3. Causes of Childhood Death

Analysis of the death data for children in the Mallco Rancho Health Area for 1991-1992 reveals that the leading cause of death is diarrhea. Approximately one-third of the deaths were associated with diarrhea. ARI, asphyxia, trauma and malnutrition were listed as diagnoses for 13%, 11%, 8%, and 8%, respectively, of the deaths (see Table X.20). The accidental deaths were due to drowning in two cases and to head trauma in two cases. A variety of other causes were encountered including TB, meningitis, prematurity, and low birth weight. There were 45 diagnoses listed for the 38 deaths.

Table X.20.

Diagnoses of Cause of Death Among Children Under Five in Mallco Rancho, 1991-1992

diagnosis of cause of death	freq	percentage of diagnoses (n=45) percent	percentage of deaths (n=38) percent
diarrhea	13	29%	34%
acute respiratory infection	5	11%	13%
accident/trauma	4	9%	11%
asphyxia	3	7%	8%
malnutrition	3	7%	8%
other diagnoses (including unknown causes)	17	37%	45%
Total	45	100%	119%*

* This sum is greater than 100% because 19% of the deaths (7/38) had more than one diagnosis.

source: Mallco Rancho health registry

4. Effect of Death Analysis on Program Functioning

The analysis of death data has led the program staff to focus its efforts on children under two years of age. Since diarrhea is the leading cause of death, increased emphasis has been given to ORT training and to education. Particular attention has been given to the need for early referral of children who are developing signs of dehydration. There continues to be a significant amount of malnutrition in the area, and a number of deaths appear to have been associated with malnutrition.

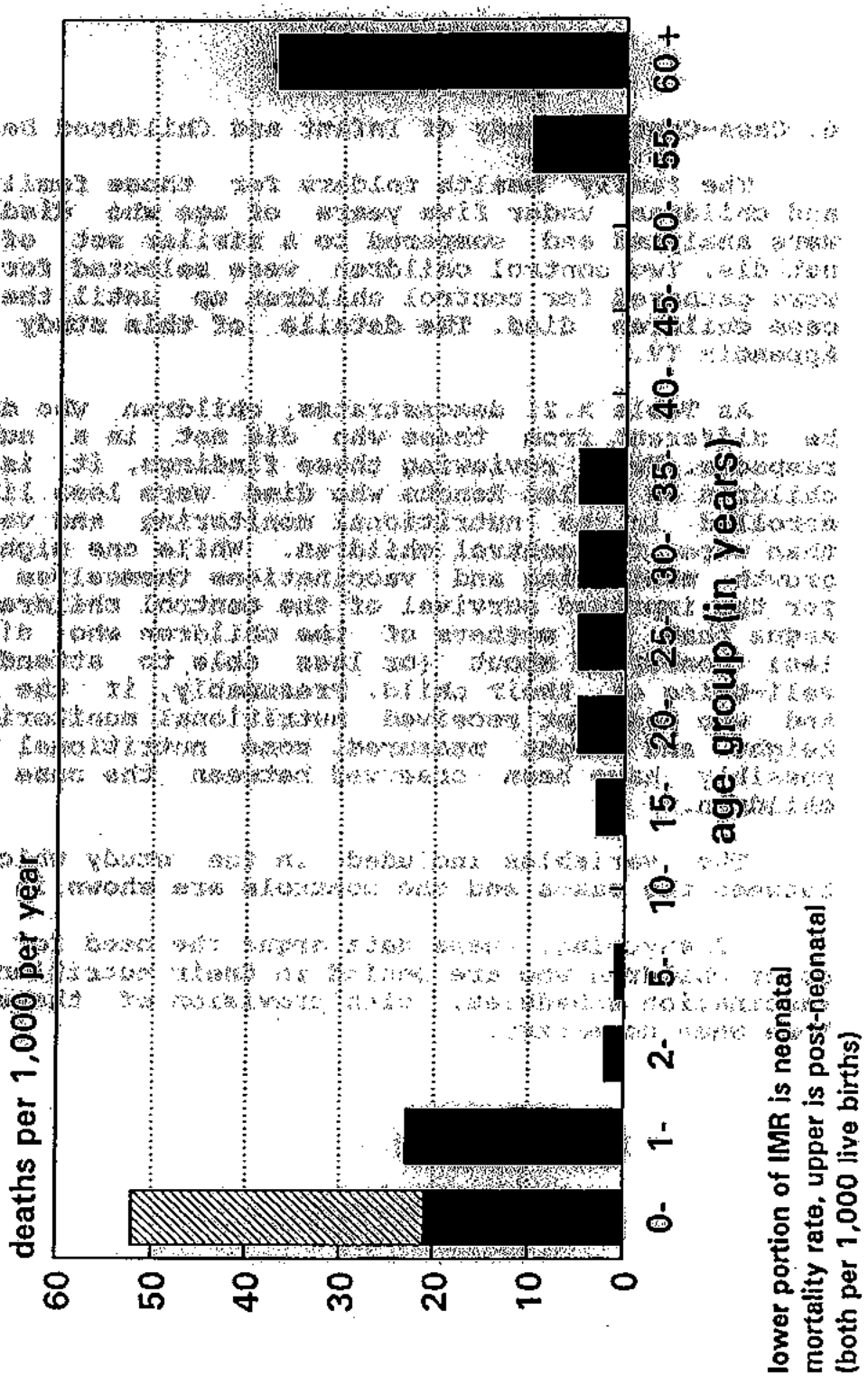
Although only one childhood death definitely has been attributed to TB so far, the staff are suspicious that TB may have been a contributing or underlying cause in several other childhood deaths. Consequently, as mentioned previously, there are now intensified efforts underway to diagnose TB in children who have signs of chronic malnutrition or chronic illness.

5. Comparison of Death Rates for All Age Groups

On the basis of prospective routine systematic home visitation carried out in the Mallco Rancho Health Area in 1992, age-specific death rates have been calculated. As shown in Figure X.2, the mortality rates for those under two years of age are much greater than for other age groups except for the 60 and older age group. Death rates for children 2-15 years of age are extremely low compared to the other age groups in Mallco Rancho.

Figure X.2

Age-Specific Death Rates
Malco Rancho, Bolivia 1992



6. Case-Control Study of Infant and Childhood Deaths

The family health folders for those families with infants and children under five years of age who died in 1991 or 1992 were analyzed and compared to a similar set of children who did not die. Two control children were selected for each death. Data were gathered for control children up until the age at which the case children died. The details of this study are described in Appendix IV.

As Table X.21 demonstrates, children who died were found to be different from those who did not in a number of different respects. From reviewing these findings, it is obvious that the children in Mallco Rancho who died were less likely to have been enrolled in the nutritional monitoring and vaccination program than were the control children. While one might argue that the growth monitoring and vaccinations themselves were responsible for the improved survival of the control children, one could also argue that the mothers of the children who died may have been less concerned about (or less able to attend to) the general well-being of their child. Presumably, if the children who died and who had not received nutritional monitoring had had their height and weight measured, some nutritional differences would possibly have been observed between the case and the control children.

The variables included in the study which did not differ between the cases and the controls are shown in Table X.22.

If anything, these data argue the need for aggressive follow up of children who are behind in their nutritional monitoring and vaccination schedules, with provision of these services in the home when necessary.

Table X.21.

Results of Analysis of Case-Control Study of Children Under Five Dying in Mallco Rancho, 1991 and 1992: Characteristics Which Differed Significantly Between Cases and Controls

	level of statistical significance
presence of growth chart (30% of the children who died did not have a growth chart compared to only 7% of the control children)	0.008
number of nutritional monitorings carried out (children who died had a mean of 2.7 monitorings compared to 4.0 for control children)	0.039
presence of BCG vaccination (45% of the children who died had received BCG compared to 84% of control children)	0.0003
presence of DPT1 vaccination (42% of the children who died compared to 76% of the control children had received DPT1 vaccination)	0.003
presence of DPT2 vaccination (32% of the children who died compared to 65% of the control children had received DPT2 vaccination)	0.007
presence of OPV1 vaccination (45% of the children who died compared to 81% of the control children had received OPV1 vaccination)	0.001
presence of OPV2 vaccination (32% of the children who died compared to 68% of the control children had received OPV2 vaccination)	0.002
presence of OPV3 vaccination (26% of the children who died compared to 52% of the control children had received OPV3 vaccination)	0.032
total number of vaccinations given (children who died received a mean of 2.7 vaccinations compared to 5.1 for the control children)	0.001

source: case-control study of childhood deaths in Mallco Rancho, 1993

Table X.22.

Results of Analysis of Case-Control Study of Children Under Five Dying in Mallco Rancho, 1991 and 1992: Characteristics Which Did Not Differ Significantly Between Cases and Controls

sex
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
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 DPT3 vaccination
presence of measles vaccination
maternal age
marital status of the mother
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
number of siblings

source: case-control study of childhood deaths in Mallco Rancho, 1993

COST ANALYSIS FOR MALLCO RANCHO

Estimation of Program Costs

The Mallco Rancho financial data for FY 1991 and FY 1992 have been analyzed. From March, 1992, until February, 1993, total recurring program costs were calculated to be $75,110. These include allowances for vehicle and building depreciation and all other identified expenses except for the cost of 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. This also includes locally-generated income and expenditures of that income. Identifiable costs born by the Ministry of Health are also included.

A breakdown of these expenses is shown in Table X.23. The MOH expenses include $5,133 in salary support for one MOH physician and one auxiliary nurse as well as an estimated $1,500 for vaccines and other supplies and medicines. Further detailed information about program costs can be found in Appendix V.

Seventy-three percent of the recurring expenses in FY 1992 were for personnel, 11% for transportation, with administration, supplies, and infrastructure each accounting for less than 10% of the recurring expenses (see Figure X.2).

TABLE X.23

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

		percentage of the total
personnel	$ 45,689	61%
supplies	$ 7,745	10%
administration (non-personnel)	$ 6,023	8%
transportation (including depreciation)	$ 8,844	12%
equipment and infrastructure maintenance (including depreciation)	$ 6,809	9%
Total	$ 75,110	100%

source: program financial reports

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

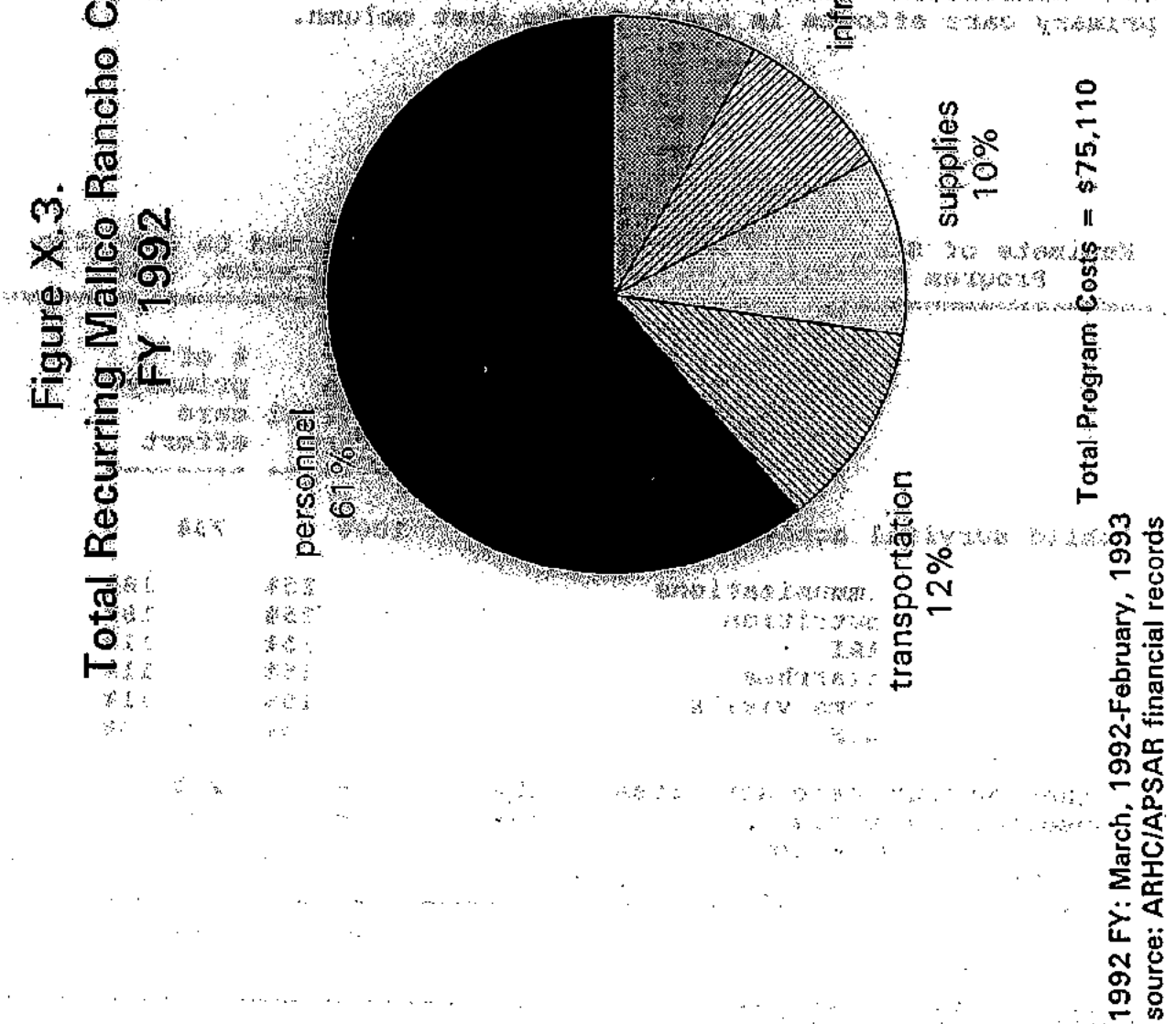


Figure X.3.
Total Recurring Malico Rancho Costs
FY 1992
personnel
61%
administration
8%
infrastructure
9%
supplies
10%
transportation
12%
Total Program Costs = $75,110
1992 FY: March, 1992-February, 1993
source: ARHC/APSAR financial records

Estimating the Cost of Program Components

On the basis of discussions with the Mallco Rancho Health Program staff, the following distribution of program effort has been estimated as shown in Table X.24. The program staff estimate that approximately 13% of program time and effort goes into hospital activities and 12% into water and sanitation activities. The remaining 75% of program effort is divided between child survival activities (55%) and other primary care activities. Within the child survival portion of program activities, the percentage breakdown is shown in column two of Table X.24. Since our cost analyses will be limited to the primary care portion of the program's activities (not including hospital care or water and sanitation activities), the breakdown of the program's primary care efforts is shown in the last column.

Table X.24.

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

	% of total program effort	% of child survival effort	% of primary care effort
child survival activities	55%	100%	73%
immunizations		25%	18%
nutrition		25%	18%
ARI		15%	11%
diarrhea		15%	11%
home visits		15%	11%
HIS		5%	4%
other primary care activites	20%	-	27%
hospital activities	13%	-	-
water and sanitation activities	12%	-	-
	100%	100%	100%

source: staff estimates

Assigning these percentages to the recurring program costs in Table X.23 makes it possible to estimate the recurring cost for each program component. These estimates are shown in Table X.25. These figures were obtained by applying the percentages of program's primary care efforts to the various program functional categories shown in Table X.24 according to the percentages given except for the value of vaccinations and supplies provided by the MOH. These were all placed in the vaccination category. Further details of this calculation are provided in Appendix V.

Table X.25.

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

functional category	recurring cost
child survival activities	
vaccinations	$10,843
nutrition	$ 9,343
diarrhea	$ 5,710
acute respiratory infection	$ 5,710
home visitation	$ 7,575
health information system	$ 2,525
other primary care activities	$16,943
Total	$56,333

source: program financial reports

Estimating the Cost of Child Survival Activities

The per capita cost for the child survival effort, when the beneficiaries are limited to children under five years of age, is $46.34. If women of childbearing age are considered as beneficiaries along with the children under five, the cost per beneficiary drops by over half to $19.13 (see Table X.26).

Table X.26.

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

total child survival cost	$39,390
number of children under 5	850
cost per child under 5 years of age	$ 46.34
number of children under 5 and women 15-44 years of age (850 + 1,209)	2,059
cost per child/woman beneficiary	$ 19.13

source: program financial reports and annual census

Estimating the Cost of Other Primary Care Services

The total cost of the non-child survival primary health care portion of the Mallco Rancho Health Program is estimated to be $16,943 as calculated in Table X.25. In Table X.27, the number of other primary care services in addition to child survival activities provided by the Mallco Rancho Health Program during 1992 is shown by type. Overall, 7,738 services were provided, at an average cost of $1.11 per unit of service.

This is a heterogeneous grouping of activities, so the same relative value scale employed in the cost analysis for Carabuco is utilized here (see Chapter IX). As Table X.27 shows, a relative value scale has been developed in which a patient consultation has been given two units of service while an injection receives one, and so forth. 15,237 "units" of service were provided at an overall cost of $16,934, yielding a cost per unit of service of $1.11. Thus it is estimated that the cost of a patient consultation (two units of value) is $2.22, An injection, with one unit of value is thus estimated to cost $1.11, and so forth as shown in Table X.27.

TABLE X.27.

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

type of service provided	numbers of services provided	relative value	units provided	estimated cost of service
patient consultation	3,047	2	6,094	$ 2.22
injection	1,853	1	1,853	$ 1.11
IV fluid	219	1	219	$ 1.11
minor wound care	954	1	954	$ 1.11
prenatal visit	385	1	385	$ 1.11
childbirth care	98	10	980	$ 11.10
postpartum care	22	2	44	$ 2.22
treatment of TB case	7	100	700	$ 111.00
dental visit	851	4	3,404	$ 4.04
laboratory exam	302	2	604	$ 2.22
Totals	7,738		15,237	

estimation of cost of unit of service: $\frac{\$16,943}{15,237} = \$1.11$

source: monthly program and financial reports

The cost of providing other primary care services (for those over five years of age) is estimated in the following manner. There were 4,979 persons over five years of age in the Mallco Rancho Health Area in 1992. Dividing the total cost of the non-child survival primary health care component ($16,943) by 4,979 yields a per capita cost estimate of $3.40 (see Table X.28).

Table X.28.

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

total cost of other primary health care activities	$ 16,943
total number of persons over 5	4,979
program cost per person over 5	$ 3.40

source: program financial reports and annual census

Estimating Total Recurring Program Costs Per Capita

Finally, if one looks at overall program cost per beneficiary as shown in Table X.29, this is calculated to be $9.66.

Table X.29.
Summary of Total Recurring Program Costs
for Mallco Rancho, FY 1992

total overall recurring cost	$ 56,333
number of persons covered by the program	5,829
cost per program beneficiary	$ 9.66

source: program financial reports and annual census

Locally-Generated Income

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 the Mallco Rancho Health Program for FYs 1991 and 1992 is shown in Table X.30. The sale of medicines is the leading source of local revenue in Mallco Rancho followed by dental services. Excluding the funds generated for hospital services, locally-generated income accounts for 11% of annual recurring primary health care program costs ($6,133/$56,333). MOH support amounts to exactly 10% ($5,633/$56,333) of recurring local program costs. Thus, at present, 21% of primary health care annual recurring program costs are sustainable with local private or Bolivian governmental sources.

Table X.30.

Locally-Generated Funds for the Mallco Rancho Health Program: Sources and Amounts, FYs 1991-1992

source	year FY 1991	FY 1992
sale of medicines	$3,154	$3,181
medical consultation	$ 497	$ 674
dental services	$1,167	$1,538
hospital revenue	$ 529	$ 765
other sources	$ 835	$ 740
Totals	$6,682	$6,898

Source: program financial reports

Conclusion

The Mallco Rancho Health Program has achieved high levels of coverage of child survival interventions and has shown notable declines in the infant mortality from 1991 to 1992. Coverage rates for immunizations and growth monitoring are strikingly higher in Mallco Rancho than in neighboring Sipe Sipe where the CBIO approach has just begun to be implemented. Current estimates of mortality indicate that the postneonatal mortality in Mallco Rancho is one-third that for Sipe Sipe and mortality rate for children 12-59 months of age in Mallco Rancho is less than half that for children in Sipe Sipe. The recurring costs of child survival and other primary care activities in FY 1992 was $9.66. Bolivian local private and governmental sources of support amount, at present, to 21% of annual recurring local primary health care costs.

CHAPTER XI. THE VILLA COCHABAMBA/MONTERO HEALTH PROGRAM

Description of Program Area

Villa Cochabamba is a periurban low-income area on the outskirts of the city of Montero (see Figure XI.1). It is called Villa Cochabamba (Cochabamba neighborhood) because a large proportion of its residents have migrated there from the highland valley area of Cochabamba. The migrants are mostly indigenous Quechua Indians who are moving to the Eastern lowlands of Bolivia in search of economic opportunities which are better than in the Cochabamba region. Montero itself is a city of approximately 70,000 persons. It has grown rapidly over the past 15-20 years as a result of migration from the surrounding rural areas and from the highlands.

The city of Montero is divided into six health areas, one of which is the Villa Cochabamba Health Area. In addition to the neighborhood actually called Villa Cochabamba, the Villa Cochabamba Health Area includes seven other adjacent neighborhoods and had a total population of approximately 12,000 persons at the end of 1992. At the time of censuses carried out in the area in 1990 and 1991, the population of the various neighborhoods were as shown in Table XI.1.

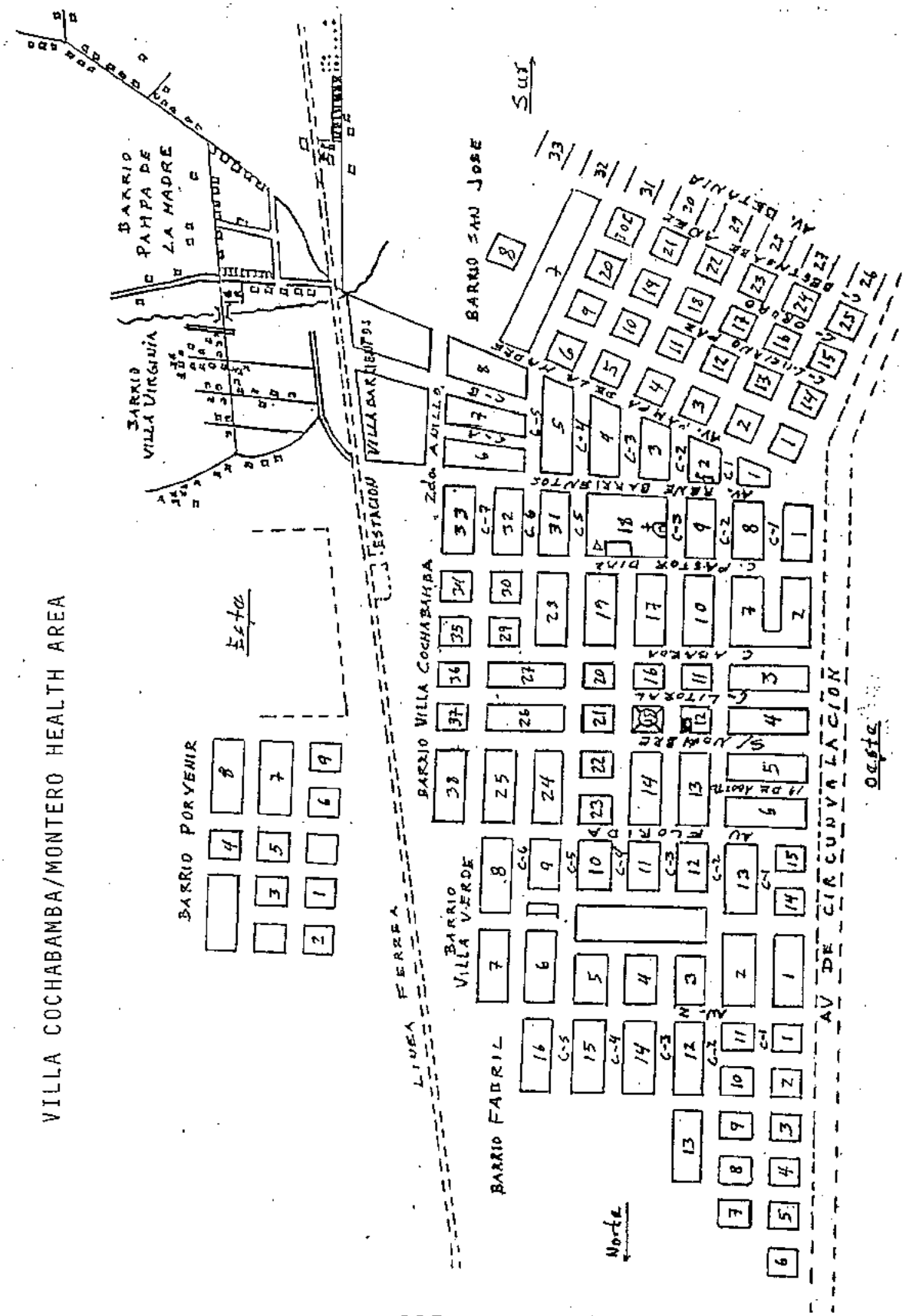


Figure A1.1

VILLA COCHABAMBA/MONTERO HEALTH AREA

In view of the fact that many of the women living in the health area are "minoristas" (that is, they operate small stores by the roadside), they are away from home much of the time tending to their businesses. Relatives often live in the home, and several different families frequently live in the same dwelling. Most of the dwellings are rented.

The entire program area is usually easily accessible by vehicle or foot, although during rainy periods the roads may be impassable by vehicle. Outlying homes are approximately a twenty-minute walk from the Villa Cochabamba Health Center. There is a children's hospital less than a five-minute ride from the program area. Sick children are referred by the program there where the attention provided is quite adequate. There is also a separate district health hospital several blocks from the children's hospital where adult patients, including women in need of maternity care, are referred and can receive adequate medical and surgical care.

History of the Villa Cochabamba/Montero Health Program

There has been a long tradition of outstanding public health work, community health, and hospital care in Montero since the mid-1960s. The Methodist and Catholic Churches working together with the Ministry of Health made this possible initially, and the health professionals of Montero have worked hard to maintain this tradition. In the late 1970s and early 1980s, there was an AID-financed health project based in Montero. This project evolved into the Montero Health District, the first official health district in Bolivia.

In 1986, Andean Rural Health Care began to provide some very limited support to the Montero District Hospital (Hospital Alfonso Gumucio Reyes) of the Ministry of Health and to the public health work of the Montero Health District. The initial support was in the form of supplies and visiting medical volunteers to the hospital as well as a small amount of financial support to the Montero Health District which was directed at that time by Dr. Dardo Chavez.

Dr. Chavez became ARHC's Coordinator for Montero in 1986. He had been inspired by Dr. James Alley as a high school student to pursue a career in public health. Dr. Alley was at that time serving as a Methodist medical missionary in Montero and later served for many years as the Director of Public Health for the State of Georgia.

CBIO APPROACH Chapter XI.

The Pilot Phase: 1988-1989

In 1988, ARHC submitted an application for a small grant to the United Methodist Committee on Relief (UMCOR) for development of a community maternal and child health project in Montero. This proposal was later funded. At that time, there was no health facility in the Villa Cochabamba Health Area, and no health staff from the Ministry of Health were available to work in the area.

Beginning with the awarding of the initial UMCOR grant for the program in mid-1988, discussions were held with the community about plans for the health program. An initial census of the area was undertaken in the fall of 1988, but it did not include a mapping of the area with enumeration of houses nor creation of a system of family health folders based on the number of the home.

In June, 1989, a small health post was established in a rented home which bordered the central plaza of Villa Cochabamba. Curative health services were thus established with a limited amount of community outreach underway. A second census of the area was completed in mid-1989.

Establishment of Primary Health Care and Early Community Health Work: 1989-1991

Through the assistance of a local Rotary Club in Waynesville, North Carolina, collaborating with the Montero Rotary Club, a new health center was constructed alongside the temporary health post which had opened in 1989. This new health center was completed in 1990. With a permanent facility in place, with a stable staff at work, and with a strong curative program underway, Dr. Chavez was ready to begin a serious effort towards further implementation of the CBIO approach. A section of Villa Cochabamba was selected as a pilot area for the community outreach work. Dr. Chavez had resigned his position as District Health Director by that time.

In the fall of 1990, the entire health team spent four months working together in one "manzana" (or city block) obtaining initial experience with enumeration of houses, census updating, and home visitation. In early 1991, every member of the health team took responsiblity for his or her own "manzana." Houses were numbered, home visits were carried out, and a family archive system similar to the ones in Carabuco and Mallco Rancho was developed. Thus by 1991, 31 "manzanas" were included in the system of routine systematic home visitation. In 1990 and 1991, a third census of the health area was undertaken, and the staff devoted considerable attention to the development of a workable health information system.

CBIO APPROACH Chapter XI.

Establishment of a Strong Home-Based Activity: 1992

By the middle of 1992, routine systematic home visitation was underway throughout the entire neighborhood of Villa Cochabamba, as well as in Barrio San Jose and Villa Verde. This continued expansion of program activities was made possible through support to ARHC from Rotary International, UMCOR, and PROCOSI (Programa de Coordinación en Supervivencia Infantil-Program of Coordination in Child Survival), a USAID-funded entity which supports the child survival work of PVOs in Bolivia.

The program staff from 1988 until 1993 are shown in Appendix II. The numbers of staff by category and the program population per staff member is shown in Table XI.2.

CURRENT PROGRAM FUNCTIONING

The Villa Cochabamba Health Center has a strong curative health program which has been in place since the new building housing the center was completed in 1990. This facility provides space for physician and nurse consultations, well-child care, dental services, and laboratory services. The building also serves as headquarters for the entire health program.

At the present time, the neighborhoods of Villa Cochabamba, Villa Verde, and Barrio San Jose have been included in the system of enumeration of houses, routine systematic home visitation, follow up home visits to high-risk children, and registration of vital events. Throughout this area, health activities in a given "manzana" (block) are the responsibility of one member of the health team. The three health promotors on the staff have no additional responsibilities beyond working in the "manzanas." They each have approximately 15 "manzanas" for which they are responsible. Other staff, such as auxiliary health nurses, graduate nurses, the program statistician, and one of the physicians, have responsibility for a smaller number of "manzanas," generally 5-10. A "manzana" generally has 30-40 families and approximately 200 people.

The current policy is to visit homes of children under two years of age on a monthly basis. Children 24 - 59 months of age are visited every three months. All other families are visited every six months, at which time the census information is updated. High-risk persons who receive more frequent home visits include:

a. malnourished children
b. children with diarrhea
c. patients with acute respiratory infection
d. patients with tuberculosis or symptoms of tuberculosis
e. pregnant women

Table XI. 2.

Staffing of the Villa Cochabamba/Montero Health Program, 1988-1993

Number of Paid Staff by Staff Category
(with program population* per staff member category shown in parenthesis)

	1988	1989	1990	1991	1992	1993
physicians	0.3 (21,667)	2 (4,000)	3 (3,180)	3 (3,188)	3 (3,541	2.5 (4,800)
dentists	0 -	0 -	0 -	0.5 (19,126)	0.5 (21,246)	0.5 (24,000)
midlevel health staff (graduate nurses, rural health technician)	1.5 (4,333)	1.5 (5,333)	1 (9,563)	3 (3,188)	3 (3,541)	2 (6,000)
lower level health staff (auxiliary nurses, etc.)	0 -	1 (8,000)	1 (9,563)	4 (2,391)	7 (1,518)	7 (1,714)
ancillary support (driver, groundskeeper, etc.)	0 -	1 (8,000)	1 (9,563)	1 (9,563)	1 (10,623)	1 (12,000)
administrative support staff (administrator, other office staff)	0 -	1 (8,000)	1 (9,563)	1 (9,563)	2.5 (4,250)	2.5 (4,800)
TOTAL	1.8 (3,611)	6.5 (1,231)	7 (1,366)	12.5 (765)	17 (625)	15.5 (774)

* estimated program populations are 6,500 in 1988; 8,000 in 1989; 9,563 in 1990 and 1991; 10,623 in 1992; and 12,000 in 1993.
source: program records and census data

Depending on the nature of the situation, follow-up visits may take place the following day or perhaps a week later. Most children with significant diarrhea or respiratory infection are seen the following day.

Children who are not vaccinated at the health center or at the time of concentrated vaccinated sessions in the community are vaccinated in the home at the time of a home visit. Children are also weighed and measured for height at that time. Children who are not gaining weight after home follow up and intensive nutritional education are referred to the health center for further evaluation. Severely malnourished children are taken to the children's hospital for initial rehabilitation. CEAC (Centro Experimental Agricola Campesino- Farmer's Agricultural Experimental Center) is an organization based in Montero which provides supplemental foods for the rehabilitation of malnourished children in several of the neighborhoods in the program area.

The health center provides vaccinations every day that it is open. Much of the vaccinating, however, is done in the home although sometimes it is provided in concentrated campaigns out in the community. The entire town of Montero has occasional vaccination campaigns in which the Villa Cochabamba Health Program participates fully. The health promotors do not give vaccinations themselves, so they need to coordinate the vaccination of children in the "manzanas" for which they are responsible with a more senior member of the health team who can go with them to vaccinate.

Women who are identified as pregnant at the time of home visitation are given a "ficha" (card) instructing them when to come to the health center for a prenatal visit with the center's physician. If the woman does not come on the date specified, a home visit is carried out to find out what happened. Prenatal care is provided free of charge. Those women who participate in the prenatal care program receive a significant reduction in the cost of childbirth care at the district hospital. Pregnant women receive monthly home visits during their pregnancy once the pregnancy has been identified.

Similar follow up is provided for TB patients. When a TB case is diagnosed, a home visit is undertaken to assess the family situation. One of the purposes of a visit to the home of a newly registered TB patient is to verify that the patient actually lives in the program area and therefore is, according to MOH norms, enrolled in the proper program. If patients do not continue to come to the treatment center to receive their medications, then follow up home visitation takes place to reenroll the patient in the treatment program.

When persons are encountered during routine systematic home visitation who have symptoms suggestive of TB, they are referred to the health center for sputum examinations. If the person does not comply with this referral, the health worker returns to the home to collect sputum specimens.

Each week, health staff members plan their work in each "manzana" based on a review of the high-risk cases identified and on a review of those children who need vaccinations or growth monitoring. This review is carried out by looking through the family health folders of each "manzana" and by reviewing "cartillas" (charts) which list for a given "manzana" all the children with their respective dates of birth, vaccinations, nutritional monitoring (and nutritional status), as well as recent episodes of illness. This information is placed initially on the child's growth chart which is kept in the family health folder. This same information is also recorded on wall charts for easy monitoring. The home visitation work plan for the next week can then be readily developed by reviewing the "cartilla."

The Role of Volunteers

The health staff member responsible for a given "manzana" is reponsible for recruiting volunteers to participate in the work of the "manzana." The goal is to have at least one volunteer for each "manzana." There are approximately 30 volunteers at present. Some of the most committed of these are persons who previously had tuberculosis and have completed their treatments provided by the program. These persons have dedicated themselves to improving the health of their neighbors. The role of the volunteer is to assist the health staff member in his or her work in the "manzana". The volunteer reports to the health staff member cases of high risk in need of treatment or follow up. The volunteer also reports births and deaths.

The Health Information System

The health information system (HIS) which has emerged in the Villa Cochabamba Health Program is similar to the ones in Carabuco and Mallco Rancho. The staff in Villa Cochabamba have shown considerable initiative in HIS development. The system is based on "manzanas" (city blocks). As described above, all of the health information for a family is kept in a family health folder which is numbered by community (i.e. "villa" or "barrio,") by "manzana," by "vivienda" (house number), and by the family number since there is frequently more than one family living in a given dwelling.

The health staff feel that the information contained in the

HIS is reliable. They say this because they have put the information into it themselves and they use it on a daily basis. As their experience with the system has grown, so has their ability to keep records which are accurate and legible. New staff have some difficulty in learning this system initially, but they soon learn how to enter information and make use of the information which the system contains. So far, there has not yet been any direct feedback of health information to any of the "manzanas".

In addition to the family health folders and the wall charts described previously, there is also another wall system for each "manzana" to show how many children are present, their vaccination status, and the number of nutritional monitorings provided. This is all noted on blocks measuring about one inch square for each child. The block is divided into smaller components which are colored in yellow after the indicated vaccination is administered. A nutritional monitoring is shown alongside the block as a colored dot. Each block has the number of the family and the number of the child at the top. Using this method also, staff can readily determine which children in which houses are in need of additional services.

Health Education

Because childhood malnutrition is common in the Villa Cochabamba Health Area, extensive educational efforts are made at the time of the home visit and at the time of evaluations of malnourished children at the health center to assist the mothers in the promotion of breast feeding, in discouraging the use of bottle feeding, and in the provision of foods with high caloric and protein content beginning at four months of age.

Childhood diarrhea is also common in the program area. In addition, there were 139 cases of cholera during 1992 among the residents of the Villa Cochabamba Health Area. Only several of these were among children. Because of the importance of diarrheal disease, extensive educational efforts are underway through community meetings as well as at the time of health center visits and home visits to promote sanitation, the use of clean or boiled water, cooking of food, washing of fruits and vegetables, and handwashing before eating. The recognition of symptoms of dehydration, instruction in the use of ORT, and the importance of seeking assistance when dehydration develops is also emphasized. ORT packets are left in the home or nearby for treatment of diarrheal illness. The presence of cholera in the program area has heightened everyone's awarness about diarrheal diseases in general.

Tuberculosis is common in the area. Educational efforts are being carried out regarding symptoms, the importance of case

detection, and the need for completion of treatment.

Supervision

The health staff working in the community are now divided into three teams. Each team is directed by a supervisor who is a member of the "Consejo Tecnico" (technical steering group) which establishes policies for the community outreach activities of the Villa Cochabamba Health Program. Each of the three teams is led by a supervisor. One team is led by a physician (Dr. Baldomar), one by a rural health technician (Mr. Guarabia), and the other by the statistician (Mr. Simone). The other two persons making up each of the three health teams are an auxiliary nurse and a promotor. The supervisor of each team is responsible not only for supervision but also for the training of the team, including the volunteers who work in the "manzanas".

The consolidation of coverage data for basic child survival services at the "manzana" level on "cartillas" as well as on another type of wall chart with columns of colored blocks showing which children are in need of follow up has helped the supervisor to assist the other team members in planning his or her work for the week.

Specific Issues Related to Home Visitation

Just as in Carabuco and in Mallco Rancho, it took some time before the Villa Cochabamba health staff were able to begin home visitation. Home visitation was not an initial priority because of the level of effort required initially to establish acute curative primary health care services as well as to begin the vaccination and nutritional monitoring of concentrated groups of children. However, once the home visitation program finally started in 1990, the staff soon realized its value. The staff have now found that home visitation is an ideal way of beginning health work in the neighborhoods because it gives them an excellent opportunity to begin to know the families and to learn about their problems. It also gives the families an opportunity to learn about the program and to become acquainted with the program staff.

The staff now acknowledge that many mothers and children will not go to the effort to bring their children to the health center or to a special immunization/growth monitoring session. Thus, without home visitation, a large percentage of the children would not receive basic services. Although there are still occasionally some families who refuse home visits, the visitation staff have been by and large well-accepted. In fact, the home visitation program has given a certain prestige to the Villa Cochabamba Health Area. The staff are now beginning to encounter

families who say they have moved into the area primarily because of the ready availability of health services.

The staff are now convinced of the utility of the system of household enumeration and location of family health folders according to "manzana" and house number as a highly effective means of follow up of sick children and high-risk cases. Nevertheless, there are some drawbacks to home visitation but these are greatly outweighed by its advantages. The drawbacks mentioned by the staff include the costs of staff time, especially since it is often difficult to find families at home. The staff are gradually learning how most efficiently to contact families. The incorporation of volunteers has been helpful in this regard.

Staff find it humiliating to be rejected by a family at the time of a home visit, but this is occurring less and less. The families frequently have a multitude of problems which are not health-related. Those being visited often want to share their marital, economic or other personal problems with the visiting health worker. As in Carabuco and in Mallco Rancho, the staff in Villa Cochabamba are also concerned about the dependence which families are developing on home visits as a method of receiving health care, but they do not see any effective alternative at the present time.

Specific Issues Related to Community Relationships

The Director of the Villa Cochabamba Health Program, Dr. Dardo Chavez, is a true expert in relationships between health programs and communities. At one point several years ago, all of the political parties in the City of Montero came to him and asked him to be their candidate for mayor. Dr. Chavez views the role of the community in defining the work of the health program as an indirect one. As a result of extensive contacts between the health staff in Villa Cochabamba and the community through patient visits and home visitation, the program staff learn what the community feels to be its health priorities.

Dr. Chavez thinks that the community wants above all quality health care at an affordable price. The responsibility of the health program is to ensure that this in fact is provided, according to Dr. Chavez. Dr. Chavez believes that the Villa Cochabamba Health Program staff are even responsible for ensuring that quality health care at an affordable price is also provided by referral hospitals and specialists. Thus, when program staff encounter a patient who needs hospitalization, someone from the staff of the Villa Cochabamba Health Program accompanies the patient to the referred provider to be sure that the patient receives appropriate attention.

At this time, there is no formal participation of community leaders or health committees in the operation of the Villa Cochabamba Health Program. Community leaders and organizations within the program area are consulted on a regular basis, however, to discuss program plans and activities. Some of these leaders are health volunteers in the community.

Issues Regarding Coordination of Child Survival Work With Related Activities

The program has warm working relationships with the MOH in the Montero area. The MOH has provided vaccines, TB medicines, and medical supplies. There is no MOH salary support currently for program staff.

Dr. Chavez and his staff feel that child survival efforts and primary health care are inseparable. "Having one without the other," Dr. Chavez says, "is like trying to applaud with one hand." In the process of providing child survival services, the program is continually encountering persons who need medical attention. In the course of providing medical attention, the program frequently encounters children who need child survival interventions. To carry out child survival programs without other primary health care services and without access to referral services is, says Dr. Chavez, "like giving a prescription to a sick patient in an isolated rural area where there is no pharmacy."

The Villa Cochabamba Health Program has a number of strong relationships with other organizations related to health in the city. The relation with the CEAC nutritional program has already been mentioned. Ties with the Montero Rotary Club are very strong. The Montero Rotary Club has a long tradition of support of health work. ARHC has fostered the continuation of this tradition by working with a local Rotary Club in Waynesville, North Carolina, in obtaining financial support for the community health work in Villa Cochabamba. Another strong relationship which the program has is with COSMOL, the Montero water cooperative. With assistance from Rotary International, funds have been obtained to improve water and sanitation in the program area. This effort is coordinated closely with the municipal water cooperative and with the local Rotary club.

PROGRAM RESULTS

Numbers of Services Provided

The numbers of patient visits provided at the Villa Cochabamba Health Center and in the community is shown in Table XI.3. Table XI.4 shows the number of doses of vaccine administered by the program since 1989. While the number of primary health care services appears to have stabilized around 5,000 to 7,000 per year, the number of vaccinations in 1992 was substantially greater than in earlier years.

Table XI.3.

Number of Patient Consultations Provided by the Villa Cochabamba/Montero Health Program at the Health Center and in Homes, 1989-1992

year	number of patient consultations
1989	1,031
1990	5,214
1991	6,999
1992	4,682
Total	17,926

ɔurce: monthly program reports.

Table XI.4.

Total Number of Vaccination Doses Given per Year
by the Villa Cochabamba/Montero Health Program, 1989-1992

year	number of vaccinations given
1989	3,898
1990	7,304
1991	6,103
1992	10,576
Total	27,881

source: monthly program reports

The number of nutritional monitorings carried out in the Villa Cochabamba Health Area between 1989 and 1992 is shown in Table XI.5. This effort, like that of the vaccination program, has grown remarkably over the life of the program. The number of home visits (shown in Table XI.6) has grown even more dramatically during the past two years from only 467 in 1990 to more than 6,000 in 1992.

Table XI.5.

Total Number of Nutritional Monitorings (Weight and Height Measurements) Among Children Under Five Years of Age in the Villa Cochabamba/Montero Health Area, 1989-1992

year	number of nutritional monitorings
1989	420
1990	2,698
1991	3,054
1992	5,941
Total	12,113

ource: monthly program reports

Table XI.6.

Number of Home Visits Carried Out in the Villa Cochabamba/ Montero Health Area, 1989-1992

year	number of home visits
1989	51
1990	467
1991	1,698
1992	6,504
Total	8,720

urce: monthly program reports

Coverage of Child Survival Services

There has been only one household survey carried out in the Villa Cochabamba Health Area since the program's initiation. This was undertaken in August, 1991, as part of an internal evaluation. At that time, the routine systematic home visitation program had begun in only one part of the Villa Cochabamba neighborhood. The data shown in Table XI.6 show that vaccination coverage rates were respectable taking into consideration the high rate of movement of the population and the difficulty of locating the families in their homes. In the Villa Cochabamba neighborhood, the percentage of children 12-23 months of age with completed vaccinations appears to have almost doubled between 1991 and 1992.

Table XI.6.

Coverage of Vaccinations Among Children 12-23 Months of Age in the Villa Cochabamba/Montero Health Area, 1991-1992

		area of coverage		
	type of vaccination	entire program area 1991	Barrio Villa Cochabamba 1991	1992
children 12-23 months of age	BCG	80%	89%	100%
	DPT3	49%	53%	82%
	OPV3	47%	55%	82%
	measles	67%	79%	100%
	complete series	40%	45%	82%
women of childbearing age	tetanus	41%	na	na

note:
1. BCG, DPT3, OPV3, measles, and complete series coverage rates are all for children 12-23 months of age.
2. The 1991 data are from the 1991 cluster sample survey.
3. The 1992 data are from a 10% sample of health records from the Villa Cochabamba neighborhood.
4. Tetanus coverage refers to the percentage of women responding to the 1991 cluster sample survey who had documentation demonstrating two tetanus toxoid vaccinations.
5. na: not assessed
6. source: 1991 household survey and analysis of health center family health folders

The coverage of growth monitoring within the health program area is shown in Table XI.8. Fifty-seven percent of the children 0-35 months of age included in the 1991 cluster sample survey were not enrolled in the nutritional monitoring program. The average number of monitorings was only 1.3, and only 29 percent of the children had received two or more monitorings. Coverage of nutritional monitoring in the entire program area since that time has not been assessed. The number of monitorings carried out doubled from 1991 to 1992. It seems reasonable, therefore, to assume that coverage has expanded considerably. Coverage may not have grown as much as the number of monitorings might suggest, however, since the overall population has been been growing rapidly during this same time as a result of in-migration.

The number of monitorings among children 0-23 months of age in the Villa Cochabamba neighborhood was tabulated for the six-month period between May and October, 1992. 239 children were monitored a total of 794 times during this period. Assuming this same level of activity continued throughout the year, this would produce an average of 6.6 monitorings per child per year in this area of the program.

Table XI.8.

Coverage of Growth Monitoring in the Villa Cochabamba Health Area, 1991-1992

	entire program area 1991	Barrio Villa Cochabamba 1992
average number of monitorings during the previous 12 months	1.3*	6.6**
percentage of children 0-35 months of age with at least two monitorings during the previous 12 months	29%	na
percentage of children 0-35 months of age with at least four monitorings during the previous 12 months	16%	na

* children 0-35 months of age
** the estimated average number of weighings for children 0-23 months of age (based on six months of observations, May to October, 1992)
na: not assessed
source: 1991 household survey and analysis of health center family folders

We have no basis for assessing any changes in the overall knowledge about or use of ORT in the program area. At the time of the 1991 household survey of mothers, only 52 percent indicated that they had heard of ORT. Only 42 percent knew how to prepare ORT, and only 37 percent actually had used ORT. Twenty-seven percent of the children at the time of the survey had had

diarrhea during the previous two weeks and only 20 percent of these had received some form of ORT. Because of the importance of diarrheal disease as the leading cause of death among children and because there are more cases of cholera among adults here than in ARHC's other program areas, ORT education and training have received strong emphasis since 1991. Thus, we expect to see major improvements in ORT coverage in future evaluations.

Progress in the Application of the CBIO Approach

1. Development of the CBIO Approach

From the beginning of the Villa Cochabamba/Montero Health Program in 1988, censuses have been carried out on an annual basis. Detailed maps have been developed which show the location of each house in each "manzana" and which identify each house by number. The program has been much slower, however, to place numbers on the front of each house and to develop a family health folder for each family. In 1991, only 27 percent of the houses had numbers visible at the front and 34 percent of the families had a family health folder at the center. At that time in 1991, censuses had been carried out for the entire program area but enumeration of houses and creation of family health folders with the house number had been possible in only the Villa Cochabamba neighborhood, which included about one-third of the population of the entire health area.

More recent assessments of the coverage of these aspects of the CBIO approach have not yet been undertaken. Routine systematic home visitation is now underway in the neighborhoods of Villa Cochabamba, Barrio San Jose, and Barrio Villa Verde. Together, these three neighborhoods constitute 72 percent of the overall program area and have a combined population of 7,671 persons. Given the tripling in the number of home visits between 1991 and 1992, it would seem to be a safe assumption that there has been considerable progress in the coverage of those elements of the CBIO approach shown in Table XI.9.

Table XI.9.

Progress in the Development of the CBIO Approach in the Villa Cochabamba/Montero Health Area, 1988-1992

	1988	1991	1992
percentage of blocks with census	100%	100%	100%
percentage of project population enrolled in census	100%	100%	100%
percentage of homes with number visible on the front (based on cluster sample survey of homes with children under 36 months of age in 1991)	0%	27%	na
percentage of families with a family health folder at the health center (based on cluster sample survey of homes with children under 36 months of age in 1991)	0%	34%	na

na: not assessed
source: annual census and 1991 household survey

The CBIO approach involves identifying all the members of the community, their household location, and then developing an ongoing relationship with each family. It also involves identifying the major health problems in the area, both from the standpoint of the health practitioner and from the standpoint of

the community. At the time of the 1991 household survey, mothers participating in the survey were asked what they felt was the most important health need in their community. The most frequently mentioned needs were cleaning the trash from the area, primary health care services, clean water, and improved hygiene and cleanliness. These needs also correspond to the community needs expressed by local leaders.

2. Analysis of Death and Population Data for Villa Cochabamba/ Montero

The formal registration of deaths began in 1990. In 1992, there were almost twice as many deaths registered as in each of the two previous years (see Table XI.10).

Table XI.10.

Number of Deaths Registered in the Villa Cochabamba/Montero Health Area, 1990-1992

year	number of deaths registered
1990	29
1991	29
1992	51
Total	109

source: Villa Cochabamba/Montero death registry

The number of deaths by five-year age groups is shown in Table XI.11. Two-thirds of the deaths registered are among children under five years of age. Only 10 percent of the deaths are among persons over 60 years of age. We noted earlier that only five percent of the population is over 50 years of age.

Table IX.11.

Age at Death Registered in the Villa Cochabamba/Montero Health Area, 1990-1992

age group in years	freq	percent	cumulative percent
00 - 04	71	62%	62%
05 - 09	3	3%	65%
10 - 14	3	3%	68%
20 - 24	2	2%	70%
25 - 29	1	1%	71%
30 - 34	1	1%	72%
35 - 39	3	3%	75%
40 - 44	5	4%	79%
45 - 49	4	4%	83%
50 - 54	4	4%	87%
55 - 59	1	1%	88%
60 - 64	3	2%	90%
65 - 69	2	2%	92%
70 - 74	2	2%	94%
75 +	5	4%	98%
NO DATA	3	3%	100%
Total	113	100%	

source: Villa Cochabamba/Montero death registry

The distribution of age at death for children is shown in Table XI.12. Deaths are concentrated during the first two years of life, with a peak of deaths recorded at five months of age. These same data are collapsed into fewer groups in Table XI.13 and show that 88 percent of the deaths in children under five occur during the first two years of life. Less than 10 percent of the deaths are in the first month of life. The six deaths recorded during the first month of life are evenly spread throughout this period.

Table XI.12.

Number of Deaths Recorded Among Children Under Five by Age at Death in the Villa Cochabamba/Montero Health Area, 1990-1992

	age in months	number of deaths
monthly age group	00-<01	6
	01-<02	3
	02-<03	1
	03-<04	4
	04-<05	2
	05-<06	10
	06-<07	3
	07-<08	1
	08-<09	3
	09-<10	3
	10-<11	3
	11-<12	2
	12-<13	2
	13-<14	2
	14-<15	3
	15-<16	2
	16-<17	2
	17-<18	3
	18-<19	0
	19-<20	2
	20-<21	2
	21-<22	1
	22-<23	1
	23-<24	1
six month age groups	24-<30	5
	30-<36	0
	36-<42	2
	42-<48	1
	48-<54	0
	54-<60	1
	Total	71

source: Villa Cochabamba/Montero death registry

Table XI.13.

Number of Deaths Recorded by Age Group Among Children in Villa Cochabamba/Montero, 1990-1992

age at death	freq	percent	cumulative percent
00 - 30 days	6	9%	8%
01 - 11 months	35	49%	58%
12 - 23 months	21	30%	88%
24 - 35 months	5	7%	95%
36 - 47 months	3	4%	99%
48 - 59 months	1	1%	100%
Total	71	100%	

source: Villa Cochabamba/Montero death registry

The 1992 neonatal, post-neonatal, and age-specific mortality rates have been calculated for the Villa Cochabamba neighborhood, where the vital events registration is felt to be reasonably good. Compared to the other two program areas in Carabuco and in Mallco Rancho, the neonatal death rate in Villa Cochabamba is quite low and the second year death rate is quite high. For instance, the neonatal mortality rates in Carabuco and Mallco Rancho for 1992 were 46 and 15 deaths per 1,000 live births respectively compared to seven for Villa Cochabamba/Montero. On the other hand, the 12-23 month mortality rates in Carabuco and in Mallco Rancho were 13 and 32 deaths per 1,000 children of this age group compared to 65 for Villa Cochabamba/Montero. It should be noted that all deaths observed in the Villa Cochabamba neighborhood were included in this analysis, even if the infant or child had just moved into the area. Mortality rates for children 12-59 months of age are quite low (see Table XI.14).

Table XI.14.

Neonatal, Postneonatal, Infant, and Age-Specific Childhood Mortality Rates for the Villa Cochabamba/Montero Health Area, 1992

	rate	number of deaths observed	population
neonatal mortality rate (per 1,000 live births)	7	1	142*
postneonatal mortality rate (per 1,000 live births)	56	8	-
infant mortality rate (per 1,000 live births)	63	9	-
12-23 month age-specific mortality rate (per 1,000 population of this age group)	65	9	139
24-35 month age-specific mortality rate (per 1,000 population of this age group)	7	1	147
36-47 month age-specific mortality rate (per 1,000 population of this age group)	0	0	123
48-59 month age-specific mortality rate (per 1,000 population of this age group)	8	1	128

* number of live births recorded
source: Villa Cochabamba/Montero birth and death registry and 1992 annual census

3. Causes of Infant and Childhood Death

The diagnoses listed for the 71 registered infant and childhood deaths are shown in Table XI.15. There were 115 different diagnoses listed for these 71 deaths. Diarrhea was by far the most common diagnosis recorded, followed by malnutrition. Other diagnoses were considerably less frequent. Over half of the children dying had a diagnosis of diarrhea and one-third died with a clinical diagnosis of malnutrition.

Table XI.15.

Diagnoses of Cause of Death Among Children Under Five in the Villa Cochabamba/Montero Health Area, 1990-1992

diagnosis of cause of death	freq	percentage of diagnoses (n=115) percent	percent of children dying with diagnosis (n=71) percent
diarrhea	40	35%	56%
malnutrition	25	22%	33%
acute respiratory infection	9	8%	13%
fever	9	8%	13%
anemia	5	4%	7%
other diagnoses	27	23%	38%
Total	115	100%	160%*

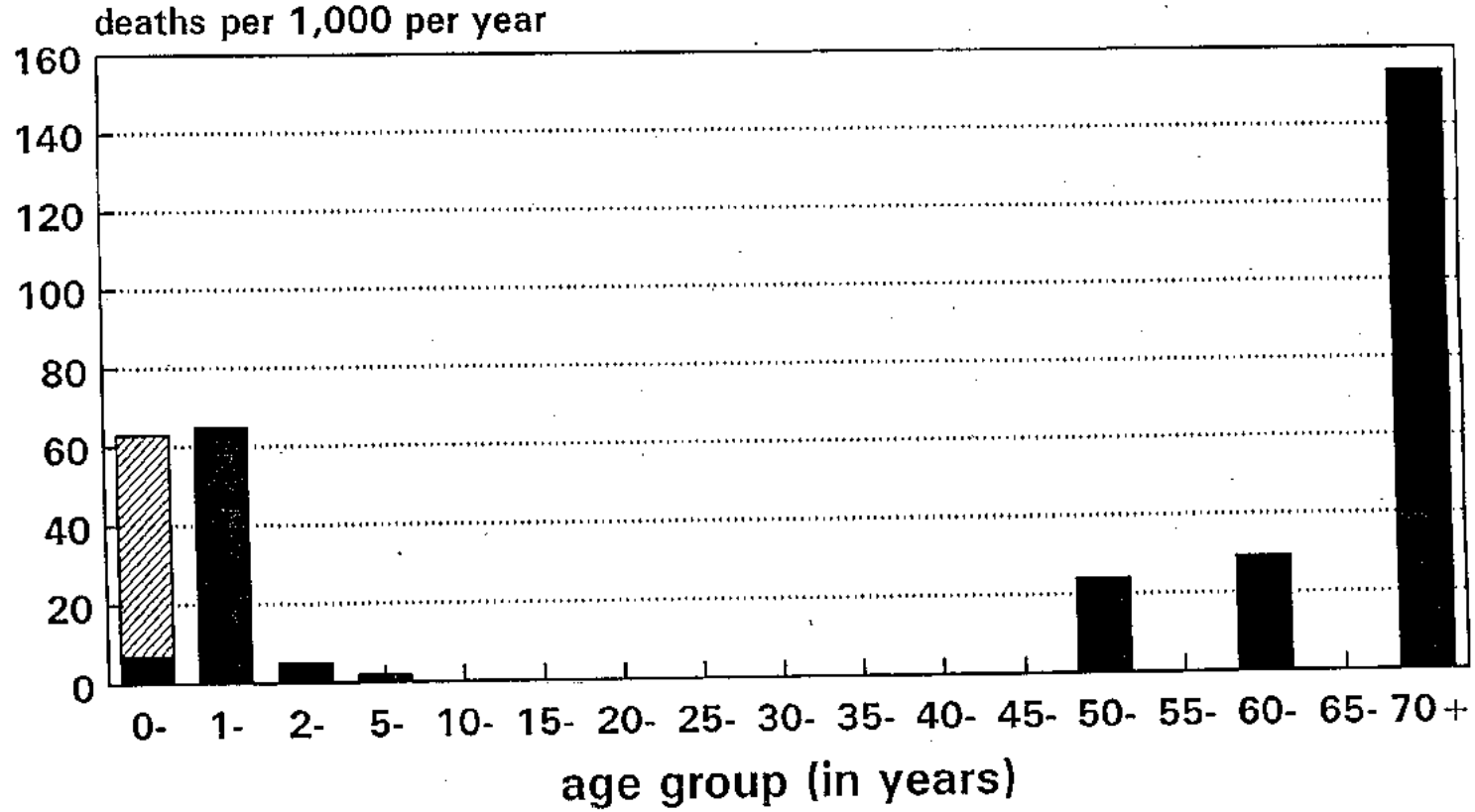
* This sum is greater than 100% because 60% of the deaths (44/71) had more than one diagnosis.
source: Villa Cochabamba/Montero death registry

1. Comparison of Death Rates for All Age Groups

On the basis of prospective routine systematic home visitation in the Villa Cochabamba neighborhood in 1992, age-specific death rates have been calculated as shown in Figure XI.2. Aside from the high death rate among persons over 70 years of age, the high postneonatal and high 12-23 months death rates are particularly striking compared to the death rates for the other age groups.

Figure XI.2.

Age-Specific Death Rates
Villa Cochabamba/Montero, 1992



lower portion of IMR is neonatal mortality rate, upper is post-neonatal (both per 1,000 live births)

5. Case-Control Study of Infant and Childhood Deaths

The family health folders for those families with infants and children under five years of age who died in 1992 were analyzed and compared to a similar set of children who did not die. Two control children were selected for each child who died. The details of this study are described in Appendix IV. In Villa Cochabamba/Montero it was possible to compare case and control children on several additional characteristics which were not available for inclusion in the case-control studies at the other two program sites. These included maternal education, languages spoken in the home, father's occupation, physical characteristics of the house, and whether water was boiled prior to consumption.

As Table XI.16 demonstrates, children who died were found to be different from children who did not in several significant respects. First of all, there is evidence that the nutritional status of the children who died was not as favorable as that of the control children. Secondly, there is evidence that the mothers of the children who died were less educated and were more likely to speak an indigenous language than were the mothers of the control children.

None of the following characteristics were related to the risk of childhood death: vaccination status, maternal age and education, birth interval, father's occupation, or characteristics of the house.

Table XI.16.

Results of Analysis of Case-Control Study of Children Under Five Dying in the Villa Cochabamba/Montero Health Area, 1992: Characteristics Which Differed Significantly Between Cases and Controls

	level of statistical significance
height for age percentile (HAP) at the initial nutritional monitoring session (mean HAP was 32% for cases and 53% for controls)	0.042
weight for age percentile (WAP) at the initial nutritional monitoring session (mean WAP was 42% for cases and 64% for controls)	0.031
weight for age percentile (WAP) at the third nutritional monitoring session (mean WAP was 11% for cases and 45% for controls)	0.013
percentage of children below the third percentile of weight for age at the second nutritional monitoring session (33% of cases versus 5% of controls)	0.042
percentage of children below the 25th percentile of height for weight at the last recorded weighing (67% of cases versus 9% of controls)	0.028
maternal educational level (22% of cases had a mother with no formal education versus 4% of the controls; 17% of the cases had a mother with more than an elementary school education versus 39% of controls)	0.031
language spoken in the home (20% of the cases came from homes in which an an indigenous langauge was spoken versus 4% of the controls)	0.029

source: case-control study of childhood deaths in Villa Cochabamba, 1993

Table XI.17.

Results of Analysis of Case-Control Study of Children Under Five Dying in the Villa Cochabamba/Montero Health Area, 1992: Characteristics Which Did Not Differ Significantly Between Cases and Controls

sex
presence of growth chart
number of nutritional monitorings
low birth weight (defined as less than 3.0 kilograms during the first month of life)
weight for height percentile at the initial nutritional monitoring
height for age, weight for age, and weight for height percentiles at the second nutritional monitoring
height for age and weight for height percentiles at the third nutritional monitoring
percent of children below the third percentile of weight for age at the first and third nutritional monitorings
percent of children below the 25th percentile of height for age and weight for age at the last recorded nutritional monitoring
loss of weight from next to last, to 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
marital status of the mother
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)
number of siblings
birth interval between the child and the next oldest sibling
percentage of children with a birth interval of less than 24 months
father's occupational status
general condition of the house
ownership of the home
source of water
use of boiled water for household consumption
type of household sewage disposal
condition of toilet or latrine

source: case-control study of childhood deaths in Villa Cochabamba/Montero, 1993

COST ANALYSIS

Estimation of Program Costs

The Villa Cochabamaba/Montero financial data for FYs 1990, 1991, and 1992 have been analyzed. From March, 1992, until February, 1993, total recurring program costs were calculated to be $78,862. These include allowances for vehicle and building depreciation and all other identifiable expenses except for the cost of 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 of that income have been included. Identifiable costs borne by the Ministry of Health are included as well. Further detailed information is obtainable in Appendix V.

A breakdown of these expenses is shown in Table IX.18. Fifty-nine percent of the total recurring costs in FY 1992 were for personnel and 19% for supplies, while administration, transportation, and infrastructure each accounted for less than 10% of the recurring expenses (see Figure XI.3).

The MOH did not provide any salary support for the Villa Cochabamba staff, but did provide vaccines and supplies. We estimate the value of this contribution to be approximately $2,000 in FY 1992.

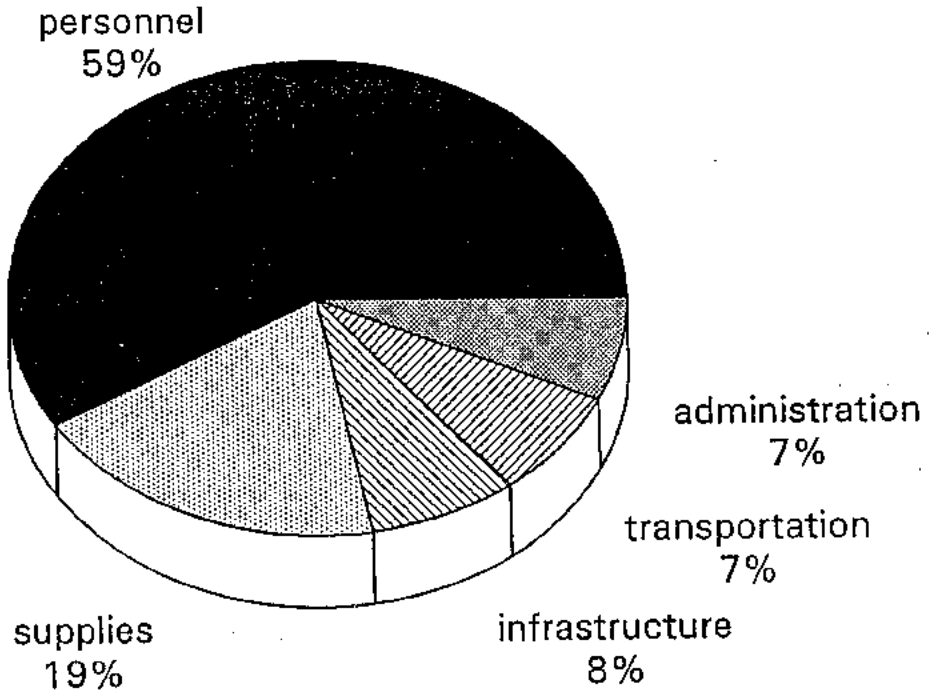
Table XI.18.

Total Estimated Recurring Costs for the Villa Cochabamba/ Montero Health Program, March 1, 1992 - February 28, 1993*

		percentage of the total
personnel	$46,390	59%
supplies	$14,916	19%
administration (non-personnel)	$ 5,610	7%
transportation (including depreciation)	$ 5,842	7%
equipment and infrastructure maintenance (including depreciation)	$ 6,104	8%
Total	$78,862	100%

source: Villa Cochabamba/Montero and ARHC financial data
* does not include some donated supplies and equipment nor the costs of the La Paz and Lake Junaluska, NC, ARHC offices

Figure XI. 3.
Total Recurring Villa Cochabamba/ Montero Costs, FY 1992



Total Program Costs = $78,862

1992 FY: March, 1992 - February, 1993
source: Montero/ARHC financial records

Estimating the Cost of Program Components

On the basis of discussions with program staff, the following distribution of program effort has been estimated as shown in Table XI.19. The program staff estimate that approximately 15% of staff time and effort are dedicated to water and sanitation activities, 50% to child survival activities, and 35% to non-child survival primary care activities. Within the child survival portion of program activities, the percentage breakdown of various compenents is shown in column two of the Table XI.19. Since the cost analyses will be limited to the primary care portion of the program's activities (not including the water and sanitation activities), the breakdown of the program's primary care efforts is shown in the last column.

Table XI.19.

Estimate of Staff Time and Program Expense Devoted to Specific Program Functions, Villa Cochabamba/Montero Health Program, 1992

	% of total program effort	% of child survival effort	% of primary care effort
child survival activities	50%	100%	59%
immunizations		30%	17%
nutrition		25%	15%
ARI		5%	3%
diarrhea		15%	9%
home visits		20%	12%
HIS		5%	3%
other primary care activites	35%	-	41%
water and sanitation activities	15%	-	-
	100%	100%	100%

source: staff estimates

Assigning these percentages to the recurring program costs in Table XI.18 makes it possible to estimate the recurring cost for each program component. These estimates are shown in Table XI.20. These figures were obtained by applying the percentages of the program's primary care efforts to the various program functional categories shown in Table XI.18 according to the percentages given except for the value of vaccinations and supplies provided by the MOH. These were all placed in the vaccination category. Further details of this calculation are shown in Appendix V.

Table XI.20.

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

functional category	recurring cost
child survival activities	
vaccinations	$11,638
nutrition	$ 8,501
diarrhea	$ 5,100
acute respiratory infection	$ 1,701
home visitation	$ 6,803
health information system	$ 1,700
other primary care activities	$31,590
Total	$67,033

source: program financial reports

Estimating the Cost of Child Survival Activities

The per capita program cost for the child survival effort, when the beneficiaries are limited to children under five years of age, is $20.10. If women of childbearing age are considered as beneficiaries along with the children under five, the cost per beneficiary drops by over half to $8.81 (see Table XI.21).

Table XI.21.

Summary of Child Survival Costs for the Villa Cochabamba/Montero Health Program, FY 1992

total child survival cost	$35,443
number of children under 5	1,763
cost per child under 5 years of age	$ 20.10
number of children under 5 and women 15-44 years of age (1,763 + 1,209)	4,021
cost per child/woman beneficiary	$ 8.81

source: program financial reports and annual census

Estimating the Cost of Other Primary Care Services

The total cost of the non-child survival primary health care portion of the Villa Cochabamba/Montero Health Program is estimated to be $31,590. In Table XI.22, the number of other primary care services is shown by type. Overall, 12,639 services were provided, at an average cost of $1.29 per unit of service.

This is a heterogeneous grouping of activities, so the same relative value scale employed in the cost analysis for Carabuco is utilized here (see Chapter IX). 24,408 "units" of service were provided at an overall cost of $31,590, yielding a cost per unit of service of $1.29. Thus it is estimated that the cost of a patient consultation (2 units of value) is $2.58, of an injection, $1.29, and so on as shown in Table XI.22.

TABLE XI.22.

Number of Non-Child Survival Primary Care Services Provided and Their Estimated Costs in Villa Cochabamba, January - December, 1992

type of service provided	numbers of services provided	relative value	units provided	estimated cost of service
patient consultation	4,682	2	9,364	$ 2.58
injection	3,964	1	3,964	$ 1.29
IV fluid	0	1	0	$ -
minor wound care	236	1	236	$ 1.29
prenatal visit	646	1	646	$ 1.29
childbirth care	0	10	0	$ -
postpartum care	4	2	8	$ 2.58
treatment of TB case	37	100	3,700	$ 258.00
dental visit	220	4	880	$ 5.16
laboratory exam	2,760	2	5,520	$ 2.58
Totals	12,639		24,408	

estimation of cost of unit of service: $\frac{\$31,590}{24,408} = \$1.29$

source: monthly program and financial reports

The cost of providing non-child survival primary care services (for those over five years of age) is estimated in the following manner. There were 8,862 persons over five years of age in the Villa Cochabamba/Montero Health Area in 1992. Dividing the total cost of the primary health care component ($31,590) by 8,862 yields a per capita cost estimate of $3.56 per capita (see Table XI.23).

Table XI.23.

Summary of Total Recurring Other (Non-Child Survival) Primary Health Care Costs for Villa Cochabamba/Montero, FY 1992

total non-child survival primary health care program cost	$ 28,251
total number of persons over 5	8,862
program cost per person over 5	$ 3.56

source: program fiancial reports and annual census

Estimating the Total Recurring Program Costs Per Capita

Finally, the total overall cost of the program per beneficiary as shown in Table XI.24 is calculated to be $6.31. It should be noted that these costs do not fully represent what would be encountered if routine systematic home visitation were carried out in the entire program area since at the end of 1992 home visitation was underway in most but not all of the program area.

Table XI.24.

Summary of Total Recurring Program Costs
for Villa Cochabamba/Montero, FY 1992

total overall recurring program cost	$ 67,033
number of persons covered by the program	10,624
cost per program beneficiary	$ 6.31

source: program financial reports and annual census

Locally-Generated Income

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 the Villa Cochabamba/Montero Health Program for FYs 1990-1992 is shown in Table XI.25. As in the other two program areas, the sale of medicines is the leading source of local revenue. The total amount of locally-generated revenue is much greater for Villa Cochabamba/Montero than for the other two program areas. In FY 1992, for instance, locally generated revenue in Carabuco amounted to only $2,538 and in Mallco Rancho it was $6,898 compared to $15,457 for Villa Cochabamba/Montero. Although the Villa Cochabamba Health Area is the poorest section of the city of Montero, the availability of funds to pay for health services is greater here than in ARHC's other established program sites.

Locally-generated income accounts for 23% of annual recurring primary health care program costs ($15,457/$67,033). MOH support for the Villa Cochabamba/Montero Health Program is 2% of annual recurring primary health care program costs ($1,500/$67,033). Thus, at present, 25% of annual recurring primary care program costs are sustainable with locally-generated or Bolivian governmental sources.

Table XI.25.

Locally-Generated Funds for the Villa Cochabamba/Montero Health Program: Sources and Amounts, FYs 1990-1992

	year		
source	FY 1990	FY 1991	FY 1992
sale of medicines	$ 4,160	$ 6,613	$ 7,729
medical consultation	$ 1,560	$ 2,480	$ 2,628
lab services	$ 1,473	$ 2,342	$ 3,091
other services	$ 1,474	$ 2,343	$ 2,009
Totals	$ 8,667	$13,778	$15,457

source: Villa Cochabamba/Montero financial records

Conclusion

The Villa Cochabamba/Montero Health Program faces a different set of challenges from ARHC's two other established programs. Although the inhabitants in Villa Cochabamba/Montero are not as dispersed as in Carabuco, they are rarely at home and thus program staff find that maintaining regular contact with the families is especially challenging. Nevertheless, the home visitation program has become very strong. The most recent coverage rates for immunizations and growth monitoring in the Villa Cochabamba neighborhood show encouraging improvements compared to baseline rates. The postneonatal and 12-23 month mortality rates are very high and the neonatal mortality rate is very low compared to the two other health programs. Diarrhea and malnutrition are the leading causes of childhood death. The primary care program in Villa Cochabamba/Montero cost just over $6 per capita in 1992. One-quarter of total recurring program expenses are sustainable with locally-generated or Bolivian governmental sources.

CHAPTER XII. CONCLUSIONS

The census-based, impact-oriented approach to health improvement in defined communities represents an important conceptual advance regarding the provision of preventive and curative health services. Enabling and motivating health programs to focus on long-term health improvement while at the same time maintaining their capacity to respond to the acute day-to-day demands for services is a critical need of health programs around the world, both in developing as well as in developed countries. The CBIO approach provides a means for doing this.

While the concepts of the CBIO approach are simple and straightforward, their application is certainly not. Andean Rural Health Care's initial experience with the application of the CBIO approach has shown that a committed and energetic staff is required along with strong program leadership. Once experience has been achieved with the approach, the staff become increasingly committed to it because they recognize its inherent utility and its advantages over more traditional approaches.

The CBIO approach as ARHC is applying it has been viewed by some as too complex and too expensive for more widespread application. In response to these criticisms, it should be pointed out that ARHC's programs have made considerable progress in streamlining the health information system and the time required by the staff in preparing reports. As experience with the approach grows, additional streamlining will occur which will make the approach less complex without signficantly reducing its effectiveness. The fact that all five of ARHC's programs in Bolivia, with their own separate staffs, are finding the CBIO approach highly motivating, professionally satisfying, and effective is strong evidence that the complexity involved is not overly cumbersome.

The costs of operating the CBIO approach in ARHC's hands are still somewhat expensive relative to the current financial capacity that Bolivia and similar developing countries now possess. Several ways in which the costs can be reduced while

minimizing the effects on program quality have been suggested. Applying the CBIO approach in larger populations so as to achieve economies of scale is one possibility. Relying more on lower level paid staff than is currently the case would also lower costs. This would require a heavier reliance on locally-trained part-time paid village health workers to carry out most of the home visitation. Finally, more highly-targeted home visitation would reduce the total number of home visits required to carry out the CBIO approach, thereby also reducing costs.

ARHC recognizes that its field programs have not engendered among the communities themselves the sense of "ownership" and responsibility which is required if long-term sustainability based primarily on locally-generated resources is to be achieved. The Bolivian Ministry of Health's financial capacity to totally support local health services for impoverished populations will not be adequate in the near future, so alternatives will have to be developed to ensure the provision of effective basic health services. Adjusting ARHC's field programs so that they are sustainable in the long-run with resources available within the country from the Ministry of Health and from the people themselves represents the immediate challenge. At the same time, the communities themselves will have to accept increasing responsibility for and "ownership" of the programs. It will be important to learn how this can be done in a way which maintains quality and a technical focus on impact.

ARHC staff are convinced that the CBIO approach deserves more widespread application. They are convinced that this approach is a highly effective way to build strong relationships between the community and the health program. The approach achieves a high coverage of child survival interventions, and there is strong evidence that the programs are improving child survival.

The difficulty of initiating this approach was called to the attention of field staff in Ancoraimes and in Sipe Sipe, where ARHC initiated work during the past year. Staff from nearby established programs in Carabuco and Mallco Rancho were transferred to these new sites to provide leadership for the implementation of the CBIO approach. They found once again that this approach must be slowly cultivated and cannot be pushed too hard when community resistance is encountered. In the long run, however, results will be far superior even if the startup is slow.

There is unanimous support among ARHC field staff for the concept of a strong linkage between the child survival effort and ongoing primary (and also referral) care. Involvement in the one strengthens the effectiveness of the other. There is also unanimous support for the concept of integrating ARHC health activities with MOH activities in a given health area. Because of

the professional leadership and additional financial support which ARHC has been able to provide, it has greatly strengthened the MOH effort in each area. Infrastructure, medicines, and supplies as well as salary support provided by the MOH have all made a strong contribution to each of the programs.

Concentrating on child survival and primary health care while limiting involvement in other community development activities appears to the ARHC staff in Bolivia the best way to maintain the quality and impact of its work. Although there have been a number of efforts over the years to become more actively involved in other types of development activities, the staff are realizing that each area of work requires a high degree of specialization and competence that a small organization like ARHC is unable to provide at this time.

The effective use of volunteers has been a notable shortcoming in ARHC's programs, particularly in Carabuco and in Mallco Rancho. New strategies will need to be tried if progress is to be made in this area.

In all ARHC's established program sites, relations with the communities appear to be excellent. Working with families on a direct one-to-one basis appears to be effective in building community trust and confidence.

ARHC's experience with the application of the CBIO approach has been sufficiently positive that the approach deserves a broader application under carefully evaluated conditions. There are two general strategies for this. One would be to continue to expand ARHC's programs in geographically adjacent areas while continuing to closely monitor the results. The CBIO approach could be applied throughout the entire health districts where ARHC's programs are located. Obviously, this approach would involve strong leadership and management responsiblity from ARHC itself.

A second strategy would be to try the CBIO approach in entirely different geographic settings without any direct involvement from ARHC itself, except perhaps through limited technical assistance. This could be carried out elsewhere in Bolivia or in another country. In any case, carefully designed quasi-experimental designs would be required along with independent external evaluators (presumably university-based) if the effectiveness of the CBIO approach is to be rigorously evaluated.

There is clearly a need now to focus on approaches to child survival in developing countries which have demonstrated long-term impacts on child mortality and are sustainable with local resources. More than a decade ago, Gwatkin, Wilcox, and Wray (1980) called for field experimentation in populations of

100,000-500,000 people of primary care programs in which alternative approaches are compared "not simply in terms of nutrition and health outcomes, but more broadly, to incorporate equity and community participation considerations" (p. 33). The CBIO approach deserves this type of rigorous evaluation because of the demonstrated potential which it has for lowering infant and childhood mortality rates and because of the potential it has for long-term sustainability. The evidence for the long-term sustainability of the CBIO approach is currently limited. However, since this approach involves a commitment to responding to acute care needs and quality curative services, the potential exists for stronger local community financial and political support than currently exists. The more selective, GOBI approach to primary care does not carry this same potential.

The recently released report from the panel of the National Academy of Sciences reviewing the effects of child survival and general health programs on mortality in Sub-Saharan Africa concluded that "there is a desperate need for more research on the effectiveness of integrated programs and individual interventions in a wider range of environments" (Ewbank and Gribble, 1993, p. 150). The panel goes on to recommend, among other things, the following:

1. declines in infant and child mortality rates should remain the primary indicator of the effectiveness of child health interventions;

2. more emphasis should be given to age-specific mortality rates;

3. there is a need for more evaluations of various packages of interventions;

4. more empirical evaluation of program effects are needed in order to test predictions from models;

5. there is a need for more long-term studies that include regular collection of vital statistics and routine surveys of service utilization and quality of care;

6. evaluation studies should include detailed measurement of both the coverage and the promptness of services, as well as compliance with program protocols (pp. 150-153).

The CBIO approach lends itself to this type of rigorous field evaluation. The National Academy of Sciences panel is, in effect, supporting the argument put forth by Gwatkin, Wilcox, and Wray in 1980 that continued political and financial support for child survival will require firm scientific evidence that the programs being implemented are actually producing the anticipated results. In their closing comments to their monograph "Can Health and Nutrition Interventions Make a Difference?," Gwatkin, Wilcox, and Wray make the following plea:

> What is needed is not sophisticated demographic research, but rather, simple program-management information systems that can be administered by program operators at all levels and that can provide them quickly with the information about their field operations which they need in order to asses their own effectiveness. Also important are the evaluation studies necessary to document the impact which large-scale, ongoing primary care programs are having on mortality--documentation that will be needed on that inevitable forthcoming day when policy leaders begin to insist on firm evidence that the funds they have allocated to primary care have actually produced the promised results (p. 33).

In the introduction to a recent seminar report sponsored by US AID entitled "Child Health Priorities for the 1990s," the editor, Dr. Ken Hill, makes the following summary statement:

> Priorities for the rest of the decade include consolidating the gains that have already been achieved, that is, continuing with the main components of the 1980s interventions. At the same time, it is necessary to develop research activities into better, or more effective, or broader programs .... As programs become broader, they need to become more context-specific. A critical issue is maintaining financial and other support for child survival programs. The field of public health needs to do a better advocacy job in order to maintain or improve funding levels. The ultimate objective is universal access to a system of primary health care that offers adequate preventive and curative services, plus a referral system. In practice,

> political appeal drives funding allocation, and high visibility "magic bullet" programs attract funding easily, but do not necessarily use it efficiently. Part of the advocay job that is needed for the lower profile primary health care approach depends on demonstrating impact, which in turn requires not only technological fixes but also behavioral and social changes. The challenge for the 1990s is to make sure not only that children survive, but also to enable them to achieve their full potential (Hill, 1992, p. 15).

Given the ability of the CBIO approach to address the issues outlined by Hill above, and given the progress which ARHC has made in developing this approach, further development of this particular model of child survival and primary care services holds great potential for strengthening the child survival movement and of eventually reaching the goal of "Health for All."

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STAFF OF THE VILLA COCHABAMBA/MONTERO HEALTH PROGRAM 1988-1992

Staff of the Villa Cochabamba Health Program, 1988-1992

1988

Dr. Dardo Chavez- Director (part-time)
Ms. Juana Zeballos- graduate nurse
Mr. Pedro Simone- statistician (part-time)

1989

Dr. Dardo Chavez- Director
Dr. Ramiro Bravo- physician
Ms. Juana Ceballos- graduate nurse
Mr. Pedro Simone- statistician (part-time)
Ms. Gloria Suarez- administrator
Ms. Corina Echeverría- auxiliary nurse
Mr. Edwin Claure- groundskeeper

1990

Dr. Dardo Chavez- Director
Dr. Ramiro Bravo- physician
Dr. Javier Baldomar- physician
Ms. Mitma de Chavez- graduate nurse
Ms. Teresa Ruíz- health promotor
Mr. Carlos Chavez- groundskeeper

1991

Dr. Dardo Chavez- Director
Dr. Javier Baldomar- physician
Dr. Walter Munoz- physician
Ms. Mitma de Chave- graduate nurse
Mr. Pedro Simone- statistician
Ms. Mirta Sanjines- administrator
Mr. Juan Carlos Guarabia- health technician
Mr. Edwin Claure- laboratory auxiliary
Ms. Sara Mercado- auxiliary nurse
Ms. Marta Heredia- auxiliary nurse
Ms. Teresa Ruíz- health promotor
Ms. Maria Esther Claros- health promotor
Mr. Carlos Chavez- groundskeeper

CBIO APPROACH Appendix II.

Staff of the Villa Cochabamba Health Program, 1988-1992
(continued)

1992

Dr. Dardo Chavez- Director
Dr. Javier Baldomar- physician
Dr. Maria Bravo- physician
Ms. Mitma Sanjines- administrator
Mr. Pedro Simone- statistician
Mr. Juan Carlos Guarabia- health technician
Ms. Olympia Maldonado- auxiliary nurse
Ms. Marta Heredia- auxiliary nurse
Ms. Inez Herbas- auxiliary nurse
Ms. Ester Andia- auxiliary nurse
Ms. Armanda Vargas- auxiliary nurse
Ms. Teresa Ruíz- health promotor
Ms. Silvia Pantoja- health promotor
Ms. Jacquelin Rosado- accountant (part-time)
Ms. Ana Maria Sosa- secretary

CASE-CONTROL STUDY OF INFANT AND CHILDHOOD DEATHS IN VILLA COCHABAMBA/MONTERO, BOLIVIA

In May, 1993, family health folders were reviewed for those infants and children under five years of age who had died in 1992 and whose death had been registered in the Villa Cochabamba health information system. In contrast to the Carabuco case-control study, this study did include children older than one year of age since we knew that children in Montero beyond one year of age were also at significant risk of death. Twenty-five infants and children under five were included, and their ages at death ranged from three days to 32 months.

For each death identified, two controls were selected. A child qualified as a control if he or she lived in a nearby house and was born within six months (either before or after) of the child who died. The family folder for the house closest to the house of the child who died was first examined for the presence of a suitable control. If none was found, then the family folder for the next closest house was examined until a suitable control was found. Two control children were selected for each death. For the control children, information was abstracted relevant for that child up until the age at which the comparison child had died.

Information was abstracted from the family health folder for each child who died and for each of the two control children. The attached questionnaire was used for this purpose. This information was then computerized using EPI INFO software.

RESULTS

There were 25 infant and child deaths and 50 controls in this study. There was no significant difference between the two groups in terms of sex distribution. The causes of death for the 25 cases are shown in Table 1. Over half of the deaths were associated with diarrhea, and one-third of the deaths had malnutrition listed as one of the causes of death. Only 16% of the deaths were associated with respiratory causes. The two deaths due to prematurity were among twins, both of whom died at three days of age.

Table 1
Causes of Death Among Infants and Children in Montero Included in the Case-Control Study

cause of death	number	percent
diarrhea	7	28%
diarrhea and malnutrition	6	24%
malnutrition	3	12%
pneumonia	3	12%
fever (unspecified)	2	8%
prematurity	2	8%
diarrhea and pneumonia	1	4%
poisoning	1	4%
TOTAL	25	100%

Table 2 shows the ages at death for the 25 cases included in the study. The most frequent age category shown is from 12-23 months of age. Only 12 percent of the deaths occurred during the first month of life.

Table 2
Ages at Death of the 25 Cases Included in the Montero Case Control Study

Age	Number of Children	Percentage
less than 1 week	2	8 %
1-4 weeks	1	4 %
1-2 months	3	12 %
3-5 months	2	8 %
6-11 months	4	16 %
12-23 months	*10*	*40 %*
24-35 months	*3*	*12 %*
TOTAL	25	100 %

APPENDIX V. ADDITIONAL FINANCIAL INFORMATION

We are estimating the cost of a single dose of vaccine to be $0.14, based on data provided by UNICEF (Joseph, 1985), on data from The Gambia (Robertson et al, 1992), and on data for Peru (Pavone et al, 1993, p.11).

None of the costs of program operations are really dependent on foreign exchange except perphaps some of the supplies purchased or parts for vehicle repairs. These items account for less than 10% of the costs.

"Travel costs" are listed as separate from "transportation costs." Travel costs refer to expenses associated with staff travelling within the country or between the program area and La Paz when using transportation other than program vehicles. For instance, there is an annual ARHC national meeting which involves air travel to a central location. Transportation costs, on the other hand, include the costs of operating the program vehicles including repairs, gasoline, depreciation, and so forth.

A Methodology for Estimating the Cost of Specific Program Components for Carabuco

The distribution of costs in 1992 accross functional categories was carried out using the following methodology. An estimate of staff time spent in various activities was carried out by asking the Carabuco Health Program staff to estimate the amount of time they spent in the following categories:

child survival activities vs. other primary care activities (total = 100%)

type of child survival activity (total = 100%)
- immunizations
- nutrition
- diarrhea control
- ARI (acute respiratory infection) control
- home visitation
- HIS (health information system)

When the field staff was asked as a group to estimate the percent of their time devoted to these activities, they agreed on the following as shown in Table 1.

Table 1.

Carabuco Staff Estimates of Effort by Functional Category

	% of total effort	% of child survival effort
other primary care	20%	--
child survival activities	80%	100%
immunizations		20%
nutrition		25%
diarrheal control		15%
ARI control		15%
home visitation		20%
HIS		5%

source: staff estimates

Apart from this, the 11 community-based auxiliary nurses were asked how many days a month they devoted to the following activities:

home visitation
immunizations
growth monitoring and nutrition
treatment of diarrheal and ARI cases
maternal health and prenatal care
treatment of TB patients
treatment of other patients
training and continuing education
preparing reports
training of volunteers
cleanup of the health post
meeting with volunteers

The total number of days estimated per month by each community auxiliary for each category was calculated and then summed for the entire group. The time for each category was distributed across the functional categories as shown in Table 2. This distribution across functional categories is an estimate based on a general knowledge of program operations.