HKI Senegal: Pilot Project Vitamin A Supplementation from 6 Months

Part I: Introduction to mHealth

Worldwide cell phone coverage is growing at unprecedented speeds, with more than 6 billion unique users. In the past few years huge strides have been made to take advantage of vastly improved telecommunications networks in the developing world. Moreover, cell phones provide access to individuals who live in remote areas, often off the electric grid. In reaction to this new technological climate the field of mHealth has emerged, short for mobile health. In a World Health Organization study on mobile health, 93 countries had at least one active project in place[1]. The scope of activities involved have taken many forms, from SMS communications, to mobile applications, to full-scale service delivery products targeted at community health workers and health systems. The implications for this technology expand beyond simple communication because they provide a new method of collecting beneficiary data, mobilizing individuals, and monitoring services in real time. The next challenge is to build tools to effectively analyze this data to improve service delivery and conduct rigorous evaluations of health services. The emerging question is no longer if, but how, mobile health will digitize the landscape of public health.

Several mobile health initiatives have already been piloted by Helen Keller International. A 5 year project in Nepal worked to procure a massive amount of data using personal digital assistants (PDAs) collecting more than a million unique records. In Tanzania, mobile phones were used in household level surveys to gather qualitative observations of daily behaviors relevant to nutrition. In Kenya, SMS services have been used in maternal and child health projects. HKI worked in partnership with local telecommunications partners to send mass awareness text messages to all of the users to notify individuals of upcoming events. Most recently in Ivory Coast, mobile health has been used to introduce reminders to mothers concerning Vitamin A supplementation from 6 months. Furthermore, HKI-Ivory Coast has developed a partnership with the Ministry of Health to develop an online database to improve the monitoring of nutrition projects in the country. These pilot studies have shown great promise, but many questions remain before these projects can be scaled to a national level. Amongst this growing list of projects, HKI-Senegal decided to take on a mHealth research study of its own.

Part II: Context of Pilot in Vitamin A Supplementation from 6 months

Presently, Vitamin A supplementation in Senegal is carried out through bi-annual child health days that act as a nationwide mass mobilization for the supplementation of all children ages 6-59 months. This strategy ensures an elevated coverage of children less than five years of age. However, the six month period between mass campaigns causes many

[1] *mHealth: New horizons for health through mobile technologies.* Switzerland: World Health Organization (2011).

children to wait long after 6 months of age to receive their first dose, with many not receiving any supplementation until 7-11 months. In Senegal, Vitamin A deficiency in children has been measured at 17.1%[2]. Given the critical importance of Vitamin A in the protection of children's sight, ability to fight off infections and more generally their survival, Helen Keller International –Senegal has designed a multi-faceted strategy to overcome the programmatic limits of these mass campaigns and provide supplementation in the routine setting.

Primary Objective: To improve the availability of Vitamin A supplementation coverage in the routine setting through the promotion of Vitamin A supplementation at 6 months.

Secondary Objective: To study the effectiveness of SMS monitoring and evaluation strategies in improving the service delivery of a proven nutritional intervention.

Why SMS: The purpose of deploying SMS monitoring and evaluation is to introduce real time feedback into project management. The SMS strategies designed for this project can result in the development of both quantitative and qualitative data. SMS communications provide data that is as reliable as paper data entry, while introducing time and cost efficiencies. SMS strategies can be used to improve: the targeting of mothers, the engagement of the community health worker with local beneficiaries, provide data-driven performance feedback, and enhance the accountability in stock management and service provision.

Part III: Project Strategy of Pilot for Vitamin A Supplementation from 6 months

In Senegal, Vitamin A supplementation in the routine setting is very weak: 8% for sick visits, 12% for visits to weigh the child, and 15% for vaccination visits (HKI, USAID, 2005)[3]**.** To improve coverage of Vitamin A supplementation in this setting, a package of traditional and innovative strategies were designed to improve both ***Demand*** and ***Supply*** of the service.

Demand. This project seeks to build an active demand at the community level for Vitamin A supplementation outside of the mass campaign setting using three strategies:

1. The introduction of a Ministry of Health approved *child health card* that includes a 6-month supplementation check-point.
2. *Social mobilization activities* that include local radio announcements, community workshops and health promotion from community health workers
3. The *ReminderSMS* program will invite targeted mothers to their local health post once her child reaches 6 months. This system uses mother's cell phones as a new medium for direct communication with community health workers

(See Appendix 1 for Logic Circuit)

*Supply***.** In order to assure quality service provision, stock of vitamin A capsules needs to be *readily available* and *regularly monitored* to avoid shortages. All the initial stuck supplies will be provided by Helen Keller International, and put in place after the district level

---

[2] MI, COSFAM. (2010). *Situation de base du statut en vitamine A, en fer et en zinc chez les femmes en age de procreer (15-19 Ans) dans le cadre du programme de fortification des aliments en micronutriments au Senegal .* Dakar: Laboratoire Du Nutrition.

[3] HKI. (2005). *Enquete rapide de couverture des Journees Locales de Supplementation en Vitamine A au Senegal.* Dakar: Helen Keller International, USAID.

census determines the size of the target group. Monitoring of supply will be managed through two SMS strategies.

1. Introduction of stock monitoring tools, that use a paper register of the census created for each health post to allow health posts to identify, track and follow-up with the targeted child, verify supplementation, and treat vitamin A capsules as essential medicine.
2. The *StockSMS* program will go a step further, and require weekly reporting of vitamin A capsules. This program will facilitate real-time monitoring of stock to reduce outages and ensure rapid replenishment. This tool is designed to report the receipt of stock in a string of variables entered in a predefined order within a single SMS. The report will arrive as a single SMS with 5 data points:
    1) Health post id
    2) Initial stock supply
    3) End stock
    4) Number of patients supplemented
    5) Stock request.

    (See Appendix 2 for Logic Circuit)

Part IV: Realizing the SMS Strategy

This section will introduce: the fundamental tools of the SMS strategy, the design and implementation of the district level census that will provide the core data for SMS communications and the SMS product Telerivet. Finally, several key challenges will be identified.

A. Key Inputs:

- Reliable phone network
- Census: all children aged 0-6 months with phone number contacts
- Partnership with Telecommunications Providers:
    - Orange, Tigo, and Expresso
- Hardware:
    - Samsung Android Phone (used for project management for each district)
    - Basic Samsung phone (at level of the health post).
    - Orange SIM Card

B. Census of children aged 0 to 6 months

In order to carry out an effective SMS strategy, a phone number needs to be collected for all the children targeted by the intervention. In order to accomplish this task a district-wide census will be introduced in all three intervention zones.

The census will take place over 5 days and will be conducted by community health workers in the district. Supervision of the census will be managed by the district and specifically by ICP responsible for each CHW.

In order to maximize the success of SMS communications, two contacts will be collected for each child aged 0-6 months in the district. Each of these contact points will also provide their name, their relation to the child, and the availability of their phone. The data-entry of this information will serve as the foundation for the SMS data repository.

Moreover, the census will serve as the initial point of contact with the target demographic and the CHW will be responsible for explaining the objective of the project,

how the project will use the phone number, when the mother will be contacted and what to do once they receive an SMS. This communication is critical to provide context to the end user, especially in cases where the recipient has a low level of literacy. It is also essential for the CHW to establish a precise address for the household in case the CHW must follow up directly with the household.

C. SMS Software: Telerivet

The selection of a mobile health product for this project was an extensive process the considered more than 6 software products. Each product offered unique capacities and drawbacks. In the selection process it was important to consider the specific needs of this project. The selection criteria were as follows:

- Able to send SMS and create automatically trigger outgoing messages
- Able to send and receive messages using simple mobile phones
- Able to reimburse the cost of text messages received at central server.
- Cost of basic service
- Availability of technical support

Several products had more elaborate features that would be very relevant for project in survey data collection (EpiSurveyor, FormHub, CommCare). However, the strategies outlined in this project are exclusively SMS communications. The use of RapidSMS required advanced programming competency. While, FrontlineSMS had negative feedback after several experience of unreliable data service.

Telerivet is a SMS product used in a variety of sectors from public health to mobile banking, agriculture, and education. The platform is the for-profit entity of EnvayaSMS and is chiefly devoted to SMS communications. The platform works by using a mobile application installed on an Android phone that sends and receives SMS messages locally, in country. The Android phone must stay connected to the internet in order for messages to be transferred. Once a message is received to the phone, the message is then pushed to the cloud and available to all the account users.

The Telerivet platform is user friendly and allows for the management of numerous projects, log-in accounts, and cell phones. Additionally booster packages, extra copies of the EnvayaSMS mobile application allow the server to increase the SMS/hour capacity, set at 100 messages per hour, per application. To avoid lapses in service, the product has the added assurance of technical redundancy, with servers in the UK and the U.S. The platform has a “rules engine” that allows users to build automatic replies.

Telerivet is a pay as you go service with no contract. Accounts can be established at one of three cost tiers: basic, silver and gold. The gold service will be used for this project and costs $25 dollars a week. The services included in this package are: ability to use up to 25 mobile phones, unlimited messages, unlimited contacts, 25 Telerivet user accounts, 500,000 API requests per day. Most importantly, the gold plan provides priority support from Telerivet developers who are accessible by Skype to answer questions and offer advanced technical support[4]. Additionally, each message sent through the Telerivet system is charged a fee of 1 cent per message.

D. Key Obstacles to Success:

- Managing a central repository of data in a secure, sensitive and ethical manner while remaining transparent to all levels of the health system.
- Potential for disruption of data due to limits in connectivity and power shortages in remote areas, and the possibility of intermittent service.
- Capacity of beneficiaries especially in relation to accessibility of mobile phones, the availability of the phones, and the barrier of illiteracy.
- Capacity of health system including the capacity of community health workers, cooperation with local health district, transparency of activities, adherence to reporting protocols.

Part V: Indicators for Evaluating Impact:

The evaluation of project will come into two phases, first using SMS feedback during the intervention and second using baseline and final evaluation to measure the impact of the package of activities introduced by the introduction.

First, the data collected through the SMS activity can also be analyzed to produce meaningful conclusions. Fundamentally, SMS communications allow project implementers to gather real-time feedback about their intervention. For this reason, it is important to establish quantitative and qualitative feedback about the impact, success, obstacles and lessons learned and respond to them during the implementation to adapt to realities on the ground.

Indicators that can be collected directly using SMS reporting:

- *Stock SMS*
    - Regularity of stock reporting
    - Number of successful stock replenishments
    - Number of stock outages recorded via SMS reporting
    - Open ended feedback from health post
- *Reminder SMS*
    - Number of SMS sent per reminder cycle
    - Percentage and Number of Positive Reports of Supplementation
    - Analysis of age of child supplemented (how many days after 6 months)
    - Number of cases were SMS was not received
    - Number of cases escalated to HKI/ District Focal Point

Monthly reports will be generated to measure the effectiveness of all of the health actors engaged in the intervention, as well as data-driven supervision of low performing actors.

[4] For more information please go to: https://telerivet.com/

Second, a baseline and final evaluation will be conducted in six districts (3 intervention, 3 control) to establish the coverage of Vitamin A supplementation in the routine setting and measure the impact of the 4 months of intervention activities. These studies will target mothers of children aged 7-10 months, at least 5 months after the previous mass campaign. This age range includes all the children born before the last mass campaign, who had not yet reached 6 months and who will be targeted during the intervention period. The questionnaire will be administered in 30 clusters in each district, and the survey will be conducted in 7 households per cluster. A total of 210 households per district will be interviewed. The questionnaire will also ask the following questions to gather information about the impact of the intervention:

- The mother will be asked questions about if their child has received Vitamin A supplementation:
    - Where the child was supplemented (health post, household…)
    - In what month, and specifically what precise date did the child receive their dose (the date of supplementation can be verified using the health card introduced during the intervention)
    - What context the child was supplemented in (vaccination, weigh…)
- The mother will also be asked questions to judge her understanding of the benefits of vitamin A
    - If she has heard about the importance of Vitamin A outside of mass campaign activities
    - How she received information about Vitamin A
    - If she would recommend Vitamin A supplementation to another mother

This baseline and final evaluation will allow us to determine the raw number of children reached and the percentage of children who were reached in the routine setting. The questionnaire will also be useful in determining which methods of communication were the most effective during the intervention.

Part VI: Training and Selection of Health Workers

Head of Health Post (Infirmiere Chef de Poste)

The core responsibility of the ICP is to provide weekly transparency into the stock levels of Vitamin A capsules in their health post. Each health post will have a simple Samsung phone distributed to them at the beginning of the intervention, along with monitoring tools and phone credit. In Senegal, the primary obstacle in routine Vitamin A supplementation is a lack of stock. This activity is critical to the success of the project.

Each health post will have a monitoring and evaluation booklet issued to them at the beginning of the project. In this booklet there will be a memo explaining: I. the objectives of the project, II. a step by step how-to guide on how to complete both SMS strategies, III. a copy of the stock monitoring sheet for each week of the intervention, IV. a manual on proper protocols of vitamin A administration. These monitoring tools will facilitate the SMS stock report, and avoid inaccuracy in measuring the number of cases of supplementation per week.

Each week a reminder will be sent to the ICP to complete their stock report. Using a single SMS the ICP will send a string of variables identifying: **1.** The health post identification number, **2.** The initial stock of Vitamin A, **3**. The final stock of Vitamin A, **4.** The number of cases of supplementation, **5.** A request for more stock. If stock levels fall

below a reserve level of 20 pills, a replenishment of stock will be automatically triggered. The reserve level can be adjusted based on the size of the health posts.

If a report is not submitted within 4 days of the reminder the case will be escalated to the SMS focal point in the district. If there are repeated failures to report they will become targeted cases during the following month of supervision. ICP's will also be invited to provide unstructured feedback about their needs concerning the project. This will also us to quickly accommodate limitations and make adjustments as necessary.

Community Health Worker (Relais)

It is critical to establish firm selection criteria for community health workers to assure that all the actors selected have a minimum level of education, not only for the purposes of SMS, but for the successful communication of nutritional objectives. The following are the criteria for the selection of community health workers:

1. Middle school diploma
2. Able to read and write French
3. Experience with Mass Campaigns and/or Vitamin A
4. Owner of mobile phone
5. Availability for work during the 4 months of intervention

The core responsibility of the community health worker (CHW) is to promote the mobilization of their community to come to their local health post from 6 months. Using the results from the census collected in December, each health post will be responsible for providing an SMS report on the status of each baby after they reach 6 months of age. All these children will be contacted by SMS, and the responsible CHW will be copied on the message. After one week, the CHW will be sent a message prompting them to report on the patient concerned. If the SMS reminder did not result in a supplementation, the CHW will go directly to the house to follow up with the child. The CHW is responsible to send a report to the central server so that a second reminder can be sent to both phone numbers collected during the census.

An incomplete report will be escalated to the SMS focal point 4 days after they receive their report reminder.

The training for the intervention will be based around 4 major themes:

1. *Technical materials for health posts:* Health Cards, Monitoring tools, Posters and Brochures
2. *Communications via media:* content of community radio emissions
3. *Communication for social mobilization:* standards of communication and how to facilitate the organization and implementation of community workshops.
4. *Communications by SMS:* interactive training on the use of mobile phones and the two strategies of the intervention: stockSMS and reminderSMS.

Part VII: Supervision of Pilot Project

Supervision by SMS Contact Point

Supervision at the local level is critical to ensure compliance with the SMS strategies, as they will serve as our primary channel to access our community. This contact point will have complete training on the Telerivet system and benefit from constant support of HKI staff. Each intervention district will have a local SMS Contact Point selected during the planning phases of the project: The candidate selected will:

1) demonstrate technological competence
2) possess a mobile phone
3) have an active e-mail address
4) present clear motivation towards the project objectives
5) demonstrate a solid grasp of nutritional objectives.

These contact points will be in regular contact with the HKI team and will be responsible for all cases that are escalated to supervision. The android phone that will act as a server for the project will be installed in Dakar to avoid delays in the transmission of data due to connectivity. Therefore, all three contact points will be issued a wireless internet key to ensure access to the central server, to update information, follow up on data collection, and be notified of escalated cases. Additionally, the SMS contact point will be motivated 10,000 CFA for their time and provided 2,500 CFA in telephone credit, and 1,000 CFA in internet credit each week.

Supervision at the central level will take place in two forms:

First, monthly supervision will be conducted in co-operation with the Ministry of Health, a designated contact point in the medical region, and the designated contact point at the district level. This team will follow up on the activities directly at the health post and include site visits to beneficiaries to document the activities on the ground. Furthermore, group meetings of ICP's and CHW's will be planned to collect information about the realities of the intervention.

Second, focus groups will be conducted at two points during the four months of intervention in two sessions. Both the head of the health post (responsible for stock reports) and community health workers (responsible for follow-up to reminder messages) will be organized in order to gather qualitative feedback, foster dialogue about obstacles encountered, distill lessons learned and provide an opportunity to reinforce best practices.

Supervision by the Ethics Committee

This project has received official approval from the Ethics Committee of Senegal. In coherence with Ministry requirements, the Ethic Committee will conduct independent supervision of the project following the baseline and final evaluations.

Part VII: Next Steps

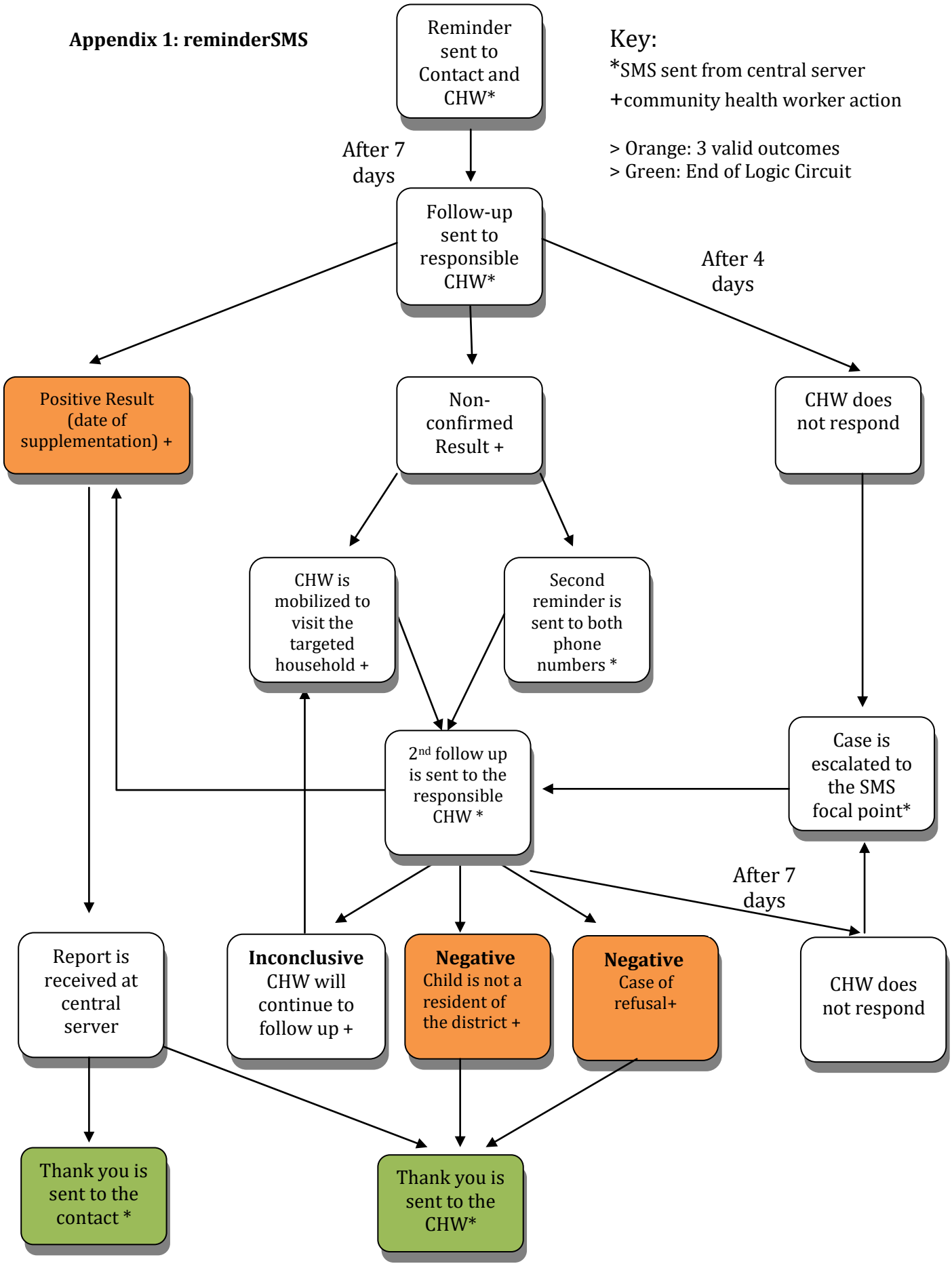
1. Share SMS communication model and results with the Ministry of Health of Senegal, Ethics Committee of Senegal, the administration on Nutritional Services and Child Survival of Senegal (DANSE) as well as local level project partners.
2. Apply the lessons of this intervention for scaling up other nutrition projects within Helen Keller International.
3. Share conclusions through a final report, scientific article and presentations at industry conferences.
4. Assess effectiveness of tools and training materials developed during the pilot.

For further information please contact:

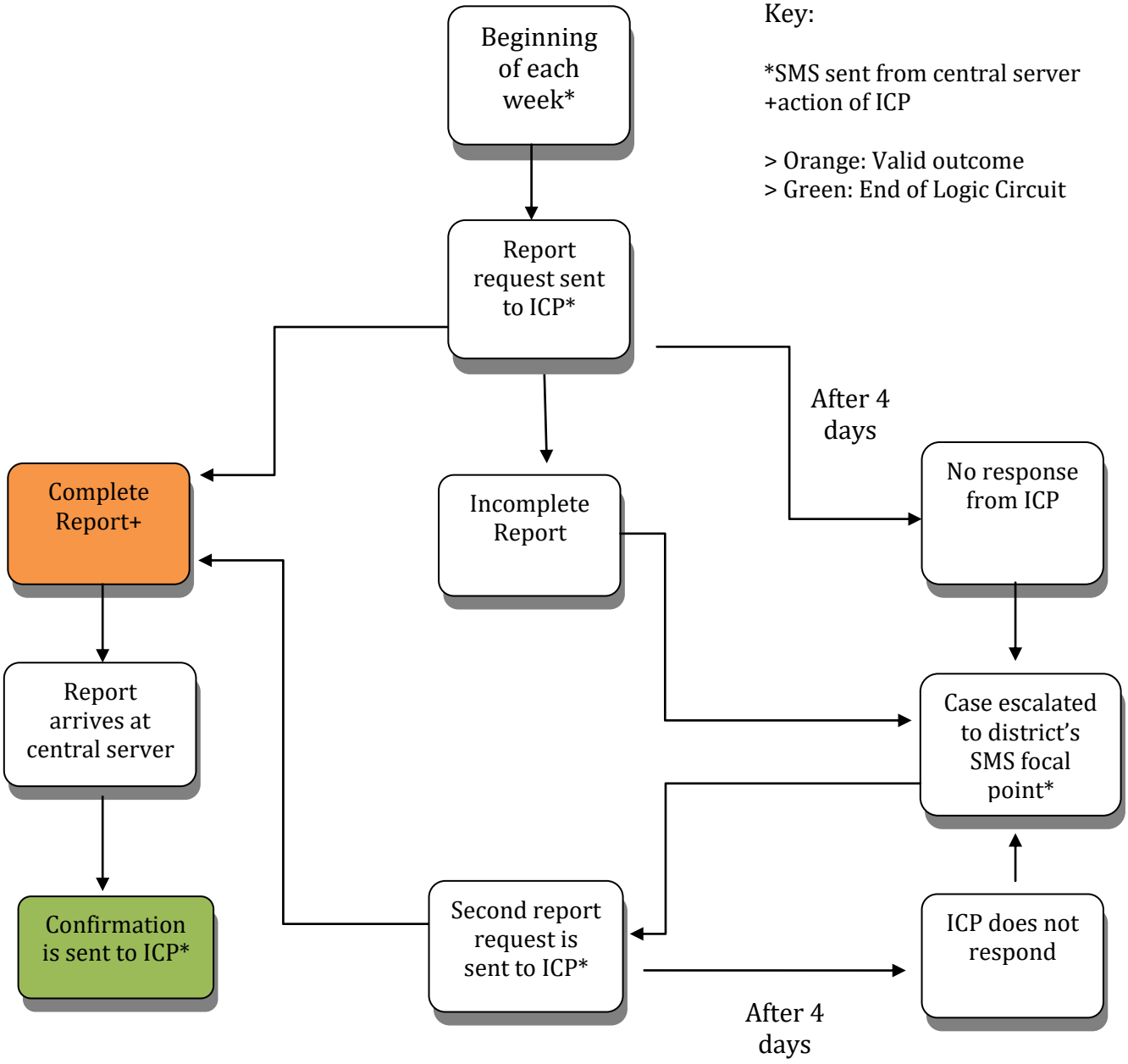
Amy Cooper

HKI-Senegal
acooper@hki.org

Appendix 1: reminderSMS



Appendix 2: stockSMS



Appendix 3: Plan of Action

PLAN OF ACTION FOR THE PILOT PROJECT: VITAMINE A SUPPLEMENTATION FROM 6 MONTHS										
	PHASE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
1	PLANNING/ ORGANISATION/ INFORMATION	■								
2	ORGANISTATION OF BASELINE EVALUATION		■							
3	BASELINE EVALUATION IN 6 DISTRICTS		■	■						
4	CENSUS IN 3 DISTRICTS FOR THE PILOT			■						
5	DISTRIBUTION OF SUPPLIES FOR INTERVENTION IN 3 DISTRICTS				■					
6	PILOT ACTIVITIES DURING 4 MONTHS					■	■	■	■	
7	MONITORING AND EVALUATION OF PILOT					■	■	■	■	
8	FINAL EVALUATION								■	■
9	DOCUMENTATION OF PILOT									■
10	PRESENTATION OF RESULTS									■

Appendix 4: Global Budget

GLOBAL BUDGET FOR THE PILOT OF SUPPLEMENTATION OF VITAMINE A FROM 6 MONTHS		
	PHASE	**Sub Total (CFA)**
1	PLANNING/ ORGANISATION/ INFORMATION	322,500
2	ORGANISTATION OF BASELINE EVALUATION	2,186,850
3	BASELINE EVALUATION IN 6 DISTRICTS	10,048,300
4	CENSUS IN 3 DISTRICTS FOR THE PILOT	8,167,500
5	DISTRIBUTION OF SUPPLIES FOR INTERVENTION IN 3 DISTRICTS	4,239,500
6	PILOT ACTIVITIES DURING 4 MONTHS	25,826,600
7	MONITORING AND EVALUATION OF PILOT	9,391,000
8	FINAL EVALUATION	7,549,300
9	DOCUMENTATION OF PILOT	645,000
10	PRESENTATION OF RESULTS	860,000
TOTAL COST OF ACTIVITES FOR THE PILOT		**69236550**

$138,473.00

APPENDIX 5: BUDGET FOR THE SMS INTERVENTION

This budget establishes the expected expenses in the 3 intervention zones: Mbacke, Thionck Essyl and Dakar
Currency Conversion $1 = 500 CFA

1: Core Costs des Activities				Number	Price per unit	Weeks	Month	Sub Total	
1.1	HKI	SMS Product: Telerivet	Subscription	1	12500	4	4	200000	969000
			Cost SMS	50000	5	1	1	250000	
		Telephone	Android	6	60000	1	1	360000	
		Telephone	SIM Card	6	1500	1	1	9000	
		Solar Net book		1	150000	1	1	150000	
1.2	District	Point Focal SMS		3	10000	4	4	480000	708000
		Internet Key		3	20000	1	1	60000	
		Internet Credit		3	1000	4	4	48000	
		Telephone Credit		3	2500	4	4	120000	
2: Training on the activities of the intervention				Number	Price per unit	Weeks	Month	Sub Total	
2.1	Training of Head of Health Post in 3 Districts	Per Diem Head of Health Post (ICP)		51	5000	1	1	255,000	1,709,500
		Coffee Break		55	5000	1	1	275,000	
		Welcome Package		51	1500	1	1	76,500	
		Per Diem Medical Region		1	22,500	1	3	67,500	
		Per Diem District Level		1	7500	1	3	22,500	
		Per Diem for Facilitation		1	10000	1	3	30,000	
		HKI		3	15000	1	3	135,000	
		Simple Cell Phone		51	12000	1	1	612,000	
		SIM Card (Orange)		51	1500	1	3	229,500	
		Telephone Credit (SMS)		13	500	1	1	6,500	
2.2	Training of Community Health Workers for the Intervention in 3 Districts	Per Diem Community Health Workers		130	5000	1	1	650,000	2070000
		Coffee Break		130	5000	1	1	650,000	
		Welcome Package		130	1500	1	1	195,000	
		Per Diem Medical Region		1	22,500	2	3	135,000	
		Per Diem District Level		1	7500	2	3	45,000	
		Per Diem for Facilitation		1	10000	2	3	60,000	
		HKI		3	15000	2	3	270,000	
		Simple Cell Phone		130	500	1	1	65,000	

3: Implementation of Activities				Price per unit	Weeks	Month	Sub Total	Number
3.1	Intervention	Telephone Credit (SMS)	51	100	4	4	81600	17377600
		Cost of SMS – Reminder SMS	10000	200	1	1	2000000	
		Motivation of CHW	130	5000	4	4	10400000	
		Motivations of Head of Health Post	51	6000	4	4	4896000	
4: Supervision of Project			Number	Price per unit	Weeks	Month	Sub Total	
4.1 A	Focus Group (Mbacke)	Coffee Break	15	5000	2	2	300000	1330000
		Per Diem Head of Health Post	5	7500	2	2	150000	
		Per Diem Community Health Worker	5	5000	2	2	100000	
		Per Diem SMS Contact Point	1	7500	2	2	30000	
		Per Diem - District Level	1	7500	2	2	30000	
		Transport for Participants	12	5000	2	2	240000	
		Per Diem HKI	3	15000	2	2	180000	
		Lodging HKI	3	25000	2	2	300000	
4.1 B	Focus Group- (Dakar)	Coffee Break	15	5000	2	2	300000	910000
		Per Diem Head of Health Post	5	7500	2	2	150000	
		Per Diem Community Health Worker	5	5000	2	2	100000	
		Per Diem SMS Contact Point	1	7500	2	2	30000	
		Per Diem - District Level	1	7500	2	2	30000	
		Transport for Participants	12	5000	2	2	240000	
		Per Diem HKI	3	5000	2	2	60000	
4.1 C	Focus Group - (Thionck Essyl)	Coffee Break	15	5000	2	2	300000	1130000
		Per Diem Head of Health Post	5	7500	2	2	150000	
		Per Diem Community Health Worker	5	5000	2	2	100000	
		Per Diem SMS Contact Point	1	7500	2	2	30000	
		Per Diem - District Level	1	7500	2	2	30000	
		Transport for Participants	12	5000	2	2	240000	
		Per Diem HKI	3	15000	2	2	180000	
		Lodging HKI	2	25000	2	1	100000	
5: Analysis of Results			Number	Price per unit	Days		Sub Total	
5.1	Analysis of results	Statistics Consultant	1	50000	5		250000	250000
Total Cost of SMS Activities								26454100