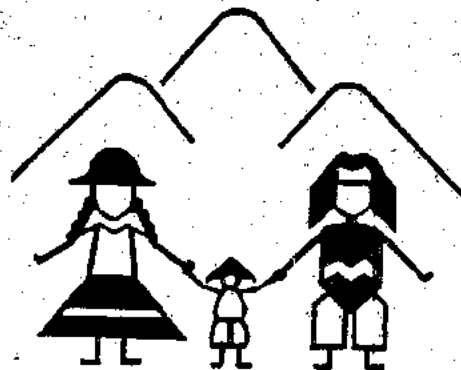


**The Census-Based, Impact-Oriented Approach
and Its Application by Andean Rural Health Care
in Bolivia, South America**

Volume I

**The Census-Based, Impact-Oriented Approach
and a Summary of the Results Achieved
by Andean Rural Health Care**



THE CENSUS-BASED, IMPACT-ORIENTED APPROACH
AND ITS APPLICATION BY ANDEAN RURAL HEALTH CARE
IN BOLIVIA, SOUTH AMERICA

Final Report

to the United States Agency for International Development
Private Voluntary Organization Child Survival Program
Office of Private and Voluntary Cooperation
Bureau for Food and Humanitarian Assistance

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EXECUTIVE SUMMARY

As the global child survival movement approaches the year 2000, the year of "Health for All," it is an appropriate moment to consider new ideas and approaches which build on the strengths of the selective primary care approach (otherwise known as GOBI or GOBI-FF*) and which offer promise for improved effectiveness. Toward this end, the AID PVO Child Survival Program has made possible an evaluation of the census-based, impact-oriented (CBIO) approach to child survival which has been under development in Bolivia by Andean Rural Health Care (ARHC) since 1987. This document describes the principles of the CBIO approach, the manner in which this approach has been implemented by ARHC, and the results achieved.

The CBIO approach involves determining the health priorities of a community or set of communities from an epidemiological perspective as well as from the perspective of the community members themselves. Based on available resources, a program is developed which addresses these health priorities and which evaluates the impact of program activities on the health status of the community. The approach is "census-based" because it involves community censuses to identify all members of the community and the most frequent, serious preventable or treatable health problems in the community. It is "impact-oriented" because the overarching goal of this approach is to improve health and to show that health has been improved.

In the Bolivian settings where ARHC has its field programs, home visitation has become an integral part of the CBIO approach. Through a process known as routine systematic home visitation, all homes in the program area are visited on a regular basis, usually at least every six months. Homes with high-risk individuals are targeted for more frequent visitation. Through home visitation, censuses are updated and vital events (births, deaths, and migrations) along with pregnancies are registered. Child survival interventions and basic primary care services are also provided at the time of a home visit if indicated.

The CBIO approach provides another unique advantage, that of being able to measure mortality rates in the communities being

* GOBI- growth monitoring, oral rehydration therapy for diarrhea, breast feeding, and immunizations.

FF- family planning, food supplementation

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served by the program. This approach also provides the opportunity to achieve high levels of coverage of child survival services such as immunizations, ORT use, growth monitoring, and treatment of ARI since all children are identified through the census and can be reached, if necessary, through home visitation. Furthermore, the CBIO approach combines basic primary care services for the entire population with child survival interventions, thereby leading to strong local political support for the program and a greater potential for longer-term sustainability.

Previously, home visitation for provision of child survival interventions and for registration of vital events has not been given serious consideration because of the presumed complexity and the relatively high costs of the endeavor. Given the fact that the evidence documenting improvement in child survival in typical field settings using the more traditional selective, GOBI approach remains limited, it is now appropriate to consider alternatives.

The field staff of ARHC have found the CBIO approach to be workable and highly motivating. They have found this approach to give them a most useful conceptual framework for addressing the health needs of the entire community and for evaluating the results of their efforts.

The full document contains a detailed analysis of the CBIO approach at three established ARHC program sites in Bolivia which serve a total of 27,500 people. These sites differ substantially in culture, ecology, disease patterns, and urban/rural dimension. In each of these three program areas, the highest mortality rates are found in children under two years of age. Neonatal mortality and mortality from respiratory causes are relatively high in ARHC's Altiplano program in Carabuco (at 13,000 feet altitude). In the tropical lowland periurban program of Villa Cochabamba/Montero, diarrheal diseases and malnutrition are far and away the leading causes of death. Neonatal mortality there is quite low relative to postneonatal mortality. Second year death rates are as high as first year rates.

Case-control studies of infant and child deaths controlling for ecological zone and age show different risk factors for each program area. In Carabuco, weight loss, having fewer siblings, and having an unmarried mother were associated with a greater risk of death. In Mallico Rancho, lack of growth monitoring and immunizations was associated with a greater risk of death. In Villa Cochabamba/Montero, evidence of growth faltering, having a mother with no formal education, and having a mother who spoke no Spanish were associated with an increased risk of death.

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Having this type of information makes it possible for local programs to more carefully target their activities for maximal mortality impact.

Locally perceived health priorities in all three program areas include the expansion of primary health care services for all age groups as well as improvements in water and sanitation.

Coverage rates of child survival services are quite high in all three program areas. Complete immunization coverage, for instance, among children 12-23 months of age is above 73% for all three program areas and reaches 85% in Carabuco. The percentage of children who have had four or more growth monitorings during the previous year is 89% for Carabuco and 56% for Mallco Rancho. The percentage of mothers who know how to use oral rehydration therapy (ORT), who have used ORT, or who used it for their child during a recent case of diarrhea is around 50% in Carabuco and Mallco Rancho.

An analysis of infant and childhood mortality data indicate that the probability of death between birth and five years of age in ARHC's established program areas is 46% less than in similar adjacent areas where this approach is just beginning to be implemented and 31% less than in similar areas in Bolivia where this approach has not been applied.

Current estimates are that the entire program can be provided for an annual cost of approximately \$9 per capita on average. The non-child survival primary care component costs on average approximately \$3 per capita per year. The average cost of the child survival component of the overall program is \$44 per child per year. While the child survival component is relatively expensive, our findings show that this approach is effective in achieving high levels of coverage of child survival interventions AND in demonstrating a favorable impact on actual child survival to age five. The cost could be lowered by carefully reducing the numbers of planned home visits, by substituting lower level workers for some higher level workers, and by relying more heavily on volunteers. More intensive efforts to foster local income generation would further reduce external costs.

The CBIO approach has made strong progress in financial sustainability in one of its three established program sites where the program beneficiaries have more financial resources. In terms of other aspects of sustainability, such as local community political sustainability and sustainability of professional resources required for program leadership, the CBIO approach is definitely sustainable.

Individual elements of the CBIO approach could be applied in

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other settings in a less intensive way than has been the case at ARHC program sites. Possibilities for a more "streamlined" CBIO approach include selecting a small area for more intensive home visitation to identify the major causes of death as well as to identify risk factors for death. These findings could then be applied on a broader geographic basis (such as an entire health district), particularly with the assistance of highly targeted home visitation throughout the district.

Routine systematic home visitation and more frequent visitation to high-risk individuals are an integral part of the CBIO approach and service delivery. A more cost-effective approach might be to apply home visitation throughout an entire large program area but in a less intensive and a more highly targeted fashion. Thus, all homes would be visited, but less frequently than in ARHC's programs. Homes with high-risk individuals would be visited, but the definition of "high-risk" would be more narrowly defined.

The CBIO approach deserves application in other settings and at varying levels of intensity so that its efficacy and cost can be more rigorously evaluated. The experience with this approach so far is sufficiently positive to justify encouraging its application by other health programs under carefully evaluated conditions.

This approach has the potential of combining the best elements of the selective primary health care movement (GOBI) and the comprehensive primary care movement (Alma Ata) into an affordable, effective, and sustainable program for developing countries. The capacity of the CBIO approach to measure mortality changes gives it the unique advantage of providing much needed mortality impact assessments for policy makers.

The CBIO approach incorporates strategies for child survival program evaluation which have recently been recommended by the Working Group on Effects of Child Survival and General Health Programs on Mortality (Ewbank and Gribble, 1993, p. 3). These include:

- a. judging the effectiveness of child survival interventions on declines in age-specific mortality rates;
- b. assessing packages of interventions rather than single interventions; and
- c. monitoring long-term mortality trends through the regular collection of vital events.

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AID and other international health organizations should provide support for the further development and evaluation of the CBIO approach to health care delivery in developing countries.

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VOLUME I.

THE CENSUS-BASED, IMPACT-ORIENTED APPROACH
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BY ANDEAN RURAL HEALTH CARE

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PREFACE

An earlier version of this document was prepared for the Expert Review Panel which was convened to evaluate the census-based, impact-oriented approach to child survival and the application of this approach by Andean Rural Health Care (ARHC) as a potential useful approach to child survival activities in developing countries. The Expert Review Panel's report about the merits of the CBIO approach is available separately.

This report contains updated information on costs as well as case-control data which were not included in earlier versions.

Everyone associated with ARHC is forever indebted to Dr. John Wyon, Senior Lecturer Emeritus at the Harvard University School of Public Health, for his long-standing interest in ARHC and for his patient sharing of ideas which are now institutionalized at ARHC as the CBIO approach. John's ideas have emerged over the course of a life dedicated to attempting to understand how health programs can effectively serve the needs of people living in economically disadvantaged areas of the world.

The contents of this report reflect the dedication and commitment of the field staff of Andean Rural Health Care in Bolivia, a truly outstanding group who are improving the lives of their fellow Bolivians. They shared freely with me their thoughts and opinions about their work. For this we are grateful.

Many friends and colleagues provided invaluable assistance at every stage of this project. The field staff at each of the program sites in Bolivia were indispensable in providing access to basic data and in interpretation of the data. The staff at the ARHC national office in La Paz including Mr. Nathan Robison, ARHC National Director, were most helpful in coordinating my work in Bolivia for this project. Mr. Joaquin Flores, statistical consultant in Bolivia, provided valuable assistance in data collection and computer data input. My son, Baker Perry, assisted me with the collection of data for the case-control studies included in this report. Dr. Scott Hamilton of the Department of Biostatistics at the University of North Carolina School of Public Health provided critical comments on an earlier version of the mortality analysis.

PREFACE

A number of people provided helpful comments and suggestions regarding the methodology and regarding earlier drafts of this document. Dr. John Wyon provided valuable assistance with Chapter II, with the death analysis, and with general editorial comments. Dr. David Parker of UNICEF provided helpful suggestions regarding the overall structure and content of the report as well as made suggestions for the financial analyses. Dr. Annemarie Wouters of the Johns Hopkins University School of Hygiene and Public Health assisted me with the development of the cost analysis methodology. She also carried out a very careful review of an earlier version of the cost analyses. Mr. David Shanklin, Andean Rural Health Care's Executive Director, provided helpful editorial comments. Ms. Sara Espada, ARHC Program Associate, was invaluable with the final editing. All the members of the Expert Review Panel, in their group discussions about the document at various stages of its evolution, helped me to fashion it into a form which I hope will be both provocative and useful. Of course, I must take final responsibility for the contents of this report.

Perhaps ARHC's experience with the CBIO approach will be a small but significant step in encouraging critical thinking by policy-makers, donor agencies, health program managers, and community members themselves regarding the most effective use of the limited resources which are available for health care and health improvement.

Finally, I would like to express my appreciation to the PVO Child Survival Program of the United States Agency for International Development for its support of ARHC's field programs and for support which has made this analysis possible.

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CHAPTER I. THE CHILD SURVIVAL "REVOLUTION" IN CONTEXT

The child survival movement is now completing its first decade and the year 2000, the year of "Health for All," is rapidly approaching. Since the early 1980s, most international health donors, including the U.S. Agency for International Development, have been strong supporters of the selective primary health approach, sometimes referred to as GOBI (growth monitoring, oral rehydration, breast feeding, and immunizations) or GOBI-FF if family planning and supplemental feeding are included. This selective approach, advocated initially by Walsh and Warren (1979), was adopted by most international donor agencies rather than the comprehensive primary health care approach advocated by the 1978 Alma Ata Conference sponsored by the World Health Organization (WHO) and UNICEF (WHO/UNICEF, 1978). The focusing of donor effort on the GOBI approach to child survival heralded the beginning of the child survival "revolution," as it is referred to by UNICEF.

Walsh and Warren (1979), on the basis of a review of the literature at that time, estimated the more comprehensive primary health care approach to cost \$2.00 per capita annually while the selective primary health care approach could be provided for \$0.25. The cost per infant/child death averted was estimated to be \$700 for the more comprehensive primary care compared to \$225 for the selective primary care approach.

The greater cost of the more comprehensive primary care approach together with concern about whether this approach would actually lower mortality from the major causes of childhood death around the world led to strong support for the selective, GOBI approach. The selective, GOBI approach was not without its critics, however. Gish (1982), for instance, expressed concern that the selective, GOBI approach would not address perceived needs of program recipients nor would it emphasize continuity and cultural considerations in the provision of health care services. Others have criticized the selective, GOBI approach for not enhancing local capacity to provide primary health care services.

The application of "proven" low-cost child survival

technologies, especially the "twin engines" of oral rehydration therapy (ORT) and immunizations (as AID called them), was seen in the mid-1980s as having the greatest hope of saving the most lives at the lowest cost. This conclusion led to an emphasis on delivering as many vaccinations and ORT packets as possible to needy populations with less concern to identify and reach the highest-risk groups. Similarly, program mortality impact evaluations were not viewed as necessary since these were "proven" technologies and impact could legitimately be inferred or assumed from the provision of immunizations and ORT packets.

Although the growth in the number of child survival services provided around the world during the past decade is truly remarkable, there is little evidence that these efforts themselves have actually improved child survival in routine, ordinary field situations. The data upon which claims of impact are made depend on major assumptions about efficacy and coverage which may be unrealistic in many field situations.

In the 1970s and early 1980s, a number of field studies were published demonstrating impacts on infant and childhood mortality as a result of low-cost child survival interventions (Berggren, et al, 1981; Gwatkin, Wilcox and Wray, 1980; Kielman et al, 1983; Taylor, et al, 1983). During the past decade, however, only limited results have been published about the impact of the GOBI-FF approach on actual child survival in routine field settings. There have been a number of community field trials assessing the impact on child mortality of Vitamin A supplementation (Sommer, et al, 1986; Rahmathullah, et al, 1990; West, et al, 1991; Daulaire, et al, 1992) and antibiotic treatment of acute respiratory infection (Sazawal and Black, 1992; Faveau, et al, 1992; Khan, et al, 1990; Datta, et al, 1987; Bang, et al, 1990; Pandey, et al, 1989; Mtango and Nevians, 1989; Pandey et al, 1991). These studies are clinical field trials of closely supervised and monitored single interventions and are therefore not representative of "routine" field situations.

Even though in general there is no question that the GOBI child survival interventions are effective in closely supervised field trials, there is a growing body of evidence which questions the actual impact of these interventions as applied in more typical field situations. For instance, Gerein (1988) found no evidence from a review of the literature that growth monitoring improves nutrition, much less mortality. The Working Group on Effects of Child Survival and General Health Programs on Mortality has just recently reached an identical conclusion (Ewbank and Gribble, 1993, p. 122). A UNICEF supported community-based nutrition program in Iringa, Tanzania, did improve the nutritional status of children in the program area but no impact on mortality was demonstrated (Joint WHO/UNICEF Nutrition Support Programme, 1988). Other experiences with nutrition interventions have not been as promising (Berg, 1991).

A recent review of the past decade's experience at the Bangladesh field site of the International Centre for Diarrhoeal Disease Research (ICDDR) has revealed that childhood mortality from diarrheal disease has not declined in spite of the promotion of ORT (Fauveau, et al, 1992). These same authors (Fauveau, et al, 1991) had previously shown that over half of the diarrheal-associated mortality among children 1-4 at Matlab, Bangladesh, was caused by persistent rather than acute diarrhea and not amenable to resolution with oral rehydration therapy. Acute non-watery diarrhea (also not readily resolved with ORT) was associated with 16% of the deaths among children in this age group as well. Even more surprising, the provision of ORT did not improve the mortality from acute watery diarrhea in this field setting. There have been no evaluations of the mortality impact of ORT in Sub-Saharan Africa (Ewbank and Gribble, 1993, 9. 81).

The effectiveness of childhood immunizations has not been questioned.* What is now being questioned, however, is the epidemiologic relevance of placing priority on this child survival intervention when the diseases for which the vaccines are designed to prevent may not be leading causes of child death in specific populations (Martin, et al, 1992).

Acute respiratory infection, a leading cause of death in children around the world, was not included in the selective approach of GOBI. Walsh and Warren (1979) had placed respiratory infections in the medium priority rather than high priority group because no effective control then existed. There has been a notable delay in the inclusion of ARI treatment as a priority within the selective approach to child survival although this has been changing recently as a result of the controlled clinical trials cited above and other epidemiologic research.

Finally, there has been a growing recognition that in many areas of the world a high percentage of childhood deaths occur during the first three months of life from causes such as prematurity and low birth weight which the GOBI approach could not be expected to affect (Henry, et al, 1990; Costell, 1988).

In addition to these concerns about the child survival strategy of the 1980s, Mosley and Becker (1991) argue that infants and children in developing countries are typically afflicted with multiple disease conditions concurrently, as well as sequentially. Successfully treating one episode of an illness such as acute, watery diarrhea leaves the child at risk for another episode of diarrhea or another type of illness. Furthermore, treating the overt symptom, such as diarrhea, with a

* see Ewbank and Gribble (1993, pp. 26-72) for a recent review of the effectiveness of immunizations in Africa.

highly-focused technical intervention, such as ORT, may in fact be treating only the tip of the iceberg of the problem. The child's underlying nutritional status along with the level of environmental exposure to pathogens may be far more powerful determinants of long-term survival from diarrheal disease than the provision of ORT. Thus, overall improvement in child survival is not assured by a highly technical intervention which does not address the child's complex biological, nutritional, and socioeconomic milieu (Mosley and Chen, 1984).

Reports of longitudinal field programs assessing overall child mortality impact are surprisingly few in view of the importance of this issue for the health of millions of children around the world. I have been able to identify only a small number of programs which have recently attempted to assess and report the impact of their overall impact on child survival.

The Matlab, Bangladesh, program of the International Centre for Diarrhoeal Disease Research reported an approximately 10% reduction in childhood mortality between 1979 and 1981 and a further 32% reduction between 1981 and 1987 as a result of controlled maternal and child health interventions (Chen, et al, 1983; Fauveau, et al, 1990). There is limited published information currently about the Jamshed Comprehensive Rural Health Project in Jamshed, India, but a monograph describing this project is soon to be released. The infant mortality rate has apparently been gradually reduced there over more than a decade from 120 per 1,000 livebirths to the low 20s through simple preventive and curative services provided mostly by low-caste and illiterate women selected by the villages (Arole and Arole, in press; Arole, 1987).

Several programs in Africa have reported substantial declines in child mortality rates following the introduction of relatively comprehensive primary care and child survival services. In Mlomp, Senegal, the percentage of children dying before the age of five fell from 37% to 8% over a 15 year period following the introduction of basic health services (Pison, et al, 1993). There was no improvement in the socioeconomic conditions of the area during this period. In four villages in the West-Kiang district of The Gambia the percentage of children dying before the age of five fell from 49% to 11% over several decades as a result of primary care and child survival activities (Lamb, et al, 1984). In Niakar, Senegal, the percentage of children dying before the age of five fell from 50% to 16% following the introduction of child survival and primary care services (Ewbank and Gribble, 1993, p. 136). It is interesting to note that all of these programs demonstrating improvements in child survival provided relatively comprehensive primary care services along with specific child survival interventions.

Finally, it should be noted that a number of studies have

assessed the quality of implementation of child survival activities in typical field situations around the world. These studies have raised serious concerns about the effectiveness of the interventions because of the manner in which they are being provided (Nicholas, et al, 1991).

For all these reasons, there is justifiable concern about whether the investments currently being made in the global child survival movement are actually improving child survival. Ewbank and Gribble (1993), for instance, make the following statement after an exhaustive review of the African child survival experience:

...we cannot make strong statements about the overall effectiveness of health programs in Africa... Our first and most important finding is that many of the central elements of most national health programs in Africa have never been evaluated in terms of their likely impact on mortality... [T]here are very few studies of the effects of health centers and integrated programs on mortality... (pp. 146-7)

Therefore, the following questions are still highly relevant and critical to the well-being of economically disadvantaged people in developing countries: are we doing the right things and are we doing things right? Gadomski, et al (1990) argue that new approaches are needed. They state the following:

while the direct interventions [growth monitoring, breastfeeding promotion, ORT, immunizations, and so forth] have proved to be highly efficacious and cost-effective in more controlled clinical settings, their large-scale implementation in communities appears to be less so. It is instructive to examine what happens to the effectiveness of technologies when they must be delivered under diverse field conditions, on larger scales, and with fewer resources than in pilot or experimental settings. It appears that simply providing these technologies to developing countries is not the solution for 'health for all' because a variety of socio-political and economic factors modify the potential of these interventions (p. 235).

A final concern which is emerging after a decade of experience with the selective, GOBI approach to child survival is

that child survival programs per se on their own, whether carried out by Ministries of Health or by private organizations, are difficult to sustain. In the case of Bolivia, for instance, a recent report (Martin, et al. 1992) noted that donor organizations encouraged vertically-oriented services beginning in the mid-1980s, particularly for vaccination campaigns. Although this approach was helpful in achieving short-term gains, the Bolivian A.T.D. mission later came to the conclusion that the vertical structure was not sustainable or efficient in the long run (Martin, et al, p. 105).

Private organizations working with the selective, GOBI approach to child survival have found it extremely difficult to generate funds locally for the child survival effort per se. This is because many of the activities involved are preventive or educational in nature while people generally are only willing to pay out-of-pocket for acute curative services, and then only if they believe them to be affordable and of reasonable quality.

Thus, because the selective primary care approach to child survival has fostered a vertically-oriented approach in Ministries of Health which is difficult to sustain and inefficient, and because the selective approach has neglected integration with local health services, the sustainability of this approach has now become a very serious concern.

The past decade of the child survival "revolution" indeed has generated widespread financial and political support for programs based on "proven" technologies which have been assumed to improve child survival. Evidence that child survival in fact has been improved during the past decade in ongoing health programs has been demonstrated in only a small number of field studies from around the world. It is particularly notable that the foremost field research unit in the world dedicated to the prevention and treatment of diarrheal diseases has been unable to demonstrate that ORT alone, a cornerstone of the GOBI approach, has made an impact on child mortality or, for that matter, on diarrheal disease-related mortality.

The child survival "revolution" could falter because of a lack of documented efficacy of the approach as it is applied in typical field situations and because of an inability to sustain the effort in the longer run. There is sufficient concern about the overall effectiveness of the selective, GOBI approach to give serious consideration to alternative approaches which might have merit.

It is in this spirit that the census-based, impact-oriented approach being developed by Andean Rural Health Care in Bolivia is presented for review. Hopefully, the concerns and issues raised here will encourage critical thinking as plans begin for the next phase of child survival programming around the world.

Conclusion

As the child survival "revolution" moves beyond its initial focus on oral rehydration and immunizations, new ideas and approaches are needed which offer the promise of improved effectiveness in lowering child mortality. The evidence of actual impact in typical field settings of the selective primary care approach (GOBI) on improvement in child mortality is limited. There is also a growing body of evidence demonstrating that specific "proven" interventions have not had the mortality impact that it was widely assumed they would have.

Continued forward momentum in expanding child survival efforts will require careful documentation of impact in typical field settings around the world. The development of new approaches which appear to have potential for greater effectiveness at a reasonable cost needs financial support from international development organizations.

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CHAPTER II. THE CENSUS-BASED, IMPACT-ORIENTED APPROACH: THEORY AND PRINCIPLES

(written in collaboration with John B. Wyon*)

Throughout both the developed and the developing world, curative health programs are responding to the health needs of those seeking medical assistance. Public health programs are working to prevent illness, disability, and death from preventable causes, mostly through the control of specific epidemic and endemic diseases. Programs in developing countries face severe resource constraints along with the terribly difficult problem of how most effectively to (1) reach those in need of services and (2) use limited resources to achieve a maximum impact on the health of the people being served.

The traditional practice of most curative programs throughout the world has been to establish a facility where health professionals, medical equipment, and medical supplies are ready and available to provide services to those who seek attention. Community outreach services sometimes have been developed to improve access to care. For instance, child survival programs in developing countries have frequently sent staff out into villages for immunization and growth monitoring sessions. Even an approach such as this depends on a mother taking the time and effort to attend these sessions. This is not an easy decision for a busy mother with limited financial resources and little experience in the utilization of health services.

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Theory Behind the CBIO Approach

Unfortunately, these traditional approaches are unable to address two fundamental issues which are important if health programs are going to improve the health of ALL the people for which they are responsible. The first issue has two components: (1) "what are the most frequent, serious, preventable or readily treatable health problems in the population for which the program is responsible?" and, (2) "who are those at greatest risk of developing these problems?" The second issue is "are those at greatest risk of developing health problems receiving basic services designed to prevent or treat these problems?"

The immediate and underlying causes of preventable or treatable sickness and death may vary from one community or set of communities to another, as do those who are at greatest risk. Social and economic circumstances often differ from one geographic area to another. Climatic and ecological characteristics also frequently differ between geographic areas, as do basic biological characteristics such as nutritional status. For these reasons, it is critical to determine for a given program area, using data derived from within the program area, the epidemiologic priorities for the area and those who are at greatest risk of sickness and death. Traditional approaches to health care delivery in both developed and developing countries only in rare instances have been able to deal effectively with these issues.

Traditional approaches to health care are also unable to address the issue of whether a given program has improved the health of the population it serves. For this reason, there are very few examples of health programs around the world which have been able to measure mortality rates, much less demonstrate a favorable mortality impact on the health of the people served.

Data arising from hospitals and clinics (and for that matter from groups of people in communities who have come together periodically to receive services) have no valid denominator with which to assess mortality rates for the entire population. Mortality rates are beginning points from which to assess health status in a population of people. In developing countries, population data are generally inaccurate or out of date, and accurate vital events registration systems are rarely, if ever, in place. Furthermore, most illnesses and deaths still take place without any formal contact with the staff of health programs.

The census-based, impact-oriented approach is a conceptual advance over traditional approaches to health improvement in populations because it addresses the two issues described above. Table II.1 summarizes the basic theoretical concepts of the CBIO approach.

The Context of Primary Care and Public Health

We consider the CBIO approach to be an example of community-oriented primary health care (COPC) as well as an example of community-oriented public health (COPH). The goal of COPC is to provide culturally appropriate and effective primary health care in communities. The goal of COPH is to improve the level of health in defined communities. These goals are obviously closely congruent but not identical.

COPH is one of three types of public health practice. The other two types, much more fully developed around the world, are disease-oriented public health and services-oriented public health. The goal of disease-oriented public health is to prevent or control a specific disease or health problem within a population of people, while the goal of services-oriented public health is to distribute more equitably health care services throughout a population of people. These two types of public health are usually practiced in large populations such as in regions or states, but also nationally, internationally, and even globally. COPH, on the other hand, is much newer than the other two approaches to public health and is usually practiced in small populations. At this point, the CBIO approach is considered most relevant to smaller populations of people living in defined geographic communities, though in principle it could be applied to large populations and to populations not defined by geographical criteria. For instance, this approach could be applied to enrollees in a health maintenance organization in the United States.

The CBIO approach is an outgrowth of a tradition of prospective, longitudinal studies of mortality, fertility, and migration in relatively small, defined communities which began in the 1950s with the professional guidance of Dr. John Gordon, then Professor of Epidemiology at the Harvard University School of Public Health. Resulting from this tradition have been the Khanna studies led by Dr. John Wyon (Wyon and Gordon, 1979) the Narangwal studies in India led by Dr. Carl Taylor (Kielman, et al, 1983; Taylor, et al, 1983), the INCAP studies in Guatemala led by Dr. Nevin Scrimshaw (Scrimshaw et al, 1968, 1969; Gordon, 1968; Guzman, 1968) and the Haiti studies led by Drs. Warren and Gretchen Berggren (Berggren, Ewbank, and Berggren, 1981).

It has been through community-based studies such as these that the problem of infant and childhood mortality in developing

Table II.1

Theoretical Concepts of the
Census-Based, Impact-Oriented Approach

1. Health improvement arising as a result of health program activities is unlikely in a set of communities unless the program staff know the most frequent, serious, preventable or readily treatable conditions in these communities, can identify those persons at greatest risk of developing these problems, and can provide appropriate preventive or curative services to these persons.
2. Rates of sickness and death in communities must be measured if health improvement is to be documented.
3. The calculation of these rates requires developing the capability to identify those persons in the communities who have become sick or have died, and to determine the population composition by age and sex.
4. Epidemiological priorities and those at greatest risk of preventable or treatable health problems vary from one locale to another; therefore, for greatest program effectiveness, diagnoses of the community's health problems and those at greatest risk are best made using information obtained from within the program area.

CBIO APPROACH Chapter II.

countries has become better understood. This understanding, together with the currently available child survival technologies such as immunizations, ORT, and growth monitoring, has helped to form the scientific basis for the child survival movement as we know it today.

Described below are the basic features of the CBIO approach to child survival, to community-oriented primary health care, and to community-oriented public health. This approach builds upon previous experience and offers the promise of using limited resources to maximize mortality impact in a way which can be demonstrated empirically, and it also responds to the diversity of health problems existing in different communities and in different geographic regions of the world.

Basic Principles of the CBIO Approach

The application of the CBIO approach assumes the existence of a health practitioner working with a health team and a population of people who, it is assumed for the sake of this discussion, live in communities readily demarcated geographically. It is also assumed that the practitioner and the population are located in a developing country with limited health resources, manpower, facilities, and equipment. A further assumption is that the people living in these communities have limited economic resources. The principles of the CBIO approach, however, could be readily applied in an environment with greater resources such as are found in developed countries.

The overarching goal of the CBIO approach is to improve health in a specific community or communities. For present purposes, it is assumed that the practitioner's main goal is to lower mortality rates. In settings in which mortality rates are not excessive, a practitioner might select a different aspect of health improvement such as disability or morbidity from a particular condition. Or the practitioner might choose to focus more narrowly on one particular aspect of mortality.

In order to assess the degree to which the goal of mortality improvement has been attained, it is necessary to measure mortality rates within the defined communities at the beginning of the program intervention and at successive stages. It is highly useful to know which people are at the highest risk of death. Those at greatest risk may be defined in terms of age, sex, household location, occupation, nutritional status, or some other observable characteristic. It is also necessary to understand the causes of mortality, both immediate and underlying.

Although in theory one might be able to develop a program oriented specifically to mortality, one of the principles of the

CBIO approach is to understand the community's perspective of its own health priorities. It is very likely that lowering mortality rates is not a high priority within the community. Human communities being what they are, it is difficult for a health practitioner to work effectively without responding to the day-to-day health problems of the local people. Furthermore, health practitioners have a moral obligation to respond within their capabilities to acute illnesses which are brought to their attention.

A final principle of the CBIO approach is to use available health resources for the purpose of responding to the health priorities as defined both by the health practitioner and by the community. This implies that a significant portion of program resources be devoted toward the longer term goal of mortality reduction within the defined communities. Table II.2 summarizes the principles of the CBIO approach.

Table II.2.

Principles of the Census-Based, Impact-Oriented Approach
to Community-Oriented Public Health (COPC)

1. The overarching goal of the CBIO approach is to improve health in communities and to be able to demonstrate that health has been improved.
2. Mortality rates need to be measured at the beginning and at successive stages of program implementation.
3. It is important to understand the immediate and underlying causes of mortality and to identify those within the communities who are at greatest risk of death.
4. The health practitioner needs to respond to the community's perceived priorities as well as to the epidemiologic priorities.

Implementation of CBIO Theory and Principles

We have conceptualized four phases of implementation of the CBIO approach (see Figure II.1). Phase 1 consists of community diagnosis, followed by Phase 2, program planning, and Phase 3, program implementation. The final phase, Phase 4, consists of program evaluation and community rediagnosis. The more accurate the community diagnosis, the more effective the "treatment" is likely to be. The "treatment," based on the community diagnosis, needs to be carefully planned prior to its execution. After carrying out the "treatment" for a period of time, its effectiveness needs to be evaluated on the basis of information obtained from epidemiologic surveillance and other approaches to program evaluation. At the same time, the community diagnosis phase can be repeated.

Community diagnosis (Phase 1) has five specific steps which are outlined in Figure II.2. Step 1 involves establishing a relationship between the health practitioner and the community. This is a process whereby the practitioner comes to know the community and the community comes to know (and have confidence in) the practitioner. Obviously, this can only be accomplished by competent and dedicated practitioners able to understand and respect the people living in the community.

During the process of establishing this relationship, it is necessary in Step 2 for the practitioner to "define" the community. By community definition, we refer to establishing clearly the geographic boundaries of the community, who the community members are, where they live, and what their relationships are within the family structure.

Step 3 involves the determination of the most frequent preventable or treatable causes of sickness and death in the community. It is necessary for the health practitioner to learn what the mortality rates in the community are, what the causes of mortality are (as best as can be understood with the resources and technical competence available), and who is at greatest risk of death. While this may appear on the surface to be the work of a professional epidemiologist rather than that of local program staff, we believe that this can be accomplished with limited additional training.

In Step 4, the health priorities from the community's perspective are identified. A determination of a community's health priorities can be accomplished as a byproduct of Step 1 by coming to know the community and understanding its inhabitants. Other means by which the community's perceived health priorities can be determined include responding to the spontaneous health needs of the people for curative medical services as well as canvassing the opinions of household members or the opinions of community leaders.

FIGURE II.1.
IMPLEMENTATION PHASES
OF THE CBIO APPROACH

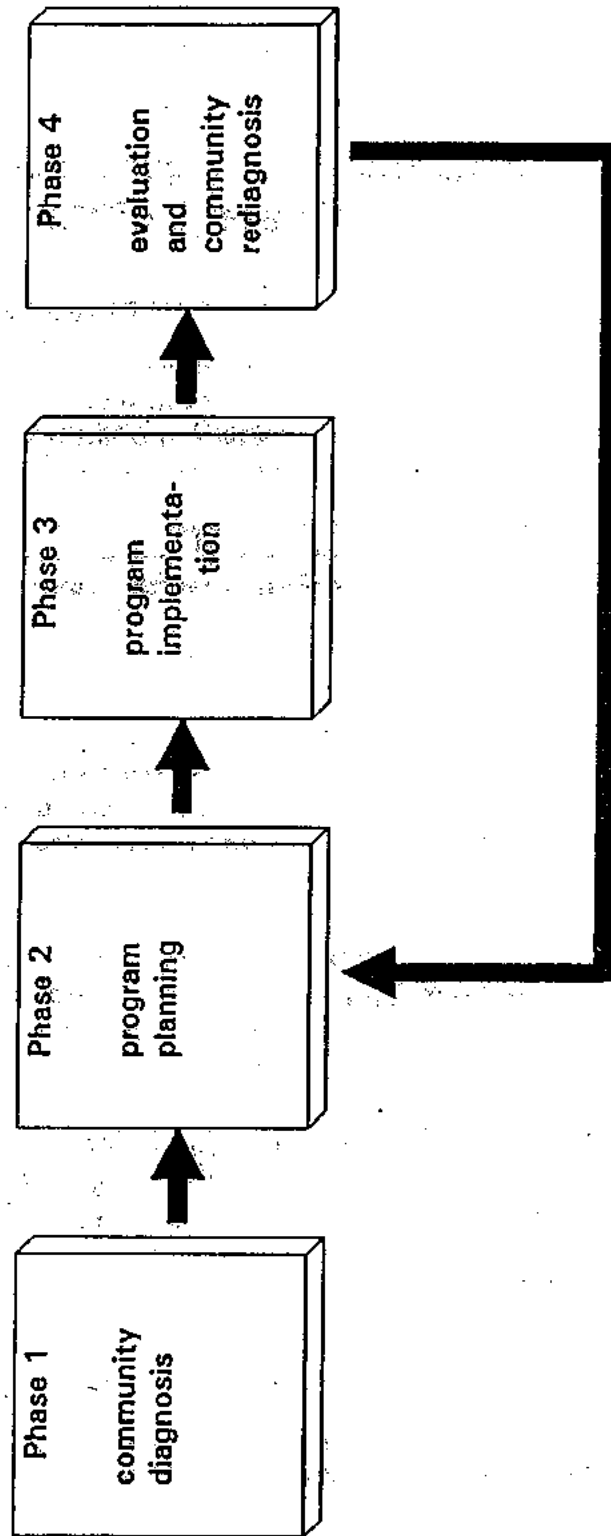
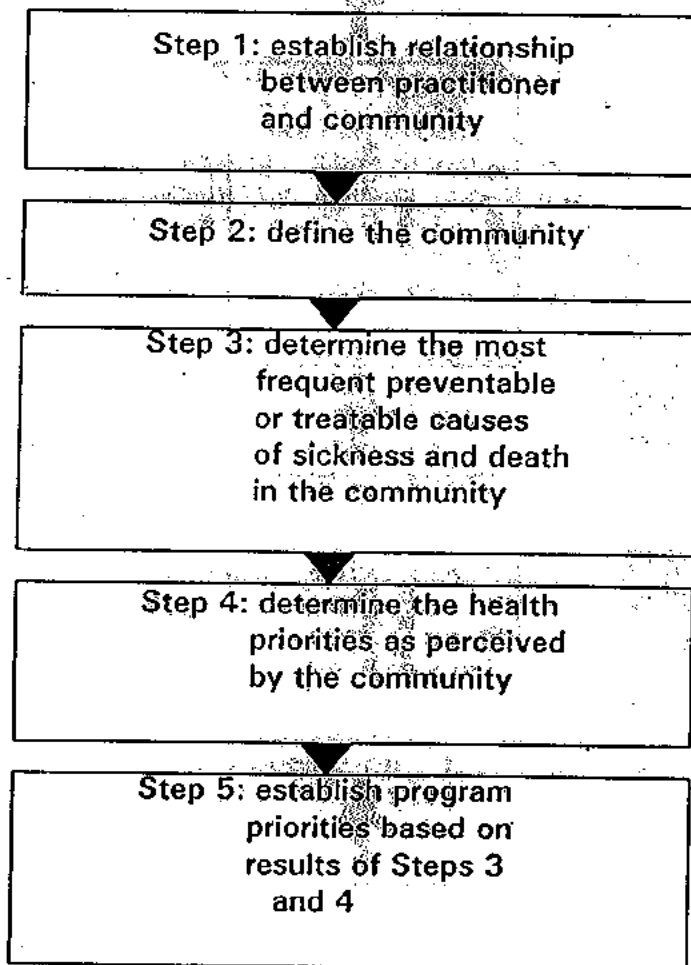


Figure II.2.
Steps of Phase 1 of the CBIO Approach

PHASE 1: COMMUNITY DIAGNOSIS



Step 5 involves the determination by the health practitioner of priorities for the program which arise from an epidemiologic assessment of community mortality and of those who are at greatest risk of death. From the epidemiologic and community priorities ascertained in Steps 3 and 4, overall program priorities can be established.

Once Steps 1-5 of Phase 1 have been completed, Phase 2 (Program Planning) begins. Phase 2 has two separate steps (see Figure II.3). In Step 1, program resources are clarified. In Step 2, a work plan is created on the basis of the program's priorities and the resources available.

In Phase 3 (Program Implementation), the program is actually carried out using the developed work plan as a guide.

Phase 4 (Evaluation and Community Rediagnosis) involves epidemiologic surveillance to provide data to evaluate program outcomes. Has the relative importance of the most frequent preventable or treatable causes of death changed since the initiation of the program? Have those groups changed who are at greatest risk of death from these causes? Have the community's health priorities changed as a result of program efforts? Has the program been successful in lowering mortality rates? Has the program successfully responded to community health priorities?

The findings from the inquiries in Phase 4 make it possible to determine anew the priority health problems of the community. Combining these redefined health priorities with a reassessment of resources available for the program make it possible once again to establish a work plan for the program. The process then repeats itself indefinitely.

Practical Considerations Regarding the Implementation of the CBIO Approach

As a practical matter of applying these principles in developing countries, a number of these steps require routine systematic home visitation (RSHV). RSHV involves the health practitioner making direct or indirect contact with everyone in the community on a periodic basis, usually at least every six months. At the time of RSHV, the community is redefined by determining the current household composition. In addition, vital events are registered. These include births, deaths, and in- or out-migrations. Causes of death are determined as accurately as possible under the circumstances.

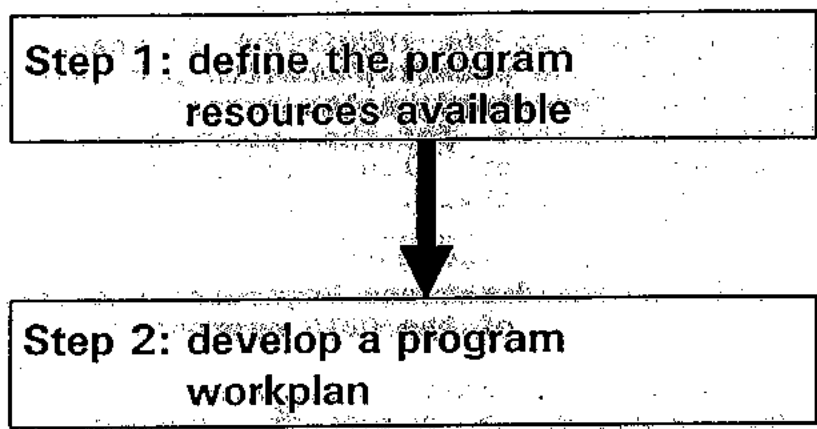
In addition to RSHV, targeted home visits to high-risk or priority individuals is another closely related necessary

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Figure II.3
Steps of Phase 2 of the CBIO Approach

PHASE 2: PROGRAM PLANNING



activity. This approach makes it possible for the practitioner to deliver important basic services to those who may not choose or be able to seek out services. This is particularly necessary for those within the community who have limited educational or financial resources or who are socially disadvantaged.

The four phases of CBIO implementation cannot realistically be expected to be completed in less than five years. The process of program implementation is unlikely to proceed in an orderly fashion from one step to another because of numerous field constraints that arise. These constraints include problems with staffing, logistical support, and local, regional or national political issues, to name only a few. Even so, the CBIO theory, principles, and phases of implementation can be used as guides and can help to provide a useful conceptual framework for both the practitioner and the community.

Usually, some type of health care services need to be provided in the early stages of establishing a relationship with the community if a warm working relationship of trust is to be established. The implementation of traditional primary health care together with child survival activities seems to be a practical means of initiating work, although the nature of the program may change later.

The CBIO approach is very different from traditional approaches to health care. Consequently, it takes time for health staff and communities to become comfortable with it. Home visitation involves considerable staff energy and may not be enthusiastically embraced by health workers used to less energetic work patterns.

Specific methods for field work need to be developed in each community. ARHC's experience has been that it is best for field staff to work together in a small pilot area, implementing the principles of this approach and modifying the methodology until it is suitable for the local situation. In addition, this pilot experience gives program leaders an opportunity to assess the staff and resource requirements required to extend the methodology on a broader scale.

Strong leadership is required if this approach is to be successfully implemented. Program leaders must be persons sensitive to the social environment in which they are working. They must be able to present the program to the community in a way that the community will find appealing. Program leaders must also be able to learn about the community structure, organization, and history. Finally, program leaders need to be able to define which tasks need to be performed and what staff are required to carry out these tasks.

The health information system (HIS) is a critical element of

the CBIO approach. Without an effective and efficient system for collecting information, for tabulating it, and for using the results in program evaluation and planning, the CBIO approach will fail.

Conclusion

The CBIO approach is a further refinement of community-oriented primary care and community-oriented public health principles. This approach is an improvement over more traditional forms of primary health care in that it makes it possible for the health care practitioner to determine within the program area (1) what are the most frequent serious preventable or treatable causes of sickness and death, (2) who are those at greatest risk of developing these health problems, and (3) if changes in health status have occurred over time.

Since the overarching goal of this approach is the empirical demonstration of improvement in the health of persons living in defined communities, it is an "impact-oriented" rather than a services-oriented approach. Since the approach requires identifying every member of the community through periodic home visits and establishing a relationship with every family in the program area, we refer to this as a "census-based" approach. The CBIO approach is carried out in four phases: community diagnosis, program planning, implementation, and evaluation with community rediagnosis.

It is critical to develop strong program leadership and to begin the CBIO approach in a pilot area prior to extending it to the entire program area. The ability of this approach to make an accurate community diagnosis and to evaluate program impact depends heavily on the effectiveness of the health information system.

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CHAPTER III. COVERAGE OF CHILD SURVIVAL SERVICES

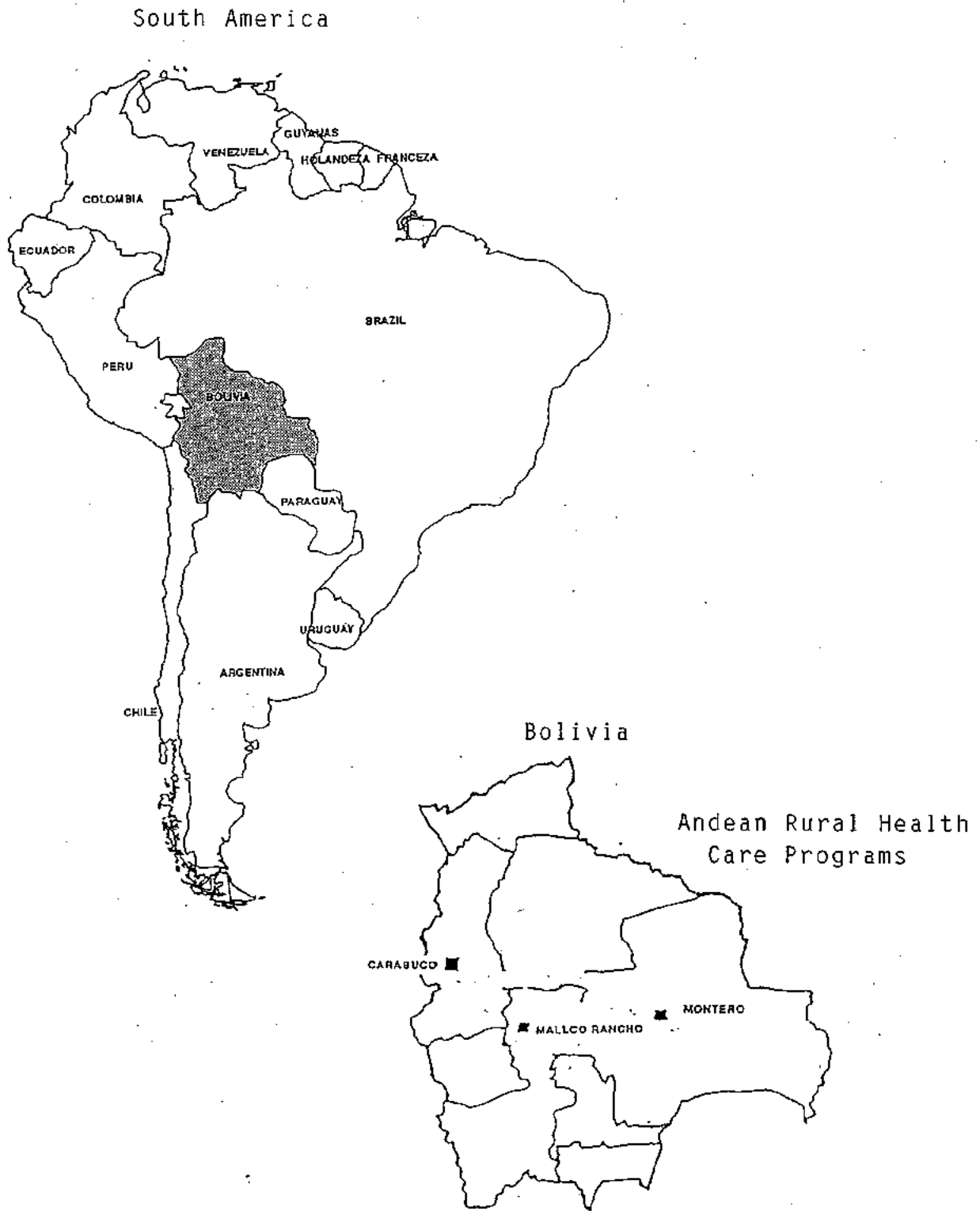
Coverage of basic child survival interventions in a program population area has been considered to be an important measure of program effectiveness. While there is significant variation in the causes of childhood death from one ARHC program area to another within Bolivia (see Chapter VI), all of the programs have given priority to achieving high immunization coverage, high rates of ORT knowledge and use for diarrheal disease, high rates of participation in the growth monitoring program, and high rates of coverage of antibiotic treatment for pneumonia and ARI (acute respiratory infection). It is the overall progress with coverage that we will now review.

ARHC has three established program sites. The Carabuco Program on the rural Northern Altiplano has been in operation since 1984 and serves approximately 9,500 people. The Mallco Rancho Program has been in operation since 1987. This program is located in the rural Cochabamba valley area of Bolivia and serves almost 6,000 people. The Villa Cochabamba/Montero Program was established in 1988. It is located in the tropical lowland area of Santa Cruz and serves approximately 12,000 people in a periurban section of the city of Montero. The location of these program sites is shown in Figure III.1 Each of the program sites is described in more detail in Chapters IX - XI. These three established program sites serve approximately 27,500 people altogether.

Over the life of these programs, household surveys have been carried out to assess coverage of child survival services. In the Carabuco Health Program Area, there have been three cluster sample surveys of 30 randomly selected clusters of seven households each. In Mallco Rancho and in Villa Cochabamba/Montero the household surveys have been more inclusive. In the case of Mallco Rancho, with its smaller population, all homes in the program area were surveyed in 1990 and 1992. All children encountered under three years of age were included in the

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Figure III.1



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surveys. In the case of Villa Cochabamba/Montero, every other home was contacted at the time of the 1991 survey. Those children under three who were identified were included in the survey.

Ability of the CBIO Approach to Enroll Children in Program Activities

Prior to discussing coverage, it is useful to consider what percentage of the children in the program area included in the coverage surveys had actually been identified previously by the health program. We use the term "identify" to mean that the child had been previously contacted by the program and had received a "road to health" growth chart containing a space to record immunizations (referred to here collectively as a health card).

These results are shown in Table III.1. The Carabuco Health Program, with the most developed version of the CBIO approach, demonstrates a gradually improving coverage with health cards which in 1992 reached 99% of the children. In Mallco Rancho, the coverage reached 91% in 1992. There has been only one household survey in Villa Cochabamba/Montero so far. This was conducted in 1990 after only six months of limited routine systematic home visitation activities. The results achieved at this point in Villa Cochabamba/Montero give an idea of the potential coverage obtainable by more traditional but intensive approaches of delivering child survival interventions.

It is interesting to note that in all three program sites at the time of the first household survey, the coverage ranged between 70 and 74%. At each of the three program sites, "traditional" child survival interventions provided at growth monitoring and vaccination sessions had been relatively well-developed prior to the first household survey.

Table III.1.

Percentage of Children in ARHC's Established Program Areas
With Health Cards

program site	year of household survey				
	1988	1989	1990	1991	1992
Carabuco	70%	92%	95%		99%
Mallco Rancho			74%		91%
Villa Cochabamba/ Montero				73%	

source: household surveys at program sites

Immunization Coverage

Immunization coverage has been calculated here for children 12-23 months of age. Coverage was considered to be complete only if the third dose of diphtheria, pertussis, and tetanus had been administered (DPT3), the third dose of polio had been administered (polio3), as well as measles and BCG vaccinations. Only those children with documentation demonstrating the administration of these antigens were considered to have received them.

Overall immunization coverage rates of 73% to 85% have been achieved using the CBIO approach. Prior to the beginning of routine systematic home visitation, using the more traditional approaches of "concentration" of children at vaccination sessions, coverage rates of only 23-48% had been achieved. In Villa Cochabamba/Montero, routine systematic home visitation began in one portion of the program area in 1991, where one-third of the program area resides. The coverage rate of 82% observed for 1992 is based on a review of family health folders for this segment of the program area only.

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Table III.2.

Vaccination Coverage at ARHC's Established Program Areas,
1988-1992

program site	year of household survey				
	1988	1989	1990	1991	1992
Carabuco	48%	77%	86%		85%
Mallco Rancho			23%		73%
Villa Cochabamba/ Montero				40%	82%

* The data for the Villa Cochabamba/Montero program in 1992 are for one portion of the total program area where routine systematic home visitation has been carried out. This coverage rate is based on a review of family health folders.

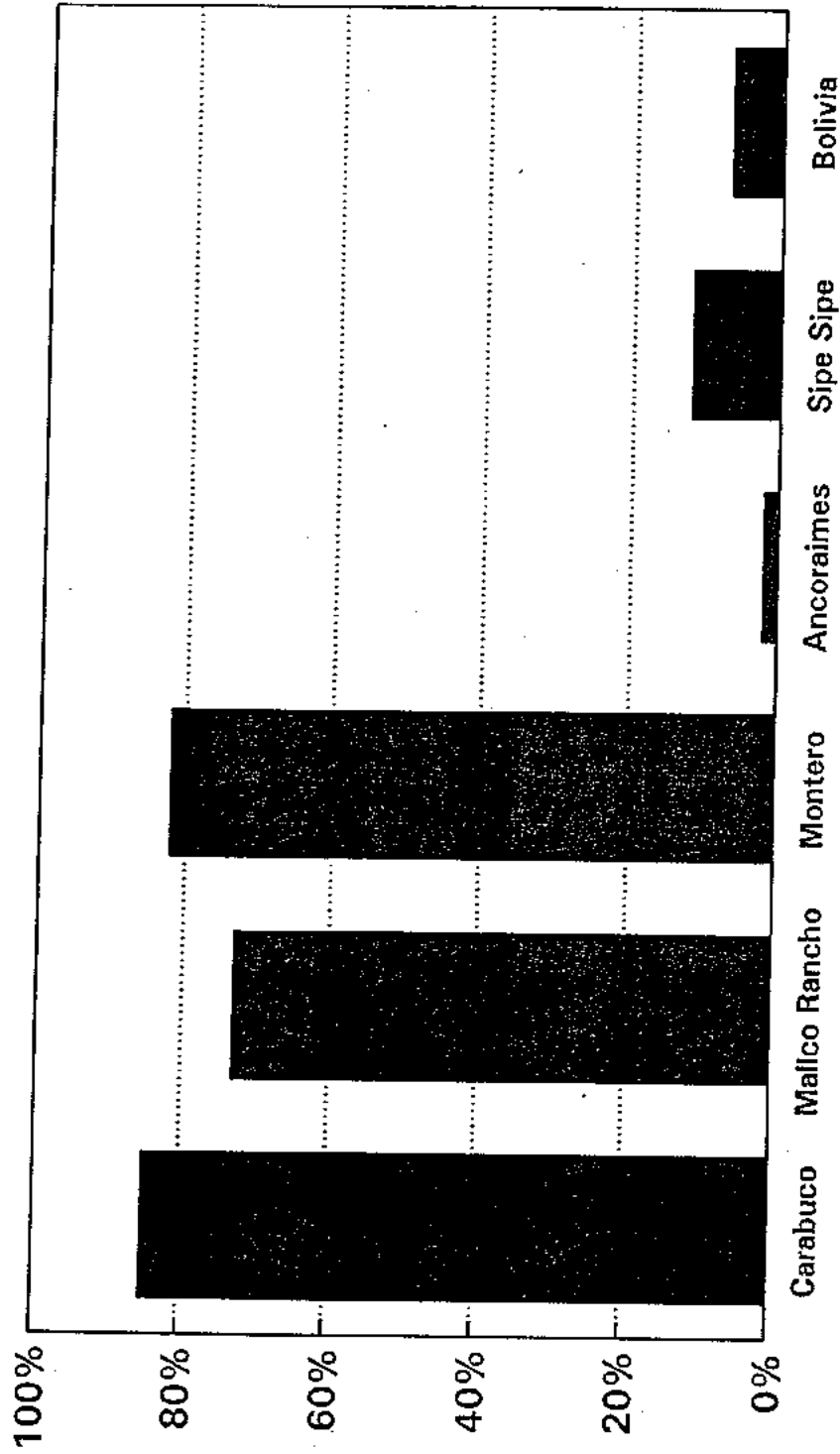
source: household surveys at program sites and review of family health folders for the Villa Cochabamba neighborhood

The 1989 Demographic and Health Survey (DHS) Survey in Bolivia (Sommerfelt, et al, 1991) determined on the basis of maternal recall and health card review that only 8% of Bolivia children 12-23 months of age had been fully vaccinated. In 1992, ARHC conducted baseline surveys in two new rural program areas (Ancoraines and Sipe Sipe) which are adjacent to established program sites. Coverage there prior to initiation of program activities was only 2% and 12% (see Figure III.2).

Growth Monitoring Coverage

Participation in growth monitoring within ARHC's programs involves weight and height determination followed by nutrition education of the mother. The percentage of children in the program areas who had at least four monitorings during the 12 months prior to the survey is shown in Table III.3. Prior to the initiation of routine systematic home visitation, only 11-21% of

Figure III. 2.
Immunization Coverage in ARHC Program
Areas, in Adjacent Areas, and in Bolivia



percentage of children 12-23 months of age who were completely vaccinated
source: see text

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Table III.3.

Growth Monitoring Coverage (Defined as Four Monitorings During the Previous 12 Month Period) at ARHC's Established Program Areas*

program site	year of household survey				
	1988	1989	1990	1991	1992
Carabuco	11%	29%	69%		89%
Mallco Rancho			21%		56%
Villa Cochabamba/ Montero				16%	

* The data for Carabuco in 1988, 1989, and 1990 are for children 12-23 months of age. The data for children in Carabuco in 1992 are for children 3-23 months of age. The data for Mallco Rancho in 1990 are for children 0-23 months of age and in 1992 are for children 3-23 months of age. The data for Villa Cochabamba/Montero in 1991 are for children 0-35 months of age.

source: household surveys at program sites

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the children had received adequate coverage. In Carabuco in 1992, 89% of the children had received adequate coverage. In Mallco Rancho, with exposure to routine systematic home visitation for a shorter period of time than in Carabuco, 56% had received adequate coverage. In Villa Cochabamba/Montero prior to the onset of routine systematic home visitation only 16% of the children had received adequate growth monitoring.

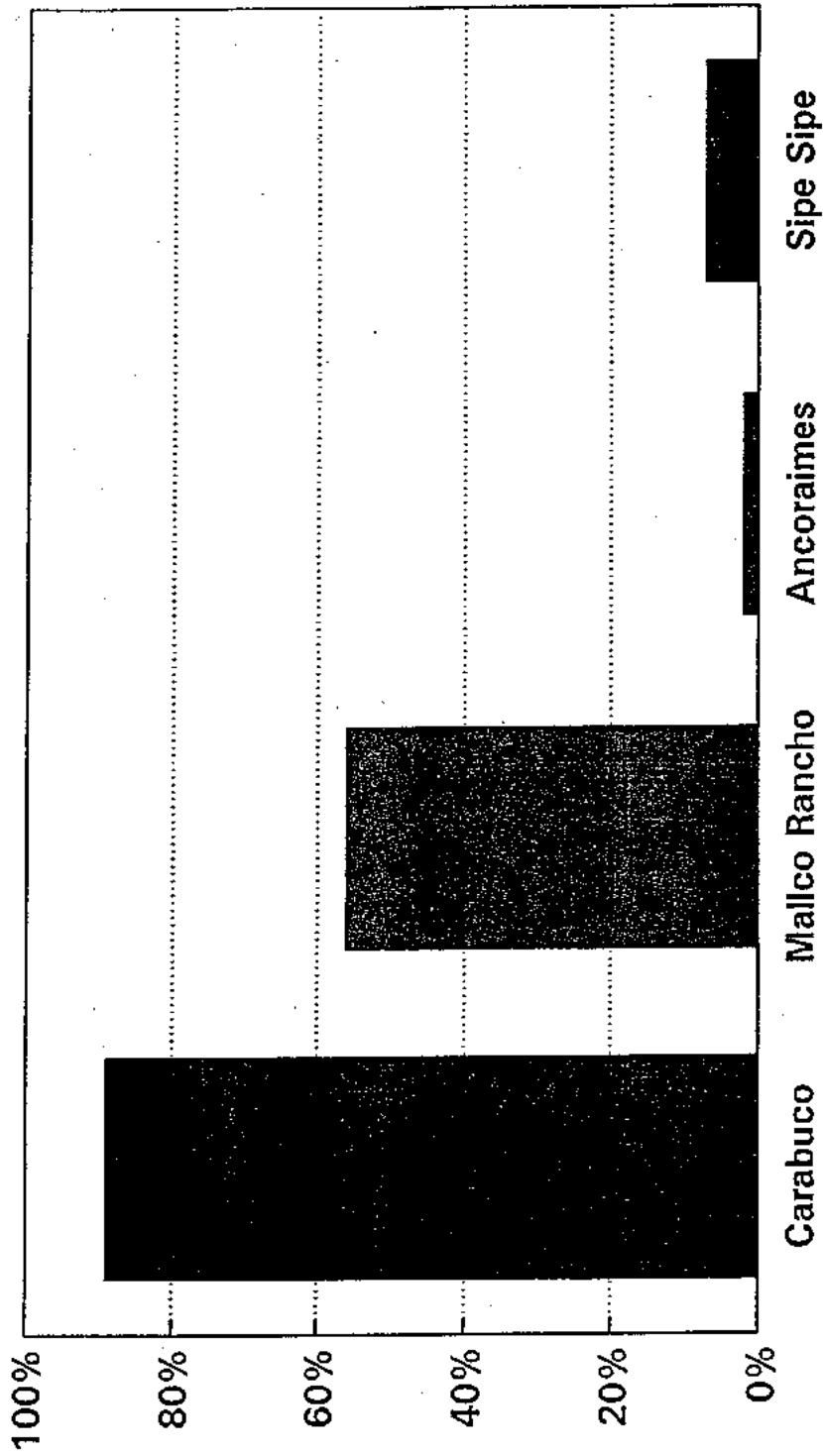
Although national data on growth monitoring coverage are not available, baseline data from two adjacent ARHC areas were obtained in 1992. In Ancoraimes, only 2% of the children 3-36 months of age had been weighed four or more times in the previous year and in Sipe Sipe, 7% (see Figure III.3). Villa Cochabamba/Montero has been excluded from Figure III.3 because only baseline data were available.

ORT Coverage

Oral rehydration therapy coverage for diarrhea treatment can be assessed in a variety of different ways. For our purposes here, we shall consider three approaches: (1) the mother's knowledge regarding the preparation of ORT fluids, (2) whether she had ever actually administered ORT fluid to her children when they had diarrhea, and (3) whether she had given ORT fluid if her child had had diarrhea during the previous two weeks.

In Carabuco, approximately half of the mothers appear to be competent in ORT use and had used it if her child had had diarrhea during the two weeks prior to the 1992 survey. In the Mallco Rancho Program Area, half of the children appear to have ORT coverage. In Montero, where CBIO activities were just getting underway at the time of the 1991 household survey, only one-third of the mothers had ever used ORT and only 20% of the mothers with a child having diarrhea during the two weeks prior to the survey had used it at that time (see Table III.4).

**Figure III.3.
Growth Monitoring Coverage in ARHC
Program Areas and in Adjacent Areas**



percentage of children with four or more
growth monitorings during the previous
12 months

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Table III.4.

Oral Rehydration Therapy Coverage at ARHC's Established Program Areas as Determined by Household Surveys*

program site	year of household survey				
	1988	1989	1990	1991	1992
Carabuco					
mother knew how to prepare ORT		44%	75%		53%
mother had used ORT sometime in past	28%	43%	64%		52%
mother had used ORT if child had had diarrhea in previous two weeks			41%		48%
Mallco Rancho					
mother knew how to prepare ORT					59%
mother had used ORT sometime in past					55%
mother had used ORT if child had had diarrhea in previous two weeks					49%
Villa Cochabamba/ Montero					
mother knew how to prepare ORT				42%	
mother had used ORT sometime in past				37%	
mother had used ORT if child had had diarrhea in previous two weeks					20%

source: household surveys at program sites

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The percentage of mothers who had used ORT in the past is greater at ARHC's established program sites than in adjacent comparison areas or than in Bolivia nationally (see Figure III.4). The percentage of children with diarrhea during the previous two weeks who had received ORT is also higher in ARHC's established program areas (see Figure III.5). The differences between ARHC established program sites and other areas are not as striking for ORT use as for immunizations and growth monitoring, in large part because of the widespread social marketing of ORT through the mass media. Nevertheless, ORT usage rates are still higher in established ARHC program areas.

ARI Coverage

Coverage of treatment of serious acute respiratory infection (also known as pneumonia or acute lower respiratory infection) is very difficult to gauge since the illness itself is not easy to diagnose in field settings. We have assessed ARI treatment coverage here by simply assessing the percentage of mothers who reported that they sought medical assistance (not merely assistance from a relative or from a traditional healer) for their child if their child had had symptoms of ARI during the previous two weeks. The findings are shown in Table III.5.

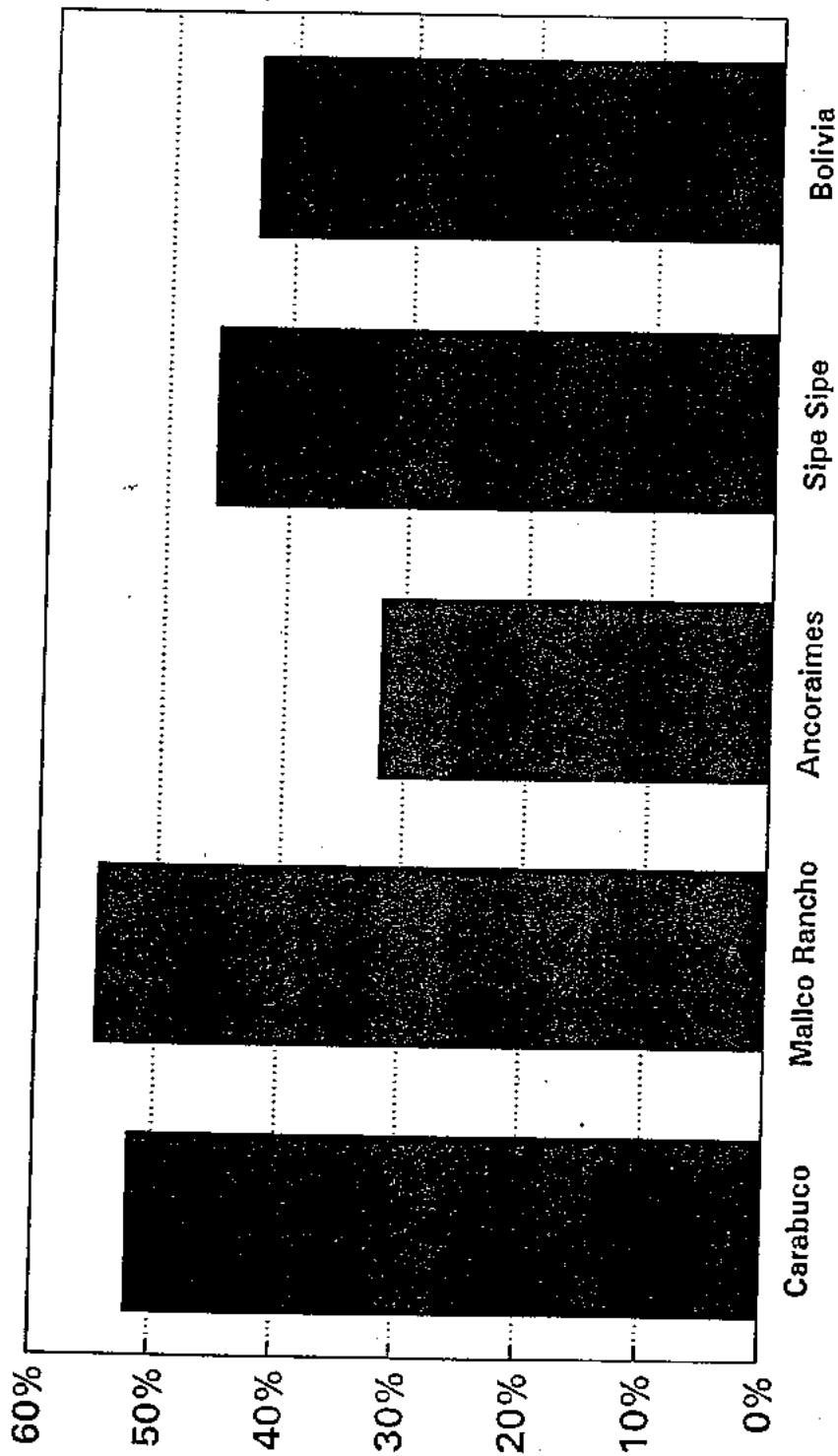
Table III.5.

ARI Treatment Coverage at ARHC's Established Program Areas

program site	year of household survey		
	1990	1991	1992
Carabuco			53%
Mallco Rancho	35%		30%
Villa Cochabamba/ Montero		45%	

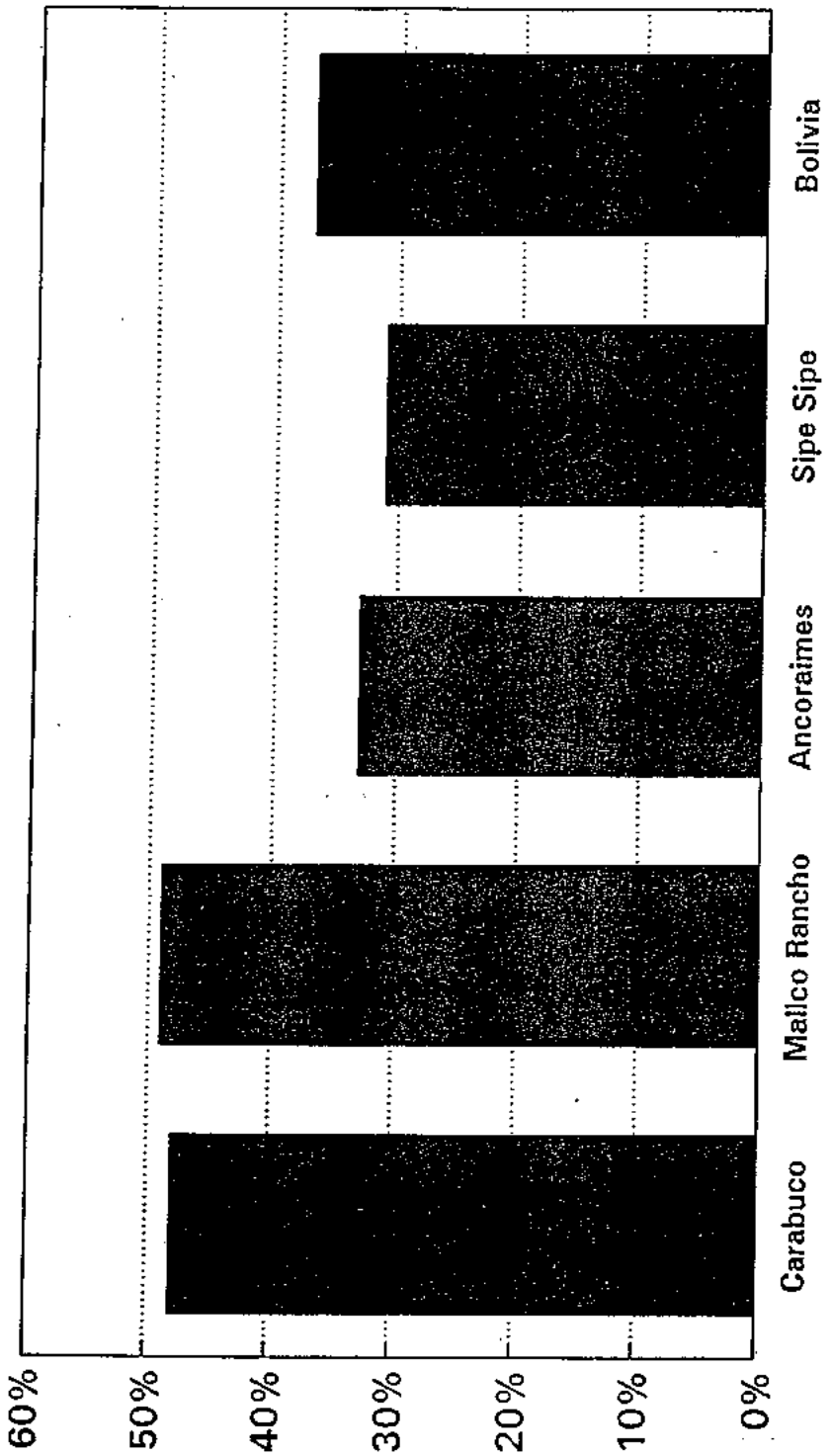
source: household surveys at program sites

**Figure III.4.
ORT Use in ARHC Program Areas, Adjacent
Areas, and Bolivia**



percentage of mothers who had used ORT
in the past (national data from
Sommerfelt, et al, 1991)

**Figure III.5.
Recent ORT Use in ARHC Program Areas,
Adjacent Areas, and Bolivia**



percentage of children with diarrhea in previous two weeks receiving ORT (national data from Sommerfelt, 1991)

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Comparison of ARI coverage rates with adjacent areas and with Bolivia nationally is shown in Figure III.6. ARI coverage in Villa Cochabamba/Montero was not assessed at the time of the 1991 household survey. Again, coverage is higher in Carabuco and in Mallco Rancho than in adjacent areas or in Bolivia as a whole. The promptness and adequacy of treatment is not addressed by these data, however. We would expect an even greater difference between ARHC's established program sites and comparison areas if these aspects of ARI coverage had been considered.

Conclusion

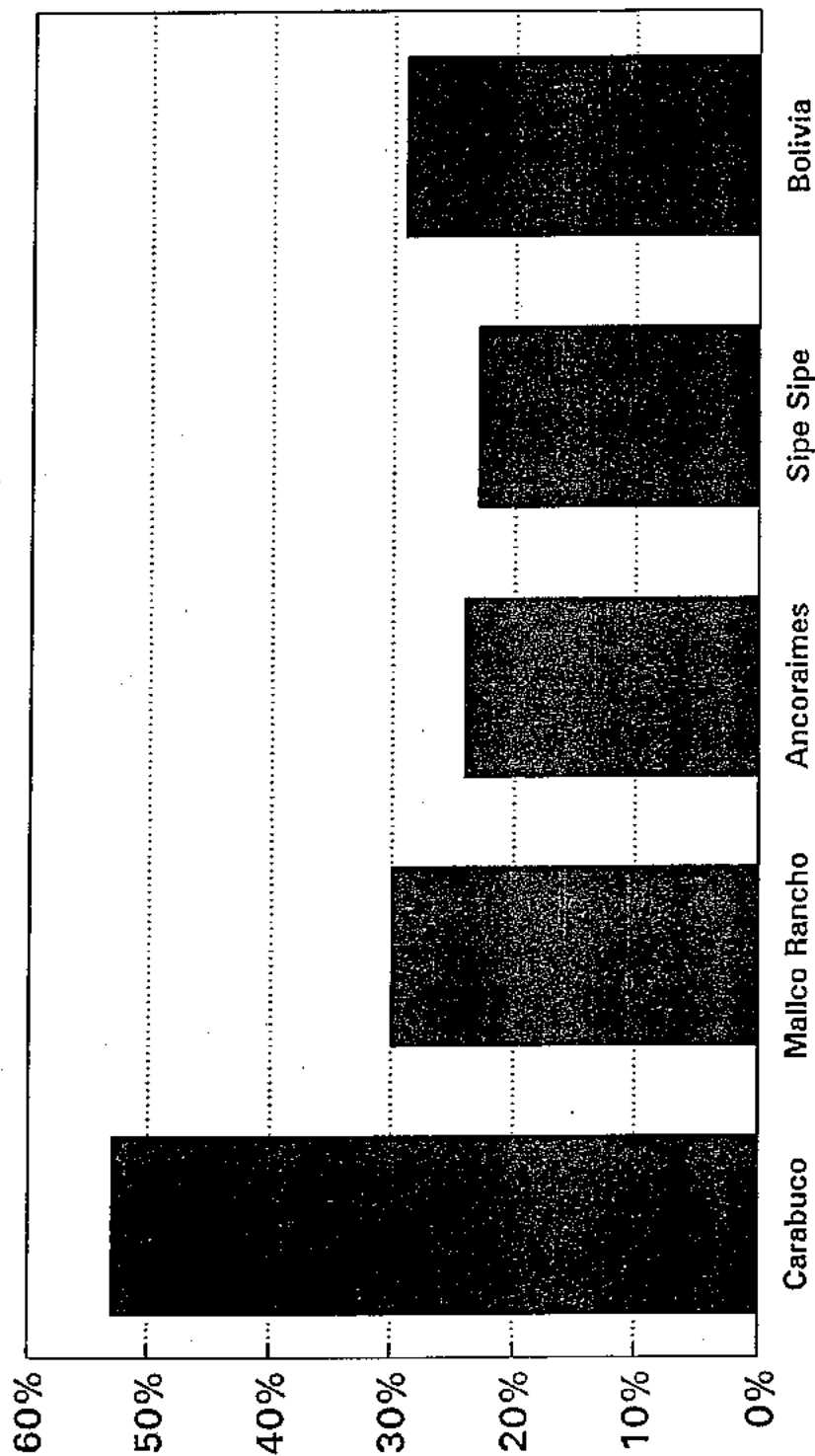
Immunization and growth monitoring coverages in ARHC's established program sites are very high, particularly when compared to adjacent areas and to national data. ORT and ARI coverage rates are higher in ARHC's established sites as well, but the differences are not as pronounced. The CBIO approach, particularly through the delivery of services in the home when appropriate, is able to achieve high levels of coverage of immunizations and growth monitoring.

ORT use is somewhat higher in ARHC's established program sites, but national social marketing of ORT throughout Bolivia has been intensive and apparently rather effective. Consequently, the relative benefits of the CBIO approach with respect to ORT use are not as apparent.

Measurement of ARI coverage as employed here is quite crude: whether a child with symptoms of ARI received some type of modern medical attention. Even so, coverage rates are higher in ARHC's established program areas than in comparison areas.

The coverage data for the Carabuco Health Program, ARHC's oldest program site, are consistently more favorable than for Mallco Rancho, the second oldest program site. We anticipate that within the next few years, as the Mallco Rancho Health Program matures, coverage rates will continue to improve there as well. The Villa Cochabamba/Montero program has at this point only limited longitudinal data, but we expect to see significant improvements when further household surveys are undertaken in the near future. Thus, overall, the coverage rates shown here demonstrate consistent and steady improvement as well as higher levels than in other areas of Bolivia.

**Figure III.6.
Coverage of ARI Treatment in ARHC Sites,
Adjacent Sites, and Bolivia**



percentage of children with symptoms ARI receiving some type of modern treatment (national data from Sommerfelt, 1991)

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REFERENCES FOR CHAPTER III.

Sommerfelt AE, JT Boerma, LH Ochoa, et al. Maternal and Child Health in Bolivia: Report on the In-depth DHS Survey in Bolivia, 1989. Institute for Resource Development/Macro Systems, Inc. Columbia, Maryland: 1991.