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INTRODUCING ZINC THROUGH THE PRIVATE SECTOR IN BENIN: EVALUATION OF CAREGIVER KNOWLEDGE, ATTITUDES AND PRACTICES, 2009 AND 2011

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INTRODUCING ZINC THROUGH THE PRIVATE SECTOR IN BENIN: EVALUATION OF CAREGIVER KNOWLEDGE, ATTITUDES AND PRACTICES, 2009 AND 2011

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ACRONYMS

| | |
|---------------|---|
| CEFORP | Centre de Formation et de Recherche en matière de Population |
| DHS | Demographic and Health Survey |
| ORS | Oral Rehydration Salts/Solution |
| ORT | Oral Rehydration Therapy |
| POUZN | Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment Project |
| PSI | Population Services International |
| SHOPS | Strengthening Health Outcomes through the Private Sector Project |
| UNICEF | United Nations' International Children's Education Fund |
| USAID | United States Agency for International Development |
| ZD | Zone de dénombrement |

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EXECUTIVE SUMMARY

BACKGROUND

In 2007 the United States Agency for International Development (USAID) Mission to Benin invited the Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) project, implemented by Abt Associates Inc. and Population Services International (PSI), to introduce pediatric zinc in Benin through private sector channels.

In November 2009, the project conducted a nationwide household survey in the project's six targeted departments and largest city of Cotonou to assess program progress. In August 2011, USAID's Strengthening Health Outcomes through the Private Sector (SHOPS) project, also implemented by Abt Associates, conducted a follow-on survey with caregivers of children under the age of five years in the seven targeted departments to assess diarrhea treatment practices, care seeking behavior, knowledge, and beliefs. The survey assessed changes in behavior and attitudes related to childhood diarrhea and zinc since 2009 and also asked new questions to enable SHOPS to better understand determinants of zinc use and therefore develop more effective programs. In addition SHOPS conducted a formative survey among public and private healthcare providers in the seven departments of Benin to assess prescription practices for, as well as knowledge and attitudes around, treatment of childhood diarrhea.

METHODOLOGY

The caregiver surveys in both 2009 and 2011 were conducted in eight major urban and surrounding peri-urban communes located in the following six departments: Alibori, Atacora, Borgou, Collines, Donga, and Zou and in the largest city, Cotonou, located in Littoral department. We used a multi-stage sampling approach and selected representative probability samples of caregivers of children aged 0-59 months with diarrhea in the past 2 weeks from this population in both 2009 (n= 294) and 2011 (n=392). Caregivers responded to questions on household characteristics, the child's diarrhea history, use of zinc and other diarrhea treatments (e.g., Oral Rehydration Salts, or ORS), knowledge and perception about zinc products, cost of zinc, and media message exposure.

Sampling weights were computed to reflect the probability of selection into the sample and to allow generalizations to the population from which the sample was drawn; all analyses presented in this report are weighted to account for the sampling procedures. Descriptive analysis was used to calculate key indicators (respondent characteristics, diarrhea prevalence, proportion of children treated with zinc, etc.) and describe the distribution of variables both in 2009 and 2011. T-tests and chi-square tests were used to test for statistical significance of differences observed within each year's survey and between the two years. Logistic regression models that controlled for confounding factors were utilized to determine which independent variables were statistically significantly associated with zinc use. Each theorized predictor was tested independently of the others and weighted chi-square tests were utilized to test for statistically significant differences in proportions of groups both within one survey year and across survey years.

RESEARCH RESULTS AND PROGRAM IMPLICATIONS

- Use of zinc for treatment of childhood diarrhea increased significantly from 32 percent in 2009 to 54 percent in 2011, and the high percentage of zinc users who also treated with ORS was sustained from 2009 to 2011 (97 percent and 100 percent, respectively). Given that the only zinc product available in Benin is the Orasel Zinc kit, co-packaging likely contributed to the high rate of co-use of zinc and ORS for diarrhea treatment.
- Providers play an important role in encouraging use of zinc plus ORS as the first-line treatment for uncomplicated pediatric diarrhea, and both the public and private sectors were important sources of zinc advice and treatment in 2009 and 2011. Most (62 percent) zinc users in 2011 treated with zinc because their provider recommended it. Most caregivers who sought treatment at a public health clinic or pharmacy were correctly given Orasel Zinc. Continued efforts to reach providers with ongoing training and education about appropriate diarrhea treatment are critical to zinc program success.
- Inappropriate treatments were still widely practiced, and many times used in conjunction with Orasel Zinc. In 2011, 20 percent of caregivers gave antibiotics to treat uncomplicated (no blood in stools or fever) diarrhea; this was not a statistically significant change from 11 percent in 2009. Both caregivers and providers likely play a role in the continued inappropriate use of antibiotics, and additional research is warranted to further explore these factors.
- While care-seeking behavior statistically significantly increased between 2009 and 2011, the percentage of caregivers not providing any treatment remained high: in 2011, 62 percent of caregivers did not seek advice or treatment outside the home and 25 percent reported that they did not give any treatment to their child. The most frequently reported reason for not giving any treatment in 2011 was that the caregiver did not perceive the child to be very sick (48 percent).
- Willingness to pay for zinc is high. There were statistically significantly more caregivers in 2011 willing to pay for Orasel Zinc at increased prices than in 2009, and the majority of zinc users (92 percent in 2011 and 85 percent in 2009) paid for their kit.
- Recall of specific Orasel Zinc messages in the three months preceding the survey was significantly correlated with use of zinc in both 2009 and 2011, as was recall of any messages about treatment for diarrheal disease (i.e., not specific to the Orasel-Zinc brand).
- Television was a major source of zinc information. The vast majority of caregivers in 2011 that heard a message about Orasel Zinc (44 percent of caregivers) heard this message via television (76 percent), up from 20 percent in 2009 prior to the launch of a television campaign. Television is thus an effective medium for increasing awareness of zinc.
- While many caregivers appeared to possess general knowledge about the effectiveness of zinc in treating diarrhea, the majority of zinc users agreed that “it is too hard to remember to give zinc to children when the diarrhea episode has ended.” To achieve higher correct use of zinc with ORS, programs must find ways to encourage and facilitate zinc use for 10 full days even when the episode of diarrhea has ended, and future campaigns should ensure that the message about the need to administer zinc for the full 10 days in order for it to have a protective effect is better communicated to both caregivers and providers.
- Logistic regression analysis showed that in both 2009 and 2011, recalled exposure to Orasel Zinc messages, speaking to health personnel about zinc, and seeking treatment from a professional health provider were significantly associated with zinc use while controlling for diarrhea severity and caregiver age, education, household wealth, and urban/rural residence. Additionally, in 2011, caregiver perceptions of zinc being an effective treatment

and readily available were found to increase the odds of using zinc to treat diarrhea. These data suggest that initiatives that combine demand generation and provider sensitization as well as addressing supply-side barriers to zinc may be associated with increased use of zinc to treat childhood diarrhea.

I. BACKGROUND

Located on the west coast of Africa between Nigeria and Togo on the Gulf of Benin, Benin is one of the poorest and least developed countries of the world, ranking 166/177 in the UN's Human Development Index (HDI) for 2012. Benin is territorially one of the smaller countries in Africa with an area of 112,620 square kilometers and a population of 9.4 million¹. Sixty-six percent of the population resides in rural areas.

Overall health indicators are poor, with a low life expectancy of 56 years and high infant and child mortality. In 2012, Benin had an infant mortality rate of 73 per 1,000 live births, and an under-five mortality rate of 115 per 1,000 live births.² The major causes of childhood morbidity and mortality are malaria, diarrhea and acute respiratory infections. Six percent of children under five years of age had diarrhea in the two weeks preceding the 2011 Benin Demographic and Health Survey³. Approximately 13 percent of all childhood deaths in Benin are diarrhea-related⁴. The major diarrhea season occurs during May-August each year, and a second diarrhea season occurs during October-November.

In 2007 the USAID Mission to Benin invited the Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment Project (POUZN) project, implemented by Abt Associates Inc. and Population Services International (PSI), to introduce pediatric zinc for the treatment of diarrhea in Benin through private sector channels. Since the public sector was found to be an important source of care during diarrhea episodes, the POUZN program was designed and implemented in close collaboration with Benin's public sector. In particular, POUZN paid special attention to assuring supply in public sector facilities and training public providers in the major urban and peri-urban communes of six targeted departments and in the largest city, Cotonou.

The project introduced OraselZinc, a diarrhea treatment kit containing ten 20-mg tablets of zinc sulfate and two sachets of orange flavored low osmolarity oral rehydration solution (ORS), into the marketplace using a combination of demand creation campaigns and provider training. The project's two-pronged communication strategy employed both mass media and community-based channels. Initial mass media efforts, beginning in 2008 and running through 2010, utilized national radio networks and 13 community radio partners to reach households living in the target areas. In late 2010 the project began to promote the Orasel Zinc kit through branded television advertisements. To complement the mass media campaign, POUZN also produced a set of promotional and educational materials tailored to local knowledge and literacy levels for use during community-based interpersonal communication activities and at points of sale. The project also created new partnerships with women's microcredit groups to promote use of the product.

On the provider side, POUZN developed a single integrated training manual that addressed diarrhea prevention and standard case management for pediatric diarrhea. The project trained

¹ Population Reference Bureau 2012.

² UNICEF, State of the World's Children, New York, December, 2012.

³ Benin Demographic and Health Survey 2011-2012, preliminary report, <http://www.measuredhs.com/pubs/pdf/PR24/PR24.pdf>

⁴ Black R. et al. June 2010. "Global, regional, and national causes of child mortality in 2008: a systematic analysis." *The Lancet* 379(9730): 1969-1987.

over 400 public sector health clinic workers and 199 pharmacist assistants throughout the country. In addition, the project visited 174 private pharmacies and their 60 rural counterparts to disseminate provider brochures and reference materials.

2. METHODS

In November 2009, the POUZN project conducted a nationwide survey of caregivers of children under five in the project's seven targeted departments and in Cotonou to assess program progress. In August 2011, USAID's Strengthening Health Outcomes *through* the Private Sector (SHOPS) project, also implemented by Abt Associates, conducted a follow-on survey with caregivers of children under the age of five years in the same departments to assess diarrhea treatment practices, care seeking behavior, knowledge, and beliefs. The survey assessed changes in behavior and attitudes related to childhood diarrhea and zinc since 2009 and also asked new questions to enable SHOPS to better understand determinants of zinc use and therefore develop more effective programs. In addition SHOPS conducted a formative survey among public and private healthcare providers in the seven departments of Benin to assess prescription practices for, as well as knowledge and attitudes around, treatment of childhood diarrhea.

2.1 TARGET POPULATION

The key population of interest for both the 2009 and 2011 surveys was female caregivers who had at least one child under 5 years old with diarrhea in the 2 weeks preceding the survey.⁵ The caregiver surveys were designed to produce information that could be generalized to female caregivers of children aged 0-59 months who had diarrhea in the past two weeks in the project departments in Benin.

Administratively, Benin is divided into 12 departments that comprise 77 communes. The communes are further divided into 546 arrondissements. During the last national census in 2002, the country was also divided into enumeration areas (zones de dénombrement or ZDs). Both surveys were conducted in seven major urban and surrounding peri-urban communes located in the 6 project departments (Alibori, Atacora, Borgou, Collines, Donga, and Zou) and in the country's largest city, Cotonou, in Littoral department (Table A).

TABLE A. SELECTED DEPARTMENTS AND COMMUNES FOR THE SURVEY

| Departments | Communes |
|-------------|-----------------|
| Alibori | Malanville |
| Atacora | Tanguiéta |
| Borgou | Parakou |
| Collines | Savalou |
| Donga | Ouaké |
| Zou | Abomey; Bohicon |
| Littoral | Cotonou |

The 2009 survey was conducted in November, during the secondary diarrhea season in Benin, while the 2011 survey was conducted during August 2011, towards the end of the primary diarrhea season.

⁵ A water treatment module was also administered to caregivers of children under 5 years. Sample size calculations accounted for this module as well, but details are not presented here.

2.2 SAMPLING STRATEGY

Representative probability samples were selected in both 2009 and 2011. For the 2009 survey, the first stage of sampling was the ZD. All 1,369 ZDs in the 8 project communes were stratified into urban and rural areas. A total of 87 ZDs (68 urban, 19 rural) were then selected, using probability proportional to population size. This was done independently in each of two strata in each commune. At the second stage of sampling, 28 to 37 households were selected in each ZD (target was 30 households per ZD); a total of 2,754 households containing at least one child under five were selected. In each household, the head of the household answered questions about household characteristics and assets, and then all women in charge of children under five years were interviewed for the water treatment module (n=2,904). Next, these caregivers were asked whether any children in the household had diarrhea in the two weeks preceding the survey. If only one child in the household had diarrhea in the past two weeks, then his or her caregiver was interviewed for the diarrhea treatment module. If more than one child in the household had diarrhea in the past 2 weeks, then the youngest child was selected⁶. This yielded a total of 294 female caregivers of children under five years who had diarrhea in the two weeks preceding the survey.

In 2011, a representative sample was selected in the same eight project communes to allow comparison with the 2009 survey data. At the first stage of sampling, ZDs were selected with probability proportional to their population size. This was done independently within each commune in each of two strata (urban and rural). Sixteen (16) ZDs (6 urban and 10 rural) were selected in each of the eight communes for a total of 128 ZDs. Next, approximately 25 households containing at least one child under five years were selected in each ZD, for a total of 3,196 households to complete the water treatment module. Three of these households in each ZD were selected using systematic random sampling because they had at least one child under 5 with diarrhea in the past 2 weeks. The remaining 22 households in each ZD were divided into two groups: those with a child under 5 who did not have diarrhea in the past 2 weeks but did have diarrhea in the past 3 months, and those with a child under 5 who did not have diarrhea at all in the past 3 months. If a selected household had more than one child with diarrhea in the past 2 weeks, then one caregiver was selected randomly to participate in the survey. If the selected caregiver had multiple children under five with diarrhea in the past two weeks, then only the youngest child was selected. A total of 392 caregivers of children under five with diarrhea in the past two weeks were interviewed for the diarrhea module.

TABLE B. BREAKDOWN OF SAMPLES FROM 2009 AND 2011 SURVEYS

| | 2009 | 2011 |
|---|-------|-------|
| Total number of households sampled with at least one child under 5 | 2,754 | 3,196 |
| Total number of caregivers in sampled households with at least one child under 5 | 2,904 | 3,545 |
| Total number of caregivers with a child under 5 with diarrhea in the past 2 weeks | 294 | 392 |
| Total number of children under 5 with diarrhea in the past 2 weeks | 294 | 392 |

⁶ Interviews were originally conducted regarding the two youngest children in the household for the 2009 survey (when more than one child had diarrhea); however, for purposes of comparison with the 2011 survey, only the youngest child was retained in the data set and used in the analyses presented herein.

2.3 CAREGIVER SURVEY INSTRUMENTS AND DATA COLLECTION

The survey instruments for the caregiver survey were designed to collect information on household and caregiver socio-demographic characteristics, diarrhea history of children under five, diarrhea treatment with zinc and other therapies, knowledge and attitudes about diarrhea and its treatment, and communication message exposure. The 2009 and 2011 surveys contained many of the same questions, but some were added or modified in the 2011 version.

In both surveys, two questionnaires were administered to households in the selected enumeration areas. The first was a water treatment module (details not presented in this report) administered to all sampled households (approximately 30 households per ZD in the 2009 survey and 25 households per ZD in the 2011 survey). The caregiver questionnaire was then administered to women in the sampled households who had a child under 5 with diarrhea in the past 2 weeks. Using questions similar to those asked in the Demographic and Health Survey (DHS), the survey gathered information on dwelling characteristics, such as source and access to drinking water, sanitation facilities, access to electricity, and type of materials used for roofing and flooring, as well as ownership of a number of durable goods and means of transportation. The first half of the questionnaire focused on water treatment and use of Aquatabs, a point-of-use water purification product marketed by PSI. The results of those questions will not be discussed in this report. The second half of the questionnaire focused on questions relevant to the POUZN project interventions.

The instruments were developed in English and translated into French. It is an accepted practice in Benin for the data collectors to do simultaneous translations from French into local dialects when administering the questionnaire. As such, each data collector was assigned to departments according to his or her native language. A pilot was conducted in Cotonou for each survey to assess the suitability of the questionnaire and modifications were made based on the results and feedback from the data collectors. Trained field supervisors and data collectors screened households in sampled areas and administered the surveys. The 2009 survey was implemented by PSI and approved by the PSI Research and Ethics Board. The Abt Associates Inc. Institutional Review Board exempted the 2011 study from review. Informed consent was collected prior to administration of the surveys.

2.4 DATA ANALYSIS

Data analysis was conducted with STATA 10 Statistical Software (StataCorp 2007) and SAS 9.3 (SAS Institute 2012). Descriptive analysis was used to calculate key indicators (respondent characteristics, diarrhea prevalence, proportion of children treated with zinc, etc.) and the distributions of variables were reviewed. An asset index was developed using principal components analysis of a set of household characteristics and ownership of durable goods or other possessions^{7,8}.

Each household in the sample was assigned a sampling weight, which was equal to the inverse of the probability of being selected into the sample and was equivalent to the number of households for which the household was representative. Similarly, each caregiver was assigned a weight that was equivalent to the inverse of the probability of selection. All results presented in this report are weighted.

⁷ Filmer D, Pritchett L. Estimating wealth effects without expenditure data—or tears: an application to educational enrollments in states of India. *Demography* 2001; 38:115-32.

⁸ Rutstein SO, Johnson K. The DHS wealth index. Calverton, MD: ORC Macro, 2004. (DHS comparative reports no. 6).

Significance tests, such as weighted t-tests and chi-square tests, were conducted to investigate the unadjusted association of key indicators of interest with one variable at a time (i.e., not controlling for other variables that may confound the association). For the analysis of predictors of zinc use, logistic regression models that controlled for confounding factors and applied sample weights were utilized. Each theorized predictor was tested independently of the others; i.e., each key predictor was tested one at a time (while including the likely confounders) without any other key predictors in the model. Weighted chi-square tests were utilized to test for statistically significant differences in proportions of groups both within one survey year and across survey years. Given that there is low probability of any overlapping observations between the two survey waves, the research team concluded that it is valid to treat the samples as independent and compare the proportions across years without controlling for clustering over time. Statistically significant differences found between the two survey waves are likely to be at least partially due to changes over time, rather than sampling variation. However, the data sets did not include household identifiers, thus preventing identification of sample overlap; this potential for overlap is a limitation and results should be interpreted with this limitation in mind.

Tests for statistical significance were not performed for every single possible comparison in this report because the number of comparisons was very large; significance testing was reserved for variables that were of most interest. For the analyses comparing 2009 to 2011, the study team conducted 284 tests of differences in proportions. The large number of statistical tests conducted necessitates a strategy for dealing with the issue of multiple comparisons.⁹ The problem of multiple comparisons is that, for example, for every 100 tests performed using an alpha of 0.05 to test for significance, 5 associations are expected to be statistically significant by chance. Thus even if there are truly no differences between the 2009 and 2011 results, one would expect to find approximately five significant results occurring by chance for every 100 tests conducted. If 284 tests were conducted, and significant differences were found for less than 14 measures, it would be a mistake to conclude that diarrhea treatment changed in Benin between 2009 and 2011 because, in this scenario, the overall pattern of results is consistent with zero differences between the years.

Because this report does not attempt to make causal claims about why diarrhea treatment may have changed between 2009 and 2011, more advanced methods of dealing with the multiple comparisons problem (e.g., the Bonferroni and the Benjamini-Hochberg adjustments) were not utilized. This limitation should be kept in mind when interpreting results. It should also be noted that of the 284 tests conducted, 105 were found to be statistically significant; the number of significant results is much greater than what is expected to occur by chance (14).

⁹ See Schochet, Peter Z. (2008). Technical Methods Report: Guidelines for Multiple Testing in Impact Evaluations. Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. NCEE 2008-4018. Retrieved from <http://ies.ed.gov/ncee/pdf/20084018.pdf>.

3. FINDINGS

3.1 DESCRIPTIVE CHARACTERISTICS OF THE STUDY SAMPLES

Table 1 shows the general characteristics of the households represented in this study, based on all households screened in the 2009 and 2011 surveys. The two samples were similar across a variety of characteristics, including location (urban versus rural), source of drinking water, and wealth quintile distribution. Although the screened households samples do not vary by wealth distribution, it is important to note that the samples of households with children with diarrhea in the past two weeks (see Table 4) are statistically significantly different by wealth distribution; this is an important difference to keep in mind while interpreting the findings presented in this report.

Household durable goods and possessions are important in reflecting the socioeconomic status of the households. The data show that television and radio were very common household possessions, with most households having a radio (82% in 2009 and 78% in 2011) and slightly more than half (55% in 2009 and 60% in 2011) having a television. In both samples, over three quarters of households surveyed owned a mobile telephone. A motorbike was the most common means of transportation owned by households, with 63-64 percent having a motorbike. A growing proportion of households reported having access to electricity, with 65 percent in 2009 and 70 percent in 2011. The 2009 and 2011 samples were statistically significantly different in regards to refrigerator ownership and bicycle ownership, with significantly more households in the 2009 sample possessing these items.

In both 2009 and 2011 the majority of households screened in which eligible caregivers were identified were from urban areas (75% and 80% respectively). The communes from which the sample was selected were primarily urban and peri-urban areas, and urban ZDs were oversampled in each commune. According to the DHS, an “improved water source” refers to piped water into dwelling/yard/plot, a public tap/standpipe, tube well or borehole, protected dug well or spring, or rainwater. Most households obtained drinking water from an improved source (82% in 2009 and 87% in 2011). However, only 11 percent of households with children with diarrhea in the past two weeks in 2011 (and 10 percent of the screened households) reported having water at home. The DHS defines an “improved sanitation facility” as a non-shared flush/pour flush to piped sewer system, septic tank or pit latrine as well as ventilated improved pit (VIP) latrines, pit latrines with slabs, and composting toilets. Significantly more households in the 2011 survey had access to an improved facility (78% compared to 69% in 2009), most of which used a ventilated pit latrine (data not shown).

TABLE 1. PERCENT DISTRIBUTION OF HOUSEHOLD CHARACTERISTICS

| Household characteristics | 2009 Percent of all screened households ¹ | 2011 Percent of all screened households | |
|---|---|--|----|
| Residence location | | | |
| Urban | 74.5 | 80.8 | |
| Rural | 25.5 | 19.2 | |
| Source of Drinking Water | | | |
| Improved source | 82.3 | 86.5 | |
| Running water at home | 34.1 | 35.1 | |
| Running water elsewhere | 32.6 | 35.4 | |
| Unimproved source | 17.7 | 13.5 | |
| Have water at home | 12.5 | 9.7 | |
| Less than 30 minutes round-trip to obtain drinking water | 47.5 | 41.5 | |
| Primary sanitation facility | | | + |
| Improved facility | 68.9 | 78.0 | |
| Unimproved facility | 31.1 | 22.0 | |
| Household possessions | | | |
| Radio | 81.9 | 78.2 | |
| TV | 54.8 | 59.5 | |
| Mobile telephone | 76.9 | 76.1 | |
| Non-mobile telephone | 3.8 | 3.2 | |
| Refrigerator | 10.6 | 7.1 | + |
| Bicycle | 21.2 | 10.8 | ++ |
| Motorbike | 64.2 | 63.2 | |
| Car | 9.6 | 8.1 | |
| Electricity Access | 64.7 | 70.3 | |
| Wealth Quintiles² | | | |
| Poorest | 25.5 | 20.5 | |
| Poorer | 19.5 | 20.2 | |
| Middle | 18.8 | 19.2 | |
| Richer | 18.5 | 23.2 | |
| Richest | 17.7 | 16.9 | |
| Total number of households | 2,754 | 3,196 | |

¹“Screened households” refer to all households that completed the household (demographic) questionnaire and includes those that both did and did not have children with diarrhea in the past 2 weeks.

²The 2011 wealth quintile designations are adjusted to the 2009 quintile cut-points. The 2009 quintiles were formed by evenly dividing the sample into quintiles (note that the percentages presented above are weighted); these naturally-derived cut-points were then applied to the 2011 wealth index so that the two indices for the samples are ranked in the same manner.

†p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

TABLE 2. PERCENT DISTRIBUTION OF CAREGIVERS BY DEMOGRAPHIC CHARACTERISTICS AND MASS MEDIA HABITS

| Caregiver background characteristics | 2009 Percent of all caregivers with children under 5 in eligible screened households | 2011 Percent of all caregivers with children under 5 in eligible screened households | |
|---|---|---|----|
| Age (years) | | | |
| 15-19 | 4.0 | 4.5 | |
| 20-24 | 21.4 | 18.3 | |
| 25-29 | 33.3 | 36.5 | |
| 30-34 | 22.3 | 21.5 | |
| 35 and above | 19.0 | 19.2 | |
| Education | | | |
| No education | 48.9 | 49.6 | |
| Primary ¹ | 27.6 | 30.8 | |
| Secondary I ² | 15.2 | 13.0 | |
| Secondary II ³ | 5.6 | 5.1 | |
| Higher ⁴ | 2.7 | 1.5 | |
| Religion | | | + |
| Catholic | 38.5 | 35.2 | |
| Protestant | 7.7 | 5.6 | |
| Muslim | 26.0 | 34.4 | |
| Traditional | 7.2 | 3.4 | |
| Other Christian | 15.1 | 16.5 | |
| Others/None | 5.6 | 4.8 | |
| Exposure to mass media | | | |
| Frequency of listening to the <i>radio</i> | | | ++ |
| Daily | 25.1 | 21.9 | |
| Several times a week | 11.2 | 2.8 | |
| Once a week | 1.8 | 1.2 | |
| On the occasion | 38.6 | 40.6 | |
| Never | 21.7 | 30.1 | |
| Don't know | 1.6 | 3.5 | |
| Frequency of watching <i>TV</i> | | | ++ |
| Daily | 28.5 | 44.2 | |
| Several times a week | 6.1 | 4.8 | |
| Once a week | 1.0 | 0.7 | |
| On the occasion | 25.2 | 16.7 | |
| Never | 38.2 | 31.2 | |
| Don't know | 1.0 | 2.4 | |
| Frequency of reading <i>newspapers or magazines</i> | | | ++ |
| Daily | 0.7 | 2.5 | |
| Several times a week | 1.0 | 1.5 | |
| Once a week | 0.2 | 0.3 | |
| On the occasion | 9.0 | 13.4 | |
| Never / Cannot read | 85.9 | 76.1 | |
| Don't know | 1.4 | 4.1 | |
| Total number of respondents | 2,904^a | 3,196 | |

More than one caregiver per household was interviewed in 2009, hence the discrepancy between number of total households (n=2,754) and caregivers (n=2,912).

Note: 1 Primary school (1-5 years of school); 2 Middle school; 3 High school; 4 University studies or equivalent and above.

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

The majority of caregivers in both samples were 20-34 years old. Caregivers younger than 20 years accounted for less than 5 percent of both samples. Educational levels were similarly distributed, with nearly half of each sample having no education. The two samples differed on religious affiliation, with more of the 2011 sample than the 2009 sample identifying themselves as Muslim, and more of the 2009 sample identifying themselves as following traditional religious practices.

Exposure to mass media is defined as listening to the radio, watching TV, or reading a magazine or newspaper at least once a week. Although overall exposure patterns were statistically significantly different, respondents in both samples had relatively low exposure with over half of the respondents in each group reporting that they never or “on the occasion” listened to the radio or read a newspaper/magazine. Respondents from the 2011 survey were more likely to watch TV, with nearly half (44%) reporting that they watched daily (compared to 28.5% in the 2009 sample).

3.2 PREVALENCE OF DIARRHEA

Table 3 presents the percentage of children under five with reported diarrhea in the two weeks preceding each survey, as well as the percentage with bloody diarrhea and fever. In 2009, 2,912 households were interviewed of which 294 (or 8.5%) reported having a child under five with diarrhea in the past two weeks. Prevalence was statistically significantly higher in 2011, where of the 3,545 households interviewed, 392 (or 12.5%) children under five had diarrhea in the past two weeks. However, it is important to note that the 2009 survey was conducted in November, during the secondary diarrhea season in Benin, while the 2011 survey was conducted towards the end of the primary diarrhea season (August), which could account for higher prevalence rates. Similar proportions in the 2009 and 2011 samples of those with diarrhea had diarrhea with blood, but significantly more children with diarrhea in the 2009 sample also had fever.

TABLE 3. PREVALENCE OF DIARRHEA AMONG CHILDREN UNDER FIVE

| Diarrhea Prevalence | 2009 Percent (%) | 2011 Percent (%) | |
|--|------------------|------------------|------|
| Diarrhea in the past 2 weeks | 8.5 | 12.5 | ++ |
| Among those w/diarrhea in past 2 weeks, % with blood | 11.8 | 10.2 | |
| Among those w/diarrhea in the past 2 weeks, % with fever | 67.8 | 52.5 | + |
| Mean # days of diarrhea duration ¹ | -- | 4.6 days | n.c. |
| Total number of children screened | 3,841 | 3,196 | |

¹Data not collected in 2009

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

Table 4 presents the background characteristics of children under five with diarrhea. The majority of children with diarrhea were aged 12-35 months in each sample, which is consistent with DHS data globally. In 2009, roughly 70 percent of households had access to improved water and 54 percent had access to an improved sanitation facility, compared to 85 percent and 77 percent, respectively, in 2011; these differences between the samples are statistically significant. This, along with the statistically significant differences in wealth distribution and caregiver’s education, shows that the samples on which data was collected in 2009 and 2011 are quite different. These differences may play a part in explaining any 2009 versus 2011 differentials found in this report.

TABLE 4. BACKGROUND CHARACTERISTICS OF CHILDREN UNDER FIVE WITH DIARRHEA IN THE TWO WEEKS PRECEDING THE SURVEY, 2009 AND 2011

| Child or Child's Household Characteristics | 2009 Percent of children with diarrhea in past 2 weeks | 2011 Percent of children with diarrhea in past 2 weeks | |
|--|---|---|------|
| Age in months | | | |
| <6 | 7.2 | 4.9 | |
| 6-11 | 17.4 | 10.5 | |
| 12-23 | 29.0 | 32.9 | |
| 24-35 | 19.4 | 28.0 | |
| 36-47 | 17.2 | 14.9 | |
| 48-59 | 9.8 | 8.8 | |
| Sex | | | |
| Male | 53.0 | 56.1 | |
| Female | 47.0 | 43.9 | |
| Caregiver's education | | | + |
| No education | 62.0 | 45.7 | |
| Primary | 23.3 | 37.8 | |
| Secondary I | 11.9 | 13.8 | |
| Secondary II | 2.8 | 2.00 | |
| Superior | 0 | 0.7 | |
| Wealth quintile | | | ++ |
| Poorest | 48.9 | 19.9 | |
| Poorer | 20.9 | 20.7 | |
| Middle | 10.3 | 21.6 | |
| Richer | 12.9 | 23.5 | |
| Richest | 7.0 | 14.4 | |
| Handwashing | | | n.c. |
| Wash hands with soap | -- | 75.6 | |
| Wash hands before/after feeding child | -- | 86.4 | |
| Improved source of drinking water | 68.5 | 85.1 | ++ |
| Improved primary sanitation facility | 51.4 | 77.1 | ++ |
| Total number of children under 5 who had diarrhea in the two weeks preceding the survey | 294 | 392 | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

3.3 DIARRHEA TREATMENT

Caregivers of children with diarrhea in the past two weeks were asked about their care-seeking behavior during this episode of diarrhea and the specific treatments used (including zinc, ORS, antibiotics and other treatments). The following sections summarize these findings.

3.3.1 CARE SEEKING BEHAVIOR

Caregivers were asked where and to whom they go for advice and treatment when their child has diarrhea. Table 5 details information about health provider visits and specific advice or treatment received by caregivers. The 2009 survey collected information on where advice and/or treatment was first sought, while the 2011 survey collected information separately for advice and for treatment. The public sector was defined as a public health center, community health worker (“relais communautaire”) or other publicly funded provider whereas the private sector was defined as for-profit providers (clinics, shops and pharmacies) as well as NGOs/FBOs and traditional healers (“tradititherapeute”). Friends and relatives made up the informal sector.

Overall, the percentage of caregivers who sought care was greater in 2009 than in 2011. The percentage of children with diarrhea for whom advice or treatment was sought (outside the home) rose from 27 to 38 percent; however, since the question was asked differently in 2009 than in 2011, it is not possible to state with certainty that this observed increase was real rather than a reflection of asking the question on source of advice separately from the question on source of treatment in 2011. In 2009, the most common sources of advice and/or treatment were neighbors/friends and relatives (48 percent) and health clinics (39 percent), while 2.5 percent sought advice or treatment at a pharmacy. The 2011 survey looked at sources of advice and treatment separately in addition to breaking sources down by public versus private. In 2011 the public sector (primarily health centers) was the most common source of advice (45 percent), followed by friends and relatives (32 percent). About one quarter (23 percent) of respondents went to private sector sources for advice. For treatment, however, both the public (41 percent) and private (37 percent) sectors were major sources, with the most common sources of treatment being public health centers (38 percent), private clinics or shops (21 percent), and private pharmacies (15 percent). Friends or relatives were a less likely but still important source of treatment (21 percent).

The lag time between the onset of the diarrhea and seeking treatment appeared to decrease between 2009 and 2011, although the change was not statistically significant. In both 2009 and 2011 the majority of caregivers (68 and 82 percent respectively) reported seeking treatment from a health provider by the third day of their child’s diarrhea.

TABLE 5. TREATMENT OF DIARRHEA AMONG CHILDREN UNDER FIVE WITH DIARRHEA IN THE PAST TWO WEEKS: HEALTH PROVIDER VISITS

| Treatment Utilized | 2009 Percent (%) | 2011 Percent (%) | |
|---|---------------------|---------------------|------|
| Children for whom advice or treatment was sought outside of the home | 27.2 | 38.3 | + |
| Children with diarrhea taken to a professional health provider (health clinic or pharmacy) for advice or treatment | 11.0 | 24.8 | ++ |
| Proportion who sought treatment outside of the home who received a specific treatment | N/A | 87.3 | |
| 2011 only: First type of health provider seen (if sought treatment outside of home) | | | n.c. |
| Public sector | | 41.2 | |
| Health center | | 38.5 | |
| Community worker | | 2.7 | |
| Other public sector | | 0.0 | |
| Private sector | | 37.2 | |
| Private clinic/shop | | 20.6 | |
| Private pharmacy | | 14.9 | |
| NGO | | 0.2 | |
| Traditional healer | | 1.5 | |
| Friends/relatives | | 21.3 | |
| 2009 only: First type of health provider seen (among care-seekers) for advice or treatment | | | n.c. |
| Health clinic | 38.7 | | |
| Pharmacy | 2.5 | | |
| Community worker | 9.4 | | |
| Neighbor/parent/friend | 48.2 | | |
| Timing taken to health provider for treatment, after onset of diarrhea | | | |
| Same day as diarrhea began | 21.5 | 41.8 | |
| Second day | 19.1 | 24.8 | |
| Third day | 27.4 | 15.7 | |
| Fourth day | 19.3 | 6.1 | |
| Five or more days | 12.7 | 11.6 | |
| Total number of children with diarrhea in past 2 weeks | 294 | 392 | |

¹Professional health provider includes a health clinic or a pharmacy

² Respondents may report multiple choices so the sum may exceed 100%

[†]p<0.05 for statistically significant difference between 2009 and 2011 proportions.

⁺⁺p<0.01 for statistically significant difference between 2009 and 2011 proportions.

^{n.c.}Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

The proportion of urban residents seeking advice outside the home significantly increased from 2009 to 2011, from 25 percent to 41 percent (Table 6). Also, the proportion of rural residents taking their child to a professional health provider significantly increased from 7 percent in 2009 to 21 percent in 2011.

The 2011 survey found that almost twice as many rural residents than urban residents sought treatment in the public sector first. In terms of the program interventions, community health workers were consulted more frequently in rural areas than in urban areas for both years whereas private pharmacies were a more important source of treatment in urban areas (especially in 2011). Seeking advice or treatment from friends and relatives appeared to decrease between 2009 and 2011 in both urban and, even more dramatically, in rural areas.

TABLE 6. TREATMENT OF DIARRHEA AMONG CHILDREN UNDER FIVE WITH DIARRHEA IN THE PAST TWO WEEKS: HEALTH PROVIDER VISITS AND FIRST SOURCE OF ADVICE/TREATMENT, BY URBAN AND RURAL RESIDENCE

| Treatment Sources | 2009 Percent of urban residents | 2009 Percent of rural residents | 2011 Percent of urban residents | 2011 Percent of rural residents | Urban 2009 vs. 2011 | Rural 2009 vs. 2011 |
|---|--|--|--|--|------------------------------|------------------------------|
| Children for whom advice was sought outside of the home | 25.0 | 29.2 | 41.1 | 27.3 | ++ | |
| Children with diarrhea taken to a professional health provider (health clinic or pharmacy) for advice OR treatment | 15.1 | 7.1 | 25.7 | 21.1 | | ++ |
| First type of health provider seen (if sought treatment outside of home) | | | | | n.c. | n.c. |
| Public sector | 60.0 | 40.0 | 36.4* | 69.1* | | |
| Health center | 56.3 | 24.6 | 35.6 | 52.6 | | |
| Community worker | 2.2 | 15.4 | 0.7 | 15.7 | | |
| Other public sector | | | 0.0 | 0.0 | | |
| Private sector | 5.6 | 0 | 38.5 | 26.0 | | |
| Private clinic/shop | | | 19.9 | 23.9 | | |
| Private pharmacy | 5.5 | 0 | 17.8 | 0.5 | | |
| NGO | | | 0.0 | 1.3 | | |
| Traditional healer | | | 1.8 | 0.0 | | |
| Friends/relatives | 34.3 | 59.9 | 25.1 | 4.9 | | |
| Total Number of Respondents | 177 | 117 | 203 | 189 | | |

*p<0.05 for statistically significant difference in distribution for within year urban vs. rural residence.

+p<0.05 for statistically significant difference between 2009 and 2011 percentages.

++p<0.01 for statistically significant difference between 2009 and 2011 percentages.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

3.3.2 TREATMENT BEHAVIOR

When asked to report on the specific treatments administered to their child, a plurality of respondents in both 2009 and 2011 reported administering ORS (40% in 2009 and 58% in 2011); this proportion statistically significantly increased between the years by about 17 percentage points (Table 7). In 2009, Orasel was the only brand of ORS available in Benin, but in 2011, UNICEF began distribution of another ORS brand in the country. Almost all caregivers who reported treating with ORS in 2011 reported that they used the Orasel brand (97%). In addition, over half (54%) of the children were given zinc in 2011, up from 32 percent in 2009. Treatment with antidiarrheals remained static (20 percent in 2009 and 17 percent in 2011), while use of antibiotics rose from 12 percent in 2009 to 30 percent in 2011. The use of home-made solutions and home remedies also decreased between 2009 and 2011.

TABLE 7. TREATMENT (REPORTED BY CAREGIVER) FOR DIARRHEA AMONG CHILDREN WITH DIARRHEA IN THE PAST TWO WEEKS

| Treatment Given | 2009 Percent of Children with Diarrhea ¹ | 2011 Percent of Children with Diarrhea ¹ | |
|---|---|---|----|
| Orasel (2009) or ORS (2011) ² | 40.2 | 57.5 | + |
| Zinc | 31.8 | 54.3 | ++ |
| Antibiotics | 11.7 | 30.3 | ++ |
| Antidiarrheals | 19.6 | 16.6 | |
| Unknown pills or syrups | 7.2 | 18.0 | + |
| Injection or Intravenous drip | 6.5 | 13.2 | |
| Recommended home-made solution | 17.4 | 1.3 | ++ |
| Home remedy other than recommended home solution | 22.6 | 11.1 | + |
| Other | 18.6 | 13.0 | |
| No treatment | 15.6 | 25.0 | |
| Total number of children with diarrhea in past two weeks | 294 | 392 | |

¹ Respondents may report multiple choices so the sum may exceed 100%

² UNICEF began distribution of a different ORS brand in 2011 (previously Orasel was the only brand on the market); thus, the 2009 survey only asked caregivers if they had given Orasel (and not ORS more generally) while the 2011 survey asked caregivers if they had given any type of ORS. In 2011, 97 percent of all ORS users reported that they had used Orasel brand ORS.

⁺ p<0.05 for statistically significant difference between 2009 and 2011 percentages.

⁺⁺ p<0.01 for statistically significant difference between 2009 and 2011 percentages.

^{n.c.} Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

Table 8 breaks down treatment given by the severity of the case. In this table complicated diarrhea is defined as presence of either blood in the stool or fever while uncomplicated diarrhea is defined as no blood in the stool and no fever. Children with uncomplicated diarrhea and no other indications (such as fever) should not have received antibiotics, yet 12 percent in 2009 and 20 percent in 2011 did. None of the children with diarrhea should have been treated with antidiarrheals.

Generally, diarrhea treatment, both among all children with diarrhea and children with complicated diarrhea, statistically significantly changed from 2009 to 2011. Treatment with ORS increased between the two years, as did treatment with zinc. In fact, treatment with zinc increased by about 22 percentage points among all children with diarrhea, and increased in even greater proportions among children with complicated diarrhea. Treatment with antibiotics also increased, and treatment with antidiarrheals decreased. Additionally, treatment of uncomplicated diarrhea decreased from 2009 to 2011, indicating that the use of unnecessary or incorrect treatments may have diminished.

TABLE 8. DIARRHEA TREATMENT GIVEN BY SEVERITY OF CASE

| Treatment Given | 2009 | | | 2011 | | | 2009 vs. 2011 All children | 2009 vs. 2011 Complicated diarrhea | 2009 vs. 2011 Uncomplicated diarrhea |
|----------------------------|--------------------------------|---|---|--------------------------------|---|---|----------------------------|------------------------------------|--------------------------------------|
| | All children with diarrhea (%) | Children with complicated diarrhea ¹ (%) | Children with uncomplicated diarrhea ¹ (%) | All children with diarrhea (%) | Children with complicated diarrhea ¹ (%) | Children with uncomplicated diarrhea ¹ (%) | | | |
| ORS | 40.2 | 38.2 | 45.0 | 57.5 | 64.0 | 47.5 | + | + | |
| Zinc | 31.8 | 28.1 | 40.2 | 54.3 | 61.0 | 44.1 | ++ | ++ | |
| Antibiotics | 11.7 | 11.3 | 12.4 | 30.3 | 36.7* | 20.0 | ++ | ++ | |
| Antidiarrheals | 19.6 | 19.7 | 19.4 | 16.6 | 13.6 | 21.1 | | | |
| No Treatment | 15.6 | 14.4 | 18.2 | 25.0 | 13.2** | 38.5 | | | + |
| Total # of Children | 294 | 200 | 94 | 392 | 182 | 210 | | | |

¹ Complicated diarrhea is defined as reporting either blood in the stool or fever. Uncomplicated diarrhea is defined as reporting no blood in stool and no fever. Percentages do not add up to 100 as caregivers could provide multiple responses.

*p<0.05, **p<0.01 comparing complicated to uncomplicated diarrhea groups *within* year.

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

Many caregivers reported giving their child multiple treatments. Table 9 shows that in 2009, 97 percent of caregivers who reported using zinc also treated with ORS, and in 2011 this was 100 percent. In 2011 nearly 40 percent of caregivers that treated with zinc also gave an antibiotic, which was a statistically significant increase of almost 28 percentage points from 2009. However, only 15 percent (data not shown) of those treating with zinc in 2011 reported presence of blood in the stool (the only reason to give an antibiotic for childhood diarrhea).

TABLE 9. PERCENT DISTRIBUTION OF TREATMENTS GIVEN IN ADDITION TO ZINC

| Additional Treatment Given | 2009 Percent of zinc users (%) | 2011 Percent of zinc users (%) | |
|--|---|---|----|
| ORS | 96.5 | 100 | |
| Antidiarrheals | 18.7 | 11.1 | |
| Antibiotics | 11.3 | 38.9 | ** |
| Total number of caregivers that treated with zinc | 102 | 135 | |

**p<0.01 for statistically significant difference between 2009 and 2011 proportions.

The following tables (Table 10-12) focus on the recent findings from 2011. The table below shows that more than half of 2011 respondents (59%) that requested a specific treatment from their providers asked for Orasel Zinc. Notably, only about 6 percent requested an antibiotic and yet nearly 30 percent treated with antibiotics.

TABLE 10. PRIMARY TREATMENT REQUESTED FOR DIARRHEA AMONG CAREGIVERS OF CHILDREN UNDER FIVE WITH DIARRHEA IN THE PAST TWO WEEKS, 2011

| Primary Treatment Requested | 2011 Percent (%) |
|--|-----------------------------|
| ORS | 5.6 |
| Zinc | 0.2 |
| Orasel Zinc | 58.7 |
| Antibiotics | 5.6 |
| Antidiarrheals | 5.5 |
| Don't know | 2.1 |
| Other | 22.3 |
| Total number of children with diarrhea in past 2 weeks who received a treatment outside of the home | 114 |

Table 11 examines the reasons for requesting a preferred treatment. Among Orasel Zinc users, a plurality (46 percent) stated they used the product because it was the “most effective.” Only 8 percent stated that they requested the product because they had heard about it in advertisements. Those who requested antibiotics or antidiarrheals did so primarily because “it is what I always use.”

TABLE 11. REASONS FOR ASKING FOR SPECIFIC PRIORITY TREATMENTS, 2011

| Reasons | ORS | Orasel Zinc | Antibiotics | Antidiarrheals |
|-------------------------------|----------|-------------|-------------|----------------|
| What I always use | 40.3 | 30.8 | 35.1 | 74.9 |
| Most effective | 12.9 | 46 | 24.1 | 39.3 |
| Heard of it in advertisements | 0 | 8.1 | 0 | 4.2 |
| Tradition | 0 | 8.9 | 0 | 0 |
| Total number | 7 | 65 | 13 | 8 |

As shown in Table 7 above, use of antibiotics rose from 12 percent 2009 to 30 percent 2011. In 2011 respondents reported that the most common reason for giving an antibiotic was because their child had a fever with the diarrhea (40 percent), and nearly 20 percent stated it was because “the provider said it was most effective” (Table 12).¹⁰ Only 6 percent said they gave an antibiotic because there was “blood in the stools,” which is considered the only medically valid reason for giving an antibiotic to treat pediatric diarrhea. However, a cross tabulation of the number of children given an antibiotic by the number of children reported to have had blood in their stool (3 percent of children surveyed) shows that most children who were given an antibiotic did not have blood in their stool, and only a small percentage (8.5 percent) of those with blood in the stool reported receiving an antibiotic.

TABLE 12. REASONS FOR GIVING ANTIBIOTICS, 2011

| Reason for giving an antibiotic | Percent of children given antibiotic |
|--|--------------------------------------|
| Blood in the stools | 6.1 |
| Also had fever with the diarrhea | 40.2 |
| The provider said it was most effective | 19.2 |
| I asked for it | 9.9 |
| Other | 24.5 |
| Total number of children given antibiotic | 51 |

3.3.3 DIARRHEA TREATMENT SOURCES

The tables below show the sources of treatment that caregivers reported according to the type of treatment administered for 2009 and 2011.¹¹ Overall, public health clinics are a major source of treatment products; however the private sector appears to be playing an increasing role as a source of diarrhea treatment products. For example, in 2011 antidiarrheals and antibiotics were more likely to be sourced from private clinics or pharmacy/drug sellers. The public sector remained the most common source of Orasel Zinc.

¹⁰ These data were not collected in the 2009 survey.

¹¹ Note that statistical testing for significant differences between the 2009 and 2011 data could not be conducted for table 13 due to differences in the questionnaire – the allowable response categories in each year were different enough to invalidate statistical testing results. For example, for the ORS category “friend/relative” was not a response option in 2009 and thus that data could be captured in the “other” response; comparing this data to the 2011 data, where “friend/relative” was a response option, would create misleading results.

TABLE 13. SOURCES OF TREATMENT REPORTED BY CAREGIVERS WHO USED THESE PRODUCTS IN THE PAST TWO WEEKS

| 2009 | | | | |
|--|--------------------|---------------------|--------------------|-----------------------|
| Source of products | Orasel Zinc | ORS (Orasel) | Antibiotics | Antidiarrheals |
| Public sector | | | | |
| Health clinic | 63.9 | 66.0 | 46.5 | 47.7 |
| Community worker | 7.1 | 3.8 | -- | -- |
| Private sector | | | | |
| Private clinic/seller | -- | 1.3 | -- | -- |
| Pharmacy | 24.0 | 25.3 | 24.6 | 32.5 |
| NGO/FBO | -- | -- | -- | -- |
| Friend/relative | 5.0 | -- | 12.8 | 11.5 |
| Other | 0.0 | 3.6 | 16.0 | 8.3 |
| Number of children treated with responses | 100 | 127 | 36 | 54 |

| 2011 | | | | |
|--|--------------------|------------|--------------------|-----------------------|
| Source of products | Orasel Zinc | ORS | Antibiotics | Antidiarrheals |
| Public sector | | | | |
| Health clinic | 56.1 | 34.0 | 31.6 | 37.8 |
| Community worker | 1.5 | 2.5 | 1 | 1 |
| Private sector | | | | |
| Private clinic/seller | 15.1 | 37.8 | 21.4 | 48.9 |
| Pharmacy | 22.3 | 21.2 | 19 | 11.3 |
| NGO/FBO | 0.2 | 0.2 | -- | -- |
| Friend/relative | 1.0 | 3.6 | 23 | 1.1 |
| Other/Don't know | | 0.7 | | |
| Number of children treated with responses | 131 | 151 | 51 | 47 |

In looking at the sources of zinc products by rural versus urban caregivers (Table 14), public health clinics were the primary source of zinc regardless of location. The private sector (pharmacies and private clinic/sellers) was the second-most common source of zinc in urban areas while in rural areas the second most common source was community health workers. (Note: while pharmacies were more commonly reported as the source of zinc products in 2009 than in 2011 this is likely because the “pharmacies” category included private sellers in the 2009 survey, while the 2011 listed private sellers as a separate response category).¹²

TABLE 14. SOURCE OF ZINC PRODUCTS REPORTED BY CAREGIVERS WHO USED ZINC FOR DIARRHEA TREATMENTS IN THE PAST TWO WEEKS

| Source of zinc products | 2009 Percent of urban zinc users* | 2009 Percent of rural zinc users | 2009 Percent of all zinc users | 2011 Percent of urban zinc users* | 2011 Percent of rural zinc users | 2011 Percent of all zinc users |
|----------------------------|---|--|---|---|--|---|
| Public sector | | | | | | |
| Health clinic | 51.0 | 78.0 | 63.9 | 52.1 | 82 | 56.1 |
| Community worker | 0 | 14.9 | 7.1 | 0 | 11.4 | 1.5 |
| Private sector | | | | | | |
| Private clinic/seller | -- | -- | -- | 16.7 | 4.5 | 15.1 |
| Pharmacy | 44.4 | 1.7 | 24.0 | 25.6 | 0.4 | 22.2 |
| NGO/FBO | -- | -- | -- | 0 | 1.7 | 0.2 |
| Friend/relative | 4.7 | 5.4 | 5.0 | 1.1 | 0 | 1.0 |
| Number of responses | 63 | 37 | 100 | 77 | 54 | 131 |

*Note, statistically significant difference among the urban and rural zinc users within that year, with respect to source of zinc products (p<0.001)

When asked about their reasons for choosing the particular source for their zinc products, caregivers differed in their responses between 2009 and 2011, and many of these differences were statistically significant (see Table 15). In 2009, caregivers using the public sector (either health clinics or community workers) as well as the private sector (pharmacies) cited “quality of care” and “affordable price” as their main reasons. In 2011, “most knowledgeable source” was the most important reason given by caregivers who chose the public sector (followed by “quality of care”). Caregivers using the private sector differed by whether they used a pharmacy (where “affordable price” was the top reason) versus a private clinic/seller (where “habit” and “quality” were the top reasons). Given that the price of Orasel Zinc was the same across sources, affordability should not have factored as a reason in selecting providers for zinc products.

¹² Note that statistical testing for significant differences between the 2009 and 2011 data could not be conducted for the same reasons as for Table 13, described above.

TABLE 15. REASONS FOR CHOOSING SOURCE OF ZINC PRODUCTS REPORTED BY CAREGIVERS WHO USED ZINC FOR DIARRHEA TREATMENTS IN THE PAST TWO WEEKS

| Reasons for source | 2009 | | | |
|---------------------------|--------------------|------------------|--------------------|----------------------------|
| | Health Clinic | Community Worker | Pharmacy | Friend/ Relative/ Neighbor |
| Affordable Price | 46.6 ⁺⁺ | 35.9 | 41.1 | 0.0 |
| Quality of Care | 62.1 ⁺ | 51.8 | 55.4 ⁺⁺ | 33.9 |
| Most Knowledgeable Source | 7.9 ⁺⁺ | 0.0 | 5.8 | 0.0 ⁺⁺ |
| Other | 8.6 | 12.3 | 5.1 | 66.1 ⁺ |

Note: Categories "near" and "used to it (habit)" were not included in 2009 survey.

| Reasons for source | 2011 | | | | | |
|---------------------------|---------------------|----------------------|------------------------|----------------------|----------------------|----------------------------|
| | Health Clinic | Community Worker | Private Clinic/ Seller | Pharmacy | NGO/ FBO | Friend/ Relative/ Neighbor |
| Affordable Price | 9.7 ⁺⁺ | 49.4 | 2.2 ^{n.c.} | 61.0 | 0 ^{n.c.} | 0.0 |
| Quality of Care | 34.1 ⁺ | 29.5 | 29.1 ^{n.c.} | 2.0 ⁺⁺ | 62.4 ^{n.c.} | 0.0 |
| Most Knowledgeable Source | 43.0 ⁺⁺ | 50.6 | 31.5 ^{n.c.} | 8.5 | 0.0 ^{n.c.} | 95.8 ⁺⁺ |
| Near | 7.7 ^{n.c.} | 19.9 ^{n.c.} | 23.9 ^{n.c.} | 12.5 ^{n.c.} | 0.0 ^{n.c.} | 4.2 ^{n.c.} |
| Used to it (habit) | 4.9 ^{n.c.} | 27.7 ^{n.c.} | 37 ^{n.c.} | 31.1 ^{n.c.} | 37.6 ^{n.c.} | 0.0 ^{n.c.} |
| Other | 20.8 | 0.0 | 0.0 ^{n.c.} | 12.2 | 62.4 ^{n.c.} | 0.0 ⁺ |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

3.3.4 DIARRHEA TREATMENT WITH ZINC AND ORS

As mentioned earlier, treatment with ORS statistically significantly increased between 2009 (40 percent) and 2011 (58 percent). During this time period there was a statistically significant shift in terms of the primary source of Orasel brand ORS. In 2009 Orasel was primarily sourced from the public sector (hospital/public health center), whereas in 2011 the private sector (private clinic or pharmacy) was the most common source¹³ (Table 16).

TABLE 16. ORASEL SOURCES, 2009 AND 2011

| Source of ORASEL | 2009 | 2011 | ++ |
|-----------------------------------|------|------|----|
| Pharmacy | 25.5 | 21.2 | |
| Traditional medicine practitioner | 0.0 | 0.0 | |
| Hospital/public health center | 66.5 | 34.0 | |
| Private Clinic | 1.4 | 37.8 | |
| Community health worker | 3.8 | 2.5 | |

¹³ This difference may be partly attributable to changes that took place in the marketing strategy of the program beginning in 2009 including establishing relationships with single "master" commercial wholesalers to push goods through commercial channels as well as mobile wholesalers (for distribution to small village retailers), and conducting medical detailing with private pharmacies and health centers.

| | | |
|---|------------|------------|
| Home | 2.3 | 3.6 |
| Other | 0.6 | 0.9 |
| Total number of children treated with Orasel | 129 | 151 |

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

Among respondents from 2011 who did not give ORS (or a home-based alternative sugar-salt solution), nearly half (44%) said it was because their “child was not seriously ill.” About a quarter stated that they “didn’t think of it” while 20 percent said they were “not aware of ORS or SSS” (Table 17).

TABLE 17. WHY ORS OR SSS WERE NOT GIVEN, 2011

| Reason | Percent of children not given ORS or SSS |
|--|---|
| Child not seriously ill | 43.9 |
| Didn't think of it | 24.8 |
| Not aware of ORS or SSS | 20.2 |
| Don't know how to make SSS | 7.2 |
| It's not a real treatment | 1.7 |
| Couldn't find ORS to buy | 0.5 |
| Products too expensive | 0.5 |
| Child/mother doesn't like | 0.4 |
| Total number not given ORS or SSS | 87 |

The proportion of caregivers treating with zinc rose from 32 percent in 2009 to 54 percent in 2011 (Table 18), a statistically significant increase. Furthermore, the number of caregivers treating with both zinc and ORS increased, from 31 percent in 2009 to 42 percent in 2011. The proportion of zinc users who reported also treating with ORS was high both years (97 percent in 2009 and 100 percent in 2011). All (100%) caregivers that gave zinc in 2011 also gave ORS. The proportion of caregivers using zinc correctly (defined as being given along with ORS for 10 or more days) grew from 2009 to 2011: in 2009 only 14 percent of children with diarrhea in the past 2 weeks were given zinc plus ORS for 10 days compared to 27 percent in 2011; this difference was statistically significant. Among zinc users, 65 percent in 2011 (compared to 45 percent in 2009) administered the treatment correctly.

TABLE 18. TREATMENT OF DIARRHEA IN PAST TWO WEEKS USING ZINC AMONG CHILDREN UNDER FIVE¹

| Treatment Given | 2009 Among children with diarrhea in past 2 weeks (%) | 2009 Among zinc-users (%) | 2011 Among children with diarrhea in past 2 weeks (%) | 2011 Among zinc-users (%) | 2009 vs. 2011 children with diarrhea | 2009 vs. 2011 zinc users |
|--|---|---------------------------|---|---------------------------|--------------------------------------|--------------------------|
| Treated with zinc | 31.8 | -- | 54.3 | -- | ++ | |
| Treated with zinc and ORS | 30.6** | 96.5** | 41.7** | 100.0** | | |
| Given zinc for 10 days or more ¹ | 14.6** | 46.9** | 27.1** | 65.0** | + | |
| Treated with zinc and ORS; zinc given for 10 days or more ¹ | 14.2** | 45.4** | 27.1** | 65.0** | + | |
| Total number of children | 294 | 102 | 392 | 135 | | |

¹ Note, this table excludes n=5 (2009) and n=3 (2011) respondents who reported that they used zinc for fewer than 10 days but child still had diarrhea at time of survey

* p<0.05 for statistically significant difference within year all children with diarrhea vs. zinc users

** p<0.01 for statistically significant difference within year all children with diarrhea vs. zinc users

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

Table 19 examines rural versus urban differences in zinc use. Overall, there appeared to be big improvements in the use of zinc among both urban and rural residents between 2009 and 2011, although these changes are only statistically significant in the urban samples. In both 2009 and 2011 urban residents appeared to be more likely than rural residents to administer zinc, although this within-year difference was not found to be statistically significant.

TABLE 19. TREATMENT OF DIARRHEA IN PAST TWO WEEKS USING ZINC, BY URBAN AND RURAL RESIDENCE

| | 2009 Urban residents | 2009 Rural residents | 2011 Urban residents | 2011 Rural residents | 2009 vs. 2011 Urban | 2009 vs. 2011 Rural |
|-------------------|----------------------|----------------------|----------------------|----------------------|---------------------|---------------------|
| Gave zinc | 34.3 | 29.4 | 56.1 | 45.2 | + | |
| Did not give zinc | 65.7 | 70.6 | 43.9 | 54.8 | + | |
| Total | 177 | 117 | 203 | 189 | | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

As mentioned previously, 100% of zinc users in 2011 also administered ORS. The only source of zinc in Benin is the Orasel Zinc kit, which includes two sachets of ORS. The table below shows that most kit users (73 percent) reported correctly giving at least two Orasel sachets during their child's diarrhea episode.

TABLE 20. NUMBER OF ORASEL/ORS SACHETS USED DURING RECENT DIARRHEA EPISODE AMONG ORASEL ZINC (DIARRHEA TREATMENT KIT) USERS

| | 2011 % OF ORASEL ZINC USERS |
|---|--|
| Gave the child zinc plus ORS | 100 |
| One | 27.7 |
| Two | 19.5 |
| More than two | 52.8 |
| Total number given Orasel Zinc kit | 135 |

Table 18 showed that compliance with the 10-day zinc regimen continued to be problematic between 2009 and 2011, although there were improvements between the two years. When caregivers who did not administer zinc for the full 10 days were probed about their behavior, most respondents in both 2009 (77 percent) and 2011 (96 percent) said it was because their “child got better” (see table 21 below). Indeed, when 2011 respondents were asked what they did with the zinc tablets they had not used, 65 percent said they saved them for a future episode.

TABLE 21. AMONG ZINC USERS WHO DID NOT USE ZINC FOR 10 DAYS OR MORE FOR DIARRHEA IN PAST TWO WEEKS, REASON WHY

| Reason (multiple responses allowed) | 2009 Percentage of respondents | 2011 Percentage of respondents | |
|---|--------------------------------------|--------------------------------------|------|
| Child got better | 77.3 | 95.8 | ++ |
| Needed the tablets for another person | 0.0 | 6.4 | |
| Saved zinc for future episodes | 7.4 | 4.9 | |
| Did not know all pills should be given | 6.6 | 3.6 | |
| Child vomited the tablets | 0.0 | 2.3 | n.c. |
| Was sold fewer than 10 tablets | -- | 0.8 | |
| Child did not want to take zinc anymore | 2.2 | 0.2 | + |
| No one told respondent to give all of the pills | 6.7 | 0.1 | ++ |
| Thought pills should only be given at the same time as ORASEL | 2.8 | 0.0 | ++ |
| Child is still taking tablets | -- | -- | n.c. |
| Forgot | -- | -- | n.c. |
| What caregiver did with remaining zinc pills/tablets | | | |
| Saved them for a future episode | -- | 65.0 | n.c. |
| Threw them out | -- | 9.8 | n.c. |
| Was not given/sold more than 10 pills/tablets | -- | 1.8 | n.c. |
| Other | | 23.4 | n.c. |
| Total number of responses¹ | 43 | 63 | |

¹Note, this table excludes n=5 (2009) and n=3 (2011) respondents who reported that they used zinc for fewer than 10 days but child still had diarrhea at time of survey

⁺p<0.05 for statistically significant difference between 2009 and 2011 proportions.

⁺⁺p<0.01 for statistically significant difference between 2009 and 2011 proportions.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

3.3.5 LACK OF TREATMENT

The proportion of caregivers that did not give any treatment to the child for the current episode of diarrhea rose from 16 percent in 2009 to 25 percent in 2011. When asked about the reason for not giving treatment, nearly half of caregivers in 2011 (48%) said it was because their child was “not very sick.” It is worth noting that several respondents (19%) mentioned “teething” – the belief that childhood diarrhea can be a symptom of teething (and as such, not something “serious”) – as well as “not enough money” (11%). Cultural beliefs around childhood diarrhea (i.e. the view of diarrhea as a normal symptom of teething) seem to influence the perceived severity of the illness and thus present a major barrier to treatment seeking.

TABLE 22. REASONS FOR NOT TREATING DIARRHEA (2011)

| Reason for giving no treatment | Percent of children given no treatment |
|--|--|
| Child not very sick | 47.8 |
| “Dentition”/teething | 18.6 |
| Not enough money | 11.4 |
| Did not know where to buy | 5.4 |
| Caregiver would not allow it | 1.8 |
| Other | 15.8 |
| Total number of children given no treatment | 126 |

Approximately one-third (37 percent) of non-treaters stated that they had heard of zinc as a diarrhea treatment. Among those that had heard of zinc, about a quarter (23 percent) stated that they did not treat with zinc because they did not consider their child’s diarrhea to be very serious, consistent with Table 17.

3.4 KNOWLEDGE AND PERCEPTIONS ABOUT ZINC, ORS, AND DIARRHEA

3.4.1 KNOWLEDGE AND ATTITUDES TOWARDS DIARRHEA

Table 36 in Annex A details knowledge and attitudes towards diarrhea causes, threat severity and threat susceptibility among all caregivers as well as zinc users versus non-users. Overall, knowledge about diarrhea was high among caregivers in both the 2009 and 2011 surveys. Knowledge of the causes of diarrhea was high among all caregivers (regardless of whether they were zinc users). However, only about a quarter of caregivers agreed with the statement that “only those diarrheal episodes that have blood in the stool require antibiotics.” This fact is obviously not well-known among caregivers, regardless of their zinc usage. In terms of knowledge of ORS, zinc non-users were more than twice as likely as zinc users to agree with the statement that giving food-based fluids is equally as effective as giving ORS.

Overall, caregivers in both 2009 and 2011 agreed that diarrhea was a threat to their households and community. Almost universally caregivers agreed that diarrhea could cause death in children under five and that their family would “experience hardship if a family member gets

diarrhea.” Half agreed that diarrhea was a problem in their community. Differences between zinc users and non-users in opinions of threat severity were minimal.

Two elements of caregivers’ opinions about the susceptibility of children under five to diarrhea changed dramatically between 2009 and 2011. The proportion who agreed that “children under five are too young to experience serious medical problems from getting diarrhea” rose from 14 percent in 2009 to 24 percent in 2011, and the proportion who agreed that “I am not worried about the children under five in my household getting diarrhea” rose from 13 percent to 32 percent. Among 2011 respondents there were a few distinctions between zinc users and non-users in their sense of threat susceptibility. Zinc non-users were almost twice as likely as zinc users to agree that children under five “are too young to experience serious medical problems from getting diarrhea.” Zinc users were also slightly less likely to agree with the statement “I am not worried about the children under five in my household getting diarrhea.”

3.4.2 KNOWLEDGE AND ATTITUDES TOWARDS ORASEL ZINC

The 2011 household survey looked at the relationship between knowledge of zinc and ever use of the Orasel Zinc kit. Table 23 below shows that zinc users were considerably more likely than non-zinc users to have accurate knowledge about zinc (by two to three times). Knowledge of zinc as a treatment for diarrhea (89 percent) as well as knowledge of zinc efficacy (that zinc makes the child stronger (42 percent), prevents future diarrhea episodes (33 percent) and reduces duration and severity of diarrhea (34 percent) appear to be most strongly correlated with zinc use.

TABLE 23. ZINC-RELATED KNOWLEDGE AND EVER USE OF ORASEL ZINC, 2011

| Zinc knowledge | Percent of all caregivers who mention | Percent of zinc users who mention | Percent of non-zinc users who mention |
|---|---------------------------------------|-----------------------------------|---------------------------------------|
| Zinc is a treatment for diarrhea | 64.0 | 89.2 | 48.5 |
| Should be taken with ORS/ORT | 17.7 | 24.3 | 12.7 |
| Makes the child stronger | 27.7 | 42.4 | 17.0 |
| Helps prevent future diarrhea episodes | 21.7 | 33.1 | 13.8 |
| Reduces duration and severity of diarrhea | 20.0 | 33.5 | 7.2 |
| Nothing | 31.6 | 2.8 | 50.4 |
| Other | 0.5 | 0.0 | 0.4 |

Table 37 in Annex B examines knowledge about and attitudes towards the availability and efficacy of zinc. Overall, 51 percent of caregivers said they had at some time used Orasel Zinc in the past, and 23 percent of those who were not using zinc for the current diarrhea episode said they had used Orasel Zinc before.

In terms of access to zinc products, zinc users in 2011 (57 percent) were statistically significantly more likely than zinc users in 2009 (35 percent) to agree that “shops near here always have Orasel Zinc kits for sale.” When asked whether they agreed that there was a “place nearby” to obtain the kits, zinc users in 2011 were much more likely (76 percent) to agree than non-users (44 percent), and more zinc non-users agreed that they did not “know where to obtain Orasel Zinc kits.” Moreover, most zinc users (78 percent) in 2011 agreed that “Orasel Zinc kits are available within walking distance of my home,” compared to 44 percent of non-users. Opinions of the price of kits did not seem to differ greatly between the two years nor between zinc users and non-users.

Respondents in 2011 were asked for their opinion on the efficacy of zinc in general. Overall, perceptions on the efficacy of zinc treatment were significantly correlated with zinc use. Virtually

all (99 percent) zinc users agreed that “zinc tablets are effective for treating diarrhea,” compared to 62 percent of non-users. Over 90 percent of zinc users (compared to about half of non-users) also correctly agreed with statements that zinc “reduces the duration of an episode of diarrhea,” “reduces the risk of new diarrhea episodes in the next 2-3 months,” and “contributes to strengthening children's immune systems.” At the same time, however, there was also a high level of incorrect agreement by zinc users and non-users alike that zinc “reduces the risk of dehydration among children.”

In continuing to look at the data from 2011, in general, more zinc non-users had false perceptions of zinc efficacy than zinc users. About a quarter of zinc non-users thought that “zinc is a nutritional supplement, and not an effective diarrhea treatment” and that “zinc tastes bad and my child won’t want to take it.”

Although 91 percent of zinc users (and 75 percent of caregivers overall) agreed that zinc can reduce the risk of new diarrhea episodes, slightly more than half of zinc users agreed that “it is too hard to remember to give zinc to children when the diarrhea episode has ended.” This perception may be contributing to non-compliance with the 10-day zinc regimen.

While most respondents knew that zinc should be given at the same time as ORS to be effective, the numbers were still low (63 percent overall and 70 percent of zinc users), showing a need to strengthen this message.

Another finding from 2011 showed that statistically significantly more zinc users (74 percent) than non-users (62 percent) agreed that “diarrhea should be treated with an antibiotic.” This is in keeping with the finding that roughly 20 percent of those that treated with zinc also treated with an antibiotic. Thus caregivers may continue to demand inappropriate antibiotics in addition to zinc.

Finally, the majority of zinc users (88 percent) agreed that they would “buy and use zinc the next time my child has diarrhea.”

3.4.3 WILLINGNESS TO PAY FOR ORASEL ZINC

Most respondents each year perceived zinc as affordable, stating it is either “not expensive” or “affordable.” However, the number of caretakers that had actually paid for an Orasel Zinc kit nearly doubled between 2009 and 2011. Respondents in 2011 were dramatically more willing to pay for all the suggested incremental price increases compared to 2009 respondents, of whom 70 percent stated the maximum they were willing to pay was “nothing.” However, this finding could be driven by the fact that the sample of caregivers surveyed in 2011 was significantly wealthier than the sample from 2009.

TABLE 24. COST OF ORASEL ZINC AND WILLINGNESS TO PAY

| Cost and willingness to pay | 2009 Percent of caregivers who obtained Orasel Zinc kit | 2011 Percent of caregivers who obtained Orasel Zinc kit | |
|-------------------------------------|--|--|--|
| How obtained Orasel Zinc kit | | | |
| Paid for it (purchased) | 85.3 | 92.3 | |
| Free | 14.7 | 7.7 | |

| Number of caregivers who reported on kit cost | 93 | 128 | |
|--|---|---|------|
| Cost and willingness to pay | 2009 Percent of caregivers who paid for Orasel Zinc in the past | 2011 Percent of caregivers who paid for Orasel Zinc | |
| Amount paid for Orasel Zinc the last time | | | ++ |
| Don't know/other | 28.5 | 10.3 | |
| 100 CFA | 9.3 | 0.6 | |
| 450 CFA | 62.2 | 89.1 | |
| Opinion about cost of Orasel Zinc¹ | | | |
| Not expensive | 42.3 | 39.2 | |
| Affordable | 36.4 | 44.6 | |
| Expensive | 10.7 | 6.7 | |
| Too expensive | 3.4 | 4.5 | |
| No opinion / Don't know | 7.2 | 5.0 | |
| Willing to pay if the price | | | |
| Increased by 25% from what they paid | 35.4 | 85.3 | ++ |
| Increased by 50% from what they paid | 34.1 | 91.3 | ++ |
| Increased by 75% from what they paid | 28.6 | 93.4 | ++ |
| Maximum price would willing to pay for Orasel Zinc | | | n.c. |
| Nothing | 69.8 | -- | |
| 1-299 CFA | -- | 2.6 | |
| 300 - 450 CFA | 10.8 | 16.6 | |
| More than 450 CFA | 19.4 | 80.9 | |
| What would you do if the price of Orasel Zinc exceeds what you can afford² | | | |
| Look for cheaper brand | 28.4 | 38.0 | |
| Stop using | 18.7 | 28.8 | |
| Other | 52.9 | 33.2 | |
| Number of caregivers who had paid for an Orasel Zinc kit at least once in the past | 77 | 118 | |

Note: In August 2011, \$1 USD = 447 CFA

¹Among 77 who purchased Orasel Zinc in 2009, 31 responded to this question.

²Among 77 who purchased Orasel Zinc in 2009, 30 responded to this question.

3.4.4 PERCEPTION OF EFFECTIVENESS OF ZINC TREATMENT

The household surveys included questions to determine perceived effectiveness of zinc. In both 2009 and 2011, the majority of zinc users agreed that “zinc tablets are effective for the treatment of diarrhea (96 percent in 2009 and 99 percent in 2011). Among zinc users who thought zinc was an effective treatment, the most common reasons in both 2009 and 2011 stated for why they thought zinc was effective were that the “diarrhea stopped quickly” (79 percent and 92 percent, respectively) and, similarly, that the “child got better quickly” (60 percent and 71 percent, respectively).

TABLE 25. PERCEPTIONS OF ZINC'S EFFECTIVENESS FOR DIARRHEA TREATMENT AND REASONS FOR THAT PERCEPTION

| Why/Why not effective | 2009 | | 2011 | | 2009 vs. 2011 Think zinc is effective | Do not think zinc is effective 2009 vs. 2011 |
|--|--|---|--|---|---------------------------------------|---|
| | % of zinc users who think zinc is an effective treatment | % of zinc users who do not think zinc is an effective treatment | % of zinc users who think zinc is an effective treatment | % of zinc users who do not think zinc is an effective treatment | | |
| Why effective (among those who think zinc is effective) | | | | | | |
| Diarrhea stopped quickly | 78.7 | -- | 92.3 | -- | | |
| Child got better quickly | 60.2 | -- | 70.9 | -- | | |
| Child regained appetite | 20.3 | -- | 26.9 | -- | | |
| Why not effective (among those who think zinc is not effective) | | | | | | |
| Diarrhea did not stop | -- | 8.8 | -- | 91.4 | | ++ |
| Child did not like the taste | -- | 8.8 | -- | 3.6 | | |
| Too difficult to administer | -- | 8.8 | -- | 0 | | |
| Other | 0 | 13.1 | 0.2 | 5 | | |
| Total number | 87 | 15 | 120 | 4 | | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

Table 26 breaks down perception of the efficacy of zinc among caregivers who treated with zinc by whether or not they had heard about Orasel Zinc. Most caregivers who treated with zinc and heard about Orasel Zinc agreed that zinc tablets are effective for diarrhea treatment (94 percent in 2009 and 96 percent in 2011). Interestingly, in 2011, almost all (99.7 percent) caregivers who treated with zinc but did not hear about Orasel Zinc agreed that zinc is effective; this was a significant increase from 2009. In both years, the primary reason that was given for why zinc is effective was that the “diarrhea stopped quickly,” followed by “the child got better quickly.”

TABLE 26. PERCEPTION OF EFFECTIVENESS OF ZINC TREATMENT AMONG CAREGIVERS WHO HEARD ABOUT ZINC AND AMONG CAREGIVERS WHO TREATED CHILD WITH ZINC, 2011

| Perception of the effectiveness of zinc treatment | 2009 | | 2011 | | Heard of Orasel Zinc 2009 vs. 2011 | 2009 vs. 2011 Did not hear of Orasel Zinc |
|---|---|--|---|--|---------------------------------------|--|
| | Percent of caregivers who treated with zinc and heard about Orasel Zinc (%) | Percent of caregivers who treated with zinc and did not hear about Orasel Zinc (%) | Percent of caregivers who treated with zinc and heard about Orasel Zinc (%) | Percent of caregivers who treated with zinc and did not hear about Orasel Zinc (%) | | |
| Zinc tablets are effective for treatment of diarrhea | 94.2 | 78.4 | 95.9 | 99.7 | | ++ |
| Why effective (among those who think zinc is effective) | | | | | | |
| Diarrhea stopped quickly | 78.1 | 79.7 | 93.9 | 90.2 | | |
| Child got better quickly | 68.3 | 46.4 | 73.2 | 67.9 | | |
| Child regained appetite | 19.9 | 20.9 | 31.8 | 20.6 | | |
| Number of caregivers¹ | 58 | 44 | 80 | 55 | | |

¹ This is the total number of caregivers whose children received zinc treatment; it is smaller than the number of children who received zinc treatment due to having more than one child per caregiver

3.4.5 PERCEPTION AND KNOWLEDGE OF ORS

Overall knowledge of ORS was generally high among caregivers. Table 27 below examines knowledge and attitudes about ORS among 2011 respondents. Among caregivers who treated their child's diarrhea, over half agreed that it "combats dehydration" and that it is "a medication that gives good health." At the same time, over half also agreed that "ORS stops diarrhea" – ORS stops dehydration, however, only when used with zinc can it stop diarrhea.

TABLE 27. KNOWLEDGE AND ATTITUDES ABOUT ORS, 2011

| Knowledge/attitudes about ORS | Percent of caregivers who treated the child's diarrhea who agreed with statement |
|--|--|
| ORS is a medication that gives good health | 55.9 |
| ORS stops diarrhea | 60.6 |
| My child does not like the taste of ORS | 25.6 |
| ORS combats dehydration | 55.1 |
| Total number of responses | 266 |

3.5 EXPOSURE TO COMMUNICATION MESSAGES RELATED TO DIARRHEA AND TREATMENT

3.5.1 EXPOSURE TO MESSAGES ABOUT TREATMENT OF DIARRHEA

Table 28 portrays caregivers' memory of exposure to diarrhea treatment messages. Slightly more caregivers sampled in 2011 recalled exposure to diarrhea messages than those sampled in 2009 (28 versus 36 percent, respectively); this difference was not statistically significant. In 2009 handwashing messages were the most recalled (59 percent), and 45 percent of caregivers reporting hearing a message about Orasel Zinc. The percentage of caregivers recalling messages about Orasel Zinc use statistically significantly increased from 2009 to 2011; in 2011, 67 percent of caregivers recalled such a message. While higher percentages of caregivers in 2011 recalled other messages, such as those about identifying diarrhea and care messages, the changes between the years were not statistically significant. A shift did occur between 2009 and 2011 in the source of the messages. In 2009, radio was most frequently mentioned source of diarrhea messages (57 percent) whereas in 2011 television was far more common (88 percent), coinciding with the initiation of a television campaign by PSI in 2010. "Reading a prospectus" (51 percent) was also frequently mentioned in 2011, referring to campaign flyers distributed by the project (although this source was not asked about in 2009).

TABLE 28. EXPOSURE TO AND RECALL OF GENERAL DIARRHEA TREATMENT MESSAGES

| Exposure to diarrhea treatment messages | 2009 % of caregivers | 2011 % of caregivers | |
|---|----------------------------|----------------------------|------|
| Heard any diarrhea treatment messages in past 3 months | 27.6 | 35.6 | |
| Messages heard among those who recalled hearing the messages | | | |
| Wash hands with soap after contact with dirt (2009) / Wash hands with soap and water after contact with stools (2011) | 59.1 | 35.5 | |
| Food should always be well protected | 42.7 | 25.1 | |
| Microorganisms that cause diarrhea can be present in drinking water | 27.0 | 28.0 | |
| Child that passes liquid stool 3 times a day has diarrhea | 13.5 | 21.3 | |
| Child with diarrhea loses water, salt, or sugar | 22.5 | 22.3 | |
| Diarrhea can rapidly kill child if nothing is done | 30.2 | 35.6 | |
| When child has diarrhea, caregiver must replace the water, salt, or sugar that the child has lost | 11.5 | 26.3 | |
| When child has diarrhea, caregiver must give Orasel Zinc | 45.3 | 67.3 | ++ |
| Sources of messages among those who heard messages | | | |
| Radio | 57.2 | 38.4 | |
| Television | 21.0 | 87.8 | ++ |
| Newspaper | 1.0 | -- | n.c. |
| NGO | 5.8 | 3.9 | |
| Microfinance institutions | -- | 0.9 | n.c. |
| Community workers | -- | 2.4 | n.c. |
| Peer educators | -- | 0.6 | n.c. |
| Posters/publicity banners/signs | 6.7 | 6.7 | |
| Friends/relatives | 19.6 | 2.7 | ++ |
| Reading a prospectus | -- | 51.1 | n.c. |
| Other | 16.7 | 2.9 | ++ |
| Total | 83 | 114 | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.
 ++p<0.01 for statistically significant difference between 2009 and 2011 proportions.
 n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

3.5.2 EXPOSURE TO MESSAGES ABOUT ZINC PRODUCTS AND ZINC TREATMENT

Exposure to messages about Orasel Zinc increased between 2009 and 2011. Of those caregivers with children with diarrhea in past 2 weeks who had heard about Orasel Zinc, 44 percent reported hearing a message about Orasel Zinc in the past 3 months.¹⁴ As with messages about diarrhea management, caregivers that had heard about Orasel Zinc in the past three months were most likely to have heard/seen the message on television in 2011 (76 percent); in 2009 radio was the most common source (56 percent).¹⁵

TABLE 29. SOURCES OF MESSAGES AMONG CAREGIVERS WHO HEARD ABOUT ORASEL ZINC IN PAST 3 MONTHS

| | 2009 | 2011 | |
|--|--|--|------|
| Knowledge | Percent of caregivers with children with diarrhea in past 2 weeks who had heard about Orasel Zinc | Percent of caregivers with children with diarrhea in past 2 weeks who had heard about Orasel Zinc | |
| Where heard/saw message on Orasel Zinc | | | |
| Radio | 56.3 | 41.4 | |
| Television | 19.6 | 75.8 | ++ |
| Newspaper | 0 | -- | |
| NGO | 6.1 | 4.0 | |
| Microfinance institutions | -- | 0.3 | n.c. |
| Community Health Worker | -- | 2.1 | n.c. |
| Peer Educators | -- | 1.0 | n.c. |
| Posters/publicity banners/signs | 5.8 | 1.7 | |
| Friends/relatives | 17.4 | 18.4 | |
| Reading a prospectus | -- | 0.0 | n.c. |
| Other | 27.9 | 2.7 | ++ |
| Total number of caregivers who heard about Orasel Zinc in last 3 months | 82 | 136 | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.
 ++p<0.01 for statistically significant difference between 2009 and 2011 proportions.
 n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

Table 30 shows the proportion of caregivers who spoke with someone about zinc as a diarrhea a treatment according to the type of person. The proportion of respondents that spoke to someone about zinc statistically significantly increased from 12 percent in 2009 to 32 percent in 2011. Among zinc users in 2009 health personnel were the most common source of zinc information whereas in 2011 friends/neighbors/relatives were most common (followed by health

¹⁴ Although the 2009 survey collected this information from all screened caregivers, the analysis presented in Table 29 is limited to only those caregivers with children with diarrhea in the past two weeks for comparability of the data with 2011.

¹⁵ Note that while the percentages of respondents reporting "other" for 2009 and 2011 are statistically significantly different, some of the response options (e.g., microfinance institutions, community health workers, etc.) were not listed in 2009; this questionnaire difference could be the cause of the statistically significant finding.

personnel). Community leaders as a source of knowledge about zinc decreased from 8 percent in 2009 to almost 0 percent in 2011.

In rural areas health personnel were a more frequent source of zinc information while friends/neighbors/relatives was higher in urban areas; this did not change between 2009 and 2011. In 2011, community health workers were statistically significantly more likely to be a source of information in rural areas than urban areas.

TABLE 30. PROPORTION OF CAREGIVERS WHO REPORTED HAVING SPOKEN TO SOMEONE ABOUT ZINC AS A DIARRHEA TREATMENT AND TYPES OF PERSONS SPOKEN TO

| | 2009 | | | 2011 | | | 2009 vs. 2011 All caregivers | 2009 vs. 2011 Urban caregivers | 2009 vs. 2011 Rural caregivers |
|---|------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|---|---|
| | Proportion of all caregivers | Proportion of urban caregivers | Proportion of rural caregivers | Proportion of all caregivers | Proportion of urban caregivers | Proportion of rural caregivers | | | |
| Spoke to someone about zinc as a diarrhea treatment | 12.2 | 12.7 | 10.8 | 32.2 | 33.5** | 26.8** | ++ | ++ | ++ |
| Type of person spoken to about zinc as diarrhea treatment | | | | | | | | | |
| Community leader | 7.0 | 6.1 | 9.8 | 0.3 | 0.2 | 0.9 | ++ | ++ | + |
| Community worker | 7.5 | 4.9 | 16* | 3.9 | 0.3 | 21.7** | | ++ | |
| Health personnel | 49.4 | 43.5 | 68.9** | 41.2 | 35.1 | 71.0** | | | |
| Friends/neighbors/relatives | 41.4 | 48.2 | 19** | 65.7 | 72.5 | 32.4** | ++ | ++ | |
| Pharmacist | 13.6 | 16.5 | 4.0** | 16.7 | 19.4 | 3.2* | | | |
| Shopkeeper | 2.8 | 3.3 | 1.3 | 1.8 | 1.5 | 2.9 | | | |
| Don't Know | | | | 5.7 | 6.9 | 0.0 | | | |
| Other | 3.7 | 4.4 | 1.3 | 0.2 | 0.0 | 1.0 | ++ | + | |
| Total number of caregivers who spoke to someone about zinc as a diarrhea treatment | 356 | 287 | 69 | 118 | 63 | 55 | | | |
| AMONG ZINC USERS ONLY: | | | | | | | | | |
| Type of person spoken to about zinc as diarrhea treatment | | | | | | | | | |
| Community leader | 10.3 | 5.6 | 15.8 | 0.4 | 0.3 | 0.5 | ++ | ++ | + |
| Community worker | 18.0 | 5.0 | 32.9* | 5.8 | 0.2 | 28.4** | | ++ | |
| Health personnel | 58.1 | 54.2 | 62.7 | 48.2 | 41.3 | 75.7* | | | |
| Friends/neighbors/relatives | 31.3 | 38.9 | 22.6 | 55.9 | 64.2 | 22.5* | + | | |
| Pharmacist | 12.7 | 20.6 | 3.6* | 27.4 | 33.3 | 3.9** | | | |

| | 2009 | | | 2011 | | | 2009 vs. 2011 All caregivers | 2009 vs. 2011 Urban caregivers | 2009 vs. 2011 Rural caregivers |
|---|------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|---|---|
| | Proportion of all caregivers | Proportion of urban caregivers | Proportion of rural caregivers | Proportion of all caregivers | Proportion of urban caregivers | Proportion of rural caregivers | | | |
| Shopkeeper | 0.8 | 1.4 | 0 | 3.0 | 2.8 | 4.2 | | | |
| Don't Know | | | | 9.8 | 12.2 | 0.0 | | | |
| Other | 1.7 | 0 | 3.6 | 0.3 | 0.0 | 1.5 | | | |
| Total number of caregivers who used zinc and spoke to someone about zinc as a diarrhea treatment | 61 | 36 | 25 | 75 | 38 | 37 | | | |

*Statistically significant difference at $p < 0.05$ and ** $p < 0.01$ between urban and rural caregivers within that year

* $p < 0.05$ for statistically significant difference between 2009 and 2011 proportions.

** $p < 0.01$ for statistically significant difference between 2009 and 2011 proportions.

Table 31 examines exposure to specific messages among caregivers who gave zinc, as well as among those who gave zinc with ORS and those who gave zinc with ORS for the full 10 days.

In 2009 roughly half of zinc users recalled hearing a message that a “child with diarrhea should receive zinc for 10 days.” In 2011, only 38 percent of caregivers who gave zinc recalled hearing this message, although over half of those who gave zinc with ORS for 10 days recalled the message. The 2011 survey had a more extensive list of potential messages. Most caregivers who gave zinc also reported hearing about dosage size for children under 6 months and over 6 months. Overall, however, Orasel Zinc specific messages were the most recalled. Roughly 90 percent of caregivers who gave zinc reported hearing a message that “Orasel Zinc is very effective for treating and protecting children from diarrhea” and over 80 percent reported hearing that “when a child has diarrhea, he should be given Orasel Zinc.” About half of caregivers who gave zinc reported hearing that “Orasel Zinc includes 2 ORS packets plus one set of 10 zinc tablets,” with a slightly higher percentage (68 percent) of caregivers who gave zinc with ORS for 10 days reporting that they were exposed to this message. Note that significance testing between the two years cannot be conducted for this table, as different questions were asked.

TABLE 31. EXPOSURE TO MESSAGES RELATED TO ZINC PRODUCTS AMONG CAREGIVERS WHO GAVE ZINC

| Exposure to messages related to zinc | 2009 | | | 2011 | | |
|---|------------------------------------|---|---|------------------------------------|---|---|
| | Among caregivers who gave zinc (%) | Among caregivers who gave zinc with ORS (%) | Among caregivers who gave zinc with ORS for 10 days (%) | Among caregivers who gave zinc (%) | Among caregivers who gave zinc with ORS (%) | Among caregivers who gave zinc with ORS for 10 days (%) |
| Messages | | | | | | |
| Child with diarrhea should receive zinc for 10-14 days (2009) or for 10 days (2011) | 51.7 | 56.2 | 55.4 | 37.9 | 37.9 | 51.1 |
| Zinc does not replace ORS; the two should be given together | 30.2 | 26.7 | 27.2 | | | |
| Zinc helps child to recover quicker | 61.1 | 64.6 | 63.9 | | | |
| Zinc improves child's appetite | 9.3 | 7.5 | 7.6 | | | |
| Zinc makes child stronger | 26.2 | 25.3 | 25.8 | | | |
| Zinc reduces risk of future diarrhea episodes | 7.4 | 8.7 | 8.9 | | | |
| 1 zinc tablet is required for children aged 6 months and older | | | | 63.4 | 63.4 | 66.0 |

| | | | | | | |
|--|-----------|-----------|-----------|-----------|-----------|-----------|
| 1/2 zinc tablet is needed for children under 6 months old | | | | 57.3 | 57.3 | 59.0 |
| Zinc helps the child to avoid diarrhea for 2 or more months | | | | 30.3 | 30.3 | 45.4 |
| Zinc makes the diarrhea less serious | | | | 29.8 | 29.8 | 42.4 |
| When a child has diarrhea, he should be given Orasel Zinc | | | | 81.6 | 81.6 | 83.5 |
| Orasel Zinc is very effective for treating and protecting children from diarrhea | | | | 90.0 | 90.0 | 85.8 |
| Orasel Zinc includes 2 ORS packets plus one set of 10 zinc tablets | | | | 57.5 | 57.5 | 68.2 |
| Number of caregivers | 48 | 42 | 41 | 67 | 67 | 37 |

3.5.3 ASSOCIATION BETWEEN MESSAGE EXPOSURE AND ZINC-RELATED KNOWLEDGE AND BEHAVIOR

Table 32 examines the association between message exposure and perceptions related to zinc for diarrhea treatment as well as the association between zinc knowledge and behavior. The relationship between recalling hearing Orasel Zinc messages and believing that zinc tablets are effective for treatment of diarrhea remained strong in both 2009 and 2011. This association was true for many of the perceptions regarding the efficacy of zinc treatment. Additionally, in most cases in 2011 a statistically significantly higher proportion of caregivers who had heard any zinc messages in the past 3 months reported positive perceptions of zinc than those who had not heard any zinc messages in the past 3 months; in 2009 not as many differences were found.

There were two notable positive, statistically significant changes in the effects of messaging over time: 98 percent of caregivers in 2011 who treated children with zinc agreed that zinc “decreases the duration of a diarrhea episode” compared to 89 percent in 2009; and, 91 percent of caregivers in 2011 who treated children with zinc agreed that zinc “decreases the risk of a new episode of diarrhea in the next 2-3 months” compared to 59 percent in 2009. However, a statistically significant smaller proportion of caregivers in 2011 who heard any Orasel Zinc messages in past 3 months agreed that “zinc should be given at the same time as ORS to be most effective” than in 2009.

TABLE 32. PERCEPTIONS RELATED TO ZINC FOR DIARRHEA TREATMENT AMONG CAREGIVERS OF CHILDREN AGED 6-59 MONTHS, BY ZINC MESSAGE EXPOSURE AND ZINC USE

| Perceptions related to zinc for diarrhea treatment- | 2009 | | | 2011 | | | 2009 vs. 2011 Heard any zinc messages | 2009 vs. 2011 Did not hear any zinc messages | 2009 vs. 2011 Treated children with zinc |
|--|--|---|---|--|---|---|--|---|---|
| | Caregivers of children with diarrhea who heard any Orasel Zinc messages in past 3 months | Caregivers of children with diarrhea who did not hear any Orasel Zinc messages in past 3 months | Caregivers who treated children with zinc | Caregivers of children with diarrhea who heard any Orasel Zinc messages in past 3 months | Caregivers of children with diarrhea who did not hear any Orasel Zinc messages in past 3 months | Caregivers who treated children with zinc | | | |
| Proportion of caregivers who agreed that: | | | | | | | | | |
| Zinc tablets are effective for the treatment of diarrhea | 96.8* | 87.4* | 95.9 | 90.9* | 74.7* | 98.5 | | | |
| Zinc decreases the duration of a diarrhea episode | 90.2 | 81.1 | 88.7 | 92.5* | 71.2* | 97.7 | | | ++ |
| Zinc doesn't contribute to reducing the severity of diarrhea episodes | | | | 50.9 | 39.2 | 46.7 | n.c. | n.c. | n.c. |
| Using zinc decreases the risk of dehydration among | 87.0 | 77.9 | 83.6 | 88.8* | 67.6* | 93.4 | | | |

| | | | | | | | | | |
|--|------|------|------|-------|-------|------|------|------|------|
| children | | | | | | | | | |
| Zinc decreases the risk of new episodes of diarrhea in the next 2-3 months | 62.0 | 67.8 | 59.3 | 83.8* | 68.4* | 91.1 | | | ++ |
| Zinc contributes to strengthening children's immune systems | 76.6 | 80.1 | 78.2 | 83.4* | 74.3* | 90.1 | | | |
| Zinc is appropriate for the treatment of diarrhea | 94.6 | 87.8 | 94.8 | 87.4 | 80.1 | 97.7 | | | |
| Zinc should be used for each type of diarrhea | 91.9 | 85.2 | 91.8 | 85.1* | 73.1* | 90.8 | | | |
| Diarrhea should be treated with an antibiotic | | | | 75.9 | 62.4 | 74.2 | n.c. | n.c. | n.c. |
| Zinc has too many side effects, so I'm not comfortable giving zinc to my small child | | | | 10.4 | 13.0 | 2.9 | n.c. | n.c. | n.c. |
| Zinc tastes bad and my child won't take it | | | | 10.9 | 18.0 | 8.1 | n.c. | n.c. | n.c. |

| | | | | | | | | | |
|---|-----------|------------|------------|------------|------------|------------|------|------|------|
| Zinc is a nutritional supplement, not an effective diarrhea treatment | | | | 18.8 | 17.9 | 8.1 | n.c. | n.c. | n.c. |
| Zinc should be given at the same time as ORS to be most effective | 83.5* | 70.5* | 78.9 | 54.6 | 69.7 | 70.0 | ++ | | |
| Total number of respondents | 82 | 212 | 102 | 136 | 253 | 135 | | | |

NOTE: Perceptions that are in bold were part of key messages relayed during PSI's demand creation campaign

*Statistically significant at $p < 0.05$ for comparison between caregivers who had and had not heard any Orasel zinc messages in the past 3 months, within that year.

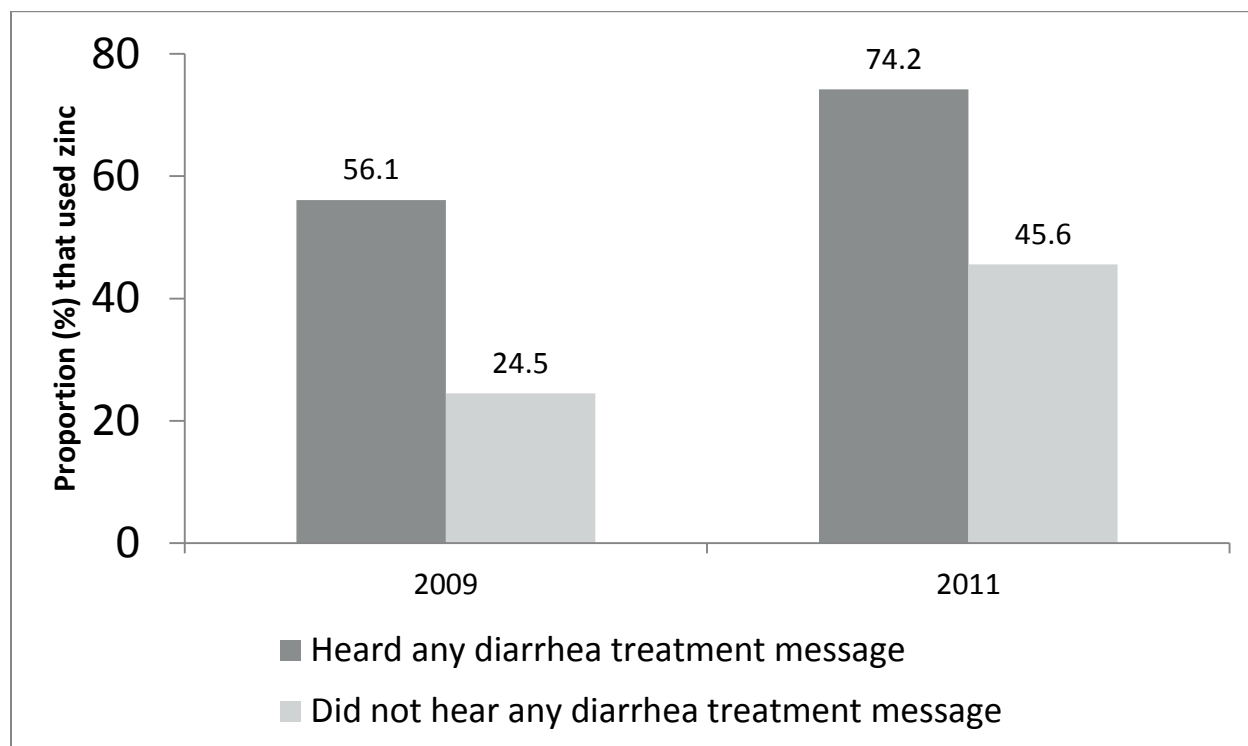
+ $p < 0.05$ for statistically significant difference between 2009 and 2011 proportions.

++ $p < 0.01$ for statistically significant difference between 2009 and 2011 proportions.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

The associations between recall of specific and generic diarrhea treatment messages and use of zinc were statistically significant in both 2009 and 2011. In 2009, zinc treatment was 56 percent among caregivers who recalled hearing any diarrhea treatment message in the previous three months, compared to 25 percent among those who did not recall those messages (Figure 1). In 2011, zinc use was 74 percent among those who recalled any diarrhea treatment messages, compared to 46 percent among those who did not recall those messages.

FIGURE 1. ZINC USE, BY RECALL OF DIARRHEA TREATMENT MESSAGES, 2009 AND 2011

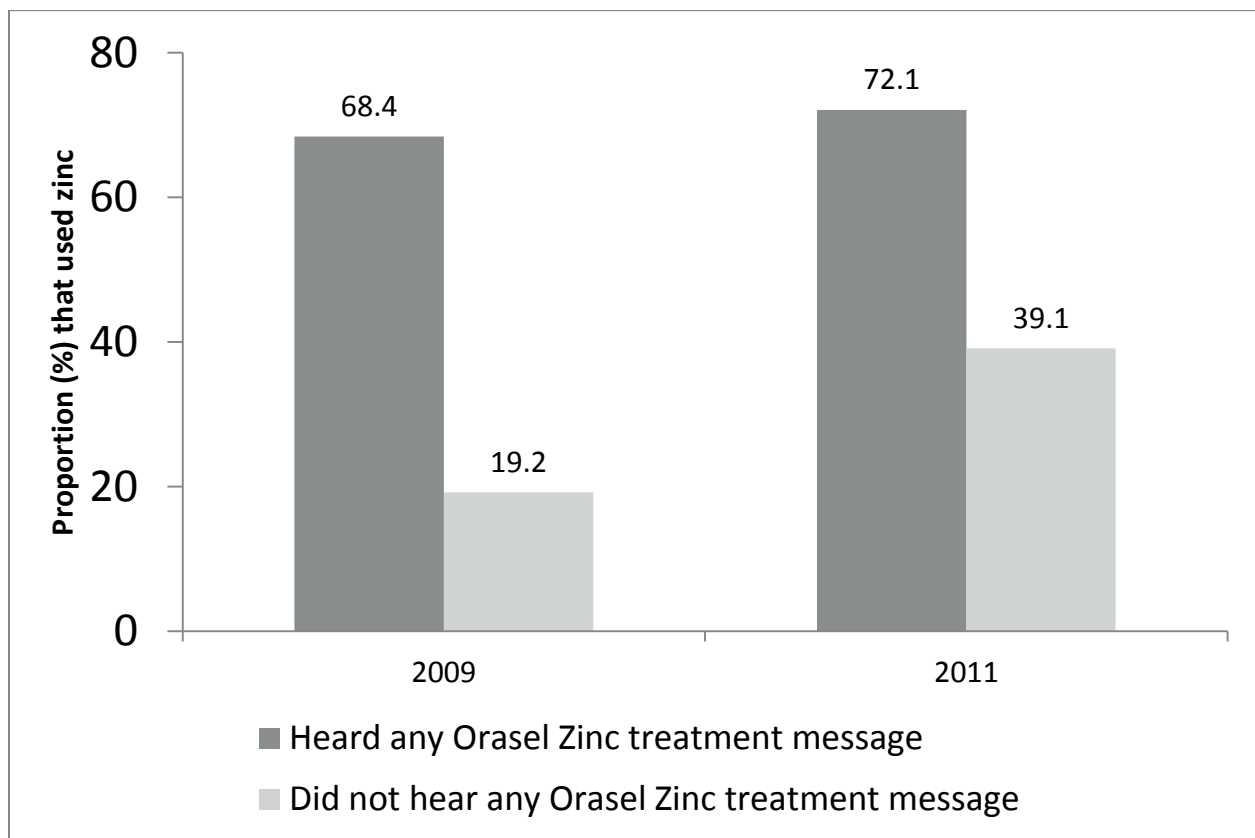


NOTE: Statistically significant difference between groups (heard/did not hear) within year (2009 or 2011) at $p < 0.01$ level

NOTE: Statistically significant difference between 2009 and 2011 among "did not hear any diarrhea message" group at $p < 0.05$ level

Similar findings were evident when respondents were asked about having heard Orasel Zinc messages in the past three months. In 2009, zinc use was 68 percent among those who recalled hearing an Orasel Zinc message, compared to 19 percent among those who did not recall hearing an Orasel Zinc message (this difference is statistically significant) (Figure 2). In 2011, zinc use was 72 percent among those who recalled Orasel Zinc messages, compared to 39 percent among those who did not recall Orasel Zinc messages, exhibiting another statistically significant change. However, it should be noted that zinc use statistically significantly increased between 2009 and 2011 even among those that had not heard any diarrhea treatment or Orasel Zinc messages, which indicates that exposure to messages was not the only reason for increased zinc use (see Figures 1 and 2).

FIGURE 2. ZINC USE, BY RECALL OF ORASEL ZINC MESSAGES, 2009 AND 2011



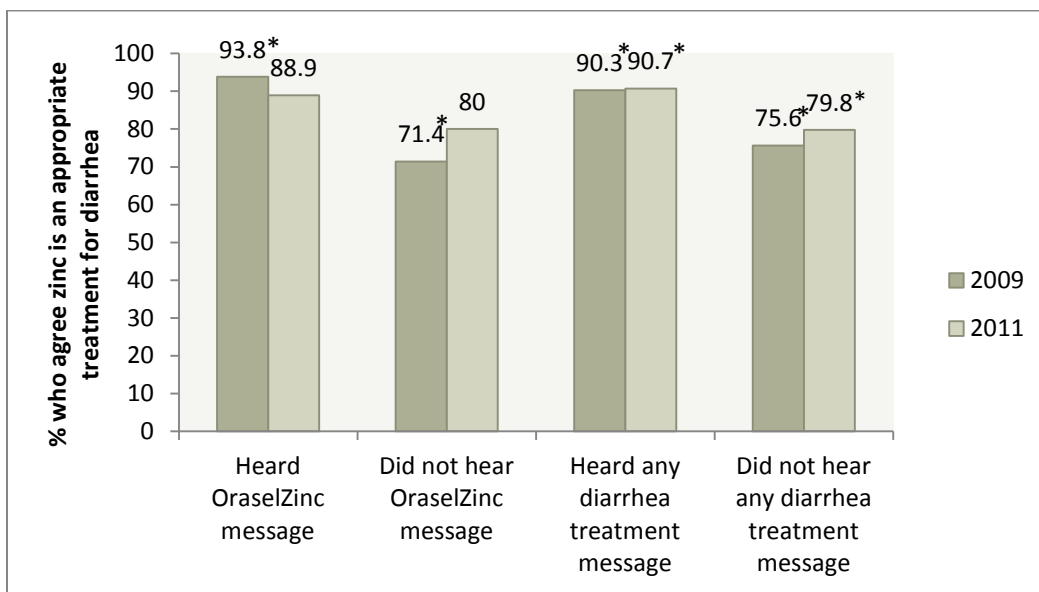
NOTE: Statistically significant difference between groups (heard/did not hear) within year (2009 or 2011) at $p < 0.01$ level

NOTE: Statistically significant difference between 2009 and 2011 among "did not hear Orasel Zinc message" group at $p < 0.01$ level

Figure 3 shows that in 2009 there was a statistically significant difference in the proportion of respondents who agreed that zinc was appropriate treatment for diarrhea depending on if they recalled hearing diarrhea treatment messages: a significantly higher proportion of those that recalled hearing messages agreed that zinc was an appropriate treatment. However, this difference dissipated in 2011, with no statistically significant differences found between recall of messages and viewpoints on appropriateness of zinc. Overall, no statistically significant change

FIGURE 3. ZINC-RELATED KNOWLEDGE BY RELEVANT MESSAGE RECALL

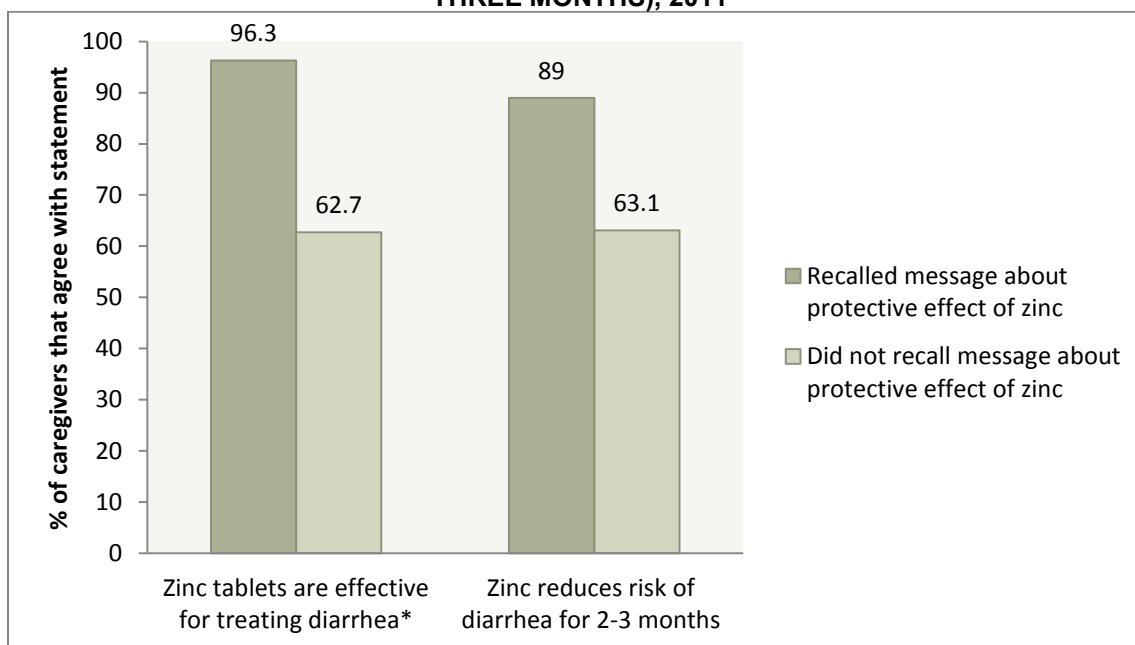
was detected between the two years in the relationship between recall of exposure to messages and agreement that zinc was an appropriate treatment.



*Statistically significant difference between groups (heard/did not hear Orasel Zinc message; heard/did not hear any diarrhea treatment message) within year (2009 or 2011) at p<0.05 level.

Finally, Figure 4 shows that, in 2011¹⁶, respondents who recalled hearing a message about the protective effect of zinc were statistically significantly more likely to agree that zinc was an effective treatment for diarrhea; they were also more likely to agree that zinc could protect against future episodes for 2-3 months, but this difference was not statistically significant.

FIGURE 4. AGREEMENT WITH ZINC STATEMENTS BY WHETHER RECALLED SPECIFIC MESSAGE (AMONG THOSE WHO RECALLED AN ORASEL ZINC MESSAGE IN PAST THREE MONTHS), 2011



¹⁶ No comparable data is available for 2009

*Note: Statistically significant difference between zinc users and non-users at p<0.01 level.

3.6 CHARACTERISTICS OF ZINC USERS

In 2009 those respondents who reported treating their child’s diarrhea with zinc may have been “early adopters” in the behavior change continuum. As the data in the table below show, zinc users in 2009 were statistically significantly more likely to have used ORS/Orasel prior to the introduction of zinc and less likely to be using antibiotics and antidiarrheals to treat their child’s diarrhea compared to those surveyed in 2011. In 2011, zinc users were most likely to report having previously used traditional remedies (36 percent) and antibiotics (22 percent).

TABLE 33. AMONG ZINC USERS, WHAT THEY USED BEFORE ZINC WAS AVAILABLE

| What zinc users used before zinc was available | 2009 % of zinc users | 2011 % of zinc users | ++ |
|---|-------------------------|-------------------------|----|
| Antibiotics | 5.9 | 22.1 | |
| Antidiarrheals | 7.5 | 13.7 | |
| IV treatment or injection | 1.2 | 0.2 | |
| Traditional remedy | 20.4 | 35.6 | |
| Orasel | 25.1 | 10.9 | |
| Other ORS solution | 9.1 | 2.0 | |
| Nothing | 18.4 | 7.5 | |
| Don’t know | 7.4 | 2.6 | |
| Other | 5.0 | 5.4 | |
| Total number of responses (among zinc users) | 73 | 129 | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

Additional information about the profile of zinc users was gathered in the 2011 survey (Table 34). A high proportion of 2011 respondents (42 percent) were first time zinc users. When asked why they had chosen to treat their child with zinc, the majority (62 percent) said it was because it had been recommended by a provider. Most (72 percent) zinc users reported that they treated their child with a diarrhea treatment kit (Orasel Zinc). Most of the rest (25 percent) reported giving a pill/tablet, which could mean that they gave the zinc sulfate tablets from the kit (although this cannot be confirmed from the data). It would thus be interesting to explore the sources of the pills/tablets to see whether, for example, providers are disassembling kits and selling the zinc and ORS separately.

Interestingly, only 2 percent of zinc users reported that using zinc for 10 days was a problem and yet Table 18 above shows that 65 percent actually treated for the full 10 days. This finding is all the more interesting given that the majority of respondents (83 percent) agreed that knowing zinc has a protective effect would motivate them to use it for the full 10 days. It appears that this message was not effectively communicated.

Zinc users overwhelmingly reported that administering zinc was “easy” and agreed with the key messages of the program campaign. Most (89 percent) stated that they anticipated using zinc to treat future episodes of diarrhea.

TABLE 34. PROFILE OF ZINC USERS

| Profile Aspect | 2011 % of zinc users |
|--|-------------------------|
| First time user? | 41.9 |
| Why chose zinc this time (<i>more than one answer possible</i>) | |
| Recommended by provider | 61.6 |

| | |
|--|------------|
| Recommended by friend/relative | 18.6 |
| Saw an advertisement | 23.2 |
| Used it successfully in the past | 33.0 |
| Had heard that zinc reduced severity of diarrhea | 2.4 |
| Had heard that zinc has protective effect for 2-3 months | 1.4 |
| Type of zinc product given to child | |
| Pill/tablet | 24.5 |
| Diarrhea treatment kit | 71.7 |
| Syrup | 0.9 |
| Don't know | 2.7 |
| Other | 0.3 |
| Among those who gave pills or tablets or diarrhea treatment kit, average # of pills/tablets they received | 10.4 |
| Attitude towards ease of use of zinc | |
| Easy | 96.8 |
| Difficult | 0.5 |
| Indifferent (not easy or difficult) | 2.7 |
| Other | - |
| Proportion of zinc users who believe administering zinc for 10 days is a problem | 2.5 |
| Knowing that zinc has a protective effect would motivate you to use zinc for the full 10 days | 83.4 |
| Agree that zinc is an effective diarrhea treatment | 96.3 |
| Had any problems or side effects when used a zinc product | 6.2 |
| Anticipates using zinc the next time child has diarrhea | 89.2 |
| Total number given zinc | 135 |

No statistically significant differences were observed between zinc users and non-users in terms of caregiver age, education and religion (data not shown). The only statistically significant difference found between users versus non-users was hearing an Orasel Zinc message in the past three months, for both 2009 and 2011. In 2009, 59 percent of zinc users versus 13 percent of non-users had heard an Orasel Zinc message in the past three months. In 2011, 57 percent of users and 29 percent of non-users had heard an Orasel Zinc message.

3.6.1 PREDICTORS OF ZINC USE

An exploratory logistic regression analysis was conducted aimed at determining whether certain factors related to mass media exposure and caregiver knowledge and perception about zinc are associated with zinc use for the treatment of diarrhea in both the 2009 and 2011 samples. The analysis was carried out among caregivers who treated the diarrhea of one or more of their children with diarrhea in the past two weeks, and results have the potential to inform future activities aimed toward increasing zinc use and to direct future research.

Table 35 below lists the factors that were tested for both years of data and the results of the analysis. The analytic models were constructed to control for caregiver demographics¹⁷ and the severity of the diarrhea episode¹⁸; that is, the results show the relationship between the factors tested and zinc use “controlling for”, or parsing out, these characteristics. Thus, the results become more policy relevant as they focus on factors that policy can affect.

¹⁷ The caregiver demographics controlled for in each model were: caregiver age, caregiver education, household wealth quintile, and urban versus rural residence.

¹⁸ The ‘severity of diarrhea episode’ items controlled for in each model were: presence of fever in a child with diarrhea and presence of blood in the stools of a child with diarrhea.

The odds ratios included in Table 35 help to gauge the overall magnitude of the association. For example, the first result is interpreted as: caregivers who recalled exposure to messaging about Orasel Zinc in the past three months were about 13 times more likely than those who did not recall the messaging to use zinc for the treatment of diarrhea. Note that some confidence intervals are quite wide (for example, the confidence interval for the 2011 measure of agree zinc tablets are effective for the treatment of diarrhea is 10.3 to 244.7); this is due to small sample sizes and demonstrates that the odds ratio estimate itself is imprecise, and thus the true magnitude of the relationship is unknown, but we can be statistically confident that the association is positive because the confidence interval does not include one.¹⁹

In 2009, recalled exposure to Orasel Zinc messages, recalled exposure to general diarrhea messages, having spoken to health personnel/pharmacist/shop keeper about zinc, and having taken the child(ren) with diarrhea to a professional health provider for treatment were statistically significantly and positively associated with zinc use.

In 2011, a larger number of variables were found to be statistically significantly and positively associated with zinc use than in 2009. In addition to the significant predictors found in 2009, caregiver agreement that zinc tablets are effective for the treatment of diarrhea is added to the list of significant predictors along with caregiver agreement that there is a place nearby where they can obtain Orasel Zinc kits. The only predictor found significant in 2009 but not found significant in 2011 is recalled exposure to general diarrhea messages, possibly because by 2011, most of the general diarrhea messages were replaced by more specific television advertisements.

TABLE 35. ODDS RATIO OF PREDICTORS FROM MULTIVARIATE REGRESSION ON ZINC USE BY CAREGIVERS

| Predictors | Odds ratio for Zinc Use Among Caregivers who Treated Diarrhea (95% Confidence Limits), 2009 n=251 | Odds ratio for Zinc Use Among Caregivers who Treated Diarrhea (95% Confidence Limits), 2011 n=259 |
|---|--|--|
| Caregiver's exposure to mass media message | | |
| Recalled exposure to message about Orasel Zinc in past 3 months (reference: did not recall) | 12.6** (5.9, 27.0) | 3.3** (1.4, 8.0) |
| Source of message for those who recall Orasel Zinc message: | [n=59] | [n=103] |
| TV | n.s. | n.s. |
| Radio | n.s. | n.s. |
| Other than TV or radio | n.s. | n.s. |
| Recalled exposure to general diarrhea message in past 3 months (reference: did not recall) | 4.0** (2.2, 7.5) | n.s. |
| Source of message for those who recall general diarrhea message: | [n=77] | [n=85] |

¹⁹ Collinearity can also cause wide confidence intervals; however, in this analysis collinearity is not a problem and thus not a cause of these wide confidence intervals. Predictors were tested one at a time, independent of the other tested predictors. Analysis models included the theorized predictor and the set of control variables described above.

| | | |
|--|--------------------|------------------------|
| TV | n.s. | n.s. |
| Radio | n.s. | n.s. |
| Other than TV or radio | n.s. | n.s. |
| Spoke to Health personnel/pharmacist/shop keeper about zinc as treatment | 24.2** (7.4, 79.6) | 14.6** (2.4, 88.8) |
| Caregiver's knowledge and perception about zinc | | |
| Agree zinc tablets are effective for the treatment of diarrhea (reference: disagree) | n.s. | 50.094** (10.3, 244.7) |
| Agree there is a place nearby where I can obtain Orasel-Zinc kits when my child needs them (reference: disagree) | n.s. | 9.305** (3.3, 26.5) |
| Child(ren) with diarrhea taken to a professional health provider (health clinic or pharmacy) for advice or treatment | 3.6* (1.2, 10.2) | 6.923** (2.3, 20.8) |

* p-value <0.01

** p-value <0.05

4. LIMITATIONS

In interpreting the results from this analysis there are several limitations that must be mentioned and taken into account. Foremost the surveys conducted in 2009 and 2011 contained differences not only in the methodology (in 2009 caregivers could report on more than one child with diarrhea for example, although only the youngest child was used for the analyses reported herein) but also in terms of questions asked (several new questions were included in the 2011 survey, for instance, or we not included in 2011 but asked in 2009). This led to difficulty in comparing some of the data between the two years or in some cases meant that data was only available for one of the years. In addition there were statistically significant differences in the characteristics of caregivers with a child with diarrhea between the two years (namely wealth quintile distribution and caregiver education) that could explain some of the treatment differentials found in this report, and the surveys were conducted in different diarrhea seasons, adding the possibility for some seasonality effects to the findings. This report does not attempt to make causal claims about why diarrhea treatment patterns may have changed between 2009 and 2011, and more advanced methods of dealing with the multiple comparisons problem (e.g., the Bonferroni and the Benjamini-Hochberg adjustments) were not utilized in the analysis.

5. CONCLUSIONS AND IMPLICATIONS

While the findings from the household surveys are specific to the Benin context, many have implications for future programming regardless of the setting.

(1) Overall use of zinc for treatment of childhood diarrhea statistically significantly increased from 32 percent in 2009 to 54 percent in 2011. In addition, the high percentage of zinc users who also treated with ORS was sustained from 2009 to 2011 (97 percent and 100 percent, respectively), and the percentage of zinc users who gave the full 10-day treatment increased from 47 to 65 percent. These improvements were seen for both rural and urban residents. Given that the only zinc product available in Benin is the Orasel Zinc kit (and standard treatment prior to the kit was Orasel ORS), co-packaging is likely to have contributed to the high rate of co-use of zinc and ORS for diarrhea treatment. Reasons for these positive changes cannot be conclusively attributed, but these data are encouraging and it is reasonable to suggest that program efforts may have contributed.

(2) Providers play an important role in encouraging use of zinc plus ORS as the first-line treatment for uncomplicated pediatric diarrhea. PSI carried out training with providers in all project departments around diarrhea management and treatment with Orasel Zinc, although the majority of these providers were in the public sector. Both the public and private sector were found to be important sources of zinc advice and treatment in both 2009 and 2011. The proportion of caregivers who reported having spoken to someone about zinc statistically significantly increased from 2009 to 2011, increasing by 20 percentage points in 2011 to a total of roughly 32 percent. Many of these caregivers (about 64 percent) reported that these conversations had been with a provider (community health workers, health personnel, pharmacists and shopkeepers). Most (62 percent) zinc users in 2011 stated that they chose to treat with zinc because their provider recommended it, and most caregivers that sought treatment at a public health clinic or pharmacy were correctly given Orasel Zinc. Continued efforts to reach both public and private sector providers with ongoing education about appropriate diarrhea treatment are thus critical to zinc program success.

(3) Inappropriate treatments were still widely reported, and many times used in conjunction with Orasel Zinc. Overall, there was a statistically significant increase in the proportion of caregivers treating with an antibiotic between the two years, yet while 30 percent of caregivers treated with antibiotics in 2011 only 10 percent of cases had blood in the stool (the only appropriate reason for giving an antibiotic). There was also a statistically significant 27 percentage point increase (from 11 to 39 percent) in the number of zinc users that also treated with an antibiotic. The majority (59 percent) of caregivers in 2011 stated that they specifically requested Orasel Zinc while only 6 percent requested an antibiotic, indicating that providers may be playing a role in the continued inappropriate use of antibiotics, but additional drivers of this behavior need to be further explored. Additional research focusing on both the supply- and demand-side drivers of continued inappropriate use of antibiotics and anti-diarrheals could help improve targeting of program messages.

(4) While care-seeking outside the home statistically significantly increased between 2009 and 2011, the percentage of caregivers not providing any treatment remained high: in 2011, 62

percent of caregivers did not seek advice or treatment outside the home and 25 percent reported that they did not give any treatment to their child. When asked in the 2011 survey why they did not give treatment, most caregivers (48 percent) reported that they did not perceive the child to be very sick (for several, this was due to the perception that the diarrhea episode was a symptom of teething), while 11 percent reported concern about the affordability of treatment. Only 5 percent reported that they didn't know where to purchase treatment.

(5) Willingness to pay for zinc is high. The majority of caregivers in 2011 (92 percent) paid for the Orasel Zinc kit they used to treat their child's diarrhea. Most (89 percent) paid the full price of 450 CFA (\$0.80 USD) and the price was perceived by most (84 percent) to be not expensive/affordable. Statistically significantly more caregivers in 2011 were willing to pay for Orasel Zinc at increased prices than in 2009 indicating that price of zinc was not an obstacle to use.

(6) Recall of specific Orasel Zinc messages in the past three months was significantly correlated with use of zinc in both 2009 and 2011. However, it is important to note that exposure to any messages about treatment for diarrheal disease (i.e., not specific to the Orasel-Zinc brand) was also significantly correlated with use of zinc. Because of the cross-sectional nature of these data, it is not possible to determine whether these correlations indicate that hearing Orasel Zinc or unbranded diarrhea treatment messages subsequently led to zinc use, or whether zinc users were predisposed (compared to non-users) to recall having heard these messages in the past three months.

(7) Television was a major source of zinc information. PSI began a television campaign in 2010 and continued advertising on radio, which had commenced in 2008. According to the 2011 data, nearly half (44 percent) of caregivers had heard a message about Orasel Zinc in the past three months – of these, the vast majority heard this message via television (76 percent), a dramatic upswing from 2009 where only 20 percent of respondents had heard a message about zinc on television. Television thus appears to be an effective medium in this area for increasing awareness of zinc.

(8) While community health workers are a more cited source of zinc information among rural caregivers than urban caregivers (28 percent vs. 0.2 percent, respectively, 2011), despite PSI's implementation of community-based Orasel Zinc sales in the last quarter of 2010, the proportion of rural zinc users who reported having heard Orasel Zinc messages from community health workers did not increase significantly from 2009 to 2011.

(9) In terms of specific messaging, the 2011 data revealed that recall of messages about the protective effect of zinc was correlated with knowledge that zinc protects against future diarrhea episodes for 2-3 months. There was a statistically significant increase in the number of zinc users that agreed with this message in 2011 (from 60 percent in 2009 to 88 percent in 2011). At the same time, the proportion of zinc users giving ORS and zinc for 10 or more days (as recommended to obtain this protective effect) grew from 47 percent in 2009 to 65 percent 2011, although this difference was not statistically significant. Despite a high level of knowledge among zinc users that zinc can reduce risk of a new diarrhea episode in the next 2-3 months, many zinc users in both years agreed that "it is too hard to remember to give zinc to children when the diarrhea episode has ended." To achieve higher correct use of ORS and zinc for 10 days, programs must find ways to encourage and facilitate zinc use for 10 full days even when the episode of diarrhea has ended, and ensure that the message about the protective effect of zinc when taken for 10 days is better communicated to both caregivers and providers.

(10) In both 2009 and 2011, caregivers' recalled exposure to Orasel Zinc messaging, speaking to health personnel, and seeking diarrhea treatment from a professional health provider were statistically significant, positive predictors of zinc use. Additionally, in 2011, caregiver

perceptions of zinc being an effective treatment and readily available were found to increase the odds of using zinc to treat diarrhea. The addition of these 2011 predictors may be due to the programmatic activities that occurred during this time span, which were geared towards these outcomes (although this study cannot assess causal relationships between program activities and zinc use). Both the 2009 and 2011 results, along with the changes in the list of significant predictors from 2009 to 2011, indicate that initiatives that combine demand generation and provider sensitization as well as addressing supply-side barriers to zinc may be associated with increased use of zinc to treat childhood diarrhea.

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ANNEX A

TABLE 36. KNOWLEDGE AND ATTITUDES TOWARDS DIARRHEA CAUSES AND TREATMENT

| Opinion | 2009 | | 2011 | | 2009 vs. 2011 Caregivers who agree | 2009 vs. 2011 Zinc users who agree |
|--|---|---------------------------------|---|---------------------------------|------------------------------------|------------------------------------|
| | Percent of caregivers of children with diarrhea who agree | Percent of zinc users who agree | Percent of caregivers of children with diarrhea who agree | Percent of zinc users who agree | | |
| Knowledge (% agreeing with the statement) | | | | | | |
| Diarrhea is caused by microorganism | 92.3 | 94.6 | -- | -- | n.c. | n.c. |
| Diarrhea is caused by lack of cleanliness | -- | -- | 97.8 | 98.6 | n.c. | n.c. |
| Diarrhea can be associated with lack of cleanliness like not washing hands with soap and water before eating | 97.0 | 99.3 | 98.2 | 98.3* | | |
| Diarrhea can be caused by drinking unsafe water | 97.0 | 99.3 | 97.7 | 99.2 | | |
| Diarrhea can be caused by eating unhygienic food | 94.8 | 96.4 | 95.4 | 96.8 | | |
| Only those diarrheal episodes that have blood in stool require antibiotics | 26.8 | 23.7 | 28.1 | 22.5 | | |
| Most diarrhea can be managed at home without any drugs | 17.3 | 8.4 | 21.2 | 12.1 | | |
| Giving food based fluids is equally as effective as giving ORS | 37.5 | 37.1 | 29.5 | 16.7 | | ++ |
| Opinion towards threat | | | | | | |

| Opinion | 2009 | | 2011 | | 2009 vs. 2011 Caregivers who agree | 2009 vs. 2011 Zinc users who agree |
|---|---|---------------------------------|---|---------------------------------|------------------------------------|------------------------------------|
| | Percent of caregivers of children with diarrhea who agree | Percent of zinc users who agree | Percent of caregivers of children with diarrhea who agree | Percent of zinc users who agree | | |
| severity (% agreeing with the statement) | | | | | | |
| Children under 5 years can die from diarrhea | 95.6 | 97.5 | 98.4 | 99.3 | ++ | |
| My family will experience hardship if a family member gets diarrhea | 84.4 | 84.9 | 93.9 | 95.4 | ++ | ++ |
| It does not seem like anyone around here has a problem because of diarrhea | 42.3 | 43.9 | 45.2 | 52.9 | | |
| Diarrhea is a major health problem in my community | 56.4 | 55.2 | 50.1 | 41.5 | | |
| Diarrhea is a problem in poorer segment of the community only | 24.8 | 24.7 | 32.2 | 34.8 | | |
| Opinion towards threat susceptibility (% agreeing with the statement) | | | | | | |
| If my child gets diarrhea it is best just to do nothing as it will pass in time | 8.7 | 4.1 | 7.3 | 9.6 | | |
| The children under five in my household are healthy so their bodies could fight off diarrhea without doing anything | 10.6 | 7.8 | 9.7 | 10.4 | | |
| Children under five are too young to experience serious medical problems from getting diarrhea | 13.7 | 9.5 | 23.7 | 19.5 | + | |

| Opinion | 2009 | | 2011 | | 2009 vs. 2011 Caregivers who agree | 2009 vs. 2011 Zinc users who agree |
|--|---|---------------------------------------|---|------------------------------------|---|--|
| | Percent of caregivers of children with diarrhea who agree | Percent of zinc users who agree | Percent of caregivers of children with diarrhea who agree | Percent of zinc users who agree | | |
| I am not worried about the children under five in my household getting diarrhea | 12.8 | 6.2 | 32.3 | 26.6 | ++ | ++ |
| Children are more vulnerable to diarrhea than are adults | 95.3 | 93.0 | 89.0 | 86.5 | + | |
| Total number of caregivers | 294 | 102 | 392 | 135 | | |

+p<0.05 for statistically significant difference between 2009 and 2011 proportions.

++p<0.01 for statistically significant difference between 2009 and 2011 proportions.

n.c. Data are not comparable between 2009 and 2011, thus statistical testing not conducted.

ANNEX B

TABLE 37. KNOWLEDGE AND ATTITUDES TOWARD AVAILABILITY AND EFFICACY OF ZINC AND ORASEL ZINC, AMONG CAREGIVERS WHO HAD HEARD OF ZINC, BY WHETHER OR NOT USED ZINC – 2009 AND 2011

| Opinion | 2009 | | 2011 | | 2009 vs. 2011 Zinc users who agree | 2009 vs. 2011 Zinc non-users who agree |
|---|---------------------------------|-------------------------------------|---------------------------------|-------------------------------------|------------------------------------|--|
| | Percent of zinc users who agree | Percent of zinc non-users who agree | Percent of zinc users who agree | Percent of zinc non-users who agree | | |
| Opinion towards threat severity (% agreeing with the statement) | | | | | | |
| Shops near here always have Orasel-Zinc kits for sale | 35.3 | 67.1* | 63.1 | 46.1 | | |
| Orasel-Zinc kits are difficult to obtain here | 38.8 | 36.6 | 43.9** | 7.0** | | ++ |
| There is a place nearby where I can obtain Orasel-Zinc kits when my child needs them | 66.2 | 75.9 | 70.6 | 80.3 | | |
| I don't know where to obtain Orasel-Zinc kits | 10.1 | 8.6 | 13.0 | 26.0 | | |
| Orasel-Zinc kits are too expensive | 28.0 | 28.9 | 27.9 | 30.0 | | |
| I am ready to pay the current price for Orasel-Zinc kits (the price shown on the box) | 74.1 | 89.5 | 95.0 | 93.6 | ++ | |
| Orasel-Zinc kits are available within walking distance of my home | 54.5 | 56.6 | 74.2 | 86.2 | | + |
| Opinion on efficacy of zinc in general (% agreeing with the statement) | | | | | | |
| Zinc tablets are effective for treating diarrhea | 96.8 | 96.8 | 97.7** | 69.3** | | + |
| Zinc reduces the duration of an | 89.5 | 92.5 | 97.3** | 76.5** | + | |

| | | | | | | |
|---|-----------|-----------|-----------|-----------|----|----|
| episode of diarrhea | | | | | | |
| Zinc does not help reduce the severity of diarrhea episodes | 28.9 | 21.9 | 53.4 | 25.3 | | |
| Zinc use reduces the risk of dehydration among children | 85.2 | 92.5 | 94.7 | 83.0 | + | |
| Zinc reduces the risk of new diarrhea episodes in the next 2-3 months | 59.6 | 69.0 | 87.8* | 60.2* | ++ | |
| Zinc contributes to strengthening children's immune systems | 76.0 | 78.4 | 94.3* | 75.1* | ++ | |
| Opinion on efficacy of Orasel-Zinc (% agreeing with the statement) | | | | | | |
| Zinc is appropriate for the treatment of diarrhea | 95.2 | 92.7 | 96.7** | 67.0** | | + |
| Zinc should be used for each type of diarrhea | 93.2 | 88.2 | 86.4 | 79.3 | | |
| Diarrhea should be treated with an antibiotic | 44.1 | 59.6 | 73.1 | 87.2 | ++ | ++ |
| Zinc has too many secondary effects, so I don't feel safe giving zinc to my child | 0.0 | 5.1 | 3.8 | 2.9 | | |
| Zinc tastes bad and my child won't want to take it | 3.6 | 4.2 | 11.3 | 14.1 | | |
| Zinc is a nutritional supplement, and not an effective diarrhea treatment | 14.3 | 21.7 | 8.9** | 34.2** | | |
| Zinc should be given at the same time as ORS to be most effective | 82.9 | 85.0 | 52.1 | 49.3 | ++ | |
| It is too hard to remember to give zinc to children when the diarrhea episode has ended | 38.6 | 58.8 | 39.7 | 54.5 | | |
| I would buy and use zinc the next time my child has diarrhea | 93.6 | 96.4 | 79.2 | 69.5 | | + |
| Total number of caregivers | 58 | 24 | 80 | 24 | | |