

In May, 1988, home visitation began in 21 of the 31 communities in the program area. These communities contained approximately two-thirds of the population for the entire program area. By 1991, home visitation was complete for the entire program area. Annual censuses were undertaken for the entire program area beginning in 1988. Age-specific death rates are based on these data, and infant mortality data are based on the number of live births recorded during the period.

The infant and child mortality rates reported in Table IX.17 have been calculated in several different ways. The rates for August, 1988 until January, 1989 (shown in column 1) and from November, 1989 until October, 1990 (shown in column 2) have been previously calculated and reported in the CSIII Final Evaluation report. The 1988-1989 rates are based on data from two-thirds of the program area and the 1989-1990 data are based on the data for the entire program area. These rates were all calculated by hand. Rates for 1990-1992 for the entire program area (shown in columns 3-5) have been calculated with the assistance of EPI INFO.

Several conclusions can be drawn from this preliminary analysis. First of all, at the time of the CSIII Final Evaluation at the end of 1990, it appeared that a notable decline in infant mortality (IMR) in Carabuco had occurred, from 74 to 36 deaths per 1,000 live births. Results from 1991, however, demonstrated a marked increase in the infant mortality to 110. In 1992, the IMR declined to 88. Given the high coverage of services during this period and no evidence that nutritional status of the children had deteriorated, one possible conclusion is that the program had not been registering all of the deaths before 1991. Another possibility is that, since the number of infants deaths is so small (fewer than 10 per year), the differences represent random fluctuations from year to year. The staff feel confident that in 1991 and 1992 more than 90% of all births and deaths have been registered.

Neonatal mortality rates have been consistently higher than postneonatal mortality rates. 12-23 month mortality rates have been low, in the 0-22 range, with no clear trend. Mortality rates for children 24-59 months of age also show no clear secular trend. Mortality rates among younger children, however, are consistently higher than among older children.

The numbers of infant deaths registered per year have ranged between 5 and 25. The numbers of deaths of children over one year of age have been consistently less than five per year. Thus, it is difficult to draw any clear conclusions regarding mortality impact. These rates are inherently unstable because of the small numbers involved and because of the apparent difficulty in capturing all of the deaths in the early years of the program.

Table IX.17.

Neonatal, Postneonatal, Infant, and Age-Specific Childhood Mortality Rates in the Carabuco Health Area, 1988-1992*

	year				
	1988- 1989 (1)	1989- 1990 (2)	1990 (3)	1991 (4)	1992 (4)
neonatal mortality rate (per 1,000 live births)	na	na	36 (7)	66 (15)	46 (10)
postneonatal mortality rate (per 1,000 live births)	na	na	31 (6)	44 (10)	42 (9)
infant mortality rate (per 1,000 live births)	74 (5)	36 (9)	67 (13)	110 (25)	88 (19)
12-23 month mortality rate (per 1,000 population of this age)	22 (2)	8 (2)	17 (4)	0 (0)	13 (3)
24-35 month mortality rate (per 1,000 population of this age)	12 (1)	10 (3)	14 (4)	4 (1)	5 (1)
36-47 month mortality rate (per 1,000 population of this age)	9 (1)	4 (1)	0 (0)	4 (1)	9 (2)
48-59 month mortality rate (per 1,000 population of this age)	0 (0)	4 (1)	4 (1)	0 (0)	0 (0)

* numbers of deaths are in parentheses beneath the death rates
na not assessed

(1) August, 1988 - January, 1989: based on two-thirds of the program area

(2) November, 1989- October, 1990: based on the entire program area

(3) January-December, 1990: based on a reanalysis of death data for the entire the program area.

(4) January-December: based on death data for the entire program area

source: Carabuco birth and death registries, annual censuses

In the Spring of 1992, ARHC began field work in the Ancoraimes area in cooperation with the Bolivian Methodist Church and the MOH. Home visitation began in April in eight pilot communities with a total population of 2,008 persons. Births and deaths registered between April, 1992, and March, 1993, were tabulated. This information, combined with the population data for the childhood age groups in these communities, has made it possible to calculate infant and child mortality rates. The rates are compared to those observed in Carabuco in 1992 in Table IX.18. The infant mortality rate in Ancoraimes is 40% more than that in Carabuco, and the second year death rate is over four times that observed for Carabuco. If the data from Ancoraimes represent a less complete capturing of deaths than in Carabuco (which is quite probable), then the true differences between the two areas are even more striking.

The data from the Ancoraimes Health Area which were used to calculate these mortality rates are shown in IX.19.

Table IX.18.

Comparison of Neonatal, Postneonatal, Infant, and Age-specific Childhood Mortality Rates in the Carabuco and Ancoraimes Health Areas, 1992

	Carabuco (1/92-12/92)	Ancoraimes (4/92-3/93)
neonatal mortality rate (per 1,000 live births)	46 (10)	68 (5)
postneonatal mortality rate (per 1,000 live births)	42 (9)	55 (4)
infant mortality rate (per 1,000 live births)	88 (19)	123 (9)
12-23 month mortality rate (per 1,000 population of this age group)	13 (3)	58 (3)
24-59 mortality rate (per 1,000 population of this age group)	0 (0)	11 (2)

note: numbers of deaths observed are in parentheses
 source: Carabuco birth and death registries and 1992 census;
 Ancoraimes birth and death registries and 1992 census

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The leading cause of death was acute respiratory infection, associated with 22% (29/130) of the deaths. This category includes code 101 and 105. The second leading cause of death was asphyxia, associated with 15% (19/130) of the deaths. Asphyxia includes codes 103, 502, and 1604. Diarrhea and accidents/trauma were the third and fourth leading causes, almost as frequently encountered as asphyxia. The accidents/trauma category is composed of cases from codes 601, 603, 606, 607, 610, 611, 613, 616, and 806. Forty-eight percent of the deaths were due to other causes. These findings are shown in Table IX.21.

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Table IX.20.
Diagnoses Associated With Deaths of Infants and Children
Under Five in the Carabuco Health Area, 1985-1992

code	cause of death	number of cases
101	acute respiratory infection	28
103	asphyxia	15
201	diarrhea	17
2001	unknown	14
701	malnutrition	8
1401	"ajayu" (spirit loss)	8
1404	"susto" (spirit loss)	7
613	trauma	5
603	accident	4
502	neonatal asphyxia	3
615	parental neglect	3
510	neonatal sepsis	2
511	fetal distress due to prolonged labor	2
805	abdominal pain	2
105	whooping cough	1
301	measles	1
302	tetanus (neonatal)	1
303	omphalitis	1
501	congenital defect	1
506	prematurity	1
507	club foot	1
508	intrauterine malnutrition (including low birthweight)	1
509	hydrocephaly	1
601	drowning	1
606	motor vehicle accident	1
607	accident with animal	1
608	asphyxia in bed	1
610	poisoning	1
611	accidental poisoning	1
616	head trauma	1
806	internal bleeding	1
808	intestinal obstruction	1
902	cardiac insufficiency	1
1102	epilepsy	1
1104	paralysis	1
1201	anemia	1
1203	purpura	1
1604	respiratory obstruction	1
1605	chronic cough	1
1703	scabies	1
Total		144

source: Carabuco death registry

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The leading cause of death was acute respiratory infection, associated with 22% (29/130) of the deaths. This category includes code 101 and 105. The second leading cause of death was asphyxia, associated with 15% (19/130) of the deaths. Asphyxia includes codes 103, 502, and 1604. Diarrhea and accidents/trauma were the third and fourth leading causes, almost as frequently encountered as asphyxia. The accidents/trauma category is composed of cases from codes 601, 603, 606, 607, 610, 611, 613, 616, and 806. Forty-eight percent of the deaths were due to other causes. These findings are shown in Table IX.21.

Table IX.21.

Most Frequent Diagnoses Associated Deaths of Infants and Children Under Five in the Carabuco Health Area, 1985-1992

diagnosis of cause of death	freq	percent of of diagnoses (n=144)	percent of deaths (n=130)
acute respiratory infection	29	20%	22%
asphyxia	19	13%	15%
diarrhea	17	12%	13%
accident/trauma	16	11%	12%
other causes	63	44%	48%
Total	144	100%	110%*

* this sum is greater than 100% because 11% of the deaths (14/130) had more than one diagnosis
 source: Carabuco death registry

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Table IX.22 lists the diagnoses of death for the 39 neonatal deaths registered. Leading the list is asphyxia. There are a number of cases with a traditional diagnosis given ("ajayu," "susto,") or with an unknown cause of death. In addition, there are several other cases with a diagnosis compatible with neonatal tetanus, such as omphalitis and neonatal sepsis. Congenital anomaly, low birth weight, and prematurity caused several of the deaths.

Table IX.22.

Diagnoses of Cause of Death for Neonatal Deaths in the Carabuco Health Area, 1985-1992*

code	cause of death	number of deaths with diagnosis (n=39)
103	asphyxia	10
101	ARI	3
701	malnutrition	3
1401	"ajayu" (spirit loss)	3
1404	"susto" (spirit loss)	3
2001	unknown	3
502	neonatal asphyxia	2
511	fetal distress associated with prolonged labor	2
302	tetanus	1
303	omphalitis	1
501	congenital anomaly	1
506	prematurity	1
507	club foot	1
508	intrauterine malnutrition (including low birth weight)	1
509	hydrocephaly	1
510	neonatal sepsis	1
603	accident	1
606	motor vehicle accident	1
608	asphyxia in bed	1
615	parental neglect	1
1604	respiratory obstruction	1

* age at death less than 30 days
 source: Carabuco death registry

Table IX.23 lists the assigned cause of death for those 50 infants dying between one and 12 months of age. Acute respiratory infection is the leading cause of death in this age group, followed by diarrhea, asphyxia, and death from unknown or traditional causes.

Table IX.23.

Diagnoses of Cause of Postneonatal Deaths in the Carabuco Health Area, 1985-1992*

code	cause of death	number of deaths with diagnosis (n=50)
101	ARI	18
201	diarrhea	7
103	asphyxia	5
613	trauma	4
1401	"ajayu" (spirit lost)	4
2001	unknown	2
701	malnutrition	2
105	whooping cough	1
301	measles	1
510	sepsis	1
615	parental neglect	1
805	abdominal pain	1
808	intestinal obstruction	1
902	cardiac insufficiency	1
1203	purpura	1
1703	scabies	1

* age at death: 1 - 11 months
 source: Carabuco death registry

The causes attributed to the 16 deaths registered among children 12-23 months of age are shown in Table IX.24. Diarrhea and accidents are the leading identifiable causes of death in this age group.

Table IX.24.
Diagnoses of Cause of Early Childhood Deaths in the Carabuco Health Area, 1985-1992*

code	cause of death	number of deaths with diagnosis (n=16)
201	diarrhea	4
2001	unknown	4
101	ARI	2
601	drowning	1
603	accident	1
607	accident with animal	1
611	accidental poisoning	1
701	malnutrition	1
1401	"ajayu" (spirit loss)	1
* age at death: 12-23 months		
source: Carabuco death registry		

Among children dying between 24 and 60 months of age, the leading identifiable causes of death were diarrhea, acute respiratory infection, and accidents (see Table IX.25).

Table IX.25.

Diagnoses of Cause of Later Childhood Deaths in the Carabuco Health Area, 1985-1992*

code	cause of death	number of deaths with diagnosis (n=25)
201	diarrhea	6
101	ARI	5
2001	unknown	5
701	malnutrition	2
502	asphyxia	1
603	accident	1
610	poisoning	1
613	trauma	1
616	head trauma	1
805	abdominal pain	1
806	internal bleeding	1
1102	epilepsy	1
1104	paralysis	1

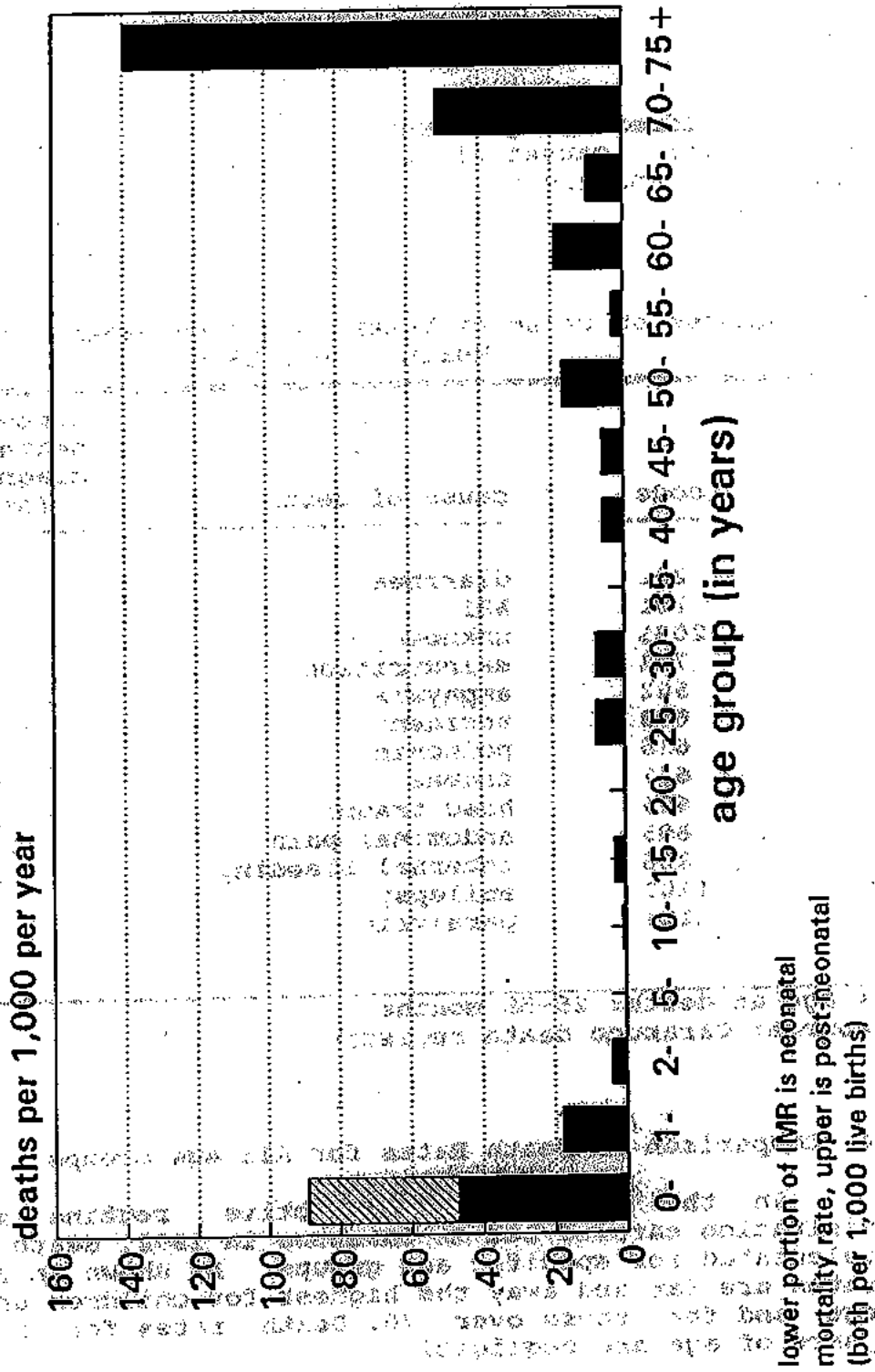
* age at death: 25-59 months

source: Carabuco death registry

4. Comparison of Death Rates for All Age Groups

On the basis of prospective routine systematic home visitation carried out in Carabuco in 1992, death rates have been calculated for specific age groups. As shown in Figure IX.2, the rates are far and away the highest for children under one year of age and for those over 70. Death rates for children over two years of age are negligible.

Figure IX.2.
Age-Specific Death Rates
Carabuco, 1992



5. Risk Factors for Infant Death

The family health folders for infants who died in the Carabuco Health Area in 1991 or 1992 before completing their first year of age were analyzed and compared to those of a similar set of children who did not die. Two control children were selected for each child who died. Data were collected for control children up until the age at which the case child died. The details of the methodology are described in Appendix IV.

As Table IX.26 demonstrates, three characteristics out of a host of variables demonstrated a significant difference at the 0.05 level between the cases and the controls. The risk factors identified were evidence of weight loss prior to the last recorded weighing, having three or fewer siblings, and having an unmarried mother. Those variables which showed no significant differences between cases and controls are shown in Table IX.27.

Table IX.26.

Results of Analysis of Case-Control Study of Infants Dying Before Completing Their First Birthday in the Carabuco Health Area, 1991 and 1992: Characteristics Which Differed Significantly Between Cases and Controls

	level of statistical significance
weight loss between next to the last and last weighing (67% of the cases compared to 0% of the controls had lost weight)	0.008
number of siblings (cases had a mean of 2.5 siblings compared to 3.8 for controls)	0.012
three or fewer siblings (72% of cases compared to 38% of controls had three or fewer siblings)	0.011
marital status of the mother (28% of the cases had an unmarried mother compared to 8% of controls)	0.035

source: case-control study of infant deaths in Carabuco, 1993

Table IX.27

Results of Analysis of Case-Control Study of Infants Dying Before Reaching Their First Birthday in the Carabuco Health Area, 1991 and 1992: Characteristics Which Did Not Differ Significantly Between Cases and Controls

sex
presence of growth chart
number of nutritional monitorings
low birthweight (defined as a weight less than 3.0 kilograms during the first month of life)
height for age percentiles, weight for age percentiles, and weight for height percentiles at the first or second weighing
percentage of children with weight for age percentile less than 3% for any given weighing
percentage of children below the 25th percentile of height for age, weight for age, or weight for height at the time of the last weighing
loss of weight from the next to the last to the last weighing
presence of BCG vaccination
presence of OPV1, OPV2, or OPV3 vaccination
presence of DPT1, DPT2, or DPT3 vaccination
presence of measles vaccination
number of vaccinations received
maternal age
percentage of children with mother under 18 at the time of the child's death (or at the time of completion of the control child's review)
birth interval between the child and the next oldest sibling
percentage of children with a birth interval of less than 24 months

source: case-control study of infant deaths in Carabuco, 1993

COST ANALYSIS

Determination of Overall Costs

Financial data for the Carabuco Health Program have been gathered for the period from FY 1987 until FY 1992 which ended on February 28, 1993. These data are shown in detail in Appendix V.

From March 1, 1992, until February 28, 1993, total recurring program costs were calculated to be \$95,906. These costs include allowances for building, equipment and vehicle depreciation and all other identifiable expenses except for the operation of the ARHC offices in La Paz and at Lake Junaluska, North Carolina (USA) and the value of some donated medicines and supplies. Locally generated income and expenditures have been included. Identifiable expenditures borne by the Ministry of Health have been included as well.

A breakdown of these expenses is shown in Table IX.28. Sixty-one percent of total recurring costs were for personnel, 13% for transportation, and 11% for administration. Infrastructure accounted for 10% of the costs and supplies only 4% (see also Figure IX.3).

Costs borne by the MOH were estimated to be \$6,045 for salary support for one physician, four auxiliary nurses, and the grounds keeper for the Carabuco Health Center. In addition, an estimated \$1,500 worth of vaccines and supplies were provided by the MOH to the Carabuco Health Program in 1992. Finally, the health center in Carabuco, constructed some 20 years ago by the MOH, has been given a depreciation value of \$3,000 per year. These costs borne by the MOH amount to a total of \$10,545 for FY 1992.

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PERCENTAGE

Table IX.28.

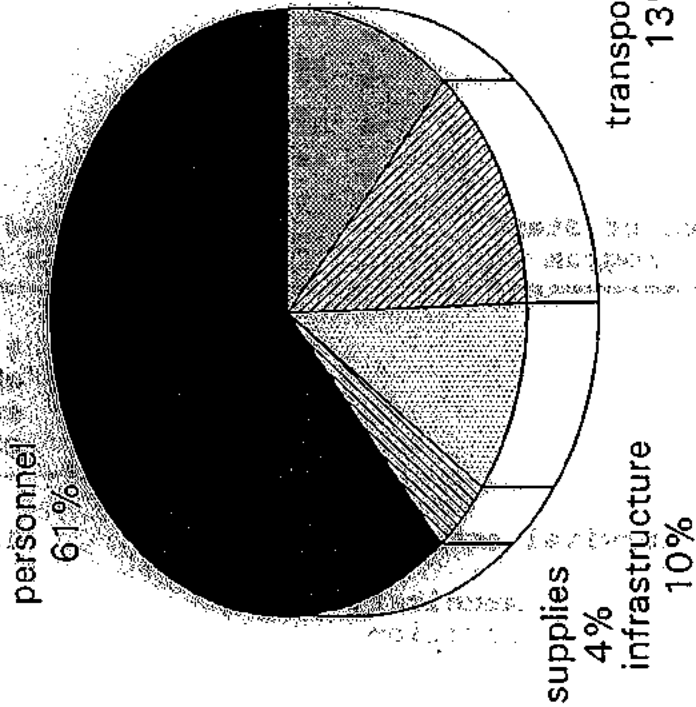
**Total Estimated Recurring Costs for the Carabuco Health Program
March 1, 1992 - February 28, 1993***

		percentage of the total
personnel	\$64,840	61%
supplies	\$4,221	4%
administration (non-personnel)	\$1,943	11%
transportation (includes depreciation)	\$14,027	13%
equipment and infrastructure maintenance (including depreciation)	\$10,875	10%
Total	\$95,906	99%

source: program financial records

* does not include some donated supplies and equipment nor the costs of the La Paz and Lake Junaluska, NC, offices

Figure IX.3. Total Recurring Carabuco Health Program Costs, FY 1992



Total Recurring Program Costs = \$95,906

source: ARHC financial records

Estimating the Cost of Program Components

Using a rather elaborate methodology which is described in detail in Appendix V, we have estimated the following distribution of program effort as shown in Table IX.29. Program staff estimates as well as a review of time sheets for program staff indicate that 80% of program effort goes to child survival activities and 20% to other primary care activities. Within the child survival component of program activities, the percentage breakdown of various components is shown in column two of Table IX.29. Since our cost analyses will involve the entire primary health care program, the percentage breakdown of all identified program components is shown in the third column.

Table IX.29.

Estimate of Staff Time and Program Expense Devoted to Specific Program Functions, Carabuco Health Program, 1992

	% of total program effort	% of child survival effort	% of primary care effort
child survival activities	80%	100%	80%
immunizations		20%	16%
nutrition		30%	24%
ARI		11%	9%
diarrhea		11%	9%
home visits		21%	17%
HIS		7%	5%
other primary care activities	20%	-	20%
	100%	100%	100%

source: staff estimates; see Appendix V for details

Assigning these percentages to the recurring program costs in Table IX.28 makes it possible to estimate the recurring cost for each program component. These estimates are shown in Table IX.30. These figures were obtained by applying the percentages of the program's primary care efforts to the various program functional categories shown in Table IX.28 except that the value of the vaccines and supplies provided by the MOH were all placed in the vaccination category. Further details of this calculation are shown in Appendix V.

With the distribution of staff time effort according to the various functional categories established, it then became possible to distribute program costs in these same categories. All of the costs shown in Table IX.28 were broken down into various components using the same percentage as calculated for distribution of staff time with the following minor exceptions. The \$1,500 in health supplies provided by the MOH was placed under the vaccination category and \$250 in this same category provided by ARHC was placed under other primary care. The \$700 for consultants was placed under nutrition since the consulting was primarily in the area of nutrition.

All of the specific functional categories involve a similar degree of administrative and logistical support, so dividing the overall programs costs according to the percentage of time spent by staff in each functional category appears to be a reasonable method to break down costs.

The distribution of program costs then becomes as shown in Table IX.30.

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TABLE IX.31.

Summary of Child Survival Costs for the
Carabuco Health Program, FY 1992

Table IX.30.

Estimate of Recurring Cost of Functional Categories of Child Survival and Other Primary Health Care Activities for the Carabuco Health Program, FY 1992

functional category	recurring cost
child survival activities	
vaccinations	\$ 16,237
nutrition	\$ 22,243
diarrhea	\$ 8,340
acute respiratory infection	\$ 8,340
home visitation	\$ 15,754
health information system	\$ 4,634
other primary care activities	\$ 20,268
Total	\$ 95,906

source: program financial records

Estimation of Costs of Child Survival Activities

The per capita cost for the overall child survival effort, when the beneficiaries are limited to children under five years of age, is \$66.35. This is based on a total child survival program cost for FY 1992 of \$75,638 which is taken from IX.30. When women of childbearing age are considered as beneficiaries along with the children under five, the cost per beneficiary drops to approximately half, or \$27.21 per person per year (see Table IX.31).

Estimation of the Cost of Other Primary Health Care Services

The total cost in FY 1992 of the non-child survival primary care portion of the Carabuco Health Program is estimated to be \$20,268 as shown in Table IX.30. In Table IX.32, the numbers of non-child survival primary care services are shown by type. Overall, 5,848 specific services were provided.

This is a heterogeneous grouping of activities. Treating a minor wound does not take the same effort as does attending a birth, for instance. In an attempt to develop reasonable estimates for the cost of specific services, a "relative value scale" was developed based on a value of "2" for a patient consultation. Other services were given values roughly equivalent to multiples or fractions of a patient consultation.

This relative value scale is shown in Table IX.32 and gives a value of "1" to each of the following services: injections, IV fluid administration, minor wound nursing care, and prenatal visit. A relative value of "2" is given for a patient consultation, postpartum care, and a laboratory test. A value of "4" is assigned to a dental visit and to the suturing of a minor wound, and so forth. The total number of "units of service" were then added up and divided into the total cost of the primary care component of the overall program cost.

13,613 "units" of service were provided at an overall cost of \$20,268, yielding a cost per unit of service of \$1.49. Thus the estimated cost of a patient visit (2 values of service) is \$2.98, of an injection is \$1.49, and so forth as shown in Table IX.32.

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TABLE IX.32.

Numbers of Non-Child Survival Primary Care Services Provided in Carabuco, January - December, 1992, and Their Estimated Costs

type of service provided	numbers of services provided	relative value	units provided	estimated cost of service
patient consultation	3,840	2	7,680	\$ 2.98
injection	877	1	877	\$ 1.49
IV fluid	153	1	153	\$ 1.49
minor wound care	608	1	608	\$ 1.49
prenatal visit	169	1	169	\$ 1.49
childbirth care	35	10	350	\$ 14.90
postpartum care	113	2	226	\$ 2.98
treatment of TB case	3	100	300	\$ 149.00
dental visit	0	4	0	\$ 5.96
laboratory exam	50	2	100	\$ 2.98
Totals	5,848		13,613	

estimation of cost of unit of service: $\frac{\$20,268}{13,613} = \1.49

source: monthly program and financial reports

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The estimated per capita cost of non-child survival primary care services is as follows. In 1992, there were 8,744 persons in the Carabuco Program Area over five years of age. Dividing the total cost of the primary health care component (\$20,268) by the number of persons over five (8,744), yields a per capita cost estimate of \$2.32 per person (see Table IX.33). Obviously, children under five also received non-child survival primary care services as well. To avoid arriving at an overly conservative per capita cost estimate, however, children were omitted from this calculation.

TABLE IX.33.

Summary of Total Recurring Other Primary Health Care Costs
(Not Including Child Survival Activities)
for Carabuco, FY 1992

total primary health care program cost	\$ 20,268
total number of persons over five	8,744
program cost per person over five	\$ 2.32

source: program financial reports and annual census

Estimation of Total Per Capita Program Costs

The overall recurring primary care program cost per beneficiary as shown in Table IX.34 is \$12.50 per person per year.

TABLE IX.34.

Summary of Total Recurring Primary Health Care Costs
for Carabuco, FY 1992.

total overall program cost	\$ 95,906
number of persons covered by the program	9,887
program cost per beneficiary	\$ 9.70

source: Carabuco Health Program financial records and annual census

Locally Generated Funds

Through the provision of local health services, the program charges fees to the program beneficiaries according to the family's ability to pay but within the guidelines established by the Ministry of Health. The locally generated income for FYs 1985-1992 is shown in Table IX.35. The sale of medicines is the major source of local revenue. \$2,538 was generated locally during FY 1992, representing 3% (\$2,538/\$95,906) of the total recurring primary care program costs. As indicated earlier, MOH contributions to the primary care program costs in FY 1992 were estimated to be \$10,545, representing 11% (\$10,545/\$95,906) of the total recurring local primary care program costs. Thus, as presently constituted, only 14% of local primary health care annual recurring program costs are sustainable with local private or governmental sources.

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Table IX.35.

**Locally Generated Funds for the Carabuco Health Program,
FYs 1985-1992**

fiscal year	sale of medicines	medical services provided	total
1985	\$ 240	\$ 152	\$ 392
1986	\$ 1,193	\$ 625	\$ 1,818
1987	\$ 1,317	\$ 400	\$ 1,717
1988	\$ 987	\$ 362	\$ 1,349
1989	\$ 821	\$ 197	\$ 1,018
1990	\$ 1,962	\$ 315	\$ 2,276
1991	\$ 1,215	\$ 551	\$ 1,767
1992	\$ 1,751	\$ 787	\$ 2,538

source: program financial reports

Conclusion

The Carabuco Health Program is ARHC's most advanced in terms of progress in implementation of the CBIO approach. In spite of the initial difficulties, the program has now achieved extremely high levels of coverage of child survival interventions. Currently, infant and child deaths are concentrated in the first three months of life, and respiratory causes predominate. The overall recurring program cost was \$9.70 per person in 1992.

CHAPTER X. THE MALLCO RANCHO HEALTH PROGRAM

DESCRIPTION OF THE PROGRAM AREA

The Mallico Rancho Health Area is located in the Cochabamba valley at 8,000 feet elevation, approximately 30 minutes from the city of Cochabamba (see Figure X.1). The area contains farmland inhabited primarily by Quechua people who have inherited small plots of land from earlier generations of family members. Corn is the major crop although a variety of other agricultural products are grown, including fruits and vegetables. The Cochabamba valley has traditionally been referred to as the "breadbasket" of the country as well as the region of "eternal spring."

While farming is the main activity, there is more non-farming commercial activity in this area than in Carabuco because of its close proximity to a major urban area. Many of the inhabitants of the Mallico Rancho Health Area obtain some type of work, mostly temporary, in the city of Cochabamba. There are "trufis" (vans) which carry people between Mallico Rancho and the city of Cochabamba. These leave from the area every hour.

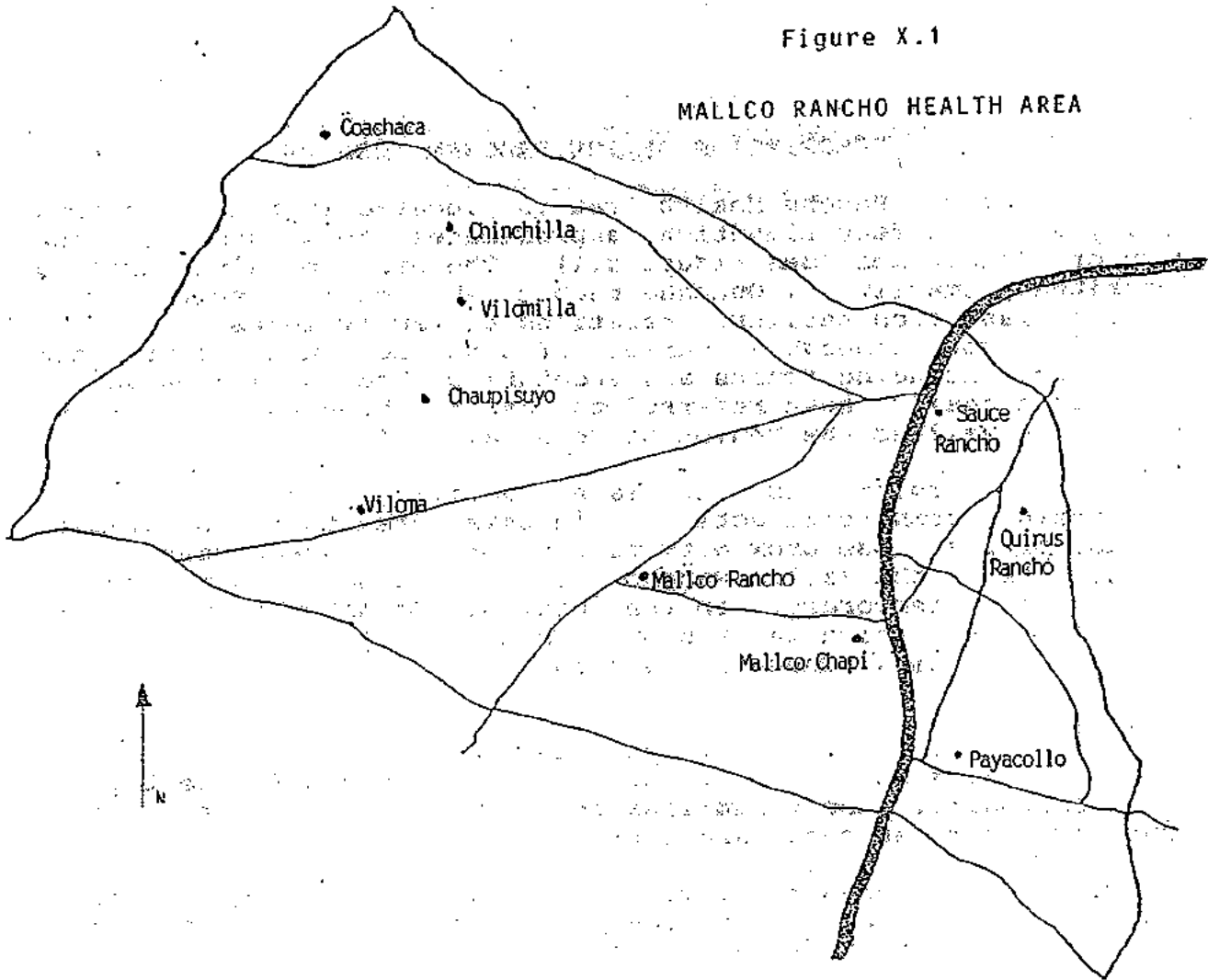
The population of the Mallico Rancho Health Area is composed of 5,829 people in 11 different communities as shown in Table X.1. The population is relatively stable, although frequently men and occasionally their families travel to lowland areas several hours away for seasonal farm work.

The MOH had previously maintained a health center in Mallico Rancho and a health post in Payacollo, one of the communities in the Mallico Rancho Health Area. Both of these were in poor repair at the time of initiation of program activities in 1987. The outer limits of the program area can be reached within 15-20 minutes from the program headquarters in Mallico Rancho by vehicle, bicycle, or foot over rough unpaved roads.

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Figure X.1

MALLCO RANCHO HEALTH AREA



POPULATION PYRAMID OF THE MALICO RANCHO HEALTH AREA

The population pyramid of the Malico Rancho Health Area shows a relatively stable population structure with a slight increase in the younger age groups. The population is distributed across various communities within the health area, with Malico Rancho being the largest. The pyramid illustrates the demographic composition and potential health needs of the population.

Table X.1.

Populations of Communities in the Malico Rancho Health Area

community	population
Chauptusuyo	241
Chinchilla	253
Coachaca Chico	287
Coachaca Grande	208
Malico Chapi	823
Malico Rancho	792
Payacollo	991
Quirus Rancho	192
Sauce Rancho	760
Viloma	908
Vilomilla	374
Total	5,829

source: 1992 census

HISTORY OF THE MALLCO RANCHO HEALTH PROGRAM

In 1985, ARHC established a collaboration with Dr. Orlando Taja while he was Dean of the National Technical School of Public Health in Cochabamba. This program was the first in Bolivia to train mid-level health professionals for rural areas. Their graduates were called "tecnicos de salud rural" (rural health technicians). ARHC provided some assistance to the school for the costs of providing its students with practical field training in rural communities.

In 1987, under Dr. Taja's leadership and with support from ARHC, a Bolivian NGO was created which is called APSAR (Asociación de Programas de Salud del Area Rural- Association of Rural Health Programs). At the same time, APSAR established a community health program based in the community of Mallco Rancho. This program provided primary health care as well as immunizations and growth monitoring at special group sessions in the communities. The MOH health center in the community of Mallco Rancho was rehabilitated and a five-bed hospital was added to it to improve patient care in the area. The MOH gave APSAR authorization to supervise MOH activities for this health area. Several MOH "items" (salaried positions) were assigned to the Mallco Rancho Health Area. These staff received supplemental salary support from APSAR and were supervised by APSAR.

Dr. Taja was at that time employed full-time at the San Simon University in Cochabamba, directing this community health work on a part-time basis. The initial field staff consisted of a graduate nurse, Ms. Adela Asbún, who served as Coordinator of Field Work. Working with her was a rural health technician, Mr. Sabino Gabriel. The primary health care, child survival, and hospital activities grew slowly. It eventually became possible to vaccinate children through house-to-house campaigns in 1988. In 1989, the first census was carried out in the community of Mallco Rancho. In addition to the actual census, a map was created locating each house by number. This number was placed on the front of the house. A family health folder was made for each household. Home visitation was begun to all the homes in the community. During this same year, Dr. Taja left his post in the university to work with ARHC/APSAR on a full-time basis, dividing his time between the Mallco Rancho Health Program and the Carabuco Health Program on the Northern Altiplano.

By 1990, the Mallco Rancho Health Program staff included a physician in his "año de provincia" (obligatory year of rural service), a graduate nurse, and a rural health technician in addition to Ms. Asbún as Field Coordinator and Dr. Taja as

part-time Director. With this staff it was then possible to carry out censuses in seven additional communities in the Mallico Rancho Health Area. The same method was carried out: houses were numbered, a community map was created, and all family health information was placed in a "ficha familiar" (family file) with a number corresponding to the household number. Routine systematic home visitation also was begun in these seven additional communities during 1990.

By 1991, another rural health technician was added to the staff along with two auxiliary health nurses. The census methodology and routine systematic home visitation were extended to the remaining three communities in the Mallico Rancho Health Area. This field work continued without any significant changes during 1992. Dr. Taja became full-time director of the program in early 1991, when his responsibilities in Carabuco were handed over to Dr. Carolina Hilari.

Throughout this time, APSAR has existed as a Bolivian NGO whose only financial support has been through ARHC except for one grant from PROCOSI* directly to APSAR. Since 1990, APSAR has maintained an administrative office in Quillacollo, a town about 15 minutes from the field area. Prior to that time, APSAR had an administrative support office in the city of Cochabamba.

Throughout the history of the Mallico Rancho Health Program, there has been involvement of "work teams" from the United States. From 1987 to 1992, 14 groups of short-term volunteers from the U.S. assisted in various specific projects, such as the construction of the small hospital, remodeling of the health post in Payacollo, remodeling of village schools, and construction of latrines and wells. The Mallico Rancho Health Program assisted the community in a number of development projects during this period such as providing small loans for the construction of irrigation wells.

The numbers of health staff from 1987 until 1992 and the number of population per staff member are shown in Table X.2. Appendix II contains the names of the Mallico Rancho staff employed during this period.

* PROCOSI (Programa de Coordinación en Supervivencia Infantil) is an AID-sponsored consortium of PVOs working to promote child survival in Bolivia.

CURRENT PROGRAM ACTIVITIES

At the present time, the health program in Mallico Rancho consists of child survival interventions, other primary health care activities, a limited amount of hospital care, and community development activities (including water and sanitation improvements). The hospital serves as a clinic and an inpatient facility with five beds, but it usually has only one or two inpatients. Most of these are obstetrical cases. The primary health care program consists of attention provided to outpatients at the hospital and the treatment of acute illnesses at the time of home visits. There are dental facilities at the local hospital clinic, and a dentist is usually present several days a week.

The Quillacollo District Hospital, only fifteen minutes away, the children's hospital in Cochabamba (Hospital Alberto Patiño), the maternity hospital in Cochabamba, and the Gastroenterology Hospital in Cochabamba all receive patients referred from the area by the program. Since Dr. Taja is a well-known and well-respected physician in the Cochabamba area, he has been able to arrange for highly satisfactory referral care for patients from the Mallico Rancho Health Area at modest prices. The child survival activities are now concentrated in the homes, although, of course, sick children are referred to the local hospital in Mallico Rancho for further treatment and referral from there to the city of Cochabamba if indicated.

The health staff currently working in the field include Ms. Adela Asbun as Field Coordinator and an MOH "año de provincia" physician who is based primarily at the hospital. There are also two rural health technicians and three auxiliary nurses who work primarily in the communities. Dr. Taja provides leadership to the field program and helps with program planning, community relationships, evaluation, and the supervision of patients who need referral for hospital care. Ms. Asbun supervises the clinic/hospital work and provides care for most of the women who come to the hospital for childbirth. The staff currently meet monthly to review previous work and to plan the next month's work.

Each of the 11 communities in the Mallico Rancho Health Area is under the responsibility of one of the auxiliary nurses or rural health technicians working in the field. Each of the three auxiliary health nurses has two communities for which she is responsible. One of the rural health technicians has two communities and the other, three.

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Table X. 2

Staffing of the Mallico Rancho Health Program, 1987-1993

Number of Paid Staff by Staff Category

(with program population per staff member category shown in parenthesis*)

	1987	1988	1989	1990	1991	1992	1993
physicians	0	13	13	15	22	22	22
midlevel health staff (graduate nurses, rural health technician)	(19,423)	(4,482)	(4,482)	(3,885)	(2,914)	(2,914)	(2,914)
lower level health staff (auxiliary nurses, etc.)	(2,914)	(2,914)	(1,942)	(2,914)	(1,942)	(1,942)	(1,942)
ancillary support (driver, groundskeeper, etc.)	0	0	0	5,827	(5,827)	(5,827)	(5,827)
administrative support staff (administrator, other office staff**)	(2,914)	(1,457)	(1,457)	(1,165)	(971)	(971)	(1,942)
TOTAL	63	93	73	115	116	115	120
	(925)	(627)	(798)	(619)	(364)	(388)	(486)

* an average population of 5,827 over this time period is assumed.
 ** includes a driver based outside of the program area

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The current policy is to visit homes with children under 24 months of age every two months and to visit homes with children 24-59 months of age every three months. Women of childbearing age are visited every three or four months depending on their age. Those who are 15-19 or 35-49 years of age are visited every three months. Women 20-34 years of age are visited every four months. All other homes are visited every six months.

At the time of a routine home visit, the census form is updated. All persons living in the household, their relationship within the family, their age (and birthdate if known) and sex are listed on this form. Vital events (births, deaths, or migrations) which have occurred since the last visit are noted as well. Family members with a chronic cough or other symptoms of TB are noted on the visit form, and arrangements are made for sputum examinations.

Health education messages relevant to the family's situation are provided at the home visit. Since cholera has come to the area, messages regarding the prevention of diarrheal diseases have been emphasized. These messages include the boiling of drinking water, cooking of fruits and vegetables, and handwashing before eating. ORT packets are left in the home or nearby with instructions for their use. The need for early referral to the hospital is also emphasized if severe diarrhea occurs.

At the time of a visit to a home with a child under five years of age, the child's height, weight and vaccination status are noted. The family health folder is brought along at the time of a home visit. If a vaccination is needed, the child is referred to the hospital where vaccinations are given twice a week. If the child had been previously referred but did not go for the vaccination, then the child is vaccinated at the time of the home visit. If the child has diarrhea, appropriate health education is given and ORT packets are left with the mother. If the child is found to have an acute respiratory infection then he or she is usually referred to the local hospital for evaluation and treatment by a physician. A basic health message is chosen by the health team each month, depending on the season of the year and the nature of the sicknesses and deaths which have been encountered during the previous month. This message is given at the time of the home visit.

When women of childbearing age are visited by the health staff, they are given information about family planning. Any pregnancies which are encountered are noted as well as any symptoms suspicious for TB.

Persons who fall into the high-risk category in need of more frequent home visitation are the following:

- a. malnourished children;
- b. children with diarrhea, acute respiratory infection, or other significant acute illness;
- c. orphans and children who appear to be neglected by their parents or guardians;
- d. patients enrolled in the TB program; and
- e. pregnant women.

Malnourished children are those who fall more than one standard deviation below the NCHS median, who are not gaining weight, or who have lost weight since the previous weighing. These children are visited in their homes on a weekly basis until they have become nutritionally rehabilitated. The mothers of these children are given nutrition education. Sometimes, packets of "api nutricional" are left with the mother. These packets are produced locally. They contain barley, wheat, quinoa (a local grain), and other nutritious foodstuffs. Cooking oil, sugar, milk, and flavoring are frequently added to this if available.

Children with diarrhea or acute respiratory infection are usually seen on a daily basis until their illness has resolved. Orphans and children whose parents or guardians show little interest in their well-being are visited on a monthly basis so that the health staff may see how they are faring and so that they may receive nutritional monitoring. Children enrolled in the TB program are visited in their homes on a monthly basis to monitor their nutritional status and to leave medicines for the following month. The parents of these children usually administer the TB medicines to them. The home visit in these cases provides an opportunity to see how the treatment is progressing.

The staff are beginning to find an increasing number of children with tuberculosis. Six children are currently enrolled in TB treatment. Efforts have been intensified to identify additional cases. Technical assistance in this effort is being provided by a Belgian-supported TB program for the Quillacollo Health District in which the Mallico Rancho Health Area is located.

Children who are malnourished, who have chronic diarrhea, who live in families with TB patients or who have chronic coughs all receive tuberculin skin tests. Those with positive results (>5mm if the child has not had BCG and >10mm if the child has had BCG) receive a chest x-ray from which a diagnosis is made.

Pregnant women are seen at home twice a month if they are not coming regularly to the hospital clinic for prenatal checkups. A program element which has been added in recent months is family planning. As a result of growing local interest, a

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gynecologist was hired to come to the hospital clinic on Saturday mornings for consultations with women interested in family planning. Prior to that time, women had been referred to family planning clinics in the city of Cochabamba.

The Role of Health Volunteers

As in Carabuco, the experience with volunteers in Mallco Rancho has been disappointing. The first formal course to train "educadores" was in 1990, although before then there were volunteers in the communities who assisted with the health work. In 1990, a course was established in which once or twice a week for three months, 25 volunteers chosen by the communities would come for several hours of training. By 1991, the number of volunteers had dwindled to 14. At that time, five new "educadores" were recruited into training but by the end of 1991 only nine were still active. By the end of 1992, these nine had terminated their involvement as volunteers, although two still help out occasionally.

The Health Information System

The health information system (HIS) in Mallco Rancho shares many similarities with the HIS in Carabuco. A family folder ("ficha familiar") is kept at the hospital and is numbered according to the household number in the community. Unfortunately, hospital records for both inpatients and outpatients are kept separately by the name of the patient apart from the family health folders which are also kept at the hospital according to the household number. Efforts are underway to put the hospital clinic records in the family health folders. The family health folder contains all the growth charts, vaccination data, census and vital events data, as well as information about childhood illnesses.

The staff member who is responsible for a particular community completes a report which indicates the updated population, births, deaths, and detected pregnancies as well as illnesses during the previous month for that community. The first two days of the month are dedicated to this effort. This information is then passed on to the Field Coordinator who consolidates the information and sends it on to the MOH and also to the APSAR and ARHC offices. The Field Coordinator used to take up to two weeks to complete her report. Since the forms have been streamlined and simplified, she is now able to complete this report in two days.

The community field staff have two notebooks for each community in addition to the "fichas familiares" (family health folders). Both notebooks contain a list of all children under

five in that particular community. In one notebook, all the births and deaths are kept as well as the date of vaccinations for each child. In the other book, information about home visits, heights and weights, and childhood illnesses are recorded. All of this information is recorded as well in the "fichas familiares." A summary of each home visit is recorded in this notebook along with an indication when the home should be visited next. Since these notebooks list the house number, the staff member knows where to go to carry out a follow up home visit.

Health staff members plan their work and complete monthly report forms from the information in these notebooks. The reports are reviewed carefully by the Field Coordinator before being incorporated into one consolidated monthly program report.

The Field Coordinator, Ms. Asbun, feels that the data being collected at present are of high quality and that an extremely high percentage of the vital events in the area are being "captured" by the HIS.

The HIS data are used to plan home visits according to the policies described above. Obviously, the mapping and home numbering scheme united to the numbering of the "fichas familiares" is of considerable help in getting needed services to those in high-risk categories. In addition, an analysis of the illnesses treated during recent months as well as an analysis of recent death data are used to guide upcoming community educational efforts. Results of household surveys carried out in 1990 and 1992 regarding maternal knowledge of child survival topics has also been used to guide educational efforts. The prioritization of home visits for children under two arose from an analysis of the local mortality experience.

Feedback of health information to the communities has been possible in the Mallico Rancho Health Area. There is a local radio station whose range of coverage corresponds roughly to that of the Mallico Rancho Health Area. Statistical information derived from the health work is shared with the local population over the radio. A written message based on this information is prepared several times a week and shared with the local population over the radio. The station is a popular one and has a high local listener coverage in the early mornings.

At community-wide meetings, a member of the health staff is usually present and shares with the community some of the findings relevant to the community, including census data and information about the numbers of patients treated. During the next few months the staff is planning to prepare a brochure unique to each community which gives basic statistical information about the population and the health conditions in that community.

Health Education

A number of issues pertaining to health education have already been mentioned above. The Field Coordinator has noted that educational efforts during a home visit seem to be more effective than giving health talks to groups of mothers who have come for immunization/growth monitoring sessions.

Supervision

Day-to-day supervision of community health staff is the responsibility of the Field Coordinator. She keeps very close watch on the patient care activities which are provided in the hospital and in the hospital clinic. Because hospital activities have grown, she does not now have time to go out to the communities with the other health staff as she did in years past. She does, however, maintain close contact with all the health staff working in the communities.

Specific Issues Related to Home Visitation

The Mallico Rancho staff have found that at times it is difficult to locate families in their homes. Occasionally, families leave the area for indefinite periods of time to carry out work in another geographic area. Staff have had success in encouraging families to leave word with their neighbors regarding where they have gone and when they expect to be back. This helps the health staff member to plan return visits. Staff have found that it is usually best to carry out home visits during the mornings from around nine o'clock in the morning until noon. The mother is usually at home during this time cooking and completing other household chores. During the planting and harvesting seasons, families are frequently in the fields, often some distance from the house, from sunrise to sunset. At these times, the home visit does not take place in the home but out in the field. Home visits are not planned for Mondays since that is market day in nearby Quillacollo.

The staff of the Mallico Rancho Health Program are enthusiastic supporters of the home visitation concept. They feel that the interest in the welfare of the children which is demonstrated by the home visit fosters additional concern on the part of the parents for the welfare of their own children. Home visitation enables the program staff to maintain close contact with all the people in the program area, to achieve high levels of coverage of child survival services and to provide follow up for sick children.

The costs involved, however, are significant in terms of the

time and energy of the staff and the financial cost to the program. There also seems to be a growing tendency on the part of some families to await a home visit rather than seek out a needed service from the health program, be it treatment of an illness or a vaccination. For this reason, the program has decided not to offer prenatal visits in the home but rather have pregnant women come to the clinic at the hospital.

Specific Issues Related to Community Relationships

The health staff feel that the communities in the Mallico Rancho Health Area now have a high level of trust in the program because of the commitment the staff have shown to help the families with their health problems. Villagers have a particularly high regard for the particular staff member who is responsible for their community.

The communities have been cooperative with the community health work, including the home visitation activities, vaccinations, and nutritional monitorings. The program staff have been careful to coordinate their work with the community authorities. Beyond this, however, the community has not played a strong role in helping to shape program policies or to influence program activities. Unfortunately, the communities do not appear to have a strong interest in providing ongoing financial support for the work.

Community field staff report that they hear comments from the local people indicating that there seem to be fewer infant deaths than before. In addition, the staff have noted that parents of children who die communicate a sense of guilt and shame that previously other parents in similar situations did not express. The Field Coordinator feels that parents are now coming to realize that it is not inevitable, as they once thought, that so many of their children should die.

Family pride in healthy children is now being promoted by the program. At the end of the year, those families whose children are all appropriately vaccinated and well-nourished receive a prize which is a basket of food including rice, noodles, sugar, quinoa, and cookies for the children.

Issues Regarding the Coordination of Child Survival Work With Related Activities

The Mallico Rancho Health Program staff consider child survival activities and curative health services to be indispensable, one to the other. The availability of primary health care services and hospital services has given trust and confidence in the preventive child survival work and has enhanced

child survival through the effective treatment of seriously ill children. The program staff see no disadvantages in combining these services.

The integration of MOH work into the Mallico Rancho Health Program is seen as a strong asset. Some staff salary support is provided as a result of this relationship. This relationship also facilitates receiving vaccines, growth charts, TB medicines, and other supplies from the MOH. Technical support from the "Undidad Sanitaria" (the health department for the "Department," i.e. State, of Cochabamba) is often helpful. However, when the MOH has assigned a physician in his or her "año de provincia" who the Mallico Rancho staff feels should be transferred, they find the MOH unable or unwilling to cooperate with the recommended change. On balance, however, the relationship is a beneficial one for the Mallico Rancho Health Program.

The Mallico Rancho Health Program plays a strong role in the activities of the Quillacollo Health District. Also located in the Quillacollo Health District is a child survival program of Project Concern (a US-based private voluntary international health organization). Relationships between ARHC/APSAR and Project Concern are highly supportive, and the physician directors of both programs are devoting considerable effort to improving the MOH Quillacollo District health activities.

The Mallico Rancho Health Program also has an organizational relationship with World Vision. World Vision has a program to provide nutritious foods to certain children in the program area on Saturday mornings. The Mallico Rancho Health Program staff assist with nutritional monitoring of these children. In addition, the World Vision program provides assistance with dental care for these children. World Vision pays for the dental materials and the Mallico Rancho Health Program provides a dentist at no charge.

The Mallico Rancho Health Program has worked with the regional water and sanitation cooperative in the installation of water and sanitation systems in several of the communities. ARHC has facilitated the assistance of a recognized water and sanitation expert, Dr. Kazayoshi Kawata. Dr. Kawata came to Mallico Rancho on several different occasions and introduced a type of latrine new to Bolivia which had been used with success in India. A modification of this design is now being installed in several communities in the area. A U.S. Peace Corps worker is helping the Cochabamba water/sanitation cooperative in this effort.

The Mallico Rancho Health Program staff, and particularly its Director, Dr. Taja, have devoted considerable effort to local issues of wells and water supplies for agricultural and personal use. It has helped to obtain assistance from CORDECO (the

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Cochabamba Department development corporation) in drilling new wells in the area. The Mallico Rancho Health Program is also coordinating its work with a new program in the area which is promoting the raising of rabbits as a source of protein for the family diet.

Year	Number of Patients Treated
1988	889
1989	1,019
1990	2,361
1991	2,718
1992	3,047
PROGRAM RESULTS	10,034

The number of consultations for illness in the Mallico Rancho Health Area has grown steadily over the past five years (see Table X.3). The number of vaccinations given (shown in Table X.3) was greatest in 1989 when a major effort was made to reach all the unvaccinated children. The following year, there were fewer children overall in need of vaccination and there was difficulty in obtaining needed vaccines from the MOH. The numbers of vaccinations during the past two years appears to be stabilizing at around 3,000 doses per year.

Table X.3.
Number of Patient Consultations in Health Facilities and in Homes in the Mallico Rancho Health Area, 1988-1992

Year	Number of Patients Treated
1988	889
1989	1,019
1990	2,361
1991	2,718
1992	3,047
Total	10,034

source: review of monthly program reports.

Table X.4.

Total Number of Vaccination Doses Given Per Year in the Mallico Rancho Health Area, 1989-1992

Year	Number of Vaccinations Given
1989	4,281
1990	691
1991	3,329
1992	2,891
Total	11,192

source: monthly program reports

The number of nutritional monitorings has remained modest in 1991 and 1992, being around 1,000 (see Table X.5). The number of home visits almost doubled between 1991 and 1992 from 1,890 to 3,219 as shown in Table X.6.

Table X.5.

Total Number of Nutritional Monitorings (Weight and Height Measurement) Among Children Under Five Years of Age in the Mallico Rancho Health Area, 1988-1992

Year	Number of Nutritional Monitorings
1988	185
1989	610
1990	1,789
1991	864
1992	1,079
Total	4,527

source: monthly program reports

Table X.6.

Number of Home Visits Carried Out in the Mallico Rancho Health Area, 1988-1992

Year	Number of Visits Carried Out
1988	0
1989	500 (est)
1990	1,000 (est)
1991	1,890
1992	3,219
Total	5,109

source: monthly program reports

Coverage of Basic Child Survival Services

During the fall of 1990, a baseline household survey was carried out in Mallico Rancho as part of the AID Child Survival (CS) VI grant. A follow up survey was undertaken during the Spring of 1992 as part of the grant's Mid-Term Evaluation. The coverage data shown below are from these two surveys. These household surveys included all the homes in the area rather than a cluster sample because of the small population. Both surveys were of households in which there were children under two years of age.

1. Immunizations

Between 1990 and 1992, the percentage of children 12-23 months of age with a complete set of vaccinations rose from 23 percent to 73 percent. Fifty-four percent of the children 12-23 months of age in 1992 had completed their entire set of vaccinations by their first birthday (see Table X.7).

Table X.7.

Percentage of Children 12-23 Months of Age in the Mallico Rancho Health Area with Completed Vaccinations, 1990-1992

type of assessment	date of assessment	
	1990	1992
percentage of children 12-23 months of age with complete vaccinations (hs*)	23%	73%
percentage of children 12-23 months of age with all vaccinations completed by 12 months of age (hs*)	na	54%

source: AID child survival grant-related evaluations

* hs: household survey

na: not assessed

2. Nutritional Monitoring

The coverage of the nutritional monitoring program improved substantially between 1990 and 1992 (see Table X.8). In 1992, children under two years of age were being weighed an average of 4.3 times per year, and the level of coverage appears to have increased by over 50 percent during the previous two years.

Table X.8

Coverage of Nutritional Monitoring Among Children Under Two Years of Age in the Mallico Rancho Health Area, 1990-1992

type of measure of coverage	date of assessment	
	1990	1992*
average number of monitorings during the past 12 months	na	4.3
% with at least two monitorings during the past 12 months	54%	88%
% with at least four monitorings during past 12 months	21%	56%

* children 3-23 months of age

na: not assessed

source: AID child survival grant-related evaluations

3. Knowledge and Use of ORT

The 1990 baseline survey unfortunately did not assess the current knowledge and use of ORT. The Mid-Term Evaluation did, however, and found high levels of ORT knowledge and use (see Table X.9).

Table X.9.

Mothers' Knowledge About and Use of Oral Rehydration Therapy for Diarrhea in the Mallico Rancho Health Area, 1990-1992

percentage of mothers who:	date of assessment	
	1990	1992
had heard of ORT	na	72%
knew that ORT was used to treat dehydration caused by diarrhea	na	67%
know how to prepare ORT	na	59%
actually had used ORT	na	55%

na: not assessed

source: AID child survival grant-related evaluations

In 1992, ARHC/APSAR expanded into a geographic area adjacent to Mallico Rancho called Sipe Sipe. In the Spring of 1992, before significant field work had gotten underway, a baseline household survey was undertaken there. The health program in Sipe Sipe previously had been operated by the MOH without outside assistance.

Table X.10 compares the coverage of selected child survival services in the Mallico Rancho Health Area with coverage in the Sipe Sipe Health Area. There are striking differences in the coverage rates of vaccination and nutritional monitoring. The knowledge and use of ORT by mothers in the Mallico Rancho Health Area is also greater than in Sipe Sipe, but the differences are not as striking.

Table X.10.

Comparison of Child Survival Coverage in 1992 in the Mallico Rancho and Sipe Sipe Health Areas

	Mallico Rancho	Sipe Sipe
percentage of children 12-23 months with complete vaccinations	73%	12%
percentage of children 12-23 months with all vaccinations completed by 12 months of age	54%	4%
average number of nutritional monitorings in past 12 months	4.3	0.9
percentage of children with at least two monitorings in the previous 12 months	88%	6%
percentage of children with at least four monitorings in the previous 12 months	56%	2%
percentage of mothers who had heard of ORT	72%	59%
percentage of mothers who knew ORT was used to treat dehydration caused by diarrhea	67%	53%
percentage of mothers who knew how to prepare ORT	59%	45%
percentage of mothers who had actually used ORT	55%	46%
percentage of cases of diarrhea in past two weeks treated with ORT	49%	31%

source: AID child survival grant-related evaluations

Progress in the Application of the CBIO Approach

1. Development of the CBIO Approach

As described previously, the census work first began in the Mallico Rancho Health Area in 1989 when the community of Mallico Rancho became a pilot area. Routine systematic home visitation (RSHV) began in this community at that time. In 1990, censuses were completed in seven more communities and RSHV was undertaken at that time. By 1991, the final three communities in the area had been included in the census process and were receiving RSHV (see Table X.11). The household surveys carried out in Mallico Rancho did not assess the number of home visits or whether or not there was a visible number on the front of the house.

Table X.11.

Progress in the Development of the CBIO Approach in the Mallico Rancho Health Area, 1988 - 1992

	1988	1989	1990	1992
percentage of communities with census	0%	9%	73%	100%
percentage of project population enrolled in census	0%	14%	67%	100%

source: AID child survival grant-related evaluations

In the 1992 household survey, mothers were asked what their suggestions were to improve health in their community. The major priorities identified were expanded primary health care services, education about health, improved nutrition, and improved sanitation. All of these are areas of current active involvement of the Mallico Rancho Health Program.

2. Analysis of Death and Population Data for Mallico Rancho

Death registration began in 1991. As Table X.12 shows, the number of deaths registered in each year was 46.

Table X.12

Number of Deaths Registered in the Mallico Rancho Health Area, 1991-1992

year	number of deaths registered
1991	46
1992	46
Total	92

source: Mallico Rancho death registry

The age distribution of these deaths reveals that 42 percent were among children under five years of age. No other age group had more than eight percent of the deaths except the 75 and over age group which had 13% (see Table X.13).

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source: Mallico Rancho death registry

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Among the deaths of children under five, 87 percent are in the first two years of life. One-quarter are in the first month of life, one-third are in the remainder of the first year of life, and one-quarter are in the second year of life (see Table X.14). When these same data are spread out on a month by month basis in Table X.15, there does not appear to be any clustering of deaths observable around any particular age group except during the first month of life and within the first 24 months of life compared to the next three years of life.

Table X.13.

Number of Deaths Registered in the Mallico Rancho Health Area by Age Group, 1991-1992

age group (in years)	numbers of deaths recorded	percent
00 - 04	38	42%
05 - 09	3	3%
10 - 14	0	0%
15 - 19	2	2%
20 - 24	2	2%
25 - 29	6	7%
30 - 34	3	3%
35 - 39	4	4%
40 - 44	0	0%
45 - 49	2	2%
50 - 54	1	1%
55 - 59	3	3%
60 - 64	7	8%
65 - 69	5	5%
70 - 74	4	4%
75 +	12	13%
Total	92	100%

source: Mallico Rancho death registry

Among the deaths of children under five, 87 percent are in the first two years of life. One-quarter are in the first month of life, one-third are in the remainder of the first year of life, and one-quarter are in the second year of life (see Table X.14). When these same data are spread out on a month by month basis in Table X.15, there does not appear to be any clustering of deaths observable around any particular age group except during the first month of life and within the first 24 months of life compared to the next three years of life.

Table X.14

Numbers of Deaths Recorded Among Children Under Five Years in the Mallico Rancho Health Area, 1991-1992, by Age at Death

Table X.14.

Numbers of Deaths Recorded Among Children Under Five Years in the Mallico Rancho Health Area, 1991-1992, by Age at Death

age at death	number of children dying	percent
00 - 30 days	10	26%
01 - 11 months	13	34%
12 - 23 months	10	26%
24 - 35 months	4	11%
36 - 47 months	1	3%
48 - 59 months	0	0%
Total	38	100%

source: Mallico Rancho death registry

Table X.15.

Number of Deaths Recorded Among Children Under Five
in the Mallico Rancho Health Area, 1991-1992,
by Age at Death

	age in months	number of deaths
	00-<01	10
	01-<02	0
	02-<03	2
	03-<04	1
	04-<05	2
	05-<06	1
	06-<07	0
monthly age groups	07-<08	2
	08-<09	1
	09-<10	1
	10-<11	0
	11-<12	3
	12-<13	1
	13-<14	2
	14-<15	2
	15-<16	0
	16-<17	1
	17-<18	0
	18-<19	0
	19-<20	1
	20-<21	1
	21-<22	0
	22-<23	0
	23-<24	2
six month age groups	24-<30	3
	30-<36	1
	36-<42	1
	42-<48	0
	48-<59	0
	54-<60	0
	Total	38

source: Mallico Rancho death registry

VI. X. 16

The neonatal, postneonatal, infant, 12-23 month, and 24-59 month mortality rates are shown for 1991 and 1992 in Table X.16. Although the numbers of deaths upon which these rates are based are small, they do suggest that both neonatal and postneonatal mortality rates have fallen between 1991 and 1992. The overall infant mortality rate fell from 78 to 46. The denominators for these rates are shown in Table X.17.

Table X.16.

Neonatal, Postneonatal, Infant, and Age-Specific Childhood Mortality Rates in Mallico Rancho, 1991-1992

	year	
	1991	1992
neonatal mortality rate (per 1,000 live births)	36 (6)	15 (3)
postneonatal mortality rate (per 1,000 live births)	42 (7)	31 (6)
infant mortality rate (per 1,000 live births)	78 (13)	46 (9)
12-23 month mortality rate (per 1,000 children of this age group)	33 (7)	32 (6)
24-59 month mortality rate (per 1,000 children of this age group)	8 (4)	2 (1)

note: the number of deaths upon which each rate is based is shown in parenthesis.

source: Mallico Rancho birth and death registries and annual census

Table X.17.

Denominator Data for Calculating Mortality Rates for the Mallico Rancho Health Area

	year	
	1991	1992
number of live births	164	194
12-23 month of age population	212	187
24-59 month of age population	488	542

source: Mallico Rancho birth registry and annual census

Since ARHC/APSAR initiated child survival and primary health care activities in Sipe Sipe in early 1992, home visitation has been underway in a section of the new program area containing eight small communities. Vital events have been registered in these communities at the time of home visitation. Data are available for the 12 months of home visitation from April, 1992, until March, 1993.

Table X.18 demonstrates that infant and child mortality rates for all age groups are substantially higher in Sipe Sipe than in Mallico Rancho. The differences between the two areas are particularly striking for both the postneonatal and the 12-23 month mortality rates.

These data should be interpreted with caution since they arise from small populations, especially in the case of Sipe Sipe. If deaths are more likely to be under-reported in Sipe Sipe than in Mallico Rancho (a distinct possibility), the "true" mortality rates for Sipe Sipe are even greater than shown here, making the differences between Mallico Rancho and Sipe Sipe even more striking.

Table X.19 contains the numerator and denominator data from Sipe Sipe which were used in mortality rate calculations.

Table X.18.

Comparison of Neonatal, Postneonatal, Infant, and Age-Specific Childhood Mortality Rates in the Mallico Rancho and Sipe Sipe Health Areas, 1992

	Mallico Rancho (1/92-12/93)	Sipe Sipe (4/92-3/93)
neonatal mortality rate (per 1,000 live births)	15 (3)	20 (1)
postneonatal mortality rate (per 1,000 live births)	31 (6)	98 (5)
infant mortality rate (per 1,000 live births)	46 (9)	118 (6)
12-23 month mortality rate (per 1,000 population of this age group)	33 (17)	65 (4.5)
24-59 mortality rate (per 1,000 population of this age group)	2 (1)	8 (1.5)

note: numbers of deaths observed are in parentheses
 source: Mallico Rancho birth and death registries and annual census; Sipe Sipe birth and death registries and annual census.

Table X.19.

Numerator and Denominator Data for Calculating Infant and Child Mortality Rates for Eight Communities in the Sipe Sipe Health Area, April, 1992 - March, 1993

age group	population
number of live births	47
0-11 months	51
12-23 months	69
24-59 months	181
age at death	number of deaths observed
0-30 days	0
1-11 months	5
12-23 months	4
24-59 months	2

source: Sipe Sipe birth and death registries and 1992 census

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