The NicaSalud Network:
Restoring Community Health Activities in Nicaragua after Hurricane Mitch
A Final Evaluation (December 1999-October 2001)

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Contents

CHARTS

TABLES

SUMMARY

The NicaSalud Network began in September 1999, as a USAID funded project that combined the efforts of a group of national and international organizations present in the country to restore and protect the health of the population affected by Hurricane Mitch.

Currently, the organizations making up the NicaSalud Networks are grouped in three sub networks: 1) Pacific (León and Chinandega): Asociación para el Desarrollo de los Pueblos (ADP), PLAN, Fundación Hablemos de Nosotras, Save the Children y Centro de Mujeres Ixchen; 2) Las Segovias (Madriz, Estelí y Nueva Segovia): CARE, ADRA, CEPS, INPRHU Somoto, FUNDEMUNI; and 3) Jinotega: CRS, Project HOPE, Wisconsin Partners of the Americas, PCI, Alistar de Nicaragua y Compañeros de las Américas.

NicaSalud's members implemented health projects for high priority populations (women of childbearing age, children under 5, and adolescents). The projects were located in 31 municipalities in 8 departments of the country, giving coverage to a population living in 736 communities and/or barrios.

This document reports the results of the final evaluation carried out in September 2001 and compares them with the baseline studies of 1999 for the PVOs and in 2000 for the NGOs.

The methodology used for the evaluation was the same one used for the baseline studies: Lot Quality Assurance Sampling *LQAS.* NicaSalud coordinated refresher training and standardized the questionnaires.

The geographic area for each project was divided into Supervision Areas (SA) and a systematic random sample of 19 observations was collected in each SA for each group defined by each organization: children from 0 to 11 months, mothers with children from 12 to 23 months, women from 15 to 49 years old who were not pregnant, men from 15 to 49 years old, adolescents, and youth 15-24 years old. All data were entered into a computer database using EPI INFO, Version 6.04d.

SAFE MATERNITY AND CARE OF NEWBORNS

Prenatal Care

In NicaSalud (PVOs and NGOs) 59.7% of mothers presented their maternal health card to the interviewer. Of the remaining mothers, 10.5% had lost their card, 3.6% had it in another household, 12.1% mentioned they had never had a card, and the remaining 14% had given their cards to MINSA.

For all NicaSalud, 55.7% of mothers had at least one antenatal care visit (ANC) by a qualified health staff. Mothers with maternal health cards in NicaSalud had on average 4.5 visits with a median of 5. The data for PVOs shows an increase in the proportion of mothers having had at least one ANC visit: 46% at baseline and 61% in the evaluation. No significant variation was detected for NGOs.

According to the maternal health card, only 1.1% of the women in NicaSalud were vaccinated against tetanus toxoid, which included 5% and 0.6% for PVOs and NGOs, respectively. These results are lower than at the baseline, which were 10% and 22%, respectively. The 90.7% of women with children 0-11 months mentioned that the vaccine protects the newborn. For PVOs, the percentage

was 94%, a significant increase over the baseline (47%). NGOs had a similar percentage (86%) to the baseline result.

For PVOs only, 86.4% of mothers with children 0-11 months said they had received iron during their most recent pregnancy, a significant increase from the baseline (71%).

A third of the women 15-49 not pregnant (33.1%) mentioned at least two danger signs during pregnancy that require immediate referral to a health facility. The proportions for PVOs and NGOs respectively were 33% and 33.6%. With respect to the baseline, PVOs show a significant increase of 12% while NGOs had a 5.4% reduction.

Delivery

For all of NicaSalud, 62.8% of the deliveries of mothers with children 0-11 months were attended by qualified health staff. PVOs display an increase of 18.5% while NGOs had an increase of 16.2%.

In the final evaluation, in PVO areas, the proportion of deliveries attended by TBA did not change (24.2%) . However, in NGO areas, the TBAs attended 50% of deliveries.

For NicaSalud, 60.6% of the births were attended in a health institution, while 39.2% occurred at home. The PVOs showed an increase over the baseline of 13% of deliveries occurring in a health institution. By contrast, NGOs displayed a smaller proportion of institutional births both in the baseline and in the evaluation (35% and 39% respectively. In NicaSalud, 32.6% of the women mentioned at least two delivery danger signs.

Post Natal Care

Postnatal care increased in 36.8% for PVOs and 42.3% for NGOs. PVOs also asked the mother if she had received information about family planning during the post-natal visit. 77.9% responded affirmatively, this result represents a significant increase when compared with the baseline result of 40%. Results for PVOs show a statistically significant increase in the proportion of mothers who said they received Vitamin A after giving birth (28% to 40.8%).

Care of Newborns

The 88% of mothers with children 0-11 months reported that in the first week of life, their child showed no signs of complications with the umbilical cord. Both PVOs and NGOs had similar results. PVOs reveal an 10.4% increase above the baseline (77% vs 87.4%) while NGOs did not (91.5% vs 86.4%).

In NicaSalud mothers with children 0-11 months reported that 82.6% of the newborns had a consultation with qualified health staff. PVOs (85.9%) realized an increase over the baseline of 15.9%, while NGOs (78.7%) increased the proportion by 35.7%. Both results are statistically significant.

Child Spacing

The 61.1% of women 15-49 not pregnant said they used a contraceptive method. Among women residing in the PVO areas, 69.4% used a contraceptive method, which is an increase of 13.4% over the baseline result. 96.8% of those women knew mentioned at least three contraceptive methods. For PVOs, 98.2% knoew 3 or more methods which represents an increase of 35.2%.

The main contraceptive methods mentioned were: pills 90.1%, injections 87.6%, and condoms 79.9%. With respect to knowledge of where to obtain contraceptive methods, 90.7% of women mentioned at least one place. The places mentioned most frequently were: Health Center (53.3%), Health Post (41.6%), and pharmacies (12.4%). Of the women who did not use an FP method, 13.7% signaled that it was difficult to obtain them, and 6.8% did not know a single method.

CHILD SURVIVAL

Growth Monitoring

For NicaSalud, 89.1% of mothers with children 0-11 months showed their child's card, which indicate that these children were taken to a MINSA health facility at least once for growth monitoring. PVOs and NGOs exhibited increases over their baselines (78% to 89.1%, and 81.7% to 89.6%, respectively). The 73.6% had had their growth monitoring session within the last two months. The PVOs maintained their baseline percentage of 73%, while the NGOs achieved a significant increase of 21%.

Immunization

A high percentage (94.6%) of all mothers interviewed with children from 12 to 23 months old showed the vaccination card for their child, which represents a significant increase over the baseline for PVOs and NGOs.

In NicaSalud, the coverage with BCG was 91.1%, for PVOs the coverage was 91.7%, which is a significant increase over the baseline of 82%. Coverage also increased among NGOs (86% to 90.3%).

The coverage with Pentavalent was 89%. When it is compared with DPT, the vaccine used during the baseline, both PVOs and NGOs show an increase of 13.1% and 5.9%, respectively.

MMR coverage for all NicaSalud was 83.9%. PVOs had an increase of 9.8% while NGOs increased by 4.9% over the baseline.

To be considered as fully vaccinated a child needs to have had the complete basic regime, including one dose of BCG and at least three doses of polio and three of pentavalent. The coverage with this criteria was 88%. PVOs realized an increase over baseline of 17.2%, while the NGOs increased the proportion by 11.8%.

Breastfeeding and Complementary Feeding

The 76.4% of PVO mothers with children 0-11 months reported having begun breastfeeding in the first hour after giving birth, which is a statistically significant increase of 13.4% over the baseline. NGOs did not report data for this indicator.

The 61.1% of children 0-5 months were exclusively breastfed. In PVO areas exclusive breastfeeding increased by 27.4% from a baseline value of 35%. Exclusive breastfeeding declined as the child grows older. In addition to breastfeeding, a greater proportion of children tend to consume other liquids and solids, especially when they are 3 months old.

In NicaSalud, 64.8% of mothers with children 12-23 months were still breastfeeding. The PVOs had an increase of 13% over the baseline, while in NGO areas a 13.8% increment occurred.

Diarrhea Case Management

In NicaSalud, 24.6% of mothers with children 0-23 months reported that their child had diarrhea in the previous two weeks to the interview. PVOs reported 24.6% and the NGOs 24.7%, which are significantly smaller diarrhea prevalences than reported during the baselines.

When mothers were asked what kind of treatment they gave their children for diarrhea, 59.4% said they used oral rehydration salts. PVOs displayed a significant increase from the baseline (19% to 60%). NGOs also displayed an increase although it was not significant.

The 38.8% of the mothers interviewed had ORS in their home at the time of the interview. Also, when the mothers were asked where they got this product if needed, the responses in order of frequency were the following: Casa Base or Community Oral Rehydration Units-UROCs (44.6%), Health Center (44.1%), health promoters (33.7%), and health posts (17%).

For the baseline, the PVOs considered preparation correct when the mother mentioned and carried out three steps (use of one envelope of salts, use of one liter of water, and mixing until completely dissolved). In the evaluation, PVOs showed a significant increase in the proportion of mothers preparing the oral salts correctly (43% to 77.9%)

NGOs required the mother mentioned five steps (wash hands, boil or chlorinate the water, use one envelope of salts, use one liter of water, and mix until dissolved completely). In the evaluation, 53.8% explained using the 5 steps, which is an increase of 45.8% over the baseline of 8%. When behavior was assessed, 72.2% of mothers prepared the ORS correctly, which is an increase of 61.2% from the 11% baseline.

The 78.8% of mothers interviewed for NicaSalud mentioned at least two danger signs. For PVOs, 77.8% of mothers knew two or more danger signs, a significant increase over the baseline of 43%.

Acute Respiratory Infections (ARI)

Almost half (48.2%) of mothers with children 0- 23 months reported that their children had had a respiratory infection (cough and rapid breathing) in the two weeks prior to the interview. For the PVOs and the NGOs, the prevalence of respiratory ailments was similar: 50.4% and 47.3%, respectively

Mothers with children 0-11 months were asked about ARI danger signs in a child that would have her urgently visit a health unit. PVOs considered three danger signs (rapid breathing, intercostal in-drawing, and not being able to drink or breastfeed) and obtained an increase of 30% over the baseline (5% to 35%). For NGOs a reduction of 39% was found.

In NicaSalud, 71% of mothers with children with respiratory infections sought help or treatment in a health facility. At the baseline, PVOs had 32%, which increased to 71.5% in the evaluation. While PVO increase is significant, there was no significant difference for the NGOs, with 70.8% in the baseline study and 65.9% in the evaluation.

HIV/AIDS and other Sexually Transmitted Infections (STIs)

For PVOs, 97.6% of women stated that they had heard about HIV/AIDS. The main transmission way mentioned was sexual relations with 91.2%. Less than half of informants mentioned other transmission ways.

The 65.9% of women mentioned at least two ways that a person can prevent HIV transmission. These percentages represent an increase over the baseline: PVOs (47.4%) and NGOs (26.6%). All forms of prevention involved sexual relations. The most frequently mentioned was the use of condoms (73.9%). The other forms mentioned for preventing HIV transmission range from 2.9% to 35.2% in the evaluation.

Sexual Transmitted Infections (STI)

In NicaSalud, 74.9% of the women 15-49 years not pregnant, mentioned knowing other infections, in addition to HIV, that are transmitted through sexual relations. The PVOs had an increase of 18% over the baseline while the NGOs achieved an increment of 36.4%. The sexually transmitted infections most commonly mentioned were gonorrhea (67%), syphilis (63.4%), condilomatosis (24.1%), pediculosis (9.4%), and tricomoniasis (8.4%).

For all NicaSalud, 83.5% of the women mentioned locations where they can obtain condoms. However, only 6.49% of them used condoms in the last sexual contact.

INTRODUCTION

In September 1999, USAID/Nicaragua approved funds to implement health projects aiming to help the Nicaraguan population located in the north and northwest of the country that had been affected by Hurricane Mitch one year earlier. These funds were channeled through the as NGO Networks for Health Cooperative Agreement. They supported the initiative to form the NicaSalud Network in Nicaragua.

The NicaSalud Network began as a project that combined the efforts of a group of national and international organizations present in the country to restore and protect the health of the population affected by Hurricane Mitch, according to the USAID guidelines and objectives.

NicaSalud's members implemented health projects for high priority populations (women of childbearing age, children under 5, and adolescents). The projects were located in 31 municipalities in 8 departments of the country, giving coverage to a population living in 736 communities and/or barrios.

The duration of PVO projects was two years and a little more than one year for the NGOs.

This document reports the results of the final evaluation carried out in September 2001 and compares them with the baseline studies of 1999 for the PVOs and in 2000 for the NGOs.

PROJECT OBJECTIVES

The USAID/Nicaragua post-Mitch reconstruction plan is summed up by its Special Objective (SpObj) of *Rapid Reconstruction and Sustainable Recovery in Areas Affected by Hurricane Mitch*. The specific intermediate result (IR) in public health proposed by the SpObj is "Health Situation of families affected by Hurricane Mitch maintained or improved."

According to what USAID/Nicaragua requested, NicaSalud proposed to work under IR1.1: *Increased access to health services in areas affected by Hurricane Mitch*. Thereby, the planning of the work of NicaSalud set out to restore primary health services in the components of immunization, infant survival, and reproductive health in small communities and rural areas affected by Hurricane Mitch. The USAID Mission asked that emphasis be put on "health education, monitoring, prevention and treatment of malaria, dengue, cholera, leptospirosis, and other infectious diseases."

GEOGRAPHIC AREAS

The organizations making up the NicaSalud Network are located in the departments in the north and northwest of the country, as shown in Table 1. (See map on following page).

Table 1. Departments and municipalities covered by NicaSalud Network partners

Department	Organization	Municipalities
Madriz	ADRA	Totogalpa, Yalagüina, San Lucas, Palacagüina
	INPRHU Somoto	San José de Cusmapa
Estelí	CARE	Pueblo Nuevo, La Trinidad, Condega, San Juan de Limay, San Nicolás, Estelí
	Ixchen*	Estelí
Nueva Segovia	CEPS	Ocotal
	FUNDEMUNI	Quilalí
Jinotega	CRS	Wiwilí
	Project HOPE	Wiwilí, Pantasma, Jinotega Rural
	Partners of the Americas	Jinotega Rural
	PCI	Yalí, La Concordia, San Rafael del Norte, Pantasma
	Compañeros	Peri-urban Jinotega
Chinandega	PLAN	Puerto Morazán, Tonalá
	Save the Children**	Posoltega, Chinandega, Chichigalpa, El Realejo
	ADP	Villa Nueva
	Fundación Hablemos de Nosotras	El Viejo
	Ixchen	Chichigalpa
León	Save the Children	Malpaisillo, Quezalguaque, Telica
	Ixchen	Malpaisillo
Matagalpa	Ixchen	San Isidro
RAAN	Alistar of Nicaragua	Waspán

* Ixchen is present in 4 different zones.

** Save the Children is present in two departments in the northwest of the country.

Except for the projects of CEPS and Partners of the Americas, all projects were executed in rural communities. CEPS executed its project in the urban area of the municipality of Ocotal and Partners of the Americas executed theirs in the peri-urban area of the municipality of Jinotega.

Though the table shows some municipalities as being shared among the partner organizations, they intervened in different communities.

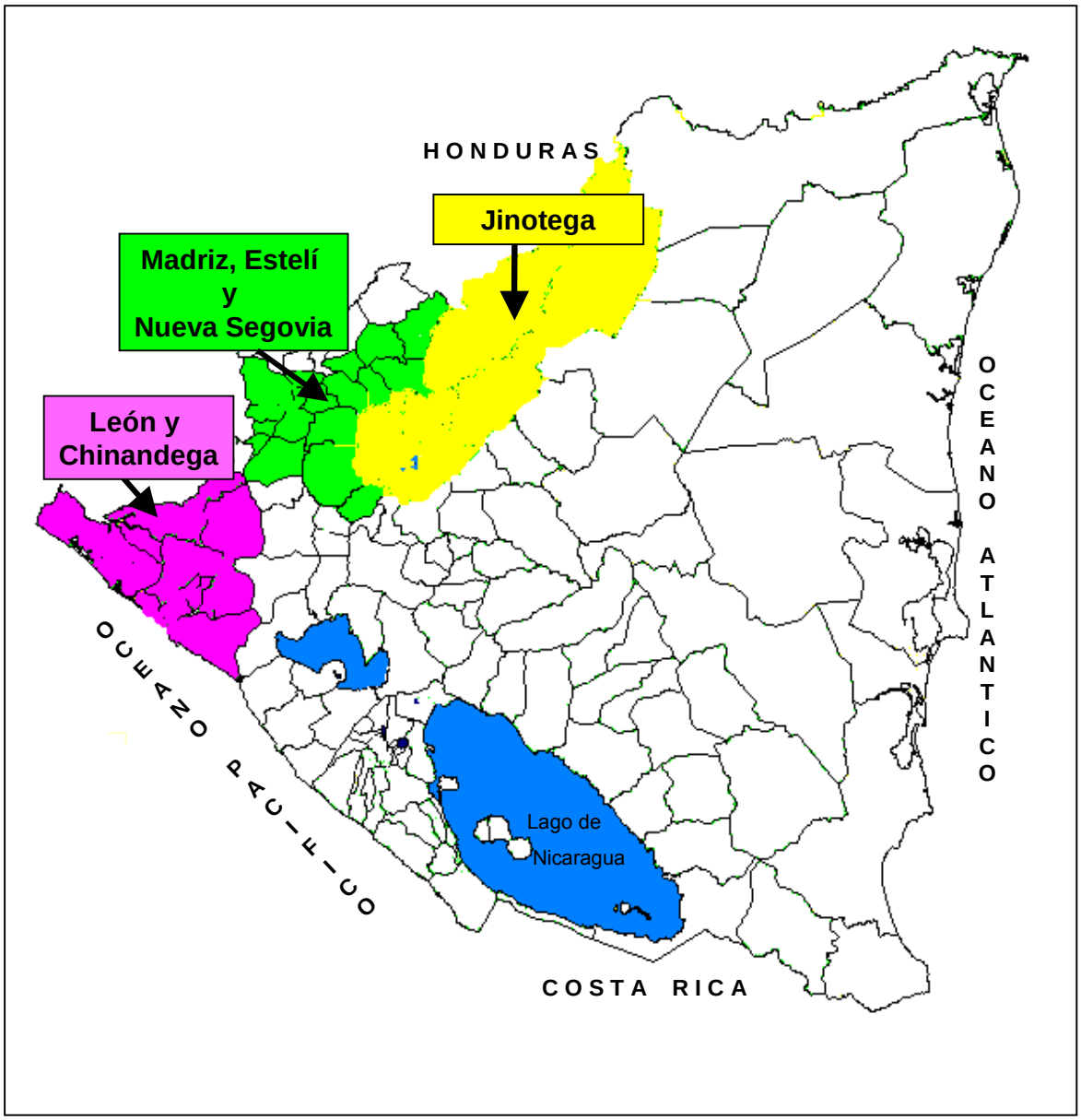


Figure 1. Map of Nicaragua showing departments where NicaSalud members are located.

Sub Network Pacific, León and Chinandega	**Sub Network Las Segovias, Madriz, Estelí and Nueva Segovia**	**Sub Network Jinotega**
ADP, PLAN, Fundación Hablemos de Nosotras, Save the Children, Ixchen Women's Center	CARE, ADRA, CEPS, INPRHU Somoto, FUNDEMUNI, Ixchen Women's Center	CRS, Project HOPE, Compañeros, PCI, Alistar of Nicaragua, Partners of the Americas

PROGRAM INTERVENTIONS

Tables 2a and 2b list the interventions implemented by each organization.

The interventions listed below reflect the objectives of each organization as stated in their proposals.

Table 2a. Interventions by the PVOs

Type of intervention	ADRA	CARE	CRS	PLAN	PCI	HOPE	Partners	SAVE
Breastfeeding and Infant Nutrition	*	*	*	*	-	*	*	*
Care of sick children: diarrhea/ARI	*	*	*	*	-	*	*	*
Prenatal Care	*	*	-	*	*	*	*	*
Care during delivery and of newborns	-	*	-	*	*	*	*	*
Postnatal care	-	*	-	*	*	*	-	*
Child Spacing	*	*	-	*	*	-	-	*
Immunization	*	-	*	*	-	*	*	*
STDs/HIV/AIDS	*	*	-	-	*	-	*	*

* = Intervention made

Table 2b. Interventions by the NGOs

Type of intervention	Hablemos	ADP	INPRHU	CEPS	Ixchen	FUNDEMUNI	Compañeros	Alistar
Breastfeeding and Infant Nutrition	*	*	*	-	-	-	*	-
Care of sick children: diarrhea/ARI	*	*	*	-	-	*	*	-
Prenatal Care	*	*	*		*	*	-	*
Care during delivery and of newborns	*	*	*	-	*	*	-	*
Postnatal Care	*	*	*	-	*	*	-	*
Child Spacing	-	-	-	*	*	-	-	*
Immunization	*	*	*	-	-	*	*	-
STDs/HIV/AIDS	*	-	-	*	*	-	-	*

* = Intervention made

METHODOLOGICAL DESIGN

The tool used for the evaluation was the same one used for the baseline studies: Lot Quality Assurance Sampling *LQAS* (*Wolfe and Black 1989; Valadez 1991; Robertson, Anker et al. 1997; Valadez et al. 2000)*. LQAS is a simple quick method that uses small sample sizes to determine the initial situation, coverage, and quality of projects or interventions. It can be applied on different levels and in different areas of work like: Health Posts, Casa Base, Barrios, etc., enabling quick and accurate identification of the priorities within the Supervision Area (SA). The data can be easily analyzed and used for making immediate managerial decisions in the Supervision Areas. It also allows for adding the data obtained from the SAs for calculating averages. (See Annex 1)

There are three main advantages of the LQAS sample over cluster sampling, another method often used by organizations and institutions.

1. Besides allowing for calculating a conventional average coverage for a program area, the program managers can also determine the performance relative to the different areas of supervision making up the whole area of influence. For example, a typical program area of an organization can include hundreds of communities with a total population of several thousand persons. To manage the implementation of the program, the entire area of influence is divided into Supervision Areas (SAs). Each SA is managed by a supervisor who may be a nurse, a midwife, an experienced health promoter, or any other individual. With LQAS, each supervisor can determine the relative performance of these in order to arrive at a point of reference for annual performance.

2. LQAS allows for a smaller sample size than cluster sampling in order to make judgments. With a sample of 19 individuals, one can judge whether a target has been reached in a given SA. To calculate a coverage proportion, the individual samples of 19 from each SA are added together and the average is calculated. In the conventional application for cluster sampling, a sample size of 300 is required.

3. Since LQAS needs a small sample in order to judge whether the performance of a health worker or another indicator in the population is reaching a preset standard, data collection does not compete seriously with the time the staff have allotted for other activities of providing health services. Health workers in developing countries often have too much work and they need management tools that are easily understood within their particular cultural context.

Sample Design

The geographic area for each project was divided into Supervision Areas (SAs). The SAs are defined according to the particular characteristics presented in each project using criteria like number of communities, population, geographic location, but above all, the administrative-managerial flow of the project. That is why it is called an Supervision Area. For all NicaSalud, the total number of SAs is 70.

A systematic random sample of 19 observations was collected in each SA for each group defined by each organization. Table 3 shows the number of interviews per organization per population group.

Interviews were conducted in the randomly selected household so long as people from the defined population groups were found there: mothers with children from 0 to 11 months, mothers with children from 12 to 23 months, women from 15 to 49 years old who were not pregnant, men from 15 to 49 years old, or adolescents. If no one from these population groups was found, a visit was made to the closest house, and thereon successively until the set of questionnaires was completed.

If more than one person from the same population group was found in the same household, the informant was selected randomly. A special case is when there are two children from the defined population groups (0 to 11 months and 12 to 23 months) in the same household, in this situation a random selection was made of one of them. Never was the same mother interviewed twice, and never was the same type of interview conducted with two persons in the same household.

Table 3. Areas of Supervision and Interviews by organization and population group

Organization	# AS	Population Group Interviewed						Total interviews
		Mothers, children 0-11	Mothers with children12-23	Women 15-49 Not pregnant	Men 15-49	Adolescents 15-19	Adolescents 15-24	
ADRA	4	X	X	X	-	-	-	228
CARE	6	X	X	X	-	-	-	342
PCI	4	X	-	X	X	-	-	228
Partners	4	X	X	X	-	-	-	228
HOPE	4	X	X	X	-	-	-	228
CRS	4	X	X	-	-	-	-	152
PLAN	6	X	X	X	-	-	-	342
SAVE	7	X	X	X	-	-	-	399
ADP	4	X	X	-	-	-	-	152
Hablemos	4	X	X	X	X	-	-	304
Ixchen	4	-	-	-	-	-	X	228
INPRHU	4	X	X	X	-	-	-	228
CEPS	4	-	-	-	-	X	-	228
FUNDEMUNI	3	X	X	X	-	-	-	171
Compañeros	4	X	X	-	-	-	-	152
Alistar	4	X	-	X	-	-	-	152
TOTAL	**70**	**1178**	**1026**	**950**	**152**	**228**	**228**	**3762**

Data collection was carried out from September 17 to October 2, 2001. On average, each organization took five days to collect the data in the community. The time taken depended on the complexity and number of questionnaires that each organization used. The project technical team, made up of project managers, supervisors, and promoters took part in this process, and the NicaSalud technical team participated as accompanying supervisor.

Preparation of Questionnaires

Four questionnaires were used. Together, they make up a set. Each one corresponds to a particular sample universe. These are:

- Mothers with children, 0-11 months
- Mothers with children, 12-23 months
- Women of childbearing age, 15-49 years old, not pregnant
- Men of reproductive age from 15-49 years old

The questionnaires used for the baseline studies were used as a basis for designing the evaluation questionnaires. To standardize these instruments for all the organizations, the questionnaires were shared with all the organizations who revised and vetted the contents, first independently through working sessions between the members of the NicaSalud technical team with each organization, and lastly, in a training workshop, the content was finalized.

The organizations CEPS and Ixchen used questionnaires directed at their special client populations: male and female adolescents from 15 to 19 years old and 15 to 24 years old, respectively.

Staff Training

NicaSalud organized four workshops to train 116 members of the technical teams of the projects on methods for gathering data. The workshops were facilitated by the NicaSalud M&E Specialist, the Senior Advisor for M&E of Networks, and a professional specialized in the use of the LQAS methodology. Training was organized so that seven members of the NicaSalud partner organizations participated as trainers. They had received training in previous workshops and had experience in applying the methodology, making them ready to facilitate the training on this occasion. There was also support from the NicaSalud technical team for the training process.

The schedule and distribution of the 116 participants in the training was as follows:

September 10-12, 2001	Nueva Segovia	33 participants
September 17-18, 2001	Jinotega	23 participants
September 17-18, 2001	Jinotega	23 participants
September 19-20, 2001	León	37 participants

Given the number of participants in the Jinotega sub-network, the group was divided in two, with simultaneous training on the same day. The topics covered in all the training sessions focused especially on the management of basic principles and concepts of the LQAS method, validation and standardization of data collection tools.

Data Processing and Analysis

All questionnaire data were entered into a computer database using EPI INFO, Version 6.04d. Each questionnaire was double entered to identify data entry errors. Range tests were also carried out as part of data cleaning.

The data were weighted by the population size of the Areas of Supervision, using the direct adjustments method. Although weighting is not necessary when making LQAS judgments in an Supervision Area, it is used when the data are added together in order to calculate the coverage for all the areas of NicaSalud, a geographic area, or an area of influence of an organization. Without weighting, a sample of 19 may either overestimate or underestimate the coverage for an organization, depending on the population sizes of the different Supervision Areas. The weighting of the data allowed for this distortion to be eliminated.

For these aggregate analyses, the total population interviewed formed the denominator. However not all organizations measured every indicator. This is because the interventions they implemented differed amongst them.

The PVOs' baseline study was carried out in December 1999 while the NGOs carried out theirs in August 2000. Both kinds of organizations used the LQAS method. In both baseline studies, four population groups were used (mothers with children from 0-11 months, mothers with children from 12 to 23 months old, women from 15 to 49 who were not pregnant, and men from 15 to 49 years old). The sample sizes of informant groups are presented below.

Table 4.Maximum Sample Sizes in Baseline and Evaluation Studies of PVOs and NGOs

Informant Group	Baseline		2001 Evaluation	
	PVOs	NGOs	PVOs	NGOs
Mothers of children 0-11 months	532	361	665	361
Mothers of children 12-23 months	532	361	665	361
Women (not pregnant) 15-49 years	532	531	665	285
Men 15-49 years	532	76	76	76

In the evaluation, the sample sizes changed among PVOs and NGOs as noted in the above table. The reasons for these changes are that either PVOs or NGOs increased the number of SAs they had (which resulted in more data being collected) or they decided to reduce the number of activities they were to implement. This latter change suggests the basic difference between the baseline and evaluation datasets. Not all of the variables that PVOs/NGOs measured in the baseline, did they continue to measure in the evaluation. The reason is they were no longer relevant to their programs. The dramatic example of this is in the male informant group. Although PVOs sampled 532 men in the baseline, they sampled only 76 in the evaluation since activities focusing on men were no longer included in their programs.

Unless an indicator is reported by a group of PVOs or NGOs, it is not included in this report. There would be little validity in comparing a national baseline data with evaluation data that are not representative of the NicaSalud catchment area. For the purposes of this report, indicators with sample sizes less than n=200 are not reported. There are a few exceptions to this rule. Other exceptions to this rule are analyses of sub-samples. As a result of this decision, indicators concerning men 15-49 are not included in this report.

RESULTS

The results are presented for NicaSalud as a whole. The data include information from 8 international organizations (PVOs) and 8 national organizations (NGOs). However, as the projects of PVOs were implemented in 2-years versus 1-year, stratified analyses were carried out of these two organizational groupings.

Results are presented in four sections:

- Safe motherhood and newborn care
- Child Spacing
- Child Survival
- HIV/AIDS and other STIs

Tables are presented showing baseline and evaluation results for each organizational grouping (PVO vs NGO). There is also a column indicating whether the difference between the baseline and evaluation measures is a statistically significant improvement. When evaluation sample sizes are very small, no comparison of baseline and evaluation data are carried out.

DEMOGRAPHIC CHARACTERISTICS

The average age of women 15-49 years not pregnant was 28.1 years. 79.4% of the women had a stable partner. Marital status was as follows: common law, 44%; married, 35.4%; single, 17.6%, and other categories, 4%.

The project implemented by the Center for Social Studies and Promotion (CEPS) focused on adolescent males and females from 15 to 19 years old. The average age for males was 17 and 16.8 for females. 10.7% of females said they had a spouse (3.9% married and 6.8% common law); 3.9% of the men stated they had a common law wife.

The project implemented by the Ixchen Women's Center focused on adolescents and young adult men and women between the ages of 15 and 24.

The average age of the mothers with children from 0-11 and 12-23 months of age was 24.5 and 25.7, respectively. The average age of the children in the first group was 5.3 months and in the second, it was 17.3 months.

SAFE MATERNITY AND CARE OF NEWBORNS

This section presents the results of interviews with mothers of children 0-11 months. Indicators concern antenatal care, delivery, post-partum care.

Maternal Health Card

In NicaSalud (PVOs and NGOs) 59.7% of mothers presented their maternal health card to the interviewer. Of the remaining mothers, 10.5% had lost their card, 3.6% had it in another household, and only 12.1% mentioned they had never had a card. This latter percentage may approximate the number of women who did not have access to health care. The remaining 14% had given their cards to MINSA.

Among PVOs the proportion of card holders increased from 56% to 63.1%. During the PVO baseline study, interviewers stated that some women said they had no card because they had given it to the MINSA health unit. In the evaluation this information was included as an option response in the questionnaire.

Among the NGOs the proportion found in the baseline (45.3%) did not change substantially during the evaluation (46.1%). Of all the mothers not presenting the maternal control card, 37.8% said it was because they had given it to MINSA.

Considering the high percentage of mothers without a maternal health card, NicaSalud has proposed to MINSA an initiative to create and develop a maternal card for community use.

Prenatal Care

About half of the mothers (55.7%) in the NicaSalud evaluation attended at least one antenatal care visit (ANC) by a qualified clinician. According to the records from the 1998 ENDESA (Nicaraguan Demographic Health Survey), 84% of the pregnancies in the five years prior to the survey had at least one ANC visit, a higher percentage than in the NicaSalud catchment area. The data, however, collected by NicaSalud and ENDESA used different standards. NicaSalud used the information on the maternal health cards, and ENDESA 98 used not only those cards but also mother's verbal reports. Therefore, the results are not comparable. Moreover, the ENDESA sampled all of Nicaragua and NicaSalud sampled its intervention areas.

The data for PVOs shows an increase in the proportion of mothers having had at least one ANC visit: 46% at baseline and 61% in the evaluation. No significant change was detected for NGOs as the proportion of mothers with at least one ANC visit had increased by 2.4%.

As MINSA's recommendation is that women have at least 4 ANC visits, the data were analyzed for this indicator. Mothers with maternal health cards in NicaSalud had on average 4.5 visits with a median of 5. This latter result is similar to ENDESA 98 which reported a median of 5.1 ANC visits.

The significant increases in ANC may be attributed to the formation of pregnant women clubs and development of birth plans. PVOs promoted these activities in coordination with community networks and the network of health services of the local MINSA. In both activities, emphasis was put on promoting healthy behavior, especially, looking for timely care. The success of these activities can be attributed to trained midwives and health brigades, who searched for pregnant women and referred them to MINSA health units.

Table 5. Prenatal Care. Comparison between baseline and final evaluation studies

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Mothers with children, 0-11 months, showing ANC card	56%	532	63%	662	7%	NO	45%	360	46%	359	1%	NO
Mothers with children 0-11 months, who received iron during pregnancy	71%	532	86.4%	305	15.4%	YES	83.8%	228	NA	NA	NA	NA
Mothers with children 0-11 months, who received at least one ANC visit during pregnancy	46%	532	61%	573	15%	YES	44%	318	46%	359	2%	NO
Mothers with children 0-11 months vaccinated with TT, according to maternal card	10%	532	5%	662	-5%	YES	22%	324	0.6%	359	-21.4%	NO
Mothers with children 0-11 months who mentioned that TT protects the baby	47%	532	94%	399	47%	YES	85%	190	86%	282	1%	NO
Women (15-49 years, not pregnant) who know 2 or more signs of danger during pregnancy	21%	532	33%	665	12%	YES	39%	646	33.6%	285	-5.4%	NO

NA= Not Applicable

Tetanus Toxoid Vaccine

The criterion for judging adequate tetanus toxoid vaccination is at least two vaccinations during pregnancy or five doses during their lifetime. Vaccination had to be recorded on the maternal health or a vaccination card. Using this standard, only 1.1% of the women in NicaSalud were vaccinated, which included 5% and 0.6% for the PVOs and NGOs, respectively. These results are lower than at the baseline, which were 10% and 22%, respectively. However, there is a marked under-recording of the data for this indicator. The ANC card does not have space to record all the doses applied before and during pregnancy. There is only space to note one dose, which is normally applied during ANC visits. This result emphasizes the need to develop a strategy to guarantee that information about maternal health is contained in a document managed by the woman herself, in the community.

The 90.7% of women with children 0-11 months mentioned that the vaccine protects the newborn. For PVOs, the percentage was 94%, a significant increase over the baseline (47%). For NGOs, it was 86%, a similar percentage to the baseline result.

Iron during Pregnancy

This indicator was measured by PVOs only. 86.4% of mothers with children 0-11 months said they had received iron during their most recent pregnancy, a significant increase from the baseline (71%). This increase can be attributed to the health units that distribute this micronutrient to pregnant women. It also reflects the health education and referral of pregnant women by community health workers.

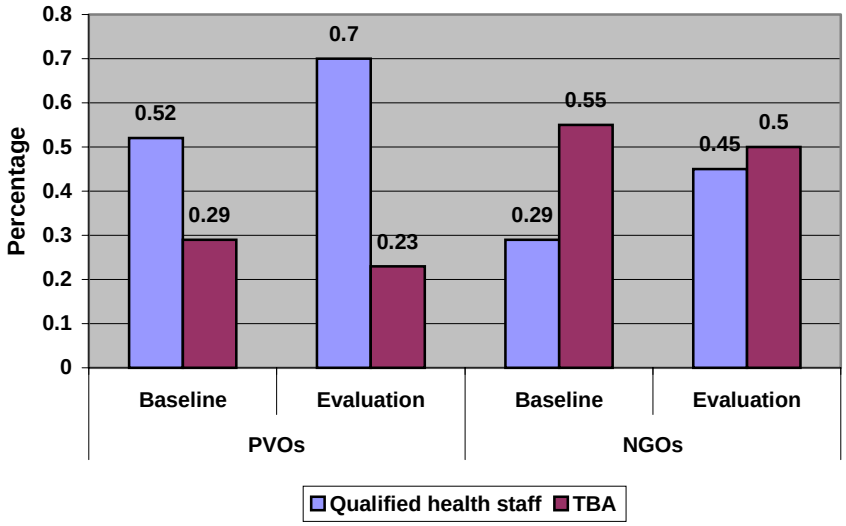
Knowledge of Pregnancy Danger Signs

One third of the women 15-49 not pregnant (33.1%) mentioned at least two danger signs during pregnancy that require immediate referral to a health facility. The proportions for PVOs and NGOs respectively were 33% and 33.6%. With respect to the baseline, PVOs show a significant increase of 12%. However, NGOs had a 5.4% reduction.

Delivery

For all of NicaSalud, 62.8% of the deliveries of mothers with children 0-11 months were attended by qualified health staff. While the percentages vary between the two kinds of organizations, the differences between baseline and final evaluation values are significant. The PVOs display an increase of 18.5% while NGOs had an increase of 16.2%.

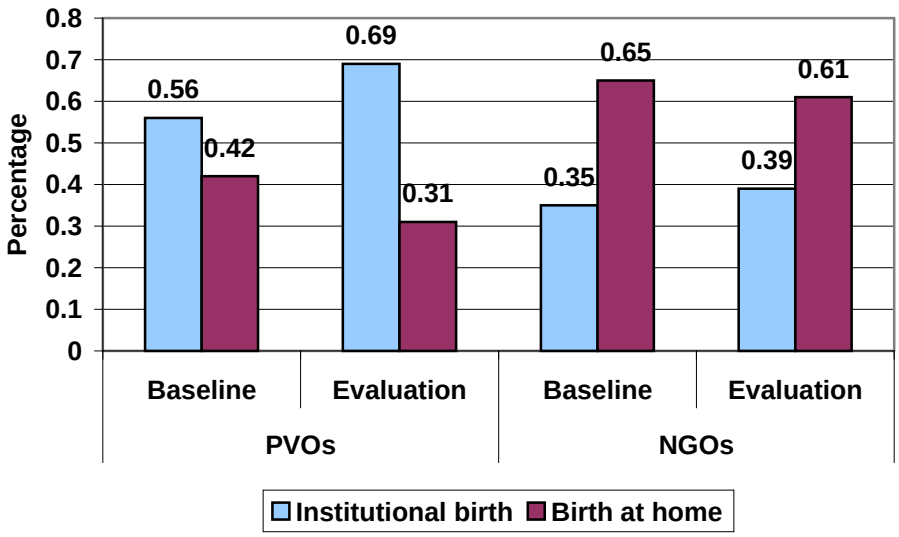
Chart 1. Person who attended the birth: A Comparison of PVO and NGO Baseline and Final Evaluation Results



The proportion of deliveries by traditional birth attendants (TBAs) did not change over this period in PVO areas, accounting for approximately a fourth of the total (24.2%) in 2001. However, in the zones attended by NGOs, TBAs attended 50% of all births. The increase in deliveries by qualified health staff is probably due to a decrease in births attended by the mother herself or by a relative. For example, the PVO baseline of 11% of deliveries by the mother herself or by a relative dropped to 4.9%.

For NicaSalud, 60.6% of the births were attended in a health institution, while 39.2% occurred at home. The PVOs showed a substantial increase over the baseline, going from 56% to 69% of deliveries occurring in a health institution. By contrast NGOs displayed a smaller proportion of institutional births both in the baseline and in the evaluation (35% and 39% respectively), while the proportion occurring at home decreased slightly (65% and 61%, respectively). These results may be due to the high percentage of births attended by TBAs. In the ENDESA 98, 63.6% of births were institutional and 34.8% were at home.

Chart 2. Place of Birth of Mothers with Children 0-11 Months: A Comparison of PVO and NGO Baseline and Final Evaluation Results



With respect to knowledge of danger signs during delivery, there was a slight increase in the recognition by women (15-49 years) of at least two danger signs. In NicaSalud, 32.6% of the women mentioned at least two danger signs. There was no difference among PVOs and NGOs. These proportions represent a statistically significant 14% increase for PVOs. Among NGOs a 2% increment occurred. These results signal the need to continue the work, but while applying new improved activities.

Table 6. Delivery Related Behavior and Knowledge: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	N	%		%	n	%	n	%	
Deliveries by mothers with children 0-11 months, attended by a qualified health personnel	52%	532	70.5%	586	18.5%	YES	29%	342	45%	228	16%	YES
Women (15-49 years, not pregnant) who know 2 or more danger signs during delivery	18%	532	32%	589	14%	YES	30%	646	32%	285	2%	NO
Birth attended by TBA	29%	532	24.2%	586	-4.8%	NO	56%	342	50%	228	-6%	NO
Institutional birth	56%	532	69%	586	13%	YES	35%	342	39%	228	4%	NO
Birth at home	42%	532	31%	586	-11%	NO	65%	342	61%	228	-4%	NO

Post Natal Care

In the PVO baseline study, 51% of mothers with children 0-11 months reported receiving postnatal care. Among NGOs, 37% of mothers did so. The final evaluation data indicate that 84.7% of mothers in NicaSalud report they received postnatal care. Significant increases in this behavior took place in both the PVOs (87.8%) and NGOs (79.3%) catchment areas.

PVOs also asked the mother if she had received information about family planning during post-natal visit; 77.9% responded affirmatively. This result represents a significant increase when compared with the baseline result of 40%. NGOs did not include this indicator in their projects.

Results for PVOs show a statistically significant increase in the proportion of women who said they received Vitamin A after giving birth (28% to 40.8%). The increased coverage for Vitamin A suggest two things: (1) during the project period Vitamin A was available in the health units, and (2) NicaSalud members were effectively promoting that mothers take Vitamin A. One reason why supplements were available is that Wisconsin Partners of the Americas delivered several lots of Vitamin A to MINSA health units. They also distributed it through a network of promoters in communities where their project was working.

With respect to knowledge of post natal danger signs, in NicaSalud 55.6% could cite 2 or more danger signs requiring them to visit a health facility immediately. In PVOs areas 53.7% cited 2 or more danger signs. This result represents a 27.7% increase over the baseline. In NGO areas 57% could cite 2 or more danger signs, which is a 16% increase over the baseline. Both effects are statistically significant increases.

Table 7.Post Natal Care Behavior and Knowledge: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Post natal care received by mothers with children from 0 to 11 months from qualified health staff	51%	257	87.8%	156	36.8%	YES	37%	323	79.3%	169	42.3%	YES
Mothers with children from 2 to 11 months who received Vitamin A in the first two months after giving birth	28%	462	40.8%	316	12.8%	YES	NA	NA	NA	NA	NA	NA
Mothers with children from 0 to 11 months who received FP information at the post natal visit.	40%	532	77.96%	205	37.96%	YES	NA	NA	NA	NA	NA	NA
Women 15 to 49 years, not pregnant, who know 2 or more signs of danger after giving birth	26%	532	53.7%	665	27.7%	YES	41%	551	57%	285	16%	YES

NA= Not Applicable

Despite the increases in the proportion of women knowing pregnancy, delivery, and post natal danger signs, the percentages are low (half or less of the women interviewed). Substantial work is still needed. Programs should focus more effort on males since in Nicaragua, men tend to make decisions about the care seeking behavior of woman and children.

Newborn Care

In NicaSalud 88% of mothers with children 0-11 months reported that in the first week of life, their child showed no signs of complications with the umbilical cord. Both PVOs and NGOs had similar results. However, PVOs reveal an 11% increase above the baseline (77% vs 87.4%), where the NGO results show no significant change (91.5% vs 86.4%). In NicaSalud mothers with children 0-11 months reported that 82.6% of the newborns had a consultation with qualified health staff. PVOs realized an increase over the baseline of 15.9%, while NGOs increased the proportion by 35.7%. Both results are statistically significant.

Table 8. Newborn Care: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Mothers with children 0-11 months who reported a clean umbilical cord during the first week after birth	77%	532	87.4%	323	10.4%	YES	91.5%	323	86.4%	152	-5.1%	NO
Mothers with children 0-11 months who report newborn visit with qualified health staff	70%	263	85.9%	323	15.9%	YES	43%	259	78.7%	150	35.7%	YES

Child Spacing

In the NicaSalud sponsored projects, no funds were used to support family planning activities. Nevertheless, some organizations made use of the final evaluation as an opportunity to measure their family planning activities financed with non-Mitch funding sources. Those results are reported here.

Knowledge of child spacing is measured in NicaSalud by asking the women 15-49 years (not pregnant) how long a woman should wait before getting pregnant after giving birth. In NicaSalud 95.5% of women said that women should wait 2 or more years. PVOs realized an increase of 7.5% over the baseline – a statistically significant result. NGOs realized a significant increase of 20.3%.

Some PVOs measured actual spacing of births. In this assessment of mothers with children 0-11 months, 46.6% spaced their last two births by at least 24 months; and 31.6% spaced them by at least 36 months. The baseline values for spacing these two intervals was 42% and 21%, respectively. These results suggest that Nicaraguan woman increased birth spacing intervals in 2001 as compared with 1999. In the ENDESA 98, 68% and 39.8% of mothers had a spacing of at least 24 and 36 months, respectively.

Two PVOs and one NGO asked women whether they used a contraceptive method. However, as multiple geographical areas of NicaSalud are included in the sample, the results are presented as NicaSalud, where 61.1% of women said they used a contraceptive method. This situation is similar to the finding in ENDESA 98 (61.7%).

Among women residing in the PVO areas, 69.4% used a contraceptive method, which is an increase of 13.4% over the baseline result. As only one NGO measured this variable no results are presented. As family planning interventions could not be financed with Mitch funds, the results can be attributed to work carried out by PVOs and NGOs with financing from other sources.

Women were also asked their knowledge of contraceptive methods. In NicaSalud, 96.8% knew three or more methods. For the PVOs, 98.2% of the women mentioned a minimum of three methods, a significant gain over the baseline result of 63%. Only one NGO evaluated this indicator, obtaining a level of knowledge of 70.3%. The eight most frequently mentioned methods are listed below.

- Pills 90.1%
- Injections 87.6%
- Condoms 79.9%
- IUDs 55.8%
- Tubal Ligation 29.9%
- Rhythm 13.9%
- Vasectomy 12%
- Breastfeeding 10.2%

With respect to knowledge of where to obtain contraceptive methods, 90.7% of women mentioned at least one place. The places mentioned most frequently were: Health Center (53.3%), Health Post (41.6%), and pharmacies (12.4%). Other places mentioned less frequently were brigadistas, PROFAMILIA, and private clinics. In communities of the municipality of Waspán, the most frequently mentioned source was counselor mothers (33%). This high percentage is illustrative of the work being done with the community network in this zone through the NicaSalud.

Table 9.Family Planning Knowledge and Behavior: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	N	%	n	%		%	n	%	n	%	
Women 15 to 49 years, not pregnant, who know about spacing pregnancies	89%	455	96.5%	209	7.5%	YES	63.6%	560	83.9%	152	20.3%	YES
Women 15 to 49 years, not pregnant, who know 3 or more family planning methods	63%	532	98.2%	209	35.2%	YES	73%	585	70.3%	76	-2.7	NA
Women 15 to 49 years, not pregnant, who use a contraceptive method (CPR)	56%	532	69.4%	207	13.4%	YES	62%	598	42.3%	76	-19.7	NA

Ixchen and CEPS work with adolescents to educate them about issues related to Sexual and Reproductive Health. An important topic concerns the best age for a women's first pregnancy. A comparison of baseline and final evaluation results indicate an increase in the proportion of adolescents who are knowledgeable about this matter. 79% of adolescent women interviewed by CEPS said the ideal age for a women to get pregnant for the first time, is over 24 years. This result is 22% above the baseline. Among adolescent men, the baseline value of 51% increased to 76%.

For Ixchen, 95% of adolescents women said the ideal age is over 24 years, a 30% increase over the baseline. For adolescent men, the baseline proportion of 50% increased to 65% in the final evaluation.

In the final evaluation, CEPS asked questions about practices of sexual relations. 60.5% and 21.1% of adolescent men and women, respectively, said they had already had sexual relations. The average age for the first sexual relation was 14 years for men and 16 years for women. These data will be valuable to NicaSalud and its members for planning future interventions, especially those related to pregnancies prevention and STIs/HIV/AIDS control among adolescents.

CHILD SURVIVAL

Most NicaSalud members implemented projects with child survival components. The exceptions are PCI, CEPS, and Ixchen whose work did not concern children and consequently had no intervention with this client group.

The core area of child survival work carried out by most projects concerned IMCI. Community IMCI was implemented through a volunteer community network, and MINSA staff were trained in the clinic-based IMCI. In addition to staff training, some projects equipped community networks and MINSA's health units with basic materials.

The evaluation focused on assessing knowledge, practices, and coverage of several services. To measure specific indicators data were obtained from interviews with mothers with children 0-11 months and 12-23 months.

Growth Monitoring

Mothers with children 0-11 months were asked to show the child's growth card. For NicaSalud, 89.1% of mothers showed their child's card. This result indicates that these children were taken to a MINSA health facility at least once for growth monitoring. Both PVOs and NGOs exhibited increases over their baselines (78% to 89.1%, and 81.7% to 89.6%, respectively). On reviewing the cards, it was found that three quarters of the children (73.6%) had had their growth monitoring session within the last two months. The PVOs maintained their baseline percentage of 73%, while the NGOs achieved a significant increase (70.6% to 91.8%).

Table 10. Monitoring of Growth: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Mothers with children 0-11 months who showed the child's growth card	78%	532	89.1%	475	11.1%	YES	81.7%	300	89.6%	133	7.9%	NO
Mothers with children 2 - 11 months who weighed their child in the last 2 months, according to the growth card	73%	462	72.3%	361	-0.7%	NO	70.6%	289	91.8%	106	21.2%	YES

Immunization

A large number of organizations, and community networks worked together under MINSA to vaccinate children. A principal means of vaccinating children was through the National Health Campaigns (NHC). During the lifetime of NicaSalud, members have participated actively in at least four National Campaigns, providing support in: logistics, human and financial resources, educational materials, information, direct vaccination, and more. The results obtained in immunizing children as a result of this effort are presented below.

A high percentage (94.6%) of all mothers interviewed with children from 12 to 23 months old showed the vaccination card for their child. This represents a significant increase over the baseline for PVOs and NGOs. The PVOs went from 88% to 97.8% and the NGOs from 84% to 94.5%. These

percentages are higher than those found by ENDESA 98, where 74.1% of Nicaraguan children had cards. In terms of vaccination coverage, it is important to note that in the last 4 years, MINSA and other organizations have invested considerable resources to heighten mothers' awareness of and commitment to childhood vaccination. Therefore, the results reported here may be attributed to these as well as other programs.

The regime for basic childhood vaccinations in the first year of life as set by MINSA Nicaragua, is the following:

BCG Newborn	**Polio 1** 2 months old	**Polio 2** 4-6 weeks after the first dose	**Polio 3** 4-6 weeks after the second dose
Measles 12 months old	**Pentavalent 1** 2 months old	**Pentavalent 2** 4-6 weeks after the first dose	**Pentavalent 3** 4-6 weeks after the second dose

For this analysis, vaccinations were counted only if they were recorded on the child's vaccination card. The analysis did not take into account the interval between doses, nor the age at which the child was vaccinated. There were from time to time errors in the way to record vaccination dates. These errors were not considered in the analysis. For example, a child whose vaccination date is prior to its birth is an obvious entry error. NicaSalud will undertake work in 2002 to try to resolve such problems detected during the evaluation. Using these criteria, BCG coverage in NicaSalud was 91.1%, a similar percentage to the coverage described by the ENDESA 98 (95%). Coverage among PVOs was 91.7%, which is a significant increase over the baseline of 82%. Coverage also increased among NGOs (86% to 90.3%).

90.9% of children had had at least three doses of polio vaccine, while ENDESA 98 showed 72%. Coverage among PVOs and NGOs was 91.1% and 90.6%, respectively. While these results represent increases over baseline values of 77% and 85%, only the PVO result is a statistically significant increase.

Three doses of Pentavalent replace DPT in the Nicaraguan EPI program. This vaccine immunizes against diphtheria, pertusis, tetanus, hepatitis B, and Haemophilis influenza. Coverage for all NicaSalud with Pentavalent was 89%, with similar percentages for PVOs and NGOs. These results are compared with DPT, the vaccine used during the baseline. In the ENDESA 98, a coverage of 68.8% of children with three doses was reported for all Nicaragua. Therefore, NicaSalud's results signal an increased coverage. PVOs realized a significant increase of 13.1% over the baseline. The increase for the NGOs was not significant.

Coverage for each polio dose and Pentavalent are included in Table 11. Results suggest an increased coverage.

Table 11. Doses of Polio and Pentavalent among Children 12-23 Years: A Comparison of ENDESA 98, and NicaSalud PVO Baseline and the Final Evaluation Results

Survey	Polio			Pentavalent		
	Polio 1	Polio 2	Polio 3	Penta 1	Penta 2	Penta 3
ENDESA 98	94.6	86.2	73	92.7	84	68.8
Baseline. PVOs. December 99	86.6	84.7	77	85.9	83.4	76
Final Evaluation PVOs-September 2001	92.7	91.8	91.1	92.6	90.4	89.1

MMR coverage for all NicaSalud was 83.9%. Since the application of MMR began in Nicaragua after the ENDESA 98, there is no comparative data for this antigen. However, measles vaccination coverage according to ENDESA 98 was 70.8%. Coverage among PVOs was 85.8%, a significant increase over the baseline of 76%. The NGOs had 80.9%, which despite being an increase over their baseline of 76%, is not a statistically significant effect.

Chart 3. Vaccination Coverage among Children 12-23 Months: A Comparison of PVO Baseline and Final Evaluation Results

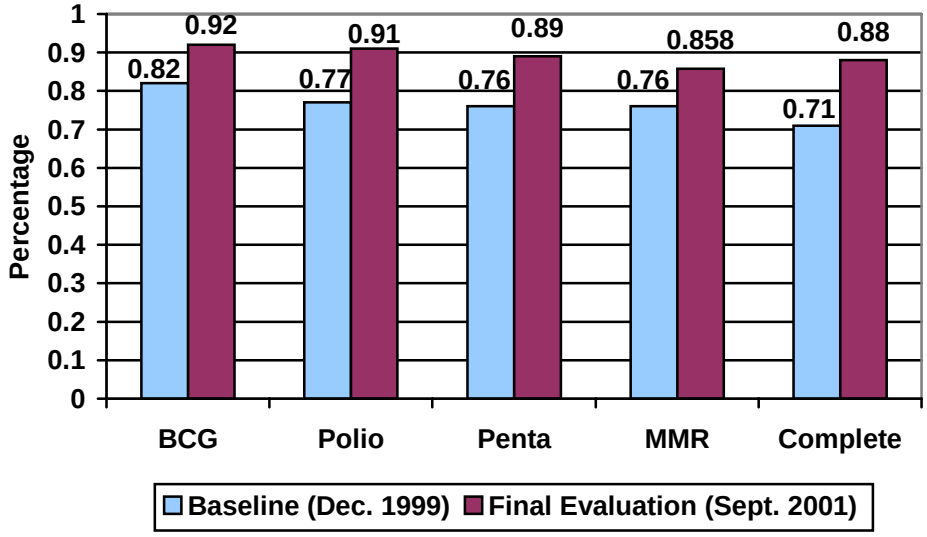
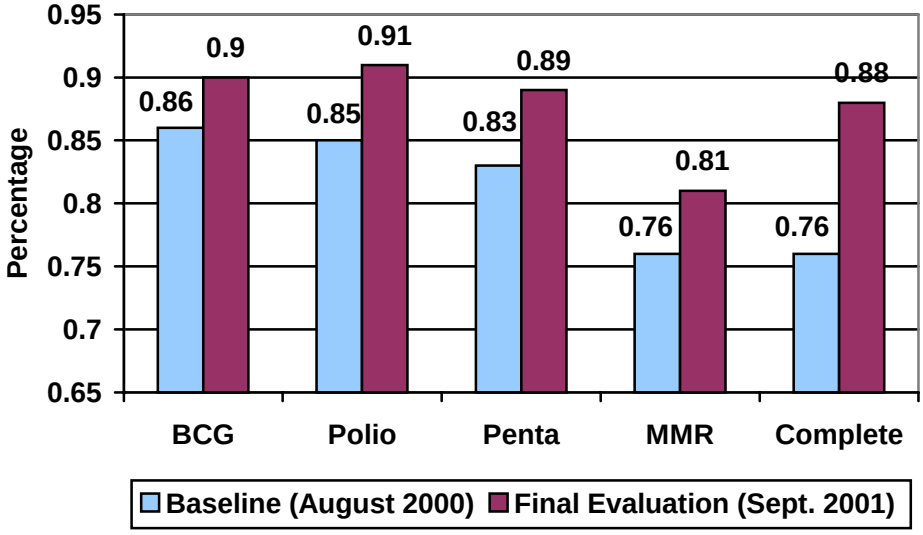


Chart 4. Vaccination Coverage among Children 12-23 Months: A Comparison of NGO Baseline and Final Evaluation Results



To be considered as fully vaccinated a child needs to have had the complete basic regime, including one dose of BCG and at least three doses of polio and three of pentavalent. The coverage for complete vaccination in NicaSalud was 88%. The ENDESA 98 included measles vaccinations in addition to those already mentioned. This is because measles vaccination had to be a part of the vaccination regime in 1998. The application of MMR however does not occur until the child is one year old. In ENDESA 98 the complete vaccination rate was 56.3%.

Among PVOs 88.2% of children were fully vaccinated in the final evaluation. This is a significant increase over their baseline of 71%. Among NGOs, 87.8% of children were fully vaccinated, a significant increase over the baseline of 76%.

In addition to support the National Health Campaigns carried out in the last two years, other activities that helped improve immunization vaccination coverage include integral visits with MINSA, and house-to-house visits by the community volunteer network. In both activities, children who had not been vaccinated and who had missed an appointment for vaccination were identified and referred to the health units for vaccination. Another activity implemented in Chinandega included nutrition fairs, where mothers were asked to present their child's vaccination card in order to identify and refer children need vaccination.

Table 12.Immunization of Children 12-23 Months: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Mothers with children 12 to 23 months who showed the vaccination card	88%	531	97.8%	551	9.8%	YES	84%	361	94.5%	361	10.5%	YES
Coverage of vaccination with BCG for children from 12 to 23 months, using the vaccination card	82%	531	91.7%	551	9.7%	YES	86%	341	90.3%	361	4.3%	NO
Coverage of vaccination with Anti-Polio 1-3 for children from 12 to 23 months, using the vaccination card	77%	531	91.1%	551	14.1%	YES	85%	343	90.6%	361	5.6%	NO
Coverage of vaccination with Pentavalent 1-3 for children from 12 to 23 months, using the vaccination card	76%	531	89.1%	551	13.1%	YES	83%	342	88.9%	361	5.9%	NO
Coverage of vaccination with MMR for children from 12 to 23 months, using the vaccination card	76%	448	85.8%	551	9.8%	YES	76%	342	80.9%	361	4.9%	NO
Complete vaccination coverage for children 12 to 23 months old with Polio, Pentavalent, and BCG.	71%	531	88.2%	551	17.2%	YES	76%	73	87.8%	361	11.8%	YES

During this study, NicaSalud identified issues that when addressed can strengthen the EPI. To gather vaccination data, mothers were asked to show the vaccination card for their child; vaccination dates were then copied into the survey form. On several cards, polio and Pentavalent dates indicate that dose two or dose three was less than the 4 weeks set. This may be due to the following

a) Inaccurate entry of the date into the vaccination card by the health professional at the time the vaccination was given;
b) A replacement card has inaccurate information transcribed on it from a medical record; or
c) Children were vaccinated with too short an interval between doses.

The third possibility is the priority concern since these children may be thought to be immunized when in fact they are not. This should be a warning for health staff working in support of the EPI.

Breastfeeding and Complementary Feeding

This section shows breastfeeding practices (start and duration) and the use of supplementary foods. Mothers with children 0-11 months were asked to report how soon after birth they started to breastfeed their children and to list the food they fed to their children in the last 24 hours besides mother's milk. Mothers with children from 12 to 23 months old were asked how long they had

breastfed their child. *Exclusive Breastfeeding and Complementary Feeding* were measured using sub-samples of the population (children under 5 months and children 6-11 months, respectively).

ENDESA 98 reported that 79.5% of children began to breastfeed within the first hour of birth. This indicator was only evaluated by the PVOs, the 76.4% of mothers with children 0-11 months reported having begun breastfeeding in the first hour after giving birth, which is a statistically significant increase of 13.4% over the baseline. The current level approximates the percentage reported in the ENDESA 98 for Nicaragua. NGOs were not assessed for this indicator since only one organization included it in their questionnaire.

For all NicaSalud, 61.1% children 0-5 months were exclusively breastfed. The result among PVOs and NGOs reveals a potential variation (62.4% and 53% respectively) although the confidence intervals indicate there is no significant difference. In PVO areas exclusive breastfeeding increased by 27.4% from a baseline value of 35%, a statistically significant effect. The ENDESA 98 reported for Nicaragua that 30% of children under 4 months were breastfed exclusively. This result is similar to the PVO baseline result. No comparative assessments are possible in NGO areas since breastfeeding indicators were not included in their baseline assessments.

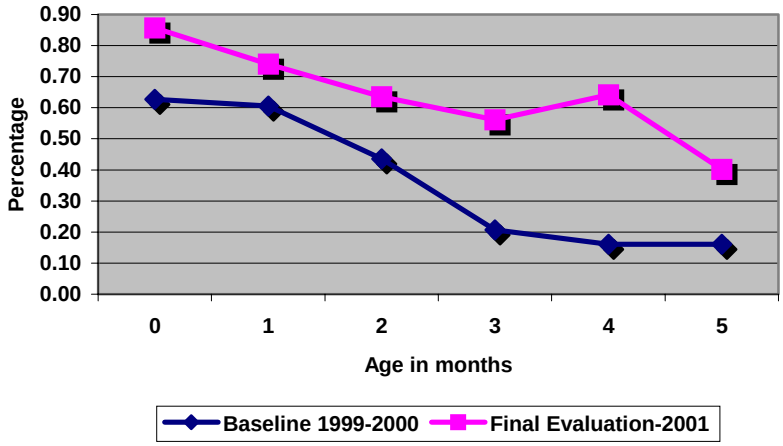
The increase observed among PVOs in this evaluation may be due to a diverse strategies implemented over two years of the projects' lifetime. One of the most important strategies is promoted and developed by MINSA: *Friends of Women and Children Municipalities*[1], which was supported by NicaSalud and volunteer networks. The municipalities of San Rafael del Norte, San José de Pantasma, Jinotega, San Nicolas, and Estelí were certified. The effect noted here should be attributed to the common effort by NicaSalud as well as by MINSA and other projects present in some municipalities who promote breastfeeding.

Other activities NicaSalud carried out under this strategy was the creation of pregnant mothers groups, breastfeeding mothers' groups, maternal counselling; public talks, and household visits to pregnant women and women with children under five years of age.

Charts five and six show the proportion of children in each month cohort exclusively breastfeeding in both the baseline and final evaluation surveys. Both trend lines show that exclusive breastfeeding declined as the child grows older. The evaluation results strongly suggest that significantly greater proportions of children in the 3 and 4 months cohort are exclusively breastfeeding.

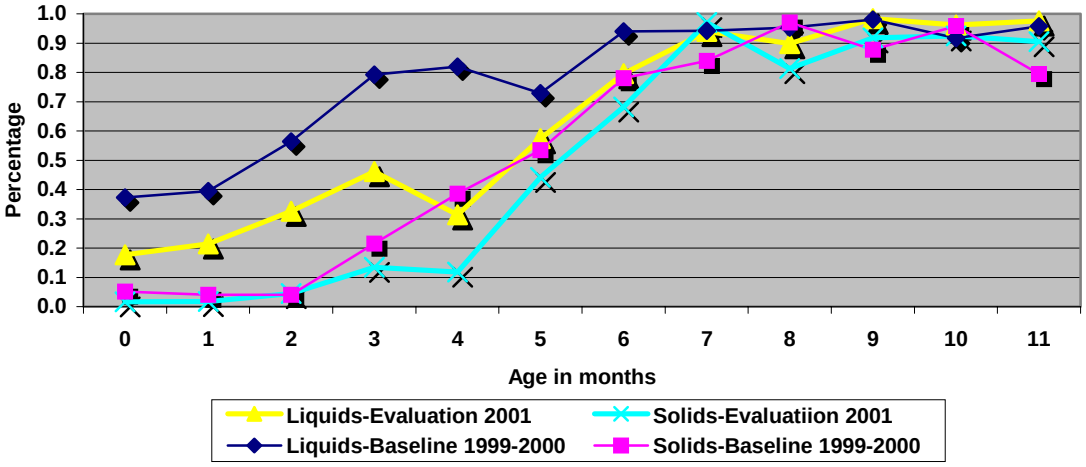
[1] These provide information and promote recommended breastfeeding practices in order to improve the nutrition of the children without additional costs to households. They also support mothers interested in exclusive and complementary breastfeeding of their children.

Chart 5. Exclusive Breastfeeding by Monthly Cohort of Infants 0-5 Months in PVO Catchment Areas: A Comparison of Baseline and Final Evaluation Results



Mothers tend to introduce liquids sooner than they do solids. However, as children age a greater proportion of them tend to consume both liquids and solids. In NicaSalud 79.9% of mothers complementary breastfeed their children 6-9 months of age. In PVOs, 79.8% of mothers with children in this age group do so. Although this result is 10.8% above the baseline of 69% it is not a significant effect. NGOs had no baseline measure for this indicator, however, in the 2001 evaluation its result was similar to the PVOs (80%).

Chart 6. Consumption of Foods and Liquids by Children 0-11 months in PVO Catchment Areas: A Comparison of Baseline and Final Evaluation Results



MINSA recommends continued breastfeeding during the first two years of the child's life. For this indicator the mothers with children 12- 23 months were surveyed. In NicaSalud, 64.8% of these mothers were still breastfeeding. Among PVOs 13% more mothers did so than at the baseline.

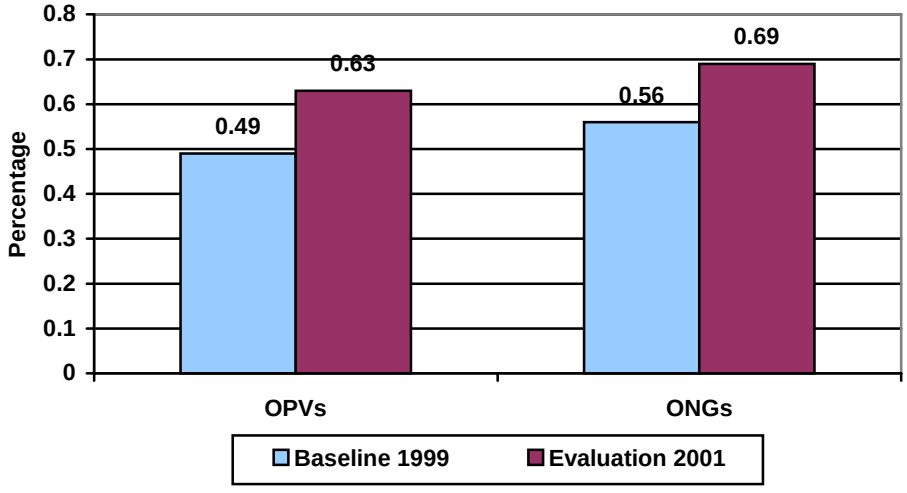
Among NGOs 13.8% more mothers continued breastfeeding. Both increases were statistically significant.

Table 13. Exclusive Breastfeeding and Complementary Feeding: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Mothers with children 0-11 months who began breastfeeding within one hour after birth	63%	532	76.4%	654	13.4%	YES	NA	NA	NA	NA	NA	NA
Exclusive Breastfeeding among mothers with infants from 0 to 5 months	35%	263	62.4%	335	27.4%	YES	NA	NA	53%	189	NA	NA
Complementary Breastfeeding among mothers with children from 6 to 9 months	69%	191	79.8%	233	10.8%	NO	NA	NA	80%	120	NA	NA
Mothers of Children 12-23 months who currently breastfeed their children	50%	531	63%	587	13%	YES	56%	361	69.8%	132	13.8%	YES

NA= Not Applicable

Chart 7. Continuing Breastfeeding. Mothers with children 12- 23 months: A Comparison of PVO and NGO Baseline and Final Evaluation Results



Diarrhea Case Management

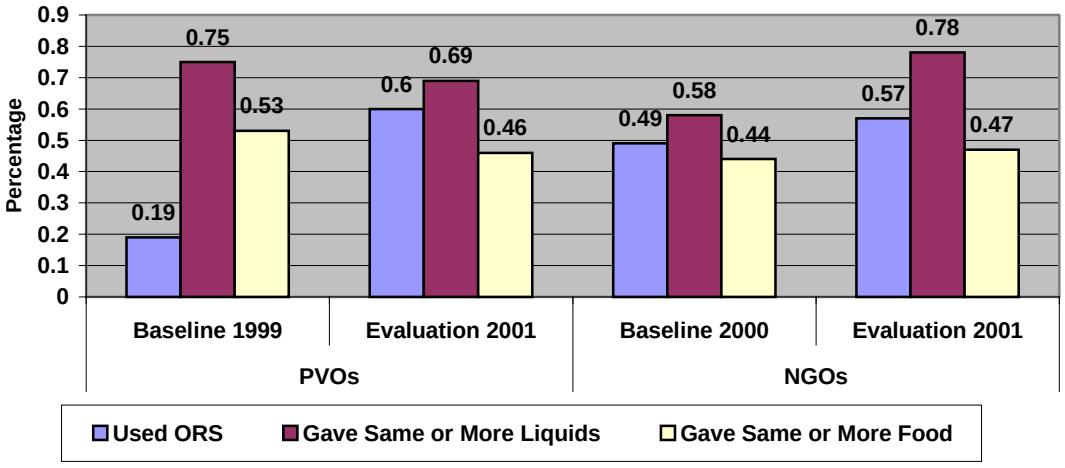
In NicaSalud 24.6% of mothers with children 0-23 months reported that their child had diarrhea in the previous two weeks to the interview. The PVOs reported 24.6% and the NGOs 24.7%, which are significantly smaller diarrhea prevalences than reported during the baselines. At that time at least 30% of children in PVO and NGO areas had had diarrhea.

The average for mothers who gave the same amount or more liquid to their children with diarrhea had no significant variation for either PVOs or NGOs, with an average for all NicaSalud of 70.4%. Among PVOs, 69.9% of mothers used the same amount or more liquids. NGOs display a significant increase as 78.1% of mothers gave the same or more liquid to their child versus 58% in the baseline.

When mothers were asked what kind of treatment they gave their children for diarrhea, 59.4% said they used oral rehydration salts. This result is similar to what was found in the ENDESA 98, with 58% for all Nicaragua. PVOs displayed a significant increase from the baseline (19% to 60%). NGOs also displayed an increase, although it was not significant.

Although the percentage of mothers giving Oral Rehydration Therapy (ORT) to their children during the diarrhea episode increased, there is still a high percentage of children with diarrhea who do not receive proper treatment, which maintains the risk of infant mortality. Along this line, the study found that 38.8% of the mothers interviewed had Oral Rehydration Salts (ORS) in their home at the time of the interview. Also, when the mothers were asked where they got this product if needed, the responses in order of frequency were the following: Casa Base or Community Oral Rehydration Units-UROCs (44.6%), Health Center (44.1%), health promoters (33.7%), and health posts (17%). This information is particularly relevant for defining ORS distribution policies and for instructing mothers.

Chart 8. Treatment Practices of Children 0-23 Months with Diarrhea: A Comparison of PVO and NGO Baseline and Final Evaluation Results

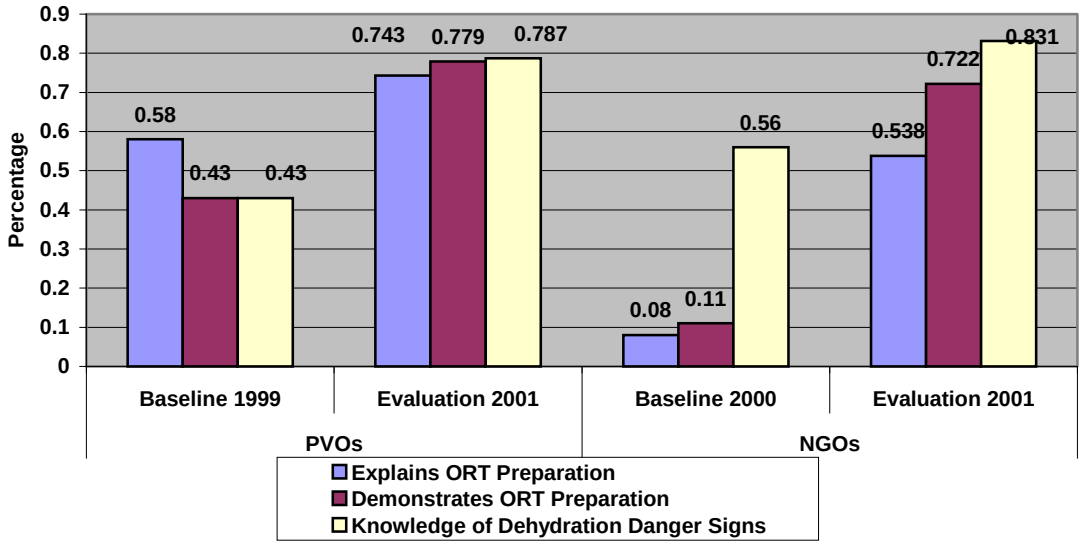


With respect to feeding practices, 46.8% of mothers gave the same or more food to their children when ill with diarrhea. In PVOs no change was detected (53% in the baseline versus 46.8% in the evaluation). NGO data are too few to analyze.

The knowledge and skills of mothers to prepare ORT were also assessed. They were asked to recite the steps for preparing ORS and then she was given an envelope of ORS to demonstrate she could prepare the solution. For the baseline, the PVOs considered preparation correct when the mother mentioned and carried out three steps (use of one envelope of salts, use of one liter of water, and mixing until completely dissolved). In this evaluation, with the same steps, PVOs displayed a significant increase in the proportion of mothers citing the three correct steps and preparing the oral salts correctly (58% versus 74.3%, and 43% to 77.9%, respectively).

NGOs required the mother mentioned five steps (wash hands, boil or chlorinate the water, use one envelope of salts, use one liter of water, and mix until the ORS dissolved completely). In the evaluation, 53.8% explained using the 5 steps, which is an increase of 45.8% over the baseline of 8%. When behavior was assessed, 72.2% of mothers prepared the ORS correctly, which is an increase of 61.2% from the 11% baseline.

Chart 9. Knowledge and Preparation of ORS and Knowledge of Dehydration Danger Signs among Mothers with Children 12-23 Months: A Comparison of PVO and NGO Baseline and Final Evaluation Results



When PVO and NGO results are compared, one notices that the proportion of mothers correctly preparing ORS goes down when the two additional steps are included in the assessment (hand washing and water treatment). When these two steps are eliminated from the NGO analysis, the proportion of mothers who correctly demonstrated preparation of ORS increased from 72.2% to 82.9%, which is not significantly different from the PVO result. Knowledge of preparation increased from 53.8% to 77.2%, which is also similar to the PVO result.

During both baseline studies, the main deficiencies of mothers when preparing ORS were: they did not wash their hands with soap and water before the preparation, they did not boil or chlorinate the water, and they did not always use one liter of water. Identifying these problems should help orient future interventions. NicaSalud members develop several activities to improve this practice, including: formation and development of mothers' groups, public talks, distribution of one liter measuring utensils, education of the mothers during household visits, and food fairs.

The other indicator related to proper and timely treatment of diarrhea in children is the mother's knowledge of diarrhea danger signs, especially dehydration. 78.8% of mothers interviewed for NicaSalud mentioned at least two danger signs. For PVOs, 77.8% of mothers knew two or more danger signs, a significant increase over the baseline of 43%. For NGOs, 83.1% of mothers were knowledgeable, also a significant increase from their baseline of 56%.

These results indicate that mothers know how to prepare and use oral rehydration salts and also recognize diarrhea danger signs, and that the proportion of mothers with these capabilities have significantly increased during the two-year life of this project.

Table 14.Knowledge and Practice about Diarrheic Illnesses: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Children 0-23 months who had diarrhea in the last 2 weeks	30%	1063	24.6%	1329	-5.4%	NO	36%	721	24.7%	721	-11.3%	NO
Mothers who gave the same amount or more liquids to children 0-23 months with diarrhea in the last 2 weeks	75%	307	69.9%	308	-5.1%	NO	58%	183	78.1%	106	20.1%	YES
Mothers who gave ORS to children 0-23 months in the last 2 weeks	19%	307	60%	309	41%	YES	49%	175	57.8%	146	8.8%	NO
Mothers who gave the same amount or more food to children 0-23 months with diarrhea in the last 2 weeks	53%	307	46.8%	300	-6.2%	NO	44%	182	47%	58	3%	NA
Mothers with children 12-23 months who explained how to prepare ORS (PVOs used 3 criteria, NGOs used 5 criteria)	58%	532	74.3%	646	16.3%	YES	8%	689	53.8%	326	45.8%	YES
Mothers with children 12-23 months who showed how to prepare ORS (PVOs used 3 criteria, NGOs used 5 criteria)	43%	532	77.9%	646	34.9%	YES	11%	689	72.2%	314	61.2%	YES
Mothers of children 12-23 months who know 2 or more diarrhea danger signs	43%	531	77.8%	653	34.8%	YES	56%	344	83.1%	276	27.1%	YES

Acute Respiratory Infections

Almost half (48.2%) of mothers with children 0- 23 months reported that their children had had a respiratory infection (cough and rapid breathing) in the two weeks prior to the interview. For the PVOs and the NGOs, the prevalence of respiratory infections was similar: 50.4% and 47.3%, respectively. These percentages vary little from the results obtained in the respective baseline studies. In the ENDESA 98, lower percentages than those found by NicaSalud were found for all Nicaragua: 26% of children under five years with a cough and rapid breathing, while for children 0- 23 months, it was almost 30%.

Acute respiratory infections (ARI) are the first cause of illness and the second leading cause of death among children under five years old. However, there is a wide variety of conditions classified as ARI ranging from a simple cold to a severe case of pneumonia, moreover there may be wide variation in mothers' capacities to perceive rapid breathing. This variation could explain the difference detected by ENDESA and NicaSalud.

The challenge is in aiding mothers to recognize the symptoms of pneumonia. As recognition of pneumonia symptoms is crucial for the early referral of sick children, mothers with children 0-11 months were asked about ARI danger signs in a child that would have her urgently visit a health unit. The evaluation for PVOs recognized three danger signs (rapid breathing, intercostal in-drawing, and not being able to drink or breastfeed). In the baseline, 5% of mothers knew two or more danger signs, while 35% did so in the evaluation.

NGOs exhibited a different pattern. Firstly, their baseline measure indicated that 69.5% mothers knew two or more danger signs. However, their baseline considered four signs rather than three (rapid breathing, intercostal in-drawing, not being able to drink or breastfeed, and difficulty noisy breathing). These were the signs included in the IMCI manuals. The evaluation only considered the former three signs as correct (as these are most closely associate with pneumonia). The evaluation resulted in 29.9% of mothers knowing two or more danger signs. The reduced number of option responses may account for the difference between the baseline and evaluation results. Non-sampling error may also account for the high percentage reported in the NGO baseline.

With respect to treatment seeking, in NicaSalud 71% of mothers with children with respiratory infections sought help or treatment in a health facility. At the baseline, 32% of mothers in PVOs areas sought treatment for their sick children. At the evaluation this percentage increased to 71.5%. While PVO increase is significant, there was no significant difference for the NGOs with 70.8% in the baseline study and 65.9% in the evaluation. The NicaSalud percentages are above those reported by the ENDESA 98 for Nicaragua (57.8%).

Table 15. Knowledge and Practice about Acute Respiratory Infections: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Cough and rapid breathing present in children 0-23 months in the last 2 weeks	54%	1063	50.4%	1329	-3.6%	NO	50%	720	47.3%	570	-2.7%	NO
Mothers who took their child 0-23 months with cough and rapid respiration to a health facility	32%	596	71.5%	662	39.5%	YES	70.8%	264	65.9%	266	-4.9%	NO
Mothers who know 2 or more danger signs of pneumonia in children 0-11 months	5%	532	35%	661	30%	YES	69.5%	361	29.9%	356	-39.6%	NO

HIV/AIDS and other Sexually Transmitted Infections

This section reports knowledge and practices by women 15 to 49 years (not pregnant) related to the control or treatment of HIV/AIDS and other Sexually Transmitted Infections (STIs). As only two organizations in NicaSalud asked questions of men, these results are not reported here since they cannot be generalized to NicaSalud.

CEPS and the Ixchen Women's Center focused their projects on adolescents and youths of both sexes about these issues. These reports are presented separately since they represent a specific part of the age distribution.

Awareness and Transmission of HIV

A high percentage of women (97.6%) in NicaSalud stated that they had heard about HIV/AIDS. Regarding the women surveyed by PVOs, 98.3% had heard about HIV/AIDS, an increase of 11.3% over the baseline. Among women interviewed by NGOs, no significant change was detected (94.3% baseline vs 88.5% evaluation). These percentages indicate a high level of awareness about the existence of HIV/AIDS.

The most frequently mentioned HIV transmission routes are presented in the table below:

Table 16. Knowledge of Ways HIV Is Transmitted among Women: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Form of transmission	NicaSalud	PVOs	NGOs
Sexual relations	91.2%	92.6%	86.9%
Blood transfusion	44.3%	44.4%	43.8%
Use of syringes	39.3%	46.2%	18.5%
During pregnancy	3.3%	4.3%	0.0%
During birth	1.0%	1.3%	0.0%
During breastfeeding	6.9%	2.3%	20.8%

In NicaSalud, the most frequently mentioned transmission route by women was sexual relations (91.2%). This route also is the main HIV transmission routes in Nicaragua. However, less than half the respondents mentioned other transmission route, and less than 5% mentioned that HIV can be transmitted to children through pregnancy, birth, or breastfeeding.

With respect to mother to child transmission, the PVO baseline revealed that more than 50% of informants knew these transmission routes. However, these high percentages disappeared in the final evaluation. This is probably due to the way the questions were asked. In the baseline, informants were directly asked if they knew that HIV could be transmitted to the baby during pregnancy, birth, or breastfeeding. In the final evaluation, informants were asked to cite ways that HIV is transmitted. It is clear from the current data that there is not high awareness of HIV.

A considerable percentage (13.2%) of informants gave incorrect responses about how HIV can be transmitted. Among the most noteworthy are: kissing, and the use of personal items. This result suggests that portions of the population are still not completely clear about how HIV is transmitted.

CEPS and Ixchen's also asked adolescents how HIV is transmitted. The results for these organizations were as follows:

In CEPS, 80% of adolescent women responded correctly with two or more forms of transmission of HIV, an increase of 19% over the baseline of 61%. Male adolescents had 82% correct responses, an increase of 22% over the baseline of 60%.

For Ixchen, 85% of respondents correctly mentioned two or more ways that HIV can be transmitted, an increase of 45% over the baseline (40%). 90% of the adolescent men answered correctly, an increase of 60% over the baseline (30%).

As with the adult population interviewed for NicaSalud, adolescents mentioned sexual relations as the main transmission route.

HIV Prevention

Over half the women (65.9%) mentioned at least two ways that a person can prevent HIV transmission. These percentages represent a significant increase over the baseline, where percentages of less than 50% were obtained for both PVOs and NGOs.

The most frequently mentioned ways to prevent HIV transmission are presented in the following table:

Table 17. Knowledge of Ways to Prevent HIV Transmission among Women 15-49 Years: : A Comparison of PVO and NGO Baseline and Final Evaluation Results

Form of Prevention	Women 15-49 years	
	Baseline	Evaluation
Use of condom in every sexual relation with penetration	48.0%	73.9%
Abstinence from sexual relations	11.0%	35.2%
Being faithful to sexual partner	19.0%	32.8%
Avoiding sexual relations with persons who have had a number of partners	13. %0	22.4%
Avoid sexual relations with prostitutes	17. %0	15.9%
Avoiding blood transfusions	5.0%	11.1%
Avoiding sexual relations with drug users	-	5.4%
Avoiding sexual relations with homosexuals	-	2.9%

All forms of prevention mentioned involved sexual relations. The most frequently mentioned was the use of condoms. Women exhibited a significant increase in this indicator as nearly three quarters of women mentioned this way in the evaluation as contrasted with a baseline measure of 48%. The other forms mentioned for preventing HIV transmission range from 2% to 35% in the evaluation. This may be due to the priority given by projects and others institutions to condom use. The 2001 evaluation percentages for sexual abstinence are very much higher than those found for all Nicaragua in the ENDESA 98, which may signal a growing awareness.

85% of all adolescents interviewed by Ixchen mentioned at least two ways to prevent HIV infection (20% and 40% for males and females, respectively, in the baseline), an increase of 65 percentage points and 45 percentage points, respectively.

The CEPS focused their HIV prevention methods on sexual contact. In the evaluation, adolescents were asked if they know about safe sex (using a condom during every sexual relation). The baseline results were 51% and 64% for women and men, respectively. In the final evaluation, for women, the percentage increased to 64.6% and for men the percentage was similar to the baseline (65.8%). It is

important to note that the CEPS developed its intervention based on the Chain of Change Model, which uses specific behaviors as the basis for developing the intervention.

Table 18. Knowledge about HIV/AIDS/STI among Women 15-49 Years: : A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Women 15 to 49 years old, not pregnant who have heard about HIV/AIDS	87%	532	98.3%	399	11.3%	YES	94.3%	525	88.5%	152	-5.8%	NO
Women 15 to 49 years old, not pregnant, who know 2 or more ways to prevent HIV/AIDS	30%	532	77.4%	399	47.4%	YES	30%	525	56.6%	152	26.6%	YES
Women 15 to 49 years old, not pregnant, who say they know other STIs beside HIV	60%	532	78%	247	18%	YES	32%	525	68.4%	56	36.4%	NA
Women 15 to 49 years old, not pregnant, who know 2 or more signs of STIs in men	11%	532	48.9%	247	37.9%	YES	19%	521	34.9%	76	15.9%	NA
Women 15 to 49 years old, not pregnant, who know 2 or more signs of STIs in women	14%	532	55.4%	247	41.4%	YES	28%	434	29%	71	1%	NA

NA= Not Applicable

Other STIs

For all NicaSalud, 74.9% of the women mentioned knowing other infections, in addition to HIV, that are transmitted through sexual relations. Among PVOs, 78% women know about other STIs besides HIV, a significant increase over the baseline of 60%. NGOs had insufficient data to analyze.

The sexually transmitted infections most commonly mentioned were: gonorrhea (67%), syphilis (63.4%), condilomatosis (24.1%), pediculosis (9.4%), and tricomoniasis (8.4%).

Although the percentage of women who said they know about other STIs is high, when asked how they would recognize them, only 48.9% mentioned two or more signs or symptoms that may present themselves in men and 55.4% in women. Regarding knowledge of signs and symptoms in men, PVOs exhibited an increase of 37.9% over their baseline. Knowledge of signs and symptoms in women, also exhibited a significant increase of 41.4% in PVOs. NGOs were not assessed due to insufficient data.

Despite the significant increase, more than half of the women could not recognize persons with STIs. This indicates that although education interventions have been successful, it is still necessary to develop activities to improve the level of knowledge.

Condom Use

For all NicaSalud, 83.5% of the women mentioned locations where they can obtain condoms. PVOs increased knowledge of women by 17.1% over the baseline. There was insufficient data to assess NGOs for this indicator.

For all NicaSalud, only 6.49% used condom during the last sexual intercourse. PVOs did not exhibit any significant gains above the baseline. NGOs were not assessed due to insufficient data.

Table 19. Use of Condoms among Women 15-49 Years: A Comparison of PVO and NGO Baseline and Final Evaluation Results

Indicator	PVOs						NGOs					
	Baseline		Final Eval.		Differ.	Significant	Baseline		Final Eval		Differ.	Significant
	%	n	%	n	%		%	n	%	n	%	
Women 15 to 49 years old, not pregnant, who know where to obtain condoms	73%	501	90.1%	112	17.1%	YES	75%	397	78.5%	76	-3.5%	NA
Women 15 to 49 years old, not pregnant, who used condom the last time they had sex	3%	331	6.6%	109	3.6%	NO	9%	381	5.6%	75	-3.4%	NA

NA=Not Applicable

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Annexes:

Annex 1: LQAS Methodology. A brief history and description of LQAS

The LQAS methodology was developed in the 1920s to control the quality of the industrial production of goods (Dodge and Romig, 1944). The basic principle is that a line supervisor takes a small random sample of a recently manufactured lot of goods from a production unit, like an assembly line or a machine. If the number of defective items in the sample exceeds a preset number, then the lot is rejected; otherwise, it is accepted. This permissible number is called the rule of decision. The permissible number of defective items is determined statistically (Dodge and Romig 1944; LWANGA and Lemeshow 1991; Valadez 1991) based on a production standard and the sample size. This sample size is selected so that a manager would have a high probability of accepting lots in which a preset proportion of the items is of high quality and a high probability of rejecting lots that fail to meet the production standard.

In health systems, an example of a production standard is a reference point for the predetermined coverage of a program area, such as vaccinations, knowledge of how to prepare and use SRO, birth attended by a trained medical provider, or the use of the contraception methods. Standards (or points of reference) can be established by the managers of the health system, either national or at the district level. In health systems, a *lot* is the area of influence of a health unit or a health worker. It may also refer to a community. In this report, a lot is an *area of supervision*. The production unit is the set of health workers under a supervisor.

The LQAS judgments about field areas have a percentage of error. In the standard statistical nomenclature, these correspond to alpha (α) and beta (β) errors. In epidemiological terms, these errors are related to the proportion of false positives to false negatives in an evaluation. The former are used to calculate *specificity* ($1-\alpha$), the probability of correctly identifying areas of supervision that achieve points of reference for execution. The latter are used to calculate *sensitivity* ($1-\beta$), the probability of correctly identifying areas of supervision that cover an unacceptably low proportion of the population. The errors associated with sample sizes for LQAS present themselves everywhere. (Valadez 1998; Valadez y Leburg 2000) since this is a discussion of the principles of LQAS. (Dodge y Romig 1944; Valadez 1986; Wolfe and Black 1989; Valadez 1991; Immunization 1996; Robertson, Anker et al. 1997).

Steps for using LQAS

The steps for using LQAS do not differ drastically from the gathering of data with the sample by conglomerate of PAI (Henderson and Sundaresan 1982) and are listed below:

Each organization organizes its area of program influence into areas of supervision (SAs). As mentioned, an area of supervision is managed by a supervisor who may be a nurse, midwife, or other person. Experience shows that this step helps the organizations revise and potentially improve their management plan.

Each supervisor organizes their area into a sample framework that consists of a list of communities and their population size within each area of supervision.

A systematic random sample of the communities is used to identify the location of 19 households. This step is done using a standard procedure described in many places (CSSP 1997). Depending on the number of communities in an area of supervision and the population size of each community, this procedure often results in no more than one randomly selected locality per community. Table 4 includes a sample frame for one of the areas of supervision of CARE included in the baseline. Of the

13 communities in the area of supervision, 12 were selected as locations for a set of interviews in each of them. Two communities had two sets of interviews and one had three. One community had no interviews.

Supervision Area #2 – MUNICIPALITY: SAN NICOLAS/Estelí				
No. AS	Community	Population	Accumulative Population	Number of Households to Sample
1	Quebrada De Agua	218	218	1
2	Espinito	183	401	1
3	Rodeo Grande	296	697	1
4	Santa Clara	233	930	1
5	La Puerta	144	1074	1
6	Limones # 1	283	1357	1
7	La Sirena	246	1603	1
8	Salmerón (Moyes)	329	1932	2
9	La Tijera	218	2150	1
10	Potrerillo	169	2319	1
11	La Granadía	120	2439	
12	Las Tablas	194	2633	1
13	Limay	301	2934	2
14	San Nicolás	652	3586	3
15	Guingajapa	244	3830	1
16	Jocomico	133	3963	1
Total in Area 2		3,963	Total	19
Sample Interval =		208.58		
Random Number =		164		

A household is selected in the identified communities. Although the spin-the-bottle method or something similar is often used for samples of 30 groups, the M&E team of Networks recommended a different procedure for Nicaragua that had been previously proven in the field in Nepal (Valadez and Devkota in preparation). It consisted of: 1) using existing sketch maps of the community made by the local health worker or 2) asking local informants to divide the community into vicinities of equivalent size and then selecting one of these at random. A combination of these methods can be used. In the second case, the half selected is again subdivided into equivalent sections with the help of an informant and one is selected randomly. This procedure is continued until there is a small area left in which the households can easily be counted. Then one of these homes is selected randomly. Both procedures worked well so that the supervisors selected one household at random.

Once a household has been selected at random, the supervisor determines whether a person with the appropriate characteristics lives in the home. If so, and if the person agrees, then he/she is interviewed. If not, then the supervisor proceeds to the house closest to the door of the house where the supervisor was standing. In the section of this report on *Parallel Sampling*, there is more discussion of the selection of the persons to be interviewed.

Interpretation of the LQAS data

The LQAS data can be interpreted by using a decision rule to decide whether the number of correct responses is under the threshold or by calculating a proportion of coverage (average coverage). The NicaSalud baseline report uses average coverages as described in the section of the report: *Use of*

LQAS for baseline surveys. In surveys that have established a threshold or goal, an LQAS judgment is made by taking the following steps.

For each indicator, count the number of *correct* responses for the corresponding question. Go to the appropriate LQAS Table and find the row for a sample of 19 (or the appropriate sample size if different from 19). The program target is found along the header of the column. Once it is located, put your finger on it and go down it to the cell with a value in it. This is the Decision Rule. If the total number of correct responses is less than the decision rule, then the area did not meet the target.

The compound table used for making decisions by supervisors during the tabulation workshops is included in Table 5 of the subsection *Use of LQAS for baseline surveys* in the *Methods* section of the main text. This LQAS table is the most user-friendly version to date. A more sophisticated set has also been developed and published separately (Valadez and Leburg 2000). However, a detailed table for a sample size of 19 is included in Annex 2. It shows the errors associated with the identification of areas of supervision that meet the preset annual targets and those that do not. As shown in Annex 2, the α and β errors never reach 0.10. The corresponding specificity and sensitivity is always over 90%.

SAMPLE SIZE= 19

Decision rule for an LQAS sample of **19** for average coverage/coverage target and lowest likely estimates ranging from 20-95% and 0-75%, respectively, with corresponding producer and consumer risks (α and β errors)

LOWER THRESHOLD	AVERAGE COVERAGE (Baselines) / ANNUAL COVERAGE TARGET (Monitoring and Evaluation)															
	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
0%	1 0.014 0.000	2 0.031 0.000	3 0.046 0.000	3 0.017 0.000												
5%		3 0.111 0.067	3 0.046 0.067	4 0.059 0.013	4 0.023 0.013											
10%				4 0.059 0.115	5 0.070 0.035	5 0.028 0.035	6 0.032 0.009									
15%					5 0.070 0.144	6 0.078 0.054	6 0.032 0.054	7 0.034 0.016								
20%						7 0.173 0.068	7 0.084 0.068	7 0.034 0.068	8 0.035 0.023							
25%							8 0.180 0.077	8 0.087 0.077	8 0.035 0.077	9 0.035 0.029						
30%							8 0.180 0.182	9 0.184 0.084	9 0.088 0.084	9 0.035 0.084	10 0.033 0.033					
35%								9 0.184 0.185	10 0.186 0.087	10 0.087 0.087	10 0.033 0.087	11 0.029 0.035				
40%									10 0.186 0.186	11 0.185 0.088	11 0.084 0.088	12 0.077 0.035	12 0.023 0.035			
45%										11 0.185 0.184	11 0.084 0.184	12 0.077 0.087	13 0.068 0.034	13 0.016 0.034		
50%											12 0.182 0.180	12 0.077 0.180	13 0.068 0.084	14 0.054 0.032	14 0.009 0.032	
55%												13 0.175 0.173	14 0.163 0.078	14 0.054 0.078	15 0.035 0.028	16 0.013 0.008
60%													14 0.163 0.163	15 0.144 0.070	15 0.035 0.070	16 0.013 0.023
65%														15 0.144 0.150	16 0.115 0.059	16 0.013 0.059
70%															16 0.115 0.133	17 0.067 0.046
75%																17 0.067 0.111

Annex 2. LQAS Table

LQAS Table: Decision rules for sample sizes from 12 to 30 and Targets or Average Coverages from 10% to 95%

Sample Size	Targets or Average Coverages																	
	10%	15%	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%	70%	75%	80%	85%	90%	95%
12	N/A	N/A	1	1	2	2	3	4	5	5	6	7	7	8	8	9	10	11
13	N/A	N/A	1	1	2	3	3	4	5	6	6	7	8	8	9	10	11	11
14	N/A	N/A	1	1	2	3	4	4	5	6	7	8	8	9	10	11	11	12
15	N/A	N/A	1	2	2	3	4	5	6	6	7	8	9	10	10	11	12	13
16	N/A	N/A	1	2	2	3	4	5	6	7	8	9	9	10	11	12	13	14
17	N/A	N/A	1	2	2	3	4	5	6	7	8	9	10	11	12	13	14	15
18	N/A	N/A	1	2	2	3	5	6	7	8	9	10	11	11	12	13	14	16
19	N/A	N/A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
20	N/A	N/A	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17
21	N/A	N/A	1	2	3	4	5	6	8	9	10	11	12	13	14	16	17	18
22	N/A	N/A	1	2	3	4	5	7	8	9	10	12	13	14	15	16	18	19
23	N/A	N/A	1	2	3	4	6	7	8	10	11	12	13	14	16	17	18	20
24	N/A	N/A	1	2	3	4	6	7	9	10	11	13	14	15	16	18	19	21
25	N/A	1	2	2	4	5	6	8	9	10	12	13	14	16	17	18	20	21
26	N/A	1	2	3	4	5	6	8	9	11	12	14	15	16	18	19	21	22
27	N/A	1	2	3	4	5	7	8	10	11	13	14	15	17	18	20	21	23
28	N/A	1	2	3	4	5	7	8	10	12	13	15	16	18	19	21	22	24
29	N/A	1	2	3	4	5	7	9	10	12	13	15	17	18	20	21	23	25
30	N/A	1	2	3	4	5	7	9	11	12	14	16	17	19	20	22	24	26

N/A: Not Applicable, means that it cannot be used since the average coverage or target is very low for assessing an area of supervision

: Alpha or beta errors are ≥≥ 10%

: Alpha and beta errors are > 15%

Annex No.3
Table summarizing indicators for PVOs
Comparison between Baseline and Final

INDICATOR	BASELINE PVOs: Dec. 1999				EVALUATION PVOs: Sept. 2001				Change PVOs	BASELINE NGOs: Sept. 2000				EVALUATION NGOs: Sept. 2001				Change NGOs
	%	n	IC Min	IC Max	%	n	IC Min	IC Max		%	n	IC Min	IC Max	%	n	IC Min	IC Max	
Population group: Mothers with children 0-11 months of age																		
Safe Maternity																		
Last pregnancy not planned	57.0	532	53.1	61.7	63.6	110	54.3	73.0	NO	Not included				23.9	74	13.6	34.2	NA
Information about FP received during postnatal care	62.0	146	54.0	7.0	78.0	205	71.2	84.8	YES	29.0	293	23.8	34.2	49.4	49	33.6	65.3	NO
Prenatal																		
Mothers who showed CPN card	56.0	532	51.4	60.0	63.1	662	58.6	67.6	NO	45.3	360	40.4	50.2	46.2	359	40.3	52.1	NO
Mothers who made at least 1 CPN visit, according to card	46.0	532	42.0	50.6	60.8	573	56.1	65.5	YES	43.7	318	38.8	48.6	46.2	359	40.3	52.1	NO
Mothers with 5 doses of TT or 2 doses during pregnancy	10.0	532	7.1	12.3	5.0	662	3.0	7.1	NO	22.0	324	17.5	26.5	0.9	359	0.2	1.5	NO
Mothers mentioning that TT protects the child	47.0	532	43.1	51.8	93.5	399	90.2	96.8	YES	85.3	190	79.4	91.2	86.4	282	82.2	90.6	NO
Mothers mentioning receiving iron during the pregnancy	71.0	532	66.7	74.6	86.4	305	82.0	90.7	YES	83.8	228	78.9	88.7	Not Included				NA
Birth, Post Natal																		
Mothers who had skilled personnel attend the birth	52.0	532	47.8	56.5	70.6	586	66.1	75.0	YES	29.0	342	24.2	33.8	45.2	228	38.3	52.1	YES
Mothers who received postnatal care from skilled personnel	51.0	257	45.0	57.5	87.8	156	83.8	91.8	YES	37.0	323	31.7	42.3	79.3	169	73.0	85.5	YES
Received Family Planning Information at Post Natal Visit	40.0	532	36.0	44.6	78.0	205	71.8	84.8	YES	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mother's Received Vitamin A after Birth	28.0	462	24.1	32.4	40.8	316	34.6	47.0	YES	NA	NA	NA	NA	NA	NA	NA	NA	NA
Newborns																		
Care of newborn by skilled personnel	70.0	263	64.5	75.8	85.9	259	81.3	90.5	YES	43.0	324	37.6	48.4	78.7	150	72.0	85.5	YES
Newborns with clean umbilical cord in 1st week after birth	77.0	532	73.8	81.1	87.4	323	83.5	91.3	YES	91.5	247	85.6	97.4	86.4	152	80.7	92.2	NO
Mothers saying they vaccinate baby although he/she is ill	87.0	526	84.5	90.3	89.9	189	85.4	94.4	NO	87.0	246	81.1	92.9	92.2	75	86.0	98.4	NO
Breastfeeding																		
Under 6 months receiving exclusive breastfeeding	35.0	263	28.8	40.6	62.4	335	56.2	68.7	YES	Not included				30.1	361	24.5	35.6	NA

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Comparison between Baseline and Final

INDICATOR	BASELINE PVOs: Dec. 1999				EVALUATION PVOs: Sept. 2001				Change PVOs	BASELINE NGOs: Sept. 2000				EVALUATION NGOs: Sept. 2001				Change NGOs
	%	n	IC Min	IC Max	%	n	IC Min	IC Max		%	n	IC Min	IC Max	%	n	IC Min	IC Max	
Children from 6-9 months receiving complementary feeding	69.0	191	62.7	76.0	79.8	233	74.7	84.9	NO	Not included				56.0	361	49.9	62.2	NA
Newborns breastfed in first hour after birth	63.0	532	59.3	67.6	76.4	654	72.6	80.3	YES	84.3	357	80.6	88.0	45.5	76	34.1	57.0	NO
Infant Survival																		
Mothers with card for Control of Growth and Development of baby	78.0	532	74.0	81.2	89.1	475	86.1	92.1	YES	81.7	300	75.8	87.6	89.6	133	83.5	95.7	NO
Children 2-11 months controlled in the last 2 months	73.0	462	68.4	76.7	72.3	361	67.6	77.0	NO	70.6	289	64.7	76.5	91.8	106	87.0	96.5	YES
Mothers who correctly explain preparation of oral serum (3 criteria)	58.0	532	53.8	62.4	74.3	646	70.3	78.3	YES	Not included				77.2	327	72.0	82.5	NA
Mothers who prepare oral serum correctly (3 criteria)	43.0	532	38.2	46.8	77.9	647	74.1	81.7	YES	Not included				82.9	314	77.5	88.2	YES
Mothers who know age when the baby should be weaned	42.0	532	37.3	45.8	64.8	662	60.4	69.2	YES	50.8	360	45.9	55.7	50.3	291	43.3	57.3	NO
Mothers who know at least 2 signs of IRA	0.05	532	0.0	0.1	35.0	661	30.5	39.5	YES	69.5	361	64.6	74.4	29.9	356	24.4	35.4	NO
Population Group: Mothers with children 12-23 months of age																		
Vaccines																		
Mothers who showed vaccination card for the baby	88	531	84.6	90.4	97.8	551	96.6	99.0	YES	84	361	80.2	87.8	94.5	361	92.1	96.9	YES
Coverage of BCG, according to card	82.0	531	78.7	85.4	91.7	551	87.2	96.2	YES	86.0	341	81.1	90.9	90.3	361	87.2	93.4	NO
Coverage of polio, according to card	77.0	531	73.8	81.0	91.1	551	86.2	96.0	YES	85.0	343	80.1	89.9	90.6	361	87.7	93.5	NO
Coverage of Pentavalent, according to card	76.0	531	72.3	79.7	89.1	551	84.0	94.2	YES	83.0	342	78.1	87.9	88.9	361	85.6	92.2	NO
Coverage of MMR, according to card	76.0	448	71.8	79.9	85.8	551	81.2	90.4	YES	76.0	342	71.1	80.9	80.9	361	76.8	85.0	NO
Coverage of complete vaccination (BCG, Penta3 and Polio3)	71.0	531	66.9	74.8	88.2	551	83.1	93.3	YES	76.0	73	71.1	80.9	87.8	361	84.5	91.1	YES

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Table summarizing indicators for PVOs
Comparison between Baseline and Final

INDICATOR	BASELINE PVOs: Dec. 1999				EVALUATION PVOs: Sept. 2001				Change PVOs	BASELINE NGOs: Sept. 2000				EVALUATION NGOs: Sept. 2001				Change NGOs
	%	n	IC Min	IC Max	%	n	IC Min	IC Max		%	n	IC Min	IC Max	%	n	IC Min	IC Max	
Infant Survival																		
Mothers knowing 2 or more signs of danger of EDA	43.0	531	38.7	47.3	78.7	653	75.0	82.3	YES	56.0	344	50.7	61.3	83.1	276	77.9	88.3	YES
Mothers found breastfeeding their baby	50.0	531	45.7	54.3	63.0	587	58.1	67.8	YES	56.0	361	50.9	61.1	69.8	132	61.4	78.2	YES
Population Group: Children 0-23 months																		
Acute Diarrheic Illnesses (EDA)																		
Prevalence of EDA in last 2 weeks	30	1063	27.5	33.1	24.6	1329	21.8	27.4	YES	36.0	721	32.5	39.5	26.2	570	22.1	30.4	NO
Mothers who say they give more or the same amount of food to their child when ill with EDA	53	307	47.4	58.8	46.8	300	39.8	53.8	NO	44.0	182	36.8	51.2	47.0	58	32.6	61.4	NO
Mothers who say they give more or the same amount of liquids to their child when ill with EDA	75	307	69.7	79.6	69.9	308	63.8	76.0	NO	58.0	183	50.8	65.2	78.1	106	68.2	87.9	YES
Mothers who say they give more or the same amount of food to their child when recovering from EDA	71	307	64.9	76.8	69.5	298	63.4	75.5	NO	72.0	180	65.4	78.6	73.4	60	63.0	83.7	NO
Mothers who used ORS for children with EDA	19	307	14.4	23.3	60.0	309	53.5	66.5	YES	49.0	175	41.6	56.4	57.8	146	48.6	67.0	NO
Mothers who sought treatment for the EDA (Centers and other Health Unit)	16	307	11.6	20.0	53.9	307	47.3	60.4	YES	55.0	182	47.7	62.3	59.6	143	50.3	68.9	NO
Acute Respiratory Infections																		
Prevalence of IRA in last 2 weeks	54	1063	51.4	57.5	50.5	1329	47.3	53.7	NO	49.6	720	46.3	52.9	47.3	570	42.6	52.0	NO
Mothers who take their child with IRA to a health establishment	32	596	27.8	37.4	41.6	662	39.1	44.1	YES	70.8	264	64.9	76.7	2.4	266	0.5	4.2	NO
Population Group: Men 15-49 years																		
Safe Maternity																		
Men who know 2 or more signs of danger in pregnancy	10	520	7.4	12.6	7.3	76	1.1	13.5	NO	30.9	456	26.7	35.1	Not included				NO
Men who know 2 or more signs of danger during birth	11	520	8.5	14.0	3.4	76	-0.7	7.4	NO	22.0	456	18.2	25.8	Not included				NO
Men who know 2 or more signs of danger after birth	17	520	14.0	20.0	10.0	76	3.1	16.9	NO	29.0	456	24.8	33.2	No included				NO
Men who know where to take a woman with maternity complications	94	520	92.0	96.0	96.2	76	91.2	101.2	NO	54.0	456	49.4	58.6	Not included				NO

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Comparison between Baseline and Final

INDICATOR	BASELINE PVOs: Dec. 1999				EVALUATION PVOs: Sept. 2001				Change PVOs	BASELINE NGOs: Sept. 2000				EVALUATION NGOs: Sept. 2001				Change NGOs
	%	n	IC Min	IC Max	%	n	IC Min	IC Max		%	n	IC Min	IC Max	%	n	IC Min	IC Max	
HIV/AIDS/STDs																		
Men who have heard about HIV/AIDS	95.0	520	92.6	96.6	96.6	76	91.7	101.5	NO	42.6	399	38.7	46.5	98.7	76	96.2	101.2	YES
Men who know of 2 or more ways to prevent transmission of HIV	42.0	520	37.6	46.2	42.9	76	30.6	55.2	NO	41.0	394	36.1	45.9	71.1	76	60.9	81.3	YES
Population Group: Women 15-49 years, not pregnant																		
Safe Maternity																		
Women who know 2 or more signs of danger during pregnancy	21.0	532	17.9	25.0	32.7	665	28.5	37.0	YES	39.0	646	35.2	42.8	33.6	285	27.1	40.1	NO
Women who know of 2 or more signs of danger during birth	18.0	532	14.6	21.3	32.0	589	27.3	36.7	YES	30.0	646	26.5	33.5	32.4	285	26.0	38.8	NO
Women who know of 2 or more signs of danger after giving birth	26.0	532	21.7	29.3	53.7	665	49.1	58.2	YES	41.0	551	36.9	45.1	57.0	285	50.3	63.7	YES
Women who know where to go if they have maternity complications	97.0	532	96.1	98.8	99.1	665	98.2	100.0	NO	82.0	552	78.8	85.2	95.7	209	93.2	98.3	YES
Women under 24 years who had their 1st birth after reaching 20	12.0	122	6.5	17.5	11.3	70	4.0	18.5	NO	Not included				2.9	18	-2.8	8.6	NA
Women who know about appropriate birth interval	89.0	455	84.5	93.6	96.5	209	93.8	99.2	YES	63.6	560	60.7	66.5	83.9	152	76.7	91.1	YES
Family Planning																		
Women who use some form of contraception	56.0	532	52.1	60.7	69.4	207	62.5	76.4	YES	62.0	598	58.1	65.9	42.3	76	29.9	54.8	NO
Women who know about 3 or more family planning methods	63.0	532	58.5	66.8	98.2	209	96.5	99.9	YES	78.0	585	74.6	81.4	70.3	76	58.9	81.8	NO
HIV/AIDS/STDs																		
Women who have heard about HIV	87.0	532	84.3	90.0	98.3	400	98.2	98.4	YES	94.3	437	91.4	97.2	88.5	152	83.3	93.7	NO
Women who know 2 or more ways to prevent HIV transmission	30.0	532	26.0	33.9	77.4	399	72.9	82.0	YES	30.0	525	26.1	33.9	56.6	152	48.8	64.4	YES
Women who know about other STDs	60.0	532	55.2	63.7	78.0	247	72.3	83.7	YES	Not included				68.4	56	55.1	81.7	YES
Women who know 2 or more signs and symptoms of STDs in men	11.0	532	8.0	13.4	48.9	247	42.1	55.7	YES	19.0	521	15.7	22.3	34.9	76	23.0	46.9	YES
Women who know 2 or more signs and symptoms of STDs in women	14.0	532	10.9	16.9	55.4	247	48.7	62.2	YES	27.6	434	23.7	31.5	29.0	71	17.3	40.7	NO
Women 15-49 years, not pregnant who used a condom with their partner during the latest sexual relation	3.0	331	1.4	5.5	6.6	109	1.4	11.8	NO	9.0	393	6.2	11.8	8.0	75	1.1	14.9	NO