CS XII BASELINE SURVEY

PROJECT HOPE/UNIVERSIDAD PERUANA CAYETANO HEREDIA
HUALLAGA VALLEY, SAN MARTIN, PERU

IMPROVING MATERNAL-CHILD HEALTH
IN THE HUALLAGA VALLEY OF PERU

Cooperative Agreement # FAO-0500-A-00-6056-00

March 1997

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ACKNOWLEDGEMENT

This baseline study would not have been possible without the collaboration of many institutions and individuals. Project HOPE wishes to thank DIRES-SM, PRISMA, UPCH, Helen Keller International, Giovanna Baltazar, Dr. Antonio Carrasco, the staff of the cooperating health centers, the community leaders, and the families who participated in this survey.

ACRONYMS

CSSP	Child Survival Support Program - Johns Hopkins
CS	Child Survival
DIP	Detailed Implementation Plan
DIRES-SM	Dirección Regional de Salud San Martín
HAZ	Z-score for height-for-age
Hb	Hemoglobin
HKI	Helen Keller International
KPC	Knowledge, Practice and Coverage survey
MINSA	Ministry of Health
NGO	Non-Governmental Organization
ORS	Oral Rehydration Solution
UBASS	Unidad Básica de Servicios de Salud
UPCH	Universidad Peruana Cayetano Heredia
UROC	Oral Rehydration Unit
USAID	U.S. Agency for International Development
WAZ	Z-score for Weight-for-age
WHZ	Z-score for Weight-for-height

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INTRODUCTIONINTRODUCTION

The project area includes the provinces of Lamas and El Dorado and the UBASS (Unidad Básica de Servicios de Salud) Banda de Shilcayo, in the Huallaga valley, administrative region San Martin. Being part of the Amazon Basin, most of the project area is a tropical rain forest, with poor roads and communication. The main economic activity is subsistence agriculture in small plots of land with minimal production of some cash crops including coca leaves. In the recent past, those provinces were the focus of social instability with two terrorist groups (Shining Path and MRTA) competing for the supremacy. As a result, the main cause of death for adult males in the upper Huallaga valley was homicide, as recently as 1996. Budget restrictions and instability in the upper Huallaga valley have restricted the target area to the provinces and UBASS mentioned above. These areas are geographically encompassed in the middle and lower Huallaga valley.

The infant mortality rates are high compared to the rest of Peru. Peru: 43/10,000; Lamas: 60.5/1000; El Dorado: 93.8/1000; Banda de Shilcayo: 53.7/1000. These figures are from the national census of 1993. Little or no data has been available for the target area on nutrition status, micronutrients, or actual health practices.

The project plans to target 37,965 women and children under five. Its goals are to reduce infant, child and maternal morbidity and mortality; to motivate and involve local communities to resolve health problems and to increase the capacity of Project HOPE, UPCH (Universidad Peruana Cayetano Heredia), MINSA (Ministry of Health) and NGO (Non-Governmental Organization) partners to plan, implement and evaluate effective and sustainable child survival interventions.

There are four child survival interventions in the project: nutrition and micronutrients (40% of effort), breastfeeding (25% of effort), diarrheal disease control (20% of effort), and family planning (10% of effort). The four-year project started on Sept 30, 1996 and will continue through September 29, 2000. Project HOPE will provide leadership, in conjunction with the Center of Public Health of the UPCH, and in collaboration with the DIRES-SM (Dirección Regional de Salud-San Martin) and local NGOs, PRISMA and CEPCO. Project HOPE furnishes technical staff for overall project management and implementation, and technical assistance in community health, nutrition and adult education. The UPCH provides medical, public health and nursing students on community rotation as well as technical support in nutrition, micronutrients, monitoring, and evaluation.

The primary objective of the survey was to provide useful information about the health and nutritional status of the target communities with which to make sound decisions, i.e. where to focus interventions to increase their potential effectiveness, and to provide baseline data which will be used for evaluation when compared to a final survey at the end of the four years.

METHODOLOGY

METHODOLOGY

Since so little data is available on the health practices, nutrition, and micronutrient status of the target population, the project designed a comprehensive baseline study. The study included an adaptation of the Johns Hopkins PVO-CSSP standardized KPC (Knowledge, Practice, Coverage) survey, height and weight measures of all children in the sample, dietary intake assessments, and tests for iron, Vitamin A, iodine in salt, and parasite loads.

As shown in Table 1, the survey can be divided in seven modules. Most modules collected data on children below 3 years of age, but others include their older siblings (36-71 months) or parents.

Table 1: Age and Sex Groups on Which each Survey Module was Applied

	Children <3 yr	Older Sibling	Mother	Father	Household
KPC survey	x		x		
Food consumption	x	x			
Anthropometry	x				
Hemoglobin	x	x	x	x	
Serum retinol	x				
Parasites in stools	x				
Iodine in salt					x

Survey instruments:

KPC: The generic questionnaire, in Spanish, developed by the CSSP was reviewed with the field team, discarding all questions not relevant for the project objectives and adopting others specific to project needs. Wording and the name of foods and preparations was adapted to the local situation. A draft was sent to MINSA staff for review and later validated in the field. The final version was printed just before the survey started (see Annex 2). The staff received training in interviewing and a written guide.

Food consumption: A HKI (Helen Keller International) generic form for food frequency was used as a starting point, resulting in several revisions by a HKI staff member after a pilot in the field. Locally available foods were substituted for others in the list. Two versions were used, one for children below 24 months of age, and other for children from 24 to 71 months of age (see Annex 3).

Sampling:

Sample Size:

The sampling methodology followed the 30 cluster sampling followed the WHO/EPI and CSSP models. For a prevalence rate (or probability) set up at 50% (0.5), a degree of precision was set up at 10% (0.1). Replacing in the formula

$n= z^2 pq/d^2$

Where:

n = sample size

p = prevalence rate **or** coverage **or** level of knowledge, all expressed as a probability

q = 1-p

d = degree of precision, and

z = statistical certainty chosen

To improve representation, the number of interviews per cluster was limited to 10. A final sample size of 300 was chosen, to take into account non-respondents and other losses of data.

Primary unit: Cluster

The clusters were selected from the list of communities in the project area, excluding the few towns with a population above 2000 which would be considered urban areas. The selection was made with a random digit table using 3-digits, with a starting digit and sampling interval set according with this example:

Village A pop. 200
Village B pop. 300
Village C pop. 1500
Village D pop. 120

If the starting point is 250, and the sampling interval 500, Village A is skipped. A conglomerate is selected in village B.

Three additional conglomerates are selected in Village C. In this procedure, the chance of being selected is a function of the village size.

The distribution of the conglomerates in the project area was kept in proportion with the total population in each UBASS as shown in Table 2:

Table 2. Distribution of Sample Population by UBASS/Province

	% Total	# of clusters (household) planned
UBASS Banda de Shilcayo	60%	18 (180)
El Dorado	25%	7 (75)
Lamas	15%	5 (45)

Secondary unit: Household

If the village had less than 100 households, the surveys were made in all eligible households until the quota of ten children was filled. If the village or area had more than 100 households, a list was made and a sampling interval number was selected by dividing the number of households by 10. When the quota was not met, another cluster in the neighborhood was selected as an extension of the first.

Eligible households were those having at least one living and present child between 6 and 35 months of age. The oral, informed consent from the mother for all our procedures, including blood extraction was essential. The presence of the biological mother of the child was not considered indispensable if another family member could give the required information. If no family members capable of giving information were present, the household was immediately replaced. This event was, according to the field team, very uncommon, since the absent member was usually the father. Since the field team stayed a short number of hours in each village, non responders -women absent - were not revisited. This risk was kept at minimum by sending notes or broadcasting radio messages with the schedule of visits for each conglomerate.

The reasons for restricting the enrollment to children over 6 months of age were:

- known difficulties in obtaining a venous blood sample in very young children
- lack of clear reference values for hemoglobin in young infants (below 6 months)

Training:

Luis Benavente, UPCH, trained the personnel in the use of the Hemocue® -a portable device to measure hemogoblin- and techniques to draw blood from the vein and the finger, and in safe procedures for handling blood. Standardization included the calculation of precision and accuracy of each interviewer in the use of the Hemocue®. Also included in the training was discussion of ethical aspects of epidemiological research, and

how to inform participants before asking for consent. A test survey was held December 16 to 18, 1996.

Susan Burger, Helen Keller International, trained the team in the use of HKI food frequency survey to assess community risk of Vitamin A deficiency from December 18 to 20, 1996. The training included a pilot survey in a community called *Diez de Agosto,* near Tarapoto, to validate the wording of the questions. Twelve families were interviewed.

Giovanna Baltazar, from PRISMA, trained the staff in early January, 1997 in all the other procedures: anthropometry, collection and handling of samples for serum retinol, and interviewing techniques. The goal was to reach consistency between interviewers.

The final part of the training process was in specialized skills for the members of the team who were selected to perform laboratory procedures and the quality control of the survey. During the initial weeks of field work, Ms. Baltazar, as an expert anthropometrist, supervised: sample selection, laboratory, physical measurements, and checked the questionnaires for completeness and accuracy.

Description of a Typical Day of Work:

- Travel to the community by foot, four-wheel drive vehicle, or boat. Since the equipment (see Annex 7) represented a heavy load (40 lb each), to travel by foot on muddy trails 4 or 5 hours to reach communities was a demanding task for all the field teams, as was loading and unloading the boat or truck.
- Meet with local authorities, give them a letter describing the proposed work.
- Listing of eligible households if conglomerate was greater than 100 households
- Obtain an oral informed consent from the mother
- Interviews (performed by two nurses and two auxiliary nurses). Review of the forms.
- Ask for a stool sample. Draw capillary or venous blood.
- Perform laboratory procedures, report results to the family and give recommendations or make referrals to health center.
- Quality control of the questionnaires for consistency and completeness. Nutritionist reviews the HKI food frequency surveys.
- End of work, farewell to the community

Supervision:

To provide quality control, there was one supervisor and one other reviewer who checked all of the completed forms for

inconsistencies and values outside the acceptable range.

PROCEDURES TO COLLECT CLINICAL INFORMATION

Anthropometry:

Usually the children were weighed without clothes. When light clothes were being worn, an amount of 50 to 100g was subtracted to obtain the net weight. Scales (Salter-type, Balper trademark, 100g in precision, 25kg of capacity) were adjusted to zero prior to every measurement.

Children under 24 months of age were measured with a wooden infantometer while lying down, those over 24 months old were measured in a standing position, with the same infantometer.

Biochemistry:

Hemoglobin: Capillary blood was obtained from the left ring finger in all subjects older than 36 months, with disposable lancets. The second or third drop of blood was collected with Hemocue cuvettes. These were inserted within 10 minutes in the portable hemoglobinometer (Hemocue®). This procedure was performed within the household. If found anemic (see Table 3 for cut off points) they were given a written report and counseling to visit the health post or center for treatment. Adults were asked about a history of malaria or, if pregnant, length of gestation. All subjects were questioned about use of iron supplements or recent de-worming.

In children aged 6-35.9 months, a venous blood was obtained from the cubital vein, with an heparinized syringe (Sarstead®), pulling the plunger slowly to avoid hemolysis. The needle size was 1 inch long and 20 gauge. After mixing the content well with a gentle rotation, two blood drops were put over a plastic film to fill a Hemocue cuvette. The syringe was protected from the light by covering it with black plastic film. Then the syringe was carried to the field laboratory, usually arriving less than 25 minutes after the blood was extracted.

Table 3: Cut off points for anemia

Sex and age group	Cutoff point (g/100 ml)	Reference
Children - both sexes:		
Infants (6 to 12 months old)	11	WHO 1993
Preschool children (1 to 5 years)	11	WHO 1993
School-age children (6 to 14 years)	12	WHO 1993
Adult Female:		
Non-pregnant (15 to 45 years old)	12	WHO 1993
Pregnant:		
First trimester	11	CDC 1989
Second trimester	10.5	CDC 1989
Third trimester	11	CDC 1989
Adult Male:		
Adult men	13.6	WHO 1993

Serum retinol: In a place protected from the sun with screens of black plastic film (the field lab) a trained nurse centrifuged the blood sample with a hand centrifuge (donation of UNICEF to PRISMA). After 5 minutes of centrifuging, the supernatant fluid, more properly plasma, was transferred with the aid of an automatic pipette to 1-ml vials (Cryotubes), which were immediately labelled and stored in a thermos filled with liquid nitrogen. These were ultimately transported to the DIRES-SM lab (Tarapoto), where the samples were kept in a freezer at -20°C until their shipment to Lima by plane in an insulated container designed for viral studies (KST).

Once at UPCH the samples were kept at -20°C for a minimum number of days until analysis. The measurement of serum retinol was made with HPLC in a C-18 reverse-phase column. Pure methanol was used as a mobile phase, with a flow rate of one ml per minute.

As shown in Table 4, cut off points to determine low or deficient levels of serum retinol were used according to WHO prevalence rates.

Table 4: Cut off point for prevalence rates to consider Vitamin A a public health problem (WHO, 1993)

Level		Prevalence
Less than 20 ug/100ml	*low levels*	More than 15% of the sample
Less than 10	*deficient levels*	More than 5% of the

ug/100ml		sample

Iodine in Salt: Each household was asked to provide a sample (5 mg) of the table salt they use. If the salt was in the original container, the brand and source of origin was noted. When the family had unlabeled salt, they were asked to identify the source. The salt was placed in a plastic bag labeled with the family's survey identification number and taken to the field lab.

A medical technologist from DIRES-SM titred in the field the content of iodine in salt, with the aid of a graduated burette and known amounts of sodium thiosulfate. Although a semi-quantitative method was also used (Ioditest^{R}), the results will not be shown because the first analysis is more reliable and accurate.

Parasites: Mothers were given a small, wide-mouthed opaque plastic container, labeled with the family's survey i.d. number, and asked to collect a sample of the child's feces (approximately 4-6 gr) if the child should have a bowel movement during the time the survey team remained in the community. They were to bring the sample to the field lab. Only 64 samples were collected. Because of the logistics of the survey, team members could not remain in the community or return to collect more samples.

The samples were either analyzed in the nearest health center or preserved in a solution of phenol, alcohol, and formalin for transport to the Public Health Reference Laboratory in Tarapoto. After mixing the samples with saline solution, the following techniques were used: direct, lugol and Ziehl-Nielssen staining. Total number and types of parasites were noted for each sample and the results recorded on the form with the other data from that family.

Data Handling and Processing:

Data was entered in EPI INFO in Project HOPE office at DIRES-SM, Tarapoto. One administrative assistant entered the data in 7 days. A DIRES-SM staff member trained in EPI INFO conducted the initial analysis, and more advanced analyses were done at UPCH using SPSS-X.

Exact age of the child was calculated subtracting the date of birth from the date of the interview. Anthropometric indexes, WAZ (Z-score for weight-for-age), HAZ (Z-score for height-for-age), WHZ (Z-score for weight-for-height) were calculated from EPI INFO. Scores over 6Z or under -6Z (Z being the number of standard deviation of the sample) were assumed as outliers and discarded from the analysis. Only two such scores were

identified.

Confidentiality of the data was ensured by erasing the identification of the household in the final version of the data base. Answers not included within the options, or answers to open-ended questions were coded manually.

Frequencies were generated from EPI INFO directly. Survival analysis was done through the generation of life tables, a methodology that re-constructs breast feeding and weaning patterns using SPSS-X at UPCH computer center. Graphs showing the results of such analysis were generated in MS Power Point.

Data on the consumption of foods for children under 24 months of age was entered in MS Excel, and tabulated directly in that program. To analyze the food frequency for older children, the EPI INFO program developed by HKI was used.

Preliminary analyses were discussed with the field team and DIRES-SM staff to ensure the results were consistent with the experience in the field. For instance, a case with a hemoglobin concentration below 4g/100 was in the scatterplot far below the average. The field team explained the data belonged to a child with a severe hookworm infestation. Information of this kind (i.e. hookworm infestation or gestational age when the mother was pregnant) had been recorded in a separate section for comments on the survey forms.

RESULTS RESULTS

A. KPC SURVEY

Only one mother refused to allow her family members to participate in the survey, and was replaced by another household. This is a very high rate of response, considering the request for a venous blood sample.

Table 5 summarizes the geographical distribution of the sample in the project areas, where more than 300 mothers and same amount of children between six and 35 months of age were surveyed.

Table 5. Geographical distribution of the sample in Lamas, El Dorado and UBASS Banda de Shilcayo

	#Clusters	Households (mothers)	Children 6-35 m	Older Siblings*	Fathers*	Salt Samples*
Banda Sh.	18	182	182			
El Dorado	7	73	73			
Lamas	5	52	52			
Total	30	307	307	145	120	305

*Data not disaggregated by province/UBASS.

Ethnicity:

Only one interviewed mother spoke a native language (Quechua) and she also spoke Spanish. This form of question did not serve as an adequate verification of ethnicity since no other indigenous mothers who migrated from other regions still speak their native languages.

Age Distribution of the Mothers:

14.3 percent of mothers were under 20 years old and 7.5 percent were 40 or older. Data from health statistics and other studies show that San Martin is one of the regions with the highest fertility rate among adolescents. In 97.7 percent of the cases the interview was conducted with the biological mother.

Education of the Mothers:

15.3 percent of the mothers had not received any formal school instruction. Almost three fourths had received some primary education, 9.4 percent secondary education and only two mothers (0.7 percent) received technical or higher education.

Economic Activity:

Three fourths (75.2 percent) of the mothers engaged in agriculture, the main economic activity in this area. Less than one fifth (19.9 percent) reported no economic activity, while the remainder worked as domestic servants (2), vendors in shops (6) sold foods (2), made handcrafts (1) or sold agricultural products (4). While the mother is outside the home, the children are mostly cared for by the older siblings (42.0%) or other relative (23.5%).

The main economic activities of the fathers were farming on their own land (91.5 per cent) and being a paid laborer (4.8 percent). Only four reported being without any economic activity. Ninety-three percent reported owning land. According to the last agricultural Census (1994), most of family production units are less than 20 hectares, and the productivity of common staples such as corn or rice in the region is barely half of the national average. Among farmers, a secondary economic activity was to sell their products.

Age Distribution of the Children:

As previously stated, the KPC survey was restricted to children between 6 and 35.9 months of age. 17.9 percent were in their second semester of life, almost half (49.2 percent)

were in their second year and the remaining (32.6 percent) in their third year of age.

Breast Feeding and Weaning Patterns:

All the children had received breast milk some time in the past. All children below 12 months of age were breast feeding at the time of the interview. The prevalence of breast feeding during the second year of age was 40.4 percent. Only 2 percent of the children in the 24-35 month age group were still being breastfed.

Less than a third (30.6 percent) of the children were put to the breast during the first hour of birth. 37.5 percent received breast milk more than 8 hours after birth.

53.7 percent of the mothers said children should start foods other than breast milk at six months of age, while 19.2 percent said ***after*** six months was the right moment to end exclusive breastfeeding. This high knowledge level probably reflects that IEC activities in San Martin have already reached a good coverage, but do not correlate with current practices of early introduction of complementary foods and liquids (see below).

All children were receiving other liquids by one month of age. Over half of the children were receiving other foods before six months of age. See Figure 1 in Annex 1.

The age of introduction of food items other than breast milk follow in part the pattern found in other parts of Perú: the first item to be introduced is clear liquids. The second food item to be introduced is a pap, usually mashed ripe plantains, while other food preparations have later median age of introduction, between 6 and 18 months.

When asked to list the proper foods to offer to their children, the highest percentages named were cereals and by-products (73 percent), followed by meats (71.3 percent), and beans (65.5 percent). Substantially lower percentages were obtained on roots/tubers (44 percent), fruits (38.8 percent) and vegetables (30.3 percent). It must be stated that children older than 3 years of age in this region search for food in the nearby fruit trees, trap small animals and catch fish; all those foods obtained for themselves can not be registered when interviewing the mother.

According to the survival analysis, the median duration of breast feeding was near 12 months of age (Fig. 1, Annex 1). The median age of introduction of other liquids was less than one month of age.

Morbidity:

According to the mothers, upper respiratory tract infections (46.6 percent) and diarrhea (37.1 percent) are the main causes of morbidity in their children. Other causes are fever (14 percent), skin infections (1 percent) and malaria (0.7 percent).

Fifty-seven percent of the mothers reported having heard about a condition called anemia. Among those who said to have heard (n=175), anemia was attributed to a poor diet by almost one third (n=52). The remaining mothers mentioned malaria, worms, blood loss through menstruation and other, with a large number (n=78) admitting not knowing the cause of anemia.

Diarrhea:

66.8 percent of the children had diarrhea during the two weeks prior to the survey.

The most commonly mentioned danger sign among the mothers whose children had diarrhea was weakness/apathy (59 percent) followed by anorexia (35 percent), dehydration signs (34 percent) and others: vomit (3.6 percent), fever (3.6 percent), prolonged diarrhea (2.1 percent) and other (2.1 percent).

Over two thirds (65.8 percent) of the mothers treated their own children without help. Among those who sought help (n=105) , 41.9 percent went to a health service, while 36.2 percent were aided by a relative or a friend. One out of ten consulted a health promotor. Only three (2.9 percent) went directly to a pharmacy because, in part, those stores exist only in large towns. As shown below, many mothers buy antibiotics from any store and even from the health service, without a prescription.

Over a quarter (24.1 percent) of the mothers whose children had diarrhea the previous fortnight gave the children a smaller volume of fluids. 35.5 percent gave the child less solid foods, and 12.7 percent gave the child less breast milk. The latter figure is for those still being breastfed at the time of the survey. From the wording, it is not clear whether the mother is deliberately withholding food and/or liquid, or whether she gives less because the child accepts less.

When asked what should be done for a child with diarrhea, the mothers said to give the child anti-diarrheal drugs or antibiotics (54.7%), followed by taking the child to the health center (26.4%), offer the child herbal teas (15.6%), make ORS (11.7%), give the child more fluids (6.8%) and give the child liquids as soon as possible (5.2%).

Most of the mothers (69.1%) said that during the recovery from diarrhea the child should receive more foods than usual (35.2%), or more food, more often and in smaller quantities (33.9%). 12.1 percent of the mothers said convalescent children should receive less food.

52.8 percent of the mothers said their child had a fever the week before the interview. Since virtually no one has a thermometer at home, this data must be considered only as a crude and subjective signal of possible infection.

Immunizations/Growth Monitoring:

74.9 percent of the mothers were able to produce an immunization card for their child. Of those unable to show the card, some said they did not have the card in their homes because the health services keep the cards, this information has not been verified. The following indicators are calculated with the information extracted from the immunization card, and restricted to children with ages in the range 12-23.9 months:

The coverage of BCG was 86.6 per cent, 90.2 percent received the three doses of polio vaccine. The corresponding coverage for DPT3 was 92.0 percent, while 92.9 percent had received measles vaccine.

Defining as completely protected those children (between 12-23.9 months) who had received all doses of all vaccines-BCG, measles, Polio-3 and DPT3- the complete coverage was 60.7 percent. Many children were missing just one dose.

The dropout rate between the first and the third doses of DPT in children 12-23.9 months of age was 3.6%.

A third (33.5 percent) of the children had been weighed and the weight noted on the card in the 4 months before the survey.

Family Planning:

43 (14%) of the mothers reported being pregnant at the time of the survey. Selecting the non-pregnant women and those not wishing to became pregnant in the next 2 years (n=190), the use of family planning methods was 66.3%. The coverage of modern contraceptive methods in this group was 60 percent.

LAM-Lactation and Amenorrhea Method-was not considered, even if a mother mentioned it, because exclusive breast feeding is not practiced in this region as stated above.

Most commonly used methods were the pill (42.4%), injected anovulatories (20.6%) tying of the Fallopian tubes (10.3%),

Norplant implants (4.6 percent), intrauterine devices (3.6 percent) followed by abstinence, traditional herbs and foams.

B. FOOD CONSUMPTION - HKI food frequency method

Children Below 24 Months:

Food items with the largest average number of meal times per day (mt/d) in which they were consumed were breast milk (2.72 mt/d), water (2.33 mt/d), gruels (1.2 mt/d), rice (1.2 mt/d), beans (0.63 mt/d) and a local beverage made out of ripe bananas (0.5 mt/d).

The average number of meal times/day, excluding breastmilk and clear fluids, was 3.32, far below the recommended five or more. In Banda de Shilcayo three children over 6 months of age were receiving only breast milk and clear fluids. Thus, in some children there is a problem of a delayed weaning process.

Children from 24 to 71 Months:

The diet is based on rice (54.5 percent consumed it daily, an average of 4.9 days/week [d/w]) and beans (2.5 d/w). The consumption of vitamin-A rich foods is less common, when looked at a one-by-one basis: pijuayo 1.62 d/w, eggs were consumed an average of 1.45 d/w, papaya 1.36. The only exception is a semi-domesticated dark green vegetable (sachaculantro) eaten in small amounts, as a condiment, an average of 3 d/w. This survey was made at the end of the mango harvest season, a possible explanation of the low average use of this fruit.

When looking at Vitamin A sources, it was seen that children eat an average of 3 animal sources per week and an average of 9.6 plant sources. The limitation of this food frequency, of course, is that it does not quantify the amount eaten.

When foods are combined in groups, children consumed fruits at an average of 6.4 d/w, animal protein and iron-rich foods were ingested an average of 5 d/w and vitamin A-rich foods were consumed an average of 4.6 d/w . There is not a lack of consistency with the information shown above, because there is a large diversity of fruits in this region.

Table 6.
Times per week children age 3-6 months eat specific foods

	Fruits	**Animal Protein**	**Vitamin A Sources**
Lamas	10.17	3.96	3.94
El Dorado	3.50	4.67	3.72
Banda de	6.88	5.36	5.11

Shilcayo			
Total	6.42	5.03	4.64

C. ANTHROPOMETRY

Weight for Age: 41.4 percent had low weight for age (less than -2Z). If the cutoff point was raised to -1Z, the prevalence rate would be 78.8%.

Height for Age: 55.4 percent of the children showed stunting or chronic malnutrition with a HAZ less than -2Z. Inside the project area, El Dorado province had the highest prevalence rate of stunting, 64 percent. If the cutoff point was raised to -1Z, the total prevalence rate would be 87%.

A survey conducted by current staff of DIRES-SM in 1992 showed that Lamas, then including the new province of El Dorado, had the highest prevalence, (51 percent) of stunting among school children aged 6 to 9 years, as compared with other provinces of San Martin where the global prevalence rate for the region was 41 percent.

Weight for Height: As found in other surveys in Peru, a relatively low percentage of children (5.2 percent) were wasted, with a weight for height lower than -2Z. Since most of episodes of wasting have a short duration, the point prevalence rate is not appropriate to measure such unstable conditions, whereas the incidence rate of episodes per child per year could be much higher than expected.

If the cutoff point is raised to -1Z, the prevalence rate of low weight for height increases to 28 per cent. These children are at-risk of moderate-severe wasting, since they have low reserves of fat and are exposed to a high incidence of infectious diseases affecting the nutritional status.

In fact, our survey shows that wasting (WHZ below -1Z) was associated with diarrhea in the previous two weeks ($p<.05$). We can not verify the sequence of events, i.e., if the wasting episode followed or preceded the diarrhea.

D. BIOCHEMISTRY

Iron:

The overall prevalence of anemia in children below 3 years of age was 52.1% . When we stratify by province there is a striking difference in the prevalence rate of anemia: it is almost two thirds in Banda de Shilcayo, where hookworm and malaria are endemic, and less in middle Huallaga, where between a quarter and a half of the children had anemia.

Table 7. Prevalence of Anemia by UBASS

	Banda de Shilcayo	Lamas	El Dorado
Children below 3 years	60.40%	26.90%	49.30%
Children 36-71 months	55.40%	18.80%	27.00%
Non-pregnant women	38.20%	17.00%	27.40%
Adult men	48.40%	4.20%	44.40%

The prevalence of anemia in the older siblings 36-71.9 months old (n= 145) was 44.1%. As previously found in other surveys of children from the Amazon Basin, the prevalence of anemia decreases only slightly with age, while in the rest of the country the drop is significant (Pajuelo, Amemiya 1992).

The prevalence of anemia among the 43 women found pregnant was 18.6 percent, if the cutoff point is set at 11 g/100 ml as recommended (Dallman 1991, WHO 1993). The prevalence rate is slightly higher if the duration of pregnancy is considered (MMWR, June 9, 1989): 6 out of 31 (19.4 percent) pregnant women whose duration of pregnancy could be recalled were found anemic. Only one of the women was taking iron supplements.

31.8 percent of non-pregnant mothers were anemic, while the prevalence of anemia (Hb less than 13.6) among fathers (n=120) was 38.3 percent. Since the poor diet is not expected to be a risk factor common for both sexes, we must explore other factors that could be selective for males, such as greater mobility which exposes males to malaria and hookworm, and possible alcoholism. Another survey made by our group in the Upper Huallaga valley three years ago showed that adult males were at risk of anemia, with a prevalence rate of 62.3%.

It must be noted that interviewers are more likely to find a given man at home instead of working in the field during the day if he felt sick or weak that day, a factor opposite to the "sick worker bias" in occupational health studies. However, the presence of anemia in all the members of the family is evidence that its main cause is not the low amount of available iron in the diet, as in most poor places, but the load of infection and parasitic infestation, a condition first described in the Peruvian jungle and once called *Tropical anemia,* (which is often unresponsive to the treatment with iron supplements).

Vitamin A:

8.1 percent of the children had ***deficient*** levels of serum retinol (less than 10 ug/100 ml) and 70 percent had ***low*** levels (less than 20 ug/100 ml). According to WHO criteria, this evidence strongly suggests that the lack of vitamin A constitutes a public health problem in the project area, in spite of the relatively low prevalence of clinical deficiency. The low consumption of fats and oils is a possible risk factor for this condition, however we have not collected ***quantitative*** data on food consumption. Another factor to explore is the high incidence of diarrhea and other morbidity that affect Vitamin A bioavailability, even if the consumption of vitamin A-rich foods is relatively frequent.

Our survey is the first that has demonstrated without doubt that the children living in the Peruvian Amazon Basin are affected by Vitamin A. Although PRISMA conducted a survey in Madre de Dios in 1992, liquid nitrogen tanks were not available and the extremely low levels were attributed to a deficient cold chain. The frequent power blackouts exposed the samples to repeated freezing and thawing cycles. With our data now available, and taking into account that Vitamin A is relatively stable to changes in temperature, we must acknowledge that the figures for Madre de Dios may have been accurate.

Iodine:

One third (33.5 percent) of the samples of household salt had no detectable iodine. Almost 90 percent of the samples were under the recommended level of fortification, (30 parts per million), but recent research in Indonesia has shown that loss of iodine occurs during storage. The un-iodized salt was from Banda de Shilcayo, where it was reportedly purchased in bulk from informal providers. This salt is locally known as *sal de mina, sal a granel* or *sal de pesca*.

E. PARASITES

Only 3 out of the 64 children who gave a stool sample were free from parasites. The most commonly found parasite was *Ascaris lumbricoides(n= 34)*, followed by *Giardia lamblia (n=17)*, *Enterobius vermicularis (n=12)*, *Entamoeba coli* (n=12), *Strongiloides stercoralis(n=11)*, and hookworm (n=10, 15.6 percent).

The true prevalence rate of hookworm is expected to be several times the rate estimated by our survey. Since only a single stool sample was obtained from about one fifth of sampled children in the KPC survey, the data must be considered only as a reference because of the lack of sensitivity (three stool samples are required) and the lack of representation, because

we had a non-responder rate near 80%. The logistics of the survey, including frequent refillings of the liquid nitrogen tanks for storing the retinol samples, made it impossible to stay in the community until fecal samples were collected from most of the children.

DISCUSSION/ RECOMMENDATIONS/ IMPLICATIONS FOR THE PROJECT

The results of this comprehensive baseline study are of great value not only to Project HOPE, for purposes of evaluation and program planning, but also to other projects working in the region, and to the Ministry of Health (MINSA). Some of the data collected was never before available to describe the health practices and status of the population of the target area.

For project planning, the most significant overall information was that which identified specific needs in the different areas. For example, El Dorado as the province with the highest prevalence of malnutrition, Banda de Shilcayo as the area with the most anemia, and Lamas as the area with the highest coverage of modern methods of family planning. Such information will enable the project to focus specific intervention activities on the geographic areas where they are most needed, resulting in efficient use of project resources.

It is also important for planning project activities to know that the large majority of mothers have gone to school, making written communication possible. It will also be easier to find persons to be community health volunteers who can complete simple reporting forms.

The fact that 93% of families have their own land will be useful in planning for ways to increase family food supply and for seeking out other agencies to provide technical assistance in agriculture. However, the project will have to plan activities taking into account that three-fourths of the women are working in the fields during the day.

The survey collected information on immunization coverage as an indicator of access to health care services. The high rates of coverage with the very low DPT drop-out rate, plus the extensive use of modern methods of family planning, (which are only available through MINSA health units) indicates that the population has very good access to health services and that they have accepted these health practices. This has implications for promoting other health care services and for promoting behavior change.

By intervention, the baseline survey results offer the following implications:

Breastfeeding:

The issue is obviously not whether women breastfeed, since all children are breastfed until at least six months, and over half were still breastfeeding between twelve and eighteen

months. The problems identified through the baseline survey is that there is **no** exclusive breastfeeding, and that one-third of mothers do not initiate breastfeeding until eight hours or longer after the birth. The educational activities of the project will have to target these two behaviors.

Nutrition:

Mothers have good knowledge about when to introduce complimentary foods and what these foods should be, but they do not practice what they know. The project will have to identify the barriers to changing these feeding practices in order to plan messages to bring about behavior changes.

The survey also shows that children under two are not being fed often enough. Parents will need to learn why small children need to eat more often and the project, with assistance from PRISMA, will have to develop strategies to enable mothers to feed children while in the fields. The food frequencies showed that there is a lack of variety of foods offered to small children, a practice that the project will also have to work to improve.

Vitamin A:

Our survey is the first that has demonstrated, without doubt, that the children living in the Peruvian Amazon Basin are affected by Vitamin A deficiency. The lack of vitamin A constitutes a public health problem in the project area, in spite of the relatively low prevalence of clinical deficiency. A first step has already been taken by sharing this data with MINSA at the regional level thus making them aware of the problem. From this point, the project will undertake serious discussions with MINSA officials about whether or not to supplement children at-risk and post-partum women.

Further research is needed to identify the major causes of the wide-spread deficiency. The accompanying food frequency survey indicated a relatively high consumption of plant and animal sources of Vitamin A. The low consumption of fats and oils is a possible risk factor for this condition, however, we have not yet collected quantitative data on food consumption. The high incidence of repeated infection from diarrhea and ARI (acute respiratory infection) may also be important factors.

Meanwhile, Project HOPE will promote increased consumption of the widely available plant sources, and promote solar drying of fruits to ensure availability all year.

Iron:

The most surprising result was the lack of anemia among pregnant women. Discussions with HKI, CDC, and other authorities assure us that this result is hardly a methodological aberration, in spite of the small sample size. To confirm these findings, the project staff will collect hemoglobin samples from a much larger convenience sample of all pregnant women they encounter in the communities during the next 4 months. They have also prepared a questionnaire to discern any practices during pregnancy which might be affecting Hb status. Once we have determined whether or not anemia during pregnancy is a problem, appropriate activities can be planned.

Because there is such a high prevalence of anemia among the men as well as among the women and children, it is probable that hookworm and malaria are as significant, or more so, than diet. The project will work with MINSA to incorporate de-worming into immunization campaigns and into the Integrated Management of Childhood Illness policy that is being implemented in the region with technical assistance from PAHO.

The project will also promote improved dietary consumption of iron-rich foods to all age groups. The proposed fortified snack, however, will likely be more acceptable and effective in improving the iron status of children than promotion of eating leafy greens, given the fact that traditionally, consumption of leafy greens by children at home is very low.

Iodine:

The results of the iodine tests, which showed one-third of household salt was not fortified, was a big surprise to MINSA officials. They had previously conducted a study of fortification, but not at the household level, rather, by testing salt in stores and markets. Such a study ignored the direct sale of salt by micro-entrepreneurs who dig the salt out of hillsides. MINSA is now motivated to follow-up with these vendors and to promote the consumption of iodized salt through health center personnel. Project HOPE will assist by training the community health volunteers in the promotion of iodized salt.

Diarrhea:

The reported high prevalence of diarrhea in the two weeks prior to the survey was even higher than anticipated, even considering the survey was done during the rainy season. The project will work with community health committees to analyze the causes of diarrhea and seek solutions such as improved water supplies and sanitation.
It is encouraging, however, that the majority of mothers

continue to give liquids and do not withhold food during diarrheal episodes. The project will promote these positive behaviors and the use of home liquids to prevent dehydration, while assisting MINSA to expand UROCs (oral rehydration units) to all communities to treat dehydrated children. The use of antibiotics to treat diarrhea is a concern, which the project will address though education of families, friends and relatives, and MINSA personnel.

The fact that over one-third of mothers sought advice from friends and relatives about treatment of the child's diarrhea means that the project has to educate not only mothers, but the whole community. Seeking advice from a community health worker was rare, but this may be because there are currently very few in the target area.

Some mothers said that a child should receive less food during recovery. The project will have to develop education messages about the proper care of a child with diarrhea during and after the episode.

Family Planning:

The intensive efforts of MINSA in family planning during the past few years are paying off as evidenced by the large number of women using modern methods. There are still about forty percent who are not using any method or an ineffective method, who could be reached by project educational efforts. There exists some knowledge of lactational amenorrhea as a method of child spacing, but this is not practiced because no one exclusively breast feeds. The breast feeding promotion activities will include promotion of this benefit to the mother.

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Annex 1

Tables and Graphs

Annex 2

Spanish Version of the KPC Questionnaire

Annex 3

Spanish Version of the Food Consumption Questionnaire

Annex 4

Credits

Credits

Inter-institutional coordination: Victor Zamora, M.D. (DIRES-San Martin), Judiann McNulty, DrPH (Project HOPE), June-Pierre Louis, PhD (Helen Keller International)

Overall supervision: Aquilina Palomino (Project HOPE)

Training: Susan Burger (HKI), Giovanna Baltazar (PRISMA), Luis Benavente (UPCH/Project HOPE)

Interviewers: (all HOPE staff)
Registered Nurses: Jessica Ventura , Nancy García,
Technical nurses: Eda Huanca, Martha Paima

Supervision of interviews and anthropometric procedures: Giovanna Baltazar

Supervision of food frequency questionnaires: Oscar Villafuerte (HOPE)

Quality control of questionnaires: Azucena Ríos (Project HOPE)

Laboratory: Ana Quijano, R.N. (Project HOPE), Ana Colarossi, Miriam Navarro, Rosa Pérez (DIRES-SM)

Data entry and analysis: Antonio Carrasco, M.D. (DIRES-SM), Welington Arévalo (Project HOPE), Miguel Campos, M.D., PhD (UPCH), Juan Carlos Alegre (Project HOPE-HQ).

Report: Luis Benavente, Judiann McNulty, Juan Carlos Alegre

Technical aide and driver: Eduardo Zambrano

Annex 5

Baseline Survey Schedule

Annex 6

List of Clusters

List of clusters

Lamas

1 Pamashto
2 Chirapa
3 Boca de Shamboyacu
4 Chiricyacu
5 Pampayacu
31 Bellavista
32 Cochapata
33 Aviación

El Dorado

6 Nauta
7 Santa Rosa
8 Santa Martha
9 San Isidro
10 Nueva Esperanza
11 Nuevo Pucacaca
12 Nuevo Barranquita
34 Santa Cruz

Banda de Shilcayo

13 Callanayacu
14 Yumbatos
15 Santa Rosa de Tio Yacu
16 Sargento Lores
17 Metilluyoc
18 Naranjal
19 Nuevo Junín
20 Grau
21 Sangamayoc
22 Pelejo
23 Nuevo San Juan
24 Asunción
25 Santa Martha
26 Miraflores
27 Pucallpa
28 Aguano Muyuna
29 Tununtunumba
30 Shilcayo
35 Alfonso Ugarte
36 Ricardo Palma
37 Leoncio Prado

1-30: Planned communities
31-37: Extended communities

Annex 7

Budget

From Project HOPE funds (in Nuevos Soles)

Materials	
Office supplies	600.00
Laboratory supplies	3,316.00
Field supplies (ie, raincoats)	1,358.60
Medical supplies	145.00
Fuel	2,216.90
Sub-Total	7,630.50
Services	
Perdiem	4,500.00
Food	3,210.00
Boat [motorist]	267.00
Data analysis, local	469.00
Transportation fares	418.00
Vehicle repairing and maintenance	237.00
Laboratory services	9,858.00
Sub-Total	18,959.00
Grand total (nuevos soles)	26,595.50
Grand total (US$ dollars) at 2.6 s/d exchange rate	10,229.04

Loans and other contributions from collaborators:

UPCH
Backpacks for equipment, large (2)
Automatic pipette, sterile tips
Liquid nitrogen tank, 3 liters
Alcohol burner (2)

PRISMA
Liquid nitrogen tank, 4 liters
Infant scales (3)
Wooden infantometers (3)
Centrifuge, electric (1)
Centrifuge, hand (2)

HKI
Hemocue hemoglobinometers (2)
Hemocue cuvettes
Disposable lancets

DIRES-SM
Motorized boats (5 different, for a total of 14 days)
Insulated KST chest to transport serum samples
Reagents for stool tests

Reagents to measure iodine in salt
Life jackets for an expanded field team (n=7)

Services (without cost to the project):

DIRES-SM
Housing in Health centers during the survey
Stool examinations for parasites (n=64)
Salt analysis for iodine content (n=307)
Laboratory personnel (1 person-month)
Assistance in EPI INFO analysis (10 person-days)

PRISMA - Training in nutrition surveys (15 person-days)

Annex 8

Key Indicators

See DRC # 7616 for appendices.