What's inside?

Introduction

Challenges faced by community health nurses

According to the World Health Organization, the maternal mortality ratio in Ghana declined from 634 maternal deaths per 100,000 live births in 1990 to 319 per 100,000 live births in 2015, and the under-five mortality ratio declined from 128 deaths per 1.000 live births to 78 per 1,000 live births during the same time period. Ghana's maternal and under-five mortality ratios are still the same or higher than the average for low-income countries, which has been calculated as 230 per 100,000 live births and 76 per 1,000 live births, respectively. While Ghana has made admirable progress in maternal, newborn, and child health (MNCH) to reach Millennium Development Goals 4 and 5, progress has been uneven throughout the country.

Ghana has made efforts to implement many policies and strategies in the development of its human resources for health strategy through the provision of care at the community level. In the 1990s, Ghana implemented the Community-based Health Planning and Services (CHPS) program to improve the accessibility and quality of health and family planning care. CHPS compounds are Ghana's primary strategy to extend health care provision to those who have been beyond the reach of the existing formal system. Community health nurses (CHNs), who are paid frontline health workers, are either posted at CHPS compounds or health facilities and provide community-based preventive and curative maternal, newborn, and child health care while residing in the community. CHNs face many challenges in their work, including isolation in remote areas, limited access to important health information and professional advancement and learning opportunities, time management, and support for problem solving—all of which affect the motivation of CHNs, ultimately impacting retention rates and quality of care.

A mobile platform for health worker motivation

The objective of the Care Community Hub is to improve connectivity and career development among CHNs, increase their linkage and interactions with a professional network and supervisors, and provide clinical refreshers.

The Care Community Hub (CCH) project is part of Concern Worldwide's Innovations for Maternal, Newborn, & Child Health (*Innovations),* an initiative that seeks to identify, support, and field-test bold innovative ways to overcome barriers to delivering proven solutions to women and children.

Specifically, the pilot aims to provide the government of Ghana with an innovative solution to address barriers in health worker motivation through the use of information and communications technology (ICT) via a smartphone application called CHN on the Go.

The app is designed to facilitate health worker learning, supervision, performance monitoring, communication, and work activity planning, as well as to support health worker wellness through mobile technology to CHNs who work through the CHPS system and subdistrict health centers with the objective of improving their well-being and connectedness and decreasing feelings of demotivation. It is expected that this will have implications for improved quality of care.

Grameen Foundation, the implementing organization, led the design of the app, using a human-centered design approach, the development of the app, and the implementation of the CCH project in Ghana. JSI Research & Training Institute, Inc. (JSI R&T), served as the global research partner.

Few evaluation studies have sought to understand the effectiveness of using a mobile platform to improve health worker motivation. This project evaluation seeks to understand the effect of the CCH project on CHNs' motivation in the project areas, examining the pathways through which the CHN on the Go app influenced the outcome.
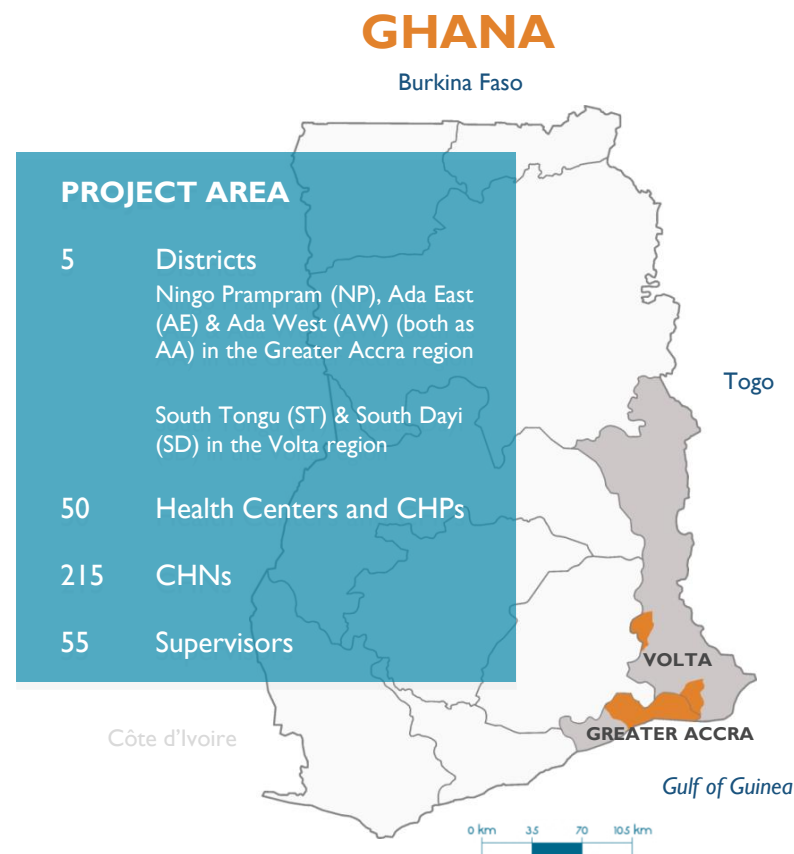
Program design

How the project was designed

The *Innovations* initiative used design thinking (DT) concepts and tools in two stages to come up with five projects, one of which is the CCH project:

- **MARCH 2011:** The "ideate, incubate, test and evaluate" process was used to define several possible pilots to address barriers to accessing MNCH services. Different DT tools were used to ensure that pilot ideas reflected the needs, interests, and desires of target communities and to tap into expertise outside the traditional health sector. Five pilots were selected and then shaped and refined using DT methods, including divergent thinking from cross-disciplinary and multidisciplinary domain experts through a *charrette* and formative research.

- **OCTOBER 2013:** A DT workshop was held for the CCH project to engage design experts from the design firm Thinkplace with the aim of refining perceptions of the problem (to understand health worker motivation), to refine steps the project could take to overcome barriers that CHNs face, and to test different project elements with end users.

GHANA

Burkina Faso

PROJECT AREA

5	Districts
	Ningo Prampram (NP), Ada East (AE) & Ada West (AW) (both as AA) in the Greater Accra region
	South Tongu (ST) & South Dayi (SD) in the Volta region
50	Health Centers and CHPs
215	CHNs
55	Supervisors

Togo

VOLTA

GREATER ACCRA

Côte d'Ivoire

*Gulf of Guinea*

0 km   3.5   70   10.5 km

The CHN on the Go application

In the DT workshop, six key ideas were identified as the challenges that could be addressed via a mobile application. These ideas were selected based on desirability, viability, and possibility of making the most impact within the defined parameters. The ideas were used to guide the development of the CHN on the Go application of the CCH project and its six modules.

Point of Care

A mobile-enabled set of decision support tools for diagnosis and care of clients
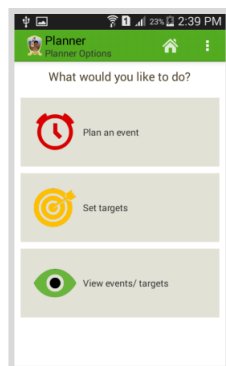
Planner

A simple and intuitive work activity planning and scheduling tool for CHNs to coordinate with peers and supervisors and plan to meet preestablished targets
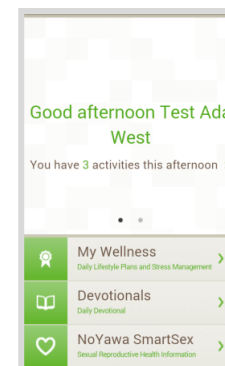
Learning Center

A highly usable, highly engaging. mobile learning space with a range of distance learning courses and training materials accessible anywhere, anytime
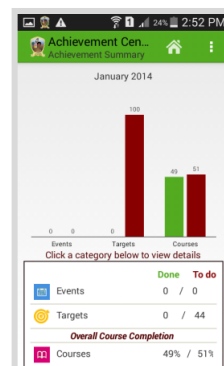
Achievement Center

A tool used for performance monitoring, which documents CHN achievements with regard to e-courses, events, and clinical targets met

Staying Well

A range of tools that supports a holistic approach to staying motivated and enables CHNs to take charge of inspiring themselves
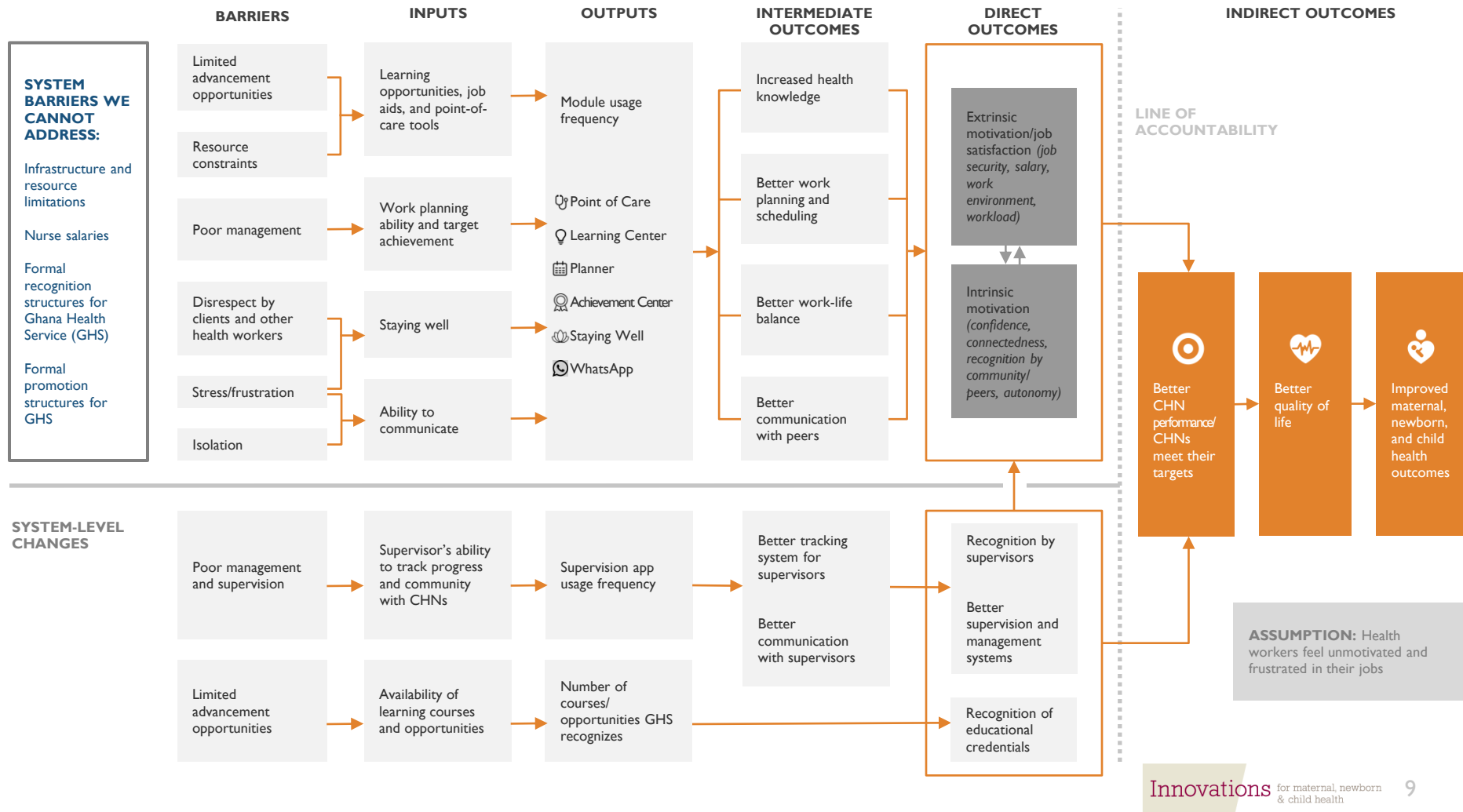
WhatsApp

An interactive and participatory communication space that supports ongoing forum-driven conversation, material sharing, and collaboration
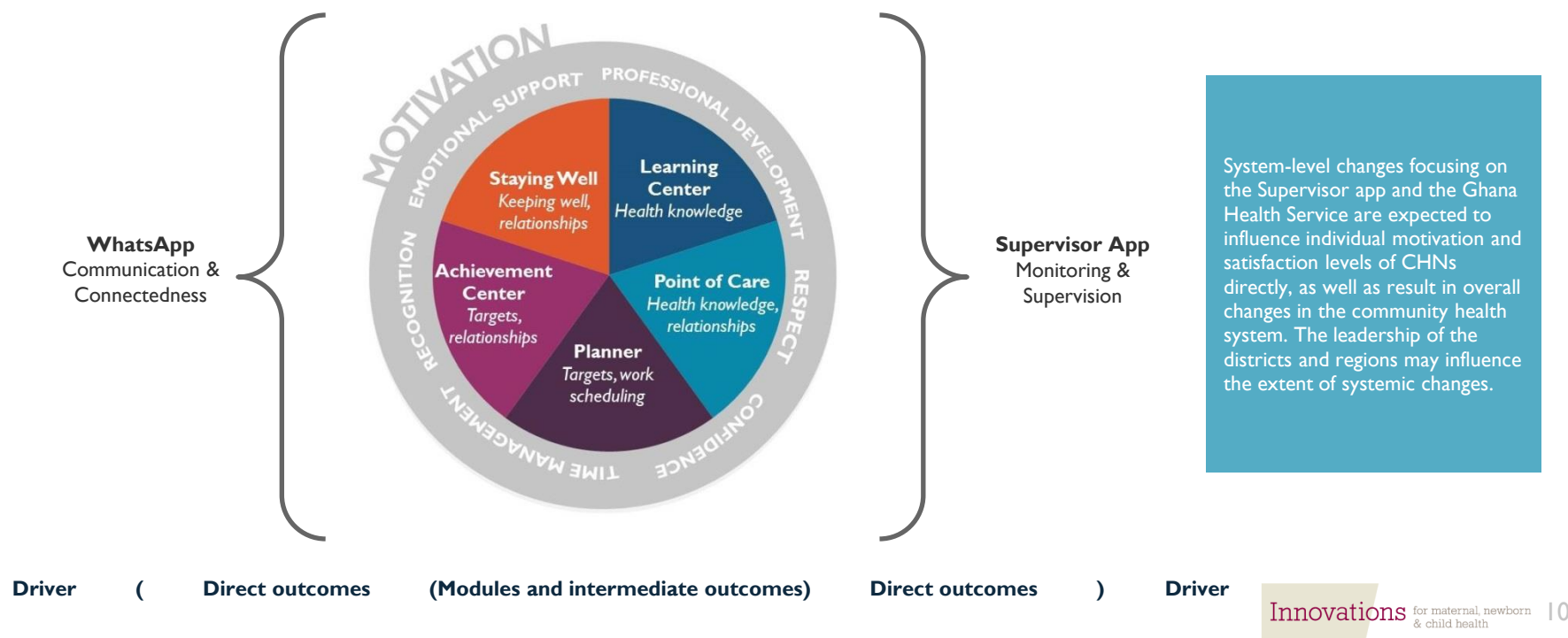
Theory of change

After the CCH project design was completed, a visual representation of the project's *theory of change* (TOC) was developed to display the pathways through which the various CHN on the Go application modules would work at improving the motivation and job satisfaction levels of the participating CHNs, improving their performance and ultimately the quality of MNCH care.

BARRIERS

INPUTS

OUTPUTS

INTERMEDIATE OUTCOMES

DIRECT OUTCOMES

INDIRECT OUTCOMES

SYSTEM BARRIERS WE CANNOT ADDRESS:

Infrastructure and resource limitations

Nurse salaries

Formal recognition structures for Ghana Health Service (GHS)

Formal promotion structures for GHS

- Limited advancement opportunities
- Resource constraints
- Poor management
- Disrespect by clients and other health workers
- Stress/frustration
- Isolation

- Learning opportunities, job aids, and point-of-care tools
- Work planning ability and target achievement
- Staying well
- Ability to communicate

- Module usage frequency
- Point of Care
- Learning Center
- Planner
- Achievement Center
- Staying Well
- WhatsApp

- Increased health knowledge
- Better work planning and scheduling
- Better work-life balance
- Better communication with peers

- Extrinsic motivation/job satisfaction (job security, salary, work environment, workload)
- Intrinsic motivation (confidence, connectedness, recognition by community/peers, autonomy)

LINE OF ACCOUNTABILITY

- Better CHN performance/CHNs meet their targets
- Better quality of life
- Improved maternal, newborn, and child health outcomes

SYSTEM-LEVEL CHANGES

- Poor management and supervision
- Limited advancement opportunities

- Supervisor's ability to track progress and community with CHNs
- Availability of learning courses and opportunities

- Supervision app usage frequency
- Number of courses/opportunities GHS recognizes

- Better tracking system for supervisors
- Better communication with supervisors

- Recognition by supervisors
- Better supervision and management systems
- Recognition of educational credentials

ASSUMPTION: Health workers feel unmotivated and frustrated in their jobs

Innovations for maternal, newborn & child health

9

Pathways to change health worker motivation

The TOC was divided into two sections: The top half focused on the CHN on the Go app and pathways through which the different modules would affect health worker motivation, and the bottom half focused on system-level changes that would lead to improved supervision and learning systems and facilitate faster and more effective systems for feedback to CHNs. Together, improvements along these two sections and their pathways are hypothesized to result in greater CHN motivation and satisfaction and potentially better service delivery and quality of care.

The TOC guided the evaluation of the CCH project, and over time results from periodic data collection showed the complex relationship between the CCH app modules and the components of motivation. To simplify this relationship, the research team created a diagram (see below) to illustrate the change pathways through which the CCH app could affect health worker motivation. The diagram was used to guide the narrative of the CCH results presented in this report.

WhatsApp
Communication & Connectedness

Supervisor App
Monitoring & Supervision

System-level changes focusing on the Supervisor app and the Ghana Health Service are expected to influence individual motivation and satisfaction levels of CHNs directly, as well as result in overall changes in the community health system. The leadership of the districts and regions may influence the extent of systemic changes.

Driver **(** **Direct outcomes** **(Modules and intermediate outcomes)** **Direct outcomes** **)** **Driver**

When activities were implemented

Design process
(Oct 2013 – March 2014)

Development of
application and user testing
(March – June 2014)

Version 1 of app deployed
(June 2014)

Version 1 training
(June – Aug 2014)

Feedback, revision, and refinement
(Sept – Oct 2014)

Version 2 training
(Nov – Dec 2014)

Version 2 deployed
(Nov 2014)

Refresher training
(April – May 2015)

Feedback session
(April 2015)

Version 3 deployed
(April 2015)

Accreditation of learning courses
by Nursing & Midwifery Council
(Nov 2015)

Version 3 training
(Nov– Dec 2015)

Version 4 deployed
(Feb 2016)

Feedback session
(March 2016)

Version 5 deployed
and end of project
(May 2016)

Monthly meetings with field officers for feedback

Questions we want to answer

RESEARCH QUESTIONS

1 What are baseline and endline levels of CHN motivation and job satisfaction in rural Ghana?

2 How does motivation/job satisfaction differ among various subgroups of CHNs? Are there differences by district, facility type, and CHN age?

3 Is the use of an mHealth platform such as CHN on the Go associated with greater health worker motivation/satisfaction?

A. Which of the modules were used most by CHNs?

B. How is the use of the modules associated with improvement in CHN motivation/satisfaction?

PROCESS QUESTIONS

1 How are the CHN on the Go app and system-level interventions being applied?
- To what extent were they implemented as planned?
- What were some of the barriers and supportive factors that affected implementation?

2 Are the expected results at the individual level (CHN, supervisor) and system level (district, region) emerging as foreseen in the pathways in the TOC?

- Factors and processes driving changes in health worker knowledge, perceptions, motivation, and behavior
- Extent of CHN exposure to the modules and perceptions of their experience
- Level of CHNs' overall satisfaction with the app

- Perceived link between exposure to the modules and changes in CHN learning/knowledge, work scheduling and environment, relationship with supervisors, connectedness, confidence, and external recognition as identified by pathways in the TOC
- Systemic changes in learning and supervisory systems associated with introduction of the modules

Methodology

What difference sources of data were used

SOURCE	BASELINE	PROCESS DOCUMENTATION		ENDLINE
Dates of data collection	May – Aug 2014	Nov – Dec 2014	July – Aug 2015	March – April 2016
In-depth interviews	29 CHNs 11 Supervisors	18 CHNs 11 Supervisors 4 Stakeholders	16 CHNs 8 Supervisors 6 Stakeholders 8 Clients	40 CHNs 8 Supervisors 12 Stakeholders 2 Clients
Observations			6 CHNs	
Focus group discussions	4 (23 CHNs total)			
Job satisfaction questionnaire	186 CHNs			185 CHNs
Knowledge questionnaire	184 CHNs			186 CHNs

Other data sources:
- Monthly usage dashboard
- Monthly progress reports

- Magpi e-survey
- Feedback sessions
- Pop-up questions

Descriptive statistics were run for the quantitative data using Stata. For qualitative data, thematic coding was applied using Nvivo.

When data were collected

The evaluation of the CCH project is an iterative learning process, with periodic data being subject to ongoing discussions that eventually feed into revising project design. The endline evaluation report triangulates results from a series of data collection activities conducted during the project lifetime from May 2014 to May 2016.

Baseline data collection
(May – Aug 2014)

Feedback session
(April 2015)

Magpi e-survey
(April – May 2015)

Endline data collection
(April 2016)

Project start
(Oct 2013)

Pop-up questions
(June 2015)

Process documentation 2
(July – Aug 2015)

Pop-up questions
(March 2016)

Project end
(May 2016)

Other data collection activities:
• Monthly field interviews
• Monthly usage monitoring dashboard

Process documentation 1
(Nov – Dec 2014)

Magpi e-survey
(Dec 2015 – Jan 2016)

What our baseline/endline samples looked like

BASELINE

ENDLINE

186 CHNs   186 CHNs

District

23%	28%	23%	25%		29%	24%	25%	23%
SD	ST	NP	AA		AA	NP	ST	SD

AGE

68% 25-30 years old   63% 25-30 years old

92% female   97% female

52% work at CHPS   50% work at CHPS
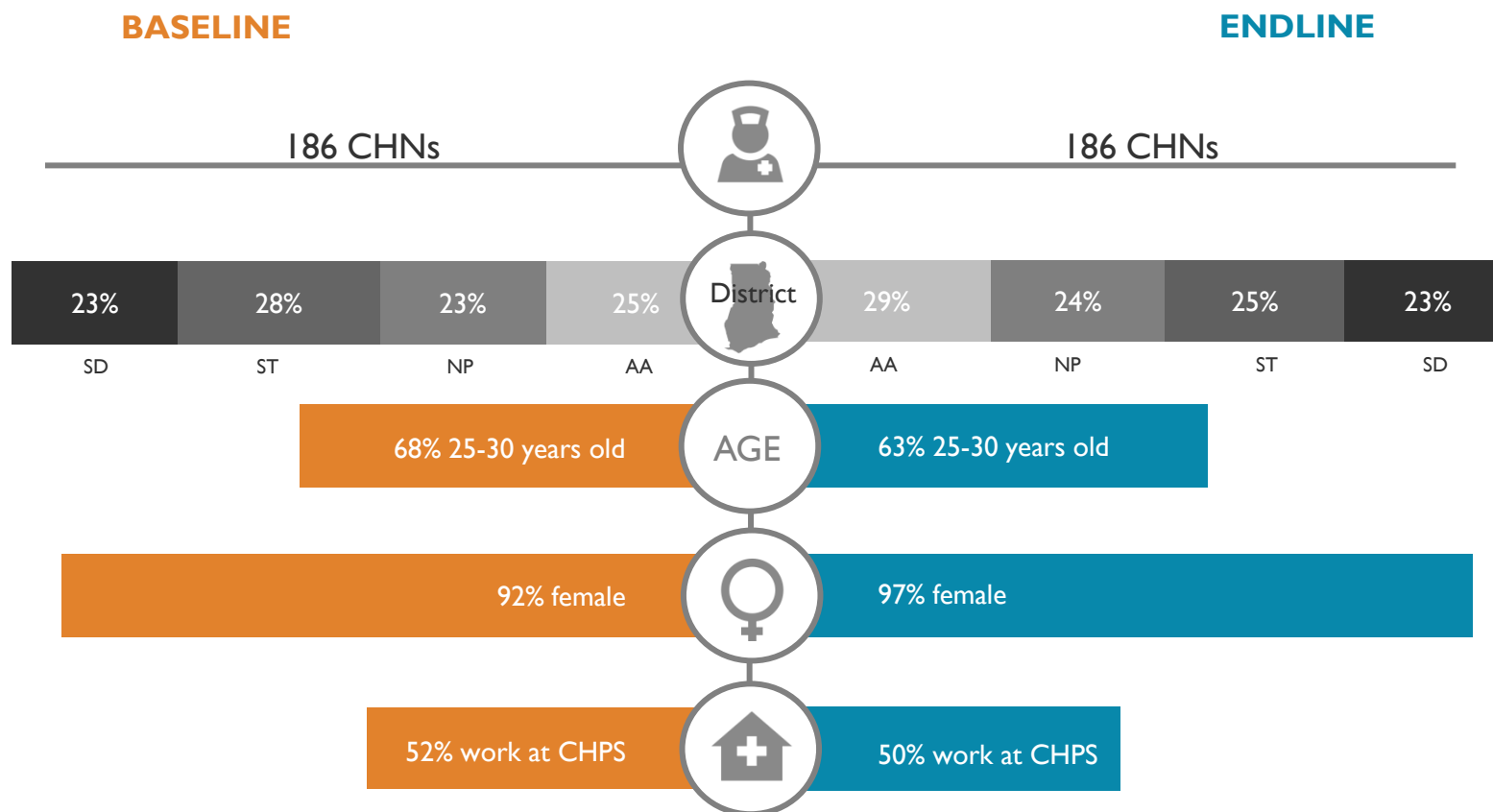
Analysis methodology

The project followed a learning approach to data collection and analysis. Survey and qualitative data at baseline and endline were analyzed to show change in outcomes (motivation and its different components) over the implementation period.

Process documentation conducted at two time points (late 2014 and mid-2015) included in-depth qualitative data collected from CHNs, supervisors, the district health management team, and Grameen Foundation and Concern Worldwide staff and analyzed in conjunction with monitoring data to provide insight into the implementation progress in relation to plans, reasons why different modules were used, successes and challenges faced, and whether the results with regard to app use were as expected according to the CCH TOC.

Data from the Magpi e-survey provided information on app use and technical problems during the implementation period. The analysis of results guided the implementation process. Feedback sessions conducted by Grameen Foundation also provided direct feedback on what CHNs and supervisors thought of the app.

CHNs also self-reported responses to five to six simple "pop-up" questions that were sent directly to their phones at two time points. These questions focused on whether they were satisfied with the app, whether it improved their relationship with their supervisor, and whether it improved their work or personal lives.

Results from each round of qualitative data collection for process documentation and other data sources (monitoring data, Magpi e-survey, pop-up questions) were analyzed and discussed at two follow-up meetings in country involving the program implementation and analysis teams. The purpose of the meetings was to review the results and assess whether changes to program implementation plans and the app were needed to ensure long-term use and sustainability of the program.

The quantitative survey data were analyzed using descriptive analysis methods. All qualitative data were coded using deductive coding based on the TOC, and inductive codes were added in based on the data collected.

The results presented in this evaluation report are primarily based on the baseline and endline results to get a better understanding of change in the outcomes over time and the effect of the project on CHNs' and supervisors' lives. The qualitative data from baseline and endline, as well as process documentation, provide context as well as help explain the reasons for change observed. Data from process documentation in particular are useful to understand whether the observed change followed the pathways outlined in the TOC. The analysis draws information from all the other data sources mentioned earlier as well, especially the monitoring data, to provide a comprehensive picture of the effect of the project.

Limitations of the study

Although the evaluation of the CCH project was proposed primarily as a qualitative study to understand the effect of the project on CHNs' motivation, the team decided to follow a mixed-methods approach and include data from baseline and endline surveys on satisfaction and knowledge. These surveys were self-reported by CHNs on paper based on their understanding of questions asked. As a result, it is possible that the responses may have some biases.

The app and its modules went through a lot of changes and improvements during the project implementation period. WhatsApp, which was not originally planned, later became very popular among CHNs. The Supervisor app changed from a simple dashboard at the facility to an app of its own, and the target-setting aspect of the Planner was much enhanced as the project developed. Although the evaluation methodology followed an approach of obtaining information at critical points throughout project implementation, CHNs were not exposed to the final version of the app and all the modules for the entire time frame of the project, given the ongoing changes in what the app offered to CHNs, They had exposure to the final version of some modules such as the Planner and Supervisor app only for a few months. As a result there could be a varying effect of each module of the app on CHNs' work and personal lives.

The baseline survey was conducted based on the proposed plan and modules for the CHN on the Go app at the time of project implementation. Since supervision was not planned as a key component at that time, questions in the baseline survey on supervision were based on an understanding of the supervision system at that time. Although questions on supervision were included in the survey, it was not based on a good understanding of the current system. However, supervision became more important as the app evolved over time.

Another key challenge was the analysis of monitoring data. The data often showed low levels of app use, which was not aligned with findings from the qualitative data interviews or from discussions with the program implementation team on their perspectives on findings from the ground. Although the monitoring data went through several rounds of revision by the program and analysis teams, it is possible that there may still be some underreporting of usage.

While the availability of data from multiple sources was very useful to present a more complete picture, the collation of all these data was sometimes challenging, especially when they did not always provide a consistent story. For example, the available monitoring data did not always match the findings from qualitative data.

What we found

Results outline
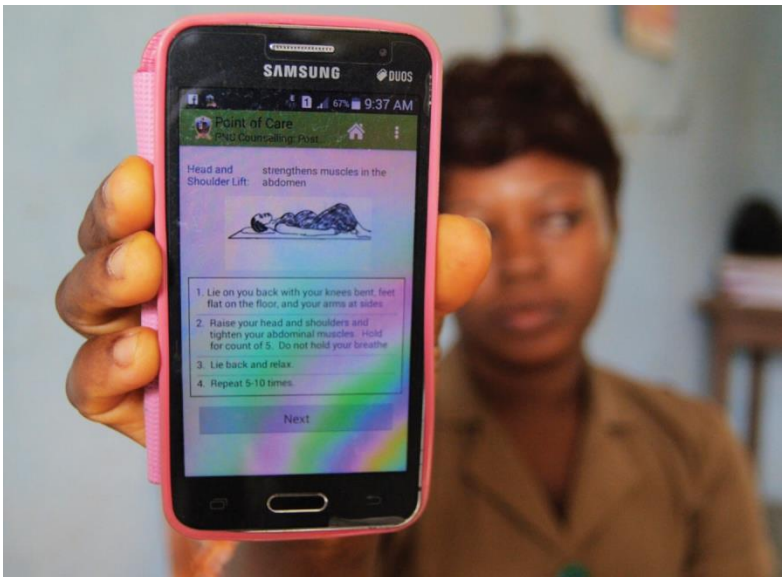
The results are organized based on the research questions. First, baseline and endline levels of CHNs' motivation, and whether they varied by CHN profile, are presented. Next, the usage of the app and whether its use was associated with improved CHN motivation/job satisfaction are explored. Usage data on the app and its different modules are presented as well as qualitative data on CHN satisfaction with the app obtained at various time points. Then overall effects of the app on job satisfaction/motivation and CHN quality of life are summarized.

To assess the detailed effects of the app, results are broken down based on the change pathways diagram (see slide 10), first presenting the modules and their individual effects on intermediate outcomes, followed by the effects of the intervention as a whole on different components of motivation/job satisfaction, and then finally the influence of key drivers.

Are CHNs generally satisfied with their jobs?

Research questions:

- What are baseline and endline levels of CHN motivation and job satisfaction in rural Ghana?
- How does motivation/job satisfaction differ among various subgroups of CHNs? Are there differences by district, facility type, and CHN age?

The level of satisfaction among nurses was consistent at baseline and endline, based on data from the job satisfaction survey at both time points.

60%

of CHNs were satisfied with their jobs at endline compared with 57% at baseline. Job satisfaction increased over time across all districts with an average increase of 11.5% between baseline and endline, except for South Dayi, where a decrease of 20% was observed.
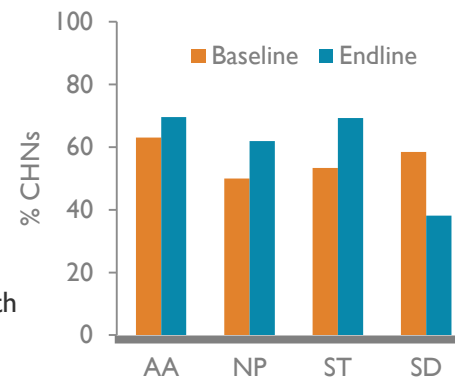
Younger CHNs (<30 years old) had an increase in job satisfaction over time compared with no change in older (>30 years old) CHNs.

+5%

CHNs from both CHPS and health centers reported an increase in job satisfaction over time.

+4%

Overall, nurses felt more comfortable working with their clients as well.

However, there was no clear association between job satisfaction and knowledge score across different health topics.
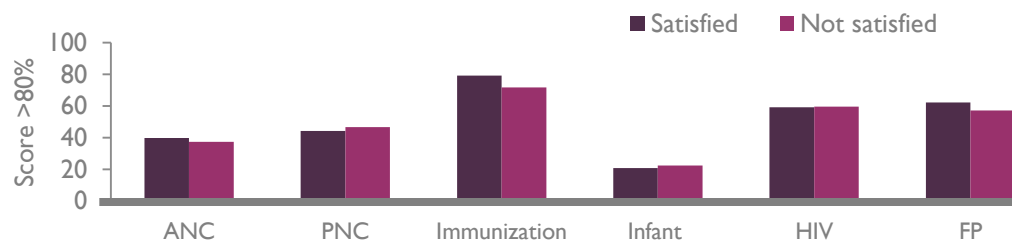
CHN on the Go usage

CCH phone usage could be measured only for the usage of the CHN on the Go app and the various modules of the app, and not the phone itself, SMS, and the use of WhatsApp. Actual usage of the CHN on the Go App fluctuated over the implementation period, with the highest use in early 2015.

CHN on the Go app usage
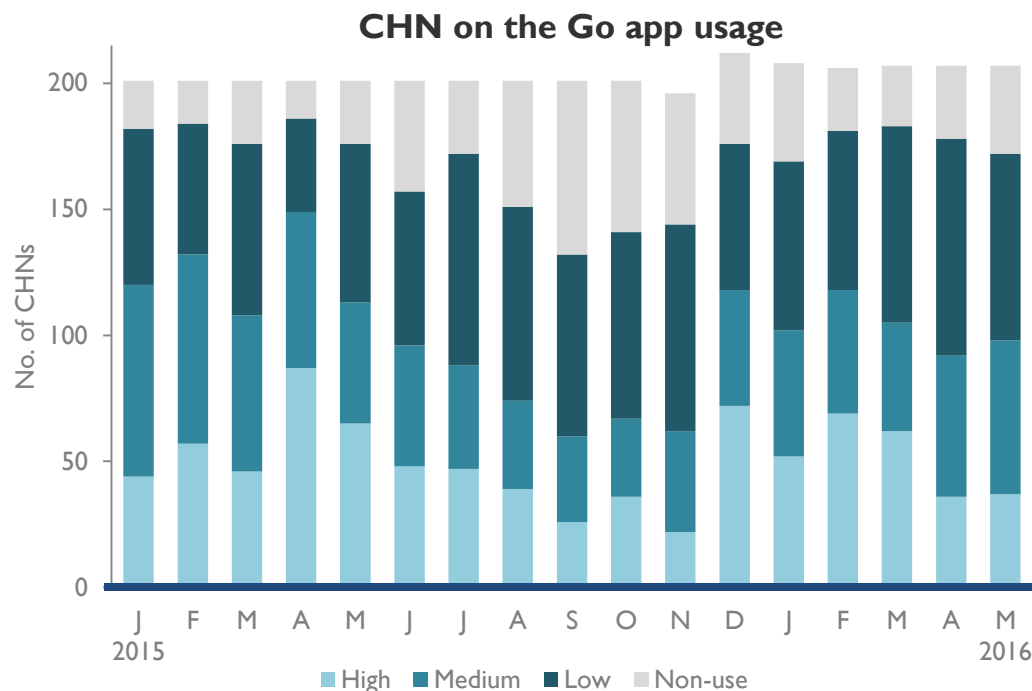
Research questions:

Is the use of an mHealth platform such as CHN on the Go associated with greater health worker motivation/satisfaction?

   A.   Which of the modules were used most by CHNs?
   B.   How is the use of the modules associated with improvement in CHN motivation/ satisfaction?

It is important to note that the monitoring data for the CCH project need to be reviewed with caution. Although the data went through several rounds of revision by the program and analysis teams, it is possible that there may still be some underreporting of usage.

Usage may have been influenced by the fact that both supervisors and nurses were not given any specific guidance or requirements on the extent to which they needed to use the app. Their use of the app and the modules was defined by their sense of how useful it would be for their work needs. As a result, usage was possibly low in certain months because of other work demands, such as the preparation of annual reports in the months of October to January, when a greater number of non-users was observed. Overall, in all months, there were nurses who did not use the app.

CHN on the Go module usage

Usage data across all modules also showed variable use over the lifetime of the project. The target-setting function of the Planner had considerably lower usage compared with other modules, particularly at the end of the project. This could be due to the frustration of nurses to have to enter their target information twice—in the Planner and also in their reports. Because of this, there were efforts toward the end of the project to push target information into the CHN on the Go phone, instead of having nurses enter the information; however, this was discontinued due to complications with obtaining the information. Even with the modules that CHNs reported as popular, such as the Learning Center and Point of Care, there were non-users and low users in all months.

Planner: Events

Planner: Target Setting
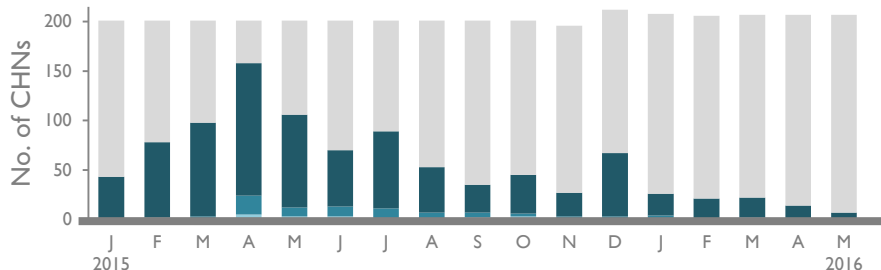
Point of Care

Learning Center
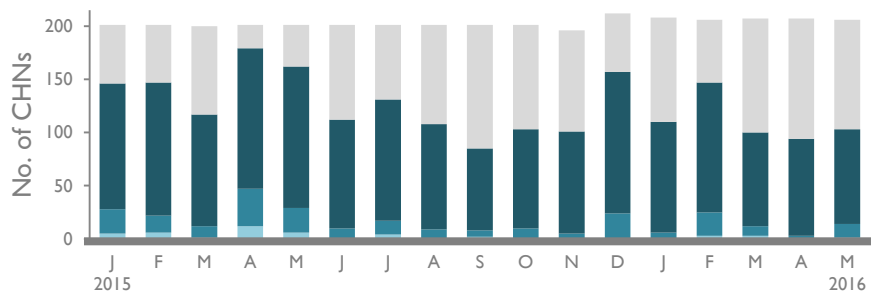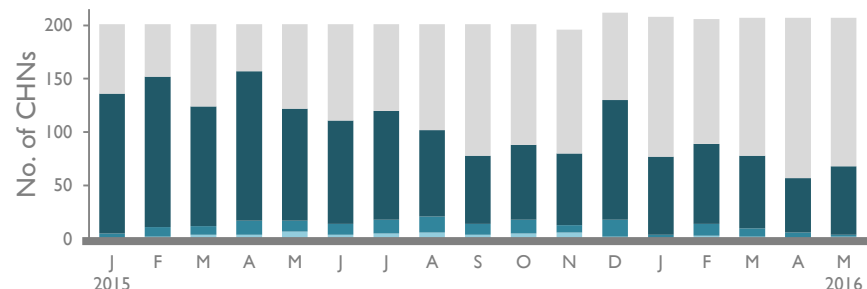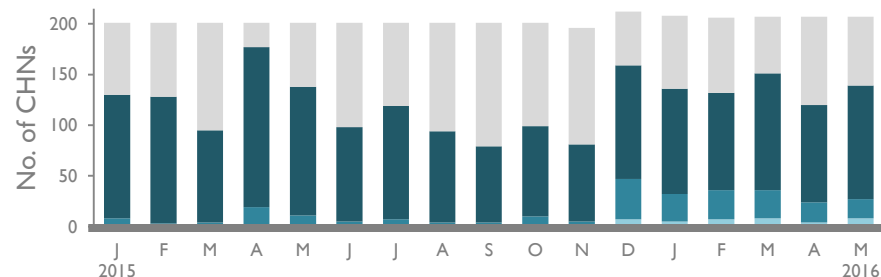
Staying Well
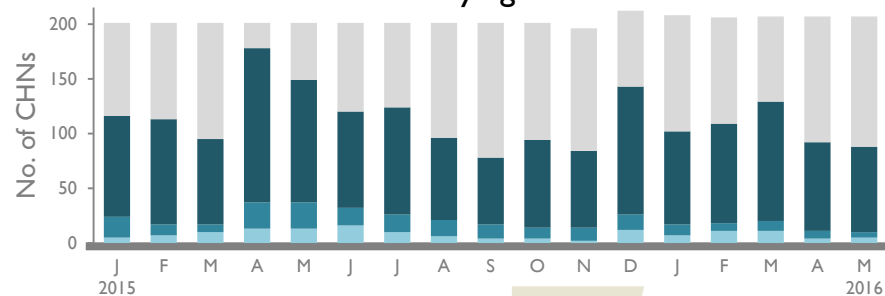
Legend: ■ High ■ Medium ■ Low ■ Non use

CCH phone: Satisfaction with the app

CHNs were satisfied with the CCH phones and the CHN on the Go app. They liked that information such as their itineraries, reference materials, and learning documents were readily available and easily accessible. This made their job easier and manageable. Results from the job satisfaction questionnaire at endline showed:

CHNs said the CHN on the Go app met their needs as a CHN.

94%

Almost half of CHNs used the CCH phone more than five times a week.

49%

Interviews with CHNs found that most CHNs would continue to use the CCH phone and app. They would also pay for their own credit to use the app; however, not everyone was willing to pay for the phone if they had to purchase it. Furthermore, they preferred that the app was usable in their personal phones.

The following are some key themes from the interviews with CHNs:

Gaining knowledge
CHNs liked that Learning Center courses were both a good refresher and taught them something new.

Organization
The Event Planner helped CHNs stay organized.

Something new
The phone helped CHNs break away from their routine tasks. They used it in their downtime to brush up on courses or communicate more effectively with others, which was something they were not able to do in the past.

Ease of communication
The app made it easy to communicate with supervisors in terms of their needs and whereabouts, resulting in a better relationship with their supervisors.

Phone as a resource
CHNs liked having so many resources at their fingertips. The Learning Center offered courses that built on their clinical skills. Point of Care enabled them to calculate dosage for medications and go through symptom differentials while doing home visits.

CCH phone: Barriers to use

A few months into the project, nurses reported problems accessing the cellular networks. They had problems downloading content as well as updates. Many of these issues were resolved over time.

Most CHNs did not have any difficulty using the phone, but some did continue to report problems with the phone that acted as a barrier to their use. Although the extent of these problems decreased considerably over time, they did persist to some degree. They included issues such as content taking a while to load or accessing the Bible in the Staying Well module.

Examples of problems faced by CHNs:

> *Some of the things when they are showing us it's small, so you cannot see them well. They have been enlarging it, but it's still small for me.* – Client, South Tongu

> *[We] had connectivity problems but now that has been solved. Initially we decided to give them Vodafone but it was not working so now we gave them MTN and through that there is a particular place that when you go you can get reception.* – Supervisor, Ada East/West

> *They also complain that the app crashes and freezes the phone when they flip through many pages in search of information. They then have to off the phone to restart.* – Supervisor, Ningo Prampram

> *And the major problem is that they will be using the phone after some time and they will find that the charging is not working.* – Supervisor, South Tongu
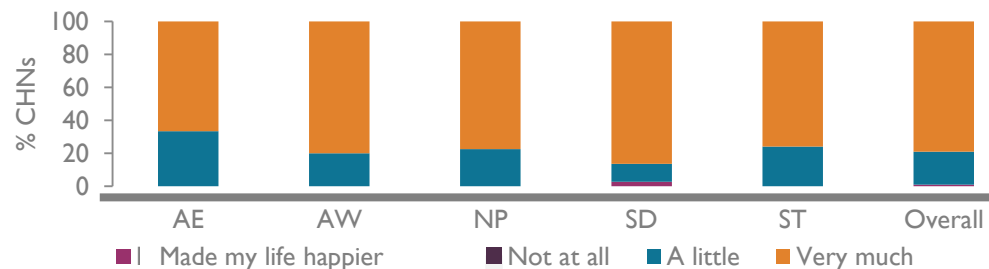
CHN on the Go and quality of life

Results from a pop-up survey showed that the app made supervisors' and nurses' lives better both in terms of their jobs and personal lives. Furthermore, relationships between nurses and their supervisors also improved.
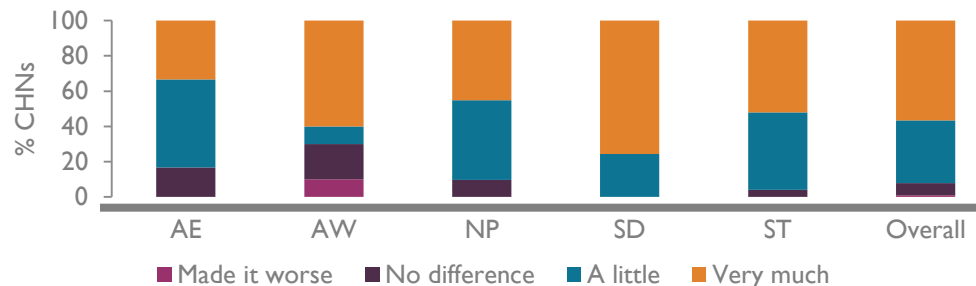
App made CHNs' work life easier

Legend: Made my work easier · Not at all · A little · Very much
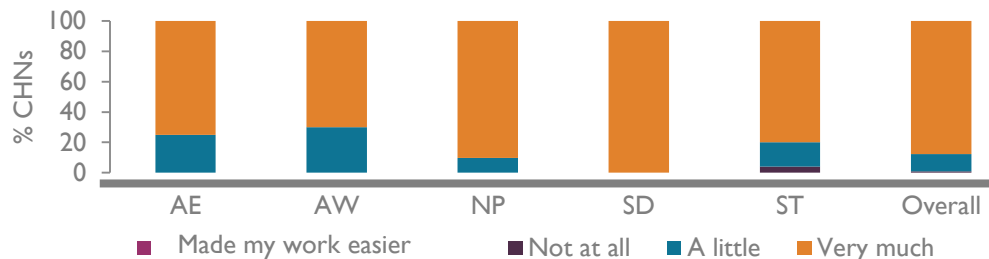
App made CHNs' personal life happier

Legend: I Made my life happier · Not at all · A little · Very much

App improved CHN relationship with supervisor in month prior to survey

Legend: Made it worse · No difference · A little · Very much

CHN on the Go and quality of life

Qualitative data also showed that the CHN on the Go app impacted both the work and personal life of the CHNs. The app helped the CHNs be more effective and efficient in their work by helping them plan their tasks, measure the work that they had done, and serve as a resource that could be used to prepare for their interactions with clients.

In terms of the benefits the app provided to their personal life, the CHNs felt that the app helped reduced stress through the Staying Well module and allowed them to stay connected to their social networks of friends and family. Having such outlets helped to better motivate the CHNs in their work.

Maybe let's say especially when I am down, it has something there that…. It has some information there that when you are down….when you go to…It has a certain thing there, stress free. – CHN, Ada

It has changed my attitude of coming to work. Sometimes when I get bored at work with maybe my colleagues or clients, the Stay Well says take water and take deep breath. And the Learning Center upgrades my knowledge. Because […] are a lot of things there which I don't even know. I have not seen them before, I have not heard but through the Learning Center when a client asks me a question I would be able to answer. The Point of Care also helps me and my client because I know there are pictures I can show to my clients…this is how it is. Then I can further schedule with them—you have to come this week or that week. – CHN, Ada

Achievement Center

CHNs liked using the Achievement Center to help them keep track of meeting their targets and to enable transparency with their supervisors.

Meeting targets

- Information in the Achievement Center showed when nurses were on track or were lacking to meet targets in terms of Learning Center courses taken and events attended/participated in.

- Reviewing information in the Achievement Center acted as a means of self-assessment for nurses to see whether they needed to make any improvements.

- The general view was that when they saw progress in their work, it motivated them to work harder and achieve more.

Supervisors

- Based on information they could access in the Achievement Center, supervisors were able to follow up and provide nurses feedback.

- They discussed nurses' progress and helped them strategize to better meet targets.

- Targets for each facility were based on the national target set and the catchment area population of the facility, These targets were set high and unreachable in the beginning. Better strategy and planning with supervisors set more doable targets.

Issues with target setting

- There was some confusion between nurses and supervisors regarding targets. Nurses would set their own targets, which were not always realistic. This did not always match the facility-level targets.

- There were two types of targets. Targets could refer to events, such as immunization days or home visits, or health outcomes. Both types of targets were not consistently recorded, and nurses tended to report on events more often.

> *…[Then] you realized that I haven't done well at the end of the year. I would not be able to achieve my goal. So…it's a kind of [a] self-assessment for them.* – Stakeholder, Accra

> *There has been a change because they are all trying to do their best, knowing that we are tracking their work. And once you set targets/objectives, then you will be questioned whether you have achieved it or not."*– Supervisor, Ada

Planner

The two key roles of the Planner were work scheduling and reminders and assisting in meeting targets.

Work scheduling and reminders

As nurses entered information into the planner, they also set reminders that later prompted them to keep to their schedule. However, since reminders were sent automatically, usage of the Planner may appear low because nurses did not have to open the module to view their schedule.

Assistance in meeting targets

CHNs were able to meet their assigned targets more easily when they used the event planner to schedule their activities; however, a supervisor from South Dayi said that nurses did not use the Planner as much as they should.

And the Planner too reminds you. It serves as an alarm for you to begin your work.– CHN, Ningo Prampram

*The phone and the app [has been helpful to me and everybody, because the] planner helps to plan and acquire new knowledge.
[It] has been very useful. – CHN, Ada East*

90%

of CHNs at endline felt that they could plan their day well to meet their targets.

At baseline, almost half of CHNs agreed with the statement: "Most of the time, I am overwhelmed and do not know how to handle an excessive workload." At endline, only 34% felt this way.

% CHNs

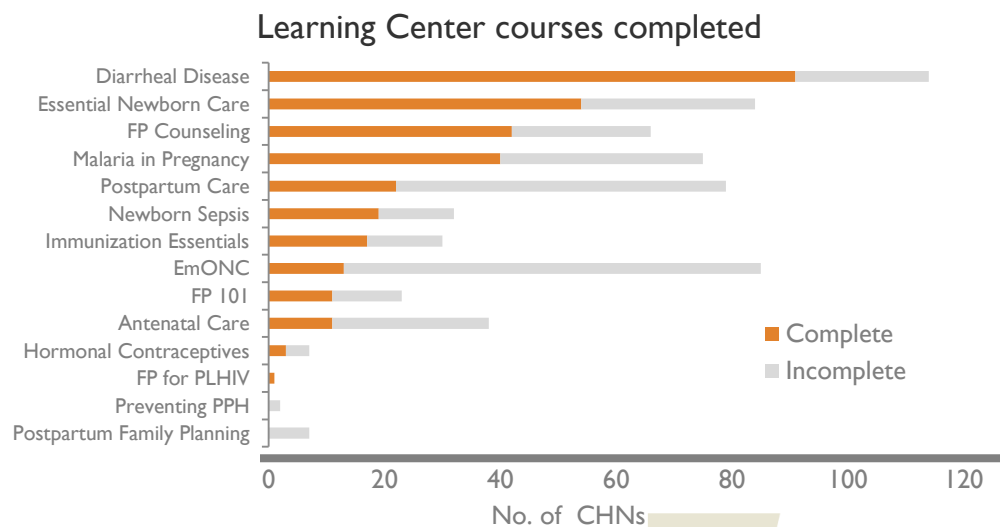|	Baseline	Endline
Neutral	26	25
Overwhelmed	48	34
Not overwhelmed	26	40

■ Not overwhelmed ■ Overwhelmed ■ Neutral
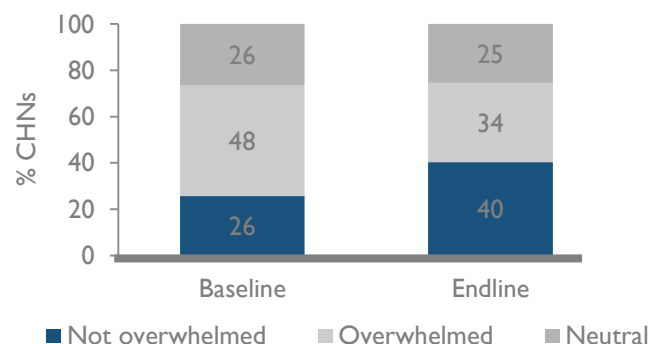
Learning Center

When CHNs were asked what they valued most about their job at baseline and endline, the two most common responses were finding useful and creative solutions and learning new skills on the job. By taking courses in the Learning Center, CHNs obtained additional information and were able to broaden their knowledge. This was very beneficial for their personal and professional development without having to take study leave to take other classes.
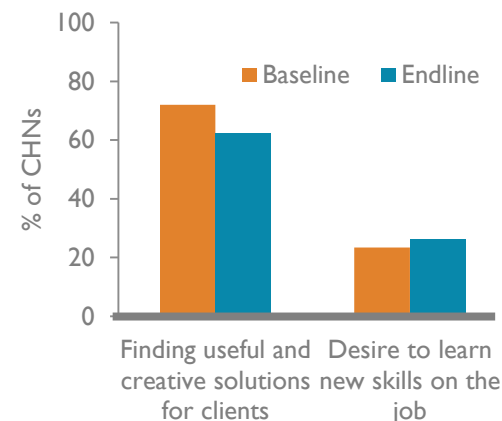
As shown in the graph below, the most popular courses in the Learning Center were Diarrheal Disease, Essential Newborn Care, Family Planning (FP) Counseling, Malaria in Pregnancy, and Emergency Obstetric and Newborn Care (EmONC); however, only 13 out of 85 nurses completed the EmONC course. The least popular courses were Hormonal Contraceptives, FP for People Living with HIV (PLHIV), Preventing Postpartum Hemorrhage (PPH), and Postpartum FP.

Learning Center courses completed

Learning Center

Based on data from the health knowledge survey at baseline and endline, consistent improvements in health knowledge were evident, especially in the area of family planning. However, as presented earlier, no clear association between knowledge and job satisfaction was observed.

Consistent improvements in health knowledge, especially in family planning

% CHNs with >80% correct
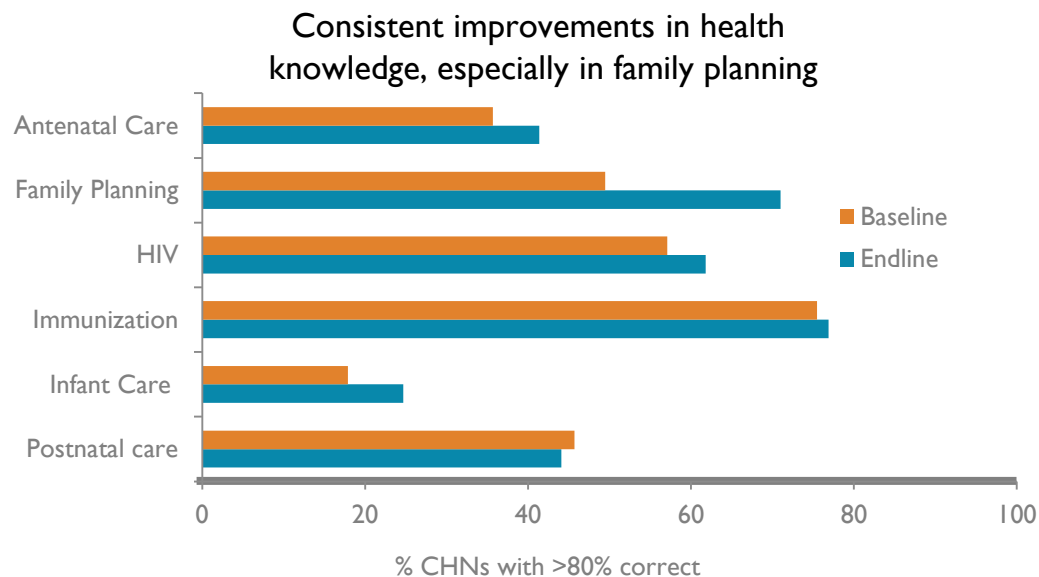
The project implementation team regularly made updates to the courses available, thus continuously providing new information. Some nurses did report the need to increase the number of courses available.

Point of Care

The Point of Care module was popular among CHNs because it provided them easy access to health information when working with pregnant women, young mothers, infants, and young children for providing preventive care, diagnoses, and treatment in the areas of reproductive, maternal, newborn, and child health. As a result, this improved knowledge of relevant health issues resulted in better relationships with their clients.

Health knowledge

- The Point of Care module provided easy access to health information to CHNs when they were with clients. They could also review information in the module whenever they had the time.

- Access to this module on the phone eliminated the need for them to carry flip charts during home visits or visits to pregnant women or new mothers on ANC or newborn care. They typically used the phone to display the images on the phone to clients.

- The Point of Care module was consistently very popular among CHNs, especially the medical dictionary, which provided clarifications for technical medical terms.

Relationships

- Letting clients learn from seeing pictures on the phone was especially useful. If they had any doubts on the information, it acted as evidence and a credible source of information

Like now everything about health, as in the maternal and family planning side, has been put into an app for you to easily access it so it makes the work easier. If something is beating your mind and you are not clear about it, you just pick it and read it and it will broaden your mind. – CHN, Ningo Prampram

At first I didn't know there is a difference between postnatal and postpartum. But through the use of this phone I now get to know that the postnatal refers to the care of the child while the postpartum refers to care of the mother. – CHN, South Dayi

Examples of health information

- Expected date of delivery calculations

- Use of ORS and zinc for diarrhea

- Right dosage for malaria

- Family planning information

Staying Well

The Staying Well, some of the activities will help you to ease the stress, and thereby giving you more strength to carry on with your work. – CHN, South Tongu

I have used the Staying Well module. I use it anytime I am **stressed** *or anytime that I am bored. There is fitness, there is a devotional section, and there are exercises. So, I look at my wellness plan. – CHN, South Dayi*

CHNs were using the Staying Well module to ease their stress and stay well. It also helped them improve their relationships at work.

Keeping well

• The Staying Well module told CHNs to do something different everyday. It suggested exercises to improve their well-being and topics for them to read. It also provided religious messages and motivational quotes on a daily basis.

• CHNs and supervisors reported it as a module that helped relieve their stress.

Relationships

• Nurses and supervisors talked about activities encouraged by the Staying Well module and shared their experiences.

• Information in the module made them feel good and helped when they were annoyed or angry

However, among those interviewed during rounds of process documentation (especially round 2), when nurses and supervisors were asked about which modules they would continue to use, some reported the Staying Well module to be less useful than the others. In addition, a few nurses said that it did not have a lot of information.

Staying Well module is what I don't often use because I'm given my daily routine activities so I just do those one so I don't normally go to because my wellness, my wellness is I think that's where the daily routine comes but the devotional and the no yawa, I don't often go there. – CHN, Ningo Prampram

Components of motivation

Components of motivation

Herzberg's two factors theory from 1959 argues that motivation is a result of increase in intrinsic factors related to job satisfaction and a decrease in the extrinsic or hygiene factors affecting job dissatisfaction.[1,2] The presence or absence of hygiene factors such as supervision, interpersonal relations, work conditions, salary, and job security determine levels of worker dissatisfaction and are extrinsic factors of motivation. Intrinsic factors, on the other hand, are key in determining the level of worker motivation and include achievement, the work itself, recognition, responsibility, advancement, and growth. Both these sets of factors enable the creation of a comfortable and supportive work environment for workers. More recent research specifies the importance of both intrinsic and extrinsic factors in impacting motivation. Our theory of change captures both sets of factors breaking motivation down into multiple components.

As the theory of change presented earlier shows, the use of the different modules in the CHN on the Go app met the different motivation needs of CHNs and influenced the following components of motivation:

- Professional development
- Confidence
- Time management
- Respect
- Recognition
- Emotional support

For example, the Learning Center encouraged professional development, giving CHNs more confidence in working with their clients, earning their respect, and getting recognized by their supervisors. The Planner assisted in time management and meeting targets, ultimately allowing CHNs to be recognized by their supervisors. Use of the Staying Well module provided emotional support to CHNs, assisting them in better performing their jobs. A review of the

Achievement Center results in data on how the modules helped workers with these components. These findings came from qualitative data collections as part of process documentation, as well as the endline quantitative survey, which asked about some of these factors, such as satisfaction with pay/were they paid fairly, whether they felt overwhelmed with excessive workload, peer/supervisor/client interactions, and respect and recognition received.

1. Herzberg, Frederick; Mausner, Bernard; Snyderman, Barbara B. (1959). *The Motivation to Work* (2nd ed.). New York: John Wiley.
2. Yusoff, Kian & Idris 2013. Herzberg's Two Factors Theory Work Motivation: Does it Work for Today's Environment? Global Journal of Commerce & Management Perspective. Global Institute for Research and Education.
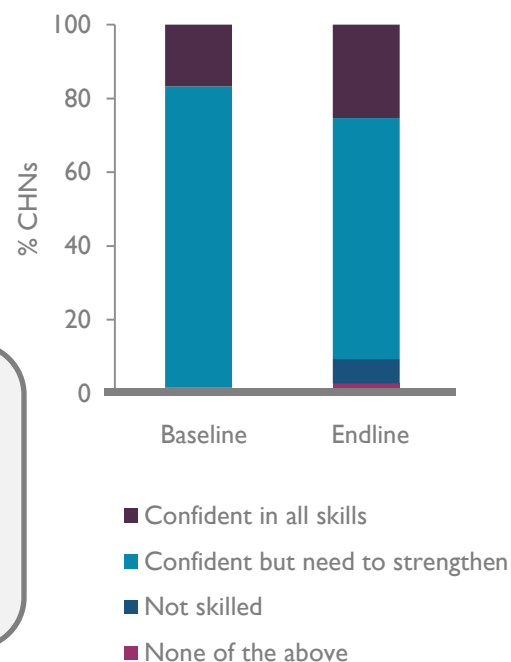
Confidence

CHNs felt confident with the service that they provided because the CHN on the Go app acted as a useful resource to provide better care to patients. The Point of Care module had different protocols available for the many situations that they face in their work.

Easy access to the app, especially during client visits, assured them that the care they provided and the information that they were relaying to their client was correct.

Results from the endline survey showed that CHNs felt more confident in ALL their skills at endline compared with baseline. The use of the Learning Center and Point of Care modules and the improvements in the health knowledge scores can be associated with this increase in confidence in their skill set.

*[With] the **Point of Care**, at least it helps you to render the best of care. I am not a midwife but I know how to render pregnancy care to my clients because of the app. – CHN, Ada East/West*

Change in confidence between baseline and endline surveys

% CHNs

Baseline   Endline

■ Confident in all skills
■ Confident but need to strengthen
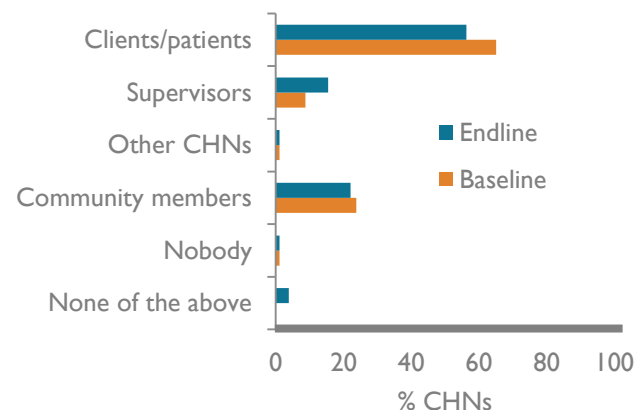■ Not skilled
■ None of the above

Respect

Results from the endline survey showed that CHNs were keen to earn the respect of others. In particular, they were keen on earning the respect of their clients. At baseline, 89% of CHNs reported that earning client and community members' respect was most important, compared with 79% at endline.

Earning the respect of their supervisors was also key. It was most important to only 9% of CHNs at baseline, compared with 16% at endline.
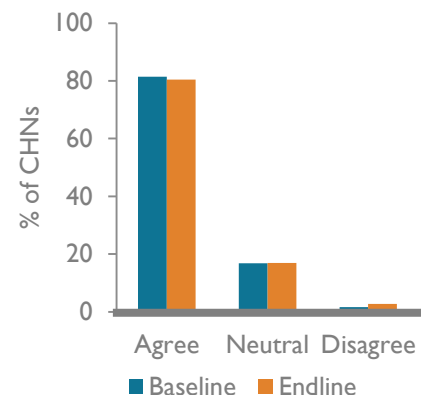
CHNs reported feeling more respected and encouraged by different groups after their use of the CHN on the Go app. More than 80% of CHNS felt respected by their clients at both time points.

Transparency resulted in supervisors encouraging and congratulating CHNs when they were doing well. Easy access to schedules, activities, and performance of CHNs helped eliminate doubt from supervisors on CHNs' roles. Clients also trusted the information they received and respected CHNs to a greater extent.

> *If they are doing well I **praise them**, and if they are not doing well, I see that you are not even reading these things at all, you will have to share it with them.* – Supervisor, Ningo Prampram

> *Yes it has given us much **respect** because it creates communication and assurance between us and the clients.* – CHN, Ada East/West

Person(s) from whom respect is most important to CHNs in their job

% CHNs

(Legend: Endline, Baseline. Categories: Clients/patients, Supervisors, Other CHNs, Community members, Nobody, None of the above)

CHNs feel respected by their clients

% of CHNs — Agree, Neutral, Disagree

(Legend: Baseline, Endline)

Recognition

The CHN on the Go app is a tool for supervisors to monitor how CHNs were performing – the learning courses they completed, the targets they met – and review their daily and weekly schedules including home visits, meetings for pregnant women and new mothers, child immunization camps, etc. Based on this information, supervisors recognized and acknowledged the work of CHNs and their achievements in many ways.

CHNs got recognized at group meetings and events held at the district level and at face-to-face meetings with their supervisor or at the district and subdistrict level WhatsApp groups. In some districts, the top performers were announced to all members in the WhatsApp group.

For material awards, one CHN reported that they were given t-shirts and saw this as a reward for their work and a motivation to continue doing well. Others, however, reported that they only received verbal recognition and that they did not receive any prize or award. CHNs in South Dayi and Ningo Prampram were offered prizes based on their performance.

CHNs consistently expressed two main needs from all levels of supervisors at the district and subdistrict levels as well as the in-charge at the lowest level: the first was to receive feedback on things they could improve on, and the second most-important thing their supervisors could do for them was provide encouragement when they did things well.

[When] we're able to exceed that target that we set, they applaud us for the good work that we did and it was ok, it was fun. And also recently we went for some interview on the learner's app and they gave us a certificate. So it shows that someone is looking at what you are doing and they will applaud you for that. – CHN, Ada

Emotional support

The CHN on the Go app helped CHNs by addressing their social and emotional needs. The app kept them connected with people outside of work. CHNs also called their family and friends and discussed their health with them.

> *It keeps you, it keeps you company and then it doesn't make you feel bored. –* CHN, Ningo Prampram

> *They [struggled],…adjustments, family connections, and all of those things were a bit of a challenge…[Now] they [can] connect to families. They [can] chat with friends. [They are] now connecting with people easily, not just people in their immediate environment but people outside their environment as well. –* Stakeholder, Accra

Time management

Time balancing is very important for CHNs to be able to do their work well, because they are involved in many activities. They have outreach, home visits, and trainings, so they have to plan accordingly. Different modules of the app contributed to better time management. by CHNs.

The Planner module helped CHNs in many ways. CHNs could plan their itinerary and activities, making them more efficient in their work. It enabled CHNs to go to work on time by providing a reminder for events such as outreach, home visits, child immunization or wellness visits, or meetings that they had to attend. These reminders were particularly important for when they visited their clients. As one CHN pointed out, if she missed a client, it was possible that they wouldn't meet for another month. The planner also gave them the ability to keep track of time they spend on each activity.

The app and WhatsApp enabled information sharing – for example, if an event was canceled, nurses knew before they went to the field and didn't have to waste time traveling to the event just to find out.

In addition, the phone acted as a means to provide easy access to health information, since they did not need to pack flipcharts and books to review, thus making them more efficient and saving them time. They used the Learning Center and Point of Care modules for reference and also the Internet to easily look up topics.

Since supervisors had access to CHNs' schedules and could communicate easily with them, they were aware of CHN activities and plans, resulting in better coordination.

*And the **Planner too reminds you**. It serves as an alarm for you to begin your work.* – CHN, Ningo Prampram

The Planner - it reminds you of the activities you have. And makes you plan your work too. - CHN, Ada East

Professional development

Professional development and career advancement were key needs expressed by CHNs. Supervisors were also keen on obtaining certificates and continuing to learn. While the app addressed some of these needs by encouraging learning and helping CHNs obtain their professional identification number (PIN) renewal by taking Learning Center courses, there was still a feeling of not having enough traditional career development opportunities.

Small overall decline in feeling of not having enough career advancement opportunities
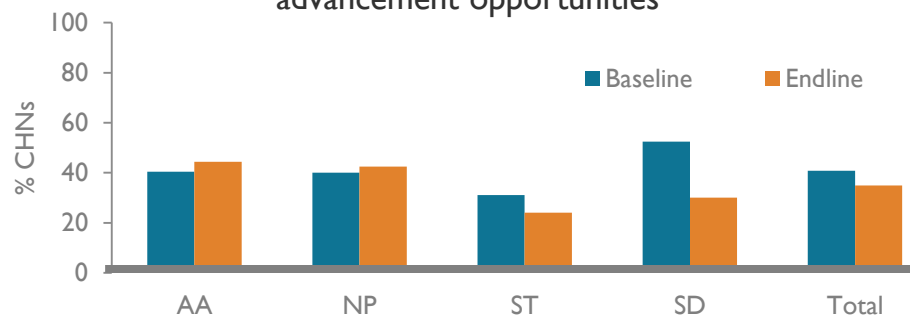
Results from the endline survey found that CHNs reported training as their greatest need.

CHNs reporting that they most needed/wanted more training to be happy working as a CHN at baseline, compared with 62% at endline

71%

CHNs actively looking for opportunities to strengthen their skills so they could be better at their job

95%

More than half wanted to be promoted to a public health nurse (PHN). However, although it was valued by CHNs and reported as useful, there were limits to CHNs' career advancement path and prospects or potential increase in salary.

Key drivers of motivation

Monitoring and supervision

Results from the baseline and endline surveys found that CHNs reported the need for improved supervision from their supervisors at different levels and continued to desire support from their supervisors at times of need.
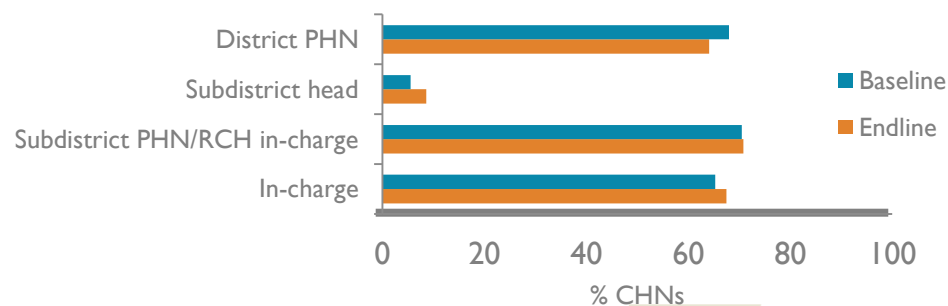
Different supervisors provided assistance to CHNs when they faced challenges as part of their job. Interaction with subdistrict heads was the least among the different types of supervisors. Though a greater role for the subdistrict head may have been anticipated, they only provided administrative approval for annual leave, ordering vaccines, etc. The critical persons providing support on a regular basis were the in-charge, the subdistrict PHN/ reproductive and child health (RCH) in-charge, and the district PHN.

While CHNs had this need for supervision, it is, however, important to note that the original purpose of the app was for supervisors to be up to date on CHNs' achievements in terms of their learning courses completed, events planned, and targets met. Based on this information, they would be in a better position to provide feedback on CHNs' performance. The app was not intended to assist with other supervision-related activities.

Main person from whom support is desired

Legend:
- CHPS in-charge
- Subdistrict-level staff
- District PHN
- Other CHNs
- Other
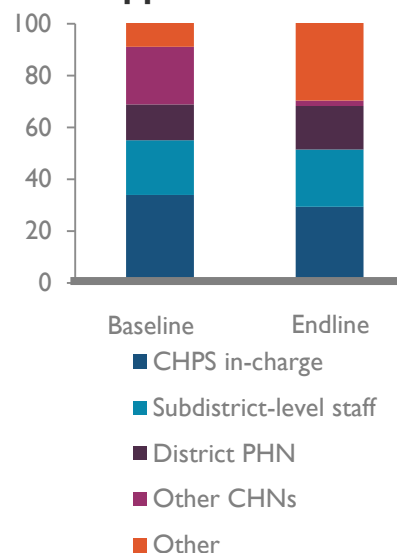
Supervisors contacted by CHNs for assistance

% CHNs

Legend:
- Baseline
- Endline

Monitoring and supervision

The surveys provided information on the frequency of contact with each type of supervisor regarding CHNs' performance. Most CHNs contacted their supervisors either daily, weekly, or monthly. Frequency of contact was greatest in the case of the subdistrict PHN/RCH in-charge and the district PHN, and it is possible the app was associated with the change in extent of contact.

Frequency of contact with different supervisors

By in-charge

By subdistrict head

By subdistrict PHN/RCH in-charge

By district PHN
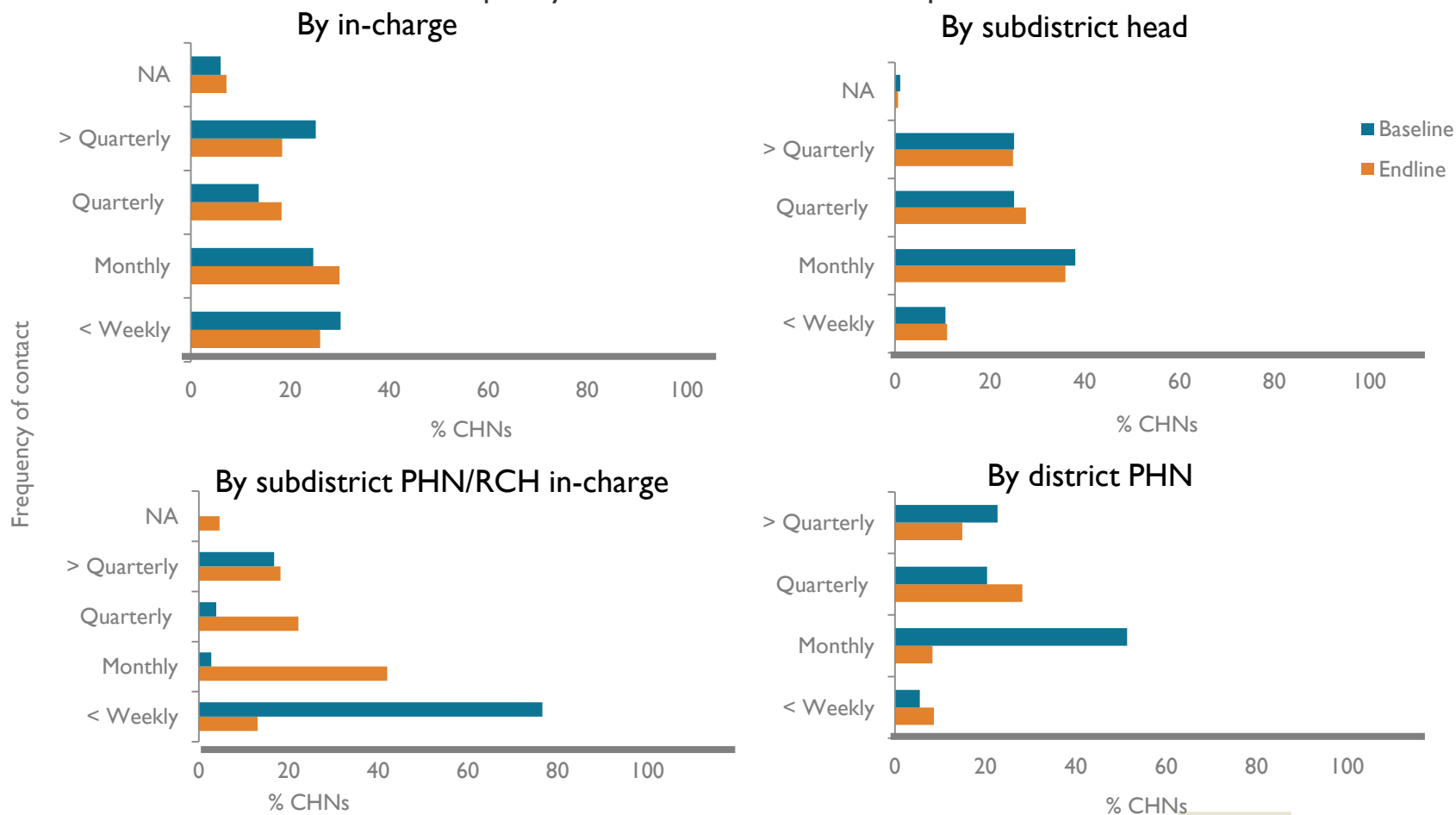
Monitoring and supervision

Data from qualitative interviews indicate that supervisors now have access to more up-to-date information on CHNs' events and activities on their tablets. They were able to assist more as a result, also communicating through WhatsApp.

Sometimes supervisors didn't always have the correct information.

Similar to the use of the CHN on the Go app, use of the Supervisor app fluctuated over time. Reasons for this may be data not always being synced properly with the server due to connectivity issues or continuous revisions that led to multiple iterations of the app throughout the project lifetime. It was first presented as a desktop program, then eventually a mobile app.

> *Maybe they will visit you once a month, or maybe for three months they have not been here. But with the phone, any information, every day they will know that maybe this is the place that you are supposed to be.*
> – CHN, Ningo Prampram

Use of the Supervisor App

Legend: Medium, Low, No use
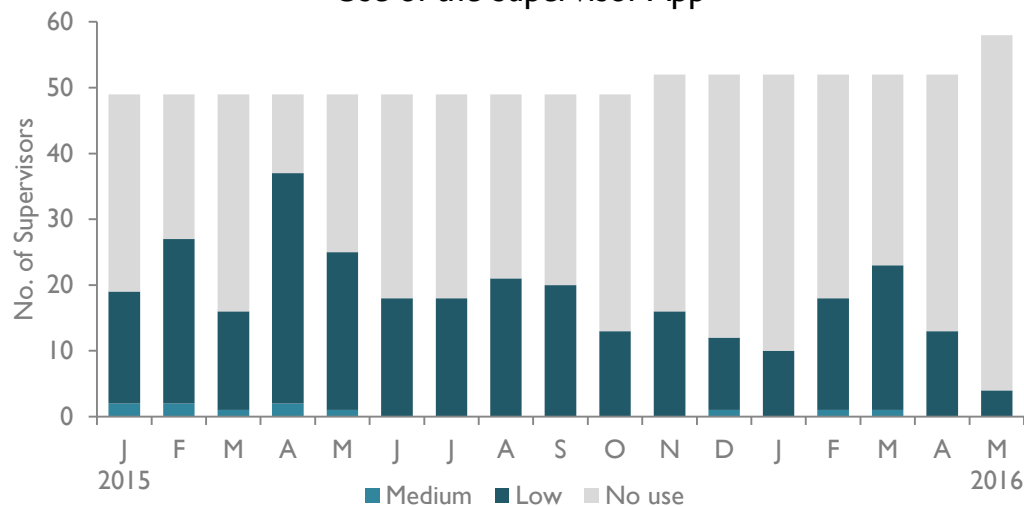
Communication and connectedness

In general, nurses felt connected to their supervisors and to their friends and family. WhatsApp facilitated this connection by acting as an efficient and inexpensive medium of easy communication. Some CHNs reported that they could get ahold of their supervisors easily using the phone or WhatsApp. CHNs also felt connected because supervisors could see what they were doing through the Supervisor app. They were able to discuss with their supervisors whatever was bothering them and have similar conversations with other CHNs as well.

People that CHNs communicated with:

| Supervisors | Peers | Grameen staff | Family and friends |

How: Via calls and WhatsApp including sharing of photos. Some mentioned face-to-face interaction, especially with their supervisors when they meet for feedback and updates.

About: Their work – if something new was happening or if there were any issues or concerns. They also sent their supervisors information on their activities, like their itineraries, courses they have been taking, targets met, etc.

Because we chat on the phone. They monitor the work I do, so I feel closer to them than formerly. – CHN, South Tongu
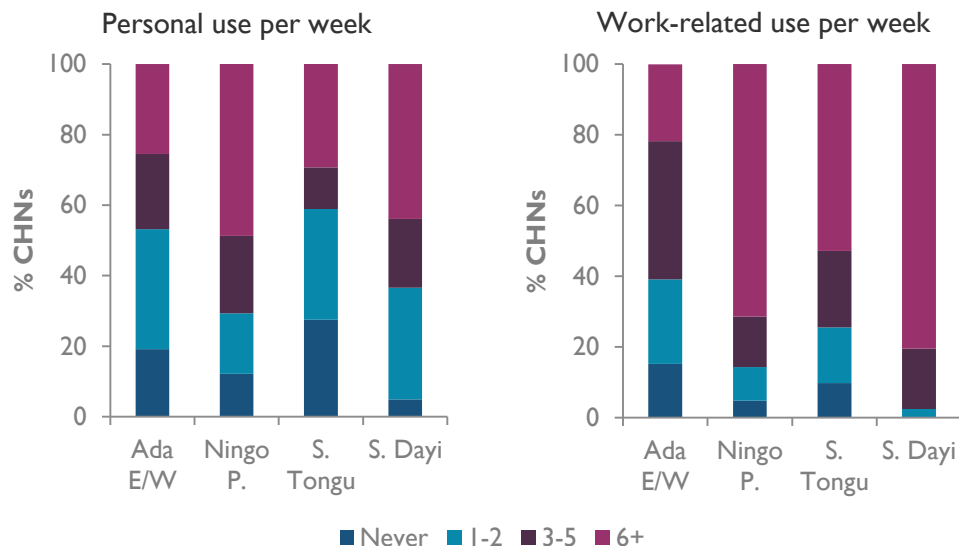
Communication and connectedness

CHNs were part of WhatsApp groups formed by Grameen or among themselves. The types of groups were:

- District
- Subdistrict level
- Personal/informal groups among CHNs

There was a lot of individual communication via WhatsApp as well.

Results from the endline survey indicated that while CHNs reported higher use of WhatsApp in South Dayi and Ningo Prampram, it was a widely used means of communication in all districts.

CHNs from South Dayi and Ningo Prampram used WhatsApp more often than the other two districts

Personal use per week

Work-related use per week

■ Never ■ 1-2 ■ 3-5 ■ 6+

Communication and connectedness

The majority of messages shared in WhatsApp groups were composed of jokes, stories about God or excerpts from the Bible, and games. The next most common messages were reminders about meetings and trainings.

WhatsApp built connections between all the groups of individuals engaged:

Created a sense of teamwork and camaraderie among CHNs. It also acted as an easy and effective means of information sharing on professional and technical topics.

Created greater trust and transparency with supervisors since they were aware of CHNs activities.

Clients were more confident, and clients were happier and trusted the information they received.

Other topics discussed in WhatsApp groups:

- Communiques from national level such as salaries and allowances
- Report submission deadlines
- Targets and issues on meeting targets
- Professional advancement opportunities
- General health information such as announcement of outbreaks
- Free services (free surgeries, eye screenings, etc.)
- CCH App updates (new downloads, reminders to complete courses, etc.)

Subdistrict WhatsApp groups often had shorter conversations than district-level groups because topics were very similar and most messages were repeated.

Other influencers

Some influencers of job satisfaction/motivation are beyond the scope of the CCH project. However, CHNs continued to value their work despite these constraints:

- Over the 2 years of program implementation, CHNs became used to the phone. Although it was popular with CHNs, only some were willing to spend their own funds toward credit.

- The phone and network issues faced in the early stages of the project are not as much of a concern any longer.

- Results from the baseline and endline surveys found that:
  - Although a majority of CHNs felt that they were not paid fairly, there was an increase in the percentage of CHNs who did not feel their pay was a concern (17% to 23%).
  - Although the CCH project did not influence factors such as transport or commodities, there was a decline in the feeling of not having enough resources. The availability of the CCH phone for CHN's use could have been a contributing factor to this decline.

Decline in feeling of not having enough resources to do their job (transport, commodities, phones, for example)
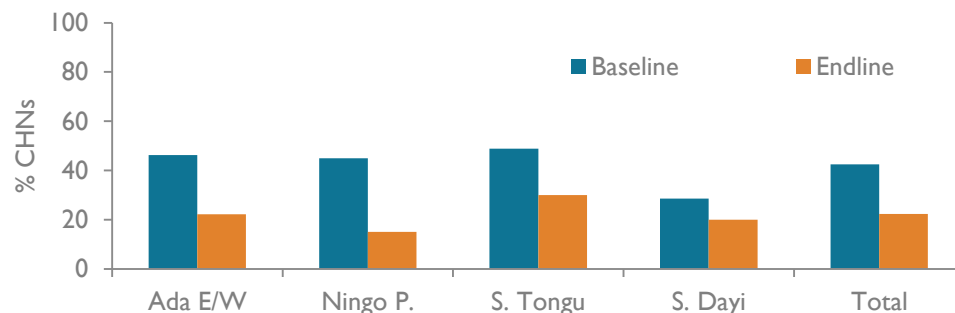
Was the CCH project effective?

CCH phone usage

- By the end of the project, more than 300 CHNs and their supervisors had been trained to use the app. Training was also provided to staff at the national level (Ghana Health Service [GHS] Family Health Division, Human Resources and Policy Planning Monitoring and Evaluation [PPME] departments), as well as the regional/district health management teams.

- CHNs **valued** CCH and the CHN on the Go app despite some difficulties faced. Overall, CHNs were very keen on continuing to use the app. They saw the benefit in the different modules that met their different needs.

- Supervisors also recognized the **benefit of the app in general,** and the Supervisor app in particular**.**

- Point of Care and Learning Center were **more popular than other modules.**

- WhatsApp was a particularly **useful mechanism for communication.**

- **Monthly usage data were inconsistent and did not always support CHNs' and supervisors' responses.** However, it is important to note reasons for inconsistency in app usage (lack of guidance and standards for app use, saturation in knowledge, for example).

- With regard to long-term use, CHNs expressed interest in continuing to use the app – in both the current implementation districts as well as in neighboring districts. GHS has offered support to scale up the project to other districts, using CHNs' personal phones, especially in the Volta region.

Effect on motivation and job satisfaction

Data from the baseline and endline indicate that there were changes in overall job satisfaction levels among CHNs but not as high as expected:

5% increase in satisfaction over time in younger (<30 years old) CHNs compared with no change in older (>30 years old) CHNs

4% increase in satisfaction over time in both CHPS and health center CHNs

94% said the app met their needs

When motivation is broken down into the extrinsic and intrinsic factors, particularly into the various components of motivation, results show that the app addressed various needs of CHNs and supervisors:

- *It worked as a job aide for CHNs (work planning, knowledge, communication).*
- *It worked as a job aide for supervisors (communication, monitoring and supervision).*
- *It helped CHNs gain confidence; gain respect and recognition from colleagues, supervisors, and clients; and receive emotional support.*

Overall, CHNs liked the app, used it, and valued it. While app use made many improvements to their personal and work lives, their association of app use with increased motivation is not always clear. CHNs and supervisors both considered the app to be very useful to help them in their work. They also valued the communication component of WhatsApp.

Program implementation

- **CCH design** with **user input** in mind

  - The CCH project was conceived initially to address the isolation of CHNs but was broadened to focus on CHNs' motivation and job satisfaction after an intensive design thinking process to identify all the needs of CHNs. It then used a very interactive approach with continuous user input to design the app. As a result, the final version of the app that was to be developed was much more complex than what was originally conceived. It covered multiple modules addressing very different aspects.

- **Complex app design** resulting in **extended time frame** for perfecting and testing the fit of the app

  - Developing the app also turned out to be much more complex and time-intensive than initially planned. The first version of the app was quite basic in comparison with the final version of the app. With five versions of the app, modifications to the app were made at regular intervals based on user input and needs of district-level GHS staff right up to the last few months of program implementation. CHNs and supervisors were trained at multiple time points with many refresher trainings to ensure that they were comfortable with all updates.

- **Variations in monthly usage**

  - The usage of different modules of the app varied by month as a result because of the changes made, how the CHNs understood the apps at each stage of development, usefulness of the different versions of the modules developed at each stage, and technical issues with the phone and the network.

- Predominant **focus on app development**

  - With the user-centered design of the CCH project, the project mainly focused on app development and how it met their needs. There was some focus on stakeholder input but predominantly at the district level at the initial stages. Although supervision was not the original intent of the app, the final version did have a Supervisor app, and its effectiveness would have been greater if there had been a better understanding of the health system and roles and needs of supervisors.

Challenges with the app

- There may be technical challenges when scale-up is planned. The app does not work optimally on all devices. It has some requirements for Android version and device hardware. There are network connectivity problems sometimes in using, sending, and syncing data.

- Scale-up may also be challenging since the app has many modules which are quite different from each other, and there may be technical issues. Moreover, CHNs and supervisors will need to be trained more than once to make sure they are comfortable with the use of all modules of the app.

- Lack of benchmarks for use

  - No benchmarks/standards were set for the optimal/minimal level of use of the CCH phone and app expected of users. CHNs used the app based on their need. For example, there was no requirement for CHNs to complete a set number of courses every month. Also, while some CHNs updated their Planner with activities every week, some did it less frequently. Although CHNs may have updated the Planner only once or twice a month, they received automatic reminders from the phone which helped them perform their job. However, these reminders from the phone did not get logged in as usage of the app. As a result, it was very challenging for the project to measure success.

- Likelihood of decline in use over time

  - It is also very hard to determine optimal use in the case of apps of this nature where use may decline naturally over time. For example, when CHNs are familiar with the content in the Point of Care module, they may not need to use it every time. The use of the Learning Center is also influenced by the number of courses available.

- Continuity challenges because of turnover of CHNs and supervisors

- In terms of motivation, the app was NOT designed to address issues and concerns of CHNs related to logistics, transportation, salary, etc., which are systemic factors that make their work challenging and negatively influence their motivation to perform.

Sustainability and role of stakeholders

The Grameen Foundation and Innovations for MNCH teams in Ghana made considerable effort to obtain buy-in at all levels of the GHS.

Stakeholders at the national, regional, and district levels were engaged and are very supportive of the CHN on the Go app and its use going forward. The project has collaborated closely with GHS divisions (family health, policy planning monitoring and evaluation, human resources, information and communications technology). While the district and regional directors were actively involved, buy-in from the national level, however, was obtained only at a later stage of the project. The Volta GHS regional director in particular has encouraged regional scale-up for all districts.

The teams made considerable effort to link with the education system for nurses, for example with health schools such as the University of Health and Allied Sciences for distance learning and the Nursing and Midwifery Council to provide accreditation for courses and PIN renewal by CHNs. This linkage is beneficial to CHNs as well as to the GHS in general and ensures continued use of the app.

Overall, the GHS sees a lot of value in the CHN on the Go app, and the government is committed to absorb future server costs to ensure sustainability of the app in all districts.

Stakeholder concerns

National-level stakeholders expressed an interest in the need for their involvement from the very beginning of the project. The project had extended emphasis on app development in the early stages of the project, without as much focus on stakeholder involvement

There was also a disconnect in the understanding of the objectives and utility of the app among some stakeholders. While the focus of the app has been on CHN motivation, GHS is more focused on improved service delivery and quality of care. Extensions of the use of the app will need to take this into account.

> *[S]ustainability should start from the beginning, the phase-out how is it going to be…so that we know that in two years or two and a half years or whatever, we will have reached the end. By that time all the phases would have been incorporated into our plans and budget and all that.* – Stakeholder, Accra

Recommendations

How to make the app most effective

Components of the app can be marketed separately
- In terms of scale-up, the app does not have to necessarily be marketed as a package. Since each module functions independently (except for the Achievement Center and its linkage to the Planner and Learning Center) and addresses different needs of CHNs, individual modules of the app can be scaled up separately.

Need to periodically update the app's health content (Point of Care and Learning Center)
- Updating this content on a regular basis will ensure that there is an e-learning center for continuous development of CHNs and all cadres of health workers.
- Guidelines for use of the app in terms of frequency of use may also be provided to CHNs in advance so that expectations for use are clear for maximum effectiveness.

Key to recognize that the app does not work in isolation to address challenges faced by CHNs
- In order to make the app most effective, it is critical to understand the role of CHNs in the context of the health system they function in and the need to make changes in the health system for maximum benefit. In order to do so, it is critical that there is ownership by all stakeholders, especially the government.

Need to focus on the national level when scaling up the intervention to help with ownership and pace of uptake.
- CCH was implemented in the districts through a bottom-up approach, engaging first with district-level stakeholders. Future scale-up in other contexts will be more effective when national stakeholders recognize at an early stage the need for the app and the purpose it serves. This would be possible if a good prototype of the final product is available in the early stages to ensure buy-in from all necessary stakeholders.

Develop the Supervisor app
- The role of supervisors is very important in the work and role of CHNs, since both groups work closely together and supervision has a large role to play in influencing CHNs motivation. It is therefore important to place a greater emphasis on supervision and understanding its role in CHNs' performance much earlier in the process of app deployment.
- The Supervisor app can be developed further to act as a monitoring tool for the GHS and to obtain necessary information directly from CHNs to meet performance measurement needs.

THANK YOU!