SOCIAL MARKETING RESEARCH SERIES

Nepal (2008): Zinc TRaC Survey

Round One

The PSI Dashboard

Kathmandu, Nepal
November, 2008

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Bottom Line Health Impact * Private Sector Speed and Efficiency * Decentralization, Innovation, and Entrepreneurship * Long-term Commitment to the People We Serve

Research Department
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Nepal (2008): Zinc TRaC Survey

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PSI Research Division

2008

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Acknowledgements

The fieldwork for this study was conducted by Blitz Media Pvt. Ltd., with technical assistance from Population Services International and financial support from the United States Agency for International Development (USAID). This publication was made possible through the support provided by USAID to Population Services International Nepal. The report may be freely received, quoted, reproduced or translated in full or in part, provided the source is acknowledged.

Summary

Background and Objectives Zinc TRaC Survey: Round One was conducted in July-October 2008 in order to provide quantifiable data upon which programmers can better design, manage, monitor and evaluate the POUZN program in Nepal. The study provides guidance for the development of an evidence-based, strategic, cost-effective behavior change intervention focused on increasing the use of zinc along with ORS (oral rehydration salts) for the treatment of diarrhea in children five years of age and under.

The purpose of the TRaC Zinc Round One was to answer the question:

- Among children ages five years and under, what determines the use of zinc in terms of opportunity, ability and motivation?

Specifically, the research objectives were to identify and describe one or more target groups in terms of:

a. Risk;
b. Behavior (use of zinc along with ORS);
c. Behavioral determinants (opportunity, ability and motivational (OAM) characteristics); and
d. Population characteristics, including media habits;

Methodology TRaC Zinc Round One was conducted in July-October 2008 with a total of 3550 respondents in POUZN program districts, via a structured questionnaire interview process. A multi-stage cluster sampling approach was used to draw a sample of households with children five years old and under living in the program area of selected districts.

PSI/Nepal used the TRaC methodology, which is designed to provide actionable evidence for decision making. The TRaC survey systematically and repeatedly measures levels and trends of indicators such as behaviors, behavioral determinants and population characteristics. The framework for development and construction of the variable for the behavioral determinants is based on the PSI Behavior Change Framework (Annex 2).

A pilot study was undertaken in Kavre district (this area was not sampled within the main survey) prior to the main study. The findings were used to conduct reliability analysis and to refine the measurement tool for the final study.

Main Findings The findings from the TRaC Zinc Round One are primarily depicted by the segmentation table and the monitoring table, which together are referred to as the dashboard. The

survey findings show that 6.9% of the children in the sampled households had diarrhea in last two weeks, 9.7% children had diarrhea in last one month and 1.1% had diarrhea with blood.

About half of the respondents had heard about zinc for the treatment of diarrhea. Seventy-two percent of the children who had diarrhea in the last one month preceding the survey were given ORS, 16.6% of the children received zinc and 14.6% received zinc along with ORS.

The most reliable and valid behavioral determinants for use of zinc for the treatment of diarrhea were found to be: availability and outcome expectations. The relationship between use of zinc by children five years old and under and the behavioral determinants are summarized below:

- Mothers/ care-givers with a higher perception of product availability are more likely to use zinc for the treatment of diarrhea;
- Mothers/ caregivers with higher outcome expectations for zinc are more likely to use zinc for the treatment of diarrhea;
- Higher socio-economic status households are more likely to use zinc for the treatment of diarrhea in children five years old and under as compared to their counterparts.

Programmatic Recommendations Based on the findings from the monitoring and segmentation analysis, the following key program recommendations are provided;

- Interventions should attempt to improve the opportunity to use zinc by increasing the availability of the product. Results show that mothers/ care-givers with a better perception of availability are more likely to use zinc for the treatment of diarrhea as compared to their counterparts.
- Interventions should attempt to increase the motivation to use zinc by addressing outcome expectations. Programmers should attempt to improve the belief that zinc is effective in the treatment of diarrhea in children.
- The program should target households with lower SES. The results show that this population is less likely to use zinc for the treatment of diarrhea.

Background

The 2006 Nepal Demographic and Health Survey (NDHS, 2006) reported that 12% of all children under five experienced diarrhea at some time in the two weeks preceding the survey, while 2% had diarrhea with blood. The incidence of diarrhea varies with the season—April to August being the high diarrheal incidence period. During this period, diarrhea treatment in public facilities peak at 90,000 episodes per month; even in low incidence months, treatment remained at 45,000 episodes per month (Annual Report, Department of Health Services, 2003/2004). NDHS 2006 reveals that prevalence of diarrhea is highest among children 6-11 months (22.6%) and 12-23 months (19.6%).

Although the knowledge of oral rehydration salt (ORS) was universal amongst women with a birth in the five years preceding the NDHS 2006, only 29% of children were treated with ORS during bouts of diarrhea and 22% were given increased fluids. Altogether 41% of children were given oral rehydration therapy (either ORS or increased fluids). Thirty-four percent of children under five received no treatment at all for diarrhea.

In 2002, WHO research identified zinc deficiency as one of the major risks to child health, linked with 10% of diarrhea cases, 6% of lower respiratory tract infections, 18% of malaria cases and accounting for 800,000 child deaths per year across the world. A substantial body of evidence has now demonstrated that, in conjunction with ORS/ORT, zinc therapy, given for a short period of at least 10 days during and after diarrhea, reduces the duration and severity of diarrheal episodes and can have a preventive effect against new infection in the subsequent two to three month period after treatment. In May 2004, WHO/UNICEF issued a joint statement on diarrhea management that endorsed the use of zinc supplements as a new, safe and effective, low cost treatment for diarrhea for children in the developing world.

Both public and private sector programs are being launched in Nepal to introduce zinc treatment to diarrheal disease management protocols. A public sector program launch in five pilot districts is in preparation. PSI has introduced zinc treatment in the private sector, primarily through pharmacies, drug sellers and other private sector service providers, beginning in the Kathmandu valley and continuing in the Terai regions of the country. Pharmacies are the most important providers of care in Nepal's private sector. According to the 2006 NDHS, 25% of children under five with diarrhea are taken to a pharmacy for treatment, while 15% are taken to government health facilities.

The TRaC Zinc Round One is a survey carried out to track certain indicators of interest—the use of zinc along with ORS for treatment of diarrhea in children and the behavioral determinants associated with use. The results from the survey will help program managers to monitor the dynamics of the behavioral determinants and population characteristics in influencing the outcome measures of interest by providing insight to develop appropriate behavior change strategy. The subsequent section of the report presents information on incidence of diarrhea, knowledge of zinc and use of zinc for the treatment of diarrhea.

Prevalence of Diarrhea

There were 4232 children five years old and under in the sample households, with an average of 1.2 children per household. Of these, information regarding the prevalence of diarrhea and behavior was collected on 4211 children. Overall, 6.9% of the children in the sampled households had diarrhea in the last two weeks, 9.7% children had diarrhea in the last one month preceding the survey, and 1.1% had diarrhea with blood.

Among children in the study, children 24-35 months of age were most susceptible to diarrhea. Similarly, male children, children whose mother/ care-giver had no schooling, children living in rural areas and those with non-improved or shared toilet facilities were more likely to suffer from diarrhea.

Table 1: Prevalence of diarrhea, TRaC Zinc 2008

	Diarrhea in the last 2 weeks %	Diarrhea in the last 1 month %	Fever in the last 2 weeks %	Diarrhea with blood %	Number of Children
Gender					
Male	7.2	10.3	6.2	1.3	2205
Female	6.5	9.1	4.6	0.9	2006
Age in years					
Less than 1 yrs	5.9	7.7	4.7	1.5	791
1yrs	6.3	11.0	7.4	1.2	815
2yrs	9.2	11.8	6.8	1.4	738
3yrs	9.0	12.2	5.0	1.3	721
4yrs	5.7	8.4	3.9	0.4	788
5yrs	3.6	5.0	3.9	0.8	358
Education of mother/ care-givers					
No Schooling	8.0	11.0	5.9	1.6	1705
Primary	7.1	10.8	7.0	0.8	659
Secondary	4.8	7.3	4.4	0.7	862
SLC and higher	6.5	8.9	4.4	0.9	985
Residence					
Urban	5.1	9.4	5.5	1.0	1372
Rural	7.7	9.9	5.4	1.2	2839
Source of drinking water					
Improved	6.9	9.8	5.4	1.1	4010
Not improved	7.0	8.5	6.0	2.0	201

Toilet facility					
Improved, not shared	6.5	9.5	5.2	1.1	2934
Non-improved or shared	7.6	10.2	6.0	1.2	1277
SES					
Lowest	7.9	10.5	6.3	1.5	858
Second	7.6	10.7	5.4	1.4	858
Middle	4.8	7.7	4.7	0.6	850
Fourth	6.4	8.9	4.8	1.1	835
Highest	7.7	11.0	5.9	1.0	810
Total	**6.9**	**9.7**	**5.4**	**1.1**	**4211**

Primary= having completed 1to 5 class; Secondary = having completed 6 to 9 class; SLC and higher = having completed class 10 or higher

Table 2 shows use of zinc and ORS for the treatment of diarrhea in children five years old and under by background characteristics. Seventy-two percent of the children who had diarrhea in the last one month preceding the survey were given ORS. Similarly, 16.6% of the children received zinc and 14.6% received zinc along with ORS.

Table 2: Use of zinc and ORS for treatment of diarrhea, TRaC Zinc 2008

	Use of Zinc %	Use of ORS %	Use of Zinc along with ORS %	Number of Children
Gender				
Male	16.2	71.9	13.7	228
Female	17.1	73.0	16.0	182
Age of child				
Less than 1 yrs	13.4	53.8	11.4	61
1yrs	17.8	70.2	15.5	90
2yrs	21.7	79.2	19.3	87
3yrs	13.5	75.9	12.6	88
4yrs	12.4	78.9	12.4	66
5yrs	27.3	72.9	15.9	18
Education of mother/ care-givers				
No Schooling	14.0	76.0	13.0	188
Primary	17.8	70.8	15.3	71
Secondary	14.0	76.0	13.0	63
SLC and higher	17.8	70.8	15.3	88
Residence				
Urban	14.0	76.0	13.0	129
Rural	17.8	70.8	15.3	281
SES				
Lowest	2.3	64.2	0.9	90
Second	12.9	70.9	12.0	92
Middle	10.7	66.2	10.7	65
Fourth	28.3	73.1	22.7	74
Highest	29.0	86.6	27.2	89
Total	**16.6**	**72.4**	**14.6**	**410**

Primary= having completed 1to 5 class; Secondary = having completed 6 to 9 class; SLC and higher = having completed class 10 or higher

The subsequent sections of the report present behavioral data analysis that focuses on monitoring and segmentation of the target population in order to derive conclusive results for evidence-based programmatic decisions.

Monitoring Analysis

Table 3: Percentage use of zinc and mean score for behavioral determinants
Risk: Children five years old and under
Behavior: Use of zinc for treatment of diarrhea

Indicators	
Behavior/Use	**%**
Diarrhea in last one month (n=4211)	9.7
Use of Zinc (n=410)	16.6
Use of ORS (n=410)	72.4
Use of Zinc along with ORS (n=410)	14.6
Opportunity	**Mean**
Availability*	4.00
Ability	**Mean**
Knowledge	4.71
Motivation	**Mean**
Outcome Expectation*	4.04
Exposure	**%**
Heard of zinc (n=3550)	49.9
Heard of zinc in radio in last 3 months	28.2
Heard of zinc in TV in last 3 months	40.3

Note: For behavioral determinants and individual measures under opportunity, ability, and motivation, mean scores can be interpreted on a scale range from 1 (strongly disagree, low level of the determinant) to 5 (strongly agree, high level of the determinant). Standard deviations for these variables are available.
* Response for questions on availability and outcome expectations has been given only by those who have heard of zinc.

The monitoring of populations is the process of assessing the levels and trends of behavioral indicators relating to opportunity, ability and motivation, as well as exposure to social marketing activities over time in the segmented population.

The monitoring table (Table 3) presents the current behavior (use of zinc), the determinants of behavior, and exposure to program interventions. The table contains the indicators in the first column and the percentage or mean scores for the corresponding indicators in the second column. The percentages are presented for questions related to incidence, use and exposure. They reflect percentages of children behaving and percentages of respondents (mothers/ care-givers) exposed to the intervention. Mean scores are presented for statements used to measure opportunity, ability and motivation factors and reflect respondents' level of agreement with the statements, where respondents were asked to "strongly disagree" (1), "disagree" (2), "neither agree nor disagree" (3), "agree" (4) and "strongly agree" (5). The interpretation of the results should focus on the mean scores for the behavioral variables that provide the baseline information. This information becomes more meaningful when the data from a subsequent round of study is collected and a comparative analysis is carried out to examine whether the value of the indicator considered is moving forward or backward.

In the case of successful program implementation, the overall mean scores for the behavioral variables would show an increase.

About 1 in 10 children five years old and under had diarrhea in the last one month preceding the survey. The behavior measured in this study is use of zinc for the treatment of diarrhea in children five years old and below. Among these children (n=410), 16.6% were treated with zinc. Similarly, 72.4% were treated with ORS solution, and 14.6% received both ORS and zinc treatment.

Opportunity

Opportunity is institutional or structural factors that influence an individual's chance to perform a promoted behavior. Opportunity can be further described in terms of certain behavior change indicators such as product availability. Availability is the extent to which the promoted product or service is found in a predefined given area. In TRaC Zinc 2008, mothers/ care-givers who had heard about zinc (49.9%) were asked about the perceived availability of zinc in their community. The mean score value of 4.00 indicates that, on average, the perception of zinc availability was high amongst mothers/ care-givers.

Ability

Ability is an individual's skills or proficiencies needed to perform a promoted behavior. Knowledge of mothers/caregivers regarding the causes and management of diarrhea in children was assessed in the survey. The monitoring analysis indicates that knowledge was high among mothers/care-givers (mean score of 4.71).

Motivation

Motivation is an individual's arousal or desire to perform a promoted behavior; in this case use of zinc for the treatment of diarrhea in children. Outcome expectation was found to be related to the use of zinc in the segmentation table. Outcome Expectation is the belief that an object or action is effective in fulfilling its purpose. The mean score of 4.04 demonstrates high expectation that zinc is effective for the treatment of diarrhea amongst mothers/ caregivers.

Exposure

About half of the mothers/ care-givers in the survey had heard about zinc. A higher proportion of respondents had heard about zinc from television (40.3%). Similarly, 28.2% of the respondents had heard about zinc from radio.

Segmentation Analysis

Table 4: Behavioral determinants of use of zinc, TRaC Zinc 2008
Risk: Children five years old and under
Behavior: Use of zinc for treatment of diarrhea among those reporting diarrhea in past one month

Indicators	User (n=68)	Non-user (n=342)	Odds Ratio
Behaviour -Use of Zinc for treatment of diarrhea in past one month (N=410)	16.6%	83.4%	
Opportunity	**Mean**	**Mean**	
Availability	4.36	3.98	4.03*
Motivation	**Mean**	**Mean**	
Outcome Expectations	4.20	4.05	1.95**
Population Characteristics	**%**	**%**	
SES (high++ vs low)	71.8	40.6	3.31*

Note: For behavioral determinants under opportunity, ability, and motivation, mean scores can be interpreted on a scale ranging from 1 (strongly disagree, low level of the determinant) to 5 (strongly agree, high level of the determinant).
** p< .05 and * p<.001 ++ refers to reference category.
Segmentation analysis was conducted with those households who had reported children with diarrhea in the previous one month. Among these households, for those that had not heard of zinc, the SPSS imputation function was used to establish values for the determinants.

Segmentation is the process of dividing a heterogeneous population into homogenous groups, whose profile informs marketing planning objectives and strategies aimed at achieving purpose level indicators in a logical framework.

In the above table (Table 4), the column divides the risk population into those who had had diarrhea in the past one month and had received zinc treatment and those who did not receive zinc treatment. The forth column has adjusted odds ratios. The odds ratios are interpreted as relative risk and are expressed in terms of times rather than the probability of the outcome events occurring. The row is divided into three major categories. The first and second categories are behavioral determinants, which are drivers or inhibiters of behaviors that are mutable or can be changed by social marketing (Patel and Chapman, 2004). Under opportunity, for example, perception of availability was related with use of zinc, and under motivation, outcome expectation was also related with use of zinc.

The basis for computing this table is that if those who do not behave can be helped through social marketing to perceive the world as those who do behave, then this would trigger a change in their behavior. The conclusion then for social marketers is to identify those drivers or inhibiters which would trigger a behavior change.

A third category in the table above is population characteristics. These are non-mutable determinants (or drivers and inhibiters) of behavior, such as socio-economic status. While these are regularly correlated with many different types of preventive behaviors, social marketing is unable to change them. Social marketers are however still interested in them as they play an important role in identifying specific groups in developing strategies for the program.

The priority audience, in the segmentation table, is the children five years old and under reporting diarrhea in the past one month. The dependent variable of interest is whether children received zinc

for treatment of diarrhea. Logistic regression analysis was conducted to explore the relationship between usage of zinc and behavioral determinants among vulnerable populations. Mean scores, adjusted percentages and odds ratios of determinants that were found to be statistically significant are shown in the segmentation table (Table 4). Determinants that were reliable and valid through scaling and statistically correlating with behavior, use of zinc, are included in the segmentation table; other determinants were excluded in the final model. Excluded behavioral determinants and population characteristics should be given no or lesser priority for programming.

The results show that availability of zinc and outcome expectations were significantly associated with the use of zinc for treatment of diarrhea. The perception of availability of zinc was higher among mothers/ care-givers who used zinc to treat diarrhea compared to non-users (mean score of 4.38 vs. 3.98, OR=4.03, $p<0.001$). This implies that mothers/ care-givers with better perception of availability of product are more likely to use zinc for the treatment of diarrhea.

The belief that the use of zinc is effective in the treatment of diarrhea in children was higher among mothers/ care-givers who used zinc for the treatment of diarrhea in their children (4.20 vs. 4.05, OR=1.95, $p<0.05$). This finding signifies that mothers/ care-givers with higher belief of product effectiveness (outcome expectation) are more likely to use zinc for the treatment of diarrhea.

Of the population characteristics measured in the survey, socio-economic status was a significant determinant of zinc use. Users were 3.31 times more likely to have higher socio-economic status than the non-users. This implies that zinc is mostly being used by households with higher socio-economic status.

Programmatic Recommendations

Of the reliable and valid behavioral determinants and population characteristics, availability, outcome expectations and socio-economic status are significantly correlated with use of zinc for the treatment of diarrhea by children five years old and under in the program areas. These determinants should be addressed by PSI program activities. Other behavioral determinants and population characteristics should not be considered for programming purposes. The study suggests that the following statements regarding the behavioral determinants and population characteristics should be considered in order to make evidence-based programming decisions:

- Mothers/ care-givers with higher perception of product availability are 4.03 times more likely to use zinc for the treatment of diarrhea;
- Mothers/ caregivers with higher outcome expectations for zinc are 1.95 times more likely to use zinc for the treatment of diarrhea;
- Higher socio-economic status households are 3.31 times more likely to use zinc for the treatment of diarrhea in children five years old and under as compared to their counterparts.

Based on the findings, the following recommendations are provided. While the use of ORS for the treatment of diarrhea was moderate, use of zinc alone or use of zinc along with ORS was very limited. Moreover, only about half of the respondents in the sampled area had heard about zinc. Thus it is necessary to increase awareness and benefits of zinc for the treatment of diarrhea.

The availability of the zinc should also be improved in the program areas. Both the initial rapid assessment of sampled areas and the survey field report reveal low availability of the product. It is essential that zinc be widely available for the success of the program.

Segmentation analysis reveals perception of availability, outcome expectations and SES to be significantly associated with the use of zinc for the treatment of diarrhea. Therefore, the following key points should be considered for programmatic interventions:

- Interventions should attempt to improve opportunity to use zinc by improving the availability of the product. Results show that mothers/ care-givers with better perception of availability are more likely to use zinc for the treatment of diarrhea as compared to their counterparts.
- Interventions should attempt to increase the motivation to use by highlighting outcome expectations. Programmers should attempt to improve the belief of zinc effectiveness in the treatment of diarrhea for children.
- The program should target households with lower SES. The results show that this population is less likely to use zinc for the treatment of diarrhea as compared to their counterparts.

The study is designed to collect information repeatedly and on a cross-sectional basis in order to better segment, monitor, and evaluate the target population and behavior change interventions in a more strategic, efficient, and timely manner. The TRaC Zinc Round Two should be conducted after behavior change interventions based on the findings of this study have been implemented in the program areas.

Annex 1: Methodology

A multiple time cross-sectional study design was used to identify determinants of behavior, monitor progress and evaluate programmatic impact. The TRaC Survey will be conducted at least once a year however survey can also be conducted more frequently based on programmatic needs for making decision.

A representative sample of target population was drawn for the survey. This process will be followed in the each of the subsequent surveys in order to ensure comparability of data for trend analysis. The largest sample size will be used unless it is found to be financial prohibitive in which case the sample size that matches with financial resourced will be chosen.

Sample size calculation

The calculation of sample size required for this study is based on the fact that its main aim is to produce dashboard tables, namely for monitoring and segmentation purposes. In the subsequent rounds of the TRaC Survey sample size for evaluation will also be taken into account. Each table requires a specific approach to computing sample size. Therefore the minimum required sample size for each table will be calculated and the maximum of the three will be taken as the final sample size for the study.

Monitoring: Monitoring studies compare values of given indicators at different times. For example, Logical Frameworks set to compare values of key indicators at baseline and end-of-project. In particular, tracking surveys are expected to be conducted once a year. The required sample size for each year of the program is therefore calculated using the formula

$$N = \frac{deff \times \left[Z_{1-\alpha}\sqrt{2*.P(1-P)} + Z_{1-\beta}\sqrt{P_1(1-P_1) + .P_2(1-.P_2)}\right]^2}{(.P_2 - P_1)^2}$$

Where

P_1 is the hypothesized value of the indicator at year X
P_2 is the expected value of the indicator at year X+1
$P = (P_1+P_2)/2$
Z_α is the standard normal deviate value for an α type I error
$Z_{1-\beta}$ is the standard normal deviate value for a c type II error
Deff is the design effect in case of multi-stage cluster sample design

Segmentation: Segmentation studies compare values of a given behavioral determinant (bubble) between users and non users among population at risk. It requires therefore taking into account not only the level of use, but also the level of risk. Sample size for segmentation studies are computed in tow main steps.

Step 1: determine the required number n1 of behavers (users) among the population at risk, using and adapted version of the monitoring formula. Unlike the monitoring case, P_1 here refers to the percentage of users that are positive for the given behavioral determinant while P_2 refers to the percentage of non-users that are positive for the same behavioral determinant. All other parameters remain similar.

Step 2: compute the required number of subjects at risk and derive the required sample size using the proportion of people that behave (among at risk) and then the proportion of people at risk (among general target population). If P_u and P_r are those proportions respectively, then the required sample size can be computed using the formula

$$n = \frac{n_1}{p_u * p_r}$$

Evaluation: Evaluation studies compare indicator values (for example behavior or behavioral determinants) between people who are exposed to program activities and those who are not exposed among populations at risk. It is therefore similar to the segmentation approach. This approach will be applied after the program activities have been implemented.

Thus, the sample size is calculated based on the following:

1. The primary outcome of interest for the study is use of zinc for diarrheal disease treatment and control. As the estimate of the population parameters is not know we assume this proportion to be 50 percent, this also maximizes the needed sample size (in other words, if the proportion answering yes to use of zinc is assumed to be less or more than 50 percent, the sample size could be reduced, while maintaining the same level of precision +/- 5 percent).
2. An evaluation will be carried out one year in future and, it is assumed that at that time, the proportion reporting use will increase by ten percent. If that (or a higher level of increase) occurs, then the evaluation will have a power of 80 percent, and a Type 1 error of five percent, to detect that level of change. Any real change of less than ten percent will not be able to be measured.

3. The NDHS 2006 reported that 12% of all children under five experienced diarrhea at some time in the two weeks preceding the survey however using this figure would give sample size that is not feasible both programmatically and financially. Thus assuming that all children under age of five years are at risk. Similarly, nearly 30% of children were treated with ORS during bouts of diarrhea. Therefore assuming the value for the proportion of people who would use zinc for treatment of diarrhea (among at risk) as 30 percent for segmentation studies.

In this instance, the design effect (deff) is taken as 2, P ((P_1 - P_2)/2) is 55, P_1 – the proportion reporting use in the time one is 50, P_2 – the proportion expected to report use in the next round is 60, $Z_{1-\alpha}$ (where α = Type 1 error) is 1.645, and $Z_{1-\beta}$ (where β = statistical power to detect an increase – or a one-sided change) is 0.84. Taking proportion of people at risk as 12% and proportion that behave, among at risk, as 50%. This gives sample size of 2237.

From DHS 2006, proportion of children under five per household interviewed is 63% (number of children under five/number of households). Therefore the required number of household in the sample:

N=3550 households.

Sample selection process

This study design calls for a multi-stage cluster sampling approach. All program areas (VDCs/MCs) of thirty districts with the zinc program were used to construct the sampling frame. In the first stage, VDCs/MCs with the zinc program were selected using the principal of probability proportion to size. There are nine wards in each VDC and more than nine wards in each MC, which is defined as a cluster hereafter. Rapid assessment was conducted to check the availability of zinc tablets within each of the wards. The findings revealed that zinc tablets were not available in all of the wards of the sample VDCs/MCs. Thus in the next stage, a list of wards with zinc tablets available was prepared for each sampled area. Then, wards with zinc available were randomly chosen from this list. In each selected ward, 30 households were drawn using the principal of systematic random sampling to administer the structured questionnaire. In each selected household, mothers/ care-givers of children five years old and under were selected and interviewed. Mothers were chosen for the interview as they are the primary caretakers of children with diarrhea and would be able to respond to the survey questionnaire. In households with more than one eligible respondent, all eligible respondents were chosen for the interview.

Data collection tool

A structured Social Marketing TRaC Survey questionnaire was used for data collection to 1) identify determinants of behavior, 2) monitor key indicators including purpose and output level logical framework indicators. The instrument included questions on socio-demographic variables, determinants of behavior, behavior and exposure to various interventions.

Behavioral determinants were measured using multi-item scales. These scales were developed based on PERForM (see Annex 2) and validated first through a pilot survey of approximately 100 respondents to determine the extent to which the scales correlate with the outcome of interest, have sufficient variation, and items within scales correlate. Exploratory factor analysis was used to examine the dimensionality of the scales. If scales were found to be multi-dimensional, reliability analysis was conducted for each dimension identified and a decision on whether or not to keep all dimensions was made based on the results. Scales with low reliability scores were revised by making sure that all items reflect the construct definition and adding new items as needed.

Annex 2: Theoretical Framework

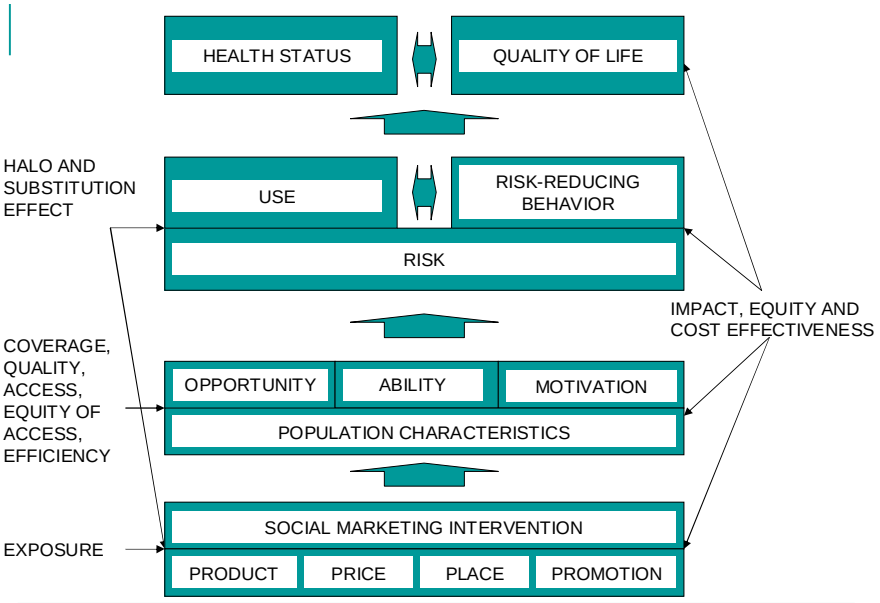
The TRaC:Zinc Phase Three study design is based on PERForM: the PERformance Framework for Social Marketing (Chapman and Patel, 2004). PERForM has been developed through a review of the most important theories of behavior change in existing literature, including the Andersen's model of utilization of health services (Andersen, 1995), the health belief model (Rosenstock, 1974), the theory of reasoned action (Fishbein and Ajzen, 1975), the social learning theory (Bandura, 1977), and the concept of locus of control (Rotter, 1966). PERForM analyzes the major determinants of health behaviors by categorizing them in terms of opportunity, ability and motivational factors.

The framework has four levels that mirror the logical framework. The top level consists of the goal of social marketing for any health promotion intervention, namely improved health status and or, for interventions relating to coping with sickness or disability, quality of life.

The second level consists of the objectives of social marketing stated as product or service use on the left side and or other risk-reducing behaviors that do not involve the use of a product or service on the right side. The adoption or maintenance of these behaviors in the presence of a given risk or need for health services is causally antecedent to improving or maintaining health and or quality of life.

The third level consists of the determinants of behaviour summarised in terms of opportunity, ability and motivation that may differ by population characteristics such as age and sex. The fourth level consists of the characteristics of the social marketing intervention.

Figure 1: PERForM "PERformance Framework for Social Marketing"

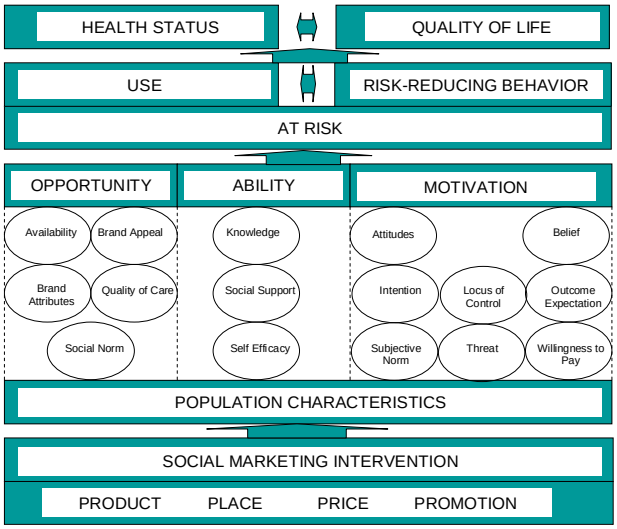


The framework describes the applications of a TRaC Survey in the social marketing process.

1. Segmentation: At this stage of the social marketing process, the omnibus survey measures opportunity, ability, and motivational constructs that are theoretically and empirically associated with behaviours known to be positively associated with health status and quality of life among those with risk.

- Opportunity is institutional or structural factors that influence an individual's chance to perform a promoted behavior. Opportunity behavioral determinants are mutable by the social marketing agency, outside the control of the individual, and can be measured objectively (i.e. measured responses typically not elicited from the target individual) and subjectively (i.e. measured responses elicited from the target individual). These behavioral determinants are: availability, brand appeal, brand attributes, quality of care, and social norm.
- Ability is an individual's skills or proficiencies needed to perform a promoted behavior. Ability behavioral determinants are mutable by the social marketing agency, are controllable by the individual, and can be demonstrated (or have the potential to be seen) through some action. These behavioral determinants can be measured objectively (i.e. measured responses not elicited from the target individual) or subjectively (i.e. measured responses elicited from the target individual), or both and they are: knowledge, self efficacy, and social support.
- Motivation is an individual's arousal or desire to perform a promoted behavior. Motivation factors are mutable by the social marketing agency, are wholly within the control of the individual, and are not demonstrable. Motivation behavioral determinants can only be measured subjectively (i.e. measured responses elicited from the target individual), and they are: attitude, belief, intention, locus of control, outcome expectation, subjective norm, threat (risk), and willingness to pay.
- Segmentation can be done at one or more levels. At a minimum, populations are segmented using risk and behavioural measures, permitting comparisons of those who behave healthily by those who do not conditional upon expertly defined categories of risk, such as sexual risk behaviour. In addition, segmentation can be extended to include cross tabulations by measures of opportunity, ability and motivation. Statistical models that permit the identification of opportunity, ability and motivational differences between those who behave and those who do not, given a set of population characteristics, provide the most information for strategic, project and marketing planning.

Figure 2: PSI Behavior Change Framework



2. Monitoring. Quantitative research strategies are used to monitor exposure to the social marketing intervention, changes in the known determinants of behaviour in terms of opportunity, ability and motivation.

Evaluation. Social marketing performance is evaluated in terms of eight primary measures for evaluating social marketing performance, including:

a. Effectiveness is defined as a casual association between the activities level (social marketing interventions) and changes at outputs (opportunity, ability and motivation), purpose (behaviour) and or goal level (health status and or quality of life), given need, and adjusting for other influencers of behaviour.

b. Cost effectiveness is defined as the cost at the social marketing interventions of producing a marginal change at goal, purpose and outputs.

c. A substitution effect is a negative, unintended impact in which one behaviour is increased, but use of an equally beneficial behaviour is decreased. In HIV/AIDS programs, for example, policy makers seek to monitor a specific type of substitution effect known as disinhibition in which potentially a campaign aimed at increasing the use of condoms may be found effective, but also results in a decrease in risk reducing behaviour such as abstinence or fidelity to one sexual partner.

d. A halo effect is a positive, unintended impact in which efforts to increase one behavior also results in increases in other, positive behaviours.

The evaluation part however can be worked out only when data from two consecutive surveys are available.

Annex 3: Reliability Analysis

Table A3.1: Reliability Analysis, Zinc TRaC 2008

Behavior Change Determinants	Cronbach's Alpha	# of Items
Availability	0.85	5
Knowledge	0.85	5
Outcome Expectations	0.78	6

Measures for reliability (Cronbach's alpha) and validity (# of items)

Annex 4: Items within Significant Behavioral Determinants

Table 4.1: Items within Significant Behavioral Determinants, TRaC Zinc 2008

Opportunity: Availability
Shops nearby here always have zinc tablets for sale.
Zinc tablets are difficult to get around here. **[R]**
There is a place nearby where I can get zinc tablets when my child needs them.
I don't know where to get zinc tablets. **[R]**
Zinc tablets are available within walking distance from my home.
Motivation: Outcome Expectations
Zinc tablets are ineffective for treatment of diarrhea. **[R]**
Zinc reduces the duration of diarrheal episode.
Zinc does not help in reducing the severity of diarrheal episode. **[R]**
Use of zinc reduces the risk of dehydration in children.
Zinc reduces the risk of new diarrheal episode in the following 2 to 3 months.
Zinc helps to strengthen the immune system of children.

[R] indicates response for these statements were reverse coded for the monitoring and segmentation analysis.

Annex 5: Tables

Table A5.1 Sample distribution by district, Zinc TRaC 2008

District	Sample Size	Percent
Jhapa	270	7.6
Morang	330	9.3
Sunsari	210	5.9
Dhankuta	60	1.7
Sankhuwasabha	90	2.5
Saptari	92	2.6
Dhanusa	120	3.4
Mohattarai	60	1.7
Sarlahi	90	2.5
Kavre	61	1.7
Lalitpur	152	4.3
Bhaktapur	90	2.5
Kathmandu	452	12.7
Nuwakot	30	0.8
Makwanpur	91	2.6
Bara	90	2.5
Tanahu	90	2.5
Kaski	121	3.4
Parbat	60	1.7
Nawalparasi	120	3.4
Rupandehi	210	5.9
Dang	151	4.3
Banke	90	2.5
Bardiya	150	4.2
Kailali	180	5.1
Kanchanpur	90	2.5
Total	**3550**	**100.0**

Table A5.2 Proportion of household by source of water, Zinc TRaC 2008

	Percent
Piped into yard/plot	55.8
Public tap/Standpipe	22.6
Piped into house	14.8
Protected well	1.7
Kuwa	1.6
Stone tap/dhara	1.2
Unprotected well	1.1
Others	1.4
Total	**3550**

Table A5.3 Toilet facilities in the household, Zinc TRaC 2008

	Percent
Flush to piped sewer system	12.9
Flush to septic tank	34.2
Flush to pit Latrine	3.9
Flush to somewhere else	0.5
Flush don't know where	0.1
Ventilated improved pit latrine	9.0
Pit Latrine with slab	10.4
Pit Latrine without slab	3.1
Composting toilet	0.2
Bucket toilet	0.5
No facility/bush/field	25.3
Total	**3550**

TableA5.4 Educational attainment of respondents, Zinc TRaC 2008

	Percent
Primary	15.9
Some Secondary	20.8
SLC and higher	24.4
No Education	39.0
Total	**3550**

TableA5.5 Frequency of exposure to mass media, TRaC Zinc 2008

Mass Media Channel	Newspaper/ Magazines (%)	Radio (%)	Television (%)
Daily	17.7	47.0	59.6
At least once a week	21.8	14.8	8.9
Less than once a week	20.6	10.3	6.4
Never	39.9	27.9	25.1
Total	**2233**	**3550**	**3550**

Table A5.6 Background Characteristics of Respondents, TRaC Zinc 2008

Background Characteristics	Percent	Number of Women
Age		
15-19	5.0	176
20-24	34.1	1212
25-29	35.6	1263
30-34	13.9	495
35-39	6.3	224
40-44	1.6	58
45 and more	1.2	43
Missing	2.2	79
Education		
No schooling	39.0	1383
Primary	15.9	565
Some Secondary	20.8	737
SLC and higher	24.4	865
Religion		
Hindu	87.9	3121
Buddhist	5.7	204

Muslim	4.5	158
Kirat	0.9	33
Christian	0.9	31
Residence		
Rural	66.9	2374
Urban	33.1	1176
SES		
Lowest	20.0	710
Second	20.0	710
Middle	20.0	711
Fourth	20.2	718
Highest	19.7	701
Total	**100.0**	**3550**

TableA5.7 Exposure to zinc, TRaC Zinc 2008

	Heard of zinc (%)	Total
Number of Children five years and below		
1	42.0	2889
2	7.8	641
3	0.1	19
4	0.0	1
Education of mother/ care-givers		
Primary	7.4	565
Secondary	12.3	737
SLC and higher	18.9	865
No Schooling	11.3	1383
Residence		
Urban	18.7	1176
Rural	31.2	2374
SES		
Lowest	4.4	710
Second	8.3	710
Middle	11.0	711
Fourth	12.8	718
Highest	13.4	701
Total	**49.9**	**3550**

TableA5.8 Name of zinc brand used for treatment of diarrhea, TRaC Zinc 2008

Brand Name	Percent
Z-Dis 20	37.9
Z-Dis 10	21.2
Zincova 20	7.6
Zinc-DT 10	4.5
Zinc DT 20	3.0
Zinc Fant 20	1.5
Don't know	27.3

Table A5.9 Source of zinc used for treatment of diarrhea, TRaC Zinc 2008

Source	Percent
Hospital	25.4
Health Post/Sub-health post	27.0
Private Clinic/Nursing Home	30.2
Private Pharmacy	39.7
FCHV	12.7

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