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## NEPAL ZINC CASE STUDY

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## **Disclaimer**

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors (UW START and Skye Gilbert, Saul Morris, and Shelby Wilson of the Bill & Melinda Gates Foundation) and do not necessarily reflect the views of the key informants, thought partners or reviewers.



## OVERVIEW

<b>Status:</b>	Unsustained Success
<b>Major players:</b>	NFHP, POUZN
<b>Financing:</b>	USAID, UNICEF, product sales
<b>Price:</b>	\$0.19-\$0.26 for one course of treatment; free in public sector
<b>Regulatory change:</b>	Integration into national treatment guidelines

FIGURE 1: KEY FEATURES OF NEPAL ZINC SCALE-UP

Nepal and Bangladesh were the first two countries to implement a national scale-up of a zinc therapy program. Nepal's program began in late 2005 and has been classified as an unsustained success (Figure 1). Whereas Bangladesh was able to retain much of the management and implementation of the scale-up of ORS and zinc in-country, Nepal sought external partners for both funding and implementation, which may have contributed to the relative lack of sustained success. The government of Nepal took a two-pronged approach to their zinc program, involving the private sector with the Nepal Family Health Project (NFHP) and the public sector with the Point-of-Use Water Disinfection and Zinc Treatment Project (POUZN).

According to the 2011 DHS, Nepal's program for zinc scale-up only achieved 6% zinc coverage. Positive attributes of the program included the policy support for integrating zinc into diarrhea management protocols and the enlistment of local manufacturers to produce zinc in-country. Both of these created the local infrastructure needed for a successful program. However, the program included only an 18 month media campaign. Additionally, the effort did not sufficiently target end-users, nor did it thoroughly revitalize case management to include zinc.

TABLE 1: KEY CONTEXTUAL INFORMATION ABOUT NEPAL

Statistic	Estimate	Source
Total population	30.5 M	(UNDP 2011)
Under 5 population	3.6 M	(MoHP 2011)
Under 5 mortality rate	48 per 1,000 live births	(UNDP 2011)
Human Development Index (HDI) ranking	157 of 187 countries	(UNDP 2011)
Gross National Income (GNI) per capita	\$1160	(UNDP 2011)
Life expectancy	68.8 years	(UNDP 2011)

## CONTEXT

### DEMOGRAPHICS

Nepal is a land-locked Himalayan country surrounded to the south by India and to the north by China. The country is divided into three main land regions: the Terai (plains), the hill region, and the mountainous region. The 30 million people in the country comprise over 100 ethnic groups/castes, the most populous being Kshatriya and Bahun. The caste system leads to some level of discrimination in Nepal, which affects access to education and healthcare (The World Bank 2011). The Terai, although easily accessible compared to the hills and mountain regions, has a large proportion of people in lower castes (Singh and Dahal 2012). Only 19.2% of the population live in urban areas (UNDP 2011), 35% of the population is under 15 years old, and the population is growing at a rate of 1.6% per year (UNFPA 2012).



Nepal has been racked with political instability since 1990 when the country transitioned from an absolute monarchy to a democracy within the framework of a parliamentary monarchy. Armed conflict between the Nepalese government and Maoist rebels began in 1996 and ended in 2006. However, unrest has continued with the establishment of ethnic identity movement groups, who are pressing for social inclusion. In 2008, an election took place for seats in the constituent assembly, monarchy was abolished, a president was elected, and Nepal was declared a federal democratic republic. From 2008 to 2011 there were four different coalition governments (CIA World Factbook 2012).

Nepal is also one of the poorest countries in the world with a development rank of 157 out of 187 and an annual per capita income less than \$1160 in purchasing power parity (UNDP 2011). Forty percent of the population lives below the poverty line (MacDonald and Mitchell 2009). The major employment sector in Nepal is agriculture (66%), followed by the service sector (18%) (The World Bank 2012).

Nepal has a health profile similar to that of other South Asian countries. The prevalence of HIV is slightly higher in Nepal (4 per 1000 population) than in the rest of South Asia, although the prevalence of tuberculosis is comparable (238 per 1000 population). The majority of deaths among children under 5 are caused by prematurity (32%) and pneumonia (16%). Access to improved drinking water and sanitation has been slowly increasing since 1990 (NDHS 2006; GHO 2010; NDHS 2011).

#### **HEALTH SYSTEM**

Prior to the 1990s, healthcare in Nepal was highly centralized with a number of vertical program areas (USAID 1991). The current form of the government health care system in Nepal was initially developed in 1991 to improve the health of the rural population and integrate Ayurvedic medicine, a traditional medical system, into healthcare. This initial health strategy has been expanded and now includes several long term and multi-year plans. The goals are to develop services at the district level, garner community participation, mobilize the private sector to provide services, make family planning and maternal/child health a main focus, decentralize health administration, and promote participation by NGOs, private enterprises and foreign investors (SEARO 2007). There are 62 district level hospitals, which provide specialized care, among the 75 districts. Primary healthcare is provided through 193 primary healthcare centers, 701 health posts, and 3129 sub-health posts. Between 1992 and 1996, the number of government health facilities increased nearly twelve-fold (SEARO 2007).

According to the 2006 DHS, of those who sought care, 43% of Nepali mothers first sought care for their child's diarrhea in the public healthcare system, while a similar proportion (42%) first sought care at a private pharmacy. Private-sector pharmacies are common in both rural and urban areas in Nepal, providing both diagnoses and drugs. Most of the for-profit private sector hospitals are otherwise located in urban areas and are not within reach of lower socio-economic groups. Over two thirds of the hospital beds in Nepal are in the for-profit private sector, but they are underutilized because of the cost. NGOs also provide services, but tend to partner with the government facilities (MoHP 2010).

The frequent changes in government, limited resources, and difficult terrain of Nepal all create barriers to healthcare delivery (SEARO 2007). Terrain restrictions and the associated freight costs in particular affect the private sector more than the public sector (Upadhyay 2012). Nepal's governmental supply chain to the peripheral public health system is considered to be strong, but they are also subject to transportation issues in the mountain region (Hodgins 2012; Poudel 2012; Singh and Dahal 2012).



## HEALTH SYSTEM SUCCESSES AND FAILURES

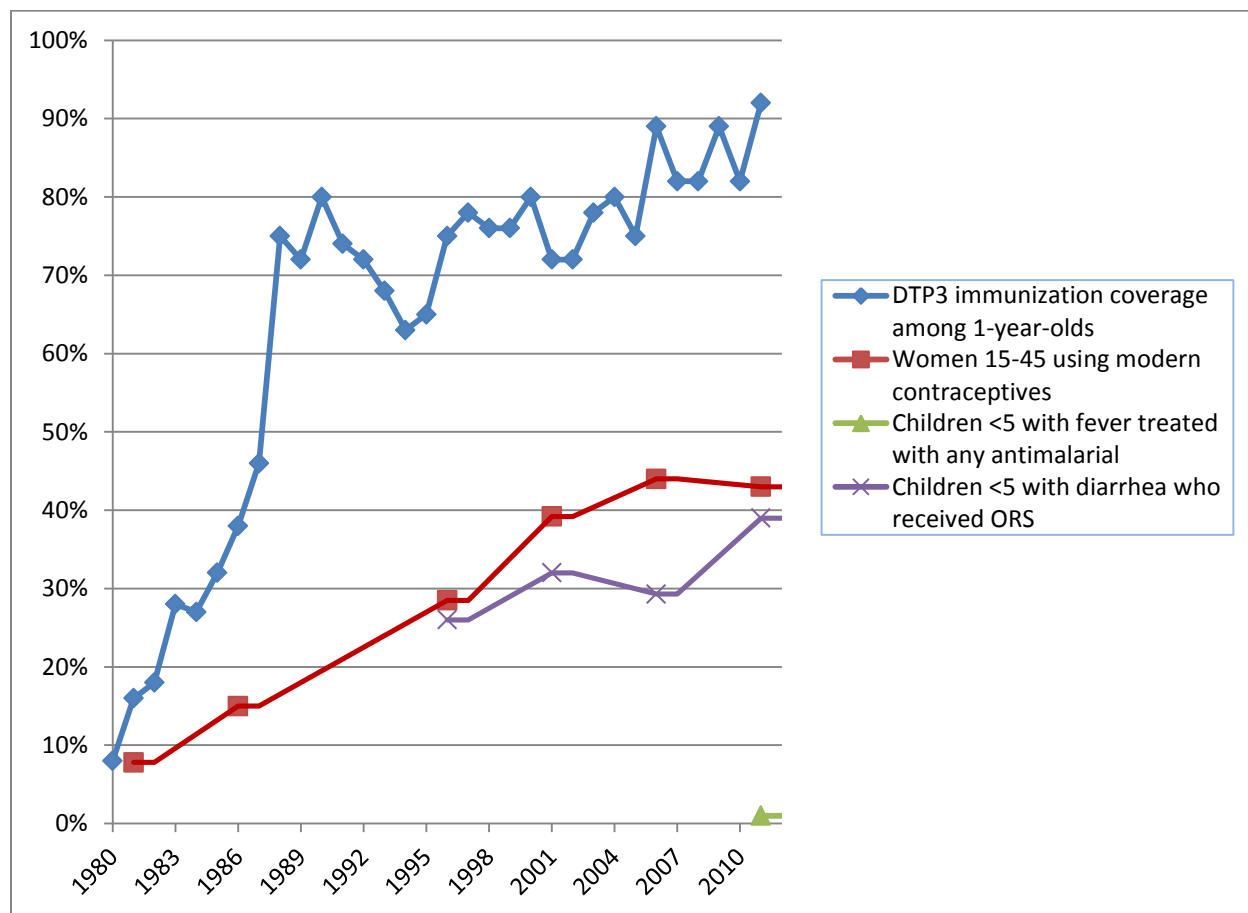


FIGURE 2: KEY HEALTH INDICATORS OF CHILD SURVIVAL IN NEPAL

Nepal has had some significant child health achievements, including a vitamin A supplementation program that has reached 90% of children and a national deworming program with similar coverage (MacDonald and Mitchell 2009). Childhood mortality has decreased from 118 deaths per 1000 live births in 1996 to 54 per 1000 live births in 2011 (NDHS 2011). Despite the decrease in child mortality, disparities in child health are increasing. Overall child malnutrition has decreased, but malnutrition in the lowest wealth quintile has increased (Singh and Dahal 2012). Additionally, according to the 2011 Nepal Demographic and Health Survey (NDHS), diarrhea continues to be a major overall cause of childhood morbidity: the two week period prevalence for diarrhea was 14% among children under 5 (NDHS 2011).

Treatment with anti-malarials for fever among children under 5 is very low (Figure 2). Malaria is seasonal in Nepal, and its treatment is included in the Community-Based Integrated Management of Childhood Illness (CB-IMCI) package. Nepal has the lowest burden of malaria in the Southeast Asia region, with only 4,000 cases in all age groups in 2010 (SEARO 2012). Treatment of children under 5 with antibiotics for fever is much more common (32%) than treatment with antimalarials, which reflects a stronger focus on acute respiratory infections (ARI). The two week period prevalence of ARI in 2011 was 4.6% (NDHS 2011).



Attention to diarrheal disease in Nepal began in the 1980s with the advent of ORS. The National Control of Diarrheal Diseases Program (CDD) began in 1982 and was integrated into the Child Health Division in 1994. The program strategized to decrease diarrhea morbidity through standard case management of diarrhea in health facilities and promotion of ORT at home. Female Community Health Volunteers (FCHV) were given training on home management of diarrhea (Taylor, Houston et al. 2003).

The Nepal Family Health Program (NFHP), funded by USAID and implemented by John Snow International (JSI), is a technical assistance program that began its first phase in 2001, and is currently in the second phase (NFHP II) which started in 2007. The project includes family planning, maternal, neonatal and child health. NFHP provides training packages for healthcare providers and FCHVs. Within the Child Health Division, the NFHP has been responsible for CB-IMCI (which began in 1998), mass vitamin A supplementation, and use of zinc/ORS for diarrhea treatment.

UNICEF partners with the NFHP to implement CB-IMCI through an IMCI technical working group. Between 1998 and 2010, the program was rolled out through public health care worker training conducted in workshops varying in length from 7-11 days. Training emphasized educating FCHV to diagnose and treat pneumonia and diarrhea in children (NFHP 2007; Singh and Dahal 2012). A brief orientation was also held for mothers in each community to introduce them to the role of the FCHV. In the seven day course, the first five days of training focused on acute respiratory illness and pneumonia treatment. The final two days focused on diarrhea management, nutrition counseling and immunization (NFHP 2007).

## ZINC DISTRIBUTION ACTIVITIES PRIOR TO SCALE-UP EFFORT

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In 2003, the Ministry of Health and Population (MoHP) reported that 17,000 deaths in children under 5 in Nepal were attributed to diarrhea each year (Adhikari 2006). The two week period prevalence of diarrhea among children under 5 at that time was 20.4% (NDHS 2001). Inspired to act on this information, the MoHP responded by reinvigorating focus on diarrheal disease control (Adhikari 2006).

In 2004, the World Health Organization (WHO) adopted new guidelines for the treatment of diarrhea with zinc. That year, the director of Nepal's Child Health Division, Dr. Yasho Pradhan, attended an International Vitamin A Consultative Group (IVACG) conference in Peru that promoted zinc therapy (Hodgins 2012). Convinced of the importance of zinc, he worked with UNICEF and John Snow International (JSI) to seek funding for a zinc program (MacDonald 2012). At the same time, the MoHP created a Zinc Task Force (MacDonald and Mitchell 2009; Wang, MacDonald et al. 2011). Tribhuvan University conducted baseline qualitative research to identify knowledge levels and appropriate messaging (Adhikari 2006).

In late 2005, pilot projects of zinc therapy were conducted by NFHP and POUZN in 5 of 75 districts. At that time, no zinc products were available on the market. However, because children received zinc in the context of these pilot projects, the 2006 DHS found 0.4% of diarrhea cases were treated with zinc (NDHS 2006; MacDonald 2012).



## APPROACH TO ZINC SCALE-UP

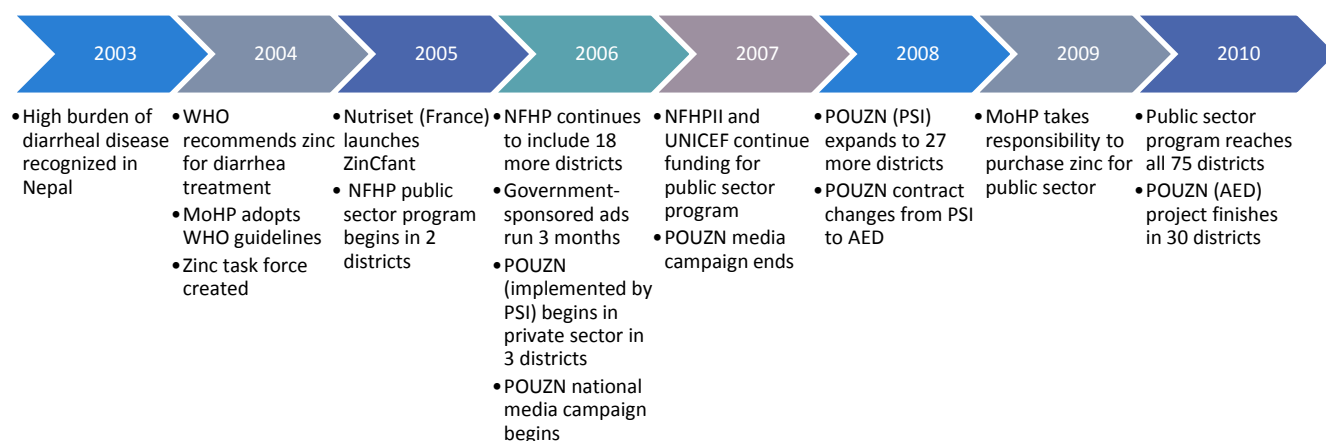


FIGURE 3: SCALE-UP TIMELINE

The Child Health Division of the MoHP guided both the private and public sector programs for zinc scale-up in Nepal. The two programs were rolled out almost simultaneously in late 2005 and early 2006 (Figure 3). The main feature of both programs was training providers in case management of diarrhea using zinc.

### NFHP: PUBLIC SECTOR SCALE-UP

In the public sector, USAID and UNICEF have helped to provide supplies, training, and technical assistance to distribute zinc through the NFHP program (Wang, MacDonald et al. 2011). NFHP is ending in the fall of 2012 and has been implemented by JSI. The NFHP team expects to receive another phase of USAID funding, although the structure of the project going forward is unclear (Hodgins 2012).

In early 2005, the NFHP began coordinating with the MoHP, USAID, and UNICEF to scale-up the use of zinc therapy for diarrhea. The goal of the project was to integrate zinc therapy into diarrhea case management by public sector healthcare providers. The program officers began by first endorsing new diarrhea case management protocols to be incorporated into the CB-IMCI program through formal government processes (Hodgins 2012). The NFHP drafted new guideline language while Dr. Pradhan steered the guidelines through the MoHP system to have the changes in standard treatment endorsed by the ministry. This process was aided by the existence of the WHO guidelines for zinc therapy (Raharison 2011; Hodgins 2012). NFHP was then in a position to begin piloting and acquire procurement support (Hodgins 2012).

After the new case management protocol had been accepted and formalized, the NFHP program began training public sector employees in the use of zinc, as well as supplying zinc to health posts. In late 2005, zinc therapy was first introduced in a pilot program in two districts, Parbat and Rautahat. In Parbat, the IMCI program had not yet begun, so zinc was introduced as part of the IMCI training package (Raharison 2011; Poudel 2012). IMCI training was conducted for all public healthcare workers in a 7-11 day course, and zinc training was provided within one day of that training (Singh and Dahal 2012). In Rautahat, the IMCI program was already being implemented, so zinc training was conducted in a separate one-day orientation for all public healthcare staff (NFHP 2007; Singh and Dahal 2012). Training for each district



occurred in a cascade style: NFHP program officers trained district level supervisors, who trained health facility staff, who then trained FCHV at the community level (NFHP 2007). The training provided instruction on diarrhea case management with zinc (NFHP 2007). In 2007, an independent evaluation of the pilot projects showed coverage of 29% zinc usage for the treatment of diarrhea in Parbat and Rautahat (Singh 2012).

The first two districts served as the model for zinc scale-up in additional districts. Those districts that already had CB-IMCI programs were trained with an orientation, and those that did not yet have CB-IMCI had training in diarrhea case management with zinc integrated into the CB-IMCI rollout. The zinc program was implemented in 18 more IMCI districts in 2006. To create synergy between the public and private sector, some of the initial districts were chosen to be within the Kathmandu Valley, which supported the POUZN project in those areas (Abt Associates 2008). NFHP II funded 7 districts, and continued technical assistance for the zinc orientations for district-level supervisors. UNICEF provided financial and logistical support for the remaining 66 districts (NFHP 2007). By 2010, the program expanded to include all 75 districts in Nepal.

Because USAID does not fund the purchase of commodities, NFHP coordinated with PLAN Nepal to procure zinc for the two pilot districts (Hodgins 2012). After the pilot, UNICEF provided zinc for the program's expansion into the rest of the country. Both PLAN and UNICEF procured zinc for the roll-out through Nutriset in France (the makers of Plumpy'nut®). Procurement was somewhat delayed in distributing Nutriset's product ZinCfant® in Nepal because the company was required to be Good Manufacturing Practice<sup>1</sup> (GMP) certified in France. In 2009, the MoHP took over responsibility for procuring zinc from Nutriset for the public sector.

The NFHP program is ending this year and minimal staff are currently working with the project (Hodgins 2012). However, the team anticipates further funding from USAID to continue the next phase of NFHP work, including zinc promotion. Throughout the program, regular progress has been monitored through Health Management Information System (HMIS) reports each month (Singh 2012).

#### **POUZN: PRIVATE SECTOR**

The POUZN project was a USAID-funded, 5 year, US\$12 million dollar program that operated in 13 countries between 2005 and 2010. A full zinc program was included for Nepal, Benin, Madagascar, and Pakistan. In 2005, the POUZN project team provided a proposed work plan for zinc scale-up in Nepal's public sector to the Child Health Division. However, Dr. Pradhan, the director of the Child Health Division at the MoHP, judged it important to allow the public sector to be viewed as the lead for zinc distribution, and requested that POUZN delay the beginning of their project until after the NFHP had begun their work. The POUZN project conducted work in 3 main capacities: supporting local manufacturers, training healthcare providers, and carrying out a national media campaign. The POUZN

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<sup>1</sup> The Good Manufacturing Process is a production and testing practice that helps to ensure quality in a manufactured product. While countries and organizations vary slightly in the guidelines, there are consistent goals of safeguarding patient health as well as producing good quality pharmaceutical products. Nepal observes the WHO GMP guidelines. Compliance is a necessary condition to marketing authorization. Brhlikova, P., I. Harper, et al. (2007). Good Manufacturing Practice in the Pharmaceutical Industry. The Center for International Public Health Policy..





team consisted of technical assistants from Abt Associates and implementation officers from Population Services International (PSI), who already had a program office in-country.

Initially, the POUZN team had intended to purchase ZinCfant® from Nutriset for the program. However, they found that there was already an interest from local pharmaceutical companies to manufacture a dispersible tablet in-country (Abt Associates 2008). They quickly identified three local manufacturers who were interested in producing zinc for the initial scale-up, including Deurali-Janta Pharmaceuticals (DJPL), CTL Pharmaceuticals (CTL) and Nepal Pharmaceuticals Laboratory (NPL). The POUZN project brought US Pharmacopeia (USP) representatives to provide technical assistance to the manufacturers (Abt Associates 2008). USP tested each product for quality assurance, which helped the manufacturers prepare for Nepal's GMP audit (Abt Associates 2008). By August of 2007, all three manufacturers had passed the GMP audits and introduced a total of five products to market.

In the initial stages, there was some discussion of co-packaging the zinc with ORS. However, the MoHP had been promoting oral rehydration therapy separately, with a focus on preparing homemade solutions, and did not want to confuse messages (MacDonald 2012; Upadhyay 2012). A representative of PSI has suggested that co-packaging could increase sales because ORS use is already high (Upadhyay 2012).

The three manufacturers' distribution area covered 30 of 75 districts. These 30 districts were mainly in the Terai region (15 of 20 total districts in the Terai), followed by the hills region (13 of 44 districts), with very few in the mountainous region (2 of 16 districts). The manufacturers requested additional support from POUZN to subsidize the freight costs of transport into the mountainous regions, but funds were not available (Upadhyay 2012). Otherwise, the POUZN team worked closely with the manufacturers to ensure there was sufficient coverage in the districts. An informal study in 2008 conducted by NPL found that a zinc product was available in 75% of the outlets in those 30 districts (Abt Associates 2008). At that time, DJPL controlled about 80% of the Kathmandu market and 50% of the rural markets, with the other two pharmaceuticals making up the rest of the market (Abt Associates 2008). Between 2007 and 2008, the demand for zinc grew outside of the 30 districts and the firms expanded to meet the demand and grow market share.

The training program by POUZN was implemented in two phases. In the first phase, December 2006 to September 2007, the scale-up focused on 3 districts in Kathmandu Valley. These districts were chosen because they were near the capital, provided sufficient market, and could be monitored easily (Abt Associates 2008). POUZN contracted with the Integrated Rural Health Development and Training Center and coordinated with the NFHP program to train all of the public sector providers in the three districts (over 2,000 employees) (Abt Associates 2008; MacDonald 2012). Using MoHP training curricula, they also trained 1,660 private sector chemists from the Kathmandu Valley (total private sector chemists unknown) (Abt Associates 2008).

The second phase, from April 2008 to September 2008, expanded the scale-up to include 27 further districts, covering the same distribution area as the manufacturers (MacDonald and Mitchell 2009). These districts were also chosen because they were sites for the NFHP zinc program and IMCI (MacDonald 2012). POUZN trained over 4,000 chemists in the second phase districts (total private sector chemists unknown) (Abt Associates 2008). An assessment conducted by independent evaluators (agency unknown) during the implementation of POUZN project in the 30 focus districts revealed an increase in the use of zinc up to 16% in 2008 (Singh 2012).



In 2008, the USAID POUZN contract changed from Abt Associates/PSI to the Academy for Education and Development (AED). AED had already received a grant for social marketing from USAID in Nepal, and this allowed USAID to consolidate their funding (MacDonald 2012). Additionally, PSI had been outside of their own organizational comfort zone; they normally promote products that they provide and subsidize, rather than products that are produced locally (Hodgins 2012). This may have caused friction between USAID and PSI (MacDonald 2012). To maintain consistency, Abt Associates/PSI provided all of their promotional materials to AED.

## MARKETING CAMPAIGN

### NFHP: PUBLIC SECTOR

The NFHP did not conduct a formal marketing campaign to promote zinc. However, the team had been working with the National Health Education, Information, and Communication Centre (NHEICC) to provide messaging that promoted care-seeking for the CB-IMCI program, and zinc messaging was integrated into these communications. The NHEICC generally uses posters and radio to promote care-seeking behavior (Hodgins 2012). As part of their training program, NFHP provided zinc-related “job aids” for health volunteers to post (Figure 4), along with booklets and fliers (NFHP II 2009). The radio ads and printed materials ran for 3 months. UNICEF Nepal considers that overall communication has been unsatisfactory in duration and lacking focus on end-users (Singh and Dahal 2012). The NFHP UNICEF partners are planning to increase promotion directly to mothers through collaboration with the NHEICC and youth groups in the next phase (Singh and Dahal 2012).



FIGURE 4: USAID “JOB AID” FOR ZINC PROMOTION- ENGLISH TRANSLATION (ZINC TASK FORCE 2012)

### POUZN: PRIVATE SECTOR

Although the POUZN training and zinc supply only reached 30 districts, POUZN’s media campaign was national. Television and radio ads aired for 18 months. The campaign modeled their tactics after India’s program run by Abt Associates, using a “generic” approach. Zinc was promoted with a neutral logo, without aligning it with any one of the five products that were on the market (Figure 5). The logo was tested with caregivers of different castes and ethnicities, which ensured broad acceptability (Abt Associates 2008). Although the generic approach had many advantages, the logo was only used on marketing materials and not on the actual product. The MoHP was concerned that assigning the logo to



the products would seem like a certification, and other manufacturers would want their products to be certified as well (MacDonald 2012).



FIGURE 5: LOGO INCLUDED ON ALL CAMPAIGN MATERIALS (MACDONALD AND MITCHELL 2009)

POUZN had separate messaging for providers and consumers. For consumers, the program developed large poster boards (3'x5') with the logo and the phrase “Zinc tablets along with ORS/ORT—the most effective diarrhea treatment for children under 5”. They were placed in waiting rooms and distributed to hospitals in the target districts. Four radio spots and one television commercial were created to convey the key messages. The television ads include scenes of a mother and her son with demonstrations of how to make ORS and dissolve zinc tablets (Zinc Task Force 2011). A physician also appears in the advertisements, promoting zinc use. In phase I, radio spots ran on four Kathmandu FM stations. In phase II, the campaign expanded to include 19 regional FM stations and four national television stations (MacDonald and Mitchell 2009). Messaging to healthcare providers included printed materials with the correct use of zinc, lists of the locally available products, information on current zinc research, and the government diarrhea case management guidelines.

The marketing campaign was widespread and reached districts where no zinc was available, leading to some requests for increased zinc supply from private pharmacists (Abt Associates 2008). The media types through which consumers heard zinc messaging is included in Table 2. A higher percentage of consumers remembered hearing zinc messaging through television than radio.

TABLE 2: RESULTS OF MARKETING TO CONSUMERS (MACDONALD AND MITCHELL 2009) (SAMPLE SIZE NOT AVAILABLE)

Key Message	Heard on Radio	Heard on TV	Heard on Radio/TV
Zinc cures diarrhea faster	10.0%	9.2%	15.1%
Zinc along with ORS is the most effective solution	10.9%	13.9%	19.8%
Zinc reduces the duration of the diarrheal episode	10.8%	7.9%	14.6%
Zinc helps build the immune system	4.5%	3.2%	6.3%
Zinc should be used for a full 10 days	6.8%	7.4%	11.7%
Zinc reduces the risk of future bouts of diarrhea	9.9%	19.9%	23.5%
Any zinc-related message	36.5%	45.0%	51.5%



## FINANCING

Funding for both the public and private sector programs came from USAID. The grant for the NFHP did not have specific allocations for zinc promotion, although it was included in work plans. Between 2004 and 2010, an estimated US\$1 million was spent on zinc in the NFHP program (Hodgins 2012). Not including human resources, the Rautahat pilot program cost approximately US\$34,000, and the Parbat program cost approximately US\$65,000 (which includes the full CB-IMCI roll out). The NFHP support for 7 additional districts cost approximately US\$237,000, which included full CB-IMCI in 3 districts.

The global POUZN program was allocated US\$12 million total funding. The Nepal-specific POUZN program spent just over US\$1 million in the first two years of operations. The program was considered to be nearly 10 times less expensive than other POUZN projects (MacDonald 2012). Approximately US\$350,000 of the budget was used for personnel, US\$140,000 for training, and US\$250,000 for advertising (Abt Associates 2008).

## PRICING

Zinc was provided for free through government facilities. Through the private sector, zinc prices of 10mg and 20mg zinc tablets from the three initial pharmaceutical suppliers are summarized in Table 3.

TABLE 3: PRODUCT RETAIL PRICE, 2006

Product		Price	
Deurali-Janta Pharmaceuticals	20 mg.	NPR 40	US \$0.519
	10 mg.	NPR 20	US \$0.260
Nepal Pharmaceuticals Laboratory	20 mg.	NPR 30	US \$0.390
	10 mg.	NPR 15	US \$0.195
CTL Pharmaceuticals	20 mg.	NPR 25	US \$0.325

## IMPACT

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The NFHP program reached every district in Nepal by 2010, while the POUZN project reached their 30 target districts, mainly in the Terai and hills regions. Data from the 2011 DHS and MICS 2010 surveys on zinc use in Nepal are conflicting (Figure 6). According to the 2011 NDHS, country-wide zinc tablet use (with or without ORS) in Nepal attained a coverage level of 6.2% of treated diarrhea cases (NDHS 2011). According to the MICS 2010, zinc use in combination with ORS was 22.1%, indicating that all forms of zinc would have dramatically higher coverage (MICS 2010).



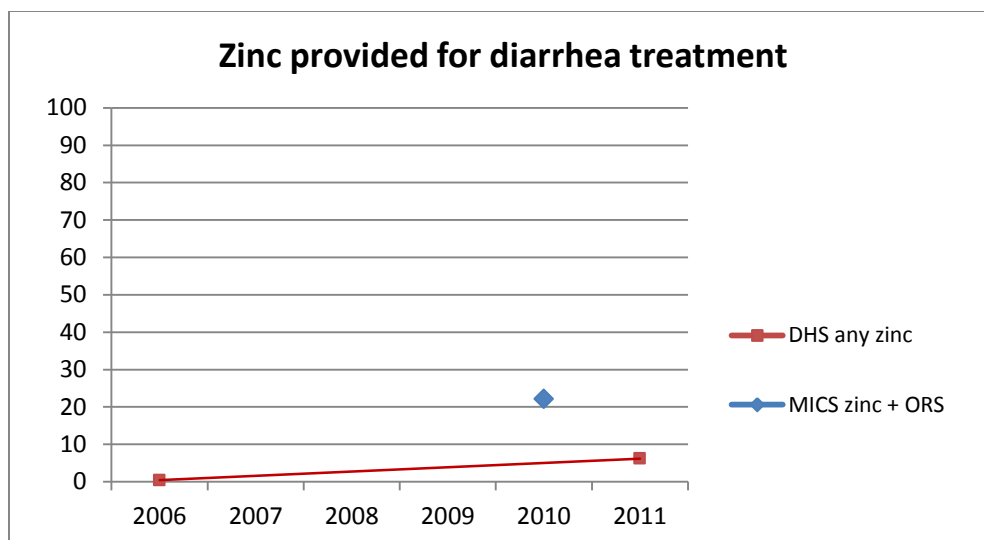


FIGURE 6: ZINC TREATMENT PROVIDED FOR DIARRHEA IN NEPAL, (MICS 2010; NDHS 2011)

Although the English version of the generic survey for both the DHS Phase 6 and MICS 2010 includes questions that are worded the same way, the discrepancy between the coverage rates has been attributed to a difference in how interviewers probed when asking about zinc use (Singh and Dahal 2012). According to the UNICEF representatives, the MICS interviewers were instructed to specifically probe for zinc, while the DHS interviewers were not (Singh and Dahal 2012). The MICS data is supported by a Health Management Information Survey (HMIS) which shows 87% zinc usage among only public sector employees (Singh and Dahal 2012). Consumers obtained 42% of their tablets from public sector providers, 26% from private clinics, and the remaining 32% of from private pharmacies (MacDonald and Mitchell 2009).

To assess whether there was a trend in increasing coverage across areas where POUZN was implemented, data from the 2011 DHS were analyzed. The DHS dataset can be divided by region, but district level information is not provided (NDHS 2011). Fortunately, there was a high level of variability of POUZN implementation between the regions, which allows for some comparison across regions. The 30 POUZN focus districts were mainly in the Terai region (15 of 20 total districts), followed by the hills region (13 of 44 districts), with very few in the mountainous region (2 of 16 districts).

TABLE 4: DHS ZINC COVERAGE COMPARED TO POUZN COVERAGE, BY REGION, 2011

Region	Coverage of zinc, (95%CI)	POUZN coverage
Terai	0.06 (0.03-0.08)	75%
Hills	0.09 (0.05-0.12)	29%
Mountains	0.07 (0.02-0.12)	12%

The DHS zinc coverage estimates are very similar for all 3 regions and also do not provide evidence of an association between regional coverage by POUZN and zinc usage (Table 4). Zinc coverage in the Terai, the region with the highest POUZN coverage, only reached 5.8% usage. The hills region had zinc coverage of 8.8%, and the mountainous region reached 7.1% zinc coverage. From these data, it does not appear that POUZN was effective in promoting zinc use in the areas where it focused.



Because the 2010 MICS provided a different estimate for zinc coverage than the DHS, regional zinc coverage and regional POUZN coverage were also compared using data from the 2010 MICS report (MICS 2010). The 2010 MICS did not survey the entire country, and further subdivided the regions into Far Western and Mid-western. Again, stratifying the MICS zinc usage rates does not appear to demonstrate an association between the regions where POUZN focused (Table 5).

TABLE 5: MICS ZINC+ORS COVERAGE COMPARED TO POUZN COVERAGE, BY REGION, 2010 (MICS 2010)

Region	Coverage of zinc+ORS	POUZN coverage
Far western Terai	42%	100%
Mid-western mountains	32%	33%
Mid-western Terai	20%	100%
Mid-western hills	19%	0%
Far western hills	17%	43%
Far western mountains	14%	0%
Total	22%	39%

To examine the reasons for the low coverage achieved by both the public and private sector zinc projects, UNICEF obtained a research grant from the International Zinc Association. They also conducted a review of the NFHP zinc program with the Micronutrient Initiative (Singh and Dahal 2012). The review concluded that the program expanded too rapidly with insufficient focus on the quality of training, the distant districts were experiencing supply bottlenecks, and the program overall was not prioritized within the Child Health Division (Singh and Dahal 2012).

## CONCLUSIONS

The Nepal experience with zinc scale-up has been marked by slow uptake that, according to the DHS, has not reached even moderate levels of coverage. However, some success was achieved. There was early political interest and supportive policies were established. The mass media promotion of zinc helped to create the necessary demand: people who heard the message were two times more likely to use zinc than people who did not (MacDonald and Mitchell 2009). The enlistment of local manufacturers and the concerted efforts of the POUZN project marketing campaign in its early stages supported the zinc scale-up. Additionally, it's possible that the DHS has underestimated the coverage of zinc use, and that the program was more successful than recognized. According to the 2010 MICS, coverage reached 22%.

There are several aspects of the zinc scale-up that could account for the slow uptake seen in the DHS estimates, however. Overall, the scale and scope of the programs may have been insufficient (Hodgins 2012). For example, the POUZN project was conducted on a small budget compared to the other POUZN projects, and did not achieve national coverage. The POUZN media campaign extended for only 18 months, and the NFHP radio advertisements only lasted 3 months. With a larger budget, private sector coverage could have been subsidized to expand into further rural regions, and the marketing campaign could have continued for a longer time. Another factor that might have limited success was the effectiveness of provider training. According to the 2006 DHS, approximately 20% of mothers of children with diarrhea first sought care from public facilities. If the NFHP training program were successful in ensuring the use of zinc among their staff, the national zinc coverage rate would be expected to at least



mirror that public healthcare access rate. However, if the DHS coverage rate of 6% is accurate, it could indicate that public healthcare providers are not managing diarrhea according to the CB-IMCI guidelines. If the MICS data are accurate, it could indicate that the private sector trainings were insufficient to reach beyond the public sector. Additionally, the training programs conducted by POUZN and NFHP only included providers or private chemists, but not mothers. Face-to-face contact time with mothers might have been more effective for demand creation and behavior change. A final issue is that POUZN leadership changed hands after the first two years of the project, and NFHP leadership also changed in 2009. Continuity in leadership is important to maintaining a solid foundation for projects to succeed (MacDonald and Mitchell 2009).

Zinc coverage in Nepal has slowly increased, and these barriers to expansion may be overcome with the planned further research and additional time. However, to achieve wider coverage more quickly, Nepal requires renewed commitment from leadership, a focus on end users, and extended marketing for zinc therapy.



## APPENDIX 1:

### EVALUATION OF ZINC SCALE-UP EFFORTS ACROSS SIX KEY COMPONENTS

Component	Degree of success (H/M/L)	Drivers of success/failure
<b>Development of improved product (including pricing)</b>	M	<ul style="list-style-type: none"> <li>• Transfer of technology from French manufacturer</li> <li>• Competitive market with multiple local manufacturers kept prices low</li> </ul>
<b>Marketing campaign</b>	M	<ul style="list-style-type: none"> <li>• Multi-channel media campaign</li> <li>• POUZN- only 18 months, NFHP- only 3 months</li> <li>• Message increased awareness among those who heard it</li> <li>• Campaign increased demand outside of targeted districts</li> </ul>
<b>Regulatory change</b>	H	<ul style="list-style-type: none"> <li>• Director of Child Health Division facilitated diarrhea case management guideline revision to include zinc</li> <li>• Manufacturers met GMP standards</li> </ul>
<b>Improving private provider knowledge</b>	M	<ul style="list-style-type: none"> <li>• POUZN trained private chemists, but limited to 30 districts</li> </ul>
<b>Improving public provider knowledge and increasing supportive supervision</b>	H	<ul style="list-style-type: none"> <li>• NFHP trained all public providers</li> <li>• Included in IMCI training</li> </ul>
<b>Increasing availability of supply in the public and private sector</b>	H	<ul style="list-style-type: none"> <li>• 3 local manufacturers</li> <li>• Strong public supply system</li> <li>• Distribution limited by mountainous regions</li> </ul>
<b>Financing of scale-up</b>	M	<ul style="list-style-type: none"> <li>• Funding for both programs from USAID</li> </ul>





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