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INTRODUCING ZINC THROUGH THE PRIVATE SECTOR IN GHANA: EVALUATION OF CAREGIVER DIARRHEA TREATMENT PRACTICES

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ACRONYMS

BCS	Behavior Change Support Project
BiG	Business Interactive Consulting
CHAI	Clinton Health Access Initiative
DHS	Demographic and Health Survey
EA	Enumeration Area
LCS	Licensed Chemical Seller
MDE	Minimum Detectable Effect
MOH	Ministry of Health
OLS	Ordinary Least Squares
ORS	Oral Rehydration Solution
OTCMS	Over-the-Counter Medicine Seller
POUZN	Social Marketing Plus for Diarrheal Disease Control: Point-of-use Water Disinfection and Zinc Treatment Project
PPS	Probability Proportional to Size
PSI	Population Services International
SHOPS	Strengthening Health Outcomes through the Private Sector Project
SMS	Short Message Service
SUZY	Scaling Up of Zinc for Young Children Project
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USP	United States Pharmacopeia
WHO	World Health Organization

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EXECUTIVE SUMMARY

Diarrhea is the third leading cause of death globally among children under the age of 5 (Liu et al. 2015). Most of these deaths are related to dehydration and can easily be prevented with low-cost treatments such as oral rehydration solution (ORS). In May 2004, the World Health Organization (WHO) and UNICEF issued a joint statement endorsing the use of zinc (an essential micronutrient for human growth, development, and maintenance of the immune system) together with a new low-osmolarity formulation of ORS (with reduced levels of glucose and sodium) as a two-pronged approach to improve case management of acute diarrhea in children under age 5 (WHO/UNICEF 2004). When given for 10–14 days during the course of an acute diarrhea episode, zinc has been shown to reduce the duration and severity of that episode and has a protective effect as well, reducing the incidence of subsequent episodes in the following two to three months (Bhutta et al. 1999; Bhutta et al. 2000; Fontaine 2001; Baqui et al. 2002).

In 2010, Ghana's government adopted the WHO/UNICEF guidelines recommending ORS with zinc to treat pediatric diarrhea. Given the substantial role of the private sector in providing treatment for pediatric diarrhea in Ghana (Montagu and Visconti 2010), the USAID-funded Strengthening Health Outcomes through the Private Sector (SHOPS) project partnered with the public sector to design and implement a set of interventions to (1) introduce zinc through private sector channels and (2) increase correct treatment of diarrhea among private providers and caregivers of children. From 2011 to 2014, SHOPS worked with a variety of local partners to promote the treatment of pediatric diarrhea with ORS and zinc among caregivers, providers, and medicine sellers. The comprehensive program included bringing locally-manufactured zinc products to the commercial market, accompanied by a mass media campaign, classroom-based provider trainings, detailing visits, text messaging (SMS) to reinforce training concepts, and supportive supervision. Most of the SHOPS activities were national in scope, but at the request of USAID, SHOPS focused selected interventions (provider training, supportive supervision) in USAID's three priority regions (Greater Accra, Western, and Central). These three regions account for approximately one-third of the country's population (Ghana Statistical Service 2012).

The goal of the SHOPS program in Ghana is to increase use of ORS with zinc as the preferred diarrhea treatment among caregivers of children under 5. Accordingly, this study seeks to answer the following research questions:

1. Did diarrhea management practices among caregivers in Ghana change following the introduction of the SHOPS interventions, and is there evidence that SHOPS interventions contributed to observed changes?
2. What do we know about the characteristics of zinc users, and how do they compare with non-users?

We administered two cross-sectional household surveys: a baseline survey at the beginning of SHOPS interventions in 2012, prior to the launch of the mass media campaign; and a follow-up survey just over two years later, in 2014. We administered both surveys in the three USAID target regions during the rainy season in Ghana, when diarrhea prevalence is highest. Survey respondents were caregivers of children aged 6–59 months old who reported that their child had an episode of diarrhea in the previous two weeks. We used a multi-stage sampling approach to

select the sample of caregivers for each survey: 754 in the baseline survey and 751 in the follow-up survey.

To estimate changes in caregiver treatment behaviors between baseline and follow-up and to control for possible confounding factors, we ran a pooled (combining data from both surveys) ordinary least squares (OLS) regression on five main outcome variables: use of zinc, use of ORS, use of ORS with zinc, use of antibiotics, and use of antidiarrheals. We calculated descriptive statistics to analyze the motivation, behavior, attitudes, and intentions of zinc users at the follow-up survey. We also compared characteristics of zinc users to non-users to determine factors associated with zinc use at follow-up.

After about three years of SHOPS interventions, diarrhea treatment behaviors in the three target regions, Central, Western, and Greater Accra, improved significantly, with caregivers reporting higher levels of ORS with zinc use and lower levels of antibiotic use. Use of zinc in combination with ORS rose from 0.8 percent to 30.1 percent, a substantial increase in a short time period. Use of ORS (with or without zinc) rose from 37.7 percent to 61.1 percent. Use of zinc (with or without ORS) rose from 1.3 percent to 32.1 percent. Antibiotic use dropped from 66.2 percent to 35.0 percent during the same time period. Antidiarrheal use also decreased, but this change was not statistically significant. Our results are consistent with evidence from other studies on ORS and zinc in Benin, Nepal, and Bangladesh. Almost all caregivers who used zinc to treat the diarrhea episode also gave ORS, as they should. This finding is encouraging, as it suggests that caregivers are not using zinc instead of ORS, but are using both in tandem, as recommended. However, correct length of treatment remains a challenge; over half of caregivers did not give zinc for a full ten days, as recommended.

Our regression results suggest that the SHOPS program significantly contributed to the positive changes observed in diarrhea management behaviors. In fact, SHOPS interventions in Ghana were the only zinc-promotion activities taking place in the survey regions during this study's timeframe. However, with our study design, it is not possible to ascertain how much of the observed increases in ORS and zinc use can be solely attributed to the SHOPS program.

Overall, we find that zinc users have positive attitudes and perceptions about zinc. Sustained zinc promotion efforts will be important to build on these gains. In addition, providers appear to play a very important role in recommending zinc. Even though SHOPS primarily focused its interventions on the private sector, caregivers obtained zinc from both private and public sector providers. Thus, continuing to work with both the private and public sectors will be essential to ensure increased access to ORS and zinc. Finally, recall of zinc mass media campaign messages is positively correlated with caregiver use of zinc to treat diarrhea.

In conclusion, over the course of three years, the SHOPS project implemented a comprehensive, multi-pronged private sector program in Ghana to introduce and promote the use of ORS with zinc to treat childhood diarrhea. Our evaluation showed substantial increases in ORS with zinc use among caregivers, and decreases in inappropriate treatment such as antibiotics and antidiarrheals. Our findings suggest that a similar package of interventions has the potential to be applied in other settings where rapid scale-up of ORS with zinc is desired. Incorrect use of antibiotics remains a challenge in Ghana (and elsewhere). Programs must continue to seek ways to work with both providers and caregivers of children to reduce the use of inappropriate treatments for childhood diarrhea.

1. INTRODUCTION

1.1 OVERVIEW

Diarrhea is the third leading cause of death globally among children under the age of 5 (Liu et al. 2015). Most of these deaths are related to dehydration and can easily be prevented with low-cost treatments such as oral rehydration solution (ORS). In May 2004, the World Health Organization (WHO) and UNICEF issued a joint statement endorsing the use of zinc, an essential micronutrient for human growth, development and maintenance of the immune system, together with a new low-osmolarity formulation of ORS, with reduced levels of glucose and sodium, as a two-pronged approach to improve case management of acute diarrhea in children under age 5 (WHO/UNICEF 2004). When given for 10 to 14 days during the course of an acute diarrhea episode, zinc has been shown to reduce the duration and severity of that episode, and has a protective effect as well, reducing the incidence of subsequent episodes in the following two to three months (Bhutta et al. 1999; Bhutta et al. 2000; Fontaine 2001; Baqui et al. 2002). In contrast, the WHO/UNICEF joint statement notes that antibiotics should only be used in limited scenarios, such as in the presence of bloody diarrhea or shigellosis, and that antidiarrheal drugs should not be administered to children (WHO/UNICEF 2004). In other cases, moreover, antimicrobial therapy is ineffective and may be dangerous (WHO 2005). Similarly, antidiarrheal drugs have no practical benefits and are never indicated for the treatment of acute diarrhea in children under 5 (WHO 2005). Despite these guidelines, ORS and zinc remain under-utilized for acute pediatric diarrhea, and antibiotics and/or antidiarrheals are often incorrectly administered instead (Das et al. 2005; Ellis et al. 2007; Zwisler et al. 2013).

Between 2005 and 2015, donor-funded country programs¹ have focused on promoting the provision and use of ORS and zinc and on reducing incorrect treatment for children with diarrhea. Programmatic activities have focused primarily on introducing high quality and affordable zinc products to local markets in a sustainable way, including: local manufacturing or importing; raising consumer knowledge of correct diarrhea treatment, using both mass media campaigns and interpersonal communication; and improving provider knowledge and skills through training and detailing visits.

Despite the wealth of on-the-ground experience over the last decade, there is limited published data about the effectiveness of these interventions in improving correct management of acute childhood diarrhea. In Bangladesh, over a two-year period of implementing a national program to scale up zinc treatment, zinc use increased from under 5 percent at baseline to 25–30 percent among children in urban non-slum areas, 15–20 percent among children in urban slums, and 9–13 percent among rural children (Larson et al. 2009). However, the design of the research does not allow direct attribution of the observed improvements in zinc use to the intervention. A project in Nepal conducted a 6-month evaluation after the launch of an ORS and zinc promotion campaign, finding that 68 percent of children under 6 years of age with diarrhea in the past two weeks were treated with ORS, 15 percent were treated with zinc, and 12 percent were treated with ORS with zinc (Wang et al. 2011). However, as the project did not conduct a

¹ A partial list of projects and organizations supporting country-level pediatric diarrhea management programs includes: Social Marketing Plus for Diarrheal Disease Control: Point-of-use Water Disinfection and Zinc Treatment (POUZN), Strengthening Health Outcomes through the Private Sector (SHOPS), Scaling Up of Zinc for Young Children (SUZY), Clinton Health Access Initiative (CHAI), Save the Children, UNICEF, and Population Services International (PSI).

baseline survey in the study districts, it was not possible to evaluate the project's contribution to the observed level of zinc use. In Benin, over a two-year period, zinc use in project districts rose from 32 percent to 54 percent, and ORS use rose from 40 percent to 58 percent (Sanders et al. 2013); however, differences in baseline and endline survey methodologies make it difficult to attribute the observed changes directly to program activities.

1.2 THE SHOPS ZINC PROGRAM IN GHANA

In 2010, Ghana's government adopted the WHO/UNICEF guidelines recommending ORS with zinc to treat pediatric diarrhea. Recognizing the substantial role of the private sector in providing treatment for pediatric diarrhea in Ghana (Montagu and Visconti 2010), the USAID-funded Strengthening Health Outcomes through the Private Sector (SHOPS) project partnered with the public sector to design and implement a set of interventions to introduce zinc through private sector channels and to promote correct treatment of diarrhea among private providers and caregivers of children. From 2011 to 2014, SHOPS developed and implemented a comprehensive program for introducing the new guidelines to the private sector, as a complement to existing public sector efforts. At the start of the program in 2011, there was no zinc on the commercial market in Ghana. Moreover, although the policy and protocols for its introduction had been developed by the Ministry of Health (MOH), public sector health workers had not been trained in its use, and zinc was not available in public sector facilities. SHOPS worked with a variety of local partners to promote the treatment of pediatric diarrhea with ORS and zinc among caregivers, providers, and medicine sellers. SHOPS activities, described in more detail below, included bringing locally-manufactured zinc products to the commercial market, promoted through a mass media campaign, classroom-based provider trainings, detailing visits, text messaging (SMS) to reinforce training concepts, and supportive supervision.

1.3 STUDY OBJECTIVES

The purpose of this research is to:

1. Evaluate whether diarrhea management practices among caregivers in Ghana changed following the introduction of the SHOPS interventions. By collecting pre-intervention and follow-up data in program areas and by using a consistent methodology at both points in time, this study measures changes in treatment behaviors over time and evaluates the extent to which SHOPS interventions are likely contributors to the observed changes.
2. Describe the characteristics of zinc users and analyze how they compare with non-users. This analysis will provide pertinent information for future zinc promotion programs.²

This study is part of a suite of research studies conducted by the SHOPS project to evaluate the SHOPS program in Ghana. Studies include an experimental evaluation of the relative impact of an SMS intervention on provider knowledge and behavior (Friedman et al. 2015; Woodman et al. 2014), and an in-depth qualitative study that explains and contextualizes the SMS evaluation results (Rosapep and Sanders 2015). The Woodman et al. (2014) study also evaluated the link between all SHOPS interventions (training, detailing visits, and mass media campaign) and zinc provision among providers.

² The second objective was contingent upon finding adequate numbers of zinc users at the follow-up survey.

2. GHANA CONTEXT AND SHOPS INTERVENTIONS

2.1 DIARRHEA PREVALENCE AND TREATMENT IN GHANA

After neonatal causes (32 percent), malaria (26 percent), and pneumonia (10 percent), diarrheal diseases are the fourth leading cause of child mortality in Ghana, at 9 percent (Black et al. 2010). Prevalence of diarrhea among children under 5 years was reported at 12 percent in the 2014 Ghana Demographic and Health Survey (DHS), a decrease from 20 percent in the 2008 DHS (GSS, GHS, ICF Macro 2015; GSS, GHS, ICF Macro 2009).

The private sector is a commonly-used source of treatment for childhood diarrhea in Ghana. A recent analysis shows that private pharmacies and over-the-counter-medicine sellers (OTCMS),³ the primary drug dispensing outlets at the community level, are by far the most commonly used private sources for diarrhea treatment accessed by caregivers of children under age 5 (Montagu and Visconti 2010). Together, they account for over half of visits to private sector providers for childhood diarrhea. The same analysis shows that the private sector serves people from all socioeconomic groups: 22 percent of households from the poorest wealth quintile report seeking treatment for childhood diarrhea from the private sector, compared to 38 percent in the wealthiest quintile.

When SHOPS began its work in Ghana in September 2011, zinc products were not available in public sector facilities or in the private sector. At that time, a range of other products were available, including antibiotics, antidiarrheals, and anti-protozoals. In addition, a number of multivitamin syrups containing zinc were sold in pharmacies, but these were not marketed for childhood diarrhea. However, three local firms (Dannex, Ernest Chemists, Ltd., and Kina Pharma) were selling ORS products (in low-osmolarity formulations, in line with MOH policy) that were manufactured in Ghana.

2.2 SHOPS INTERVENTIONS

Between 2011 and 2014, SHOPS worked with suppliers, providers, and consumers to introduce the new diarrhea treatment guidelines to the private sector and to promote the use of ORS with zinc in Ghana. Most of the SHOPS activities were national in scope, but at the request of USAID, SHOPS focused selected interventions (provider training, supportive supervision) in USAID's three priority regions (Greater Accra, Western, and Central). These three regions account for approximately one-third of the country's population (Ghana Statistical Service 2010). SHOPS focused its provider efforts primarily on OTCMS, as the most commonly used private sector source for diarrhea treatment, especially in rural areas.

³ OTCMS are privately-owned drug shops licensed by the Ghana Pharmacy Council. Sellers must have at least a basic education certificate, pass a registration test, and attend annual training. They are restricted by law to sell only Class C (over-the-counter) drugs and are only permitted to sell twenty types of Class A and Class B (prescription) drugs, mostly antimalarials and antibiotics. Note that until 2014, OTCMS were referred to as Licensed Chemical Sellers (LCS); the OTCMS designation replaced LCS in accordance with new legislation regulating the practice of pharmacy, passed by the parliament of Ghana in 2014.

2.2.1 BUILDING A VIABLE ZINC MARKET

With considerable foresight, the MOH in Ghana met with local manufacturers in 2010 to inform them of the new protocols for diarrhea management and expressed their interest in having a locally manufactured zinc product available. In September 2011, in anticipation of public sector tenders, one local pharmaceutical manufacturer, M&G Pharmaceuticals Ltd. (M&G), registered and began producing Zintab zinc sulfate tablets in 10 mg and 20 mg strengths. SHOPS partnered with M&G to (1) encourage its entry to the commercial market, (2) build a viable market demand for Zintab, and (3) link M&G with technical assistance provided by the U.S. Pharmacopeia (USP). SHOPS's role was to create demand for Zintab products among both providers and consumers and to help M&G develop a marketing plan and innovative distribution strategy to distribute its zinc products through commercial channels, particularly into rural areas. Partnership activities included printing and disseminating branded point-of-sale and detailing materials, sponsoring clinical meetings, and airing branded radio advertisements. In January 2012, M&G entered the commercial market. By the end of 2013, M&G was actively pursuing and winning Ghana Health Service tenders to supply its zinc products to public sector health facilities as well.

Building on its successful partnership with M&G, SHOPS approached several other local manufacturers to offer similar arrangements. Both LaGray Chemicals and Phyto-Riker took advantage of technical assistance offered by USP and have registered dispersible zinc products with the Ghana Food and Drug Administration. In March 2014, Phyto-Riker entered the market with 10 mg and 20 mg PR-Zinc products. LaGray is currently planning to market a co-packaged ORS with zinc product but has not yet introduced its product into the market.

Both M&G and Phyto-Riker set their prices in accordance with National Health Insurance Scheme guidelines, ensuring that the products were affordable to consumers without price subsidies.⁴

2.2.2 PROVIDER TRAINING AND SUPPORTIVE SUPERVISION

SHOPS partnered with the Ghana Health Service (the service delivery arm of the Ghana MOH), the Ghana Pharmacy Council, professional associations, and other stakeholders to develop standard training curricula on diarrhea management. The training curricula would be used not only in continuing medical education and professional development programs for private providers, but also for refresher training in public sector health facilities on integrated management of childhood illness. The training materials provide information on how to assess the severity of instances of pediatric diarrhea and present the rationale for treating children with ORS and zinc, in line with current national and international guidelines. The materials also discuss limiting the use of antibiotics and explain the dangers of antidiarrheal drugs for children. The training materials were developed for two levels of private and public providers: (1) clinical providers, including doctors, nurses, midwives, and pharmacists; and (2) nonclinical personnel working at the community level, such as OTCMS, pharmacy technicians, and community health workers.

In 2012, SHOPS partnered with the Ghana Pharmacy Council, which conducts routine annual training for the re-accreditation of OTCMS, to train OTCMS on diarrhea management. Following the SHOPS-sponsored training-of-trainer sessions, the Pharmacy Council trained a total of 1,935 OTCMS in the three USAID target regions, and later expanded the training to the

⁴ As of the writing of this report, retail prices range from approximately 1.00GHS to 1.50GHS (US\$0.26-0.38) for one package of ten 20mg tablets, which is the recommended treatment. Retail prices range from approximately 0.50GHS to 1.00GHS (US\$0.13-0.26) for one package of ten 10mg tablets. Zinc is not provided for free at either public or private facilities. Private facilities are permitted to determine their own retail prices for zinc.

remaining regions of Ghana, reaching a total of 8,159 OTCMS nationwide. Partner M&G participated in all of the training sessions, making Zintab available for sale at the end of each training session. All attendees were provided with information on how and where to purchase additional supplies of zinc. Finally, a brief refresher training on diarrhea management was provided at the Council's annual training sessions for OTCMS in 2013 and 2014.

Recognizing Ghana's robust private provider network, SHOPS extended the diarrhea management training to private providers beyond OTCMS, including pharmacists, clinicians, midwives, and other technicians. SHOPS partnered with the Association of Community Pharmacists, Ghana Registered Midwives Association, and Ghana Physician Assistants Association to train additional private sector providers during 2012–2013, including 1,500 pharmacists and clinicians, 234 midwives, and 1,004 other technicians (pharmacy technicians, dispensing technicians, and physician assistants).

To reinforce training, SHOPS partnered with the Pharmacy Council and the Institutional Care Division of the Ghana Health Service to implement a program of supportive supervision. The program utilized Pharmacy Council inspection teams who were already responsible for routine inspections of OTCMS. Adding to the existing inspection protocols, SHOPS and its partners trained inspection teams to answer questions, give advice, and provide on-the-job training in diarrhea management, using a mobile-phone-based supportive supervision tool designed for inspection teams.

In addition, SHOPS implemented an SMS campaign for OTCMS. The SMSs were sent three times per week during the diarrhea seasons each year (April-June and September-October), as systematic reminders that reinforced key messages from the trainings.⁵

2.2.3 MASS MEDIA CAMPAIGN AND OTHER DEMAND GENERATION ACTIVITIES

In July 2012, SHOPS partnered with the USAID-funded Behavior Change Support project (BCS) implemented by Johns Hopkins Center for Communications Programs to develop and then integrate messages about ORS and zinc into the BCS Good Life umbrella campaign, which created and aired media messages on a variety of health topics.⁶ SHOPS and BCS also conducted a separate national mass media campaign featuring television and radio advertisements, designed specifically to increase awareness of the new diarrhea treatment protocols for children under 5. The mass media campaign ran annually during the diarrhea season, April to October. 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. BCS obtained favorable media discounts to air television and radio advertisements that were critical to expanding awareness of zinc, and added zinc to its community mobilization activities. Job aids, treatment guideline wall charts, and client brochures created through this partnership were distributed widely for use in pharmacies and all OTCMS shops as well as by M&G's sales teams. The marketing efforts of both the zinc manufacturers benefitted from these demand generation activities.

⁵ In 2012, SHOPS evaluated the SMS campaign through a randomized controlled trial, including mystery client surveys and interviews with 900 OTCMS. The evaluation found that SMS follow-up had increased OTCMS knowledge of correct pediatric diarrhea treatment with ORS and zinc, but did not change their practices in terms of recommending ORS and zinc to clients. SHOPS used data from this evaluation and from another qualitative study of OTCMS to revise its trainings in order to foster behavior changes in addition to knowledge changes. For more information and results from this study, see Woodman et al. (2014).

⁶ Under its communication mandate from USAID, BCS worked with all district health management teams, 18 nongovernmental organizations (NGOs), and more than 2,000 community volunteers in the three focus regions to promote various health issues.

3. METHODOLOGY

3.1 RESEARCH QUESTIONS

The ultimate objective of the SHOPS program in Ghana is to increase use of ORS with zinc as the preferred diarrhea treatment among caregivers of children under 5. Accordingly, this study seeks to answer the following research questions:

1. Did diarrhea management practices among caregivers in Ghana change following the introduction of the SHOPS interventions? Specifically:
 - a. Did use of ORS with zinc increase, and did use of antibiotics and antidiarrheals decrease?
 - b. Is there evidence that SHOPS interventions contributed to observed changes?
2. What do we know about the characteristics of zinc users, and how do they compare with non-users?

3.2 STUDY DESIGN

We used a pre-post study design to examine changes in diarrhea treatment practices over time and to assess the contribution of SHOPS interventions to observed changes. We administered two cross-sectional household surveys: a baseline survey at the beginning of SHOPS interventions and prior to the launch of the mass media campaign (May–June 2012), and a follow-up survey just over two years later (August–September 2014). We administered both surveys in the three USAID target regions during the rainy season in Ghana, when diarrhea prevalence is highest. Survey respondents were caregivers of children aged 6–59 months who reported that their child had an episode of diarrhea in the previous two weeks. We defined diarrhea as having three or more loose or watery stools over the course of one day. We excluded children under the age of 6 months because the prevalence of acute diarrhea is lower in this age group than in the 6–59 month age group. We used data from the follow-up survey to better understand care-seeking behavior and attitudes of zinc users.

3.3 STUDY INSTRUMENTS

We developed three study instruments: (1) A household listing and screening form (Annex B); (2) a baseline survey instrument; and (3) a follow-up survey instrument (Annex C).⁷ We contracted with Business Interactive Consulting (BiG), a data collection firm based in Accra, to train data collectors, pilot test the instruments, and conduct the fieldwork.

Data collectors used the household listing and screening form to enumerate households and determine their eligibility for the study. Specifically, the forms recorded the following information:

- Household address
- Whether the household had at least one caregiver of a child aged 6–59 months old, and if yes, how many

⁷ The baseline and follow-up survey instruments are largely similar, so we only include the follow-up instrument in the Annex.

- Whether the household had at least one child aged 6–59 months who had diarrhea in the past two weeks, and if yes, how many
- A unique ID for eligible households

To ensure comparability of baseline and follow-up data, we designed the survey instruments to be virtually identical, with a few additional questions included in the follow-up survey.

Specifically, the survey instruments included the following sections:

- Diarrhea treatment practices (treatments used, sources of treatments, reasons for use) for the last reported episode (previous two weeks)
- Recall of exposure to zinc and/or diarrhea treatment messages (including where the messages were heard)
- Attitudes and beliefs related to zinc use, including opinions about effectiveness, affordability, and sources
- Socio-demographic information (including exposure to media messages)

The survey instruments built in a number of verification steps to minimize misclassification of treatments (e.g., caregivers not being aware of the category of product given) and to minimize underreporting, due to incorrect or incomplete recall. The interviewer first asked the caregiver whether she had given her child a treatment for the diarrhea episode. If she had, the interviewer then probed for the types of treatment through the use of visual aids containing photos of popular drugs and treatments currently in the market in Ghana. A follow-up/verification question asked the caregiver to validate her initial answer and to show the treatment packaging to the interviewer (whenever possible).

We designed the surveys to each take about 30–45 minutes to complete.

3.4 SAMPLING

3.4.1 SAMPLE SIZE AND POWER CALCULATIONS

We developed sample size estimates for the household surveys based on three criteria:

1. A large enough overall sample size for reasonable reliability of estimates of key indicators of interest, such as levels of ORS and zinc use at each point in time
2. A reasonable amount of time required for data collection (no more than 30 days)
3. Budget constraints

Accordingly, we determined that a target sample size of 750 caregivers for each survey would be appropriate. We assumed a sample percentage of 2 percent zinc use (our main outcome of interest) for the baseline survey, since zinc was just starting to become available on the market in Ghana at that time. At the 95 percent confidence level, a pooled sample (across all three regions) of 750 individuals would provide a margin of error for this sample percentage of ± 1 percentage point. For the post-intervention estimate, we assumed a sample percentage of 15 percent zinc use, which would have a margin of error of ± 2.6 percentage points at the 95 percent confidence level. With a sample of 750 caregivers in each survey, the minimum detectable effect (MDE) with 80 percent power was estimated at a 2.2 percentage point increase in zinc use.

3.4.2 SAMPLING DESIGN

We used a multi-stage sampling approach to select the sample of caregivers for each survey. In Ghana, regions are divided into districts, and districts are in turn divided into enumeration areas (EAs). At each stage (region, district, EA, household), we first selected the number of sampling units and then allocated the target sample of 750 caregivers among these units.

Stage 1: Regional strata

For the purpose of this study, we divided the three regions into four sampling strata: Accra metropolitan; Accra non-metropolitan; Central; and Western. We divided Greater Accra into two strata to distinguish between its metropolitan district representing the capital city, Accra, and other non-metropolitan districts in the region. For each survey, we allocated the target sample of 750 caregivers to each stratum in proportion to the population size in that stratum (Table 1).

TABLE 1: SAMPLE ALLOCATION BY STRATA

Strata	Population size ¹	Percent allocation	Allocated target sample of caregivers in each survey
Accra Metro	2,153,086	23.7	178
Accra (non-Metro)	1,567,335	17.2	129
Central	2,694,797	29.6	222
Western	2,678,791	29.5	221
Total	9,094,009	100.0	750

¹Source: Population census data, Ghana Statistical Service 2010.

Stage 2: Districts

We selected a total sample of 15 districts from the 44 districts in the four strata (Table 2). We included the Accra Metropolitan district with certainty. We selected the remaining 14 districts using stratified probability proportional to size (PPS) sampling, where size was the population of the district. We included the same districts in both the baseline and the follow-up surveys.

TABLE 2: DISTRIBUTION OF DISTRICTS BY STRATUM

Strata	Total number of districts	Number of districts sampled
Accra Metro	1	1
Accra (non-Metro)	9	3
Central	17	5
Western	17	6
Total	44	15

Similarly, for each district we allocated the target sample of caregivers in proportion to the population size of that district (Table 3).

TABLE 3: SAMPLE ALLOCATION BY DISTRICT

	Districts sampled	District population ¹	Sample allocation to districts
1	Accra Metropolitan	2,153,086	178
2	Adenta Municipal	223,842	42
3	Ga East Municipal	201,269	38
4	Ga South Municipal	262,013	49
	Total GREATER ACCRA	687,124	307
5	Agona East	197,296	49
6	Assin North Municipal	144,665	36
7	Cape Coast Metropolitan	102,319	25
8	Gomoa West	242,199	60
9	Upper Denkyira East Municipal	208,195	52
	Total CENTRAL	894,674	222
10	Aowin-Suaman	148,102	34
11	Ellembele	130,071	29
12	Mpohor-Wassa East	152,431	35
13	Sefwi-Akontombra	102,969	23
14	Sekondi-Takoradi Metropolitan	301,884	68
15	Wassa-Amenfi East	143,102	32
	Total WESTERN	978,559	221
	Grand Total	9,094,009	750

¹Source: Population census data, Ghana Statistical Service 2010.

Stage 3: Enumeration Areas

For each of the 15 selected districts, we divided the EAs into urban and rural EAs (where applicable) and selected a total of 4 EAs in each district (2 urban and 2 rural), using equal probability systematic sampling. If a district had only urban EAs, then we selected 4 urban EAs; if a district had only rural EAs, then we selected 4 rural EAs. Two districts, Accra Metropolitan and Adenta Municipal, had no rural EAs at baseline or endline; for these two districts, we selected four urban EAs. Accordingly, we initially selected 60 EAs across all 15 districts. We then divided the target sample of caregivers allocated to each district equally among the 4 EAs selected for each district. In addition, we supplemented the initial list of 60 EAs with a randomly selected list of additional urban and rural EAs, in districts where the allocated sample size of caregivers could not be achieved. In the end, a total of 70 EAs were selected for the baseline survey and 84 EAs in the follow-up survey. There were 66 EAs that were included in both surveys.

Stage 4: Households

We selected a sample of eligible households in each selected EA. Eligible households had at least one caregiver of a child 6–59 months old that had diarrhea in the prior two weeks. Using detailed EA maps, data collection teams went door to door, using the household listing and screening form to record every household visited and to identify eligible ones for the study. As soon as an eligible household was identified, the interviewers administered the surveys. Screening in each EA stopped once the target sample of households was met. If the target could not be met in a given EA, the interviewers moved to the supplemental EAs for that district and conducted the same household screening procedure until the target sample size was achieved.

Stage 5: Caregivers

If an eligible household contained more than one caregiver of a child aged 6–59 months with diarrhea in the prior two weeks, the interviewers randomly selected one caregiver for the survey.

If the selected caregiver had more than one child aged 6–59 months with diarrhea in the prior two weeks, the interviewers randomly selected only one child for the survey, using a Kish grid. The caregiver was asked to provide consent and then was asked questions about how that particular child's diarrhea episode was dealt with.

Final samples

Our final sample sizes were 754 in the baseline survey and 751 in the follow-up survey. Refusal rates were less than 0.5 percent in each survey. The baseline and follow-up surveys were administered in the same 15 districts and in 66 of the same EAs. However, the household screening exercises were conducted separately for each of the two surveys. Thus, these were two cross-sectional surveys, and our sample of caregivers is not a longitudinal sample. However, it is possible that some of the same households participated in both surveys.⁸

3.4.3 SAMPLING WEIGHTS

We calculated sampling weights that conform with our sampling strategy. In particular, we recorded the following information during data collection: (1) the total number of households in the EA; (2) the number of households screened; (3) the number of caregivers who were eligible for selection in each sampled household; and (4) the number of children who were eligible for selection for each sampled caregiver. We used these numbers to calculate sampling weights for caregivers who responded to the surveys and to apply weights to survey responses. All results presented in this report are weighted.

3.5 OUTCOME MEASURES

Our main outcome variables of interest are the proportion of caregivers reporting use of appropriate treatments (ORS, zinc, and ORS with zinc), and the proportion of caregivers reporting use of inappropriate treatments (antibiotics or antidiarrheals) during their child's most recent diarrhea episode.

Other measures of interest include sources of zinc, reasons for zinc use, recall of SHOPS zinc messages, attitudes about zinc use, and future intentions. In addition, we adapted a methodology applied in El-Khoury et al. (2012) and Pitchforth et al. (2007) to construct a wealth index for each household in our sample (Box 1).

⁸ Since the survey screened for households with children aged 6 to 59 months, children over the age of 35 months at baseline in 2012 would have aged out of the sample by the time of the follow-up survey in 2014. In the baseline sample, 276 out of 754 caregivers surveyed had children aged 35 months or over. These children were ineligible for the follow-up survey, though it is possible that their caregivers were still surveyed at follow-up if they had other children aged 6 to 59 months with a diarrhea episode.

Construction of a wealth index

El-Khoury et al. (2012) and Pitchforth et al. (2007) calculate a wealth index using a subset of the household asset indicators used in constructing the DHS wealth index; they then rank households in the sample according to population-level wealth quintiles. Using a similar approach, we collected data on the same household asset indicators collected in the Ghana DHS (2008). Then, using the Ghana DHS dataset, we ran a regression of the DHS wealth index on the household asset indicators. The fitted values from that regression constituted our “proxy” wealth index (R^2 value of 0.94). Next, we used the proxy wealth index to rank women in the DHS sample, group them into quintiles, and identify cutoff values of the proxy index for each quintile. We then used the estimated coefficients from the DHS regression described above as weights to construct a comparable wealth index in our caregiver sample, and rescaled the index to vary between 0 and 1. We used the cutoff values identified above to classify our caregiver survey respondents into population wealth quintiles, where quintile 1 represents the lowest wealth and quintile 5 represents the highest wealth quintile in our sample.

3.6 DATA ANALYSIS

We conducted multivariate regression analysis to answer the first research question and descriptive analysis to answer the second question. We analyzed the data using Stata software (version 12.0) (StataCorp, College Station, TX).

3.6.1 MULTIVARIATE REGRESSION ANALYSIS

To estimate changes in caregiver treatment behaviors between baseline and follow-up and to control for possible confounding factors, we ran a pooled (combining both surveys) ordinary least squares (OLS) regression using the following model:

$$y_{it} = \beta_0 + \delta_0 T_t + \beta_1 X_{it} + \varepsilon_{it}$$

Where:

y_{it} is the binary dependent variable (outcome) for caregiver i at time t (where t indicates either baseline or follow-up);

T_t is a binary variable equal to 1 for the follow-up period and 0 for the baseline survey; and

X is a vector of observable covariates for caregiver i at time t . Covariates included are: caregiver age, education level, marital status, the household wealth index quintile, and region and district fixed effects.

Then:

β_0 is the conditional average value of the outcome at baseline;

$(\beta_0 + \delta_0)$ is the conditional average value of the outcome at follow-up; and

δ_0 is the impact estimate of interest, which measures the conditional difference in the value of the outcome between baseline and follow-up.

We ran the model on five main outcome variables (y): use of zinc (with or without ORS), use of ORS (with or without zinc), use of ORS with zinc, use of antibiotics, and use of antidiarrheals. For each outcome variable, we ran the regression with and without the vector of controls (X).

3.7 ETHICAL ISSUES

The study was reviewed by the Abt Associates Institutional Review Board and granted exemption. The study was also reviewed and approved by the Ghana Health Service Ethical Review Committee. SHOPS obtained oral consent from respondents, and those who did not provide consent were not surveyed.

3.8 STUDY LIMITATIONS

Several limitations should be noted:

- *Evaluation design.* The pre/post design has inherent limitations that preclude attributing reported changes in zinc use (and other outcomes) observed at the follow-up survey to the SHOPS program. We controlled for possible confounding factors in the regression analysis; however, there may be other unobservable variables driving changes, including possible spillover effects from other diarrhea management interventions in other regions of Ghana that may have affected the respondents in our survey.⁹
- *Recall and information bias.* All outcome variables were based on recall of survey respondents. If recall of diarrhea treatments or exposure to zinc messages were systematically different between subgroups of the survey populations, then differential recall may bias the estimates of association. For example, caregivers who reported hearing zinc messages may be more likely to recall treating diarrhea with zinc than those who did not report hearing messages. In that case, we would likely overestimate the correlation between exposure to zinc messages and zinc use. There is also the possibility of information bias due to the misclassification of treatments or other variables of interest. We attempted to mitigate the risk of recall bias and misclassification of treatments by using an elaborate visual aid (containing photos of common brands of various treatments), by asking respondents to show the treatment packaging if they still had it available, and by building verification questions into the survey instrument. We also limited respondents to those who had experienced an episode of diarrhea in the past two weeks.
- *Generalizability of results.* We conducted this study in only three regions of Ghana, and thus results may not be generalizable to other parts of the country or outside of the country.

⁹ UNICEF was implementing a public sector zinc distribution activity in the northern regions of Ghana, for example, while SHOPS interventions were underway.

4. CHARACTERISTICS OF THE STUDY SAMPLES

Table 4 shows descriptive statistics for each survey sample (baseline and follow-up). Our samples are balanced with respect to most observable characteristics. In both samples, about 98 percent of caregivers are female, with an average age of just over 31. Caregivers in the follow-up sample were more likely to be married (84 percent) than those in the baseline sample (77 percent) ($p=0.066$). The majority of caregivers in both samples had completed primary school.

TABLE 4: CHARACTERISTICS OF STUDY SAMPLES (BASELINE AND FOLLOW-UP)

	Baseline sample	Follow-up sample	p-value
Caregiver Characteristics			
Sex: Female (%)	97.9%	97.8%	0.976
Mean age (years)	31.1	31.5	0.644
Education (%)			0.158
None	15.4%	15.3%	
Primary	26.2%	20.7%	
Completed primary, some middle	43.9%	43.5%	
Completed middle some secondary	13.9%	18.5%	
Secondary & above	0.6%	2.1%	
Married (%)	77.4%	84.0%	0.066*
Child characteristics & diarrhea symptoms			
Child age (months)	29.3	28.0	0.305
Mean diarrhea duration (days)	4.51	4.33	0.641
Fever with diarrhea (%)	43.8%	43.5%	0.952
Bloody diarrhea (%)	11.4%	5.6%	0.095*
Household Characteristics			
Mean wealth index score (min 0, max 1)	0.58	0.59	0.695
Wealth quintile			0.008***
First (poorest) (%)	23.4%	14.3%	
Second (%)	19.9%	32.6%	
Third (%)	42.1%	46.2%	
Fourth (%)	14.1%	10.3%	
Fifth (wealthiest) (%)	0.6%	0.3%	
N	754	751	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note: For categorical variables (education, wealth quintile) the p-value is from a chi-squared test. For binary variables, the p-value is from a t-test.

There was no difference in mean duration of diarrhea between baseline and follow-up (4.5 and 4.3 days, respectively) or in the proportion of children who had fevers during the diarrhea episode (44 and 43.5 percent, respectively). However, approximately twice as many children in the baseline sample (11.4 percent) had bloody diarrhea, compared to those in the follow-up sample (5.6 percent) ($p=0.095$). Since presence of blood in the stool typically warrants antibiotic treatment, caregivers in the baseline sample may have been more likely to use antibiotics over

other treatments, compared to caregivers in the follow-up sample. We therefore controlled for the presence of blood in stool in our multivariate regressions.

While the average wealth index was the same across both samples, there was a statistically significant difference in the distribution of wealth between baseline and follow-up. The follow-up sample was more likely to include caregivers from the second population wealth quintile and less likely to include caregivers from the first (poorest) wealth quintile. It is unclear how differences in the wealth distribution may have affected treatment behavior across the two samples.

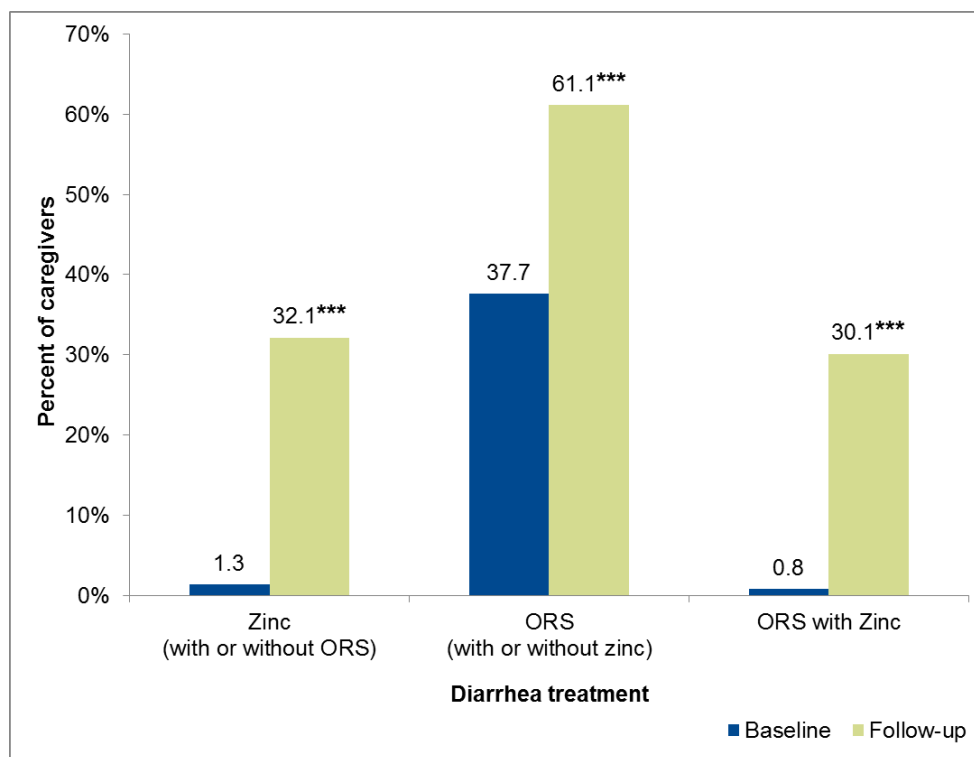
Since we did find a few statistically significant differences across the two samples, we included these variables as controls in the multivariate regression analysis (as discussed in the next section).

5. FINDINGS

5.1 CHANGES IN DIARRHEA MANAGEMENT PRACTICES AMONG CAREGIVERS

The majority of caregivers — 93 percent in the baseline survey and 88 percent in the follow-up survey — reported using some type of treatment during their children’s diarrhea episode; this difference is not statistically significant. Figure 1 shows ORS and zinc use among caregivers who provided treatment, at baseline and follow-up, showing the regression-adjusted means after controlling for possible confounding factors. (See Annex A for the full regression results.) Zinc use (with or without ORS) increased from 1.3 percent at baseline to 32.1 percent at follow-up ($p<0.001$), and ORS use (with or without zinc) increased from 37.7 to 61.1 percent at follow-up ($p<0.001$). Importantly, the proportion of caregivers who used ORS *with* zinc increased from 0.8 to 30.1 percent ($p<0.001$). Indeed, 93 percent of caregivers who used zinc used it in combination with ORS as recommended.

FIGURE 1: USE OF ORS AND ZINC AT BASELINE AND FOLLOW-UP

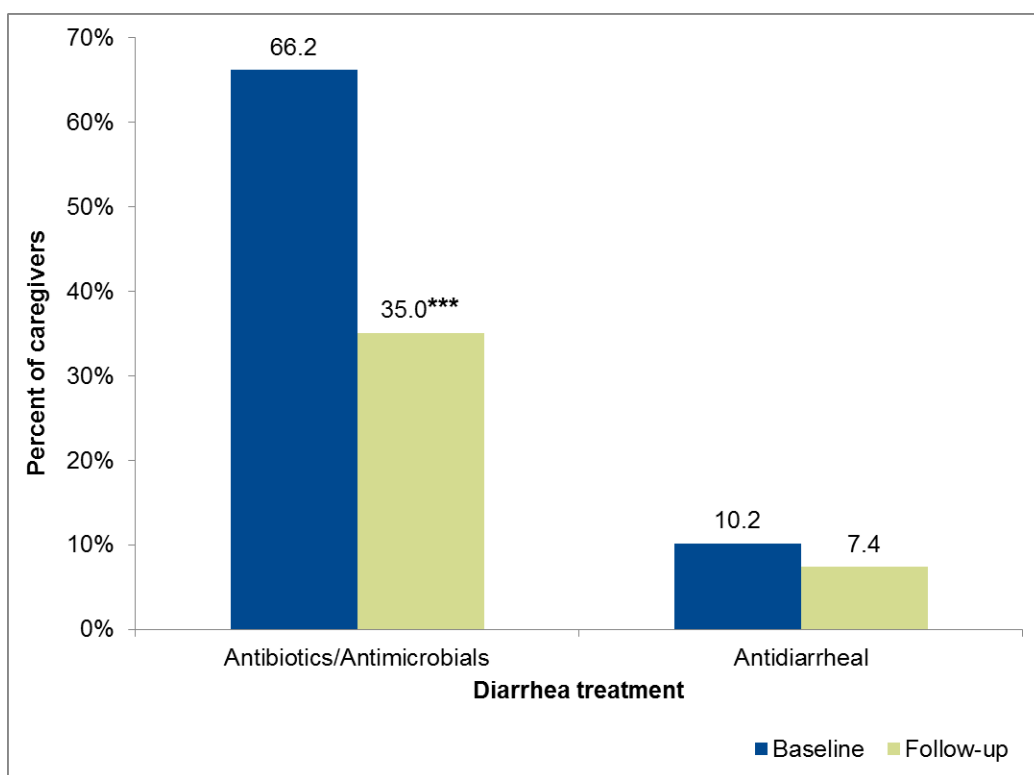


*** $p<0.01$, ** $p<0.05$, * $p<0.1$

At the same time, use of antibiotics dropped by 31.2 percentage points, from 66.2 percent at baseline to 35.0 percent at follow-up ($p<0.001$) (Figure 2). Use of antidiarrheals also dropped, from 10.2 to 7.4 percent, though this decline was not statistically significant after controlling for confounding factors ($p=0.125$). Over half of caregivers who used antibiotics (54.1 percent at baseline and 54.7 percent at follow-up) reported that their child had neither blood in the stool

nor a fever. In the absence of these signs and symptoms, antibiotic use would not be recommended.

FIGURE 2: USE OF ANTIBIOTICS AND ANTIDIARRHEALS AT BASELINE AND FOLLOW-UP



*** p<0.01, ** p<0.05, * p<0.1

As noted, 30.1 percent of caregivers at follow-up gave zinc with ORS as recommended. Out of that subset, however, over one-fifth (21.8 percent, or 52 caregivers) gave antibiotics in addition to the ORS and zinc. Among those 52 caregivers who gave antibiotics in addition to ORS and zinc, 43.2 percent reported that their child had neither a fever nor blood in the stool with the episode of diarrhea, suggesting that antibiotics should not have been used in these cases.

5.2 CHARACTERISTICS OF ZINC USERS

At the time of the baseline survey, zinc had just been introduced in Ghana for childhood diarrhea treatment, and our survey detected just 19 zinc users (or 1.3 percent of survey respondents). By the time of the follow-up survey two years later, we identified 241 caregivers who had used zinc to treat their child’s most recent diarrhea episode. This sample was large enough to support a more detailed descriptive analysis of zinc users in 2014, to better understand the behaviors and attitudes of those who chose to use zinc, and to compare their characteristics to those of non-users. This analysis will provide other diarrhea management programs with valuable information about who uses zinc, why they use zinc, and how programs can better target their interventions to increase zinc use.

5.2.1 ZINC USE, SOURCES, AND MOTIVES

Table 5 summarizes treatment patterns among zinc users at follow-up, showing that 78.4 percent of users at follow-up were first-time users. The majority (about 85 percent) used Zintab, the product manufactured by M&G. Only about 10 percent used the Phyto-Riker product, PR

Zinc. More than half of zinc users obtained zinc from private sector sources, including pharmacies and OTCMS (47.6 percent) and private hospitals or clinics (6.1 percent), while 43.5 percent obtained it from the public sector.¹⁰ Access, knowledge of source, and quality of care were the most commonly cited reasons for choosing a particular source for zinc products. Caregivers who obtained zinc from the public sector said they did so because it was easily accessible (35 percent) or because of the quality of care (28 percent) (data not shown). Likewise, the majority of those who obtained zinc from private pharmacies or OTCMS (54 percent) said they did so because they are easily accessible (data not shown). Those who obtained zinc from private clinics or hospitals said they did so because they are the most knowledgeable (63 percent) and because of the quality of care (24 percent) (data not shown). When asked about reasons for choosing zinc, the majority of caregivers (82.4 percent) said that their health provider recommended it, and another 10.4 percent said a friend or relative recommended it.

TABLE 5: ZINC USE AT FOLLOW-UP

	Zinc users at follow-up ¹ (%)
First time user	78.4
Brand of zinc used	
Zintab	84.9
PR Zinc	9.7
Zincfant	1.4
DT Zinc	0.4
Purchased zinc	82.4
Source of zinc	
Private pharmacy/OTCMS	47.6
Ghana Health Service/public hospital	43.5
Private Clinic/Hospital	6.1
Other	2.9
Main reason for choosing source	
Easily accessible/nearby	41.1
Most knowledgeable source	19.6
Quality of care	19.4
Price	3.1
Habit	0.8
Other	16.0
Reasons for choosing zinc for this diarrhea episode ²	
Recommended by provider	82.4
Recommended by friend/relative	10.4
Saw/heard advertisement	8.9
Heard that zinc has protective effect for 2-3 months	8.4
Used successfully in past	3.7
Heard that zinc would reduce severity & duration of diarrhea	2.6

¹N=232. Data missing for 9 zinc users. ²Multiple options allowed.

The majority of zinc users used zinc with ORS (93.2 percent) (Table 6). More than half of the small number of zinc users who did not use ORS cited lack of awareness that the two treatments should be given together.

On the other hand, 58.2 percent of zinc users used zinc for less than 10 days, though the WHO/UNICEF guidelines recommend using zinc for 10 days or more. The majority (about 81 percent) of those who did not use zinc for the full 10 days cited “child was cured” as the main

¹⁰ Zintab is available in the public sector.

reason for not following the recommendation. The average number of days of zinc use is 3.9 days. This average is among the subset of caregivers who administered zinc for less than 10 days, who reported that the diarrhea has stopped, and who had stopped giving zinc treatment.

TABLE 6: TREATMENT BEHAVIOR AMONG ZINC USERS

	Zinc users at follow-up ¹ (%)
Used ORS with zinc	93.2
Reasons for NOT giving ORS with zinc (N=24)	
Did not know ORS and zinc should be given together	55.7
OTCMS/doctor only recommended zinc	19.4
Child not seriously ill	10.0
Did not have ORS	3.4
Child/mother does not like taste	3.4
Other	8.1
Gave zinc for less than 10 days (N=232)	58.2
Reasons for NOT giving zinc for 10 days ² (N=144)	
Child cured	80.7
Child still taking treatment	13.4
Child vomited treatment	6.6
Thought I need to give zinc only with ORS	5.3
Child would not take zinc	5.0
Wanted to save remaining treatment for future	3.5
Did not know child needed to take entire treatment	3.5
Other	5.1

¹N=241 unless otherwise indicated. ²If zinc given for less than 10 days AND child does not have diarrhea anymore. Multiple options allowed.

5.2.2 ATTITUDES AND PERCEPTIONS

Almost all zinc users (98 percent) perceived zinc as an effective treatment for treating the most recent diarrhea episode (Table 7). About 81 percent of them believed zinc was effective at stopping the diarrhea quickly. The majority of users believed that zinc was affordable (78.3 percent), and 94.5 percent said that they plan to use zinc the next time their child has diarrhea.

TABLE 7: ATTITUDES OF ZINC USERS

	% of zinc users at follow-up ¹ (%)
Perceived zinc as effective	98.0
Reasons for perceiving zinc as effective (N=226)	
Diarrhea stopped quickly	80.6
Child recovered quickly	68.9
Child regained appetite	39.2
Perception of zinc cost (N=195)	
Affordable	78.3
No opinion/ don't know	16.9
Expensive	4.7
Plan to use zinc in future	94.5

¹N=232 unless otherwise indicated.

5.2.3 ZINC USE AND CAMPAIGN MESSAGE RECALL

We conducted the follow-up survey in the middle of the 2014 mass media campaign that ran from April to October. Just over half of caregivers at follow-up (54 percent) reported hearing at least one message relating to prevention and treatment of diarrhea in the past month, primarily from television (66.3 percent) and radio (41.5 percent). About one-third (36 percent) had heard or seen at least one message specifically about zinc, again primarily from television (85.5 percent) and radio (36.1 percent). The most commonly recalled zinc messages include: “Zinc stops diarrhea faster” (66.9 percent); and “Zinc should be taken with ORS” (35.1 percent). (Data not shown for these analyses.)

We found that recall of zinc messages was positively correlated with caregiver use of zinc to treat diarrhea. Caregivers who recalled hearing or seeing any zinc message in the last month were more than three times as likely to use zinc as those who did not recall hearing zinc messages ($p=0.003$) (Figure 3). Similarly, caregivers who recalled hearing or seeing the specific message “Zinc should be taken with ORS” were more than twice as likely to use zinc combined with ORS as those who did not recall that specific message ($p=0.046$) (Figure 4).

FIGURE 3: ZINC USE AND RECALL OF ZINC MESSAGES

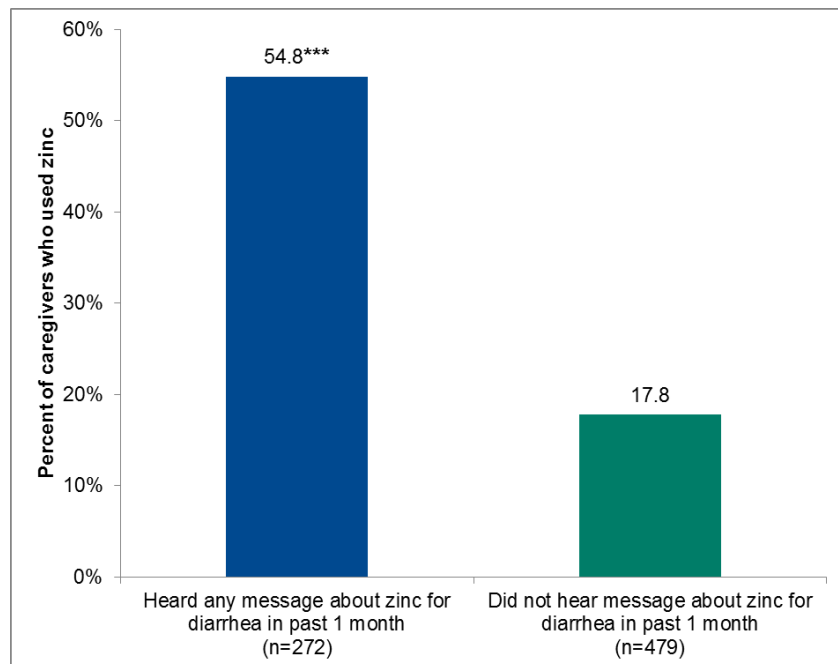
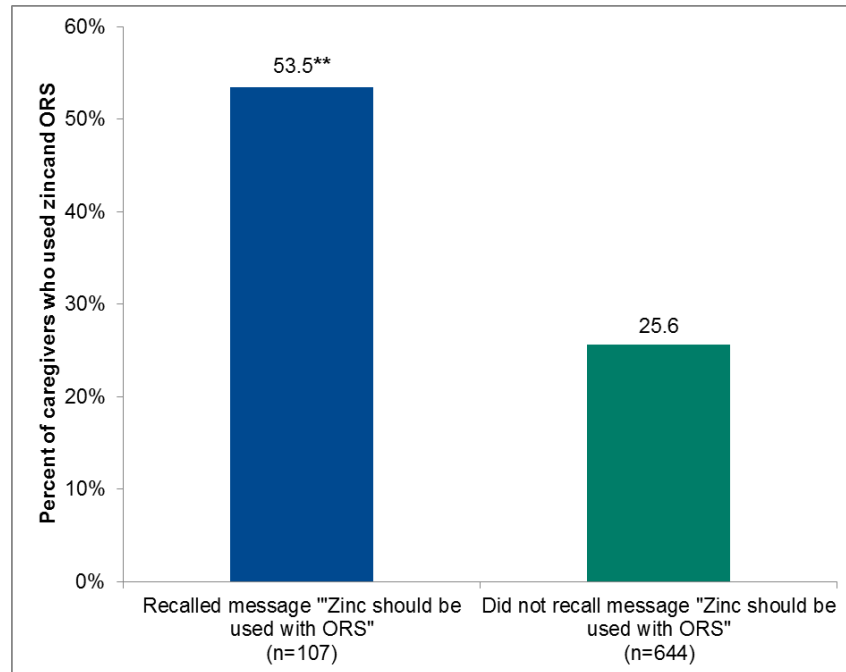


FIGURE 4: ORS WITH ZINC USE: RECALL OF SPECIFIC MESSAGE



5.2.4 ZINC USERS VS. NON-USERS

By far, the most commonly cited reasons for not using zinc at follow-up was that caregivers did not know about it (59.6 percent of non-users), and that their health care provider had not recommended it (24.7 percent) (data not shown).¹¹

We compared the characteristics of zinc users at follow-up to non-users (Table 8). The distribution of caregiver education was different between the two groups ($p=0.027$), with zinc users appearing to be more educated than non-users. Zinc users were more than twice as likely to have completed middle school and some secondary school (28.4 percent of users vs. 12.6 percent of non-users); non-users were substantially more likely to have no education or only primary education. The distribution of household wealth quintile was also different between the two groups ($p=0.058$), perhaps in correlation with differences in education levels. Zinc users were slightly more likely than non-zinc users to belong to the third or fourth population-wealth quintiles. Finally, non-users were more likely to have had a child with fever during the diarrhea episode ($p=0.003$). However, presence of fever during the diarrhea episode would not be a contraindication for zinc use.

¹¹ Among all 442 caregivers at follow-up who did not use zinc to treat the episode of diarrhea.

TABLE 8: CHARACTERISTICS OF ZINC USERS VERSUS NON-USERS AT FOLLOW-UP

	(1) Zinc users	(2) Non-users of zinc	p-value
Caregiver Characteristics			
Sex: Female (%)	97.8%	97.5%	0.888
Mean age (years)	32	31.1	0.621
Education (%)			0.027**
None	12.4%	17.1%	
Primary	15.0%	22.4%	
Completed primary, some middle school	41.8%	45.7%	
Completed middle school, some secondary	28.4%	12.6%	
Secondary & above	2.5%	2.2%	
Married (%)	81.1%	86.6%	0.573
Child characteristics & diarrhea symptoms			
Child age (months)	29.1	28.4	0.533
Mean diarrhea duration (days)	4.4	4.3	0.699
Fever with diarrhea (%)	34.6%	49.2%	0.003***
Bloody diarrhea (%)	5.4%	6.3%	0.77
Household characteristics			
Mean wealth index score (out of 1)	0.62	0.57	0.164
Wealth quintile			0.058*
First wealth quintile (poorest) (%)	11.9%	15.2%	
Second wealth quintile (%)	24.8%	35.7%	
Third wealth quintile (%)	49.5%	45.3%	
Fourth wealth quintile (%)	13.7%	3.8%	
Fifth wealth quintile (wealthiest) (%)		<i>no observations at baseline</i>	
Region (%)			0.164
Accra metro	17.5%	14.5%	
Accra non-metro	38.2%	21.8%	
Western	32.2%	35.6%	
Central	12.0%	28.0%	
N	241	442	

6. DISCUSSION

6.1 CHANGES IN DIARRHEA MANAGEMENT PRACTICES

After just three years of SHOPS interventions, diarrhea treatment behaviors in Ghana improved significantly, with caregivers reporting higher levels of ORS with zinc use and lower levels of antibiotic use. Use of ORS with zinc rose from 0.8 percent to 30.1 percent, a substantial increase in a relatively short time period. Our multivariate regressions confirmed that even when controlling for several potential confounding variables, use of ORS with zinc was significantly higher at follow-up than at baseline. Similarly, antibiotic and antidiarrheal use dropped by almost half during the same time period. Our results are consistent with findings from the Benin, Nepal, and Bangladesh studies previously cited. These studies use different approaches to zinc promotion, but taken together, they indicate that zinc programs may achieve relatively rapid gains in ORS with zinc use upon program initiation, even when zinc is completely new in a country.

SHOPS interventions in Ghana were the primary zinc promotion activities taking place in the survey regions during this study's timeframe. Before SHOPS interventions, zinc was not available in Ghana, either in the market or through public sector facilities. During the first rainy season in which zinc was available on the Ghanaian market, zinc sales saw dramatic increases, from 0 to a high of 350,000 treatments (10 tablets each) (Woodman et al. 2014); mystery client surveys showed that the majority of SHOPS-trained OTCMS were giving zinc for pediatric diarrhea treatment (Woodman et al. 2014). These developments suggest that the SHOPS program was the main driving force behind the positive changes observed in diarrhea management behaviors. However, with our study design, it is not possible to determine how much of the observed increases in ORS and zinc use may be solely attributed to the SHOPS program. A remaining gap in the current literature is the paucity of rigorous evaluations to better assess the impact of childhood diarrhea management programs, and to determine which elements of these programs are most cost-effective and potentially most scalable.

While antibiotic use decreased substantially from baseline to follow-up, it remains high at 35 percent, and many caregivers who gave ORS and zinc also reported treating with antibiotics. There are several reasons why antibiotic use may persist, even among those who correctly treat with ORS and zinc. A recent qualitative study of caregivers and providers in Ghana (led by SHOPS) found that caregivers were accustomed to using antibiotics and felt strongly about continuing to use them, especially if they perceived that antibiotics stopped diarrhea quickly (Rosapep and Sanders 2015). Providers also play a big role in the incorrect provision of antibiotics. They may not have adequate knowledge to explain to caregivers why ORS and zinc are appropriate and why antibiotics should not be used, or they may not have adequate negotiation skills, when interacting with a caregiver who feels strongly about using antibiotics, to steer the caregiver away from antibiotics and towards ORS and zinc. In addition, private providers may have other incentives (e.g., higher profit) that make provision of antibiotics an attractive choice, either in place of or in addition to ORS and zinc (Igun 1994). Studies in Nigeria (Igun 1994) and Latin America (Waters et al. 2008) found that children who seek treatment for diarrhea from private providers are more likely to receive antibiotics and less likely to receive ORS. It is important to note that our study was not designed to comprehensively assess correct

antibiotic use; some children presenting with both diarrhea and fever may have had another infection (such as otitis media, pneumonia, etc.) that warranted antibiotic prescription but was not specifically asked about in our survey. Additional targeted studies from both the caregiver and provider (prescribing) perspectives would be required to refine the estimates of levels of incorrect antibiotic use, to better understand reasons for this ongoing area of concern, and to develop interventions to address these issues.

6.2 WHAT DO WE KNOW ABOUT ZINC USERS?

Almost all caregivers who used zinc to treat the diarrhea episode also gave ORS, as they should. This finding is encouraging, as it suggests that caregivers are not using zinc instead of ORS, but are using both in tandem as is recommended. Thus it appears that the message to use both ORS and zinc together is being heard and heeded by caregivers. However, fewer caregivers administered zinc for the full 10-day recommended treatment — a challenge seen in other studies as well. In Benin, while 100 percent of caregivers treated with both ORS and zinc at follow-up, only 65 percent of caregivers used these treatments for 10 days or more (Sanders et al. 2013). In Nepal, though 15 percent of children with diarrhea were treated with ORS and zinc, only 8.3 percent were treated with ORS and zinc for 10 days (Wang et al. 2011). In Bangladesh, more than 50 percent of caregivers who bought zinc were sold only 7 or fewer days of treatment (Larson et al. 2009).

Even though SHOPS primarily focused its interventions on the private sector, caregivers obtained zinc from both private and public sector providers. Thus, continuing to work with both the private and public sectors will be essential to ensure increased access to ORS and zinc.

Overall, zinc users have positive attitudes and perceptions about zinc. Almost all of them felt zinc was effective and said that they would use it again in the future, and most said it was affordable. Such attitudes may encourage continued use among first-time zinc users. Sustained zinc promotion efforts will be important to build on these gains.

Providers appear to play a very important role in recommending zinc. By far the most commonly cited reason for use of zinc was that health providers recommended it. Among caregivers who did not use zinc, about one in four stated that this was because their health provider did not recommend it. This validates the focus of SHOPS interventions on educating and training providers, as key influencers of caregiver behaviors.

Recall of zinc messages is positively correlated with caregiver use of ORS and zinc to treat diarrhea. Similar correlations were observed in both Nepal (Wang et al. 2011) and Benin (Sanders et al. 2013). Due to the cross-sectional nature of our surveys, we cannot assess the directionality of this association: does using zinc predispose a caregiver to remember zinc messages, or does recalling a zinc message predispose a caregiver to use (or report having used) zinc? Nevertheless, these findings present evidence of an important link between hearing messages and choosing to use zinc. However, the analysis of zinc users in the follow-up survey showed that just 9 percent said that they chose to use zinc because of seeing an advertisement. It is therefore possible that some of the correlation between message recall and zinc use is attributable to the additional effect of having a provider recommend zinc. We were not able to assess the relative contributions of mass media message recall and provider recommendations using our data. Future research should focus on better evaluating the relative importance of mass media vs. provider influence on caregivers' decision-making process.

7. CONCLUSION

Over the course of three years, the SHOPS project implemented a comprehensive, multi-pronged private sector program in Ghana to introduce and promote the use of ORS with zinc to treat childhood diarrhea. The SHOPS package of interventions included market development, provider training, and mass media campaigns. Our pre-post evaluation showed substantial increases in ORS with zinc use among caregivers, as well as decreases in inappropriate treatment such as antibiotics and antidiarrheals. Our results are in accord with other SHOPS research in Ghana showing evidence of increased zinc sales and a majority of trained providers giving zinc (Woodman et al. 2014). Our findings suggest that a similar package of interventions has the potential to be applied in other settings where rapid scale-up of ORS with zinc use is desired, such as in sub-Saharan Africa. SHOPS interventions targeted both providers and consumers; it is unclear, however, which particular intervention works better than the other or is more cost-effective. Future research is needed to answer this question. Our study further shows that incorrect use of antibiotics remains a challenge in Ghana. Programs must continue to seek ways to work with both providers and caregivers of children to reduce the use of inappropriate childhood diarrhea treatment.

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ANNEX A: MULTIVARIATE REGRESSION RESULTS

Table A1 presents the full multivariate regression results. Each column presents the output of a separate regression that we ran on each of the five main outcome variables. The odd-numbered columns — columns (1), (3), (5), (7), and (9) — show the regression results without the vector of control variables. In these columns, the coefficients on *time*, our impact estimate, show the unadjusted difference in average outcomes between baseline and follow-up. For instance, the 0.343 coefficient on *time* in column (1) is the estimated difference in zinc use between baseline and follow-up. The coefficient is positive and significant, indicating that there is a statistically significant increase in zinc use over time. Similarly, results show a positive and statistically significant increase in ORS over time and ORS with zinc use combined, and a negative and significant decrease in antibiotic and antidiarrheal use.

The even-numbered columns — columns (2), (4), (6), (8), and (10) — show results after adding the vector of controls to account for any observed differences in the two caregiver samples. In each model, after adding the vector of control variables, the magnitudes of the impact estimate remained approximately the same and was significant at the same confidence level for antibiotic use. With controls, the magnitude of the impact estimate for antidiarrheal use declined and it was no longer statistically significant. As expected, caregivers who reported diarrhea episodes with fever were significantly more likely to report using antibiotics ($p < 0.000$).

TABLE A1: CHANGES IN DIARRHEA MANAGEMENT PRACTICES OVER TIME: REGRESSION RESULTS

	(1) Used zinc	(2) Used zinc	(3) Used ORS	(4) Used ORS	(5) Used ORS with zinc	(6) Used ORS with zinc	(7) Used Anti- biotic	(8) Used Anti- biotic	(9) Used Anti- diarrheal	(10) Used Anti- diarrheal
Time	0.300*** [0.000]	0.308*** [0.000]	0.222*** [0.000]	0.234*** [0.000]	0.284*** [0.000]	0.293*** [0.000]	-0.280*** [0.000]	-0.312*** [0.000]	-0.051** [0.023]	-0.028 [0.125]
Caregiver Characteristics										
Caregiver age (years)		0.001 [0.723]		-0.001 [0.418]		0.001 [0.677]		-0.002 [0.446]		0.001 [0.573]
Caregiver education (Ref: None)										
Primary school		0.011 [0.749]		-0.025 [0.705]		0.021 [0.598]		0.027 [0.594]		-0.006 [0.878]
Completed primary school, some middle		0.020 [0.429]		0.123** [0.014]		0.033 [0.211]		-0.027 [0.645]		0.016 [0.644]
Completed middle school, some secondary		0.122*** [0.006]		0.180*** [0.001]		0.125*** [0.008]		-0.017 [0.794]		-0.007 [0.886]
Completed secondary school and above		0.113 [0.286]		0.120 [0.340]		0.133 [0.216]		0.072 [0.709]		-0.083* [0.073]
Caregiver marital status		-0.018 [0.792]		-0.010 [0.824]		-0.025 [0.707]		0.072 [0.108]		-0.007 [0.811]
Household characteristics										
Household wealth index score (out of 1)		-0.113 [0.522]		0.021 [0.940]		-0.110 [0.509]		-0.108 [0.706]		-0.355* [0.079]
Household wealth quintile (Ref: first wealth quintile)										
Second wealth quintile		-0.034 [0.575]		-0.038 [0.611]		-0.054 [0.368]		0.161** [0.019]		0.058 [0.240]
Third wealth quintile		0.015 [0.805]		0.052 [0.630]		0.001 [0.993]		0.068 [0.453]		0.096 [0.229]
Fourth wealth quintile		0.105 [0.244]		0.015 [0.930]		0.095 [0.276]		-0.060 [0.727]		0.292* [0.087]
Fifth wealth quintile (wealthiest)		0.025 [0.833]		0.456** [0.031]		0.008 [0.945]		0.024 [0.883]		0.195 [0.189]
Child characteristics										
Child age (months)		0.000 [0.662]		0.000 [0.927]		0.001 [0.475]		-0.001 [0.381]		-0.000 [0.825]
Fever with diarrhea		-0.034 [0.151]		0.068** [0.033]		-0.044** [0.044]		-0.002 [0.968]		-0.017 [0.565]
Bloody diarrhea		-0.008 [0.856]		0.013 [0.883]		-0.017 [0.694]		-0.036 [0.568]		0.027 [0.523]
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Baseline	0.013	0.013	0.377	0.377	0.008	0.008	0.662	0.662	0.102	0.102
N	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505	1,505
R-squared	0.161	0.226	0.050	0.119	0.153	0.222	0.078	0.130	0.010	0.078

p-values in parentheses, *** p<0.01, ** p<0.05, * p<0.1

ANNEX C: SURVEY INSTRUMENT

HLSF No. ___/___/___/___/

2014 GHANA DIARRHEA PREVENTION AND TREATMENT RESEARCH Confidential: Data used for research purposes only

IDENTIFICATION															
HOUSEHOLD ID (11 digits):	<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 20px;"> </td> <td style="width: 20px;"> </td> <td style="width: 20px; background-color: #0070C0;"> </td> <td style="width: 20px;"> </td> <td style="width: 20px; background-color: #0070C0;"> </td> <td style="width: 20px;"> </td> <td style="width: 20px;"> </td> <td style="width: 20px; background-color: #0070C0;"> </td> <td style="width: 20px;"> </td> <td style="width: 20px;"> </td> <td style="width: 20px;"> </td> </tr> </table>														
REGION:	ACCRA METRO [01] WESTERN [05]	ACCRA NON-METRO [03] CENTRAL [07]	Code												
DISTRICT:	_____			<table border="1" style="width: 40px; height: 20px;"> <tr> <td style="width: 15px;"> </td> <td style="width: 15px;"> </td> </tr> </table>											
SUBURB :	_____														
COMMUNITY/AREA:	_____														
ENUMERATION AREA:	_____			<table border="1" style="width: 40px; height: 20px;"> <tr> <td style="width: 15px;"> </td> <td style="width: 15px;"> </td> <td style="width: 15px;"> </td> </tr> </table>											
URBANISATION:	<table border="1" style="width: 60px; height: 20px;"> <tr> <td style="width: 30px;">URBAN</td> <td style="width: 30px;">1</td> </tr> </table>	URBAN	1	<table border="1" style="width: 60px; height: 20px;"> <tr> <td style="width: 30px;">RURAL</td> <td style="width: 30px;">3</td> </tr> </table>	RURAL	3									
URBAN	1														
RURAL	3														
INTERVIEWER'S VISITS															
	1	2	3												
DATE (dd/mm)	_____	_____	_____												
INTERVIEWER'S NAME	_____	_____	_____												
RESULT*	_____	_____	_____												
NEXT VISIT : DATE (dd/mm)	1 _____	2 _____		TOTAL NBR OF VISITS											
TIME (24 hr clock)	_____	_____		<table border="1" style="width: 30px; height: 20px;"> <tr> <td style="width: 15px;"> </td> <td style="width: 15px;"> </td> </tr> </table>											
FIELD SUPERVISOR: NAME _____	QUALITY CONTROLLER: NAME _____		DATA ENTRY CLERK: ID No.: _____												
Spot check: 1	Spot check: 1		Round One 1												
Back physical check: 3	Back physical check: 3		ID No.: _____												
Back phone check: 5	Back phone check: 5		Round Two 3												

*CODES FOR RESULT			
01	Completed	07	Deaf/Did not speak a survey language
02	No HH member at home/no competent respondent	08	No adults in household
03	Entire HH absent for extended period	09	Interview postponed
04	Refused to be interviewed	10	Interview partially completed
05	Was not at home	11	Other (specify)
06	Dwelling vacant/address not a dwelling		

START TIME: | ___ | ___ : ___ | ___ | **[24HR FORMAT]**

INTRODUCTION AND ORAL CONSENT

Good morning/afternoon. My name is _____. I am a field officer from Business Interactive Consulting, a research company in Accra. We are conducting a survey on diarrhea treatment practices on behalf of Abt Associates among residents in the Greater Accra, Western and Central regions of Ghana. This information will be used to inform programming efforts by our project and other organizations on diarrhea treatment in the country.

PROCEDURES

Your household is one of many households that we are visiting to talk to or interview caregivers to be part of the survey. If you agree to take part, some of the questions that we ask will be about health practices and diarrhea treatment. We will interview you in a private place. The interview will take about 45 to 60 minutes to complete. If your name is collected, it will just be for the purpose of this survey and for back-checks only by my supervisor.

RISKS/DISCOMFORTS

Whatever information you provide will be kept confidential. Your name will not be shared with anyone outside of the study team. You do not have to answer any questions that you are not comfortable with, and you may stop the discussion at any time.

BENEFITS

Please, there is no direct benefit to you from being in this study. However, the information we collect will go a long way to help develop better programs and health services for people in Ghana.

VOLUNTARY PARTICIPATION

Please, you do not have to agree to be in this study, and you may change your mind at any time.

- If you have any questions about this study, you may call your Assemblyman/woman or DCE. He/she will answer any questions or address any concerns you may have.
- If you have any questions about your rights as a study participant, or if you think you have not been treated fairly, you may call your Assemblyman/woman or DCE.

PERMISSION TO PROCEED

Please, do you have any questions about the survey? Yes / No

Do I have permission to interview you now? Yes / No

Interviewer: If no, thank the respondent and end the questionnaire. Indicate result in identification table.

Print name of Person Obtaining
Consent (interviewer)

Signature of Person Obtaining Consent
(interviewer)

Date

CAREGIVER SELECTION TOOL

KISH GRID 1

FORM A CAREGIVER SELECTION TOOL FOR USE WITHIN HOUSEHOLDS SELECTED			
<p>1. What is the total number of caregivers of children who are aged 6-59 months and who had diarrhoea (NOT CHOLERA) in the past 2 weeks (including today) in this household? ___</p> <p><i>Note, diarrhoea is 3 or more loose or watery stools in one day.</i> IF 1, FILL BELOW & GO TO NEXT PAGE. IF 2+, FILL BELOW & USE KISH GRID 1.</p> <p>Please provide the <u>First</u> and <u>Last initials</u> of all these caregivers (<i>Interviewer: list in second column below</i>):</p>			
Serial no.	First, Last initial (all caregivers of children 6-59 months and with diarrhoea (NOT CHOLERA) in past 2 weeks, including today)	Age (Oldest to youngest)	Caregiver Randomly selected (circle below)
1			1
2			2
3			3
4			4
5			5

RANDOM SELECTION (If 2 or more caregivers are listed in table above, use KISH GRID 1 to select one caregiver):

No.	A	B	C	D	E	F	G	H	J	K
1	1	1	1	1	1	1	1	1	1	1
2	2	1	2	2	1	1	1	2	1	2
3	3	1	2	3	1	1	3	1	2	1
4	2	2	3	3	1	2	4	3	4	4
5	4	2	4	5	5	3	1	5	3	3
6	5	5	5	2	3	4	1	3	2	6
7	6	1	2	1	2	4	2	5	6	6
8 and over	3	1	5	3	6	3	7	8	8	8

The caregiver I need to speak to is:
 _____ (*insert first and last initial*).

Is this person presently at home? *Yes/No*

a. *If Yes:* May I please talk to this person now? [**Interviewer: move to Form B.**]

b. *If No:* Will this person return here today or tomorrow during day time? *Yes/No*

i. *If No:* Thank you very much. [**Interviewer: move to next eligible household**]

ii. *If Yes:* At what time can I come back and speak to this person? [**Interviewer: Mark date and time of next visit in identification table & complete Form B during next visit**]

CHILD SELECTION TOOL

KISH GRID 2

FORM B CHILD SELECTION TOOL FOR USE WITHIN HOUSEHOLDS SELECTED						
<p>1. What is the total number of children aged 6-59 months with diarrhoea (NOT CHOLERA) in the last 2 weeks (including today) for whom you are responsible: _____</p> <p><i>Note, diarrhoea is 3 or more loose or watery stools in one day.</i></p> <p>IF 1, FILL BELOW & GO TO NEXT PAGE. IF 2+, FILL BELOW AND USE KISH GRID 2.</p> <p>Please provide the <u>First name</u> of all these children (<i>Interviewer: list in second column below</i>)</p>						
Serial no.	First name (children 6-59 months with diarrhoea (NOT CHOLERA) in the past 2 weeks, including today)	Exact Age		Gender Mal=1 Fem=3	Child Randomly selected	
		Year(s)	Month(s)			
1				1	3	1
2				1	3	2
3				1	3	3
4				1	3	4
5				1	3	5

No.	A	B	C	D	E	F	G	H	J	K
1	1	1	1	1	1	1	1	1	1	1
2	2	1	2	2	1	1	1	2	1	2
3	3	1	2	3	1	1	3	1	2	1
4	2	2	3	3	1	2	4	3	4	4
5	4	2	4	5	5	3	1	5	3	3
6	5	5	5	2	3	4	1	3	2	6
7	6	1	2	1	2	4	2	5	6	6
8 or more	3	1	5	3	6	3	7	8	8	8

RANDOM SELECTION (if 2 or more children are listed in table on the left):
 We will be discussing the health of _____
 (*Insert first name of selected child*) in the interview today.

RANDOM SELECTION (if 2 or more children are listed in table above, use KISH GRID 2 to select one child)

SECTION I – DIARRHEA TREATMENT				
No	Questions and Filters	Responses	Codes	Skip To
201	First name of selected child	First name: _____		
202	What is the sex of the child?	Male	1	
		Female	3	
203	How old is the child? Interviewer: RECORD AGE IN YEARS AND MONTHS (AGE MUST BE BETWEEN 6 MONTHS AND 59 MONTHS (UNDER 5 YEARS))	<input type="text"/> <input type="text"/> years <input type="text"/> <input type="text"/> months		
204	What is your relationship with the child?	Mother	1	
		Grandmother	3	
		Aunt	5	
		Sister	7	
		Other (specify): _____	9	
205	Can you confirm that (NAME) had diarrhea in the last 2 weeks? INTERVIEWER: The last 2 weeks includes the day of the interview. Possible/probable cholera should NOT be included. Diarrhea is 3 or more loose or watery stools in one day.	Yes	1	→See instruction in footnote ¹²
		No	3	
206	For how many days has (NAME) had diarrhea or did (NAME) have diarrhea?	<input type="text"/> <input type="text"/> days		
207	Has (NAME) also had a fever during this diarrhea episode?	Yes	1	
		No	3	
		Don't know	8	
208	Did (NAME) have any blood in the stools when he or she had diarrhea in the last 2 weeks?	Yes	1	
		No	3	
		Don't know	8	
209	Interviewer: READ LIST. MARK ONLY ONE ANSWER How much was (NAME) given to drink during the recent episode of diarrhea?	Less than usual	1	
		About the same	2	
		More than usual	3	
		Nothing to drink	4	
		Don't know/Don't remember	8	

¹²This question is a second check to make sure that we did the screening/selection correctly. If the child did have diarrhea according to the screening information, but they say NO diarrhea here, then stop the interview. First, check if the same caregiver has another child 6-59 months with diarrhea in the past 2 weeks and select that child (or randomly select if more than one). If that selected caregiver doesn't have another child in the same age range w/diarrhea, then check if another caregiver in the household has a child w/diarrhea and re-do the child selection with that different caregiver. If there are no more caregivers in the household with a child with diarrhea in past 2 weeks, then stop and move to next household.

210	Interviewer: READ LIST. MARK ONLY ONE ANSWER How much was (NAME) breastfed during the recent episode of diarrhea?	Breastfed less	1	
		Breastfed about the same	2	
		Breastfed more	3	
		Not breastfed at all	4	
		Too old for breastfeeding	5	
		Don't know/Don't remember	8	
211	Interviewer: READ LIST. MARK ONLY ONE ANSWER How much was (NAME) given to eat during the recent episode of diarrhea?	Less than usual	1	
		About the same	2	
		More than usual	3	
		Nothing to eat	4	
		Don't know/Don't remember	8	
212	Did you seek advice from someone outside the home for the diarrhea?	Yes	1	If No, → Q216 If Don't know → Q216
		No	3	
		Don't know	8	
213	How many days after the diarrhea began did you first seek advice? Interviewer: IF THE SAME DAY, RECORD '00.'	<input type="text"/> <input type="text"/> days		
214	Interviewer: MULTIPLE RESPONSES ALLOWED. DO NOT READ LIST. What advice did you receive? PROBE: ANY OTHER ADVICE?	Give fluids	01	
		Give ORS	02	
		Give zinc	03	
		Give antimicrobial/antibiotics	04	
		Give antidiarrheal	05	
		Give fever medicine	06	
		Give anti-nausea (vomiting) medicine	07	
		Give more than usual amount of fluid	08	
		Give more than usual to eat	09	
		Continue breastfeeding	10	
		Take to clinic or hospital	11	
		Don't know	88	
		Other (specify): _____	99	

215	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. What is the <u>first</u> place where you received advice for (NAME)?	Public Sector		
		Ghana Health Service facility/Public Hospital	01	
		CHPS Compound	02	
		Community outreach	03	
		Other public sector	04	
		Private Sector		
		Private Clinic/hospital	05	
		Private pharmacy/LCS/Drug store	06	
		Community-based distributor	07	
		Faith-based, NGO/CBO	08	
		Friends/Relatives	09	
		Traditional healer/herbalist	10	
		Midwife	11	
		Traditional birth attendant	12	
Don't know	88			
Other (specify): _____	99			
216	Did you seek treatment from someone <u>outside</u> the home for the diarrhea? Interviewer: MAKE SURE RESPONDENT UNDERSTANDS THAT "TREATMENT" INCLUDES MEDICINE, ORS, ZINC, ETC.	Yes	1	
		No	3	If No →Q222
		Don't know	8	If Don't know →Q222
217	How many days after the diarrhea began did you first seek treatment? Interviewer: IF THE SAME DAY, RECORD '00.'	<input type="text"/> <input type="text"/> days		
218	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. What is the <u>first</u> place where you sought treatment for (NAME)?	Public Sector		
		Ghana Health Service facility/public hospital	01	
		CHPS Compound	02	
		Community outreach	03	
		Other public sector	04	
		Private Sector		
		Private Clinic/hospital	05	
		Private pharmacy/LCS/drug store	06	
		Community-based distributor	07	
		Faith-based, NGO/CBO	08	
		Friends/Relatives	09	
		Traditional healer/herbalist	10	
		Midwife	11	
		Traditional birth attendant	12	
Don't know	88			
Other (specify): _____	99			
219	Did you <u>ask</u> for a specific type of treatment?	Yes	1	If Yes →Q220
		No	3	If No →Q222
		Don't know	8	If don't know →Q222

220	What is the <u>first</u> treatment you asked for?	ORS only	01	
		Zinc only	02	
		ORS + Zinc	03	
		Antimicrobial / Antibiotic	04	
		Antidiarrheal	05	
		Don't know	88	
		Other (specify): _____	99	
221	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED Why did you ask for this treatment?	I always use it	01	
		It is the most effective	03	
		I saw/heard it advertised	05	
		It is cheap/It is not expensive	07	
		Other (specify): _____	99	
222	Now, I would like to ask you some questions regarding diarrhea treatment. Did you give (NAME) anything to treat diarrhea?	Yes	1	
		No	3	If No → Q282
		Don't know	8	If don't know → Q282

223	<p>Interviewer: READ LIST AND SHOW PHOTO CARD. MULTIPLE RESPONSES ALLOWED; IF RESPONDENT STILL HAS MEDICINE PACKAGE, ASK TO SHOW.</p> <p>If yes, please can you tell me or show me what treatments you gave (NAME) (either home-prepared or from outside of home)</p> <p>*Note:</p> <ul style="list-style-type: none"> • Home-prepared treatment include: Sugar Salt Solution, Maize/millet Porridge, Herbal remedies, coconut juice • Antimicrobial = antibiotic (cotrimoxazole, amoxicillin) or antiparasitics such as metronidazole (Flagyl, Metrolex) • Antidiarrheals include products to slow frequency of stools (i.e. Imodium, Colodium, Lomotil), bismuth subsalicylate (i.e. Pepto-Bismol), and adsorbants like Kaolin 	ORS (Dannex ORS, Hydrolyte, Dextrolyte)	01	
		Zinc (Zintab, PR Zinc, Zincfant, DT Zinc)	02	
		Home-prepared treatment*	03	
		Antimicrobial/Antibiotics*	04	
		Anti-diarrheal*	05	
		Drip/intravenous fluid	06	
		Injection	07	
		Fever medicine	08	
		Anti-nausea (vomiting) medicine	09	
		Other pill/syrup: Name: _____	10	
		Vitamins	11	
Don't know	88			
Other (specify): _____	99			
224	Interviewer: check if q223=1: ORS was given to the child.	Yes	1	
		No	3	If No →Q23 I
225	You mentioned that you have given (NAME) an ORS. Is that correct?	Yes	1	
		No	3	If No →Q23 I
	Interviewer: IF DID NOT GIVE ORS, CORRECT Q223 AND Q224.			

226	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. From where was the ORS obtained?	Public Sector			
		Ghana Health Service facility/public hospital	01		
		CHPS Compound	02		
		Community outreach	03		
		Other public sector	04		
		Private Sector			
		Private Clinic/hospital	05		
		Private pharmacy/LCS/drug store	06		
		Community-based distributor	07		
		Faith-based, NGO/CBO	08		
		Friends/Relatives	09		
		Traditional healer/herbalist	10		
		Midwife	11		
		Traditional birth attendant	12		
Don't know	88				
Other (specify): _____	99				
227	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. How often did you give the ORS treatment to (NAME)?	Frequently	01		
		After each liquid stool	02		
		Morning, mid-day, and night	03		
		Whenever the child wanted it	04		
		Don't know	88		
		Other (specify): _____	99		
228	How many sachets of ORS did you prepare for (NAME) during the episode of diarrhea?	<input type="text"/> <input type="text"/> sachets			
229	How many days did you give the child the ORS?	<input type="text"/> <input type="text"/> days			
230	Interviewer: MARK ONLY ONE ANSWER What was the primary type of water you used to prepare the ORS?	TREATED WATER			
		Treated/Boiled tap water	01		
		Sachet or bottled water	02		
		UNTREATED WATER			
		Ordinary/tap (Non Purified) Water	03		
		Stream/surface/rain water	04		
		Spring/well/borehole water	05		
Other (specify): _____	99				
231	Interviewer: check if q223=3: Home prepared solution was given to the child.	Yes	1		
		No	3	If No →Q236	

232	You mentioned that you have given (NAME) a home-prepared solution. Is that correct? Interviewer: IF DID NOT GIVE HOME-PREPARED SOLUTION, CORRECT Q223 AND Q231.	Yes	1	
		No	3	If No →Q236
233	Interviewer: READ LIST. MULTIPLE RESPONSES ALLOWED. What home-prepared solutions did you give to (NAME)?	Sugar Salt Solution (SSS)	01	
		Maize/millet porridge	02	
		Herbal remedies	03	
		Coconut juice	04	
		Don't know	88	
		Other (specify): _____	99	
234	Interviewer: READ THE LIST MARK ONLY ONE ANSWER. How often did you give the home-prepared solution to (NAME)?	Frequently	01	
		After each liquid stool	02	
		Morning, mid-day, and night	03	
		Whenever the child wanted it	04	
		Don't know	88	
		Other (specify): _____	99	
235	Interviewer: MARK ONLY ONE ANSWER. What type of water did you use when you prepared the home-based treatment?	TREATED WATER		
		Treated/Boiled tap water	01	
		Sachet or bottled water	02	
		UNTREATED WATER		
		Ordinary/tap (Non Purified) Water	03	
		Stream/surface/rain water	04	
		Spring/well/borehole water	05	
Other (specify): _____	99			
236	Interviewer: check if Q223=1 or Q233=1: ORS/SSS was given to the child.	ORS/SSS was given	1	→Q238
		No ORS/SSS was given	3	
237	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. Why did you not give (NAME) any ORS or SSS solutions?	Child not seriously ill	01	
		Could not find ORS to buy	02	
		Did not know how to prepare SSS	03	
		Products too costly	04	
		Child/Mother does not like	05	
		Didn't know about ORS/SSS	06	
		It is not a real treatment	07	
		Provider did not recommend	08	
		Prefer other treatments	09	
		Other (specify): _____	99	
238	Interviewer: check if q223=4: Antimicrobial/Antibiotics was given to the child.	Yes	1	
		No	3	If No →Q243

239	Interviewer: SHOW PHOTO CARD AGAIN OR ASK TO SHOW MEDICINE PACKAGE.	Yes	1	
		No	3	If No →Q243
	You mentioned that you have given (NAME) an antimicrobial/antibiotics. Is that correct?			
	Interviewer: IF DID NOT GIVE ANTIMICROBIAL/ANTIBIOTICS, CORRECT Q223 AND Q238.			
240	Interviewer: CHECK PHOTO CARD AGAIN OR ASK TO SHOW MEDICINE PACKAGE	Name: _____		
		What did you give?	Don't know	88
			Other (specify): _____	99
241	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER.	Where did you obtain this antimicrobial/antibiotics?		
			Public Sector	
			Ghana Health Service facility/public hospital	01
			CHPS Compound	02
			Community outreach	03
			Other public sector	04
			Private Sector	
			Private Clinic/hospital	05
			Private pharmacy/LCS/drug store	06
			Community-based distributor	07
			Faith-based, NGO/CBO	08
			Friends/Relatives	09
			Traditional healer/herbalist	10
			Midwife	11
	Traditional birth attendant	12		
	Don't know	88		
	Other (specify): _____	99		
242	Interviewer: DO NOT READ LIST. MULTIPLE ANSWERS ALLOWED.	Child had blood in stool	01	
		Child had fever with diarrhea	02	
		Health provider said it is more effective	03	
		I asked for an antimicrobial/antibiotic	04	
		Provider gave me this treatment	05	
		Other (specify): _____	99	
243	Interviewer: check if q223=5: Antidiarrheal was given to the child.	Yes	1	
		No	3	If No →Q247

244	<p>Interviewer: SHOW PHOTO CARD AGAIN OR ASK TO SHOW MEDICINE PACKAGE.</p> <p>You mentioned that you have given (NAME) an antidiarrheal. Is that correct?</p> <p>Interviewer: IF DID NOT GIVE ANTIDIARRHEAL, CORRECT Q223 AND Q243.</p>	Yes	1	
		Name of Antidiarrheal: _____		
		No	3	If No → Q247
245	<p>Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER.</p> <p>Where did you obtain the antidiarrheal?</p>	Public Sector		
		Ghana Health Service facility/public hospital	01	
		CHPS Compound	02	
		Community outreach	03	
		Other public sector	04	
		Private Sector		
		Private Clinic/hospital	05	
		Private pharmacy/LCS/drug store	06	
		Community-based distributor	07	
		Faith-based, NGO/CBO	08	
		Friends/Relatives	09	
		Traditional healer/herbalist	10	
		Midwife	11	
		Traditional birth attendant	12	
Don't know	88			
Other (specify): _____	99			
246	<p>Interviewer: DO NOT READ LIST. MULTIPLE ANSWERS ALLOWED</p> <p>Why did you give (NAME) an antidiarrheal to treat diarrhea?</p>	Health provider said it is more effective	01	
		I think it is most effective	02	
		I asked for an antidiarrheal	03	
		This treatment has worked well for me in the past	04	
		Provider gave me this treatment	05	
		Other (specify): _____	99	
247	<p>Interviewer: check if q223=6: Drip/Intravenous fluid was given to the child.</p>	Yes	1	
		No	3	If No → Q250
248	<p>You mentioned that a drip (intravenous fluid treatment) was given to (NAME). Is that correct?</p> <p>Interviewer: IF DRIP/INTRAVENOUS FLUID WAS NOT GIVEN, CORRECT Q223 AND Q247.</p>	Yes	1	
		No	3	If No → Q250

249	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. Where did you obtain this drip (intravenous treatment)?	Public Sector		
		Ghana Health Service facility/public hospital	01	
		CHPS Compound	02	
		Community outreach	03	
		Other public sector	04	
		Private Sector		
		Private Clinic/hospital	05	
		Private pharmacy/LCS/drug store	06	
		Community-based distributor	07	
		Faith-based, NGO/CBO	08	
		Friends/Relatives	09	
		Traditional healer/herbalist	10	
		Midwife	11	
		Traditional birth attendant	12	
Don't know	88			
Other (specify): _____	99			
250	Interviewer: check if q223=7: Injection was given to the child.	Yes	1	
		No	3	If No →Q253
251	You mentioned that an injection was given to (NAME). Is that correct? Interviewer: IF AN INJECTION WAS NOT GIVEN, CORRECT Q223 AND Q250.	Yes	1	
		No	3	If No →Q253
252	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. Where did you obtain this injection?	Public Sector		
		Ghana Health Service facility/public hospital	01	
		CHPS Compound	02	
		Community outreach	03	
		Other public sector	04	
		Private Sector		
		Private Clinic/hospital	05	
		Private pharmacy/LCS/drug store	06	
		Community-based distributor	07	
		Faith-based, NGO/CBO	08	
		Friends/Relatives	09	
		Traditional healer/herbalist	10	
		Midwife	11	
		Traditional birth attendant	12	
Don't know	88			
Other (specify): _____	99			
253	Interviewer: check if q223=2: Zinc was given to the child.	Yes		
		No		If No →Q284
254	You mentioned that you have given (NAME) Zinc. Is that correct? Interviewer: IF DID NOT GIVE ZINC, CORRECT Q223 AND Q253.	Yes	1	
		No	3	If No →Q284

255	Interviewer: SHOW PHOTO CARD/PACKAGES OF ZINTAB, PR ZINC, ZINCFANT, DT ZINC What brand of zinc did you give during the episode of diarrhea?	Zintab	1	
		PR Zinc	3	
		Zincfant	5	
		DT Zinc	7	
		Don't know	8	
		Other (specify): _____	9	
256	Interviewer: DO NOT READ LIST. MARK ONLY ONE ANSWER. Please, where did you obtain zinc (Zintab,PR Zinc, Zincfant, DT zinc or other)?	Public Sector		
		Ghana Health Service facility/public hospital	01	
		CHPS Compound	02	
		Community outreach	03	
		Other public sector	04	
		Private Sector		
		Private Clinic/hospital	05	
		Private pharmacy/LCS/drug store	06	
		Community-based distributor	07	
		Faith-based, NGO/CBO	08	
		Friends/Relatives	09	
		Traditional healer/herbalist	10	
		Midwife	11	
		Traditional birth attendant	12	
Don't know	88	If don't know →Q258		
Other (specify): _____	99			
257	Interviewer: MARK ONLY ONE ANSWER. DO NOT READ LIST. What was your main reason for choosing this source of supply?	Price	01	
		Easily accessible	02	
		Quality of care	03	
		Most knowledgeable source	04	
		Close by	05	
		Habit	06	
		Other (specify): _____	99	
258	Is this the first time you have given zinc to treat diarrhea in children?	Yes	1	
		No	3	
		Don't know	8	
259	Interviewer: DO NOT READ LIST. MULTIPLE ANSWERS ALLOWED Why did you chose to use zinc this time?	Recommended by provider/clinic/pharmacies	01	
		Recommended by friend/relative	02	
		Saw/heard advertisement	03	
		Used successfully in the past	04	
		Heard that zinc would reduce severity and duration	05	
		Heard that zinc had a protective effect for 2-3 months	06	
		Other (specify): _____	99	

260	How many tablets were you given/or did you purchase?	<input type="text"/> <input type="text"/> tablets		
		Don't know	88	
261	How did you find the use of the tablets? <i>Interviewer: READ LIST</i>	Easy	01	→Q263
		Difficult	03	
		Indifferent	05	→Q263
		Other (specify): _____	99	→Q263
262	If Q261=3 (Difficult):			
	a) What is the MAJOR difficulty you had with using the zinc tablets?			
	1.			
	b) What other difficulties did you have using the zinc tablets?			
	2.			
	3.			
4.				
5.				
263	What dose of zinc per day was given to (NAME)? <i>Interviewer: check zinc box/package if available. Otherwise, show photo card of zinc products and dosages</i>	Zintabs 10mg (yellow tablet)	1	
		Zintabs 20mg (orange tablet)	3	
		PR Zinc 10 mg (sand color tablet)	5	
		PR Zinc 20 mg (sand color tablet)	7	
		Zincfant 1 full tablet (white)	9	
		Zincfant 1/2 tablet (white)	11	
		DT Zinc, 1/2 tablet	13	
		DT Zinc, whole tablet	15	
		Don't know	88	
		Other (specify): _____	99	
264	<i>Interviewer: check Q236</i>	ORS/SSS was given	1	→Q266
		No ORS/SSS was given	3	

265	Interviewer: DO NOT READ LIST. MARK ONLY ONE RESPONSE. What was the primary reason you did not give ORS or SSS <u>along with zinc</u> ?	Did not know they should be given together	01	
		Did not have ORS	02	
		Don't think ORS is effective	03	
		Didn't have ingredients for ORS/SSS	04	
		Child not seriously ill	05	
		Could not find ORS to buy	06	
		Child/Mother does not like taste	07	
		Chemist/Doctor only recommended zinc	08	
		ORS products were too costly	09	
		Other (specify): _____	99	
266	For how many days did you give (or have you been giving) zinc to (NAME)?	<input type="text"/> <input type="text"/> days		
267	Does (NAME) still have diarrhea?	Yes	1	If don't know →Q271
		No	3	
		Don't know	8	
268	Interviewer: mark YES if Q266 is less than (<)10 AND Q267=3: caregiver gave child zinc for less than 10 days and child does not have diarrhea anymore. Otherwise, mark No.	Yes	1	If No →Q271
		No	3	
269	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. Was there a reason (NAME) only took X doses rather than all 10 doses?	Child was cured	01	
		Child would not take zinc treatment	02	
		Child vomited treatment	03	
		Needed treatment for another person	04	
		Wanted to save remaining treatment for future illness	05	
		Did not purchase full course of zinc	06	
		Did not know child needed to take entire treatment	07	
		No one told me to give all the treatment	08	
		Thought I needed to give zinc only along with ORS	09	
		Child still taking the treatment	10	
		I forgot	11	
		Other (specify): _____	99	

270	What did you do with the rest of the zinc?	Was not sold 10 tablets	01	
		Saved for future episode	03	
		Threw them away	05	
		Other(specify): _____	99	
271	a) In general, do you feel that administering zinc for 10 days is a problem?	Yes	1	If no, →Q272
		No	3	
b) If yes, can you tell me why: _____ _____ _____				
272	Interviewer: READ LIST. MULTIPLE RESPONSES ALLOWED. PROBE. Would any of the following help you remember to use the zinc for the full 10 days?	A cell phone text message	01	
		A 10-day calendar	03	
		A visit from a Community Health Worker	05	
		Other (Specify): _____	99	
273	If you knew that taking the full 10 day course of zinc would protect the child from future episodes of diarrhea for the next 2-3 months, would that motivate you to use zinc for the full 10 days?	Yes	1	
		No	3	
		Don't know	8	
274	Do you think this zinc treatment was effective in treating (NAME)?	Yes	1	
		No	3	
		Don't know	8	
275	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. If Yes in Q274: Why? If No in Q274: Why not?	Diarrhea stopped quickly	01	
		Child recovered quickly	02	
		Child regained appetite	03	
		Diarrhea did not stop soon	04	
		Child didn't like the taste	05	
		Too hard to administer	06	
		Don't know	88	
		Other (specify): _____	99	

276	Did you encounter any problems or side effects when using the zinc product?	Yes	1	
		No	3	If No, →Q277
		Don't know	8	If don't know, →Q277
276a	What kind of problems or side effects did you encounter when using zinc?	Vomiting	1	
		Bad/metallic taste	2	
		Other (specify): _____	9	
277	Interviewer: DO NOT READ LIST. MULTIPLE ANSWERS ALLOWED. SHOW PHOTO CARD. PROBE. Before zinc was available for diarrhea treatment, what did you do to treat (NAME) when he or she had diarrhea?	Antimicrobial	01	
		Anti-diarrheal	02	
		Fever medicine	03	
		Anti-nausea (vomiting)	04	
		Intravenous/injection	05	
		Home/traditional remedy	06	
		ORS	07	
		Nothing	08	
		Don't know	88	
		Other (specify): _____	99	
278	Do you plan on using zinc the next time (NAME) has diarrhea?	Yes	1	
		No	3	
		Don't know	8	
279	Did you purchase the zinc or obtain it free?	Purchased	1	
		Free	3	If free →Q301
		Don't know	8	If don't know →Q301
280	What price did you pay?	Less than 1 Ghana Cedi	01	
		1 Ghana Cedi	03	
		More than 1 Ghana Cedi	05	
		Other (please write below) GHC _____:_____P		
		Don't know	88	
281	Interviewer: READ LIST. MARK ONLY ONE ANSWER. What do you think of the price of zinc?	Very Affordable/Not expensive at all	01	→Q301
		Affordable	02	→Q301
		Expensive/Not affordable	03	→Q301
		Very expensive/Not affordable at all	05	→Q301
		No opinion	07	→Q301
		Don't know	88	→Q301
282	Can you please tell me why you did not provide any treatment to (NAME) during this recent episode of diarrhea? Interviewer: DO NOT READ LIST. MULTIPLE ANSWERS ALLOWED. PROBE.	Child not very sick	01	
		Could not afford/not enough money	02	
		Did not know where to purchase treatment	03	
		Child too young for drugs	04	
		Child is teething	05	
		Don't know	88	

		Other (specify): _____	99	
283	Before today, have you ever heard of zinc as a diarrhea treatment?	Yes	1	→Q301
		No	3	→Q301
		Don't know	8	→Q301
284	For non-users of zinc: Why didn't you use zinc for this episode of diarrhea?	Didn't know about it	1	
		New product/don't trust it	2	
		Provider didn't recommend it	3	
		Prefer other treatments	4	
		Didn't know where to get it	5	
		Too expensive	6	
		Other (specify): _____	9	
285	For non-users of zinc: Before today, have you ever heard of zinc as a diarrhea treatment?	Yes	1	→Q301
		No	3	→Q301
		Don't know	8	→Q301

SECTION 2 – EXPOSURE TO INTERVENTIONS AND KNOWLEDGE OF DIARRHEA TREATMENT

No	Questions & Filters	Codes		Skip to
301	Thinking back over the past 1 month, have you seen or heard any adverts messages about <u>treatment for diarrhea</u> ?	Yes	1	
		No	3	If No → Q303
		Don't know	8	If don't know → Q303
302	<p>Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. PROBE.</p> <p>Please, where did you hear/see the message(s) about treatment for diarrhea?</p>	Radio	01	
		Television	02	
		Banner/poster/flyer	03	
		Doctor/nurse	04	
		Friend or neighbor	05	
		Relative	06	
		Community volunteer	07	
		Community-based distributor	08	
		Pharmacist	09	
		LCS/drug store	10	
		Don't know	88	
		Other (specify): _____	99	
303	<p>Interviewer: SHOW THE PHOTO CARD WITH DIFFERENT ORS BRANDS TO THE RESPONDENT.</p> <p>Thinking back over the past 1 month, have you seen or heard any messages about <u>ORS</u>?</p>	Yes	1	
		No	3	If No → Q306
		Don't know	8	If don't know → Q306
304	<p>Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. PROBE.</p> <p>Where did you hear/see the message(s) about ORS?</p>	Radio	01	
		Television	02	
		Banner/poster/flyer	03	
		Doctor/nurse	04	
		Friend or neighbor	05	
		Relative	06	
		Community volunteer	07	
		Community-based distributor	08	
		Pharmacist	09	
		LCS/drug store	10	
		Don't know	88	
		Other (specify): _____	99	

305	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. PROBE. What were the main messages that you heard/saw?	ORS protects children from diarrhea	01	
		ORS should be taken with Zinc	03	
		ORS protects children from dehydration	05	
		Other (specify): _____	99	
306	Thinking back over the past 1 month, have you seen or heard any messages about <u>zinc for diarrhea</u> ?	Yes	1	If No →Q411 If don't know →Q411
		No	3	
		Don't know	8	
307	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. PROBE. What information did you get from the message(s) that you heard?	Zinc stops diarrhea faster	01	
		Zinc reduces the severity of diarrhea	02	
		Zinc is available in pharmacy and health centers	03	
		Zinc should be taken with ORS	04	
		A complete 10 day dose of zinc should be administered	05	
		Zinc protects the child from diarrhea for up to 3 months	06	
		Other (specify): _____	99	
308	Interviewer: DO NOT READ LIST. MULTIPLE RESPONSES ALLOWED. PROBE. Where did you hear/see the message(s) about zinc for diarrhea treatment?	Radio	01	
		Television	02	
		Banner/poster/flyer	03	
		Doctor/nurse	04	
		Friend or neighbor	05	
		Relative	06	
		Community volunteer	07	
		Community-based distributor	08	
		Pharmacist	09	
		LCS/drug store	10	
		Don't know	88	
		Other (specify): _____	99	

SECTION 3 – LIKERT SCALE – DETERMINANTS OF USE

*This section asks your opinion on certain issues. Please tell me if you **believe that** the following statements are true or false. Interviewer: DO NOT READ “Don’t know”*

I. Ability: Knowledge				
		True	False	Don't know
411	Diarrhea can be caused by lack of cleanliness	1	3	9
412	Diarrhea can be associated with lack of cleanliness, such as not washing hands with water and soap before eating	1	3	9
413	Diarrhea can be caused by drinking unsafe water	1	3	9
414	Diarrhea can be caused by eating unhygienic food	1	3	9
415	Only those diarrheal episodes that have blood in the stool require antibiotics	1	3	9
416	Most diarrhea can be managed at home without any drugs	1	3	9
417	Giving food-based fluids is equally as effective as giving ORS	1	3	9

*Please tell me if you “**agree strongly,**” “**agree somewhat,**” “**disagree strongly,**” or “**disagree somewhat**” with the following statements. Interviewer: DO NOT READ “Don’t know”*

		Strongly Agree	Agree Somewhat	Disagree Somewhat	Strongly Disagree	Don't know
421	Children can die from diarrhea	7	5	3	1	9
422	Your family will have a problem if one of the members has diarrhea	7	5	3	1	9
423	It does not seem like anyone around here has a problem because of diarrhea	7	5	3	1	9
424	Diarrhea is a major health problem in your community	7	5	3	1	9
425	Diarrhea is a problem in the poorer segment of the community only	7	5	3	1	9

		Strongly Agree	Agree Somewhat	Disagree Somewhat	Strongly Disagree	Don't know
431	If your child gets diarrhea it is best just to do nothing and it will pass in time	7	5	3	1	9
432	The children under five in your household are healthy so their bodies can fight off diarrhea without doing anything	7	5	3	1	9

433	Children under five are too young to experience serious medical problems from getting diarrhea	7	5	3	1	9
434	You are not worried about the children (child) under five in your household getting diarrhea	7	5	3	1	9
435	Children are more likely to get diarrhea than adults	7	5	3	1	9

440	Interviewer: Check Q253 and Q283. If Q253=1 and/or Q283 = 1 then caregiver has heard about zinc for diarrhea before today; circle 1 (Yes). If Q253=3 and Q283 = 3 or 8, then caregiver has not heard about zinc for diarrhea before today; circle 3 (No).	Yes	1	If Yes →Q441
		No	3	If No →Q501

INTERVIEWER: I WOULD LIKE TO ASK YOU ABOUT A FEW MORE STATEMENTS. PLEASE CONTINUE TO TELL ME, FOR EACH ONE, WHETHER YOU STRONGLY AGREE, AGREE SOMEWHAT, DISAGREE SOMEWHAT, OR STRONGLY DISAGREE.

2. Opportunity: Availability						
		Strongly Agree	Agree Somewhat	Disagree Somewhat	Strongly Disagree	Don't know
441	Drug stores nearby always have zinc for sale	7	5	3	1	9
442	There is a place nearby where you can get zinc when your child needs it	7	5	3	1	9
443	You don't know where to get zinc	7	5	3	1	9
444	Zinc treatments are too expensive	7	5	3	1	9
445	You are willing to pay the current price for zinc (50p per treatment)	7	5	3	1	9
446	Zinc treatment products are available within walking distance from your home	7	5	3	1	9
3. Motivation: Outcome Expectations						
		Strongly Agree	Agree Somewhat	Disagree Somewhat	Strongly Disagree	Don't know
451	Zinc is effective for treatment of diarrhea	7	5	3	1	9

452	Zinc stops diarrhea faster	7	5	3	1	9
453	Zinc does not help in reducing the severity of a diarrheal episode	7	5	3	1	9
454	Zinc can help to prevent future episodes of diarrhea for up to 2 months	7	5	3	1	9
455	Zinc does not have to be taken for the full 10 days to protect against future diarrhea	7	5	3	1	9
456	Use of zinc reduces the risk of dehydration in children	7	5	3	1	9
457	Zinc helps to strengthen the immune system of children	7	5	3	1	9
458	Zinc reduces the amount of diarrhea	7	5	3	1	9
4. Capacity/Ability: Use of Products						
		Strongly Agree	Agree Somewhat	Disagree Somewhat	Strongly Disagree	Don't know
461	Zinc should be used for every type of childhood diarrhea	7	5	3	1	9
462	Childhood diarrhea should always be treated with an antibiotic	7	5	3	1	9
463	Zinc has too many side effects, so you don't feel safe giving zinc to your small child	7	5	3	1	9
464	Zinc tastes bad so your child won't take it.	7	5	3	1	9
465	Zinc is only a nutritional supplement, not an effective treatment for childhood diarrhea.	7	5	3	1	9
466	Zinc should be given along with oral rehydration solution, or ORS, to be most effective.	7	5	3	1	9
467	It is difficult to remember to give a child zinc when the diarrhea has stopped	7	5	3	1	9
468	You would purchase and use zinc the next time your child has diarrhea	7	5	3	1	9

END OF DIARRHEA MODULE

PLEASE COMPLETE THE SOCIOECONOMIC MODULE FROM NEXT PAGE

No	Questions and Filters	Responses	Codes	Skip To
501	How old are you?	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; margin-right: 5px;"></div> years </div> <p style="text-align: right;">Don't know</p>	88	
502	What is the highest level of school you attended?	No formal education/Nursery, Pre-school	01	
		Some primary	02	
		Completed primary	03	
		Some JSS/JHS	04	
		Some Middle School/Completed JSS/JHS	05	
		Complete Middle School/Some SSS/SHS	06	
		Some Secondary/Completed SSS/SHS	07	
		Completed Secondary/Some A'Level	08	
		Completed A'Level/Vocational/Technical Training	09	
		Post Secondary (Agric/Nurse)	10	
		Tertiary: 1 st degree or diploma	11	
		2 nd Degree (graduate)	12	
503	What is your marital status?	Never married	1	
		Married/Living together	2	
		Widowed	3	
		Divorced	4	
		Separated	5	
504	<p>Interviewer: READ LIST. MULTIPLE RESPONSES ALLOWED.</p> <p>Which of the following items are available in your household?</p>		Yes	No
		Electricity	01	3
		Radio	02	3
		Television	03	3
		Refrigerator	04	3
		Cell phone/Mobile	05	3
		Landline phone	06	3
		Gas/electric cooker	07	3
		Bicycle	08	3
		Sofa set	09	3
		Water tank	10	3
505	<p>MAIN MATERIAL OF FLOOR</p> <p>(Interviewer: RECORD OBSERVATION. IF INTERVIEW IS NOT INSIDE HOUSE, ASK TO SEE INSIDE. This question refers to the floor inside of the structure/living areas.)</p>	NATURAL FLOOR		
		Earth/Sand	01	
		Earth and Dung	02	
		FINISHED FLOOR		
		Stones	03	
		Bricks	04	
		Parquet or Polished Wood	05	
		Mosaic or tiles	06	
		Cement	07	
		Rubber carpet	08	
		Other (Specify):	99	

506	MAIN MATERIAL OF WALL (Interviewer: RECORD OBSERVATION)	RUDIMENTARY WALLS	
		Mud and poles	01
		Un-burnt bricks	02
		Un-burnt bricks with plaster	03
		Burnt bricks with mud	04
		FINISHED WALLS	
		Cement blocks	05
		Stone	06
		Timber	07
		Burnt bricks with cement	08
		Other (Specify): _____	99
		507	MAIN MATERIAL OF ROOF (Interviewer: RECORD OBSERVATION)
Thatched	01		
FINISHED ROOFING			
Wood/planks	02		
Iron sheets	03		
Asbestos	04		
Tiles	05		
Tin	06		
Cement	07		
Other (specify): _____	99		
508	What type of toilet does your household use MOST of the time?	Flush toilet	01
		KVIP latrine	02
		Covered pit latrine	03
		Uncovered pit latrine	04
		Bucket/pan	05
		Free range	06
		Other (Specify): _____	99
509	What is the MAIN source of drinking water for the members of your household?	PIPED WATER	
		Piped - into house	01
		Piped to yard/plot	02
		Public tap/standpipe	03
		WATER FROM OPEN WELL/SPRING	
		Open well/spring in yard/plot	04
		Open public well/spring	05
		WATER FROM PROTECTED WELL/SPRING	
		Protected well/spring in yard/plot	06
		Protected public well/spring	07
		WATER FROM BOREHOLE	
		Borehole in yard/plot	08
		Public borehole	09
		SURFACE WATER	
River/stream	10		
Pond/lake	11		

		Dam	12	
		Rain water	13	
		PURCHASED WATER		
		Bottled water	14	
		Sachet water	15	
		Tanker truck	16	
		Cart with small tank	17	
		Other (Specify): _____	99	
510	How long does it take you to go for [or fetch] drinking water for your household, going and coming back (round trip)?	Water on premises	1	
		Less than 30 minutes	2	
		30 – 60 minutes	3	
		More than 60 minutes/1 hour	4	
		Don't know/Can't tell	8	
511	What type of cooking fuel does your household use MOST of the time?	Fire wood	01	
		Charcoal	02	
		Kerosene/paraffin	03	
		Gas/Biogas/LPG	04	
		Electricity	05	
		Straw/shrubs/grass	06	
		No food cooked in the household	07	
		Other (Specify): _____	99	
512	Interviewer: Record GPS coordinates of household. STAND BY FRONT DOOR	<p>N <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p> <p>W <input type="text"/> <input type="text"/> . <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p>		

**END OF SOCIOECONOMIC MODULE
THANK YOU FOR PARTICIPATING IN THIS STUDY!**

END TIME | | : | | **[24HR FORMAT]**

RESPONDENT'S NAME (with alias or common):.....

RESPONDENT'S Telephone No. / / / / / / / / /

RESPONDENT'S address or house number (HNo.) (If available).....

.....

.....

**INTERVIEWER: PLEASE MAKE SURE HOUSEHOLD UNIQUE ID IS INDICATED ON
TOP OF THE IDENTIFICATION TABLE**