrate with comprehensive case management systems

- **Mobile phone reminders** - Digital registries with a child's immunisation history and caregiver's contact information can automatically send tailored reminders before upcoming vaccination appointments.
- **Conditional cash transfers** - Mobile money transfer or mobile phone credit awards can be sent to the caregiver's registered mobile phone account for completion of vaccination milestones linked to the child's vaccination data.
- **Call centre** - Using their child's registry in the system, Caregivers can call or text for tailored answers to questions about upcoming appointments or nearest service delivery points. Call centres or live-chat services can facilitate the reporting of AEFI linked to the caregiver's registered home location and provide support for side-effects and caregiver concerns.
- **Health worker job aids** - With data on the complete history of vaccination at each point of contact, clinical decision support tools can guide the health worker through the next vaccinations in the routine schedule, suggest appropriate actions if a routine dose was missed, and ensure that the health worker follows clinical guidelines during visits with a caregiver.
- **Health Worker alerts** - A comprehensive platform can automatically generate defaulter lists to

prioritise follow-up with clients who require immediate action or more support. Predictive analytics can alert providers to children at risk of not completing the immunisation schedule so these families can receive special attention, counselling and support.

- **Supportive Supervision** - Automated data collection and transfer to a central dashboard allows supervisors to provide feedback on health worker performance, target health workers in need of support, and make data-driven decisions at the sub-national level to optimise quality, supply and logistics.
- **Health Worker eLearning and Remote Training** - As part of a routine case management and data platform, built-in education and task-based training modules can provide refresher training or introduce new guidelines for health workers; some platforms may even encourage vaccinators to engage in friendly competitions while learning about vaccination best practices.

As an example of a comprehensive platform for data collection, monitoring and reporting, **Zindagi Mehfooz** ("Safe Life"), is a suite of digital health interventions centred around an electronic immunisation registry system that allows health workers to record, track and follow-up with families to improve childhood vaccination outcomes in Sindh Province, Pakistan. The system is designed to track patient vaccination events in an integrated digital platform from birth until 2-years of age. The enrolment process is initiated during a newborn's first visit with a health provider when the caregiver's information and the child's data are recorded electronically and linked to a unique code on the child's immunisation card. This initial registry and enrolment process opens the door to the key features of the Zindagi Mehfooz system for both the caregiver and the health worker including mobile phone reminders, conditional cash transfers, a call centre/hotline, health worker job aids, defaulter lists and supportive supervision.

The **Open Smart Register Platform (OpenSRP)** is an open-source electronic recordkeeping system designed to be used by frontline health workers on touchscreen mobile devices. In addition to facilitating data collection and reporting, it can help the health worker manage client interactions with various functions that work to increase the user experience and immunisation demand. In Zambia, OpenSRP is the foundation of the national Zambia Electronic Immunisation Registry that can be fully integrated with other digital systems (DHIS2 and RapidPro) to increase the possibilities for combining tools that further enhance data collection, access and use.

CommCare is another open source mobile data collection platform for health workers that can facilitate data collection, case management or client tracking with links to supply management, supervisory support and caregiver follow-up. In addition to a comprehensive package developed for COVID-19 vaccine roll-out, CommCare can be customised to manage immunisation programme service delivery and can link caregivers and health workers – supply and demand – to increase Caregiver follow-up attendance, health worker productivity and job satisfaction.

Many of these features could not operate effectively as a stand-alone intervention but together have the potential to provide a continuum of care across the health system while being accountable to the needs and demands of the caregiver or client. A key component of putting all of these components together will be a strong link to the community with outreach to identify pockets and households with zero-dose children, improve denominator and coverage estimation and understand the needs and concerns of the public. Digital tools and technologies can enhance the collection and sharing of information but must be integrated with the most appropriate community engagement approaches, facility workflow, capacity, skills and enabling environment in each local context.

Lessons & Recommendations

The use of digital health information interventions for immunisation demand generation is an emerging field with experiences and evidence still developing in many cases. Any implementation of digital health information technology must be driven by the identified needs of the programme and community and adapted to the local context. No tool, recommendation or lesson will fit every possible scenario. However, during the course of this resource development process, a number of implementation experiences highlight some suggested approaches for decision-makers and programmes considering the use of digital technologies to improve immunisation demand.

Plan for scale

Starting from the initial design, analysis and idea, think about how the intervention can eventually reach scale. Do not wait until after a successful pilot to realise that the intervention will be impossible to scale-up.

Engage the government from the beginning

Involve the relevant local government agencies as integral partners and stakeholders from day one. The national immunisation programme is most likely responsible for the routine immunisation programme, including logistics management and human resources, making government buy-in and sponsorship crucial to any digital health intervention to improve demand. A meaningful partnership with the government immunisation programme can be beneficial for both parties, for example with agreements that permit sharing and access to data and relevant information to optimise demand interventions. Local capacity, complementary government initiatives, procurement policies, interoperability, approval and feasibility at scale should all be part of the initial design and concept.

Co-create with the target audience

From the very beginning of the design stage, the end user must be involved as an integral partner to give input on their true needs and challenges and to make sure the approach is accessible, affordable and relevant.

Work with local creative content developers

Partner with local organisations, content developers, technology specialists, influencers and civil society organisations to create genuine digital communication initiatives that speak to the culture and habits of the target audience.

Negotiate with mobile network operators

Most of the digital applications described in this guide depend on the availability and reliability of mobile network service to send and receive data. For sustainable and accessible services, immunisation demand generation content, messages and platforms should be available to the end user free of cost. Engage with national mobile network operators to provide free, 'zero-rated' or subsidised access to the digital intervention platform or website.

Consider the source of data on digital access

When gathering information to understand the target audience's access to mobile phones and other digital technology, take the time to understand where data on digital access is coming from. Estimates of mobile phone penetration from the commercial mobile phone industry, for example, may be very different from data on phone ownership and access collected in a household survey or census. Try to come as close as possible to a true understanding of access in the target population. Socio-demographic data such as wealth, education and age can serve to supplement this analysis as well.

Develop a marketing promotion strategy

Embed a sustainable and effective strategy to share and communicate the availability and advantages of the intervention with the target audience. The intended end user cannot benefit from the intervention if they are not aware of the service. Be sure to include training and support to community mobilisers, community health workers, facility staff and influencers on how to teach others to use and access the intervention or platform.

Take advantage of opportunities for repeat exposure

One of the advantages of digital technologies is the ability to replicate messages over different media, platforms and modes of communication. Repeated exposure to content in different ways can help reinforce key messages over time. Linkages between platforms as well as cross-promotion and integration with other health and social sectors will amplify messages and increase the potential for positive behaviour change.

Provide a link to physical services

Vaccines cannot be administered through a mobile phone and children do not receive vaccines on-line. Provide a reliable way for caregivers to locate physical immunisation services, speak to a person and to find more information. Digital tools can help improve knowledge, spread positive messages and support decision-making, but in the end, the caregiver must make in-person contact with the immunisation programme.

Proceed with caution

As part of the development of this guide, experiences shared by key informants provide some examples of digital immunisation demand approaches that are less likely to show success and should be approached with caution:

Vaccination-themed video games

Although they may seem promising during the early stages of a health emergency, it can be challenging to maintain user interest and engagement over time.

Unique project-specific apps

Rather than develop a new and costly app, projects have had much more success embedding features and functions into existing messaging apps that are already frequently used by the target audience.

Centrally-curated push messages

Official messages from a government agency are often overlooked; experiences show that people are more receptive if the messages come from within smaller online community groups or from trusted community influencers.

Text-based SMS

Many programmes have found that individuals with higher literacy who engage with pure-text messages are often in a higher income-group and are now using smartphones with WhatsApp or other messaging platforms. Interactive Voice Response (IVR) technology is more appropriate to reach low literacy populations with basic mobile phones. Take these factors into consideration when conducting formative research and analysis for your local context.

Digital as a stand-alone intervention

Digital approaches to demand generation are never able to reach everyone or solve all problems - they are one tool in the broader immunisation programme toolkit and should always be implemented as one part of a comprehensive and evidence-based approach.

Opportunities for the future

The following areas for digital demand technologies have yet to receive much attention, despite their potential for improving access and uptake of immunisation services:

Remote scheduling of appointments

digital interfaces, mobile messaging or smartphone messaging platforms could be used for direct caregiver access to schedule appointments. This could help reinforce confidence in the immunisation programme, reduce wait times and also serve as an automated reminder system.

Client access to electronic vaccination records

virtual immunisation certificates have become common with COVID-19 vaccination requirements and are included in some electronic registry systems for routine immunisation such as Zindagi Mehfooz. Caregiver access to their child's electronic vaccination record gives ownership and agency to the caregiver and reduces missed opportunities for vaccination due to lost or forgotten vaccination cards. It also provides a mechanism to link data on public and private health services and vaccinations delivered.

Conclusion

Digital health information interventions have the potential to make new connections with engaging content, accessible tools and rapid communication to improve vaccine demand for quality services in priority communities. This document draws on evidence and early experiences with tools and technologies that have been applied in Gavi-supported countries to improve demand for routine immunisation. These lessons are intended to help designers, implementers and policy makers understand the range of uses and approaches for planning, selecting and designing an intervention that uses digital technology for immunisation demand generation. When supported by careful planning, formative research and meaningful user engagement, digital technologies and tools can be useful components of an immunisation demand strategy to meet identified needs and opportunities so that no child is left behind with immunisation.

Appendix: Additional Resources

UNICEF's Human Centred Design for Health - includes tools, workbooks, resources and workshop materials to help identify and design tailored and empowering solutions for challenges related to community demand for basic health services - ENGLISH, **FRENCH** **https://www.hcd4health.org/**

The Little Jab Book: 18 Behavioral Science Strategies for Increasing Vaccination Uptake - A guide focusing on COVID-19 vaccine uptake but applicable to other immunisation programmes, using behavioural science to understanding and addressing psychological and social constraints to vaccine uptake - ENGLISH, FRENCH, SPANISH, PORTUGUESE, ARABIC **https://www.vax-up.org/**

UNICEF's Designing Digital Interventions for Lasting Impact: A Human-Centred Guide to Digital Health Deployments - an in-depth guide with exercises and activities to help design digital approaches that focus on the end-user and community needs. ENGLISH **LINK to PDF**

Strengthening Immunization Service Experience: Global, Regional and Country Insight Gathering to help frame and inform new directions for immunization programs - a resource that gives attention to the qualitative and sociobehavioral considerations that improve confidence, acceptance, use and demand of immunisation services - ENGLISH
https://www.jsi.com/resource/strengthening-immunization-service-experience/

Vaccine Misinformation Management Guide: Guidance for addressing a global infodemic and fostering demand for immunization - a guide to help organisations address the global infodemic surrounding COVID-19 with national action plans informed by social listening.
ENGLISH, FRENCH, SPANISH, ITALIAN, ARABIC, TURKISH
https://vaccinemisinformation.guide/

COVID-19 Vaccination Field Guide: 12 Strategies for Your Community - from the U.S. Centers for Disease Control and Prevention, a guide to help understand, identify and address common barriers to COVID vaccine uptake in the community - ENGLISH **LINK to PDF**

Principles for Digital Development - guidance, recommendations, resources and tools to help practitioners successfully design and apply digital technologies to development programmes
ENGLISH, FRENCH, GERMAN, SPANISH **https://digitalprinciples.org/**

A practical guide for engaging with mobile network operators in mHealth for reproductive, maternal, newborn and child health - a WHO guide to building relationships with mobile network operators with perspectives on private-sector partnerships. **LINK to PDF**

Beyond Scale: How to make your digital development program sustainable - provides suggestions and potential solutions to the challenges related to the post-pilot phase of implementation from strategy to roll out - ENGLISH
https://www.rethink1000days.org/publications/beyond-scale-how-to-make-your-digital-development-program-sustainable/

The Journey to Scale: Moving together past digital health pilots - guidance on institutionalising digital health interventions with frameworks and examples of how to effectively scale - ENGLISH
https://path.azureedge.net/media/documents/TS_dhs_journey_to_scale.pdf

References

1. Eze et al. 2021. Short message service (SMS) reminders for childhood immunisation in low-income and middle-income countries: a systematic review and meta-analysis. BMJ Global Health. 6(7):e005035. [**Link**]

2. Vann et al. 2018. Patient reminder and recall interventions to improve immunization rates. Cochrane Database of Systematic Reviews. 2018 Issue 1. Art. No.: CD003941 [**Link**]

3. Mekonnen et al. 2019. Effect of mobile text message reminders on routine childhood vaccination: a systematic review and meta- analysis. Systematic reviews, 8(1), pp.1-14. [**link**]

4. Yunusa et al. 2020. Mobile phone reminders for enhancing uptake, completeness and timeliness of routine childhood immunization in low and middle income countries: A systematic review and meta-analysis. Vaccine. 39(2):209-221. [**link**]

5. Kazi. 2017. The role of mobile phone-based interventions to improve routine childhood immunisation coverage. The Lancet Global Health. 5(4):e377-e378. [**link**]

6. Chandir et al. 2022. Small mobile conditional cash transfers (mCCTs) of different amounts, schedules and design to improve routine childhood immunization coverage and timeliness of children aged 0-23 months in Pakistan: An open label multi-arm randomized controlled trial. eClinicalMedicine. 50:101500. [**link**]

7. Gibson et al. 2017. Mobile phone-delivered reminders and incentives to improve childhood immunisation coverage and timeliness in Kenya (M-SIMU): a cluster randomised controlled trial. The Lancet Global Health. 5(4):e428-e438. [**link**]

8. Seth et al. 2018. Mobile Phone Incentives for Childhood Immunizations in Rural India. Pediatrics. 141(4):e20173455. [**Link**]

9. Barham et al. 2007. Beyond 80 percent: are there new ways of increasing vaccination coverage? evaluation of CCT programs in Mexico and Nicaragua. [**link**]

10. Crawford et al. 2014. SMS versus voice messaging to deliver MNCH communication in rural Malawi: assessment of delivery success and user experience. Global Health: Science and Practice, 2(1), pp.35-46. [**link**]

11. Mildon and Sellen. 2019. Use of mobile phones for behavior change communication to improve maternal, newborn and child health: a scoping review. Journal of global health, 9(2). [**link**]

12. Watterson et al. 2015. Using mHealth to improve usage of antenatal care, postnatal care, and immunization: a systematic review of the literature. BioMed research international, 2015. [**link**]

13. Murthy et al. 2019. The Impact of an mHealth voice message service (mMitra) on infant care knowledge, and practices among low-income women in india: findings from a pseudo-randomized controlled trial. Maternal and child health journal, 23(12), pp.1658-1669. [**link**]

14. Barron et al. 2018. Mobile health messaging service and helpdesk for South African mothers (MomConnect): history, successes and challenges. BMJ global health. 3(Suppl 2):e000559. [**link**]

15. Chakraborty et al. 2021. Does exposure to health information through mobile phones increase immunisation knowledge, completeness and timeliness in rural India?. BMJ global health. 6(Suppl 5):e005489. [**Link**]

16. WHO. Digital education for building health workforce capacity. April 2020. [**link**]

17. Long et al. 2018. Digital technologies for health workforce development in low-and middle-income countries: a scoping review. Global Health: Science and Practice. 6(Supplement 1): S41-S48. [**link**]

18. Winters et al. 2019. Using mobile technologies to support the training of community health workers in low-income and middle-income countries: mapping the evidence. BMJ global health. 4(4):e001421. [**link**]

19. Bashingwa et al. 2021. Examining the reach and exposure of a mobile phone-based training programme for frontline health workers (ASHAs) in 13 states across India. BMJ global health, 6(Suppl 5):e005299. [**link**]

20. Last Mile Health. Blended learning boosts health worker skills in Ethiopia - April, 2022 [**link**]

21. UNICEF Ghana. Empowering Frontline Health Workers through Remote training to Combat Vaccine Hesitancy in Ghana. May, 2000 [**link**]

22. Dele-Olowu et al. 2020. Leveraging e-learning to train health workers during the COVID-19 pandemic in Nigeria [blog post Aug 2020]. CHAI. [**link**]

23. GaneshAid. Rapid Learning to Sustain Routine Immunisation during COVID-19. [**link**]

24. Adepoju et al. 2017. mHealth for clinical decision-making in sub-Saharan Africa: a scoping review. JMIR mHealth and uHealth. 5(3):e7185. [**link**]

25. Rothstein et al. 2016. Qualitative assessment of the feasibility, usability, and acceptability of a mobile client data app for community-based maternal, neonatal, and child care in rural Ghana. International journal of telemedicine and applications, Oct 2016. [**link**]

26. Ward et al. 2020. Impact of mHealth interventions for reproductive, maternal, newborn and child health and nutrition at scale: BBC Media Action and the Ananya program in Bihar, India. Journal of global health. 10(2):021005. [**link**]

27. Impact of Audio-Visual Job Aid on Influencing Family Health Outcomes in Bihar: Findings from the Usage and Engagement study on Mobile Kunji. 2016. Presentation slides. [**link**]

28. mSakhi: An Interactive Mobile Phone-Based Job Aid for Accredited Social Health Activists (ASHAs). Sept 2013 Brief. [**link**]

29. Agarwal et al. 2015. Evidence on feasibility and effective use of mH ealth strategies by frontline health workers in developing countries: systematic review. Tropical medicine & international health. 20(8):1003-1014. [**link**]

30. Carmichael et al. 2019. Use of mobile technology by frontline health workers to promote reproductive, maternal, newborn and child health and nutrition: a cluster randomized controlled trial in Bihar, India. Journal of global health, 9(2):020424. [**link**]

31. Ali et al. 2020. Validation of mobile Decision Support System for scheduling age-appropriate immunizations. European Journal of Public Health. 30(Supplement_5). [**link**]

32. Kaewkungwal et al. 2010. Application of smart phone in" Better Border Healthcare Program": a module for mother and child care. BMC medical informatics and decision making. 10(1):1-12. [**link**]

33. 2022. WHO and Viamo provide critical access to COVID-19 information to the next billion digital users via their mobile phones. Jan 2022 News. [**link**]

34. 2021. Interactive Voice Response: Delivering life-saving information amid COVID-19 in Niger. International Telecommunication Union. Jan 2021. [**link**]

35. 2020. COVID Info Line: Enhancing Information Flows through Interactive Voice Response Technology in Bangladesh. International Organization for Migration. June 2020. [**link**]

36. Kamulegeya et al. 2020. Continuity of health service delivery during the COVID-19 pandemic: the role of digital health technologies in Uganda. The Pan African Medical Journal. 35(Suppl 2). [**link**]

37. Khalif. 2021. Kenya's digital vaccine warriors. Gavi Vaccines Work Stories from the Community. July 2021. [**link**]

38. Al-Hasan et al. 2021. Does Seeing What Others Do Through Social Media Influence Vaccine Uptake and Help in the Herd Immunity Through Vaccination? A Cross-Sectional Analysis. Frontiers in public health. 9. [**link**]

39. Tangcharoensathien et al. 2020. Framework for managing the COVID-19 infodemic: methods and results of an online, crowdsourced WHO technical consultation. Journal of medical Internet research. 22(6):e19659. [**link**]

40. Ho et al. 2015. Effects of a community scorecard on improving the local health system in Eastern Democratic Republic of Congo: qualitative evidence using the most significant change technique. Conflict and health. 9(1):1-11. [**link**]

41. Blake et al. 2016. Scorecards and social accountability for improved maternal and newborn health services: a pilot in the Ashanti and Volta regions of Ghana. International Journal of Gynecology & Obstetrics. 135(3):372-379. [**link**]

42. Barron et al. 2018. Mobile health messaging service and helpdesk for South African mothers (MomConnect): history, successes and challenges. BMJ global health. 3(Suppl 2):e000559. [**link**]

43. Holeman et al. 2016. Digital technology for health sector governance in low and middle income coun- tries: a scoping review. Journal of global health. 6(2):020408. [**link**]

44. Schaaf et al. 2018. Does information and communication technol- ogy add value to citizen-led accountability initiatives in health? Experiences from India and Guatemala. Health and human rights. 20(2):169. [**link**]

45. Lechat et al. 2019. Relevance of a Toll-free call service using an interac- tive voice server to strengthen health system governance and responsiveness in Burkina Faso. International journal of health policy and management. 8(6):353. [**link**]

46. Strachan et al. 2015. Using theory and formative research to design interventions to improve community health worker motivation, retention and performance in Mozambique and Uganda. Human resources for health. 13(1):1-13. [**link**]

47. Deussom et al. 2022. Systematic review of performance-enhancing health worker supervision approaches in low-and middle-income countries. Human Resources for Health. 20(1):1-12. [**link**]

48. Long et al. 2018. Digital technologies for health workforce development in low-and middle-income countries: a scoping review. Global Health: Science and Practice. 6(Supplement 1): S41-S48. [**link**]

49. GaneshAid. Coach2PEV Performance Coaching. [**link**]

50. Cashman et al. 2017. Participant-centred active surveillance of adverse events following immunisation: a narrative review. International health. 9(3):164-176. [**link**]

51. Tsafack & Ateudjieu. 2015. Improving community based AEFI (Adverse events following immunization) reporting rate through telephone "beep" in a Cameroon health district: a randomized field trial. Pan African Medical Journal. 22(351). [**link**]

52. Sebastian et al. 2019. Active surveillance of adverse events following immunization (AEFI): a prospective 3-year vaccine safety study. Therapeutic advances in vaccines and immunotherapy, 7:2515135519889000. [**link**]

53. Baron et al. 2013. Use of a text message-based pharmacovigilance tool in Cambodia: pilot study. Journal of medical Internet research. 15(4):e2477. [**link**]

54. Ateudjieu et al. 2014. Vaccines safety; effect of supervision or SMS on reporting rates of adverse events following immunization (AEFI) with meningitis vaccine: A randomized controlled trial. Vaccine. 32(43):5662-5668. [**link**]

55. IRD. An AI-powered vaccines chatbot that answers caregiver queries regarding childhood immunization. [**link**]

56. Viamo. Moving the Needle Forward: Using digital services to deploy vaccines globally. [**link**]

57. Chamberlain et al. 2022. Lessons learnt from applying a human-centred design process to develop one of the largest mobile health communication programmes in the world. BMJ Innovations, Published Online First: 27 May 2022. [**link**]

58. Chamberlain et al. 2022. Lessons learnt from applying a human-centred design process to develop one of the largest mobile health communication programmes in the world. BMJ Innovations, Published Online First: 27 May 2022. [**link**]

59. Bashingwa et al. 2021. Examining the reach and exposure of a mobile phone-based training programme for frontline health workers (ASHAs) in 13 states across India. BMJ global health, 6(Suppl 5):e005299. [**link**]

60. Agoo: An Interactive Mobile Platform. UNICEF. Nov 2015. [**link**]

61. Empowering young people through the Agoo Platform. UNICEF. May 2021. [**link**]

62. Empowering Frontline Health Workers through Remote training to Combat Vaccine Hesitancy in Ghana. UNICEF. May 2022. [**link**]

63. CARE. 2021. Community Scorecard for COVID-19 Vaccines in Malawi. [**link**]

64. Lessons Learned From Digitising Community Scorecard Data In Malawi [**link**]

65. GaneshAid Performance Coaching [**link**]