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# INTRODUCING ZINC THROUGH THE PRIVATE SECTOR FOR THE TREATMENT OF CHILDHOOD DIARRHEA: RESULTS FROM A POPULATION-BASED HOUSEHOLD SURVEY IN NEPAL



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This publication was produced for review by the United States Agency for International Development. It was prepared by Wenjuan Wang and Vicki MacDonald, Abt Associates Inc., for the Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) project.



## **POUZN Research Report No. 4**

The mission of the Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) Project is to mobilize the private sector for the prevention and treatment of diarrhea through the introduction of low-cost point-of-use (POU) water treatment products and zinc, thereby contributing to the reduction of mortality and morbidity from diarrhea.

**POUZN Research Report Series:** POUZN's research report series addresses important issues of childhood diarrhea prevention and treatment focusing on point-of-use water disinfection and zinc treatment. The papers are disseminated to a broad audience, including donor agency representatives, commercial and private sector partners, policy makers, technical advisors and researchers. POUZN staff and external reviewers review all papers.

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*In collaboration with:*

| Population Services International

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## **DISCLAIMER**

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# ACRONYMS

<b>CB-IMCI</b>	Community-based Integrated Management of Childhood Illness
<b>DHS</b>	Demographic and Health Survey
<b>FCHV</b>	Female Community Health Volunteer
<b>MC</b>	Municipality/ies
<b>MoHP</b>	Ministry of Health and Population
<b>NR</b>	Nepal Rupees
<b>ORS</b>	Oral Rehydration Salts/Solution
<b>ORT</b>	Oral Rehydration Therapy
<b>PHC</b>	Primary Health Care
<b>POU</b>	Point-of-use
<b>POUZN</b>	Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment Project
<b>UNICEF</b>	United Nations Children’s Fund
<b>USAID</b>	U.S. Agency for International Development
<b>VDC</b>	Village Development Committee/s
<b>WHO</b>	World Health Organization



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# EXECUTIVE SUMMARY

## BACKGROUND

Every year approximately 1.7 million children die as a result of diarrhea and dehydration. In the majority of cases, these deaths are preventable, yet diarrhea remains one of the leading causes of death among children under five. In May 2004, WHO/UNICEF issued a joint statement recommending the use of zinc, an essential micronutrient for human growth, development and maintenance of the immune system, and a new formulation oral rehydration solution (ORS) with reduced levels of glucose and salt, as a two-pronged approach to improved case management of acute diarrhea in children. While a few small-scale pilot programs had been implemented in limited number of countries, none had gone to scale, and the critical question remained: how does one introduce zinc treatment in different settings and ensure correct use by caregivers? The USAID-funded, Abt Associates-led Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) Project was the first project to move beyond pilot efforts into a scaled-up program with national reach in Nepal, where diarrhea is a leading cause of childhood morbidity and mortality, impacting 12 percent of the under-five population and causing 787,000 episodes and 30,000 deaths annually. The POUZN project, in collaboration with Nepal's Ministry of Health and Population, launched a pilot project in three heavily populated districts in December 2006. In April 2008, POUZN successfully expanded its program to 30 districts encompassing 50 percent of the population in Nepal and promoted zinc through innovative strategies including partnering with local manufacturers, launching a national behavior change communication campaign and training over 8,000 private sector health providers. This research study aims to assess the progress that POUZN made in improving knowledge about and the practice of using zinc, and to investigate barriers to and motivations for uptake of zinc therapy. The study findings have important implications for designing future zinc promotion programs in development settings.

## METHODOLOGY

The study results are based on data from a population-based household survey conducted in August and September 2008. A total of 3,550 households were selected through a multi-stage sampling approach. In each selected household, the caregiver of the children under five who could best answer the questions about the children in that household was interviewed to gather information on household characteristics, children's diarrhea history, use of zinc and other diarrhea treatments (e.g., ORS), knowledge and perception about zinc products, cost of the zinc, media message exposure, etc. At the inception of the POUZN project, no zinc products were available in Nepal and zinc was little known or used by caregivers. As a result, the gains in knowledge and zinc use practices are largely attributed to the project. Descriptive analysis was used to describe the key indicators. Multiple logistic regressions were used to identify the factors associated with zinc use during bouts of diarrhea. Sampling weight and clustering effects were taken into account in the analysis.

## RESULTS

The project was successful in promoting zinc use: 15 percent of children with diarrhea in the two weeks prior to the survey were treated with zinc, a substantial increase compared with the rate of use (0.4

percent) found in the Nepal 2006 Demographic and Health Survey, a national population survey. The private sector was the major source of zinc products: more than half of users obtained zinc products from private clinics or private chemist shops. The communication campaign was effective in improving zinc-related knowledge, perception, and, accordingly, increases in practice/use. More than half of the respondents had heard about zinc, of which 69 percent perceived that zinc is effective for treating diarrhea. Use of zinc did not replace ORS, which was one of the key concerns surrounding the introduction of zinc. Cost did not appear to be a barrier to consumers and the majority of zinc purchasers were willing to pay more than current price. Multivariate regressions found the likelihood of using zinc was significantly increased for caregivers who were exposed to zinc-related messages, had positive attitudes toward the effectiveness of zinc treatment, or perceived that zinc could be easily obtained.

## CONCLUSIONS AND IMPLICATIONS

While this research study was specific to the context in Nepal, the project in Nepal was a groundbreaking effort and the much-anticipated findings will inform the design and implementation of programs to introduce zinc in other developing countries with high diarrhea prevalence. The POUZN project primarily focuses on introducing zinc through private sector channels, while working in close collaboration with public sector stakeholders. This program demonstrated that private sector programs are an effective accompaniment to public sector efforts for introducing zinc and that the local pharmaceutical industry can play an important role in ensuring high-quality, affordable products. Zinc promotion through mass media is essential in not only creating awareness but also in providing caregivers with information about zinc and its correct use and access points. Ongoing message reinforcement is essential to ensuring correct use of the zinc products for maximum health benefit to the child in protecting against future bouts of diarrhea. While zinc was provided free of charge in public sector clinics, the majority of users obtained zinc at cost from private sector outlets, indicating the value of having high-quality, easily accessible, and affordable products in the private sector market.

# I. BACKGROUND

Nepal is one of the poorest countries in the world with a per capita income of \$240 per year and a population of 25 million. Forty percent of the population lives below the poverty line. Nepal is known for some significant child health achievements including its Vitamin A supplementation program that reaches 90 percent of children twice annually and a national de-worming program with a similar level of coverage. However, childhood diarrhea continues to be a major cause of childhood morbidity and mortality, causing 787,000 cases of illness and 30,000 deaths annually (Department of Health Services Annual Report, 2003/04). According to the 2006 Nepal Demographic and Health Survey (DHS), 12 percent of children under five years of age experienced diarrhea in the two weeks preceding the survey. Prevalence of diarrhea was highest among children 6-11 months (22.6 percent) and 12-23 months (19.6 percent).

The Ministry of Health and Population (MoHP) in Nepal has given high priority to the control of diarrhea through preventive as well as curative strategies. Health programs have routinely promoted the use of oral rehydration salts/solution (ORS) and appropriate home-prepared oral rehydration therapies (ORT): sugar/salt solution or other recommended home fluids. The 2006 DHS reported that nearly all mothers of children under five (97.8 percent) knew about ORS; of children who were treated, 29 percent were given ORS or pre-packaged liquid and 22 percent were given increased fluid. Zinc was virtually unheard of in Nepal in 2006, with only 0.4 percent of children given zinc for the diarrhea in the two weeks prior to the survey. Ineffective or inappropriate pills and syrups were widely used for infant/childhood diarrhea. Among children who were treated for diarrhea, two-thirds were given either antibiotics or other (known or unknown) pills and syrups. Thirty-four percent of children with diarrhea did not receive any treatment.

Regarding the sources for diarrhea treatment, supplementary analysis (Table I) of the 2006 DHS data found that 19 percent of diarrhea cases sought care in the public sector and 29 percent sought care in either pharmacies (known as chemist shops in Nepal) or private clinics/hospitals, with pharmacies being the most important providers of care. Both the public and private sectors played a role in the high use of pills and syrups; however, a private pharmacy was much more likely to recommend pills/syrups alone (56 percent) than the public sector (37 percent). Conversely, the public sector was much more likely to recommend ORS alone (21 percent) than the private sector pharmacy (2 percent).

**TABLE I. DIARRHEA TREATMENT PRACTICES IN NEPAL**

	Home (50%)	Public sector <sup>1</sup> (19%)	Pharmacy/ chemist shops (23%)	Private clinic/ hospital (6%)	Traditional provider (2%)
Pills/syrups only	3%	37%	56%	35%	11%
ORS only	13%	21%	2%	15%	11%
Pills, syrups, and ORS	2%	28%	30%	35%	0%
Others <sup>2</sup>	10%	10%	9%	12%	11%
Nothing	72%	5%	2%	3%	67%

Source: Secondary analysis of Nepal DHS 2006, Dr. Kathy Banke, Abt Associates Inc.

<sup>1</sup>Includes community health workers and female community health volunteers (FCHVs).

<sup>2</sup>Includes intravenous therapies, injections, and home remedies.





## 2. PROJECT DESCRIPTION

### 2.1 PROJECT OVERVIEW

In May 2004, the World Health Organization (WHO) and UNICEF issued a joint statement recommending the use of zinc, an essential micronutrient for human growth and development and maintenance of the immune system, and a new formulation ORS with reduced levels of glucose and salt, as a two-pronged approach to improved case management of acute diarrhea in children (WHO and UNICEF 2004). Dispersible zinc tablets, which dissolve easily in a tablespoon of clean water or breast milk, or zinc syrups can be used for zinc supplementation for children under five years of age. WHO/UNICEF recommend 20 mg of zinc per day for 10-14 days for infants and children age 6-59 months, and 10 mg for infants under six months of age.

In 2004, the Child Health Division of Nepal's MoHP established a Zinc Working Group to consider the introduction of zinc treatment for childhood diarrhea following the joint WHO/UNICEF recommendations. In 2005, the Zinc Working Group recommended the development of a new policy calling for the adoption of the WHO/UNICEF recommendations, and the MoHP requested financial and technical assistance from the United States Agency for International Development (USAID) to support the integration of zinc into the government's diarrhea management program. In response, USAID's Nepal Family Health Project and UNICEF took the lead in providing training and technical assistance to strengthen the skills of public sector health care providers in several districts in treating childhood diarrheas with both ORS and zinc. At the same time, USAID/Nepal funded the global Social Marketing Plus for Diarrhea Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) project, implemented by Abt Associates, Inc. in partnership with Population Services International, to introduce pediatric zinc in Nepal through the private sector as a companion piece to the introduction of zinc as the standard pediatric diarrhea treatment at public sector health facilities. Both public and private sector programs have now been implemented in 30 target districts, encompassing 51 percent of the total population.

While a few small-scale pilot programs introducing zinc for treatment of childhood diarrhea have been implemented in a few countries, the POUZN project in Nepal was one of the first to move beyond pilot efforts into a scaled-up program with national reach.

### 2.2 PROJECT GOALS AND TIMELINE

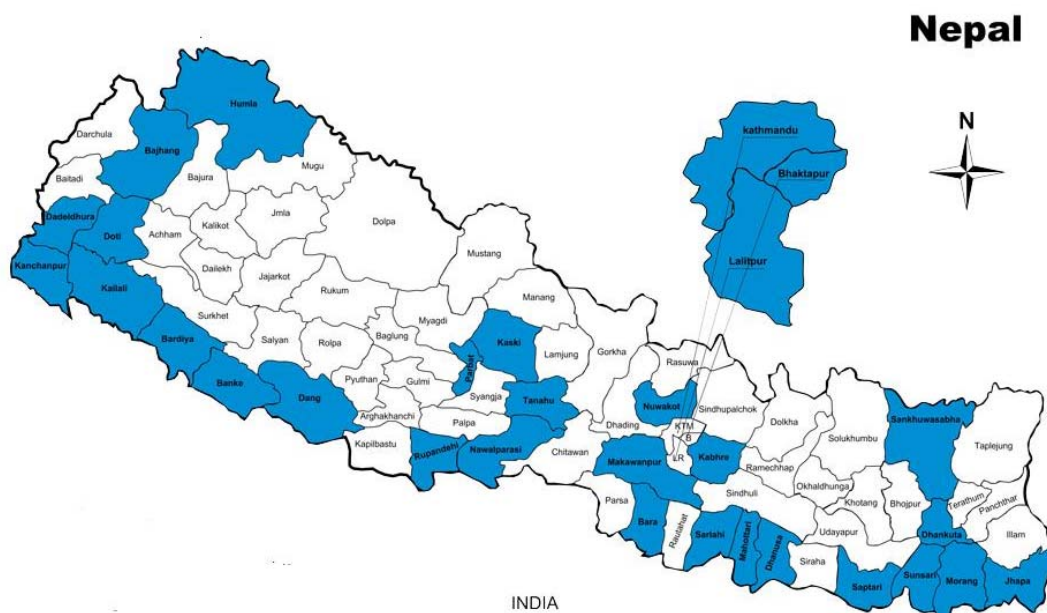
Specifically, the POUZN project was designed to fulfill the goals below:

- To create a sustainable commercial supply of pediatric zinc tablets with Nepalese pharmaceutical firms manufacturing and marketing their own brands.
- To increase access to pediatric zinc among caregivers of children under five in Nepal, ensuring that multiple, high-quality, affordable zinc tablets were available nationally in private sector urban and peri-urban outlets.

- To improve caregiver knowledge and treatment of childhood diarrhea so that caregivers provide ORS or ORT together with zinc as the first-line treatment for uncomplicated diarrhea.
- To improve private provider knowledge and treatment of childhood diarrhea so that providers promote pediatric zinc, along with either ORS or ORT, as the first-line treatment for uncomplicated diarrhea in under-five children.

The program was implemented in two phases. Phase I, which began in December 2006 and ended in September 2007, focused exclusively on the capital area of the Kathmandu Valley. Because the public sector program had not yet been initiated in Kathmandu Valley and this area was the key to initiating a private sector program, the POUZN project supported the introduction of zinc in both public and private sectors. The project procured and imported dispersible zinc for the public sector program, trained both public and private sector staff, and supported behavior change communications for both sectors. Phase II spanned the six months from April through September 2008, extending the program to an additional 27 districts that were also focus districts for the public sector Community-based Integrated Management of Childhood Illness (CB-IMCI) program. The map in Figure 1 identifies all 30 program districts (shaded areas).

**FIGURE I. POUZN (AND IMCI) FOCUS DISTRICTS**



## 2.3 PROJECT COMPONENTS

To achieve the project goals, the project implemented a series of activities, as follows:

**Supported local manufacturers to produce and market zinc products:** At the inception of the POUZN program in 2006, no zinc products were available in the market in Nepal. The POUZN project team encouraged and provided technical assistance to local firms that manufacture pharmaceuticals and, in early 2007, signed Memoranda of Understanding with three major pharmaceutical firms. By August 2007, all three firms had produced, registered their products as pharmaceutical products, and begun distribution of dispersible zinc tablets in all 30 program districts.

**Launched a behavior change communications campaign to create awareness of and demand for zinc products:** The POUZN project implemented a generic behavior change communications campaign to improve caregivers' knowledge and promote the use of zinc along with ORS to all potential consumers. The project's communication objectives for consumers were to ensure that caregivers of children under five appreciate that zinc is an appropriate treatment for diarrhea, know that dispersible zinc tablets are available from either public or private sector clinics/pharmacies, and understand that unnecessary diarrhea treatments (anti-diarrheals and antibiotics) may be harmful to their children and not the most effective treatment. The campaign incorporated various communication channels including using a generic logo, radio and TV spots, and print materials.

**Created a zinc logo:** A generic logo (shown at the right), featuring a happy and healthy baby, was used on all communication materials produced for both the public and private sectors.



**Developed radio and television spots:** Four radio spots and one television commercial were developed to convey the major messages through discussions featuring a physician, chemist, mother, and health worker. POUZN contracted with two of the Kathmandu radio stations, 19 regional FM radio stations outside the valley, and four television stations with national range to broadcast the spots and commercial during the 2008 diarrhea season. Radio broadcasts began in June and ran through September 2008. Over 35,000 spots were aired with an average of 16 spots/day per station during this period. The POUZN television commercial ran during this same time period during the prime time between 7:30pm and 10:00pm, when approximately 95 percent of television viewers are watching the television.

**Designed and distributed outdoor materials:** POUZN developed large 3x5-foot flex boards – a job aid printed on flexible, longer-lasting fabric-based materials for use in outpatient department/clinic waiting rooms. In addition, billboards (shown below) containing the Baby Zinc logo and the key message “ORS and Zinc tablets – the most effective diarrhea treatment for children under 5” were prepared and installed near the four hospitals in the Kathmandu Valley and affixed to the side of every district hospital in the 27 target IMCI districts outside the valley.



Caption: Zinc tablets along with ORS/ORT  
The most effective diarrhoea treatment method for children under 5 years

**Educated and trained providers to improve their knowledge of and skills in appropriate diarrhoea care management:** POUZN-sponsored training was conducted for a range of health care providers: physicians, nurses, and village health workers/volunteers in the public sector in Kathmandu and private sector chemists in all 30 target districts. The training covered a wide range of content such as information on the zinc product (formulation, product safety, and potential side effects), correct use of zinc, and government policies and programs to decrease mortality due to diarrhoea, among other topics.

## 2.4 PROJECT EVALUATION

At the conclusion of its private sector implementation efforts in August and September 2008, the POUZN program conducted a population-based household survey to assess whether or not the program had successfully attained the goals and objectives outlined above. This survey sought to determine prevalence of zinc product use, consumer knowledge about zinc and where to access the product, message recognition and retention, and barriers to and motivations for the uptake of the zinc therapy. The following chapters of this report present the methodology, findings, and conclusions of this evaluation research.

# 3. PROGRAM EVALUATION METHODOLOGY

## 3.1 STUDY DESIGN

Administratively, Nepal is divided into 14 zones which comprise 75 districts. Each district is divided into Village Development Committees (VDC) or Municipalities (MC). Most VDC are further divided into nine wards, depending on the size of the population within a VDC. The household survey was originally designed to cover all 30 program target districts. Due to flooding and landslides, four districts, namely Bajhang, Dadeldhura, Doti, and Humla, were not accessible during the survey period. Table 2 lists the 26 districts that were included in the survey.

**TABLE 2. DISTRICTS AND POPULATION COVERED IN THE SURVEY**

	District	Total population
1	Jhapa	632,177
2	Morang	842,507
3	Sunsari	446,501
4	Dhankuta	165,069
5	Sankhuwasabha	159,008
6	Saptari	222,207
7	Dhanusa	242,421
8	Mohattarai	173,917
9	Sarlahi	177,295
10	Kavre	131,768
11	Lalitpur	336,627
12	Bhaktapur	224,503
13	Kathmandu	1,063,821
14	Nuwakot	104,457
15	Makwanpur	148,168
16	Bara	227,608
17	Tanahu	114,379
18	Kaski	296,455
19	Parbat	71,486
20	Nawalparasi	296,482
21	Rupandehi	455,635
22	Dang	336,611
23	Banke	238,729
24	Bardiya	283,210
25	Kailali	396,707
26	Kanchanpur	168,731

A total of 3,550 households were selected through a multi-stage sampling approach. Each of the 26 districts was treated as a sampling stratum. The VDC/MC was the primary sampling unit, the ward was the secondary sampling unit, and the household was the ultimate sampling unit. First, in each district, a complete list of VDC/MC along with the population size was developed. The desired number of VDC/MC were selected using probability proportional to the population size. Second, in each selected VDC/MC, a list of wards in which zinc products were available was prepared. In most VDC/MC, one ward was randomly selected from the list; in each of four MC, 3-9 wards were selected because of the large population: Khandbari MC in Sankhuwasaha district, Lalitpur U.M.N.P. in Lalitpur district, Kathmandu M.N.P. in Kathmandu district, and Pokhara U.M.N.P. in Kaski district. Third, for each selected ward, a list of eligible households (households with children under five) was prepared, and 30 households were drawn using systematic random sampling.<sup>1</sup> In each selected household, the caregiver of the children under five who could best answer the questions about those children was interviewed. The resulting sample size at each level is summarized in Table 3.

**TABLE 3. SAMPLE SIZE**

Sampling level	Sample size
Districts	26
VDCs/MCs	104
Wards	116
Households	3,550

## 3.2 SURVEY INSTRUMENT AND DATA COLLECTION

The survey instrument was 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 different treatments, and communication message exposure. The questionnaire comprised six sections:

- Section 1: Household background information: following DHS methodology, data were collected on household socioeconomic characteristics
- Section 2: Caregiver's background information: data were gathered on caregiver's basic socioeconomic and demographic information and mass media habits
- Section 3: Diarrhea history: information was collected on diarrhea history of children under five in the two weeks preceding the survey, as well as treatment history. This information was collected for the youngest and the next youngest child under five (if there was one).
- Section 4: Zinc use: data were collected on zinc treatment behavior for diarrhea in the last two weeks from the subset of caregivers who treated children with zinc
- Section 5: Message exposure: data were collected from all respondents on diarrhea and zinc-related message exposure
- Section 6: Determinants of zinc use: including willingness to pay, perception of zinc availability, outcome expectations, and knowledge and perception about diarrhea

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<sup>1</sup> In some wards, one or two additional households were interviewed.

The instrument was developed in English and translated into Nepalese for administration. A pre-test was conducted in three districts to assess the suitability in terms of ease of language, flow, and length. Modifications were made based on the pre-test results and feedback from the data collectors. (See Annex A for English questionnaires.)

The survey was implemented in the field by Blitz Media P. Ltd, a local research firm. Sixty experienced researchers, 50 females and 10 males, were recruited as interviewers to administer the questionnaire to respondents. The interviewers were grouped in 16 teams, each with one supervisor, and 2-3 enumerators. The training of the data collectors and supervisors was structured to ensure they understood the purpose of the study, were familiar with the content of the questionnaire, and had the requisite skills to successfully administer the surveys.

The field work took approximately 20 days starting on August 23, 2008.

### **3.3 DATA ANALYSIS**

Data analysis was conducted with STATA 10 Statistical Software. Descriptive analysis was used to describe the important indicators (respondent's characteristics, diarrhea prevalence, proportion of children treated with zinc, etc.), understand the distribution of variables, and prepare for further analyses. Significance tests, such as t-test and chi-square test, 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). In addition, multiple logistic regressions were employed to examine the adjusted association between zinc use and other variables, controlling for confounders. We adjusted for clustering effect at the household level where the significance tests, such as bivariate and regression analyses, were involved. This was done because, in each household, data on diarrhea prevalence and treatment were collected for the youngest and next to the youngest child under five (if there was one). Children from the same household may share some similarities, called "clustering," that influence the variance estimation.

The sampling weights were computed to reflect the probability of selection into the sample and to allow for making generalizations to the population from which the sample was drawn. 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. Since in each household, only the caregiver who could best answer the questions about children was interviewed, the weight of the respondent was equal to the household weight. The sampling weight was also adjusted for non-responses. All results presented in this report were adjusted for sampling weights.





## 4. FINDINGS

### 4.1 DESCRIPTIVE CHARACTERISTICS OF THE STUDY SAMPLE

This section describes the characteristics of households and respondents included in the POUZN household survey. Using questions similar to those asked in the 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. These characteristics are generally used to assess the socioeconomic status of the household.

Table 4 shows the distribution of the households included in the survey by these characteristics. Forty-four percent of households were from urban areas and 56 percent from rural areas. Most of households (95 percent) obtained drinking water from an improved source. The most common source of drinking water was piped water, with 71 percent of households reporting this source. All households could access water within 30 minutes, with more than two-thirds having a source of drinking water within their premises. Compared with the national level indicated in the 2006 DHS, the regions covered in this study were more urban and had better access to improved sources of drinking water. In terms of sanitation facilities, more than 40 percent of families had an improved facility and 19 percent did not have a toilet facility. Household access to an improved sanitation facility was also better than the national-level data from the 2006 DHS, which showed that 23 percent of the households had an improved toilet facility.

Household durable goods and possessions are important in reflecting the socioeconomic status of the households. The data show that TV and radio were very common household possessions, with 67 percent of households having radio and 70 percent having TV. More than one in two households owned a mobile telephone, and one in five households had a non-mobile telephone. A bicycle was the most common means of transportation owned by households, with 46 percent having a bicycle.

Among the interviewed households, electricity was widely available, with 91 percent of households reporting access to electricity. The average number of sleeping rooms was two, but 40 percent of households had only one room for sleeping.

An asset wealth index was developed using principal components analysis of a set of household characteristics and ownership of durable goods or other possessions (Rutstein and Johnson 2004). This index was used to divide households into five wealth quintiles. Each respondent was assigned to the wealth quintile in which his/her household belongs per the principal component analysis. The wealth index has been shown to be an appropriate indication of respondent's economic status and is being widely used in studies related to inequalities in health services utilization and health outcomes (Filmer and Pritchett 2001, Bell et al. 2003).

**TABLE 4. PERCENT DISTRIBUTION OF HOUSEHOLDS BY CHARACTERISTICS**

<b>Household characteristics</b>	<b>Percent of households (%)</b>
<b>Residence location</b>	
Urban	43.8
Rural	56.2
<b>Main source of drinking water</b>	
Improved source	95.0
Piped water into house/yard/plot	70.8
Public tap/stand pipe	22.6
Others	1.6
Unimproved source	5.0
<b>Time to obtain drinking water (round trip)</b>	
Water on premises	70.8
Less than 30 minutes	29.2
<b>Primary sanitation facility</b>	
Improved, not shared facility	<b>43.3</b>
Flush to piped sewer system	5.6
Flush to septic tank	19.6
Flush to pit latrine	2.1
Ventilated improved pit latrine (VIP)	7.6
Pit latrine with slab	8.3
Composting toilet	0.2
Unimproved facility	<b>56.7</b>
Any facility shared with other households	34.7
Flush not to sewer/septic tank/pit latrine	0.5
Pit latrine without slab/open pit	2.8
No facility/ bush/ field	18.6
<b>Household possessions</b>	
Radio	66.8
TV	70.1
Mobile telephone	57.9
Non-mobile telephone	21.4
Refrigerator	14.2
Computer	6.6
Bicycle	46.2
Motorbike	14.1
Tempo (motorized rickshaw)	0.3
Car/truck/tractor/jeep	2.3
<b>Have electricity</b>	<b>91.4</b>
<b>Number of rooms for sleeping</b>	
One	39.8
Two	29.8
Three or more	30.3
<b>Total number of households</b>	<b>3,550</b>

In each household, the survey interviewed the primary caregiver of children under five years and collected data on the demographic characteristics and mass media habits of that person. Table 5 shows the percent distribution of the respondents by selected characteristics.

**TABLE 5. PERCENT DISTRIBUTION OF RESPONDENTS BY DEMOGRAPHIC CHARACTERISTICS AND MASS MEDIA HABITS**

Caregivers of children under five	Percent (%)
<b>Age (years)</b>	
15-19	4.5
20-24	33.8
25-29	37.9
30-34	14.4
35 and above	9.4
<b>Gender</b>	
Female	99.8
Male	0.2
<b>Education</b>	
No education	35.7
Primary (Grades 1-5) <sup>1</sup>	16.9
Secondary (Grades 6-12) <sup>2</sup>	43.0
Higher <sup>3</sup>	4.4
<b>Religion</b>	
Hindu	87.5
Buddhist	6.2
Muslim	3.9
Christian	1.1
Others	1.3
<b>Exposure to mass media</b>	
Frequency of listening to the <i>radio</i>	
Daily	43.5
At least once a week but less than daily	15.6
Less than once in a week	10.9
Never	30.1
Frequency of watching <i>TV</i>	
Daily	63.2
At least once a week but less than daily	9.2
Less than once in a week	6.0
Never	21.6
Frequency of reading <i>newspapers or magazines</i>	
Daily	16.9
At least once a week but less than daily	22.7
Less than once in a week	21.0
Never	39.5
<b>Total number of respondents</b>	<b>3,550</b>

<sup>1</sup> Includes those who completed 1-5 years of school.

<sup>2</sup> Includes those who completed 6-12 years of school.

<sup>3</sup> Includes those who attended university.

The majority of caregivers were 20-30 years old. Caregivers younger than 20 years accounted for less than 5 percent of the sample. Almost all (99.8 percent) of the caregivers were female. Thirty-six percent of respondents had never attended school, 17 percent had some primary education, and 43 percent had some secondary education. The distribution of respondents by religious affiliation shows that 87.5 percent of the respondents were Hindu, 6 percent were Buddhist, and 4 percent were Muslim.

Mass media are an important channel for distribution of health information to the population. These channels have been shown to influence health-related knowledge, attitudes, and behaviors. Here, exposure to mass media is defined as listening to the radio, watching TV, or reading a magazine or newspaper at least once a week. The survey found the respondents reported a high exposure to the media. Overall, more than 85 percent of respondents were exposed to at least one mass media channel and 19 percent were exposed to all three mass media channels. Fifty-nine percent of respondents listened to the radio at least once a week, with 44 percent listening to the radio daily. More than two-thirds of the respondents watched TV at least once a week and 63 percent watched TV every day. A large proportion (39 percent) of the respondents also read magazines or newspapers at least once a week.

## 4.2 PREVALENCE OF DIARRHEA

In each household, the respondent was asked about the total number of children under five years for whom she/he was directly responsible. Eighty-two percent of the respondents reported only one child and 18 percent reported two or more children. Respondents were asked questions (mostly on diarrhea history in the preceding two weeks) about the youngest and the second youngest child (if there was one). Overall, data on 4,211 children, including 3,550 youngest children and 661 next youngest children, were collected. The average age of these children was 31 months, with 22 percent age one year or younger. Half of the children were girls and half were boys.

Table 6 presents the percentage of children under five who caregivers reported had had diarrhea in the two weeks, and one month, preceding the survey, as well as the percentage with bloody diarrhea. Overall, 5.6 percent of children under five had diarrhea in the two weeks before the survey; less than 1 percent had blood in the stool.

**TABLE 6. PREVALENCE OF DIARRHEA AMONG CHILDREN UNDER FIVE**

	Percent (%)	Number of children
Diarrhea in the past two weeks	5.6	289
Bloody diarrhea in the past two weeks	0.7	32
<b>Total number of children</b>		<b>4,211</b>

Table 7 presents the prevalence of diarrhea by background characteristics. Prevalence was not found to be significantly associated with age, sex, parity, or household wealth status. Although drinking contaminated water is frequently related to the occurrence of diarrhea, the study did not find diarrhea prevalence was significantly higher among children living in households without access to improved drinking water. This is likely because almost all of the households (95 percent) covered in the survey can access improved drinking water. Caregivers' education and type of toilet facility were the only two factors showing significant association with the prevalence of diarrhea. Prevalence was lower among children living in households with improved toilet facilities, compared with households with unimproved facilities. Prevalence declined as the education of the caregiver increased.

**TABLE 7. PERCENTAGE OF CHILDREN UNDER FIVE WHO HAD DIARRHEA IN THE TWO WEEKS PRECEDING THE SURVEY BY BACKGROUND CHARACTERISTICS**

Background characteristics	Percentage of children with diarrhea	Total number of children
<b>Age (months)</b>		
<6	3.8	343
6-11	6.4	448
12-23	5.0	815
24-35	6.9	738
36-47	7.1	721
48-59	4.4	1146
<b>Sex</b>		
Male	5.9	2205
Female	5.2	2006
<b>Parity</b>		
Youngest child	5.6	3550
Next youngest child	5.1	661
<b>Caregiver's education*</b>		
No education	6.7	1705
Primary	6.3	659
Secondary	4.5	1701
Higher	2.8	146
<b>Wealth quintile</b>		
Poorest	7.1	844
Middle-poor	6.3	842
Middle	5.4	842
Middle-rich	6.0	842
Richest	3.5	841
<b>Source of drinking water</b>		
Improved	5.5	3986
Unimproved	6.8	225
<b>Sanitation facility***</b>		
Improved, not shared	3.6	1745
Unimproved or shared	7.1	2466
<b>Total</b>	<b>5.6</b>	<b>4,211</b>

Statistical significance: \*\*\* p<0.01 \*\* p<0.05 \*p<0.1

## 4.3 DIARRHEA TREATMENT

Caregivers of children who had diarrhea were asked about seeking advice on treatment from health providers or others. The following results show the specific treatments used to treat the illness such as giving zinc, ORS, and other treatments.

### 4.3.1 MEDICAL CARE SEEKING

Table 8 shows the percentage of children with diarrhea who were taken to a health provider, the distribution by type of provider seen and timing of seeking care, as well as the type of advice or treatment received. Overall, a high proportion of children with diarrhea (74 percent) were taken to a health provider. Among them, 47 percent were taken only to a public sector provider, 44 percent were taken only to a private sector provider, and 10 percent were taken to both a public and a private

provider. Most children were taken for medical care on the second day or later after the onset of diarrhea, while 26 percent were taken to a health provider within the first day of an episode. In terms of advice or treatment received from the health providers, giving ORS was the advice/treatment most commonly reported (69 percent), and 15 percent of cases were advised to use zinc or were treated with zinc.

**TABLE 8. TREATMENT OF DIARRHEA AMONG CHILDREN UNDER FIVE (PERCENT OF CHILDREN WHO HAD DIARRHEA IN THE TWO WEEKS PRECEDING THE SURVEY)**

	Percent (%)
<b>Children with diarrhea taken to a professional health provider</b>	<b>74.2</b>
<b>Types of health providers seen</b> (among care-seekers) <sup>1</sup>	
Public sector only <sup>2</sup>	46.6
Private sector only <sup>3</sup>	43.8
Both private and government sector	9.6
<b>Timing taken to health provider for treatment, after onset of diarrhea</b> (among care-seekers)	
Same day as diarrhea began	26.3
Second day	26.8
Third day	34.4
Four or more days	12.5
<b>Types of advice or treatment received</b> <sup>4</sup> (among care-seekers)	
Give fluids	47.8
Give ORS	68.5
Give zinc	15.3
Give antibiotic	9.3
Give anti-diarrheal	28.7
Give more than usual fluid	15.6
Continue breastfeeding	14.0
Information on diarrheal prevention	15.3
<b>Children with diarrhea taken to a traditional healer</b>	<b>2.4</b>
<b>Children with diarrhea not taken to a health care provider</b>	<b>23.4</b>
<b>Total number of children</b>	<b>289</b>

<sup>1</sup> The participants reported seeking care in up to two places, and this table takes account of both places. This differs from Table 9, which shows only the first place visited.

<sup>2</sup> Public sector includes government hospitals/clinics, primary health care (PHC) center, health post, sub-health post, PHC outreach clinic, FCHV.

<sup>3</sup> Private sector includes private hospital, private clinic/nursing home, and private pharmacy.

<sup>4</sup> Respondents may report multiple choices so the sum may exceed 100%.

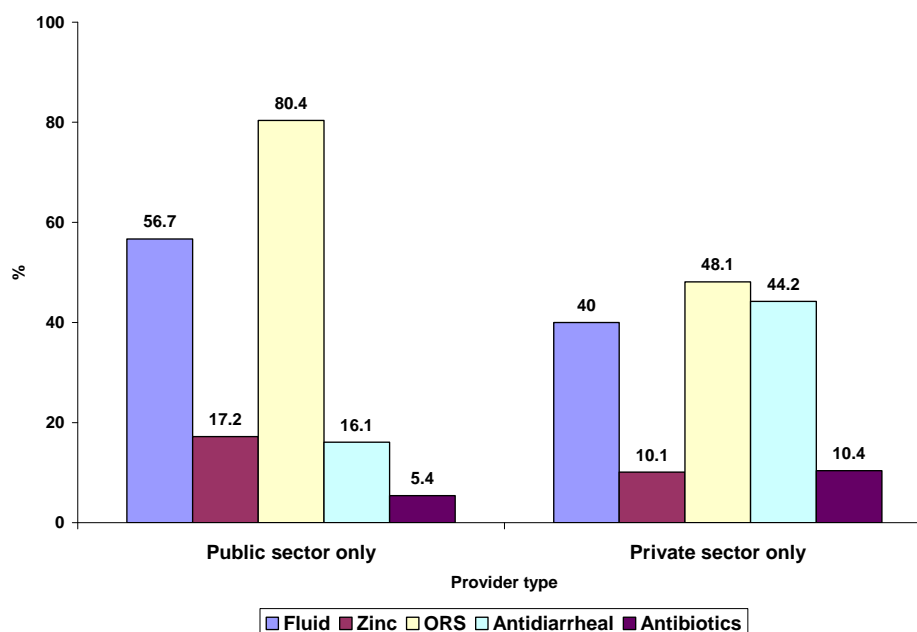
Table 9 shows types of treatment advice caregivers received from the first place they sought care. Both public and private sector providers played an important role in recommending ORS and other home fluids. Over 80 percent of caregivers seeking care in the private sector or from a private pharmacy received unknown pills or syrups. The private sector was more likely to recommend antibiotics than were other types of facilities.

**TABLE 9. TREATMENT RECOMMENDATIONS RECEIVED BY LOCATION OF TREATMENT**

Treatment recommendation	Home (25%)	Public sector (42%)	Private sector (13%)	Pharmacy (19%)	Traditional healer (1%)
Zinc	5.3%	25.7%	10.2%	10.4%	0
ORS	49.8%	85.2%	54.8%	61.7%	45.2%
Antibiotics	7.3%	12.0%	27.1%	7.1%	0
Anti-diarrheal	2.1%	21.9%	25.3%	24.3%	0
Recommended home fluid (ORT)	32.8%	67.3%	68.1%	54.9%	68.5%
Other unknown pills/syrups	44.3%	49.8%	82.2%	87.9%	45.2%
Home remedy/ traditional medicine	13.4%	23.4%	7.0%	14.8%	76.7%
Nothing	21.7%	2.8%	0	0	23.4%
<b>Total</b>	<b>73</b>	<b>136</b>	<b>29</b>	<b>48</b>	<b>3</b>

Looking only at visits to professional providers, i.e., excluding home and traditional healers, Figure 2 shows the type of advice or treatment received among those visiting only public sector and only private sector (includes pharmacies) facilities. (Caregivers visiting providers in both sectors were excluded, because the survey was not able to determine where the advice or treatment was obtained.)

**FIGURE 2. PERCENTAGE OF CHILDREN WHO RECEIVED VARIOUS TYPES OF ADVICE OR TREATMENT, BY SECTOR**



Advice about using zinc was given to 17 percent of children who visited public health facilities and 10 percent of those who visited private sector facilities. In both type of facilities, giving ORS was the most common advice or treatment received; it was reported by 80 percent of those going to the public sector and 48 percent of those going to the private sector.

The private sector was more likely to recommend anti-diarrheals and antibiotics than were public sector providers. Forty-four percent of the caretakers who had gone to private sector providers and 16 percent of those who had gone to public sector ones reported they had been advised to give the child an anti-diarrheal medicine. For antibiotics, the respective percentages were 10.4 percent and 5.4 percent.

### 4.3.2 DIARRHEA TREATMENT WITH ZINC

Caregivers of children who had diarrhea in the two weeks preceding the household survey were asked about specific treatments used to treat the illness. The 2006 DHS survey had shown that zinc use nationwide was close to zero (0.4 percent). At the time of this survey, zinc use had reached 15.4 percent in CB-IMCI districts (Table 10).

**TABLE 10. TREATMENT OF DIARRHEA USING ZINC AMONG CHILDREN UNDER FIVE**

	Among children with diarrhea (%)	Among zinc users (%)
Treated with zinc	15.4	--
Treated with zinc along with ORS	12.1	78.6
Given zinc for 10 days or more	10.1	64.9
Treated with zinc along with ORS for 10 days or more	8.3	53.9
Total number of children	289	46

Appropriate administration of zinc treatment is essential to maximize treatment effectiveness. The WHO/UNICEF-recommended regimen is to use zinc with ORS for at least 10 days with the correct dosage: 10 mg for children under six months and 20 mg per day for children 6-59 months of age (WHO/UNICEF 2004). The survey showed that compliance with correct zinc administration was generally good. Adherence to the 10-day regimen was high: 65 percent children received zinc for at least 10 days. In addition, 79 percent of children were treated with zinc along with ORS. Fifty-four percent used both zinc and ORS correctly. Lack of knowledge of using zinc together with ORS was the main reason reported by those who used zinc but not ORS.

The survey asked zinc users where they obtained zinc tablets. Table 11 shows that a variety of sources were reported, from hospitals to community-based health care workers. While a private pharmacy was the most common source of zinc products, users also obtained zinc from public health posts (28.8 percent), private clinics (25.8 percent), and hospitals (18.3 percent). Although most respondents reported obtaining zinc from only one source, 22 percent (eight respondents) reported two sources. The data do not allow us to determine why they sought care from multiple sources.



**TABLE 11. SOURCE OF ZINC PRODUCTS REPORTED BY CAREGIVERS WHO USED ZINC FOR DIARRHEA TREATMENT**

Source of zinc products	Percent (%) of zinc users
Hospital	18.3
Health post	28.8
Private clinic	25.8
Private pharmacy	32.0
Female health care volunteers	15.2
Total number of respondents	46

*Note:* Total may exceed 100% because respondents were allowed to state multiple sources.

The main reason that users chose a source of supply was easy access, reported by 69 percent of users. Quality of service was reported by 17 percent of users. Very few caregivers attributed their choice to the cost of the products.

### 4.3.3 OTHER TREATMENTS FOR DIARRHEA

Children with diarrhea were given treatments other than zinc, including ORS, recommended home fluids, antibiotics, anti-diarrheals, other pills or syrups, and home remedies. Table 12 shows the percentage of children with diarrhea who were given each type of treatment.

**TABLE 12. TREATMENT FOR DIARRHEA AMONG CHILDREN UNDER FIVE**

	Percent (%) of children with diarrhea
Zinc	15.4
ORS <sup>1</sup>	67.5
Recommended home fluids	56.5
Antibiotics	11.8
Anti-diarrheals	17.7
Unknown pills or syrups	60.0
Home remedy	17.6
No treatment	6.8
<b>Total number of children with diarrhea in the last two weeks</b>	<b>289</b>

*Note:* Total may exceed 100% because respondents were allowed to state multiple sources.

<sup>1</sup>Including those who used both ORS and zinc.

Among the other treatments, ORS was the most popular, due largely to the long history of its promotion for diarrhea treatment in Nepal. Two-thirds of children received ORS (including children receiving ORS and zinc together). Three types of ORS packets were reported: Jeevan Jal, Nava Jeevan, and Shakti Jal were used by 51.6 percent, 47.2 percent, and 6.2 percent of children, respectively. More than half of children (56.5 percent) were given recommended home fluids such as rice water, sugar-salt-solution, lentil soup, or fruit juice.

Antibiotic therapy is not the most effective treatment for diarrhea unless there is gross blood in the stool. Inappropriate use of antibiotics may be harmful to children's health. The study found that an antibiotic was given to 11.8 percent of children with diarrhea, only 20 percent of whom had blood in the stool.

Anti-diarrheals should only be given to adults or children older than 10 years. This survey found that 18 percent of children were given anti-diarrheals. A large proportion of caregivers (60 percent) reporting giving a pill or syrup as treatment but could not identify the specific treatment as an antibiotic, anti-diarrheal or zinc. Eighteen percent of children were treated with home remedies.

The study found that only 6.8 percent of children with diarrhea did not receive any treatment; “the child was not very sick” was cited by most respondents as the reason for not doing anything.

## 4.4 KNOWLEDGE AND PERCEPTIONS ABOUT ZINC, ORS, AND DIARRHEA

### 4.4.1 KNOWLEDGE OF ADMINISTRATION, SOURCES, AND COST OF ZINC

Knowledge about management of zinc is essential to its being administered correctly. The study found that more than half of caregivers had heard about zinc products. Among them, 38 percent, 80 percent, and 10 percent knew that zinc should be given to children with acute diarrhea, persistent diarrhea and dehydration, respectively (Table 13). Fifty-three percent of respondents knew one should give zinc to a child with diarrhea for at least 10 days. Adherence to the 10-day regimen was generally high if they knew about it. Over 70 percent (71.3 percent) of respondents who were aware of this regimen actually followed it.

Knowing where to obtain zinc products is prerequisite to use. Table 13 shows that 77 percent of caregivers knew at least one source of zinc. Private pharmacy was the most commonly cited source by all respondents. Other sources were hospitals, health posts, and health clinics. The survey also gathered respondents’ perception on the accessibility of the zinc. Seventy-two percent of respondents thought that zinc tablets were available within walking distance of their residence and 63 percent believed shops nearby always had zinc tablets for sale (not shown in table).

**TABLE 13. KNOWLEDGE OF THE CORRECT ADMINISTRATION OF ZINC, SOURCES, AND COST OF ZINC**

Knowledge	Percent (%) of caregivers who had heard about zinc
<b>Heard about zinc (N=3550)</b>	53.1
<b>Among caregivers who heard about zinc (N=1,772)</b>	
Know that zinc should be given to child for	
Acute diarrhea	37.8
Persistent diarrhea	79.8
For dehydration	10.0
At least one of the above	97.3
<b>Administration of zinc</b>	
Know that zinc should be given to a child with diarrhea for at least 10 days	53.3
<b>Source of zinc</b>	
Know that they can get zinc at:	
Hospital	20.6
Health post	28.2
Private clinics	21.9
Private pharmacy	58.1
Know at least one of the above sources	77.3

Knowledge	Percent (%) of caregivers who had heard about zinc
<b>Cost of zinc</b>	
Know the cost of zinc at the local health center (per packet) <sup>1</sup>	
Free	7.1
NRs 15-30	0.5
Don't know	92.4
Know the cost of zinc at the private pharmacy (per packet)	
Free	0
NRs 13-32	3.5
Don't know	96.5
Total number of respondents	1,772

Note: US\$ 1.00 = NRs. 77

<sup>1</sup> In districts surveyed, the retail price of zinc in the private sector ranged from NRs 15 to NRs 40, depending on manufacturer's pricing and tablet strength.

The cost of zinc did seem to be a problem for the respondents. Among the 226 respondents who knew the price of zinc at the local health center or local private pharmacy, 125 caregivers reported getting it for free. Among 101 caregivers who paid for zinc products, 72.5 percent thought it was affordable while 26.7 percent thought the price was high.

#### 4.4.2 WILLINGNESS TO PAY FOR ZINC

While it is essential to ensure the zinc products are physically available in health facilities, it is also important to ensure the products are financially accessible. Understanding the community's willingness to pay and potential to pay helps to set affordable prices. The current local retail price of the zinc product varies by manufacturer, from NRs 25 to NRs 40 for a strip of 20 mg zinc tablets.

Of the 151 respondents who reported purchasing zinc themselves or by other family members (half of them purchased in private clinics or pharmacies), 71 reported the amount they paid. The rest of respondents either did not pay or did not know the amount paid because another family member had made the purchase. For respondents who reported the amount paid, a series of questions were asked on the willingness to pay if the cost of the zinc were increased by certain amounts and the maximum price they would be willing to pay.

Table 14 shows that the percentage of respondents who would be willing to pay for zinc decreases as the potential price is increased. More than two-thirds of caregivers would be willing to pay for the zinc products even if the price were increased by 75 percent. The maximum price respondents would be willing to pay ranged from NRs 10 to NRs 100, with 60 percent willing to pay more than NRs 40 for per strip of zinc tablets. About half of the respondents would look for a cheaper brand if the zinc were too expensive for them, 27 percent of them would look for other medicine, and 24 percent would purchase whatever the price.

While the results show the great willingness to pay for zinc products, the results might be biased and should be interpreted with caution because only respondents who had bought zinc were asked these questions.

**TABLE 14. WILLINGNESS TO PAY FOR ZINC PRODUCTS**

<b>Willingness to pay</b>	<b>Percent (%) of respondents who paid for a zinc product in the past</b>
<b>Willing to pay if the price</b>	
Increased by 25% from what they paid	86.2
Increased by 50% from what they paid	85.0
Increased by 75% from what they paid	70.5
<b>Maximum price willing to pay for a strip of zinc tablets (10 tablets)</b>	
Less than NRs 30	7.2
NRs 30-40	32.6
More than NRs 40	60.2
<b>What would you do if the price of zinc tablets exceeds what you can afford?</b>	
Look for cheaper brand	47.5
Look for another medicine	26.6
Will pay whatever the amount	23.6
Stop using them/Other	2.3
Total number of respondents	71

#### 4.4.3 PERCEPTION OF EFFECTIVENESS OF ZINC TREATMENT

Having a positive perception of the effectiveness of zinc treatment is a prerequisite to use. Survey respondents had a generally good perception of the effectiveness of zinc treatment for diarrhea. Table 15 shows that among caregivers who ever heard about zinc, more than two-thirds of them perceived zinc tablets to be effective for treating diarrhea. Moreover, 76 percent knew that zinc reduces the duration of diarrhea episode, 69 percent believed that zinc helps to strengthen the immune system of child, and 66 percent believed that zinc helps in reducing the severity of diarrhea. The reaction was even more positive among those who ever used zinc for treating their children's diarrhea: more than 80 percent of users believe zinc is effective.

**TABLE 15. PERCEPTION OF EFFECTIVENESS OF ZINC TREATMENT AMONG CAREGIVERS OF CHILDREN UNDER FIVE**

<b>Perception of the effectiveness of zinc treatment</b>	<b>Caregivers who heard about zinc (%)</b>	<b>Caregivers who treated children with zinc (%)</b>
Zinc tablets are effective for treatment of diarrhea	68.8	80.5
Zinc reduces the duration of diarrhea episode	76.3	92.4
Zinc helps to strengthen the immune system of child	69.0	89.0
Zinc helps in reducing the severity of diarrhea	65.8	83.7
Use of zinc reduces the risk of dehydration in children	59.4	86.0
Zinc reduces the risk of new diarrhea episode in the following 2-3 months	58.4	85.2
Total number of respondents	1,772	37*

Note: 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 some caregivers caring for more than one child.

#### 4.4.4 PERCEPTION AND KNOWLEDGE OF ORS

The DHS indicated that knowledge of ORS was universal among women in Nepal. This household survey also showed that ORS knowledge is widespread (Table 16). More than 90 percent of respondents were aware that ORS should be given to child for acute diarrhea, persistent diarrhea, or dehydration. Fifty-one percent of respondents knew both zinc and ORS should be used for acute or persistent diarrhea or dehydration, 43 percent knew they should use ORS but did not know about zinc, and the rest (6 percent) knew about neither of the two. More than 80 percent knew the correct administration of ORS, and 93 percent of them knew at least one source of ORS, with private pharmacy the most commonly reported source. ORS was widely perceived as a good treatment for diarrhea.

The current cost of each sachet of ORS ranges from NRs 5 to NRs 15 at a local health center or private pharmacy. About half of respondents knew the price of a sachet of ORS. Sixty percent of them thought the price was not expensive and affordable, while 37 percent said the price was high.

**TABLE 16. KNOWLEDGE AND ATTITUDES ABOUT ORS**

Knowledge	%
<b>Heard of ORS</b>	95.3
<b>Occasions to use ORS</b>	
ORS should be given to child for	
Acute diarrhea	32.4
Persistent diarrhea	80.3
Dehydration	15.0
At least one of the above	94.3
<b>Administration of ORS</b>	
Giving one liter/6 cups of water/liquid for one sachet of ORS	80.4
<b>Know that ORS can be obtained at:</b>	
Hospital	18.9
Health post	32.5
Private clinic	18.1
Private pharmacy	60.9
FCHV	10.9
At least one of the above sources	93.0
<b>Perception about effectiveness of ORS</b>	
Good medicine	85.1
Does not stop the diarrhea	1.6
My child does not like it	6.9
Prevents dehydration	15.2
My child likes the taste	4.4
Total number of respondents	3,500

#### 4.4.5 KNOWLEDGE AND PERCEPTION OF DIARRHEA

Table 17 shows that the respondents had good knowledge of the causes of diarrhea. More than 90 percent of them knew that diarrhea is caused by microorganisms and is associated with drinking unsafe water and eating unclean food. However, their knowledge of when antibiotics should be used is limited: only half of them knew antibiotics should be used only for diarrhea episodes with blood in the stool. Most caregivers agreed that diarrhea could be severe and cause death, but they did not think diarrhea was a major health problem in their community. Children's susceptibility to diarrhea was well understood by the respondents.

**TABLE 17. KNOWLEDGE AND ATTITUDES TOWARD DIARRHEA CAUSES AND TREATMENT**

	Percent (%) of respondents who agree
<b>Knowledge (% agreeing with the statement)</b>	
Diarrhea is caused by microorganism	94.8
Diarrhea can be associated with lack of cleanliness	98.3
Diarrhea can be caused by drinking unsafe water	91.2
Diarrhea can be caused by eating unhygienic food	98.2
Giving food based fluids is equally as effective as giving ORS	79.6
Only those diarrheal episodes that have blood in stool require antibiotics	50.4
Most diarrhea can be managed at home without any drugs	29.0
<b>Opinion towards threat severity (% agreeing with the statement)</b>	
People can die from diarrhea	89.4
My family will experience hardship if a family member gets diarrhea	86.3
It does not seem like anyone around here has a problem because of diarrhea	36.9
Diarrhea is a major health problem in my community	19.4
Children are more likely to get diarrhea than adults	87.1
<b>Opinion towards threat susceptibility (% disagreeing with the statement)</b>	
If my child gets diarrhea it is best just to do nothing and it will pass in time	92.4
The children under five in my household are healthy so their bodies could fight off diarrhea without doing anything	69.8
Children under five are too young to experience serious medical problems from getting diarrhea	81.3
I am not worried about the children under five in my household getting diarrhea	83.4
Diarrhea is a problem in poorer segment of the community only	64.6
<b>Total number of respondents</b>	<b>3,550</b>

## 4.5 EXPOSURE TO COMMUNICATION MESSAGES RELATED TO DIARRHEA AND TREATMENT

Communication messages targeting health problems have been shown to be effective in improving the population’s knowledge and attitudes and then leading to behavior change. The POUZN project not only ensured the availability of the zinc products, but also increased people’s knowledge and practice of diarrhea treatment with zinc through communication programs. The project communication campaign aimed to ensure that caregivers of children under five understood that zinc is an appropriate treatment for diarrhea, knew that zinc tablets are available from public and private clinics/chemist shops, and knew that zinc should be used along with ORS for at least 10 days to maximize the effectiveness. TV and radio were the major channels used to convey the messages.

### 4.5.1 EXPOSURE TO MESSAGES ABOUT TREATMENT OF DIARRHEA

The survey collected data on the exposure to general messages on diarrhea prevention and treatment. Table 18 shows that over 68 percent of respondents had been exposed to at least one message about diarrhea prevention and treatment. Of these, 24 percent reported hearing the message that “Zinc with ORS/ORT is the most effective treatment for diarrhea,” and 21 percent were exposed to the message that the zinc should be given for at least 10 days. Many respondents recalled other messages such as the need to wash hands with soap and give ORS for diarrhea.

The major sources of these messages were radio and TV: over half of respondents heard such messages on the radio and more than two-thirds saw the messages via the TV.

**TABLE 18. EXPOSURE TO MESSAGES ABOUT TREATMENT FOR DIARRHEA AND SOURCES IN THE PAST THREE MONTHS**

	Percent (%)
<b>Heard/seen any messages about treatment for diarrhea</b>	68.5
<b>Messages</b> (among those who received the messages)	
Hand washing with soap	45.6
Treating drinking water	26.1
Zinc tablets should be given for at least 10 days	21.4
Solid food should not be given during diarrhea episode	40.4
Zinc with ORS/ORT is the most effective treatment for diarrhea	24.1
Give plenty of liquids to a child with diarrhea	21.0
Give boiled water and sugar-salt solution	14.7
Give ORS	42.4
<b>Sources</b> (among those who received the messages)	
Radio	52.0
TV	68.0
Education session/health talk	1.8
FCHV	12.8
Doctor/clinic nurse	4.6
Neighbor/friend	12.4
Newspaper	2.6
Poster	0.8

#### 4.5.2 EXPOSURE TO MESSAGES ABOUT ZINC PRODUCTS AND ZINC TREATMENT

For the specific messages on zinc products, 53 percent of respondents had heard or seen a message about a zinc product (Table 19). Radio and TV are the major channels that respondents received message about zinc products. Half of them heard the product on the radio and 85 percent in the television commercial. A few respondents heard about the product from other sources, such as friends, community health workers, or newspapers.

**TABLE 19. EXPOSURE TO ZINC PRODUCTS AND SOURCES**

	Percent (%)
<b>Have heard/seen any zinc product</b>	53.1
<b>Sources</b> (among those who heard/saw messages)	
Radio	50.0
TV	84.7
Friend or neighbor	4.2
Community health worker	2.9
Newspaper	2.0
Others (education session, doctor, health post, local pharmacist, etc.)	4.1

In radio spots and the TV commercial, the project emphasized the messages about the effectiveness of zinc treatment and the appropriate administration. The survey found that messages were well received by the respondents. Table 20 outlines the specific messages about zinc products received via the radio or TV. Among radio listeners or TV viewers, the message “Using zinc along with ORS is the most effective solution” and “Zinc reduces the duration of the diarrheal episode” had high recall.

**TABLE 20. EXPOSURE TO MESSAGES RELATED TO ZINC PRODUCTS THROUGH RADIO AND TV IN THE PAST THREE MONTHS**

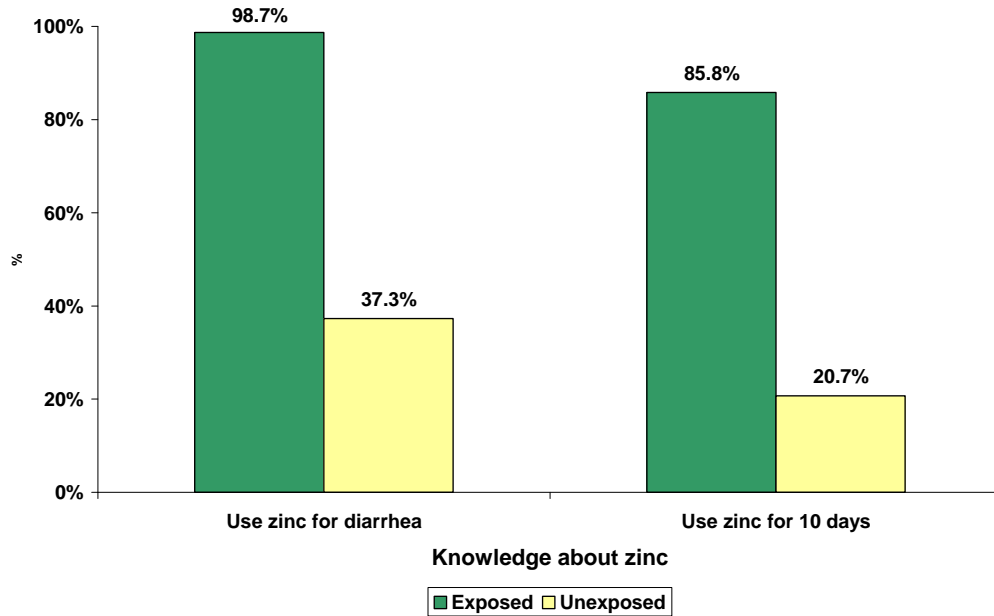
	<b>Radio (%)</b>	<b>TV (%)</b>	<b>Radio/TV (%)</b>
<b>Heard/seen any message about zinc products for treatment of diarrhea</b>	26.5	45.0	51.5
<b>Messages (among those who heard the message)</b>			
Zinc cures faster	37.6	18.1	40.6
Using zinc along with ORS is the most effective solution	41.1	24.6	46.7
Zinc reduces the duration of the diarrheal episode	40.8	35.9	49.3
Zinc helps in building immunity	16.9	7.6	19.4
Zinc should be used for 10 days	25.5	13.5	29.8
Zinc treatment reduces the risk of new episode in the future	37.1	15.0	40.4

#### **4.5.3 ASSOCIATION BETWEEN MESSAGE EXPOSURE AND ZINC-RELATED KNOWLEDGE AND BEHAVIOR**

Survey data show a positive association between relevant message exposure and zinc-related knowledge. As Figure 3 shows, almost all (98.7 percent) respondents who were exposed to the message “Zinc reduces the duration of the diarrheal episode” via radio or TV knew they should use zinc for acute, persistent diarrhea, or dehydration, whereas only 37.3 percent of respondents who had not been exposed to the same message knew they should use zinc to treat diarrhea. Similarly, 85.8 percent of respondents exposed vs. 20.7 percent of those not exposed to the message “Zinc should be used for 10 days” knew zinc should be used for 10 days.

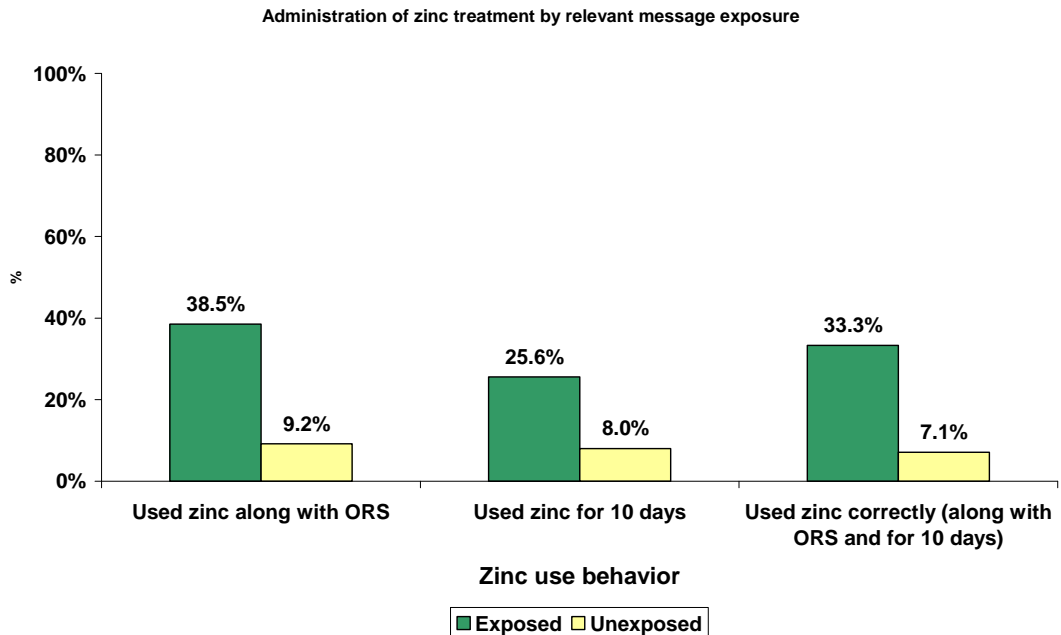


**FIGURE 3. ZINC-RELATED KNOWLEDGE BY RELEVANT MESSAGE EXPOSURE**



Not surprisingly, relevant message exposure is also strongly associated with correct zinc use behaviors. Figure 4 illustrates how respondents exposed to a specific correct use message were significantly more likely to use zinc correctly than those not exposed to the message.

**FIGURE 4. ZINC USE BEHAVIOR BY RELEVANT MESSAGE EXPOSURE**



## 4.6 PREDICTORS OF ZINC USE

Multiple logistic regressions were used to assess the predictors of zinc use and correct zinc use (dependent variables). Before running multivariate regressions, bivariate association (the association of each predictor with the dependent variable) was first tested. Variables examined included caregiver's demographic characteristics, household characteristics, knowledge and attitudes about zinc products, and exposure to communication messages. Variables showing significant association with outcomes were included in the final multivariate regressions.

Table 21 outlines the significant variables from the bivariate examination and the percentages of caregivers using zinc by each characteristic. A caregiver's age, education, household wealth status, exposure to the mass media message, having a positive attitude toward the effectiveness of zinc treatment, knowing where to get a zinc product, and knowing the price of the product were included in the regression model.

**TABLE 21. TREATMENT WITH ZINC BY CAREGIVER'S CHARACTERISTICS AND EXPOSURE TO ZINC MESSAGES, AMONG CHILDREN WITH DIARRHEA**

	Use zinc (%)	Use zinc along with ORS for 10 days or more (%)
<b>Caregiver's age</b>		
15-19	10.8	10.8
20-24	20.0	12.5
25-29	14.6	7.5
30-34	13.7	1.8
35 and above	0.0	0.0
<b>Caregiver's education</b>		
No education	4.9	1.9***
Primary education	9.0	2.1
Secondary education	31.6	19.1
Higher	33.6	21.6
<b>Household wealth quintile</b>		
Poorest	2.4***	1.8***
Middle-poor	6.6	4.2
Middle	8.2	1.6
Middle-rich	27.3	15.9
Richest	38.0	20.5
<b>Sought care for diarrhea at health facility</b>		
No	4.9	4.9
Yes	18.6**	9.3*
<b>Caregiver's exposure to the relevant message<sup>1</sup></b>		
No	2.9	7.1
Yes	26.5***	33.3**
<b>Caregiver's knowledge and perception about zinc</b>		
<b>Zinc is effective treatment of diarrhea</b>		
Disagree	5.9	3.1
Agree	30.2***	18.7***
<b>Zinc tablets are easy to obtain</b>		
Disagree	7.6	1.5
Agree	31.3***	16.8

	Use zinc (%)	Use zinc along with ORS for 10 days or more (%)
<b>Knowing the price of zinc products</b>		
No	9.7	5.2
Yes	82.7***	43.9***
Total number of children with diarrhea	289	289

<sup>1</sup> Zinc use message refers to any zinc-related message recalled; correct zinc use message refers to recalling both the message "Zinc should be used with ORS" and the message "Zinc should be used for at least 10 days"

Statistical significance: \*\*\* p<0.01 \*\* p<0.05 \*p<0.1

Table 22 presents the results of multiple regressions on zinc use and correct zinc use. This report only provides the odds ratios of significant predictors. It should be noted that the sample for regression was limited to children under five who had diarrhea in the two weeks preceding the survey, which was 289 children. It is possible that the small sample might not permit detection of some significant predictors of zinc use behaviors.

**TABLE 22. ODDS RATIO OF PREDICTORS FROM THE MULTIVARIATE REGRESSION ON ZINC USE AND CORRECT ZINC USE**

	Use zinc (Odds ratio)	Use zinc along with ORS for 10 days or more (Odds ratio)
<b>Caregivers' characteristics</b>		
Caregiver's age	0.99	0.91**
Caregiver's education (reference: no education)		
Primary education	1.09	1.53
Secondary education	2.73*	5.31
Higher	1.76***	2.46
Household wealth quintile (reference: poorest quintile)		
Middle-poor	2.33	1.39
Middle	1.73	1.39
Middle-rich	5.32*	1.54
Richest	5.76***	1.59
<b>Caregiver's exposure to mass media message<sup>1</sup></b>		
Exposed to relevant message about zinc (reference: unexposed)	2.13***	2.02***
<b>Caregiver's knowledge and perception about zinc</b>		
Agree that zinc is an effective treatment for diarrhea (reference: disagree)	1.92**	--
Perceived zinc is easy to obtain	2.10***	1.76***
Total number of children with diarrhea		289

<sup>1</sup> Zinc use message refers to any zinc-related message recalled; correct zinc use message refers to recalling both the message "Zinc should be used with ORS" and the message "Zinc should be used for at least 10 days."

Statistical significance: \*\*\* p<0.01 \*\* p<0.05 \*p<0.1

Despite this limitation, some predictors showed significant association with zinc use. Children whose caregiver obtained a secondary education or higher, and children in the top two wealth quintiles were more likely to be treated with zinc. The likelihood of using zinc increased significantly if the caregivers were exposed to any zinc-related message, had positive attitudes toward effectiveness of zinc treatment, or perceived that zinc could be easily obtained.

Because even fewer children were treated with zinc correctly, the logistic regression detected only a few significant predictors of correct zinc use. Table 22 shows the odds ratios of using zinc and odds ratios of using zinc along with ORS for 10 days or more. Children whose caregivers' had secondary-level education were 2.73 times more likely to be treated with zinc than children whose caregivers' did not receive any education. Children who had a younger caregiver, whose caregiver was exposed to the mass media message that zinc should be used for 10 days, and perceived that zinc is easy to get, were more likely to be treated with zinc along with ORS for at least 10 days.

## 5. CONCLUSIONS AND IMPLICATIONS

Although the findings of this household survey are specific to the context in Nepal, many merit consideration in planning zinc promotion programs elsewhere.

1. The POUZN project was successful in increasing zinc use for treating diarrhea among children under five from almost zero (0.4 percent) before the program began to 15.4 percent after the program. The successful experience suggests that the social marketing approach to promoting zinc use could be successfully implemented in similar settings with high diarrhea prevalence.
2. The communication campaign was effective in improving the knowledge and practice of zinc use. The likelihood of using zinc correctly was significantly increased if a caregiver was exposed to the mass media message on zinc: 85.8 percent of respondents exposed but only 20.7 percent of those not exposed to the message knew that zinc should be used for 10 days. In terms of correct use, 33.3 percent of those exposed to the communication messages vs. only 7.1 percent of those not exposed correctly administered the zinc to their child along with ORS/ORT and for the full 10 days. When introducing a new product, it is essential to ensure that communication messages focus on the basic but key information about correct use. The survey found that 46 percent of zinc users were either not using ORS along with zinc or not completing 10 days. Additionally, other important information should be conveyed through the communication channels; for example, when do children with diarrhea need an antibiotic or anti-diarrheal drug? The study indicated that there was still a high proportion of children treated with antibiotics or anti-diarrheals. Communication messages should be reinforced to ensure that consumers understand that antibiotics and anti-diarrheals are ineffective and, in some cases, dangerous for children under five and should not be used.
3. The private sector has an important role to play in promoting and distributing zinc treatment. The caregivers of 10 percent of children who had diarrhea received advice on using zinc from a private health provider and over half of zinc users obtained zinc products from either private health clinics or private pharmacies. Given that the main reason that respondents chose a particular source from which to obtain zinc is easy access, expanding access and making the zinc products available in all facilities will be important to increasing zinc use. Zinc treatment programs are most effective when public and private sector programs are coordinated and work in tandem, providing access to all segments of the population – those who can afford to purchase as well as those who need free public sector services and treatments.
4. Inappropriate treatments (using anti-diarrheals and antibiotics for acute, but uncomplicated, diarrhea) were still practiced or recommended by health providers, particularly private health providers. More effort needs to be invested in discouraging these practices. Continued training and individual detailing (sales visits) to health providers are needed, as are communication campaigns that reinforce messages about the inappropriateness of antibiotics and anti-diarrheals and the benefits of zinc.
5. The introduction of zinc did not result in replacing ORS/ORT. Given the concern that caregivers might replace ORS/ORT with zinc, the POUZN project developed messages promoting using zinc and ORS together. The survey showed knowledge of ORS was widespread: over 90 percent of

respondents knew about ORS, and 51 percent knew both zinc and ORS should be used for acute or persistent diarrhea or dehydration; 43 percent knew they should use ORS but had no knowledge of zinc, and the remaining 6 percent knew neither of the two. In practice, ORS was still the most popular treatment used for diarrhea: 68 percent of children with diarrhea were given ORS. Among zinc users, 79 percent were treated with both zinc and ORS. In 2006, DHS reported that only 40 percent of caregivers provided ORS/ORT to their child with diarrhea. The increased use rates reported in this survey are a clear indication that the efforts of the Ministry of Health and various health-related projects, including POUZN, to promote ORS/ORT use have had a positive impact. Zinc intervention programs should be carefully designed to promote zinc along with ORS/ORT and ultimately improve all diarrhea management practices.

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