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CAN TRAINING AND SMS MESSAGES IMPROVE PRIVATE PROVIDER TREATMENT OF CHILDHOOD DIARRHEA? EVIDENCE FROM AN EXPERIMENTAL EVALUATION IN GHANA

March 2014

This publication was produced for review by the United States Agency for International Development. It was prepared by Benjamin Woodman, Minki Chatterji, Willa Friedman, Vicki MacDonald and Pamela Riley for the Strengthening Health Outcomes through the Private Sector (SHOPS) project.



Recommended Citation:

Woodman, Benjamin, Minki Chatterji, Willa Friedman, Vicki MacDonald, and Pamela Riley. March 2014. *Can Training and SMS Messages Improve Provider Treatment of Childhood Diarrhea? Evidence from an Experimental Evaluation in Ghana*. Bethesda, MD: Strengthening Health Outcomes through the Private Sector Project, Abt Associates Inc.

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Cooperative Agreement: GPO-A-00-09-00007-00

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Disclaimer: The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States government.

Conflict of Interest: None declared. While the SHOPS research staff evaluated a SHOPS-implemented project, they included a third-party researcher, Dr. Willa Friedman, to ensure objectivity.

Author Agreement on Findings: All authors agree with the findings and interpretations presented.

Dissemination Plan: This report and the accompanying "Research Insights" (four page brief) will be made publicly and freely available on the SHOPS website (www.shopsproject.org) and will also be submitted to the Development Experience Clearing House (DEC). Printed copies of the Research Insights version will be made available to USAID staff and will also be distributed at relevant events and conferences.



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ACRONYMS

DHS	Demographic and Health Survey
GHS	Ghana Cedi
LCS	Licensed Chemical Seller/Sellers
NGO	Nongovernmental Organization
ORS	Oral Rehydration Solution
PSP-<i>One</i>	Private Sector Partnerships- <i>One</i> Project (USAID-funded; 2005- 2009)
POUZN	Social Marketing for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment Project
SHOPS	Strengthening Health Outcomes through the Private Sector
SMS	Short Message Service (mobile-phone text message)
UNICEF	United Nations Children’s Fund (formerly United Nations International Children’s Emergency Fund)
USAID	United States Agency for International Development
WHO	World Health Organization

ACKNOWLEDGMENTS

We gratefully acknowledge Malia Boggs and the Office of Health, Infectious Diseases and Nutrition, Global Health Bureau, United States Agency for International Development (USAID), for supporting the interventions discussed in this paper and the evaluation study. We also thank Hayford Nkansah and Eric Wiafe for assistance with oversight of data collection, and Sara Joseph for additional insights. We also thank the members of Abt Associates' Journal Authors Support Group – Jacob Klerman, Laura Peck, and Bill Rhodes – for their review of this paper, as well as Kathy Banke, Marianne El-Khoury, Doug Johnson, Randall Juras, Susan Mitchell and Jorge Ugaz of Abt Associates for their detailed reviews. Local data collection was conducted by Ipsos-Synovate Pan Africa. Finally, we note that none of this would be possible without Joseph Addo-Yobo and Odartei Lamptey who implemented a strong field program and were always willing to take the time to explore avenues for further improvement.

EXECUTIVE SUMMARY

Diarrhea is one of the leading causes of death among children in developing countries (Black et al. 2010). Most of these deaths are related to dehydration, which can be prevented through the use of low-cost treatments such as oral rehydration solution (ORS). In May 2004, after determining that pediatric zinc supplementation yields dramatic reductions in diarrheal death and can reduce future episodes of diarrhea, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) issued a joint statement endorsing the use of zinc in addition to ORS as the first-line treatment for uncomplicated diarrhea in children under age five (WHO & UNICEF 2004). Despite their life-saving potential, ORS and zinc are under-utilized and inappropriate antimicrobials and antidiarrheals are often administered instead. Thus, suboptimal treatment of pediatric diarrhea remains a major public health problem in developing countries.

Private for-profit providers are an important source of treatment of childhood illnesses in developing countries. However, working with private sector providers to improve treatment behavior often requires different approaches from those used with public sector providers. These practitioners may have less access to appropriate training and need to focus more on meeting client expectations and profit margins compared with public providers.

In Ghana, the USAID-funded Strengthening Health Outcomes through the Private Sector (SHOPS) project implemented a multifaceted program to promote the use of zinc alongside ORS through private sector channels. These interventions began by working with a local zinc manufacturer to introduce zinc tablets for pediatric diarrhea into the commercial market. This was followed by training licensed chemical sellers (LCS), who are community-based providers of basic medicines, in the use of ORS and zinc, and conducting a mass media demand-generation campaign.

To explore the potential of a low-cost intervention to reinforce in-person training on appropriate diarrhea management, SHOPS implemented and evaluated a mobile phone text message (SMS)-based intervention that consisted of both informational messages and interactive quizzes. This SMS intervention took place over an eight-week period and targeted a randomly assigned group of LCS who had attended the SHOPS diarrhea management training. The evaluation of the SMS intervention also provided an opportunity to examine the impact of the SHOPS training, detailing visits, and mass media campaign interventions on zinc provision.

This study addresses the following research questions:

1. To what extent did the SHOPS training, detailing visits, and mass media campaign interventions increase provision of zinc by LCS?
2. To what extent did the SMS intervention that followed the initial trainings lead to a change in:
 - a. Knowing the appropriate treatment to provide?
 - b. Providing the appropriate treatment?
3. What are possible explanations for why the SMS-based intervention did or did not work to change knowledge and/or behavior?

The evaluation of the SHOPS training, detailing visits, and mass media campaign used a modified pre-post study design. The pre-intervention levels of zinc provision are based on data

from the 2008 Ghana Demographic and Health Survey, as well as assumptions about levels of zinc provision by LCS given that zinc was not commercially available in Ghana prior to January 2012. Analysis of mystery client survey data along with zinc sales data provided the opportunity to assess the effectiveness of the SHOPS training, detailing visits, and mass media campaign interventions on zinc provision among LCS.

The evaluation of the SMS intervention used an experimental (randomized controlled trial) study design. A face-to-face survey of LCS measured knowledge of appropriate treatment, while the mystery client survey assessed actual behavior. Descriptive analysis of survey data also provided useful information regarding possible barriers to appropriate treatment of diarrhea by private providers.

The modified pre-post study demonstrated that the SHOPS training, detailing visits, and mass media campaign resulted in a large increase in provision of zinc by LCS in a short period of time. While few, if any, LCS were providing zinc in early 2012, 66 percent of LCS exposed to the training, detailing visits, and media campaign sold zinc to a mystery client when surveyed less than one year after zinc was introduced in the Ghanaian market.

The experimental study, which focused solely on the impact of the randomly-assigned SMS campaign that followed the initial trainings, demonstrated that the addition of SMS messages to the base interventions led to a meaningful and statistically significant increase in the proportion of drug sellers that cited the appropriate treatment (ORS and zinc) for pediatric diarrhea when interviewed. The intervention increased their knowledge of the appropriate treatment by 6.6 percentage points (from 70.7 to 77.4 percent), which represents a 9.3 percent increase in knowledge. However, the study failed to detect an impact on provider behavior.

The results from the mystery client survey demonstrated that overall provision of antimicrobials and antidiarrheals for uncomplicated pediatric diarrhea is still high, at 48 percent and 11 percent, respectively. These rates are among LCS who had attended a training that specifically discouraged providing antidiarrheals for children and recommended only providing antimicrobials if a child has blood in his/her stool. Thus, reducing inappropriate provision of antimicrobials and use of antidiarrheals remains a major challenge in Ghana.

Additional data from this study offer insight into the possible obstacles to changing provider behavior. A quarter of the LCS indicated that caregivers had refused to buy ORS when the LCS recommended it, and one in eight providers experienced caregivers refusing zinc treatments. The treatment that LCS report as being most commonly requested by caregivers is the antimicrobial Flagyl (metronidazole). While the mystery client did not ask for a particular product, providers may respond to perceived consumer demand based on past experience with clients.

Profit motives may also be an issue. A comparison of the wholesale prices at which LCS purchase their products with the retail prices charged to the mystery clients shows that both antimicrobials and antidiarrheals offer a larger profit margin than ORS and zinc, by roughly US\$0.50 to US\$1 per prescription.

I. INTRODUCTION

Diarrhea is one of the leading causes of death among children in developing countries (Black et al. 2010). Most of these deaths are related to dehydration, which can be easily prevented through the use of low-cost treatments such as oral rehydration solution (ORS). In May 2004, WHO and UNICEF issued a joint statement endorsing the use of zinc in addition to ORS as the first-line treatment for uncomplicated diarrhea in children under age five (WHO & UNICEF 2004). According to the WHO, use of antimicrobials adds to the cost of treatment, increases the risks adverse reactions, and may encourage the development of resistant bacteria. Antidiarrheal drugs also should never be used in children and can have fatal side effects (WHO 2005). However, ORS and zinc remain under-utilized and antimicrobials and/or antidiarrheals are often administered instead for uncomplicated pediatric diarrhea. Thus, suboptimal treatment of pediatric diarrhea remains a major public health problem in developing countries.

Private for-profit providers are a common source for treatment of childhood illnesses. A study of DHS data from 29 sub-Saharan African countries found that 24 percent of caregivers report visiting private for-profit facilities to obtain diarrhea treatment for their children (Sood & Wagner 2014). Working with private sector providers to improve treatment of diarrhea, as well as other diseases, may require different approaches from those used with public-sector providers. Private sector providers often have limited access to training. For-profit providers may also have more difficulty in taking time away from their facilities, given that their income depends upon keeping their shops open throughout the day. Further, private sector providers may face different challenges in providing appropriate treatment such as the desire to be responsive to client expectations (Das & Hammer 2007) and profit motives (Hsaio 2008).

The USAID-funded Strengthening Health Outcomes through the Private Sector (SHOPS) project and a previous project, the Social Marketing for Diarrheal Disease Control: Point of Use Water Disinfection and Zinc Treatment (POUZN), have worked with private health providers in several countries, such as Benin, Kenya, Madagascar, Nepal, Nigeria, Pakistan, and Uganda, to promote provision of ORS and zinc and discourage use of antimicrobials and antidiarrheals for pediatric diarrhea. In-person training followed by face-to-face detailing visits to reinforce learning about appropriate treatment of pediatric diarrhea has been a major component of these programs.

SHOPS wanted to explore the potential of a low-cost intervention to reinforce messages from training, such as mobile phone text messages (SMS). With the rapid penetration of mobile phones in developing countries, messages sent directly to providers' phones offer a promising new channel through which to encourage adherence to treatment protocol.

The SHOPS Ghana program presented an opportunity to test and evaluate this approach. In 2012-2013, SHOPS conducted a randomized controlled trial of an SMS intervention targeting licensed chemical sellers (LCS) who had attended training on appropriate treatment for pediatric diarrhea. The data collection for the randomized evaluation also provided an opportunity to evaluate the impact of the training and other non-SMS interventions on zinc provision by licensed chemical sellers. In addition, the survey data provided useful information regarding possible barriers to appropriate treatment of diarrhea by private providers.

I.1 WHAT DO WE KNOW ABOUT TRAINING, SMS, AND IMPROVING HEALTH CARE PROVIDER KNOWLEDGE AND BEHAVIOR RELATED TO DIARRHEA?

To the authors' knowledge, there are no prior studies that directly address the relationship between SMS and improving provider knowledge and behavior related to diarrhea. However, there have been several studies related to training and provider knowledge and behavior regarding pediatric diarrhea. There is also some limited research related to SMS and provider knowledge and behavior that is not specific to diarrhea. This literature is briefly summarized here to describe the motivation for the study and inform the theory of change.

Training and provider knowledge and treatment of diarrhea

Several studies have examined interventions targeted at changing knowledge and behavior related to treatment of diarrhea among public and private sector providers. The findings of these studies have been mixed. One study found that a face-to-face educational outreach program, intended to encourage providers in Kenya and Indonesia to provide ORS in place of antimicrobials, increased private for-profit providers' knowledge and self-reported use of ORS (Ross-Degnan et al. 1996). Another study compared small-group and large-group interventions targeted at providers at public health facilities in Indonesia. This intervention, designed to increase the prescription of ORS in place of antimicrobials, found that small-group interventions are more effective at increasing knowledge than large-group interventions. However, the study also found that these small-group interventions are more expensive and therefore less cost-effective (Santoso 1996). A study of a diarrhea management campaign in Bangladesh noted that, while awareness of newly introduced zinc treatments could be achieved rapidly through educating providers and informing caregivers about zinc, changing private for-profit and public provider and caregiver behaviors to encourage the provision and use of zinc was more difficult and might require further, behavior-focused interventions (Larson et al. 2012).

SMS and provider behavior

While SMS is a relatively new technology in developing countries, there has been some research on how SMS might influence provider behavior. A formative study in Uganda conducted by SHOPS found high rates of user acceptability and appreciation for interactive SMS messages designed to reinforce ideas taught during in-person trainings for family planning providers working in NGOs (Riley & BonTempo 2011). One recent study in Kenya demonstrated that one-way SMS messages sent daily to public sector health workers for six months increased adherence to recommended malaria treatment practices by these health workers (Zurovac et al. 2011). However, a meta-analysis of SMS interventions to improve service delivery highlighted the general lack of adequately powered trials in developing country settings (Free et al. 2013).

Does improved knowledge lead to improved quality?

Training and SMS interventions alike are partially based on the assumption that providing information will improve knowledge, which will ultimately lead to improved treatment behavior. However, the literature suggests that a gap exists between provider knowledge and behavior. Leonard and Masatu (2010) showed that providers in Tanzania often fail to act in ways they know is best for the patient and refer to this the "know-do" gap. Das and Hammer (2007) provided evidence that providers may vary their level of effort depending on the setting. For example, in India, public providers who also operated a private practice delivered much higher-quality care in their private practices than at the public facilities.

Profit motives may play a role in provider practices. Previous studies have found that variation in behavior is associated with variation in the financial incentives of providers, in different contexts

of comparison: between public and private providers (Siddiqi et al. 2002); when there is more or less competition (Bennett et al. 2010); and with changes in price mark-ups (Iizuka 2011).

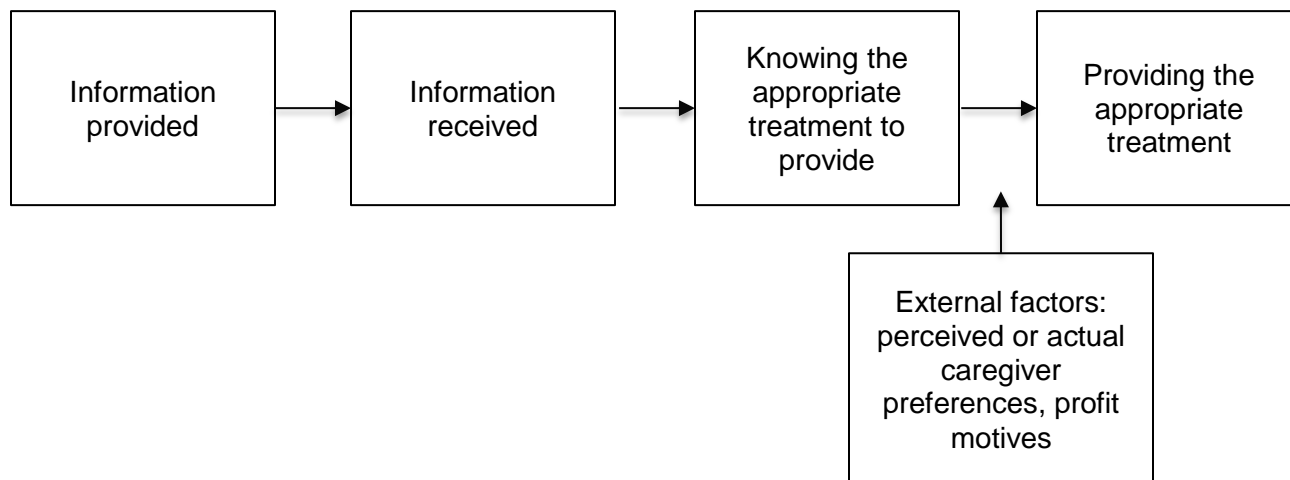
1.2 THEORY OF CHANGE

Figure 1 illustrates the study's theory of change, informed by the literature discussed above, illustrating how the SHOPS interventions relate to key outcomes for this study. The framework assumes that SMS messages about appropriate treatment for childhood diarrhea are sent to the LCS (information provided) and read by the LCS (information received). This, in turn, should increase the number of LCS who know the appropriate treatment for uncomplicated childhood diarrhea. The study assumes that the other interventions – training, detailing visits, and mass media – would influence these key outcomes in the same manner.

The final assumption is that an increase in knowledge leads to an improvement in actual practice, in terms of providing ORS and zinc and not providing antimicrobials or antidiarrheals for uncomplicated pediatric diarrhea. However, as discussed in the literature, improvements in knowledge may or may not lead to improvements in behavior. Internal factors, such as intrinsic motivation, or external factors, such as perceived consumer preferences and profit motives, may play an important role in influencing behavior as well.

Our study collects data related to knowledge, behavior, and external factors, such as perceptions of consumer preferences and profit margins. Due to limited space in the survey instruments and methods used, the surveys did not capture data related to internal factors such as intrinsic motivation, but these factors may play a role in changing provider behavior.

FIGURE 1: THEORY OF CHANGE FRAMEWORK FOR SHOPS INTERVENTION EFFECTS



1.3 RESEARCH QUESTIONS AND DATA SOURCES

1. To what extent did the SHOPS training, detailing visits, and mass media campaign increase provision of zinc by LCS?
2. To what extent did the SMS intervention that followed the initial training lead to a change in:
 - a. Knowing the appropriate treatment to provide?

b. Providing the appropriate treatment?

3. What are possible explanations for why the SMS did or did not work to change knowledge and/or behavior?

The study used multiple data sources to answer these research questions: a provider survey, a mystery client survey, monthly wholesale sales data figures for zinc tablets, and a sample of wholesale and retail price data for diarrhea treatment products. Table 1 shows how the various data sources link to the research questions.

TABLE 1: RESEARCH QUESTIONS AND DATA SOURCES

Research Question	Study Design	Sample	Data Sources
1. To what extent did the training, detailing visits, and mass media campaign interventions increase provision of zinc by LCS?	<ul style="list-style-type: none"> Modified pre-post design assuming minimal zinc provision at baseline 	<ul style="list-style-type: none"> Nation-wide (All of Ghana) Sub-sample of LCS who received training, mass media, and detailing visits, but did not receive SMS 	<ul style="list-style-type: none"> Zinc wholesale sales data (number of zinc tablets sold each month) Mystery client survey 2008 Ghana DHS
2a. To what extent did the SMS intervention lead to a change in knowing the appropriate treatment to provide?	<ul style="list-style-type: none"> Randomized controlled trial 	<ul style="list-style-type: none"> Treatment and control group, analysis sample 	<ul style="list-style-type: none"> Provider survey
2b. To what extent did the SMS intervention lead to a change in providing the appropriate treatment?	<ul style="list-style-type: none"> Randomized controlled trial 	<ul style="list-style-type: none"> Treatment and control group, analysis sample 	<ul style="list-style-type: none"> Mystery client survey
3. What are possible explanations for why the SMS did or did not work to change knowledge and/or behavior?	<ul style="list-style-type: none"> Descriptive analyses 	<ul style="list-style-type: none"> Treatment and control group, analysis sample 	<ul style="list-style-type: none"> Provider survey Mystery client survey Wholesale product prices

2. CONTEXT AND INTERVENTIONS

2.1 TREATMENT OF PEDIATRIC DIARRHEA IN GHANA

Inappropriate treatment of pediatric diarrhea remains a major problem in Ghana. According to the latest Ghana Demographic and Health Survey (DHS) conducted in 2008 (Ghana Statistical Service et al. 2009), only 42 percent of caregivers with children under five with diarrhea in the previous two weeks reported providing ORS to their child. Just 2.1 percent reported giving their child zinc, which was available in only a small number of pilot programs at government and NGO facilities in three districts in Ghana at the time of the DHS survey. In addition, 31 percent of these caregivers gave their children antimicrobials in cases of uncomplicated diarrhea (no blood in the stool). Thus, many caregivers in Ghana in 2008 were not providing treatment for diarrhea in accordance with the WHO and UNICEF guidelines.

The private sector is an important source of treatment for childhood diarrhea in Ghana. According to the most recent Ghana DHS, among caregivers whose children had diarrhea in the previous two weeks, approximately half sought treatment from a private sector provider such as a private clinic or hospital, pharmacist, or LCS (Ghana Statistical Service et al. 2009).

Given the substantial role of the private sector in providing treatment for childhood diarrhea, USAID requested that the SHOPS project design and implement a set of interventions to introduce zinc through private sector channels and increase correct treatment of childhood diarrhea among private providers in Ghana. In addition to other interventions, the SHOPS program focused on training LCS – providers licensed by the Ghana Pharmacy Council to sell basic medicines. LCS are not trained pharmacists. They have basic training, are required to have secondary school education, and are specifically mandated to reach underserved areas.¹

2.2 TRAINING

To promote appropriate treatment of childhood diarrhea, the SHOPS project, in collaboration with the Ghana Pharmacy Council, held half-day trainings for LCS in 26 districts in the Greater Accra, Central, and Western regions, from April through June 2012.² These regions in the southern part of the country account for roughly one-third of the population of Ghana (Figure 2). The trainings, advertised through newspapers, were required as part of the Pharmacy Council's Continuing Medical Education program for annual LCS accreditation; participants were charged approximately US\$5 (10GHS). Representatives from 1,935 LCS facilities attended the SHOPS-supported trainings, which provided information about how to assess the severity of instances of pediatric diarrhea and the rationale for treating children with ORS and zinc in line with current national and international guidelines. The trainings also discussed limiting the use of antimicrobials (only for diarrhea with blood in the stool), and explained the dangers of antidiarrheal drugs for children. The trainers provided all attendees with information on how and where to purchase zinc, which had just been introduced into the private sector in Ghana in

¹ According to the Ghana Pharmacy Council's website:
<http://www.pharmacycouncilghana.org/pdf/Guidelines%20CS.pdf>

² The Ghana Pharmacy Council continued using the SHOPS training curriculum to train LCS throughout Ghana.

January 2012.³ Representatives of SHOPS' partner pharmaceutical company participated in all training sessions, and made supplies of zinc available for sale to LCS at the end of each one.

FIGURE 2: REGIONS OF GHANA



2.3 PRODUCT MARKETING AND DETAILING VISITS

A major component of each SHOPS diarrhea management country program is to ensure the availability of an affordable zinc product throughout the target country. In Ghana, SHOPS worked closely with its local pharmaceutical manufacturing partner, M&G Pharmaceuticals, Ltd., to introduce and market their Zintab product to private sector clinics, pharmacies and LCS. Partnership activities included printing and disseminating branded point of sale and detailing materials, sponsoring clinical meetings, and airing branded radio advertisements. M&G sponsored numerous continuing medical education sessions for clinical providers and marketed their zinc products during the training of LCS and during detailing/sales visits to retailers. These activities were supported by follow-up detailing visits, conducted by M&G medical representatives, who were trained by the SHOPS project to provide appropriate interpersonal communications on diarrhea management.

2.4 MASS MEDIA CAMPAIGN

In July 2012, SHOPS launched a nationwide mass media campaign that included television and radio advertisements, conducted community mobilization activities through partner NGOs, and

³ While ORS, antimicrobials, and antidiarrheals have been available in Ghana for many years, zinc tablets for the management of diarrhea were introduced into the commercial market only in January 2012 by M&G Pharmaceuticals, Ltd.

developed and disseminated informational posters to health care providers. The campaign continued for six months and was designed to increase awareness of the new diarrhea treatment protocols for children under five. The campaign provided information on the effectiveness of ORS and zinc for treating diarrhea, how to correctly administer both products, and where consumers could obtain the products.

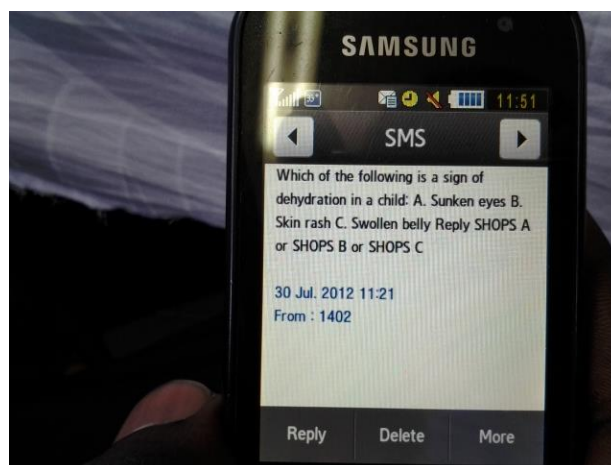
2.5 SMS INTERVENTION

The delivery of SMS messages commenced on June 7, 2012, immediately following the end of the trainings. The messages were sent every Monday, Wednesday, and Thursday for eight weeks, until August 2, 2012. The content of the messages focused on encouraging recommendation of zinc and ORS and discouraging the use of antimicrobials and antidiarrheals. The messages also covered symptoms of dehydration. The format of the messages consisted of one quiz (true/false and multiple choice), one follow-up message and one informational tip per week. A copy of the messages is attached in Annex B of this report.

Recipients used their personal phones and airtime (mobile phone credit) to respond to the quizzes. If respondents answered at least one quiz correctly, then they were sent a one-time prize of approximately US\$0.52 or 1 Ghana cedi (GHS) of airtime⁴. Anyone who responded correctly to at least seven quizzes was also entered into a lottery to win 10 GHS. During the training sessions in which the SMS messages were explained to the LCS, they were informed that airtime prizes would be available for answering quizzes correctly.

When an LCS responded correctly to a quiz, they would instantly receive a congratulatory text message regarding the correct answer. If an LCS responded incorrectly, they would instantly receive a message noting that their response was incorrect and communicating the correct answer. All non-respondents were sent a message containing the correct answer two days after the initial quiz, in order to give them the correct information even if they did not participate.

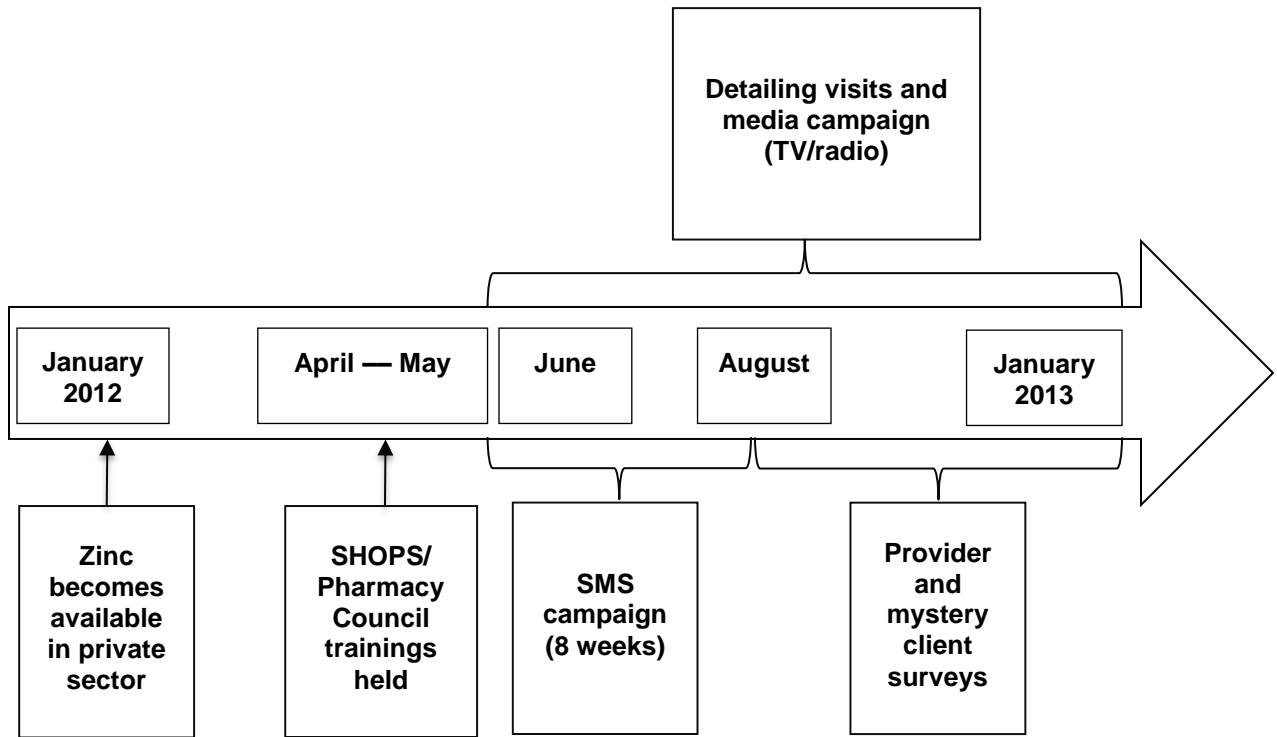
Figure 3 (below) depicts the intervention and data collection timeline. As shown, both the treatment and control groups were exposed to several interventions. The only difference between the treatment and control group was that the treatment group received the SMS intervention and the control group did not. Thus, the study can isolate the impact of the SMS intervention from the other interventions implemented during the same time period.



Example of SMS Quiz

⁴ For reference, the prize of 1 GHS is roughly equivalent to the cost of sending 200 SMS messages, according to local mobile phone providers.

FIGURE 3: INTERVENTION AND EVALUATION TIMELINE



3.METHODS

3.1 STUDY DESIGN

Research Question 1: Impact of training, detailing visits, and mass media campaign

The recent introduction of zinc in Ghana and the planned data collection for the SMS evaluation provided an opportunity to use a modified pre-post study design to evaluate the effectiveness of the training, detailing visits, and mass media interventions on zinc provision. However, SHOPS was unable to evaluate the effectiveness of these interventions on provision of ORS, antimicrobials, or antidiarrheals, as these products have been in the market in Ghana for some time.

Most commonly, the pre-post design involves the same sort of observation at two time points, where the pre-intervention measure represents the counterfactual, or what would have happened in the absence of the intervention. The difference between the pre and post measures, then, is the estimate of the intervention's impact. Pre-post evaluation designs are most appropriately used when the time period under study is short and there are no other changes in the environment that could be responsible for changes in the observed outcomes – a situation that fits this study period. This study is an unusual application of this design because it does not have a formal pretest measure, but rather makes an assumption about the previous level of zinc provision in Ghana's private healthcare sector, based on available data.

Zinc as a treatment for diarrhea was first introduced into both public and private sectors in Ghana in January 2012. Previously, zinc was only available in a pilot program in government/NGO clinics.⁵ Outside of the pilot study, zinc was not available in either public health clinics or the private sector.⁶ It is assumed, therefore, that before that time, zinc provision rates were very low, probably close to zero. Our assumption of pre-intervention zinc provision is consistent with the low level of zinc use (2.1 percent) reported by caregivers of children with diarrhea surveyed in the 2008 Demographic and Health Survey.

To estimate the effectiveness of the training, detailing visits and mass media campaign on provision of zinc by LCS, the study compares the hypothetical rate of zinc provision prior to the start of the interventions in early 2012 with the level of zinc provision by LCSs who received the training, detailing visits, and mass media campaign interventions. The authors recognize that simply by making zinc available in the Ghanaian market, rates of zinc utilization would have increased to some extent. Thus, the study triangulates the rates of monthly zinc sales with the timeframes in which the SHOPS interventions occurred in order to better estimate the zinc sales attributable to these interventions.

Research Question 2: Impact of SMS

SHOPS used an experimental study design (randomized controlled trial) to evaluate the impact of SMS on provider knowledge and behavior. This method gives an equal chance to eligible

⁵ From 2007-2010, World Vision International implemented a pilot program on zinc and gathered related operations research data in collaboration with UNICEF, WHO, and the Ghana Health Service in the Sene district of the Brong Ahafo region.

⁶ According to the SHOPS Introduction of Zinc for Diarrhea Management through the Private Sector in Ghana workplan to USAID 2011.

LCS facilities to gain access to an intervention such that the only difference between the two groups' outcomes can be causally attributed to the intervention. In this case, the authors randomized LCS facilities to an intervention group that was sent SMS messages or to a control group that did not receive the messages.

Research Question 3: Possible explanations for why the SMS did or did not work to change knowledge and/or behavior

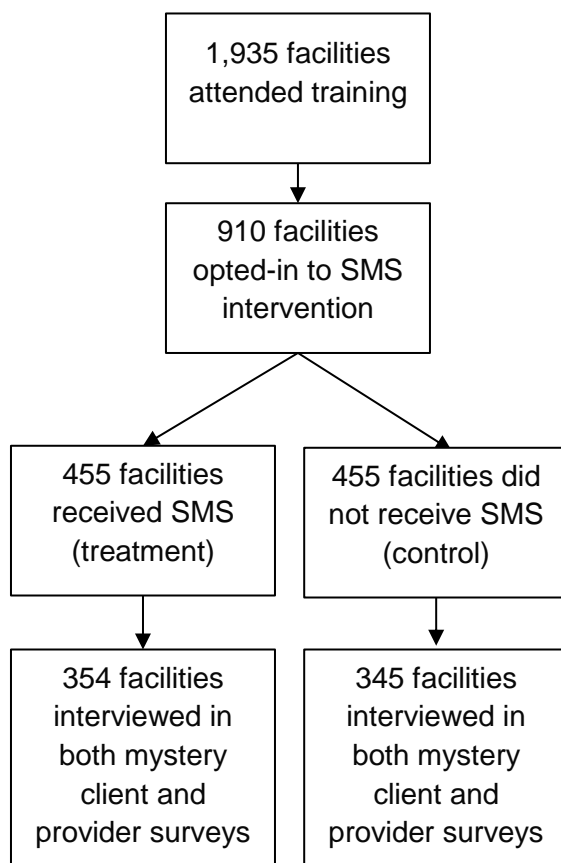
Using detailed survey data and wholesale and retail prices of diarrhea treatments sold by LCS, the study team analyzed possible factors that influence providers' decisions in treating pediatric diarrhea, including profitability and clients' demands as reported by LCS.

3.2 SAMPLE

The SHOPS project offered each attendee of the training sessions the option to participate in the study by sending an SMS text message from the participant's mobile phone to a specified number with the message "SHOPS." This allowed an automated database to capture participants' phone numbers. Staff members informed attendees that participation in the study was voluntary and that not everyone would receive the SMS. Out of the 1,935 LCS facilities that sent a representative to the training, a total of 910 had at least one employee who opted into the SMS study. Out of the total of 910 facilities, there were 40 facilities (80 individuals) included in this study that sent two individuals to the training. Only one person at each facility was interviewed.

The unit of assignment for the experimental evaluation of the SMS intervention was the facility, and the number of attendees from a facility did not change the probability of selection. If a facility was selected, all attendees from that facility who provided phone numbers received messages. These 910 LCS facilities in the experimental sample were randomly assigned, stratifying by district, to receive the SMS messages or not. Of these, 455 shops were assigned to the treatment group and 455 shops were assigned to the control group (Figure 4).

FIGURE 4: SMS RANDOMIZATION DESIGN



The analysis sample of surveyed facilities consisted of 699 facilities for which the provider survey and mystery client survey were completed, including 354 facilities in the treatment group and 345 in the control group, which represents 76.8 percent of the full experimental sample. Of the original 910 facilities that opted into the study, 211 facilities could not be interviewed by the data collection firm for one or both of the surveys (including 101 from the treatment group and 110 from the control group) and were thus excluded. The most common reasons for inability to interview LCS facilities were logistical factors: the LCS had gone out of business (25 percent)⁷; the data collection firm was unable to locate the shop (24 percent); the LCS had already been interviewed during the pilot (16 percent); or the mobile phone was turned off (13 percent).

The overall attrition rate was 23.1 percent (22.1 percent in treatment shops and 24.1 percent in control shops). The difference in the attrition rates between the treatment and control groups was not statistically significant for either the provider survey or the mystery client survey. As a result, there is no reason to believe that the analysis sample is skewed differentially between the treatment and control groups in any way that would introduce bias into the impact estimates. The local data collection firm conducted surveys at each facility from August 2012 to early January 2013. Thus, while most data was collected within 3 months of the SMS campaign, LCS who could not be interviewed in the first rounds of data collection were interviewed as much as 5 months after the end of the SMS messages.

⁷ It is likely that some LCS attend training in order to keep their license, even if they are not operating a facility at that time.

As shown in Table 2, the treatment and control groups appear similar across a range of observable characteristics. Urban-rural status is marginally significantly different (at the 10 percent level), with 7 percentage points fewer facilities of the treatment group located in urban settings. Randomization ensures that the treatment is exogenous with respect to these and any other observable or unobservable characteristics of the individuals involved, eliminating concerns about omitted variables biases.

TABLE 2: CHARACTERISTICS OF THE RCT SAMPLE

	Treatment Mean (SD)	Control Mean (SD)	Difference (SE)
<i>Age</i>	39.495 (15.792)	39.689 (15.260)	-0.193 (1.191)
<i>Male</i>	0.603 (0.490)	0.593 (0.492)	0.010 (0.037)
<i>Post-Secondary Education</i>	0.760 (0.428)	0.765 (0.425)	-0.005 (0.032)
<i>Years of LCS Experience</i>	9.440 (8.527)	8.775 (7.680)	0.665 (0.616)
<i>LCS Interviewed (vs. Assistants)</i>	0.529 (0.500)	0.500 (0.501)	0.029 (0.038)
<i>Respondent Attended Training</i>	0.650 (0.448)	0.684 (0.466)	-0.034 (0.036)
<i>Geographic Location (three regions total)</i>			
<i>Central Region</i>	0.247 (0.432)	0.253 (0.435)	-0.006 (0.028)
<i>Greater Accra</i>	0.266 (0.442)	0.267 (0.444)	-0.002 (0.029)
<i>Western Region</i>	0.487 (0.50)	0.478 (0.50)	0.009 (0.032)
<i>Urban</i>	0.503 (0.501)	0.565 (0.495)	-0.062* (0.038)
Total observations (n)	354	340	694

* statistically significant at the $p \leq 0.10$ level

** statistically significant at the $p \leq 0.05$ level

*** statistically significant at the $p \leq 0.01$ level

The reasons for nonresponse across both experimental groups suggest that the analysis sample is likely to be less isolated than the larger population of LCS facilities in terms of geography and access to communication. Specifically, the analysis sample is more likely to contain facilities operated by LCS who have their phone in operation, and facilities located in more accessible areas or areas with more reliable phone service. Thus, the impacts estimated for the analysis sample might be larger than would be the case for the full population, because the intervention was based on mobile phones.

3.3 DATA SOURCES

3.3.1 ZINC SALES DATA

M&G Pharmaceuticals, the maker of Zintab, and the sole provider of zinc for sale in the private sector in Ghana, provided SHOPS staff with monthly wholesale sales figures (nationwide) to allow for analyses of trends in the purchases of zinc by providers (LCS and others). The outcome measures obtained from this data are the monthly zinc sales totals. Because zinc was a new and previously unavailable product in the private sector, the authors assume that private sales of zinc were close to zero before the January 2012 introduction of Zintab.

3.3.2 SURVEY DATA COLLECTION

Local data collection was conducted by Ipsos-Synovate Pan Africa. Their interviewers and mystery clients were trained by SHOPS staff. To initiate the survey data collection process, the interviewers from the research firm called each LCS facility and obtained consent to conduct the interview (additional informed consent was obtained at the start of the interview). During the phone call, the interviewer explained that the Ghana Pharmacy Council had approved the study and made appointments for the provider interview. The interviewers conducted the mystery client visit at least one day before the scheduled provider interview, to prevent the provider interview from influencing LCS behavior toward the mystery client.

For both the mystery client and provider surveys, the surveyors interviewed the first available provider, whether the LCS or a shop assistant, since that person would be the one typically interacting with the clients. The authors felt that this approach would provide a better estimate of the policy-relevant impact—that is, a change in behavior on the part of the person who typically serves clients. However, the person interviewed may not necessarily be the same individual who attended training or received the SMS messages. The instances in which the survey respondent attended or did not attend training were similar between treatment group (65 percent) and control group (68 percent). This difference was not statistically significant and thus should not bias the impact estimates.

3.3.2.1 MYSTERY CLIENT SURVEY

The objective of the mystery client survey was to assess provider practices. For this survey an interviewer posing as a client with a child who is suffering from uncomplicated diarrhea visited each provider. The mystery client initially communicated only that their child had diarrhea. If the provider asked for additional details, then the mystery clients were trained to give standard details about the age, weight, and symptoms of the child, which were designed to simulate a two year old child experiencing uncomplicated diarrhea. The mystery clients continued to engage with the provider until they received advice or products. The mystery clients purchased whatever products were recommended by the provider, up to a maximum of 10 GHS

(approximately US\$5). After leaving the LCS facility, the mystery client documented the provider's actions, such as diagnostic questioning, and the products sold. The primary outcome measures of interest for the mystery client survey were whether or not the LCS provided ORS, zinc, antimicrobials, and/or antidiarrheals. In this study, these indicators are referred to as the "actual behavior" of the provider. Other outcomes of interest were whether LCS asked questions related to identifying children's symptoms of diarrhea (presence of blood or mucus, fever, vomiting, and duration of illness). The survey also recorded the prices at which ORS, zinc, antimicrobials and antidiarrheals were sold.

3.3.2.2 PROVIDER SURVEY

In the face-to-face in-depth individual interview with providers, a battery of seven general diarrhea management questions and seven zinc-specific knowledge questions were asked. However, these questions showed limited variation in knowledge among respondents, as most proved too easy (nearly all answered correctly) or too difficult (the respondents did no better than random guessing), which was not informative.

During the provider survey, the interviewer also recorded the self-reported behavior from the LCS, in order to estimate the impact of the SMS intervention on knowing appropriate diarrhea management practices and to shed light on their decision-making process. To document providers' reported behavior, the questionnaire included open-ended inquiries about what product(s) the LCS recommended most often and second most often for uncomplicated diarrhea in children under five years of age. Thus, the key outcomes measured in the provider survey were whether or not ORS, zinc, antimicrobials, and/or antidiarrheals were mentioned as most often recommended or second most often recommended. These reported behavior variables were coded as binary variables.

It is assumed that, when asked about their treatment practices by an interviewer who has stated that they are conducting an interview as a follow-up to the trainings organized by the Ghana Pharmacy Council, the respondent is likely to cite treatments that he or she believes are medically appropriate to the best of their knowledge. It is unlikely that a respondent would purposely self-report an inappropriate treatment unless they did not know that it was inappropriate.⁸

LCS were also asked questions aimed at informing future interventions, such as whether they had zinc in stock, whether they knew where to obtain zinc tablets, and whether they felt the pricing of zinc was appropriate. To measure perceived consumer demand, the interviewers also asked LCS about whether their clients had ever refused ORS or zinc and what treatments their clients prefer.

3.4 OUTCOME MEASURES

Table 3 below lists the outcome measures and their operational definitions along with the data sources.

⁸ The authors acknowledge that there are other ways in which self-reported behavior can be interpreted. For example, receiving the SMS messages may have changed the respondents' self-perceptions of what they commonly prescribe, regardless of their knowledge of pediatric diarrhea treatment protocols. Another explanation is that their perceived relative ordering of treatments changed to think of ORS and zinc as the two products that they most commonly recommend, regardless of knowledge.

TABLE 3: OUTCOME AND DESCRIPTIVE MEASURES, DEFINITIONS AND DATA SOURCES

Outcome Measures	Definition	Data Source
Provision of ORS	Binary variable for whether LCS sells ORS to mystery client	Mystery client survey
Provision of zinc	Binary variable for whether LCS sells zinc to mystery client	Mystery client survey
Provision of antimicrobials	Binary variable for whether LCS sells antimicrobials to mystery client	Mystery client survey
Provision of antidiarrheals	Binary variable for whether LCS sells antidiarrheals to mystery client	Mystery client survey
Knowing appropriate treatment for pediatric diarrhea	Binary variable for whether LCS cites ORS and zinc as either the first or second products that s/he recommends most often for pediatric diarrhea	Provider survey
Wholesale sale of zinc by month	Number of zinc tablets sold by M&G Pharmaceuticals to providers per month	Zinc sales data
Descriptive Measures	Definition	Data Source
Wholesale price of ORS	Price at which LCS buy ORS from suppliers	Wholesaler price lists
Wholesale price of zinc	Price at which LCS buy zinc from suppliers	Wholesaler price lists
Wholesale price of antimicrobials	Price at which LCS buy antimicrobials from suppliers	Wholesaler price lists
Wholesale price of antidiarrheals	Price at which LCS buy antidiarrheals from suppliers	Wholesaler price lists
Price of ORS	Price of product sold to mystery client	Mystery client survey
Price of zinc	Price of product sold to mystery client	Mystery client survey
Price of antimicrobials	Price of product sold to mystery client	Mystery client survey
Price of antidiarrheals	Price of product sold to mystery client	Mystery client survey
Caregivers refusing to buy ORS	Binary variable for whether LCS indicated that they have had caregivers refuse to buy ORS	Provider survey

Reasons that caregivers refuse ORS	Reasons cited by LCS for why caregivers refuse ORS	Provider survey
Caregivers refusing to buy zinc	Binary variable for whether LCS indicated that they have had caregivers refuse to buy zinc	Provider survey
Reasons that caregivers refuse zinc	Reasons cited by LCS for why caregivers refuse zinc	Provider survey
Products commonly requested by caregivers	Products that LCS cite when asked about the products that caregivers request for pediatric diarrhea	Provider survey

3.5 ANALYSIS METHODS

For the evaluation of the training, detailing visits, and mass media campaign, the study team estimated the impact by computing the difference between mean post-intervention outcome measures and an assumed pre-intervention level of zinc provision. This is a simple difference in means, which represents the estimated impact of participation in the training, detailing visits, and mass media campaign, as follows:

$$I = \bar{Y}_T - \bar{Y}_C$$

where:

I is the estimated impact;

\bar{Y}_T is the mean outcome for the “treatment” group, which is the post-intervention measure; and

\bar{Y}_C is the mean outcome of the assumed “counterfactual”, or the pre-intervention measure.

The impact of the SMS program on actual behavior (provision of appropriate treatment) was estimated by comparing difference between the control and treatment mean outcomes. The raw difference in means, using the equation specified above, provides an unbiased estimate of the impact.⁹

To help explore the additional factors, aside from knowledge, that may influence how LCS treat pediatric diarrhea, the study includes descriptive analyses of the data related to LCS perceptions of client demands. We also compare the average retail prices charged by LCS for products during mystery client visits with average wholesale prices at which the LCS buy their stock in order to generate estimates of the profit margins for the various products commonly provided for pediatric diarrhea. Because these factors are not related to the intervention, this report presents findings for the aggregated group of both treatment and control facilities.

⁹ SHOPS also tested results using a multiple regression framework, controlling for exogenous covariates such as age, years of experience, sex, education, whether the owner or another person was trained, urban-rural status, and the date of the survey. However, the results were similar in terms of magnitude and statistical significance to the unadjusted coefficients, which is expected given the randomized assignment to treatment.

3.6 GENERALIZABILITY OF FINDINGS

In terms of generalizability of the results from this study, the reasons for nonresponse across both experimental groups suggest that the analysis sample (those LCS who were interviewed) is likely to be less isolated than the full experimental group sample (those interviewed and not interviewed), in terms of geography and access to communication. Specifically, because a phone call was used to gain permission to interview the LCS and directions to their facility, the analysis sample is more likely to contain facilities operated by LCS who have their phone in operation, and facilities located in more accessible areas, or areas with more reliable phone service. Thus, the impacts estimated for the analysis sample might be larger than would be the case for the total treatment and control group sample, because the intervention was based on mobile phones. While the analysis sample for this study cannot be considered representative of Sub-Saharan Africa, or even all of Ghana, this study can be considered as an illustrative example of areas of Sub-Saharan Africa that have reliable mobile phone access. Given the rapid growth in mobile phone network access and use across Sub-Saharan Africa, SMS interventions may be appropriate in many settings in Sub-Saharan Africa.

3.7 LIMITATIONS

Training, detailing visits, and mass media campaign evaluation

Evaluating the impact of the training, detailing visits, and mass media campaign is limited by the absence of a true baseline survey. Thus, the study team is not comparing the post-intervention results with data collected through a similar pre-intervention survey. A related limitation is that the new introduction of zinc into the Ghanaian market would likely have led to some level of use regardless of the SHOPS training, detailing visits, and mass media campaign, but the authors cannot determine the exact level. An additional limitation is that the results of each individual intervention – the training, detailing visits, and mass media campaign – cannot be disaggregated and analyzed separately. These interventions were provided as a package and this study cannot determine their relative impacts.

SMS evaluation

As only those LCS who attended an in-person training session and opted into the SMS intervention were interviewed, this study cannot determine with certainty the effects of the various interventions on LCS who did not meet these inclusion criteria. Additionally, because of financial limitations and the scale of the logistical requirements for locating and surveying small shops across a large geographic area, the interview process lasted approximately five months. Thus, some of the effect of the interventions may have decreased over time. The date at which the interviews occurred was included as a covariate in the multiple regression analyses, but did not appear to play a significant role in provider knowledge or practices.

4. FINDINGS

4.1 IMPACT OF TRAINING, DETAILING VISITS, AND MASS MEDIA INTERVENTIONS

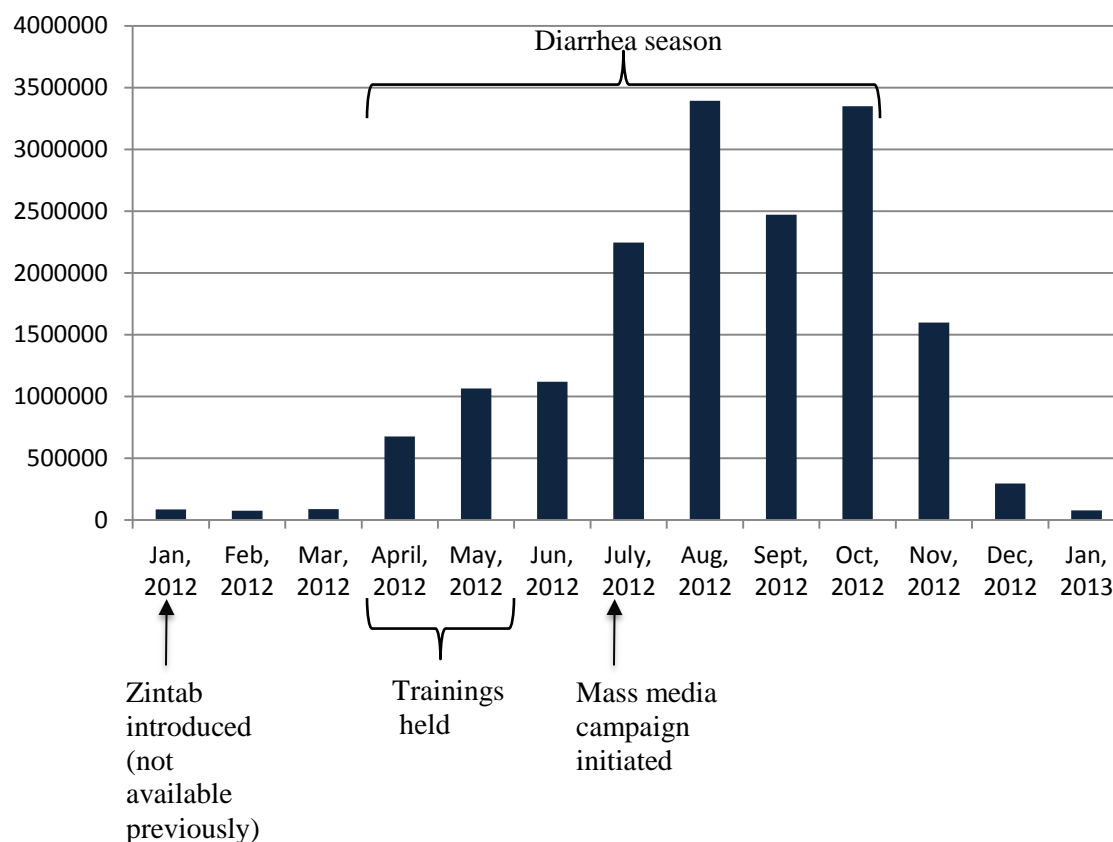
To address the extent to which the SHOPS training, detailing visits, and mass media campaign increased provision of zinc by LCS, the study draws on data from two sources: the monthly wholesale sales data of zinc from M&G Pharmaceuticals, and the mystery client survey data from the sub-sample of LCS who received training, detailing visits, and mass media campaign, but did not receive SMS.

4.1.1 ZINC SALES

Given that zinc was not previously available in the private sector and that M&G was the sole provider of zinc tablets (Zintab) to private providers, the authors assume that the overall sales of M&G's tablets are a reliable proxy for the uptake of zinc by private sector providers generally. While M&G also sold a limited number of tablets to the public sector, the sales to the private sector were more than sixteen times the number of tablets distributed by the public sector, and thus the study assumes that the majority of the observed zinc sales were driven by the private sector.

M&G pharmaceuticals began distributing its zinc products to its entire, well-established network of wholesalers across Ghana in January 2012. However, sales of zinc remained under 100,000 tablets (10,000 treatments) per month until the onset of the April-October rainy season, when diarrhea is more common, and the SHOPS trainings commenced. During April and May 2012 there are sharp increases in the monthly sales of Zintab (Figure 5), though the relative impact of the trainings versus the demand driven by rainy season diarrhea cannot be disaggregated given their similar starting dates. However, zinc sales more than doubled to 2.4 million tablets (240,000 treatments) with the commencement of the SHOPS media campaign in July. At their 2012 peak, zinc sales reached 3.4 million tablets (340,000 treatments) in August.

FIGURE 5: MONTHLY WHOLESALE SALES OF ZINTAB



4.1.2 ZINC PROVISION BY PRIVATE PROVIDERS

Given that zinc products for pediatric diarrhea were unavailable to LCS prior to January 2012, when M&G Pharmaceuticals’ zinc tablets became available, the study team assumes that LCS would have limited ability to sell zinc tablets for pediatric diarrhea and minimal knowledge of zinc as a diarrhea treatment. While it is possible that some LCS may have somehow obtained zinc tablets through other means, this appears unlikely. Thus, the authors estimate that zinc provision among LCS in Ghana prior to January 2012 was close to zero, whether during diarrhea season or at other times. When the mystery client survey was conducted in August 2012-January 2013, 66 percent of the control group of LCS provided zinc to the mystery client. This represents a substantial increase in the number of LCS providing zinc. However, the study team does not attribute the entire 66 percent increase to the SHOPS training, detailing, and mass media interventions, given the assumption that even in their absence, some level of zinc sales would have still taken place.

4.2 IMPACT OF SMS

To address whether the SMS intervention that followed the initial trainings had an impact on providers knowing the appropriate treatment to provide, and on providing the appropriate treatment, this report examines the results of the mystery client survey and the provider survey below.

4.2.1 PROVIDER KNOWLEDGE

Self-reported behavior was analyzed for first and second most-recommended products for management of childhood diarrhea, as shown in Table 4. There is a small difference in reported recommendation of ORS and zinc that is not statistically significant. However, there is a larger and statistically significant difference between the treatment and control groups in the reported use of both antimicrobials (5.6 percentage points less among treatment group) and “ideal recommendation” (ORS and zinc: 6.6 percentage points more among treatment group). The 5.6 percentage point difference in reported use of antimicrobials represents a 48.6 percent increase in knowledge of the appropriate treatment, and 6.6 percentage point difference represents a 9.3 percent increase in knowledge of the appropriate treatment. This demonstrates that the treated LCS learned or retained more about the appropriate treatment for uncomplicated diarrhea from the SMS intervention.

TABLE 4: REPORTED RECOMMENDATION OF PRODUCTS FOR CHILDHOOD DIARRHEA AMONG LCS IN GHANA BETWEEN TREATMENT AND CONTROL GROUPS¹⁰¹¹

	Treatment Mean (SD)	Control Mean (SD)	Difference Coeff. (SE)	Percent Impact
<i>LCS cites ORS among the products they recommend most or second most</i>	0.903 (0.295)	0.886 (0.317)	0.016 (0.023)	1.8%
<i>LCS cites zinc among the products they recommend most or second most</i>	0.807 (0.394)	0.765 (0.424)	0.042 (0.030)	5.5%
<i>LCS cites antimicrobials as product they recommend most (first choice)</i>	0.059 (0.236)	0.115 (0.320)	-0.056* (0.021)	48.6%*
<i>LCS cites antidiarrheals as product they recommend most (first choice)</i>	0.008 (0.091)	0.023 (0.150)	-0.014 (0.009)	60.8%
<i>Ideal reported behavior: LCS cites both zinc and ORS as the two products the most commonly recommend, and doesn't recommend antimicrobials or antidiarrheals.</i>	0.774 (0.418)	0.707 (0.455)	0.066** (0.033)	9.3%**
Total observations (n)	345	354	699	699

* Statistically significant at the $p \leq 0.10$ level

** Statistically significant at the $p \leq 0.05$ level

¹⁰ Each outcome variable was tested with sex-disaggregation. The respondents' sex had no statistical difference in any of the outcomes.

¹¹ SHOPS counted each response that included ORS and each response that included zinc, because LCS may have felt obligated to name each treatment separately as their first and second choices, even though the recommendation is that ORS and zinc be administered together. Meanwhile, some LCS cited ORS and zinc together as their first choice of diarrhea treatment, and felt that it was difficult to say if they recommend one over the other. These questions were unprompted, but there was a response option of “ORS + zinc” as a given choice. Because respondents who said “ORS + zinc” as their first choice may have felt obligated to cite a different treatment when asked for their second choice, the study did not consider citing antimicrobials as their second choice as a negative outcome, and only consider antimicrobials cited as their first choice of products they recommend most for childhood diarrhea.

4.2.2 PROVIDER BEHAVIOR

Results from the impact analysis of the treatment on actual behavior of the LCS, as measured by the mystery client survey, are shown in Table 5. None of the observed differences were statistically significant. Nearly half of the LCS, all of whom attended the training, provided antimicrobials, and one-tenth recommended antidiarrheals, contrary to current WHO/UNICEF recommendations. Thus, the results from the mystery client survey suggest that LCS provision of antimicrobials remains high despite training.

TABLE 5: RECOMMENDATION OF PRODUCTS TO MANAGE UNCOMPLICATED CHILDHOOD DIARRHEA: COMPARISON BETWEEN TREATMENT AND CONTROL GROUPS

	Treatment Mean (SD)	Control Mean (SD)	Difference Coeff. (SE)	Percent Impact
<i>Recommended ORS</i>	0.807 (0.394)	0.785 (0.411)	0.022 (0.030)	2.6%
<i>Recommended Zinc</i>	0.657 (0.475)	0.660 (0.474)	-0.003 (0.035)	-0.4%
<i>Recommended Antimicrobials</i>	0.461 (0.499)	0.495 (0.500)	-0.033 (0.037)	-6.6%
<i>Recommended Antidiarrheals</i>	0.121 (0.327)	0.104 (0.306)	0.017 (0.024)	16.3%
Total observations (n)	345	353	698	

4.3 DESCRIPTIVE ANALYSES TO INFORM FINDINGS FROM SMS EVALUATION

Given that the study detected an impact of the SMS intervention on provider knowledge of the appropriate treatment for pediatric diarrhea, but failed to detect an impact on actual behavior, additional data from the face-to-face provider survey and the mystery client survey are presented to explore possible reasons for providers to continue recommending inappropriate treatments such as antimicrobials and antidiarrheals.

4.3.1 REPORTED EXPERIENCE WITH CLIENT REFUSALS WITH ORS AND ZINC

In the survey, 25 percent of the 660 LCS who reported recommending ORS to their clients reported that they have experienced caregivers refusing ORS when they recommended it. The most common reason cited by LCS for caregiver refusal of ORS is the taste (46.7 percent across both groups) followed by caregivers preferring treatments with which they have more experience (17.9 percent across both groups) (Table 6). These results are descriptive, and thus the results are aggregated across the treatment and control groups because the SMS intervention is not likely to have had any impact on these measures.

TABLE 6: MOST COMMONLY CITED REASONS FOR CAREGIVERS REFUSING ORS

	Mean	Standard Deviation
<i>Tastes bad</i>	0.467	0.500
<i>Prefer treatments they have experience with</i>	0.179	0.385
<i>Takes too long to have effect</i>	0.161	0.369
<i>Too expensive</i>	0.089	0.286
<i>Prefer antibiotics</i>	0.059	0.237
Total observations (n; combined treatment and control groups)	167	

Note: Among the 167 LCS who have experienced ORS refusals by clients; multiple responses allowed.

Fewer LCS report that they have experienced refusals of zinc compared to refusals of ORS: 12.3 percent of those who have recommended zinc report that caregivers refused to purchase it. This may be due to the fact that zinc is simply a newer product. The most frequently cited reasons for caregivers refusing zinc as reported by LCS, are listed below in Table 7. The most common reason cited by LCS for caregiver refusal of zinc is caregivers preferring treatments with which they have more experience (38.8 percent across both groups) followed by not having heard about zinc (26.3 percent).

TABLE 7: MOST COMMONLY CITED REASONS FOR CAREGIVERS REFUSING ZINC

	Mean	Standard Deviation
<i>Prefer treatments they have experience with</i>	0.388	0.490
<i>Never heard of it</i>	0.263	0.443
<i>Too expensive</i>	0.111	0.316
<i>10 days is too long to take zinc</i>	0.083	0.278
<i>Not effective</i>	0.069	0.255
<i>Prefer antibiotics</i>	0.069	0.255
Total observations (n; combined treatment and control groups)	72	

Notes: Among the 72 LCS who have experienced ORS refusals by clients; multiple responses were allowed.

4.3.2 REPORTED CLIENT PREFERENCES FOR TREATMENT OF DIARRHEA

As shown in Table 8, when LCS were asked what treatments were commonly requested by clients for pediatric diarrhea, the most common response was the antimicrobial Flagyl (metronidazole) at 33.4 percent. ORS was reportedly requested almost as often as Flagyl (33.1 percent of LCS), but zinc was not frequently reported as a product commonly requested by clients.

TABLE 8: PRODUCTS MOST COMMONLY REQUESTED BY CAREGIVERS

	Mean	Standard Deviation
<i>Caregivers request Flagyl (metronidazole)</i>	0.334	0.472
<i>Caregivers request ORS</i>	0.331	0.471
<i>Caregivers request amoxicillin</i>	0.138	0.345
<i>Caregivers request Septrin (cotrimoxazole)</i>	0.097	0.296
<i>Caregivers request zinc</i>	0.035	0.185
Total observations (n; combined treatment and control groups)	699	

Note: Multiple responses allowed

4.3.3 ESTIMATED PROFITS FOR DIARRHEA TREATMENTS

To generate additional information regarding the possible incentives that may influence the treatments that an LCS provides for pediatric diarrhea, the SHOPS team collected wholesale prices (prices charged to LCS for stock) of products¹² commonly used for pediatric diarrhea from six wholesalers. The average wholesale prices of these products are compared with the average price that LCS charged the mystery clients for these products, thus yielding an estimate of the profit margin for each type of product. As shown in Table 9, the estimated profit margins for antimicrobial and antidiarrheal products are higher than for ORS or zinc.

TABLE 9: ESTIMATED AVERAGE PROFITS OF DIARRHEA TREATMENTS

Product	Average price across six wholesalers (GHS ^a)	Average retail price paid by mystery client (GHS)	Estimated Profit (GHS)
Antimicrobials (blister pack/bottle)	1.6	5.05	3.45
Antidiarrheals (x10 capsules)	0.85	3.68	2.83
ORS (3 sachets)	0.82	1.29	0.46
Zinc 10mg (10 tablet blister)	0.23	1.26	1.02
Zinc 20mg (10 tablet blister)	0.34	1.46	1.11

^a1 Ghanaian cedi (GHS)=0.44 USD

¹² Flagyl (metronidazole) was by far the most common antimicrobial provided by LCS, Imodium (loperamide) was the most common antidiarrheal. Thus, pricing estimates are based on the various locally-available versions of these two products. The number of capsules for antidiarrheals (10 capsules) and ORS (3 sachets) was determined to be the amount that would typically be sold, based on discussions with local Ghanaian pharmacist staff.

5. DISCUSSION AND LESSONS LEARNED

This report presents the results from a modified pre-post evaluation of training, detailing visits, and mass media campaign, a randomized evaluation of a SMS intervention to reinforce knowledge gained from the training, and descriptive analysis of the survey data used for these studies to shed light on possible barriers that LCS face in providing appropriate treatment for pediatric diarrhea. Several of the key lessons learned are discussed below:

- ***Training, detailing visits, and mass media campaign increased zinc provision dramatically***

This analysis demonstrates that the training, detailing visits, and mass media campaign led to large increases in zinc provision among LCS in Ghana. The monthly nationwide wholesale sales of the Zintab zinc tablets were close to zero prior to January 2012 and reached a total of 3.4 million tablets during August 2012. Likewise, given 66 percent of LCS sold Zintab for treatment of diarrhea during the mystery client survey, the study concludes that the combination of training, detailing visits, and mass media campaign was very effective in increasing LCS provision of zinc for pediatric diarrhea. Future regional or national programs that seek to introduce zinc or other products and increase the scale of their provision may benefit from adopting similar programs incorporating training, detailing visits and mass media campaigns.

- ***The SMS intervention increased knowledge about appropriate pediatric diarrhea treatment—if this increase in knowledge could be translated to change in provider behavior, then the SMS intervention could have a substantial public health impact***

While it appears that most of the LCS in the study were familiar with zinc due to their exposure to the other interventions, the addition of an SMS-based intervention further improved knowledge (as indicated by self-reported practices) among LCS. We found that the SMS messages reduced the rate of LCS reporting antimicrobials as the product they most recommend for pediatric diarrhea by 5.6 percentage points (48.6 percent), from 11.5 percent among the control group to 5.6 percent among the treatment group. The SMS also increased the rate of LCS reporting ORS and zinc as the products that they most recommend by 6.6 percentage points (9.3 percent), from 70.7 percent among the control group to 77.4 percent among the treatment group.

If this difference in knowledge could be translated into improvements in behavior, the SMS intervention could have a substantial public health impact. With roughly 10,000 LCS in Ghana, if the program were scaled to the national level, a 6.6 percentage point increase could result in 660 more LCS who know the correct treatment for uncomplicated diarrhea among children. The average number of children seen for diarrhea by each LCS in the survey was 17 children per week during the rainy season and 9 children per week during the dry season; this average of 13 children per week translates into 676 children per year per LCS, or an additional 446,160 cases of childhood diarrhea in Ghana per year that could potentially be treated by LCS who know the appropriate treatment. Thus, if improved knowledge could be translated into improved practices, the relatively low-cost SMS intervention has the potential to improve treatment of childhood diarrhea substantially.

- ***Despite improvements in knowledge as a result of the SMS, the study did not detect an impact on provider behavior***

This study finds that improvements in knowledge were not accompanied by detectable improvements in behavior. There are a number of possible explanations. One issue is the high rates of ORS and zinc provision in both control and treatment groups left less room for improvement and thus made it more difficult to detect an additional impact from the SMS message campaign.

The failure to detect an impact on provider behavior may also be attributed to aspects of the intervention itself. Text messages vary along numerous dimensions, all of which can affect message impact:

- **Message content:** Consistent with the study's theory of change, the SHOPS messages were purely informational content taken directly from the training materials. The SMS message content focused on the symptoms of uncomplicated diarrhea, benefits of zinc/ORS, instructions for caregivers on how to use, and only twice discouraged the sales of ineffective antimicrobials for uncomplicated diarrhea. It is possible that focusing messages on other topics, or behavioral change communications strategies may have greater impact.
- **Message duration and frequency:** The SHOPS intervention lasted just 8 weeks, with one interactive quiz, one follow-up message and one tip each week. In a Kenya-based study (Zurovac et al. 2011), a campaign of daily messages for 6 months improved health worker adherence to malaria protocols, but SHOPS was concerned about message fatigue and selected a shorter intervention. It is possible that a longer or more intense SMS campaign could have greater impact.
- ***Consumer interactions, profit margins, and other factors may explain why improvements in knowledge did not translate into improvements in provider behavior***

In the mystery client survey, the client did not ask for any particular product, so the LCS was not responding to the individual's demands. Nevertheless, the sales of inappropriate diarrhea treatments were substantial. If clients tend to prefer a particular product, then the LCS might assume that a new client would as well. When LCS were asked what treatments were commonly requested by clients for pediatric diarrhea, the most common response was the antimicrobial Flagyl (metronidazole). Meanwhile, 25 percent of the respondents report that some caregivers refused ORS and 12 percent of those who had recommended zinc report that some caregivers refused to purchase it.

Consistent with the literature on profit motives, a comparison of the wholesale prices at which LCS purchase their products with the retail prices charged to the mystery clients shows that both antimicrobials and antidiarrheals offer a larger profit margin than ORS and zinc, by roughly US\$0.50 to US\$1 per prescription. In addition, many providers who provide the recommended ORS and zinc combination are also providing antimicrobials, a choice that may be motivated by a desire to sell more products and or generate more profits.

In order to examine the barriers and motivating factors associated with treating pediatric diarrhea, SHOPS is conducting a follow-up qualitative study. Based on the findings presented in this report, the qualitative study hypothesizes that drug retailers' dispensing outcomes are not only influenced by factors such as product awareness, knowledge transfer, price sensitivity, and preferences, but are also moderated by the negotiating nature of the LCS-customer transaction preceding the dispensing decision. Analysis of participants' responses is anticipated to illuminate treatment obstacles and contribute to the existing literature on best practices in private provider behavior change in Ghana and elsewhere.

Future trainings of private providers may also want to address the issue of consumer demands in a more direct manner, through discussion and/or role play. Enhancing the counseling skills of providers to strengthen the provider-consumer interaction is an important next step in the training continuum. LCS are members of their communities, and want to be known as a trusted source of health information and treatment. The qualitative research to be conducted in Ghana should provide the SHOPS team with important information on how to influence this interchange and provide the basis for a second generation of training curriculum that can include counseling skills.

- ***Provision of antimicrobials and antidiarrheals is still a major problem in Ghana***

The results from the mystery client survey demonstrated that overall provision of antimicrobials and antidiarrheals is still high, at 48 percent and 11 percent, respectively, even among LCS who had attended a training that specifically discouraged providing antidiarrheals for children, and recommended only providing antimicrobials if a child has blood in their stool. Thus, reducing inappropriate use of antimicrobials and use of antidiarrheals for uncomplicated pediatric diarrhea remains a major challenge in Ghana.

6. CONCLUSIONS

The SHOPS training, detailing, and mass media interventions were effective in introducing and scaling up the provision of zinc among Ghana's LCS. The provision of ORS also appears quite high overall among these healthcare providers. However, similar to the findings of recent studies in other developing countries, the inappropriate provision of antimicrobials and antidiarrheals remains a significant problem in Ghana. This study demonstrated that overall provision of antimicrobials and antidiarrheals is still high, at 48 percent and 11 percent respectively, even among LCS who attended a training that specifically discouraged providing antidiarrheals for children and recommended only providing antimicrobials if a child has blood in their stool. Thus, reducing inappropriate use of antimicrobials and use of antidiarrheals for uncomplicated pediatric diarrhea remains a major challenge in Ghana.

As mobile phone technology expands throughout developing countries and rapidly decreasing hardware and connectivity costs allow growing numbers of low-income people to use this technology, mobile health interventions are likely to play an increasingly important role. The inclusion of an SMS message mobile health component into the package of diarrhea management interventions and evaluations provided an opportunity to examine a low-cost mechanism for disseminating information and conducting interactive learning with healthcare providers. The study concluded that although the eight weeks of tips and interactive quizzes yielded an improvement in provider knowledge, it did not have a detectable impact on provider behavior. That said, the science of mobile health implementation is nascent, and this study presents an evaluation of a specific iteration of mobile health methods. Research is needed to further identify elements to maximize effectiveness of text messages as a tool to improve provider quality of care. It may also be useful to test various levels of SMS campaign intensity and length—because the bulk of the cost of SMS campaigns is in initial setup, additional weeks or months of text messages could be added at little additional cost. All SMS campaigns should be closely monitored to assess their resonance with the recipients and continuously adapted to provider needs.

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8.ANNEX A: INSTRUMENTS

8.1 PROVIDER SURVEY:

Question ID	Question	Answer/ Entry Field
1	INTERVIEWER NAME	
2	FIELD SUPERVISOR NAME:	
3	QUALITY CONTROLLER NAME:	
4	CODES FOR RESULT:	1= Completed 2= Refused to be interviewed 3= Interview postponed 4= Interview partially completed 5= Other (specify)
5	Consent: Did you read the consent form to the respondent and obtain their consent to be interviewed?	Yes No
6	Just to be sure I'm at the right place, is this the facility where (Insert name from your interview sheet) works?	Yes No
7	Am I speaking with (Insert Name)?	Yes No
8	On average, how many patients or clients come to your shop in one day?	

9	On an average, for how many cases of childhood diarrhea do you provide advice and/or treatment in one 7 day week?	
	<i>Number of cases per week during rainy season</i>	
	<i>Number of cases per week NOT during rainy season</i>	
10	On an average, for how many cases of childhood diarrhea do you provide advice and/or treatment per day in the rainy season and the non-rainy season?	
	<i>Number of cases per DAY during rainy season</i>	
	<i>Number of cases per DAY NOT during rainy season</i>	
11	Do you currently recommend antibiotic treatments (Flagyl, Cipro, Septrin, or others) for children under 5 with diarrhea?	Yes No
12	In which instances do you recommend antibiotics?	<ol style="list-style-type: none"> 1. In all cases 2. If diarrhea is uncomplicated (no blood/no mucus/no fever) 3. If diarrhea complicated (blood/mucus/fever) 4. Other (specify):
13	Do you currently recommend antidiarrheal treatments or products (such as Imodium and Kaolin) for children under 5 with diarrhea?	Yes No
14	In which instances do you recommend antidiarrheal treatments?	<ol style="list-style-type: none"> 1. In all cases 2. If diarrhea is uncomplicated (no blood/no mucus/no fever) 3. If diarrhea complicated (blood/mucus/fever) 4. Other (specify):

15	Do you currently recommend oral rehydration solution (ORS) for children under 5 with diarrhea?	Yes No
16	In which instances do you recommend ORS?	<ol style="list-style-type: none"> 1. In all cases 2. If diarrhea is uncomplicated (no blood/no mucus/no fever) 3. If diarrhea complicated (blood/mucus/fever)
17	Do you currently recommend zinc treatments or products for children with diarrhea?	Yes No
18	In which instances do you recommend zinc?	<ol style="list-style-type: none"> 1. In all cases 2. If diarrhea is uncomplicated (no blood/no mucus/no fever) 3. If diarrhea complicated (blood/mucus/fever) 4. Other (specify):
19	Of the medicines and products that you keep in stock for diarrhea, what is the treatment that YOU recommend most often for diarrhea in Children under 5?	<ol style="list-style-type: none"> 1. ORS 2. Zinc tablets 3. ORS & Zinc 4. Amoxicillin 5. Septrin (Cotrimoxazole) 6. Flagyl (metronidazole) 7. Ryflox (Flucoxacillin) 8. M & B 9. Cipro (Ciprofoxacin) 10. Vermox (Mebendazole) 11. Kaolin 12. Loprex (Loperimide) 13. Peptobismol (pink bismuth) 14. Herbal Remedies 15. Other (specify):

20	Can you tell me why you usually recommend this treatment?	<ol style="list-style-type: none"> 1. Works fastest to stop episode of diarrhea 2. Affordable for clients (good price) 3. Good profit margin (for LCS) 4. Recommended by national treatment guidelines 5. Clients (caregivers) prefer it to other options 6. Easy to use/administer/better compliance 7. It kills germs/infection/bacteria/parasites/amoe bas 8. Few side effects 9. Recommended during diarrhea management training 10. It replaces fluids
21	Of the medicines and products that you keep in stock for diarrhea, is there a treatment that recommend the SECOND MOST OFTEN for diarrhea in children under 5?	<ol style="list-style-type: none"> 1. ORS 2. Zinc tablets 3. ORS & Zinc 4. Amoxicillin 5. Septrim (Cotrimoxazole) 6. Flagyl (metronidazole) 7. Ryflox (Flucoxacillin) 8. M & B 9. Cipro (Ciprofoxacin) 10. Vermox (Mebendazole) 11. Kaolin 12. Loprex (Loperimide) 13. Peptobismol (pink bismuth) 14. Herbal Remedies 15. Other (specify):
22	Can you tell me why you usually recommend this treatment?	<ol style="list-style-type: none"> 1. Works fastest to stop episode of diarrhea 2. Affordable for clients (good price) 3. Good profit margin (for LCS) 4. Recommended by national treatment guidelines 5. Clients (caregivers) prefer it to other options 6. Easy to use/administer/better compliance 7. It kills germs/infection/bacteria/parasites/amoe bas 8. Few side effects 9. Recommended during diarrhea management training 10. It replaces fluids

23	What treatments/products/medications do caregivers commonly request for children under age 5 with diarrhea?	<ol style="list-style-type: none"> 1. ORS 2. Zinc tablets 3. ORS & Zinc 4. Amoxicillin 5. Septrim (Cotrimoxazole) 6. Flagyl (metronidazole) 7. Ryflox (Flucoxacillin) 8. M & B 9. Cipro (Ciprofoxacin) 10. Vermox (Mebendazole) 11. Kaolin 12. Loprex (Loperimide) 13. Peptobismol (pink bismuth) 14. Herbal Remedies 15. Other (specify):
24	Have you ever had caregivers refuse to buy ORS if you offered it?	<p>Yes No N/A</p>
25	What reasons are given by caregivers for NOT wanting to use ORS?	<ol style="list-style-type: none"> 1. Takes too long to have effect 2. Tastes bad/child refuses to drink it/ vomits it 3. Expensive 4. They prefer antibiotics 5. They prefer antidiarrheal 6. Never heard of it 7. They prefer treatments they have experience with 8. Other (specify):
26	Have you ever had caregivers refuse to buy zinc if you offered it?	<p>Yes No N/A</p>
27	If you've experienced caregivers refusing zinc, what reasons are given by caregivers for NOT wanting to use zinc?	<ol style="list-style-type: none"> 1. 10 days too long for the child to take 2. Tastes bad/child refuses to take 3. Zinc takes too long to work, not effective 4. Expensive/can't afford 5. They prefer antibiotic 6. They prefer antidiarrheal drugs 7. Never heard of it 8. Nothing works on diarrhea 9. They prefer treatments they have experience with 10. Other (specify):

Question ID	Question	Answer
28	Which signs/symptoms do you look for or ask about for children presenting with diarrhea?	<ol style="list-style-type: none"> 1. Dehydration 2. Inability to drink 3. Vomiting 4. Mucus in stools 5. Blood in stools 6. Duration of diarrhea 7. Fever
29	How do you assess dehydration?	Skin Pinch Sunken Eyes Observation for lethargy
30	I would like to ask a few questions about diarrhea treatments. Please tell me whether you agree or disagree with the following statements	
1	<i>All children with diarrhea should be given oral rehydration salts or solution (ORS) and increased fluids. (e.g. coconut water, Breast milk, rice water etc)</i>	Agree Disagree Don't Know Refused
2	<i>Antidiarrheal drugs (such as Imodium and Kaolin) should not be given to children under five years of age</i>	Agree Disagree Don't Know Refused
3	<i>If a child has uncomplicated diarrhea and no fever, an antibiotic is the most effective treatment</i>	Agree Disagree Don't Know Refused
4	<i>Children with severe dehydration should be immediately referred to a health center</i>	Agree Disagree Don't Know Refused
5	<i>Children who cannot drink/nurse should be referred to a health center</i>	Agree Disagree Don't Know Refused

Question ID	Question	Answer
31	Have you heard of zinc as a treatment for pediatric diarrhea?	Yes No

32	What was the source of this information?	<ol style="list-style-type: none"> 1. Television 2. Radio 3. Medical journal/margazine 4. Licensed Chemical Sellers association 5. Pharmacy Council training 6. Colleagues/Friends 7. Medical or drug representatives
33	Do you currently sell zinc tablets for treating diarrhoea in children?	<p>Yes, and they are in stock</p> <p>Yes, but the shop is sold-out of them</p> <p>No</p>
34	Do you know how and where to obtain zinc tablets for treating diarrhoea in children? (from what suppliers do you get them)	<p>Yes, I know where and how to get them</p> <p>No</p>
35	What are reasons for recommending zinc treatment for children with diarrhea?	<ol style="list-style-type: none"> 1. Most effective treatment for childhood diarrhea 2. Works well to treat childhood diarrhea 3. Follows national diarrhea management guidelines 4. Other products are more expensive/zinc is more affordable 5. Zinc has a protective effect, reduces risk of future diarrhea episodes 6. Zinc reduces the severity of diarrhea 7. Zinc reduces the duration of diarrhea 8. Zinc is easy to use 9. Other (specify): 10. Don't Know
36	What are reasons for not recommending zinc treatments or products for children with diarrhea?	<ol style="list-style-type: none"> 1. Zinc takes too long to work, not effective 2. I've never heard of it 3. I don't know enough about it to trust prescribing it as a treatment 4. Zinc is more expensive than other treatments 5. Caregivers prefer antibiotic/antimicrobial 6. Caregivers prefer antidiarrheal 7. 10 days too long for the

		<p>child to take</p> <ol style="list-style-type: none"> 8. Zinc tastes bad 9. Nothing works on diarrhea 10. Not profitable /low margins 11. Never/Seldom prescribed by provider (such as doctors) 12. Cannot obtain zinc from suppliers 13. None/No reason not to recommend 14. Other (specify): 15. Don't Know
37	Is the retail price (the price customers pay) for zinc too low, about right, or too high?	<ol style="list-style-type: none"> 1. Retail price is too low 2. Retail price is about right 3. Retail price is too high 4. Don't Know
38	Is the wholesale (your supplier) price for zinc too low, about right, or too high?	<ol style="list-style-type: none"> 1. Wholesale (your supplier) price is too low 2. Wholesale (your supplier) price is about right 3. Wholesale (your supplier) price is too high 4. Don't Know
39	Is the profit margin (the difference between wholesale and retail prices) that you make from selling zinc too low, about right, or too high?	<ol style="list-style-type: none"> 1. Profit margin is too low 2. Profit margin is about right 3. Profit margin is too high 4. Don't Know
40	Which product offer the highest profit margin for sellers?	<ol style="list-style-type: none"> 1. Zinc 2. Antibiotic 3. Antidiarrheal 4. Don't Know
41	Do you or someone in your facility receive SMS text messages regarding zinc from the Ghana Pharmacy Council?	Yes No
42	Did the messages help to remind you to order more zinc if needed?	Yes No
43	Please tell me whether you agree or disagree with the following statements	
1	<i>A caregiver should stop administering zinc tablets as soon as the diarrhea stops</i>	<i>Agree</i> <i>Disagree</i> <i>Don't Know</i> <i>Refused</i>

2	<i>If zinc is prescribed for uncomplicated diarrhea (no blood in stools no fever), you should also prescribe an antibiotic such as Flagyl.</i>	Agree Disagree Don't Know Refused
3	<i>If a child has blood in stools, you should prescribe an antidiarrheal such as Imodium or kaolin.</i>	Agree Disagree Don't Know Refused
4	<i>Zinc can help prevent future episodes of diarrhea for up to 1 year.</i>	Agree Disagree Don't Know Refused
5	<i>If a child is prescribed zinc, they should also be prescribed ORS.</i>	Agree Disagree Don't Know Refused
6	<i>The appropriate dose of zinc for a 2 year old child is a 10mg (yellow) tablet or ½ of a 20mg (orange) tablet.</i>	Agree Disagree Don't Know Refused
7	<i>Children need to take the full 10 day course of zinc</i>	Agree Disagree Don't Know Refused

Question ID	Question	Answer
44	What is your name?	
45	What is your age?	
46	What is the respondent's gender	Male Female
47	Are you an LCS or a Shop Assistant?	LCS Shop Assistant
48	For how many years have you worked as a chemical seller/assistant?	
49	What is the highest level of education that you ever attended?	<ol style="list-style-type: none"> 1. Primary school 2. Junior Secondary School/ Middle school 3. Senior Secondary school/O level / A level 4. Tertiary: Training college, nursing college, polytechnic, university 5. Post graduate 6. Doctorate

50	Observe, don't ask: How many clients came to the shop during the time of your interview?	
51	Can I please take your phone number?	Yes Refused
52	Please enter 9 digits excluding country code (233)	
53	Thank you for participating in this study!	

Question ID	Question
54	Region
55	District
56	Town/Village
57	LCS Facility Name
58	LCS FACILITY UNIQUE ID #
59	2nd MATCHING NUMBER
60	ENUMERATION AREA NAME :
61	AREA (urban/rural)
62	Please take a picture of the facility's sign
63	END OF PROVIDER QUESTIONNAIRE

8.2 MYSTERY CLIENT INSTRUCTIONS AND RECORD

Instructions for Mystery Clients:

When you go to the LCS, tell whoever is working there that you have a child with diarrhea. Don't give them any other details until they ask for them.

If the provider asks, answer the following:

Your son Joseph has had diarrhea for about 24 hours.

The stools are very frequent, about 6 per day.

He is 2 years old.

He weighs 15 kilos.

There is NO blood in his stools.

There is NO mucus in his stools.

He has NO fever.

He has NO vomiting.

He IS able to drink, and you have given him some water and food.

His eyes and skin look normal to you.

You have NOT given him any medicine yet.

You cannot bring him into the LCS because he is with his father at his grandmother's house.

If the provider asks any other questions, such as "What sort of water do you have at home?" just answer as you would for your own home.

When the provider sets medicines on the counter or hands them to you, you should purchase the products, up to your allowance of 10 GHC. If what the provider recommends is more than 10 GHC, tell him you can only spend 10 GHC and ask what he recommends. Do remember if the provider gives an explanation of how to use the products.

Question ID	Question	Answer/Entry Field
1	When you asked for a treatment for your child's diarrhea, did the provider just give you a product without counseling or advising you?	Yes No
2	Did the health provider ask you about the details of the child with diarrhea?	Yes No
3	Which of the following information was discussed?	
3.1	<i>Age of Child</i>	Yes No
3.2	<i>Duration of diarrhea</i>	Yes No
3.3	<i>Presence of blood in stool</i>	Yes No
3.4	<i>Presence of mucus in stool</i>	Yes No
3.5	<i>Vomiting</i>	Yes No
3.6	<i>Fever</i>	Yes No
3.7	<i>Inability to drink</i>	Yes No
3.8	<i>Signs of dehydration in the child (e.g. child very thirsty, lethargic, sunken eyes, skin-pinch inelastic)</i>	Yes No
3.9	<i>Did the provider ask you if you have given any treatment to the child?</i>	Yes No
4	<i>Did the provider prescribe any treatment for the child?</i>	Yes No
5	If the provider prescribed a treatment, what did they prescribe?	

5.1	Antibiotic pills / syrup	Yes No
5.2	Antidiarrheal pills / syrup	Yes No
5.3	ORS	Yes No
5.4	Zinc	Yes No
5.5	Other describe:	Yes No
5.6	Description (left as mq_5_s)	<i>text</i>
6	Did the provider explain how to use the treatment?	Yes No
7	If the provider recommended zinc, did they explain the importance of completing the entire dosage (for 10 days)?	Yes No
8	If the provider recommended zinc, which of the following did they prescribe?	1. One yellow (10mg) tablet per day 2. Two yellow (10mg) tablets per day 3. One orange (20mg) tablet per day 4. ½ of an orange (20mg) tablet per day 5. Two orange (20mg) tablets
9	Did the provider ask you to bring the child to the Licensed Chemical Shop if the diarrhea does not	Yes No

	stop?	
10	Did the provider ask you to bring the child to a hospital if the diarrhea does not stop?	Yes No
11	How much did the recommended product cost?	numeric entry
12	If multiple treatments are recommended, note each of their costs.	
12.1	<i>Antibiotic pills / syrup</i>	numeric entry
12.2	<i>Antidiarrheal pills / syrup</i>	numeric entry
12.3	<i>ORS</i>	numeric entry
12.4	<i>Zinc</i>	numeric entry
13	If the provider does not mention zinc, note you saw an advert for zinc for diarrhea and ask what the provider thinks about it as a treatment for diarrhea.	
13.1	After you mentioned it, the provider recommended it and sold it to you ¹³	Yes No
13.2	They have never heard of it	Yes No
13.3	They have heard of it but don't sell it	Yes No
13.4	They sell it, but they are sold out of it	Yes No

¹³ Note that if a provider gave zinc after the mystery client mentioned it, it was NOT counted in the figures for the providers who gave zinc of their own volition. These prompted zinc recommendations were not included in any of the figures in the report for the rate at which zinc was recommended – they were simply included to generate information on how a provider might react to a client's inquiry about zinc. There were only six instances in which an LCS sold zinc to a mystery client after the mystery client mentioned seeing an advertisement for zinc.

13.5	Other (specify)	Yes No
13.6	specified text	Yes No
14	Please record any extremely important additional information about your visit to this LCS shop below (such as if something went wrong):	

Profile

Question ID	Question
15	AREA:
16	CLINIC/DRUG SHOP/PHARMACY ADDRESS:
17 auto generated	IDENTIFICATION;
17.1	<i>REGION:</i>
17.2	<i>DISTRICT:</i>
17.3	<i>TOWN/VILLAGE:</i>
18.1	<i>LCS FACILITY NAME:</i>
18.2	<i>ENUMERATION AREA NAME:</i>
19 autogenerated	RECORD NUMBER:
19.1	<i>LCS FACILITY UNIQUE ID #: (MUST MATCH WITH PROVIDER SURVEY)</i>
19.2	<i>2nd MATCHING NUMBER:</i>
20	LCS STREET NAME & HSE NO:
21	POSITION OF RESPONDENT(1. LCS 2. Shop Assistant)

ANNEX B: SMS MESSAGES

Revised SHOPS SMS message library and schedule diarrhea treatment education			
Date	Message #	Outbound Messages	Automated Replies
Thu June 7	Intro 1	<i>Hello! Next week you will start receiving text messages based on your LCS training. You have chance to win 10 cedi airtime credit if enough correct answers.</i>	
Fri June 8	Intro 2	<i>Greetings. Monday we will begin sending SMS quizzes on diarrhoea treatment, to show what you know. Remember to reply "SHOPS" with your answers to 1402.</i>	
Sat June 9	Intro 3	<i>Remember if you have any problems receiving messages, or changes to the phone number you provided, please contact Odartei at 0244732324</i>	
Mon June 11	Q1	<p><i>Giving zinc for current diarrhoea helps prevent diarrhoea in the future.</i></p> <p><i>Reply SHOPS T if statement is true or SHOPS F if statement is false</i></p>	<p>(If SHOPS T):</p> <p><i>Wow, right answer! Zinc is needed for full 10 days to help prevent future episodes for up to 3 months.</i></p> <p>(If SHOPS F):</p> <p><i>Sorry you are not correct, the statement is true. Zinc for diarrhoea WILL prevent a child from future diarrhoea episodes for up to 3 months</i></p>

Wed June 13	Tip	<i>Please remember: Giving a child with watery diarrhoea metronidazole or any antibiotic is useless. You may be harming the child.</i>	
Fri June 15	Q2	<p><i>To be most effective in treating diarrhoea, zinc should be given with:</i></p> <p>A. Metronidazole B. ORS C. Antibiotics D. Charcoal</p> <p><i>Reply "SHOPS" plus A, B, C or D</i></p>	<p>(If SHOPS B):</p> <p><i>CORRECT! Zinc together with ORS is most effective for the treatment of uncomplicated diarrhea in children.</i></p> <p>(If SHOPS A, C, D):</p> <p><i>Wrong answer. Zinc should always be given with ORS in order to prevent and treat dehydration. That is all you need to treat watery diarrhea in children!</i></p>
Mon June 18	Q3	<p><i>When should child with diarrhoea be treated with antibiotics:</i></p> <p>A. At all times B. Only when there is blood in the stool C. If dehydrated</p> <p><i>Reply "SHOPS" & A, B, or C</i></p>	<p>(If SHOPS B):</p> <p><i>That's correct! If there is no blood in the stool, then the child should only be treated with zinc and ORS.</i></p> <p>(If SHOPS A or C):</p> <p><i>No, that is incorrect! A child should ONLY be given antibiotics when there is blood in the stool. Otherwise prescribe zinc and ORS.</i></p>
Wed June 20	Correction Q3	<i>Sorry we did not hear from you. Correct answer to Monday quiz was SHOPS B. A child should only be given antibiotics when there is blood in the stool.</i>	
Thursday June 21	Tip	<i>Remember, if you have questions about diarrhoea treatment, you can call the National Drug Information Resource Centre at 0302 678559 to talk to an expert.</i>	

Mon June 22	Q4	<p><i>When should zinc treatment for diarrhoea stop?</i></p> <p><i>A. When the diarrhoea stops</i> <i>B. When child drinks enough</i> <i>C. When 10 day course is completed</i></p> <p><i>Reply "SHOPS" & A, B or C</i></p>	<p>(If SHOPS C):</p> <p><i>Good job! Zinc should be given for the full 10 days to prevent future episodes for up to 3 months.</i></p> <p>(If SHOPS A or B):</p> <p><i>I'm sorry, that's not correct. Treatment with zinc should be given for the full 10 days. Treatment should be continued even when the diarrhoea has stopped.</i></p>
Wed June 27	Correction Q4	<p><i>Sorry we did not get your quiz answer Monday. The answer was SHOPS C: Zinc should be given for the full 10 days to prevent future episodes for up to 3 months.</i></p>	
Thurs June 28	Tip	<p><i>Remember, it is important to counsel caregivers on how to prepare ORS properly.</i></p>	
Mon July 2	Q5	<p><i>Zinc is only a supplement and not an effective treatment for childhood diarrhoea. True or False?</i></p> <p><i>Reply SHOPS T if true or SHOPS F if false.</i></p>	<p>(If SHOPS T):</p> <p><i>Wrong answer! Zinc is not just a supplement. It is nationally recommended for treatment of childhood diarrhea in Ghana.</i></p> <p>(If SHOPS F):</p> <p><i>Very good! Zinc reduces seriousness and stops childhood diarrhoea faster. It also prevents future episodes.</i></p>

Wed July 4	Correction Q5	<p><i>[SENT ONLY TO THOSE WHO DON'T ANSWER July 2 QUIZ]</i></p> <p><i>Correct answer to last question was SHOPS F: Zinc is not just a supplement, it is nationally recommended treatment for pediatric diarrhoea.</i></p>	
Thurs July 5	Tip	<p><i>Never give a child with watery diarrhoea ANTIBIOTICS. You may be harming the child!</i></p>	
Mon July 9	Q6	<p><i>Prepared ORS should only be used on the same day it is made. True or False?</i></p> <p><i>Reply "SHOPS T" if true or "SHOPS F" if false.</i></p>	<p><i>(If SHOPS T):</i></p> <p><i>Great job! All of the solution should be used on the same day it is made. Left over solution should be discarded and a new batch prepared the next day.</i></p> <p><i>(If SHOPS F):</i></p> <p><i>That's wrong! All of the solution should be used on the same day it is made. Left over solution should be discarded and a new batch prepared the next day.</i></p>
Wed July 11	Correction Q6	<p><i>[SENT ONLY TO THOSE WHO DON'T ANSWER July 9 QUIZ]</i></p> <p><i>Hello. We wanted you to know the answer to last quiz was SHOPS T: ORS solution should be used the same day it is made; any left over should be discarded.</i></p>	
Thurs July 12	Tip	<p><i>When a caregiver asks for antibiotics, ask if there is blood in stool. Bloody stool is a sign of dysentery and the child should be referred to a health clinic.</i></p>	

Mon July 16	Q7	<p><i>Which of following is NOT a benefit of zinc?</i></p> <p><i>A. Protects against future episodes</i> <i>B. Stops diarrhoea faster</i> <i>C. Treats dehydration</i></p> <p><i>Reply "SHOPS" then A, B, or C</i></p>	<p><i>(If SHOPS C):</i></p> <p><i>CORRECT! Zinc protects against diarrhoea, lessens severity and stops diarrhoea faster, but does not treat dehydration.</i></p> <p><i>(If SHOPS A or B):</i></p> <p><i>Sorry, that is not correct, zinc does not treat dehydration, that is why it must be taken with ORS. Please check your manual.</i></p>
Wed July 18	Correction Q7	<p><i>[SENT ONLY TO THOSE WHO DON'T ANSWER July 16 QUIZ]</i></p> <p><i>Monday's correct answer was SHOPS C: Zinc lessens severity of diarrhea but does not treat dehydration, that is why it must be taken with ORS.</i></p>	
Thurs July 19	Tip	<p><i>Remember, check your manual: a child under 6 months should take 10-mg of zinc per day, a child over 6 months should take 20-mg per day.</i></p>	
Mon July 23	Q8	<p><i>Children are more likely to die from diarrhoea than adults. True or False?</i></p> <p><i>Reply "SHOPS T" if true or "SHOPS F" if false.</i></p>	<p><i>(If SHOPS T):</i></p> <p><i>Good job! Children are more likely to die from diarrhoea than adults because they become dehydrated and malnourished much more quickly.</i></p> <p><i>(If SHOPS F):</i></p> <p><i>Sorry, it is true. Children with diarrhoea are more likely to die than adults because they become dehydrated and malnourished much more quickly.</i></p>

Wed July 25	Correction Q8	<p><i>[SENT ONLY TO THOSE WHO DON'T ANSWER July 23 QUIZ]</i></p> <p><i>Sorry we did not get your answer, correct choice was SHOPS T: Children are more likely to die from diarrhea than adults, they dehydrate much more quickly.</i></p>	
Thurs July 27	Tip	<p><i>Tip: If a child under 5 is not able to suckle at the breast or swallow a drink, it is a general danger sign. Please refer to clinic or hospital.</i></p>	
Mon July 30	Q9	<p><i>Which of the following is a sign of dehydration in a child:</i></p> <p style="text-align: center;"> <i>A. Sunken eyes B. Skin rash C. Swollen belly</i> </p> <p style="text-align: center;"><i>Reply SHOPS A or SHOPS B or SHOPS C</i></p>	<p><i>(If SHOPS A):</i></p> <p style="text-align: center;"><i>Excellent, you answered correctly. If a baby has sunken eyes, it is a sign of dehydration. Please refer the caregiver to the nearest clinic or hospital.</i></p> <p><i>(If SHOPS B or C):</i></p> <p style="text-align: center;"><i>Sorry that is incorrect. If a baby has sunken eyes, it is a sign of dehydration. Please refer the caregiver to the nearest clinic or hospital.</i></p>
Wed Aug 1	Correction Q9	<p><i>[SENT ONLY TO THOSE WHO DON'T ANSWER July 30 QUIZ]</i></p> <p><i>The answer to last question was SHOPS A: if baby has sunken eyes, it is a sign of dehydration. Please refer caregiver to nearest clinic or hospital.</i></p>	
Thurs Aug 2	Tip	<p><i>When a caregiver asks for antibiotics, ask if there is blood in stool. Bloody stool is a sign of dysentery and the child should be referred to a health clinic.</i></p>	