HUMAN VERSUS AI: PROS AND CONS OF DIFFERENT STRATEGIES FOR PROVIDING HEALTH INFORMATION AND COUNSELING

GLOBAL DIGITAL HEALTH NETWORK MONTHLY MEETING: FEBRUARY 28, 2019

Hosted by FHI 360

Presenters:

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- FHI 360: Kate Plourde, Technical Advisor
- Jacaranda Health: Rachel Jones, Research & Evaluation Program Manager ;
  Sathy Rajasekharan, Chief Innovation Officer

Mobile Messaging

The potential of chat channels

February 28, 2019

a global social enterprise improving lives via mobile | Viamo.io

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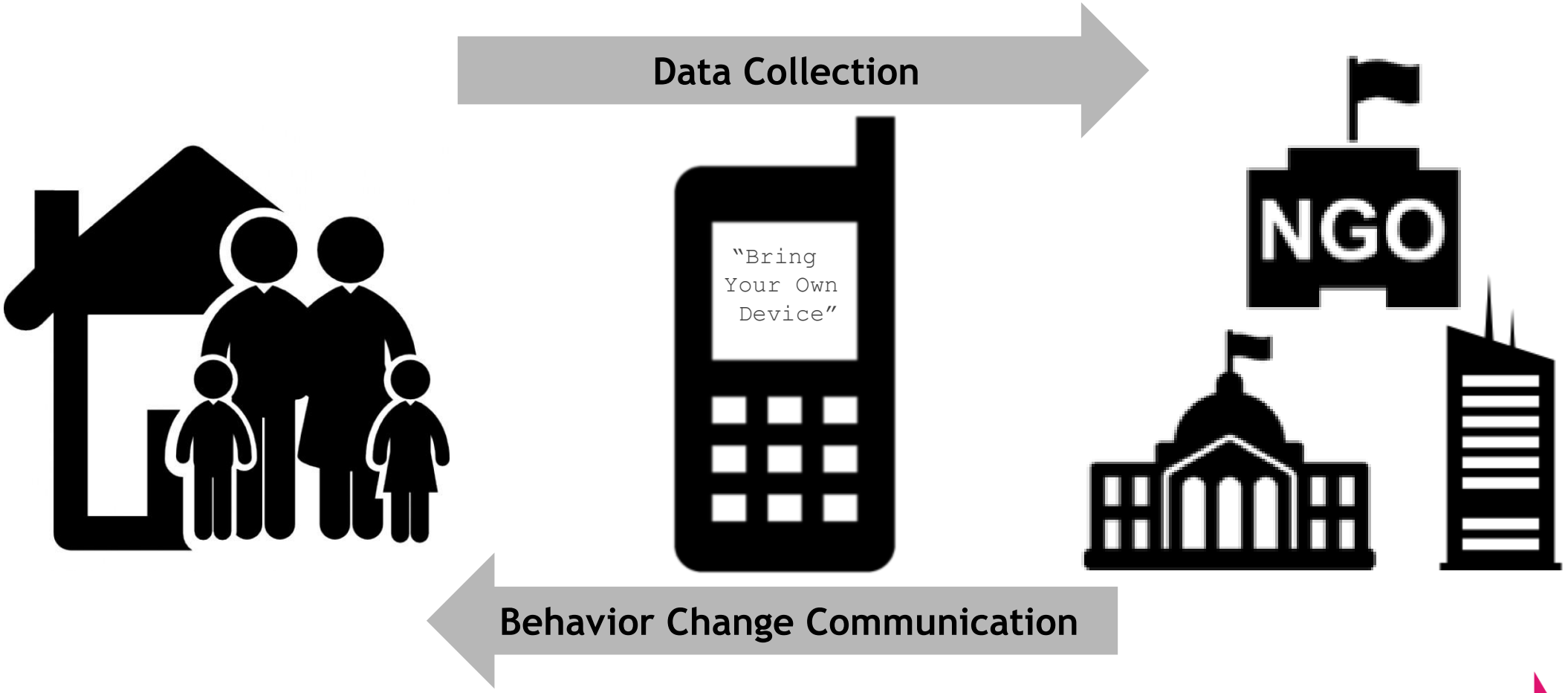
Who are we?



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The Potential of Mobile

In 2016, an estimated **63%** of the population worldwide already owned a mobile phone.

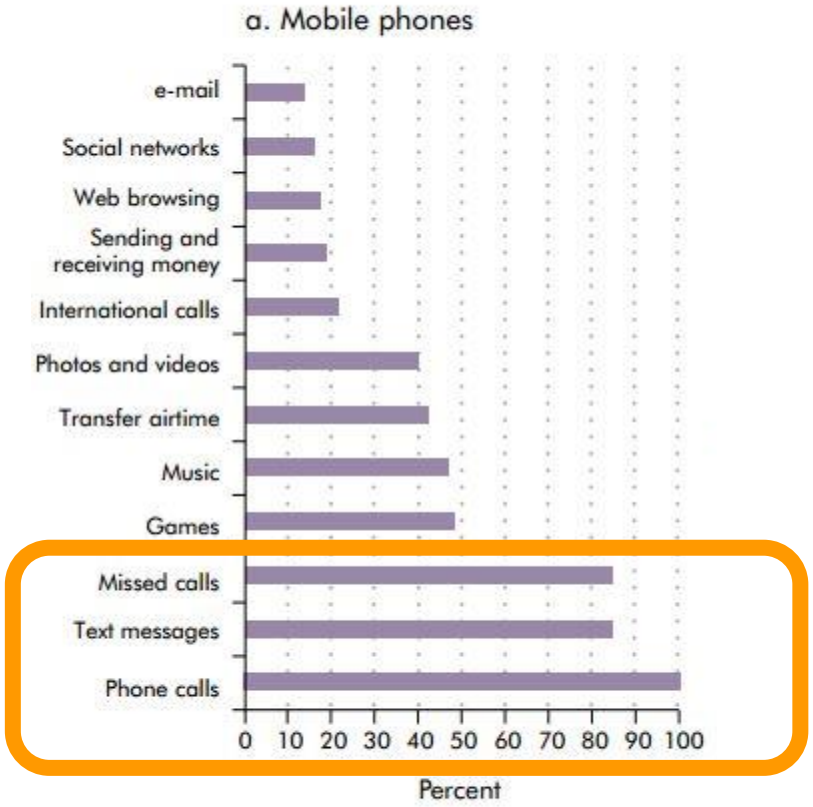
The number of mobile phone users in the world is expected to pass the **five billion mark by 2019**.

In 2014, WhatsApp had **450 million monthly active users** and 315 million daily active users.

At the beginning of 2018, CEO Mark Zuckerberg announced that WhatsApp now has **1.5 billion monthly active users**, 1 billion daily users and sends 60 billion messages per day. As of Q2 '18, Facebook had **2.2 billion monthly active users**.

Figure 2.3 How people use mobile phones and the internet in Africa

Percentage of individuals who use mobile phones or internet reporting each type of use, 2011–12



Source: WDR 2016 team, based on Research ICT Africa surveys (various years). Data at http://bit.do/WDR2016-Fig2_3.

Note: Data are simple averages across 12 African countries.

Figure 2.3 How people use mobile phones and the internet in Africa

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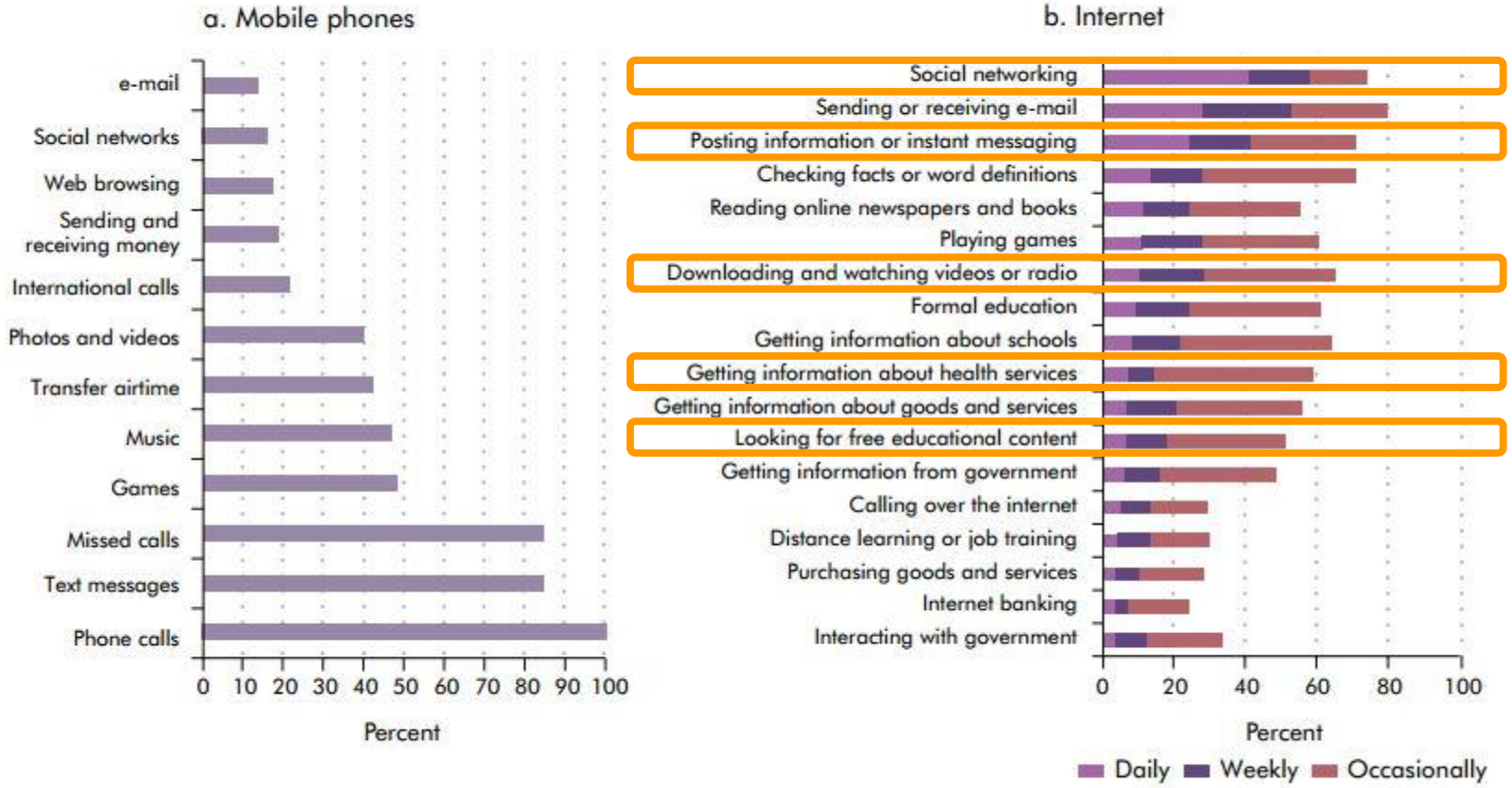

Source: WDR 2016 team, based on Research ICT Africa surveys (various years). Data at http://bit.do/WDR2016-Fig2_3.

Note: Data are simple averages across 12 African countries.

Push vs. Pull

Typical Communication Channels

PUSH
(one message to all)

Face to Face
Radio
TV
Posters

PULL
(one message to me)

Mobile

- VOICE (IVR)
- TEXT (SMS, USSD)
- VIDEO/AUDIO (DATA)

*nonexhaustive list of communication channels

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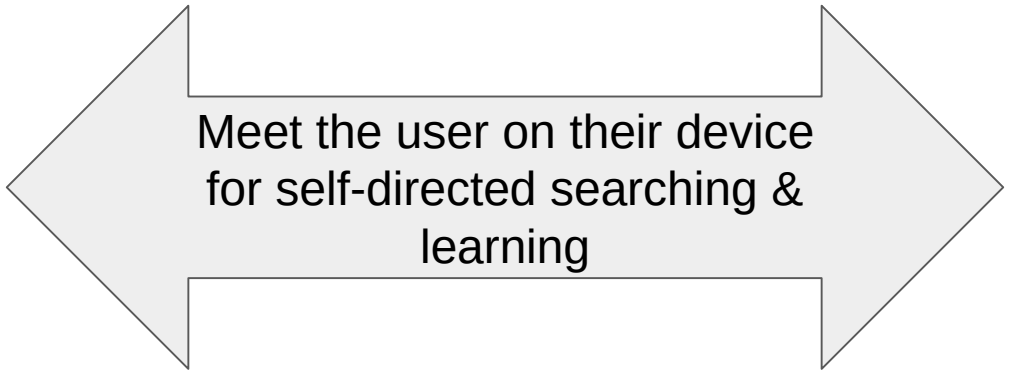
Bespoke Experience

Using IVR: “Welcome to 321. A new way to access important information. This call is absolutely free. For Health, press 1. Family planning, press 2. Wanji Games, Press 3. Weather, Press 4…”

Using a Chat: “How can I help you?”



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Optimized Content

- Interactive
  - Dynamic: changes regularly; daily digests
  - User Generated: contains feedback loops, discussions
- Entertaining
  - Innovation: podcasts, stories, games, dramas, etc.
  - Addictive: serialized, leveled
  - Gamified: ranks, scores, leaderboards
- External sources
  - increased API integration with other databases of information
  - Improves predict information based on age, region, seasonality, etc. by adding data sources outside of interaction data

321 Help!

Sure Amanda! How can I help today?

There is something wrong with my maize crop!

OK I can help you identify the problem with your maize. What do you see?

Some sort insect

Seems like you have a pest. Are you still located in Central Region?

Yes

Does the pest look like this?

I'm not sure.The maize looks like this:

It is likely that your plant may be affected by maize stalk borer. To combat maize stalk borer apply a concoction of neem seed powder, insecticides such as dipterex in liquid or granular form and make sure to destroy crop residue. Please contact your nearest agricultural extension officer for further clarification.

Thank you!

User generated information triggers information to other users...

Hi 321 User.

There is a likely outbreak of maize stalk borer in your area. To combat maize stalk borer apply a concoction of neem seed powder, insecticides such as dipterex in liquid or granular form and make sure to destroy crop residue. Please contact your nearest agricultural extension officer for further clarification.

Thank you!

Have you seen this in your maize?

Not yet. But I will let you know if I do. Will it rain tomorrow?

Here is the 6 day weather forecast for Luweero… Monday: cloudy, chance of rain...

Wednesday would be a good day to weed...

Would you like to watch a short video on weed management? Respond yes or no..

Yes

Click play!

ChatBot Implementation Process

Handoff

STEP 01

Project handoff process to D&I for ChatBot projects are the same as other projects. Fill out the handoff form!

Design

STEP 02

D&I works with the partner to build the specific content and flow of the bot.

Integration

STEP 03

The partners Facebook page (either existing one or new) needs to be integrated to our platform

Testing

STEP 04

Internal testing of the content flow and language. Testers will need to be added in the developer panel.

Production

STEP 05

Before the bot is made public, Facebook will need to approve it.

Deployment

STEP 06

Launch the bot publicly via the developer panel

USE CASE: Chatbot for Workforce Development

- Moderated Group Chat for daily questions, push messages, and emergency alerts
- Deploy ongoing professional training for remote learning and monitor progress by participant
- Conduct pre and post-tests as a part of each module to access individual capacity
- Collect routine data

Testing out a chatbot

On facebook:
facebook.com/Viamobots

On messenger: Viamobots

Click “Send a Message” then type “hi” to start the conversation!

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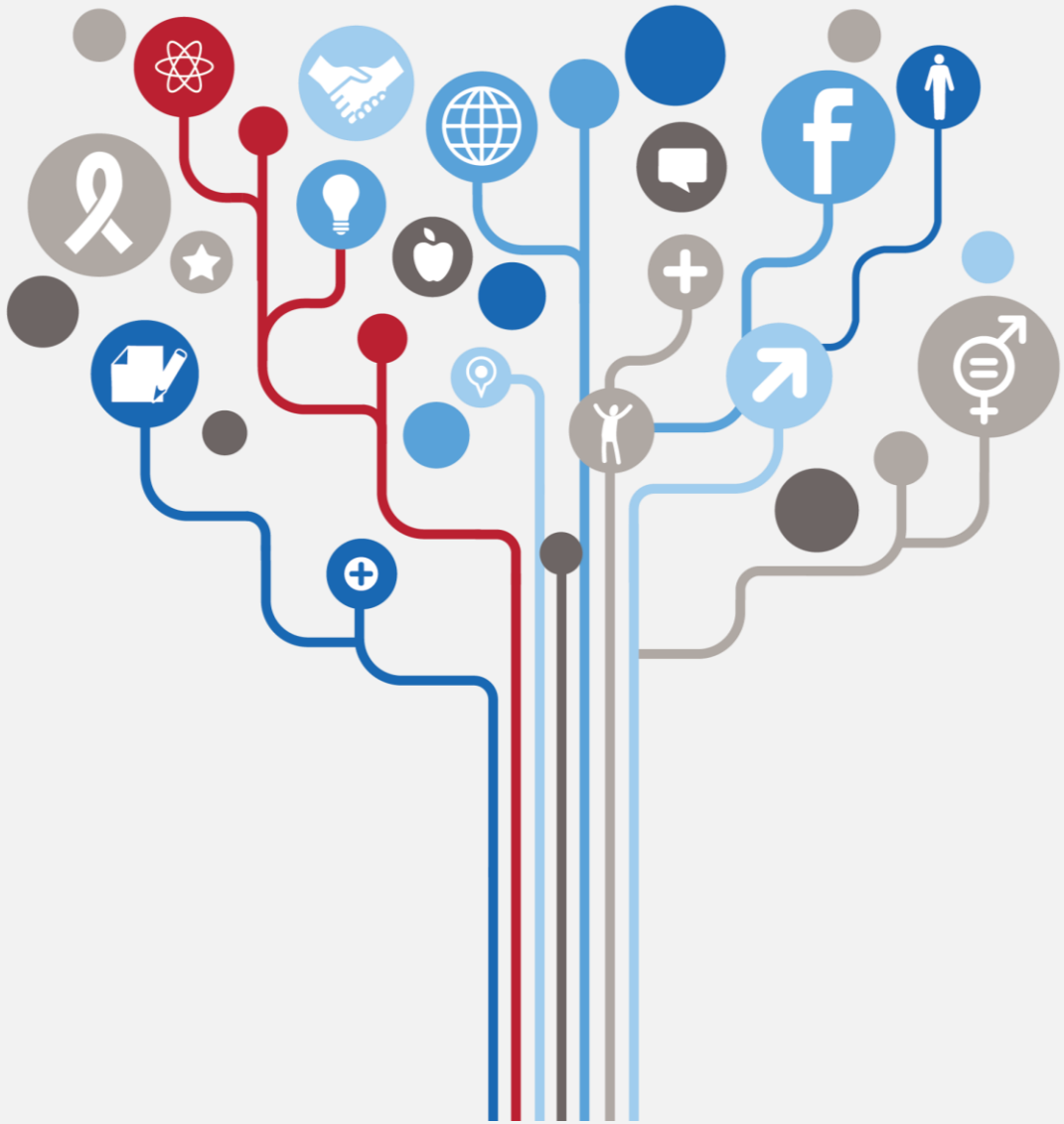
Thank You!

We hope this has inspired ways we can leverage mobile in your work!



SMART CONNECTIONS

Social **M**edia to improve **A**RT **R**etention and **T**reatment Outcomes Among Youth Living with HIV in Nigeria

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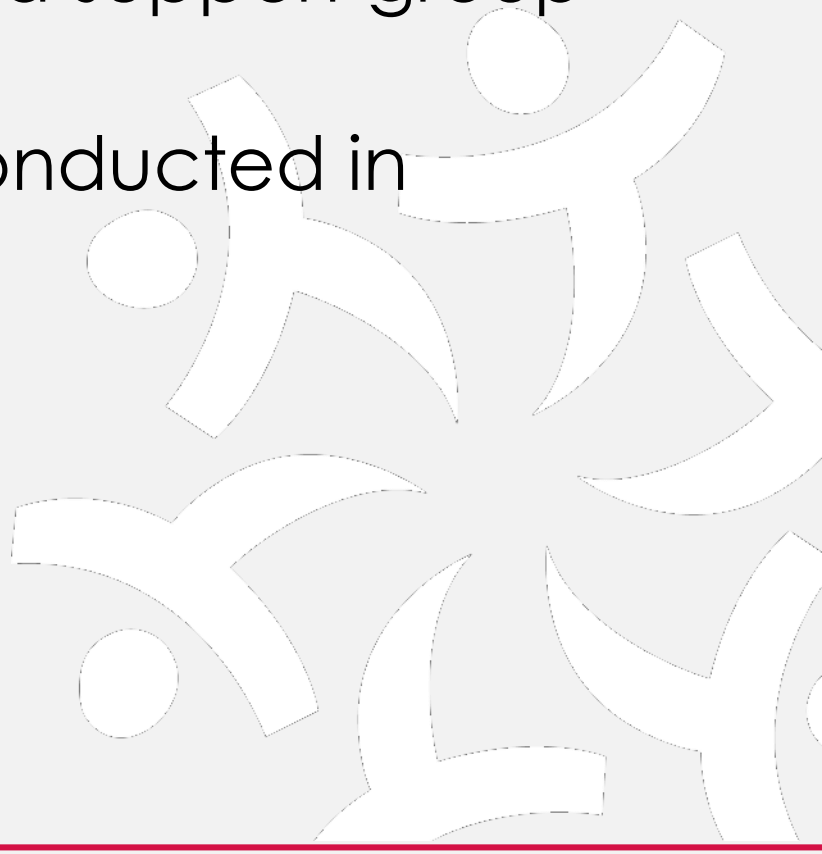
PEPFAR U.S. President's Emergency Plan for AIDS Relief

YOUTHPOWER

Overview

- SMART Connections is an Facebook based support group intervention for ALHIV
- Developed as part of two phase study conducted in Nigeria
- Phase one: feasilbity study, complete
- Phase two: impact evaluation, underway



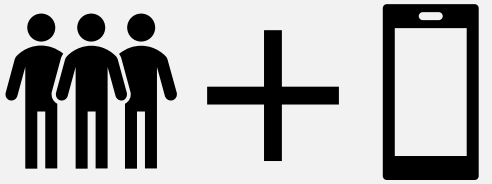
Youth Living with HIV (YLHIV)

- YLHIV, ages 15-24, experience higher loss to follow up (LTF) and poorer adherence than adults
  - Less likely to remain on treatment at 12 months after starting
  - More likely to experience treatment disruptions
- Many underlying contributors to poor adherence and retention
  - Fear of stigma or disclosure to others
  - Lack of social support
  - Limited knowledge about the disease

Existing Evidence

- Little published evidence on interventions targeting YLHIV
- One recent review found
  - Group counseling/support groups have some positive effects on HIV outcomes with adults
  - Two social media interventions to improve social support for YLHIV shown to be acceptable and feasible

Why Virtual Support Groups ?



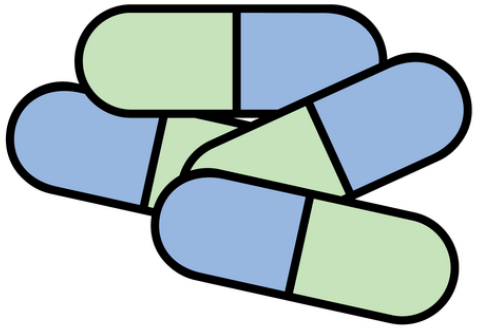
- May overcome barriers to attending in-person meetings
- Particularly suited to specific youth sub-populations (e.g. boarding students, rural, hard-to-reach populations)
- Phone ownership in Nigeria is high
  - 89% of Nigerians 18 years+ own a mobile phone (2014)
  - >50% of girls and women 12-30 years owned a phone and almost all who did not own a phone had access to a phone (2012)

Our Goal:

Develop and test an intervention designed to improve retention in health services among YLHIV

Adherence:

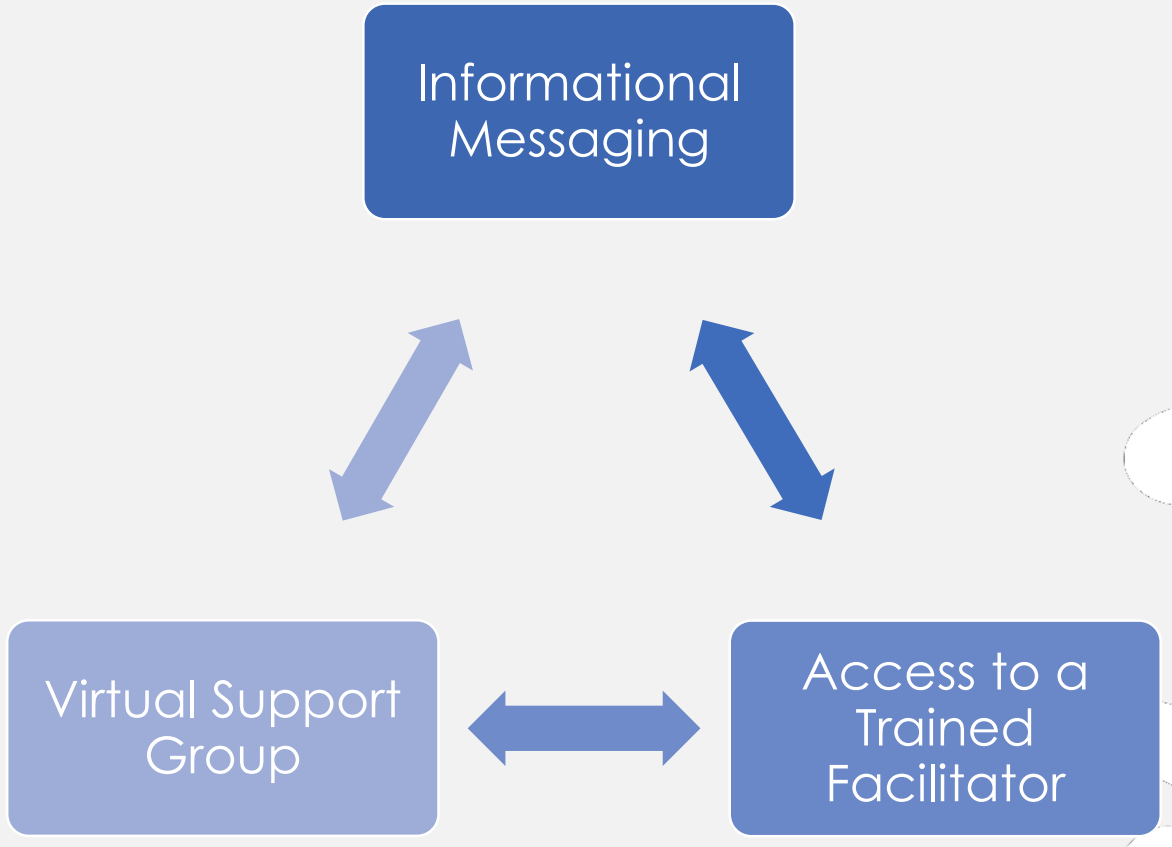
taking ART correctly every day

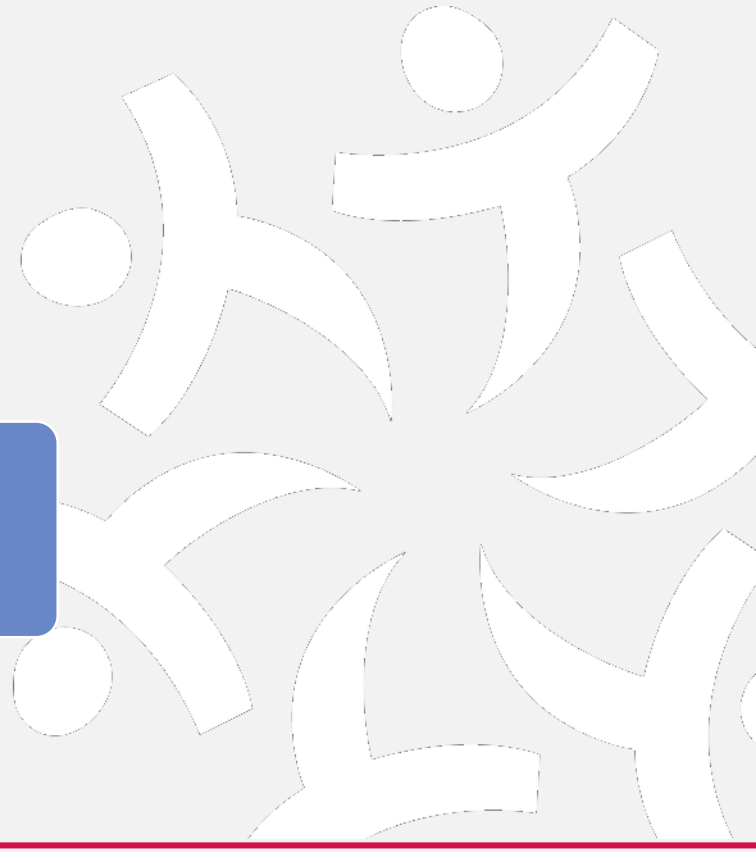


Intervention

- YLHIV will be enrolled in online support groups of 15-25 youth, by geographic region
- Participants will receive 11 educational sessions over 6 months
- Sessions delivered using Facebook
- Sessions are designed to improve HIV-related knowledge and enhance social support
- Support group facilitated by trained adult with lived HIV experience

Intervention Components





Informational Content: Positive Connections

- Provides adult facilitators with background information about the needs of YLHIV
- Tips for starting and leading an information and support group
- 14 sessions to be used in a group setting
- Guidance on tracking a program's progress and success

Intervention Topics

- Pre-Intervention: In-Person Meeting
- Session 1: Understanding HIV
- Session 2: Treatment and Adherence
- SESSION 3: Disclosure
- Session 4: Nutrition and Health
- Session 5: Reproductive Rights
- Session 6: Positive Health, Dignity and Prevention
- Session 7: Discrimination and Rights
- Session 8: Violence
- Session 9: Exploring Your Feelings
- Session 10: Communication and Problem Solving
- Session 11: Planning for Your Future

Facilitator Guide

- Background information on key topics
- Step by-step instructions for positing content on a daily basis
- Prompts to facilitator to promote engagement

Note to Facilitator

As with other sessions, if you notice that certain group members have not yet participated this week, you might want to reach out to them privately to ask if everything is okay and to offer any support or advice they might need.

DAY 3: WORD OF THE WEEK

Step 1:

Sign into the Facebook Group.

Step 2:

Under the group title, next to your photo, text that reads "write something," select the photo icon. Upload "Image # 2" from your camera roll. Click "done."

Step 3:

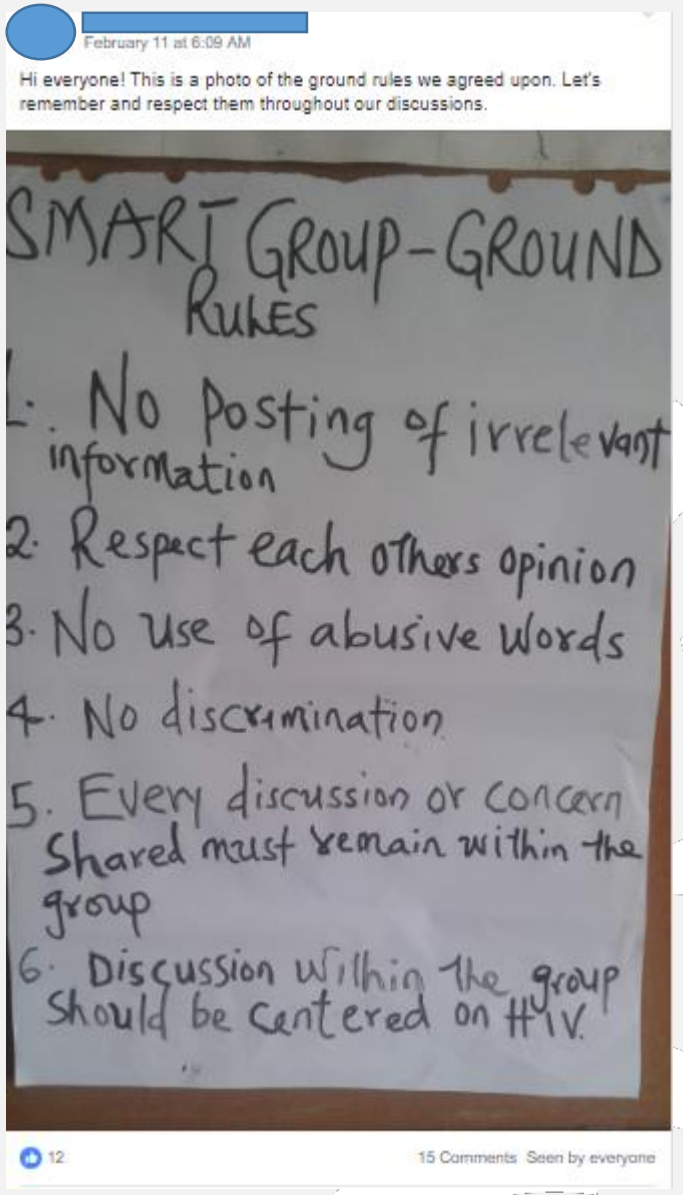
Above the photo, where it reads, "Say something about this post" type the following message: "Check out this week's word of the week 👍. If you have any questions, post them here."

Step 4:

Select "post" to post the photo and message.

In-person Meeting

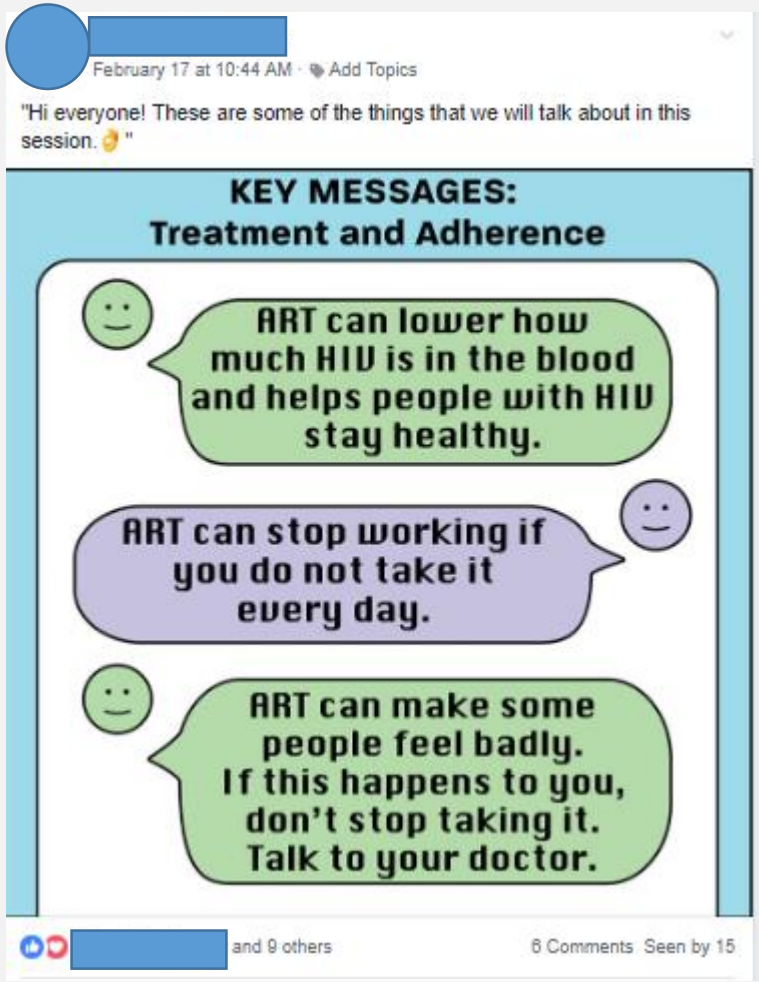
- Participants meet each other
- Establish group norms/ ground rules
- Facilitator sets up group and adds all member

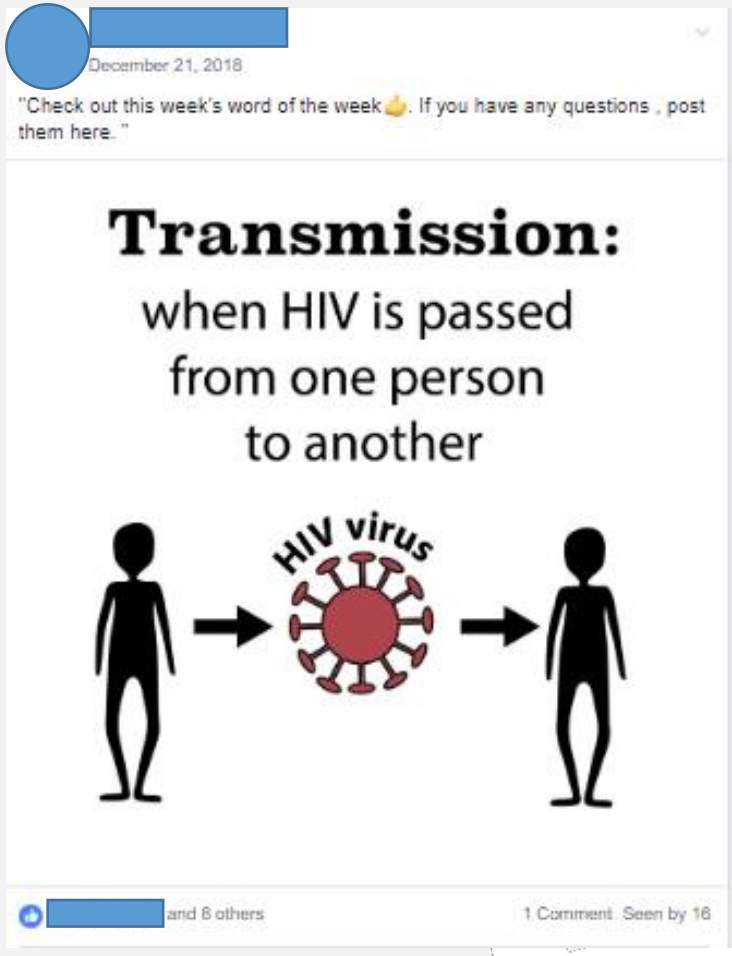


Intervention Structure

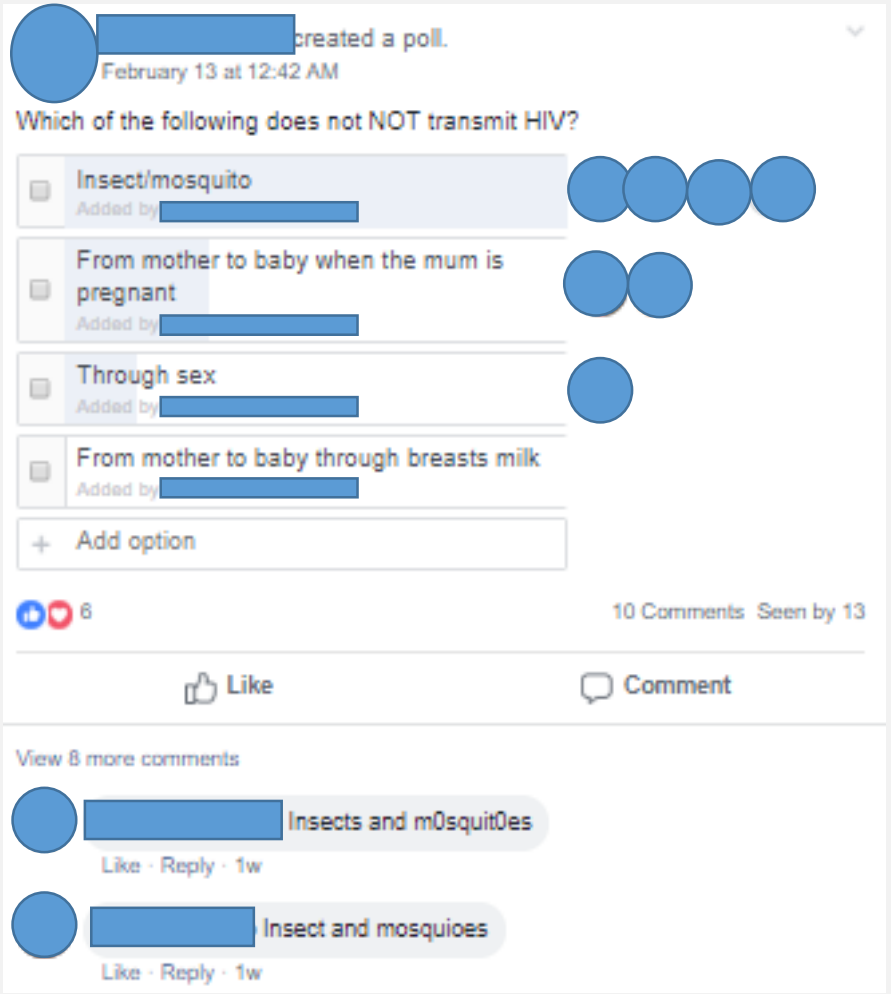
- At-a-Glance statements
- Word of the week
- Key messages
- Role model stories
- Discussion questions and polls
- Review questions and wrap-up statements
- Interactive social activities and games

Informational Messaging





Informational Messaging Contd.



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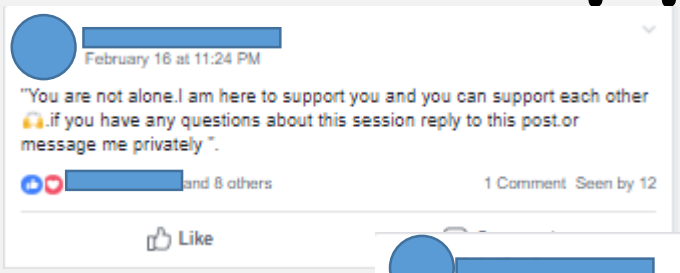
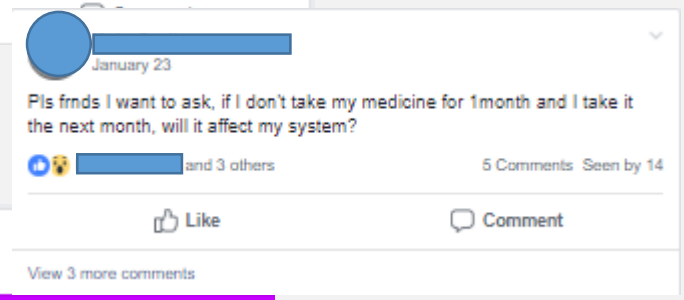
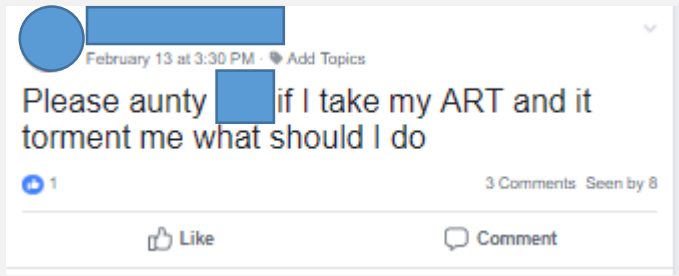
Social Support







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Feasibility Study Findings and Conclusions

- Most sessions delivered as intended and on-time.
- Participants were enthusiastic about the intervention.
- Results suggest intervention is feasible
- Social media may be leveraged to provide information and support

I love it because it makes us to interact, what we are, what we suppose not to know, we know about it, so I love it, I love the Facebook chat […] I love it because we interact with our friends having friend chat, talking… -17 yo. Female

Ok, I…I want to use this time to thank you for the support online support group. It really helped those adolescents. When… had it been that I have had that kind of chance when I was adolescent because I had this thing….seventeen years ago, at least I would have learn more, but notwithstanding, I'm still learning. So I so much thank God that these adolescents learn these things when they needed it. It was ok, so they should continue to encourage them.
– Facilitator

Human Facilitation vs. Artificial

Pros	Cons
Ability to respond to participant questions both via the platform and via other modalities (such as phone/ private message)	Human error • Delayed or missed content • Incorrect settings
Allows for some level of adaptability (delayed response to polls)	Cost and scalability
Empathy	
Ability to correct mis-information	
Trouble-shooting and participant crisis response	

Thank You!!!!

JACARANDA HEALTH

Using Artificial Intelligence to assist human interactions on an SMS platform for pregnant women and new mothers

Global Digital Health Network
Feb 28th 2018

Jacaranda is transforming maternal healthcare with high-quality, sustainable care in the public and private sector

JACARANDA MATERNITY

Social enterprise:

- Highest quality maternity hospital in East Africa
- Replicable low-cost model
- Can return capital to investors

Patient Centered Care

HR Innovations

Quality Systems

JACARANDA HEALTH

Non-profit:

- Adapt innovations to improve quality of care in Public Hospitals
- Low-cost and sustainable in public health system

Challenge: Empower women to visit health facilities more frequently during and after pregnancy

Key steps during the pregnancy continuum

Communities and families with access to care

Mothers seek appropriate, high quality care at the right time

Seen by competent, skilled healthcare providers

Strong referral networks for complications and emergency cases

42% of pregnant women do not attend 4 antenatal care visits[1]

68% of new mothers have an unmet need for postpartum family planning[1]

OPPORTUNITY: Feature phone penetration is ~90% in Kenya

PROMPTS: An SMS-based messaging platform that provides essential pregnancy and postpartum information and behavioural nudges to **improve health-seeking behavior at critical moments**

[1]Kenya Demographic Health Survey, 2014

PROMPTS: An SMS messaging platform that closes the gap between client and provider

Rigorously tested, including with a randomized controlled trial

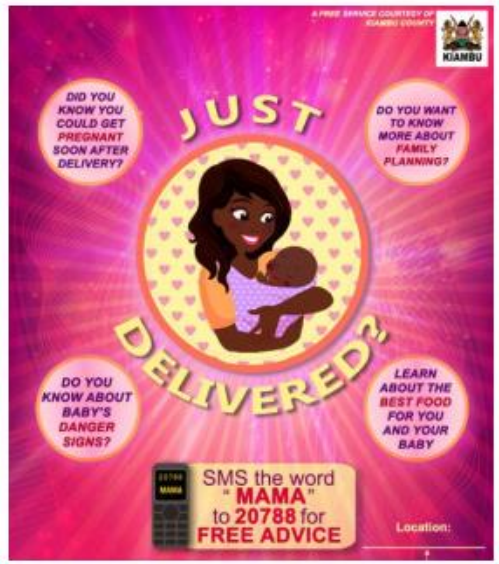
1,500 mothers enrolling every month

16,000 questions answered

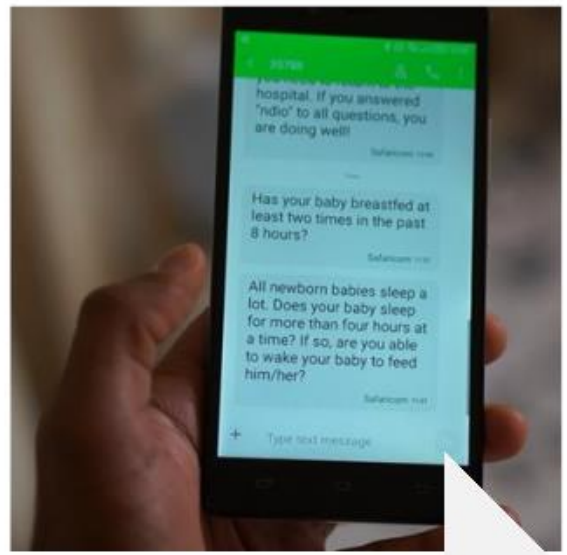
Dashboards being shared with facilities

An evidenced-based sequence of SMS messages sent to pregnant women and new mothers

Pregnant women & new mothers see posters and enroll for the service



They then receive a sequence of tips & behavioral nudges



Rigorously tested, including with a randomized controlled trial, with ~**4,500 women** at Jacaranda and **4 government hospitals**

more likely to know danger signs and seek care

Women were **22% more likely to seek advice for their negative health symptoms**

more likely to take up family planning

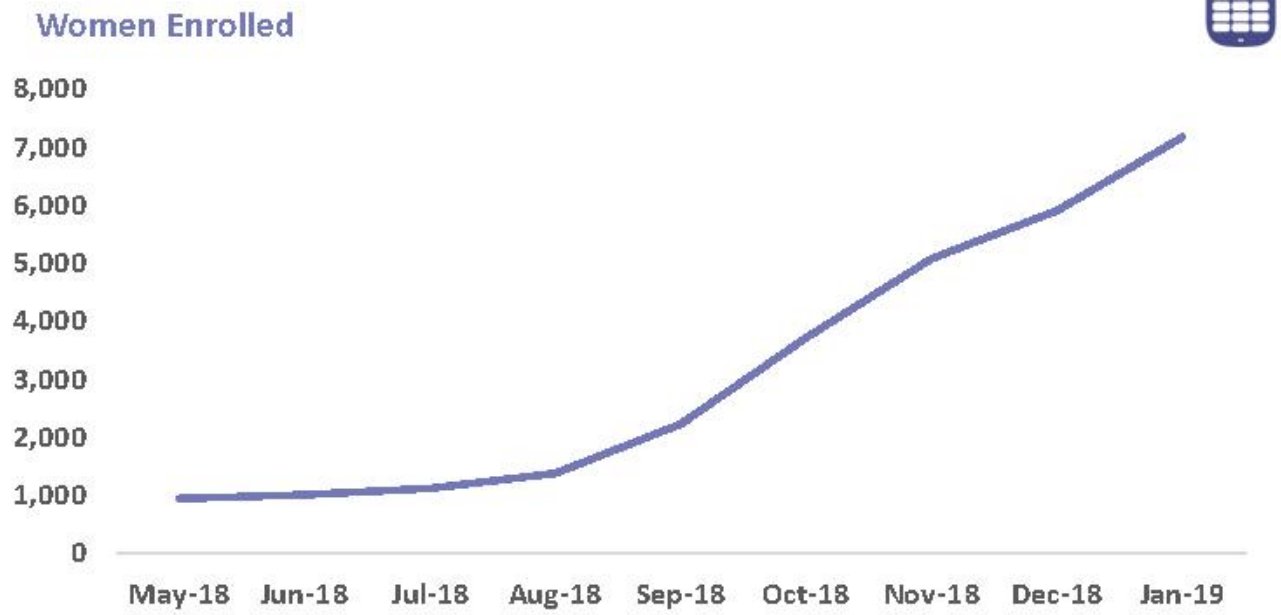
1.6x more likely to take up PPFP
~2x more likely to take up long acting contraceptives.

Current status of SMS work: Rapid enrollment across public facilities

We have now rolled out the SMS service in **60 facilities** across three counties: Kiambu County, Nairobi County, Bungoma County

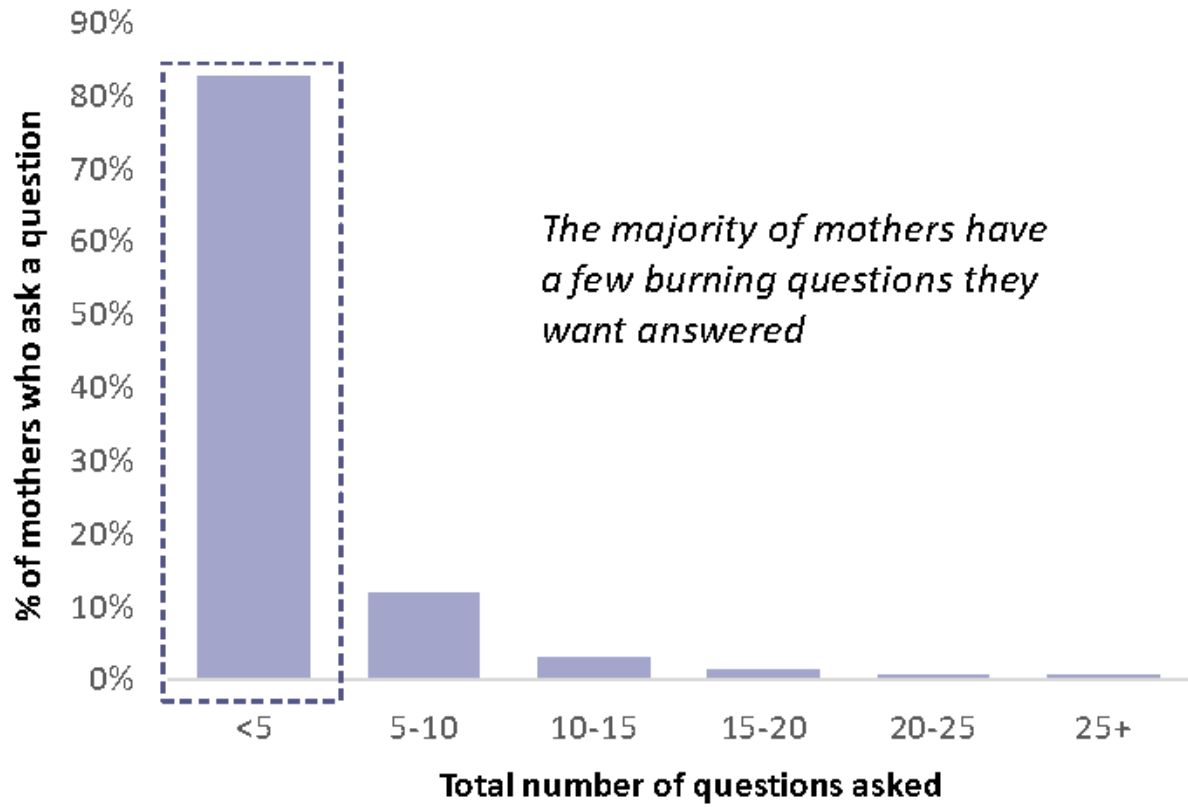
Key metrics: Jan 2019

- **8,000+ women enrolled**
- Adding ~1,500 new mothers/month



Deeper engagement through our platform: Mothers text in questions about pregnancy and new babies

- **16,000+ questions have been asked and answered on our SMS platform**
- 43% of mums ask at least one question
- 70% of the questions asked are general pregnancy, but **30% could be medically serious**
- Launched ‘Helpdesk’ service that responds to mothers within 24 hours

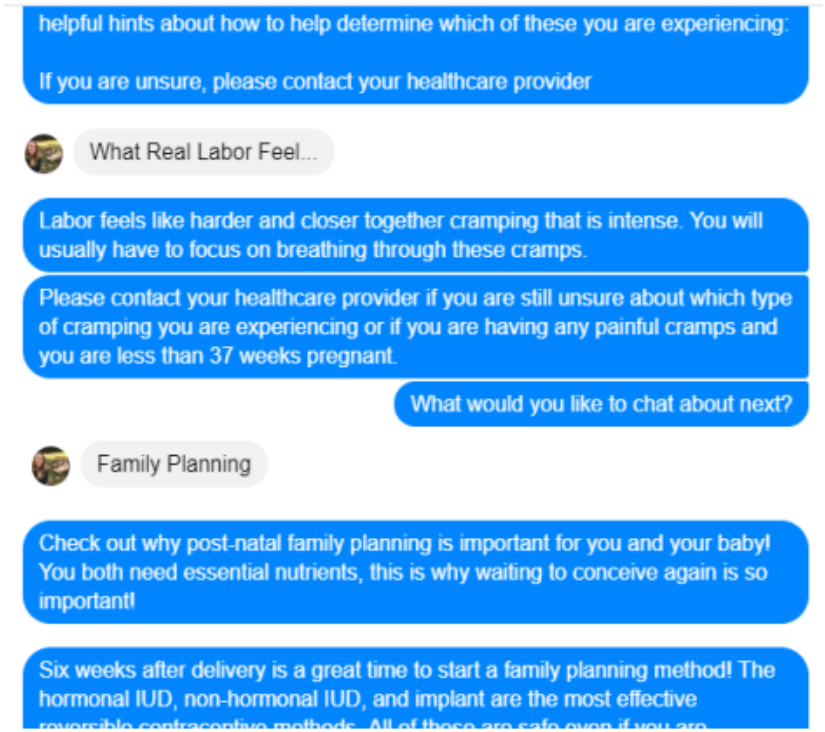


The majority of mothers have a few burning questions they want answered

What is a scalable solution for answering these questions?

Design approaches to creating a bot that can respond to questions about pregnancy

1 Flow Bot



- User has to seek information by choosing options, e.g. Pain>Medication>Back Ache
- Presumes the user knows what they are looking for and a shared approach to categorization, e.g. Pain>Location>Meds or Backache>Medication
- Works better on smart phones
- Tested this in 2018

Design approaches to creating a virtual assistant that can respond to questions about pregnancy

1 Flow Bot

2 **Intent-based bot**

"I have pain in my side"

Natural language processing allows spoken or written phrases to be analyzed by machine learning to determine an intent.

Intent: subject of the request or an action the user wants to take.

Intent = abdominal pain

Defined response = "Abdominal pain can be normal…"

Design approaches to creating a virtual assistant that can respond to questions about pregnancy

1 **Flow Bot**

2 **Intent-based bot**

"I have pain in my side"

Intent = abdominal pain

Defined response = "Abdominal pain can be normal…"

Pros

- Better user experience (if it works)
- Gets right to the point

Cons

- Need to think carefully about intent classification
- Requires training
- Language limitations (especially mixing languages)

How we created and train our intent-based bot

16,000+ questions have been asked and answered on our SMS platform

Manual intent classification

Train Natural Language Processing (NLP) agent

Dialogflow

Deploy as part of solution: beta test

How we created and train our intent-based bot

16,000+ questions have been asked and answered on our SMS platform

Manual intent classification

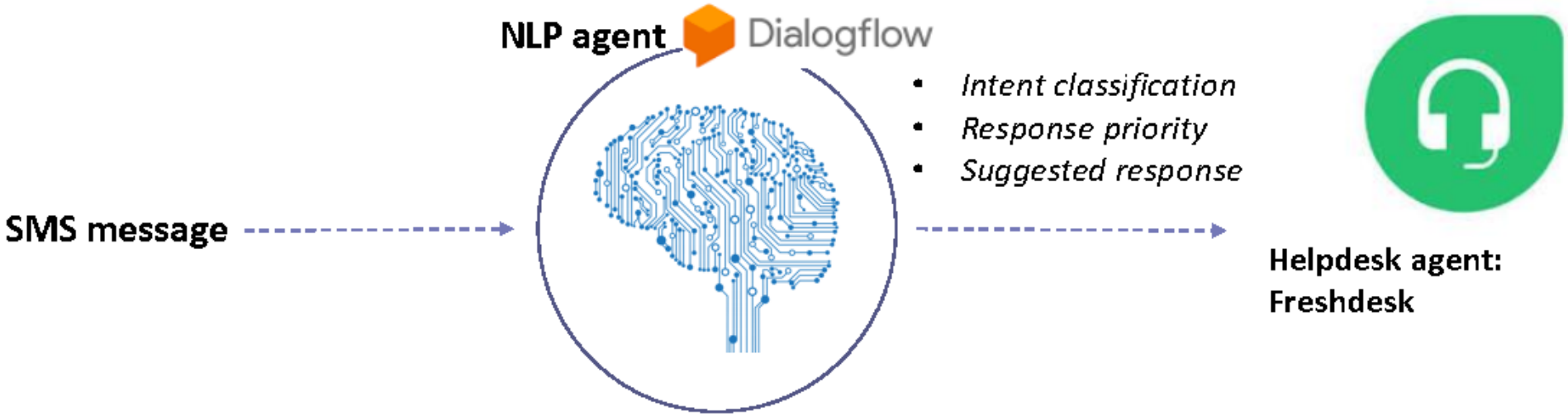
Our initial version tried too much: user journeys, multiple contexts, complex intents – **you need a well classified set of inputs for this**

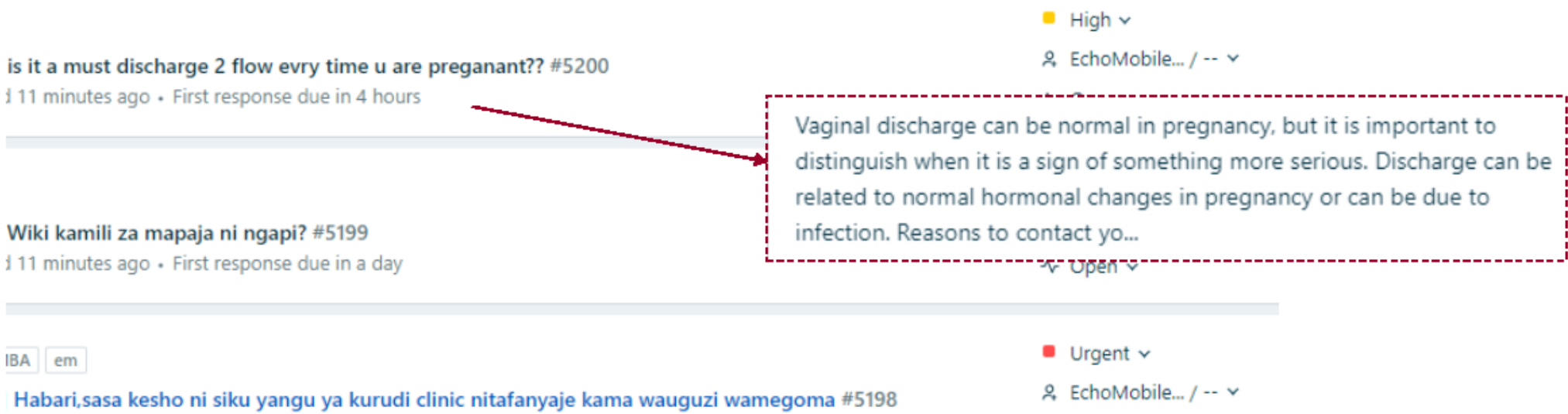
Be careful what you include in the blender. **One bad ingredient can spoil the output**

Train NLP agent Dialogflow

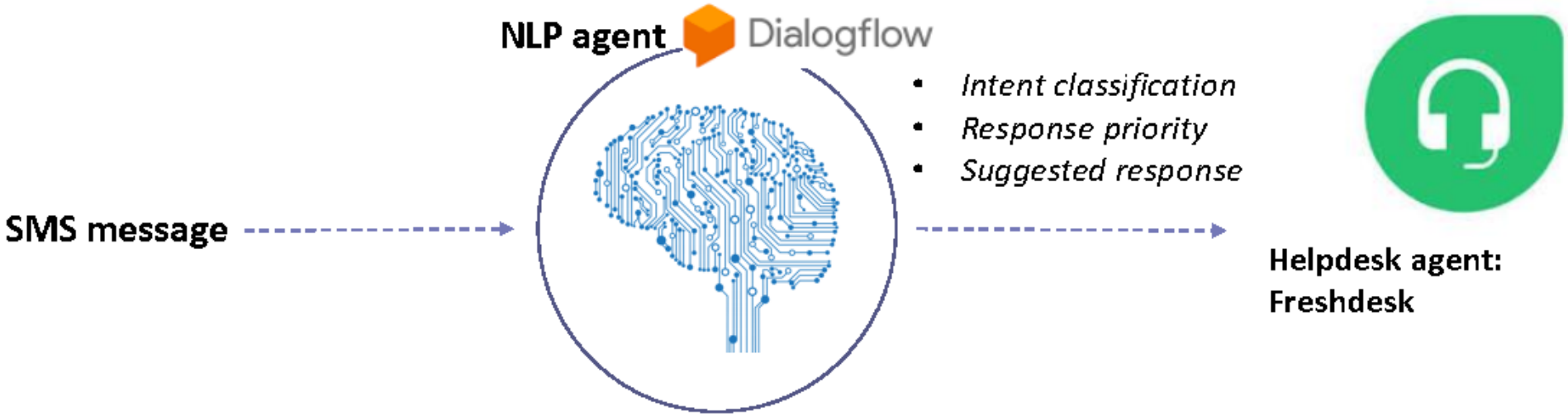
Deploy as part of solution: beta test

How our intent-based bot supports the helpdesk





How our intent-based bot supports the helpdesk



Our goals for using AI to support low-income pregnant women and new mothers

- We are not trying to replace human contact
- AI helps us triage red flag questions or comments so that a human being can address them faster
- *Why human supervision?* We receive ~1000 questions a week. An (aspirational) bot error rate of 1-2% would translate to 20 misidentified intents, which includes 2-3 red flag issues.

Q&A

Thank you!