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## Attaining health for all through community partnerships: principles of the census-based, impact-oriented (CBIO) approach to primary health care developed in Bolivia, South America

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### Abstract

This article describes a flexible primary health care methodology which was developed by Andean Rural Health Care and its colleagues in Bolivia, South America. This methodology, the census-based, impact-oriented (CBIO) approach to primary health care, involves determining local health priorities as defined both by locally acquired epidemiologic information and by the local people themselves. The CBIO approach to primary health care is now functioning successfully at seven program sites in Bolivia, which together serve 75,000 people in urban and rural communities in three distinct cultural and ecological regions of the country.

High levels of coverage of basic health services can be achieved through a system of 'epidemiographic' surveillance of all families and through home delivery, when needed, of priority services to those at risk. When the services provided are based on local health priorities, when they are provided in a technically effective manner, and when the community has a strong partnership in planning, implementation and evaluation, then the CBIO approach to primary health care will lead to measurable health improvements as defined by changes in population-based rates of mortality and illness in the community.

On the basis of our experience, we believe that the CBIO approach offers great potential for strengthening the effectiveness of local health programs in impoverished communities around the world in a way which fosters community ownership and, hence, long-term sustainability. © 1999 Elsevier Science Ltd. All rights reserved.

*Keywords:* Primary health care; Community participation; Mortality; Child survival

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### Introduction

It has been two decades since the comprehensive primary health care philosophy of Health for All by the year 2000, embodied in the Declaration of Alma Ata,

was adopted in 1978 by member governments of the World Health Organization (WHO/UNICEF, 1978). It has also been two decades since the appearance of the seminal article by Walsh and Warren (1979) calling for 'selective primary health care' as an 'interim strategy for disease control' in low-income countries. Since then, the comprehensive versus selective debate has continued.

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Unfortunately, considerable evidence exists indicating that primary health care services (either comprehensive or selective) in economically developing countries have not produced improvements in the health status of the recipients of these services (Ewbank and Gribble, 1993; Murray and Chen, 1993). Furthermore, the great majority of the world's population in low-income countries continues to lack access to a basic 'package' of essential preventive and curative services (World Bank, 1994).

Thus, Health for All by the year 2000 will be a reality for only a minority of the world's population. More than 1.36 billion disability-adjusted life years (DALYs)<sup>1</sup> are being lost annually around the world because of premature death and disability (World Bank, 1994).

The prospects in the near future for achieving global equity in levels of health and in access to basic health services also remain dim. While the low-income countries of Sub-Saharan Africa and Asia (excluding China) account for 39% of the world's population, these same countries experience 56% of the world's DALYs lost because of premature death and disability (World Bank, 1994).

Furthermore, within low-income countries at national, regional, and local levels there are major inequities in health status and health services. For instance, a third of the one million deaths which occur every year in China are among the 12% of the population who live in remote areas or who are ethnic minorities (Taylor, 1992). In urban Bangladesh, while the overall infant mortality rate is 87 deaths per 1000 live births, the infant mortality rate in urban slum popu-

lations is 180 (UNICEF, 1993). Within one District of Ethiopia (Butajira), the mortality of children under five years of age is twice as great in the rural lowlands as in the rural highlands, and even within the lowland and highland areas respectively, there are two-fold differences in under-five mortality (Shamebo et al., 1991). In a longitudinal community-based epidemiologic study in the Punjab of India, 13% of the mothers experienced multiple child deaths which accounted for 62% of the child deaths registered during the reproductive lives of all of the women in the community (Das Gupta, 1990).

Improving community-based primary health care<sup>2</sup> services is but one of a number of interrelated approaches to health improvement in poor communities (along with improving the status of women, education, nutrition, water quality, sanitation, and other socioeconomic conditions). Over the past two decades, the merits of both the comprehensive and selective types of approaches to primary health care have continued to be recognized. Although some have viewed the two types of approaches as directly conflicting (Wisner, 1988), others have considered them to be mutually supportive and complementary (Taylor and Jolly, 1988). Technical soundness and cost-effectiveness have typically been considered as strengths of the selective approach, while community participation and sustainability have typically been viewed as strengths of the more comprehensive approach. Both approaches have their limitations as well. According to some, the selective approach tends to be highly centralized and less responsive to the felt needs of communities, while the comprehensive approach is seen as more expensive, too complicated for lower-level workers to implement, and difficult to evaluate (Gish, 1982; Unger and Killingsworth, 1986; Engelkes, 1993).

In view of the strengths which both approaches may bring to Health for All, it is appropriate to consider examples from the field in which aspects of both have been melded into a 'middle way' (Mosley, 1988), by which is meant a feasible methodology for primary health care which unites the best aspects of both comprehensive and selective primary health care. This article describes one such 'middle way', developed beginning in the early 1980s by Andean Rural Health Care (ARHC), a nongovernmental organization providing community-based primary health care in Bolivia.

Andean Rural Health Care and its sister organizations (Consejo de Salud Rural Andino and Asociación de Programas de Salud del Area Rural) have now been working since the early 1980s in the provision of community-based primary health care services on the Northern Altiplano, in the Cochabamba valley, and in the Santa Cruz region of Bolivia. These activities have been reported in greater detail elsewhere

<sup>1</sup> A disability-adjusted life year (DALY) is a year of life lost due to premature death or the equivalent of a year of healthy life lost due to disability. A premature death is defined as "the difference between actual age at death and life expectancy at that age in a low mortality population". A year of healthy life lost due to disability is determined on the basis of the severity of the particular type of disability. A year living with a disability is assigned a proportion of 1 DALY, with more severe disabilities receiving a greater proportion than less severe disabilities. Years lost at mid-life due to death or disability are given greater weights than years lost earlier or later in life to reflect their greater social value, and DALYs estimated for later years following the occurrence of death or disability are discounted at a rate of 3% per year. The overall number of DALYs in a given population is then calculated both for all causes as well as for specific causes to estimate the burden of disease in the population (see World Bank, 1994).

<sup>2</sup> We will use the term primary care here to include all those preventive and curative services, including family planning, which can be provided at the community level to nonhospitalized clients.

(Perry, 1993; Perry and Sandavold, 1993; Ofosu-Amaah, 1994; Shanklin and Perry, 1994; Wyon, 1994; Perry et al., 1998a,b; Shanklin et al., 1998).

This 'middle way' developed by ARHC has now become known as the 'census-based, impact-oriented' (CBIO) approach to primary health care. The CBIO approach emerged initially as a result of efforts by ARHC staff to improve primary health care services in a rural highland area known as the northern *Altiplano* of Bolivia, where such services previously had been virtually nonexistent and where the communities there had maintained a tradition of lack of faith in and involvement with modern health services. The success of the CBIO approach on the northern *Altiplano* and the resulting enthusiasm of the local ARHC staff there led other ARHC-related projects in the Cochabamba and Santa Cruz regions of the country to also adopt the CBIO approach.

The CBIO approach is now being utilized in seven program sites throughout Bolivia which serve a total of 75,000 people. The sites range from sparsely populated remote rural communities to low-income urban neighborhoods, from Andean highland communities to tropical lowland communities, and from homogeneous traditional native-American communities to multiethnic and multicultural communities. The CBIO approach has now become the key unifying methodology for ARHC and is beginning to be applied at new ARHC projects outside of Bolivia, including one on the Texas–Mexican border and one in collaboration with FOCAS, an NGO working in Haiti. In addition, the CBIO approach and ARHC's experiences with it have been the basis of a case study in the required introductory health course at the Department of International Health at the Rollins School of Public Health at Emory University in Atlanta since 1994. Students from around the world have found this methodology to be an exciting one which they are eager to apply upon their return to their host countries. Furthermore, increasing numbers of students (including those from Emory) and health specialists are visiting ARHC's program sites in Bolivia to learn firsthand about the CBIO approach.

What follows is an attempt to synthesize the principles that have emerged over more than a decade of experience in the development and application of this new methodology for primary health care.

#### **An overview of the census-based, impact-oriented approach to primary health care**

The CBIO approach is a two-stage process whose overarching goal is to improve the health of geographically delineated communities. An exploratory and pilot program stage precedes the definitive program stage.

During the definitive program stage, a community diagnosis derived from locally acquired information provides the basis for program planning. Then, after a predetermined period of program implementation, the findings from the program evaluation and community rediagnosis provide a basis for a new program plan (see Table 1).

Six basic concepts serve as underpinnings for the CBIO approach.

1. Improvements in health arising as a result of health program activities in a community (or set of communities) depend upon the program staff knowing the epidemiologic priorities (that is to say, the most frequent and serious preventable or treatable conditions in the community), identifying those persons who are at greatest risk of developing these conditions, and providing appropriate preventive or curative services to these 'targeted' community members.
2. The documentation of health improvement requires measuring rates of sickness, disability and death in these communities.
3. These rates are based on a numerator (namely, the number of community members who have become sick or disabled, or who have died) and a denominator (namely, the number of persons in the community at risk according to age, sex and other potential risk factors).
4. Community epidemiologic priorities and the characteristics of those at greatest risk vary from one locale to another. Therefore, epidemiological diagnoses of the community's health problems and determinations of those at greatest risk are most accurately made using locally acquired information.
5. Incorporation of the community's own health priorities into program activities enhances the prospects for establishing trust between the community and the health care program, and for sustaining the program in the long-term.

Table 1  
Stages in the application of the census-based, impact-oriented approach

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#### *Exploratory and pilot program stage*

Exploratory planning  
Exploratory program implementation  
Pilot program planning  
Pilot program implementation

#### *Definitive program stage*

Community diagnosis  
Program planning  
Program implementation  
Program evaluation and community rediagnosis

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6. Inclusion of the community as a partner in program development as well as in implementation and evaluation enhances the prospects for program effectiveness and for promotion of community ownership of the program activity.

The CBIO approach is community-based because of the community partnerships which emerge in the process of defining health priorities as well as in the process of program implementation and evaluation.

Part of the power of the CBIO approach is its capacity to provide a means for helping local program staffs and communities to establish priorities (especially among competing demands for curative versus preventive services), to use program resources in a way which reflects these priorities, and to readily measure progress in health improvement over time.

Another strength of the CBIO approach is its focus on the entire community. The proactive, population-based character of the approach makes it possible to determine the major health problems in the population of a community and the characteristics of those who are at greatest risk. With this information, it becomes possible to focus a major portion of the program's efforts on those who are at greatest risk.

Facility-based primary health care services in low-income countries are often overwhelmed by persons in search of treatment for acute medical conditions. Consequently, the staff of these facilities are unable to give proper attention to preventive activities in the community and are unable to address the acute medical problems of those who have not come to the facility for treatment. But in some areas of low-income countries, the converse situation also exists: facility-based primary health care services are minimally utilized. There, the staff may erroneously conclude that there is no need for services in the population served by the facility and therefore see no justification for reaching out into the community. In contrast, the CBIO approach responds to acute curative care needs of the entire community but places greater emphasis on the prevention and early treatment of the community's epidemiologically defined health priorities.

The outreach component of the CBIO approach is therefore vital in addressing one of the major drawbacks of facility-based preventive and curative health services — namely, that a significant portion of the population, and particularly those at greatest risk of illness and death, never come to fixed delivery sites for preventive and curative services. The facility may be too far away, the client may not know about the service, the client may not perceive a need for the service, the client may not perceive the service provided there to be of sufficient value to justify the time and/or expense, the client may be unable to afford the time or money required to obtain the service even if it is

valued, or the client may fear that he or she will be treated in a disrespectful way. Thus, a variety of geographic, informational, socioeconomic, and other barriers tend to limit the population coverage of services when they are provided only at fixed facilities. Unless those at the geographical and social margins of low-income communities are somehow reached, however, the health of the overall population will improve far less than it might otherwise. Considerations of equity also require that services be distributed in such a way that those who live close to fixed facilities and those who are the socio-economically better off or the 'worried well' do not consume an excessive proportion of program resources.

### Application of CBIO concepts

#### *Specific activities carried out during the exploratory and pilot program stage*

Exploratory planning involves specifying the program's long-term goals and objectives, identifying potential sources of support and potential program sites, and negotiating preliminary agreements with the appropriate officials and community leaders (Table 2). The program leadership also gathers readily available information to guide initial project activities. We refer to these activities as reconnaissance. Two types of

Table 2

Steps in the exploratory and pilot program stage of the census-based, impact-oriented (CBIO) approach

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#### *Exploratory planning (approximately 6–12 months)*

Specify long-term program goals and objectives  
 Prepare a written preliminary program plan  
 Identify potential sources of program support  
 Negotiate agreements with governmental and nongovernmental officials and leaders at the national, regional, and local levels  
 Carry out preliminary 'library' and 'field' reconnaissance

#### *Exploratory program implementation (6–12 months)*

Recruit key program leaders and assemble staff on-site  
 Establish working agreements and relationships of trust with the communities and their leaders  
 Carry out preliminary field activities

#### *Pilot program planning (approximately 3–6 months)*

#### *Pilot program implementation (12–24 months)*

Implement the pilot program plan  
 Continue to build mutual trust between the program staff and the community  
 Continue to promote community involvement  
 Conduct an evaluation of the pilot program

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reconnaissance are called for: 'library' reconnaissance and 'field' reconnaissance. 'Library' reconnaissance is a review of existing printed information that may be relevant to the initial formulation of the program. 'Field' reconnaissance includes a first-hand assessment of potential program sites as well as initial discussions with community and government leaders.

After the exploratory planning has been completed, it is then possible to move to exploratory program implementation. During this activity, the following activities take place:

1. recruiting, employing, training, and deploying field staff;
2. inviting one or more communities to participate in the exploratory program implementation;
3. developing working relationships with the communities;
4. establishing logistic support;
5. designing, testing and then redesigning methods for obtaining the views of the community members on their own health priorities;
6. designing, testing, and then redesigning data forms suitable for field use from which statistical analyses can be readily performed;
7. designing, testing, and then redesigning program delivery strategies for addressing likely priority problems;
8. carrying out on a trial basis preventive and curative health services; and,
9. analyzing the information and experience accumulated during this period of exploratory program implementation and applying the results to the development of the pilot program plan.

At this point, a pilot program plan for a small and manageable geographic area is completed. This plan includes developing methods for:

1. identifying every community resident;
2. determining the community's views on health priorities;
3. recording the occurrence and cause of disease and death as well as the occurrence of births and migrations;
4. arriving at agreement on what are likely to be the most frequent and serious readily preventable or

treatable problems in the community (based on findings from the library and field reconnaissance);

5. designing specific activities to address the above problems;
6. agreeing on a time span for the pilot program, such as one year, after which the pilot program will be evaluated and the definitive program stage will begin.

Once this considerable set of tasks has been completed, it then becomes possible to begin the pilot program implementation. During the pilot program implementation, the preliminary health information system undergoes further modification on the basis of field experience. At this time also, the all-important relationship of mutual trust between the community and the program continues to be built, and the role of the community as a partner in the program continues to be fostered.

At the time of pilot program implementation, the program staff establishes a system for developing and maintaining periodic contact with all of the households (or, less preferably, with at least a representative sample of them)<sup>3</sup> in each collaborating community. Volunteer or minimally paid community workers are needed for this activity. Once this system is in place, a foundation exists for establishing a community diagnosis and for implementing the program on a broader scale.

In order to develop a relationship of trust between the health program staff and the community, the program staff members first of all need to get to know the community and its members. Then the program staff members need to provide services which are valued by the community. The community members need to become acquainted with the health program and its staff members. This relationship of trust becomes the foundation upon which all later program developments depend.

By working early on with the community to address community-defined health priorities, the program will facilitate the development of a relationship of trust. Even more, trust is fostered through the health program's efforts to assist the community in resolving acute medical problems as they arise.

Based on ARHC's experience, up to two years may be necessary to complete the exploratory and pilot program stage. If the implementing organization or the program population have not had previous experience with the CBIO approach, a longer time period may be required.

<sup>3</sup> We say less preferably because, while a sample of households can give an accurate picture of epidemiological priorities, it cannot pinpoint exactly where every person in the community at high risk is located and therefore cannot guide program staff to each and every household where services are needed.

*Specific activities carried out during the definitive program stage*

While the exploratory and pilot program stage takes place on a small scale (in one or in a small number of communities), the definitive program stage occurs on a much broader scale, although beginning with a modest number of communities initially and then gradually scaling up. During the definitive program stage (Table 3), a definitive community diagnosis is made using methods developed in the exploratory and pilot stage. Then, after the definitive community diagnosis has been completed and after the available resources have been defined, definitive program planning takes place. This plan outlines a gradual expansion of the program into additional communities over the period of program implementation. At this point, the definitive program implementation begins, lasting 3–5 years. Then, evaluation and community rediagnosis take place. The length of time required to pass through the complete cycle of steps in the definitive program stage varies depending upon local circumstances, but a rough estimate would be five to seven years.

Arriving at an accurate community diagnosis is one of the critical steps in the CBIO approach. Just as it is important for a physician who is treating a patient to

make as accurate a diagnosis as possible, it is also important for a community health program to make as accurate a community diagnosis as possible. If not, the 'treatment' which is 'prescribed' may not be effective. Thus, just as in the diagnosis of an individual patient's health problems, the investment of time and resources required in order to make a diagnosis of the community's health problems is justifiable if the likelihood of actual health improvement is enhanced as a result. That is to say, if the diagnostic evaluation is accurate and if it points to a 'treatment' which is effective and affordable, then the diagnostic evaluation is well worth the time and resources expended.

Like the physician's diagnosis of an individual patient's medical problem, a program's ability to make an accurate community diagnosis is highly dependent upon a relationship of trust with open and frank communication between the health program staff and community members. Ideally, at least some of the health staff members are also long-time members of these same communities. An accurate community diagnosis is also dependent, however, upon 'defining' the community — that is to say, identifying all of the people in the program area through the enumeration of households, preparing community maps describing the location of all households, and identifying the persons who live in each household. Once these major tasks have been completed, it becomes possible to determine, through repeated visits to the same households, the most frequent and serious readily preventable or treatable health problems which exist in the community and the characteristics of those persons who are at greatest risk of developing these problems. It is the process of keeping track of all community residents and recording vital events (that is, births, deaths and migrations) through regular visits to all homes which gives the CBIO approach its 'census-based' focus.

During each routine home visit, the health worker registers new pregnancies, births, deaths, illnesses and disabilities, and updates the household census. We refer to this process as routine systematic home visitation (RSHV). Later analysis of the information collected through RSHV makes it possible to complete a census of the community's population and to measure morbidity, mortality, and fertility rates. The census as well as mortality and fertility rates are usually compiled on an annual basis. In short, RSHV makes it possible to collect the information needed for an initial as well as for periodic assessments of the epidemiological priorities of the community (which are likely to slowly change over time). The health worker makes additional 'nonroutine' home visits as special needs arise.

The community's perspective can be obtained by addressing two different questions. First, what needs for health services arise spontaneously from the community as the program is beginning? Experience has

Table 3

Steps in the definitive program stage of the census-based, impact-oriented (CBIO) approach

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*Community diagnosis (approximately 6–12 months)*

Establish and maintain relationships of trust with a gradually expanding number of communities in the program area

'Define' each community (see text for details)

In each community, determine the most frequent and serious readily preventable or treatable causes of sickness, disability and death, their underlying causes, and those at greatest risk

Determine the health priorities of the community members themselves

Establish program priorities based on the epidemiologically defined and community-defined priorities

*Program planning (approximately 3 months)*

Determine the resources available for program implementation

Develop a program work plan based on the program priorities and available resources

*Program implementation (approximately 3–5 years)*

*Program evaluation and community rediagnosis (approximately 3 months)*

*Program planning for the next program phase (approximately 3–6 months)*

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shown that these are mostly requests for the treatment of acute illnesses, and most can be met by establishing a community-based primary health care service along with a system of transport for referral of seriously ill patients. Secondly, what are the health priorities which the people themselves identify? This can be determined through community surveys and discussions during home visits as well as through discussions with community leaders.

Both the community's priorities and the epidemiological priorities are best finalized at meetings of the staff with community members. The input of 'rank and file' persons representative of the community should be sought at this point along with that of formal community leaders. Through simple hand tabulation of information (if necessary) and through open discussion of problems, a consensus can be forged regarding the epidemiologically defined and community-defined health priorities. It is the emphasis given to defining and addressing these epidemiologic and community-defined priorities which gives the CBIO approach its 'impact-oriented' focus.

Program planning begins once the community diagnosis has been finalized. Program planning requires, obviously, a specification of the resources which are available — be they financial resources, community resources, facilities, supplies or transport. Given the program's priorities as identified in the community diagnosis and also given the available resources, a work plan is created which directs program resources toward the health program's priorities. A key element of the planning process is to ensure that those community members identified as being at high-risk receive the services which are designed to prevent or treat the conditions for which they are at increased risk.

Once the program plan has been completed, it is possible for program implementation to begin. After a period of program implementation ranging from three to five years, an evaluation of program activities is carried out along with a community rediagnosis<sup>4</sup>. Thus, program implementation efforts are assessed (particularly with respect to coverage and impact) and the epidemiologic priorities, along with the community's assessment of its own health priorities, are redetermined. Program planning begins again, leading to another period of program implementation. Thus, the cycle repeats itself indefinitely.

As a practical matter, field staff are unlikely to be able to carry out each step of the CBIO approach in precisely the manner called for in the above discussion.

There are always unexpected circumstances which must be addressed. Furthermore, field conditions are frequently changing, and directors of field programs must learn to make the best of difficult and unanticipated conditions by adapting CBIO principles to local conditions. Finally, some of the activities can take place simultaneously, such as exploratory program implementation and pilot program planning.

#### *Special considerations: home visitation*

Visitation of all homes has major advantages, particularly in the early stages of the program. Routine systematic home visitation (RSHV) facilitates all aspects of the application of the CBIO approach (Perry and Sandavold, 1993). RSHV makes it possible for all of the homes in the program area to be contacted, for a census to be taken and routinely updated, and for vital events to be registered in a prospective fashion. Through RSHV, barriers to basic services are largely overcome, be they geographic barriers, socio-economic barriers, informational barriers, or barriers produced by distrust. RSHV provides a basis for determining the characteristics of persons who are at high risk and, equally important, exactly where such persons can be located.

At the outset, RSHV would appear to be an overwhelming task which is prohibitively expensive and not applicable on a large scale. The experience with RSHV in Bolivia has shown otherwise, however. But, RSHV should begin on a small scale and be carried out initially by experienced community health workers who are closely supervised. As the process becomes refined and as the community becomes more familiar with it, RSHV can be carried out by persons with less training and experience as long as they continue to be closely supervised by experienced staff. In our experience in Bolivia and also in the experience of others in such places as rural India and urban Bangladesh where such regular home visitation is being carried out (Ali, 1996; DaCosta, 1996; Arole and Arole, 1997), some type of incentive is required to encourage local community health workers to continue their task. While RSHV is time-consuming, the fact that minimally paid community workers can carry it out effectively keeps costs feasible.

As a result of RSHV (or a variant thereof), the health program comes to know the families personally, including their physical and social environments. The families also come to learn about the program and to know program staff personally. As community health workers visit each home regularly and provide assistance, they gradually earn the trust of the families. The selection of community health workers from among local persons who are already known to the community facilitates this process.

<sup>4</sup> This evaluation is in addition to more frequent monitoring of the implementation of the work plan and includes activities such as community surveys, focus group discussions, and analyses of census and vital events data.

A number of health services can be provided effectively in the home. Basic health education can be given directly to the family at the time of home visitation. Vaccinations and nutritional monitoring also can be readily carried out at the time of home visitation. Many acute illnesses can be treated, and patients in need of additional services can be referred for appropriate care. Home visitation provides an ideal setting for carrying out other health activities as well, such as diagnosing and treating tuberculosis or providing family planning education and/or family planning services (Fauveau et al., 1994; Perry et al., 1994; Chowdhury et al., 1997). The types of services which can be provided in the home obviously depend upon the level of training of those making home visits, the time available to the worker for home visiting, and the quality of supervisory support available to the worker. Higher level staff can be called upon by the community health worker to make special visits to particular households as circumstances require.

High-risk individuals receive targeted follow-up home visitation. The frequency of follow-up home visits depends upon the particular situation. Referral services may not be available, and even if they are, the families may decide not to seek them. In such cases, the health worker might return to the home on a daily basis, if necessary, to provide whatever assistance is possible. Others with less serious conditions may also need targeted visitation. For instance, a child who has fallen behind on his/her immunization schedule might also receive a targeted follow-up home visit. In addition, of course, the community health worker's schedule needs to remain flexible so that he or she can respond to emergency requests for assistance at any time.

Eventually, the need for RSHV may diminish as other equally effective and less resource-intensive methods are developed for providing services to those who need them. For high-risk persons who are not obtaining basic services elsewhere, however, continued home delivery of services may be required.

#### *Experiences with the CBIO approach*

Initially, program leaders faced multiple constraints produced by the distrust which local community leaders and members had of health programs directed by 'outsiders', by the lack of experience with the CBIO approach, by the uncertainties of funding, and by the requirements of donors. But as the success of the CBIO approach became increasingly apparent (as evidenced by the support for this approach within the community and by the results which this approach was able to achieve), these difficulties gradually diminished. Furthermore, it became possible to transfer field staff from one program site where there had been previous

experience with the CBIO approach to a new site, and the 'learning curve' became easier to negotiate for the more experienced field staff. The good reputation in the local communities which the established programs had earned made it easier to establish the CBIO approach in neighboring program sites.

Even so, numerous difficulties have had to be overcome in order for the CBIO approach to reach its current level of maturity. In the beginning, staff were reluctant to devote the considerable additional effort required by the approach, and families were suspicious about frequent home visits and data collection activities. There has been an ongoing need to streamline the health information system to prevent an excessive amount of information being collected, and considerable time has been required to analyze the collected information. The effort which staff members have invested in trying to understand the priorities of the community and to incorporate these priorities into program activities have, in fact, been greatly appreciated by the community and have been one of the main reasons that effective partnerships with the communities have emerged.

It has never been, and probably never will be, possible to carry out the methodology exactly as we have described it here because of ever-changing, unpredictable field conditions and organizational constraints. Nevertheless, the principles of the CBIO approach provide a guiding conceptual framework for field operations which has proven to be immensely valuable. It is undoubtedly the case also that the CBIO approach will undergo further refinements as experience in its use increases.

The CBIO approach enables local program staff to be able to address the health priorities in their program area. Furthermore, it enables the program to be able to monitor mortality rates over time and readily assess coverage. As a result of applying the CBIO approach, staff members can verify the critical importance of reaching out to every member of the population through a home-based system of service delivery. As a result, the CBIO approach has continued to receive strong support from the field staff who have worked with it even though they could have readily abandoned it long ago if they had chosen to do so.

There is still much that can be done to improve the application of the CBIO approach at ARHC's program sites in Bolivia (such as giving even greater program emphasis to those at greatest risk of death) and in obtaining a better picture of some of the underlying causes of early childhood death (such as parental neglect and inappropriate feeding practices).

A significant limitation in ARHC's application of the CBIO approach in Bolivia so far has been the relatively small attention given to documenting the pre-



sence of disabilities in the community and to formulating a strategy for prevention and rehabilitation. Because persons with disabilities are often 'hidden away' within households, a methodology for identification of such persons which is based on visitation of all homes is a very powerful one. The potential for a strong community-based rehabilitation program exists within the CBIO approach but has yet to be implemented at ARHC program sites. Finally, further analyses of the mortality data from one program area (Carabuco) has demonstrated that injuries are the leading cause of years of potential life lost before age 65 (Perry et al., 1998b), but detailed information about these injuries is not available and no significant program activities are devoted to injury prevention.

The CBIO approach cannot be applied quickly or easily, and successful application requires a deeply committed field staff. It has taken ARHC and its colleagues more than a decade of experience and refinement to be able to reach the point today of recommending it to other organizations and other program sites.

The CBIO methodology made it possible to identify diarrhea as far and away the leading cause of childhood death in Montero (a periurban project in the Santa Cruz region) and thus led to extensive program efforts directed toward improving water and sanitation there. These efforts included loan programs to enable families to connect to the municipal water supply system and the promotion of the use of improved storage containers for water and a disinfectant for these containers (a project carried in collaboration with the Centers for Disease Control and Prevention in Atlanta). On the northern *Altiplano*, in contrast, the predominance of pneumonia as a cause of death has led staff members to focus efforts there on improving pneumonia case detection and treatment.

The low rates of death from infectious causes among children beyond two years of age observed at all CBIO program sites in Bolivia made it feasible to greatly reduce the frequency of nutritional monitoring among children 2–4 years of age. Local staff members at all program sites developed the strong impression that many of the parents of infants who died had not been eager for another child. This impression led to a stronger commitment among the staff members for including family planning as an integral part of program activities.

The experience with the CBIO approach through 1994 has recently been reported (Perry et al., 1998a; Shanklin et al., 1998). The ARHC service areas show high levels (95%) of enrollment of children in health program activities, 78% of children 12–23 months of age have card-documented coverage of all recommended childhood immunizations, and 80% of all children 0–23 months of age undergo growth monitor-

ing at least three times annually. These levels of coverage are all markedly higher than for comparison areas in Bolivia. Finally, a comparison of mortality rates in ARHC program areas with mortality rates in adjacent sites (as well as with a national sample of socio-economically similar children) suggests that the survival of infants and children to the age of five years has been reduced by one-third to one-half as a result of ARHC's application of the CBIO approach.

All households participate in the program as a result of RSHV, and community-wide meetings are held periodically to discuss current program issues and to assess community priorities. Gradually, the community members themselves are playing a stronger role in the various activities called for by the CBIO approach. However, the process of fostering community ownership and community leadership has been a slow one. The potential of community volunteers to assist in program activities has been recognized from the beginning and their assistance has been sought whenever possible. But experience has taught that ongoing collaboration with the same volunteer is short-lived unless some form of 'incentive' is provided to him or her by the program.

Some argue that the provision of services at the doorstep discourages health-seeking behavior and, therefore, utilization of services at local health care facilities. But health-seeking behavior is highly influenced by trust in particular health care providers. So, exposing all household members to the local health care provider through regular home visits can be a highly effective initial strategy for fostering trust in the local health program. Then, the frequency of home visitation can be gradually reduced and targeted more specifically to those who are not obtaining basic services at the facility. The relative emphasis which should be given to home delivery of basic services versus delivery at fixed delivery sites has been the subject of numerous discussions among ARHC staff. Even though there is no simple resolution of this issue, there is agreement among ARHC staff that, for very poor and underserved populations, the emphasis on home delivery of services needs to be quite strong initially but with time can gradually diminish.

A final issue arising from ARHC's experience in implementing the CBIO approach has been that of ensuring confidentiality of the health information system. In Bolivia, there has been a long-standing suspicion among local people that household visits are used to collect information for political, military, or taxation purposes. This was one of many reasons that the CBIO approach was slow to gain local acceptance initially. Fortunately, the ARHC programs have been able to overcome these suspicions and protect this information from other uses, but government health programs might be less successful.

The merits of the CBIO approach cannot be easily dismissed given the fact that the methodology has been gradually developed on the basis of experience in multiple program sites over a long period of time, that strong community support is a byproduct, that impressive improvements in terms of coverage and mortality have been achieved, and that health program staff members themselves find the CBIO approach to be professionally invigorating and worthy of continued utilization. Moreover, the field staff members at a number of the older program sites are raising over half of the local costs through local sources. These sources include fees for services, contributions from local funding agencies such as Rotary Clubs, and contracts with local government officials who now have control over funds for local health services.

Finally, an expert review panel commissioned by the US Agency for International Development independently reviewed the CBIO approach of ARHC in Bolivia and recommended that the concepts of the CBIO approach be disseminated and applied in a variety of settings (Ofosu-Amaah, 1994). The methodology could be implemented on a large scale within a region or country if adequate government support, leadership, training, and supervision were available along with longer-term financial and organizational support.

## Discussion

### *The tradition upon which the CBIO approach is based*

The CBIO approach incorporates the previous experience of others in community-based epidemiological research and service delivery (Wyon and Gordon, 1971; Frederiksen, 1971; Gwatkin et al., 1980; Berggren et al., 1981; Kielmann et al., 1983; Taylor et al., 1983; Fauveau, 1994; Wyon, 1994; Scrimshaw, 1995; Das Gupta, 1997) and also upon the tradition of community-oriented primary care (Kark, 1974; Geiger, 1993). The CBIO approach shares similarities with other primary health care and field-based epidemiologic research activities in which surveillance and community-based health services have been closely linked. Frederiksen (1971), for instance, recognized the potential of extending the experience of home-based surveillance for malaria and smallpox to a much broader set of home-based activities, including the collection of demographic and epidemiologic data and the provision of primary health care and family planning services.

Frederickson's enthusiasm for this 'epidemiographic' approach, as he called it, was fostered by findings from his own research which demonstrated that the client utilization of health facilities declines exponentially with the distance of the client's home from the health facility. As a consequence, he concluded that preven-

tive and curative services based at such facilities would never be able to reach an adequate percentage of the population unless such facilities were located at one mile intervals throughout the population, clearly an unachievable goal then and today.

A series of surveys around the world sponsored by the World Council of Churches in the 1960s showed that those who lived close to a mission hospital and who used the services of the hospital were no healthier than those who lived further away (Arole et al., 1995). Thus, even though access and utilization of health services may be prerequisites to improved health, they are certainly not sufficient to attain it. The services must be effective and targeted both to the major causes of death in the population and also to those at greatest risk of death.

The provision of services in the home has been widely applied by family planning programs in developing countries (Wawer et al., 1985). Indoor household spraying with residual insecticide was widespread in the 1950s and 1960s as a means of controlling malaria (Chin, 1986). Otherwise, however, the provision of basic preventive and curative health services in the home has not been widely adopted.

The early experience of the Pakistan-SEATO Cholera Research Laboratory in establishing a surveillance system in 1963 for evaluating cholera vaccines (Aziz and Mosley, 1994) led to the creation of the Matlab Maternal and Child Health and Family Planning Project of the International Centre for Diarrhoeal Disease Research, Bangladesh — a treasured global resource for assessing selected maternal/child health and family planning interventions under carefully supervised and monitored conditions. This program collects vital events data and provides selected maternal/child health and family planning services through biweekly home visits from local community health workers (Fauveau et al., 1994).

There is a strong similarity between the CBIO approach as developed in Bolivia and the Matlab approach with respect to their methods of service delivery. The process of identifying and responding to community-defined priorities is more highly developed in the CBIO approach, however.

Much of this same tradition of community-based primary health care has been influential in guiding the development of the Jamkhed Comprehensive Rural Health and Development Project over the past 25 years. The Jamkhed Project serves over 100,000 persons living in impoverished communities in central India (Arole and Arole, 1994). The Jamkhed Project has implemented many of the principles outlined above, but it has also extended far beyond these principles by empowering communities to define and address a broader set of issues concerning individual and community well-being. Since the project's commu-

nity-based activities rely on only minimal assistance from paid support staff, readily sustainable community partnerships have emerged. In addition, the project has developed a local secondary referral hospital for treatment of medical and surgical emergencies which arise within the project area, and the cost of operating this facility is sustained with local funds (Arole and Arole, 1997). The health improvements which have occurred since 1970 in the Jamkhed Project population (Arole and Arole, 1994) are among the best ever documented for a community health project.

*The need for new approaches to primary health care in low-income countries*

In spite of the continued improvements in low-cost child survival technologies during recent decades, a substantial gap remains in our understanding about how most effectively to provide health services in ordinary, typical field situations. Furthermore, there is considerable uncertainty about the contribution which health care programs have made to the observed reductions in mortality in low-income countries during the past several decades (Ewbank and Gribble, 1993; Murray and Chen, 1993).

While it has been possible to carry out well-designed and closely supervised field trials to assess the effectiveness of specific interventions (see, for example, Koenig et al., 1991; West et al., 1991; Sazawal and Black, 1992), there has been much less progress in the field-testing of more comprehensive and long-term approaches to improving health in communities (two such examples are Gwatkin et al., 1980; Scrimshaw, 1995). Improved methodologies for routine monitoring of overall and cause-specific mortality among infants and children are still being developed and field tested (WHO/UNICEF, 1994).

*The advantages of the CBIO approach*

The CBIO approach is a long-term process which requires 7–10 years in order to complete the first cycle of activities and ideally a minimum of 10–15 years of involvement in order for the process to reach its full potential. Thus, it is not a suitable methodology for short-term projects. While the CBIO approach may appear to be unduly complicated and overly expensive, this has not been ARHC's experience. If the program is developed in the gradual and systematic fashion described above and if the communities themselves can be encouraged to carry out many of the services required by the CBIO approach, then the approach is practical and affordable.

One of the strengths of the CBIO approach is that evaluations can be carried out by the local program staff and community together. The results of these

efforts are then used by the program staffs and the communities together to guide their own future actions. Such a process empowers and motivates the participants and fosters long-term sustainability of the health program. The development of a methodology by which local communities can monitor their progress in health improvement is one of the great challenges facing international health today (Foster, 1996). The CBIO approach provides one possible path toward development of such a methodology.

There is still much to be learned about how health programs can 'package' and deliver a set of interventions so that a health impact (such as a decline in the infant mortality rate or a decline in the fertility rate) is actually achieved and documented in typical field settings. The CBIO approach represents one possible path to obtaining this knowledge.

To know that a specific intervention, such as the antibiotic treatment of children with symptoms of pneumonia, reduces mortality in carefully supervised and monitored community settings does not necessarily mean that the intervention will be equally effective in diverse and more routine field conditions (Gadomski et al., 1990). Continued progress in achieving Health for All will require that 'packages' of selected services be evaluated in routine field settings. Since the CBIO approach provides for a 'package' of health care services aimed at the most prevalent local causes of readily preventable or treatable serious illness and death, and since mortality impact assessment is an inherent aspect of the CBIO approach, the potential exists with the CBIO approach to assess changes in mortality associated with the introduction of a 'package' of essential health services.

The CBIO approach represents an inexpensive, practical and potentially accurate approach to longitudinal and prospective mortality measurement for local populations in low-income countries. New methods for mortality impact assessment are needed which are inexpensive, practical, and still reasonably accurate (Vernon, 1993). Improved mortality assessment methods can be of value not only for improving the quality of the programs themselves but also for guiding the formulation of national health policies (Ewbank and Gribble, 1993). But the attribution of improvements in mortality, if detected, to program effects rather than confounding influences requires suitable control populations and even then, the interpretation of results is often not straightforward (Graham, 1989).

The inclusion of services which can prevent or treat the major causes of preventable or treatable death within the population should obviously be a key element of any program whose goal is mortality reduction. However, as Gwatkin et al. (1980) observed,

unless the services reach those in need, even the best-conceived primary health and nutrition programs can obviously have little impact on mortality. Thus... the development of plans for getting services to the people [in real need] is as important as are decisions concerning which services should be offered.

The CBIO approach responds to this concern.

In reflecting on the lessons of the global smallpox eradication campaign of the 1960s and 1970s, one of the participants in that campaign made this observation (Hopkins, 1988):

most of all, this lesson [of successful eradication of smallpox] teaches us to be aware of [the limitations of] focusing entirely on processes, or any other means to an end rather than the end itself, which is reduction in morbidity and mortality.

The CBIO approach also incorporates this viewpoint.

The provision of compassionate services which respond to the acute medical needs of patients is a vital element of any primary health care program. But primary health care programs serving entire populations which have high rates of readily preventable or treatable morbidity, disability, and mortality should also strive to have a measurable impact on these rates. Therefore, the program should develop the capacity to monitor those rates over time. Just as a physician caring for individual patients needs to know if the treatment is effective, a primary health care program also needs to know if the community's health is actually improving. The CBIO approach provides a practical and feasible way to answer this question without having to resort to expensive and sophisticated demographic and epidemiologic research methods. The CBIO activities described here can all be carried out by local level staff and community collaborators without the assistance of computers or outside 'experts'.

The CBIO approach offers a 'middle way' to building on the strengths of both selective and comprehensive primary health care. Mosley (1988) considers 'categorical problem-oriented primary health care programs' to be 'middle way' approaches which avoid the polarization which this debate has engendered. A categorical problem-oriented primary health care program "sets out some specific goals and tasks with measurable endpoints and permits one to relate inputs to output and impact" (Mosley, 1988). The CBIO approach has this capacity.

Finally, the CBIO approach is uniquely suited to promoting those healthy behaviours in the home which are critical to improved health, such as promotion of exclusive breast-feeding and administration of adequate weaning foods, hand washing, appropriate sto-

rage of water, recognition of signs of pneumonia in children, family planning, and prompt recognition of obstetrical emergencies, among others. These types of activities, which address the proximate causes of mortality and morbidity within the community, will be needed in order for Health for All to be attained.

Chen et al. (1993) have argued that:

...there remains a need to evaluate rigorously the impact of a new technology or strategy in field conditions. Too many social, economic, managerial, political and cultural factors can alter the effectiveness of proven technologies in real field conditions... Given the magnitude of the investments, the health impact of major programmes such as the Expanded Programme on Immunization and Primary Health Care have been infrequently demonstrated. We need objective evaluation of the effectiveness of the field application of proven technologies...

The CBIO approach is a strategy for health improvement which merits rigorous evaluation in settings beyond Bolivia where rates of high morbidity and mortality also exist. Through the implementation of the CBIO approach, local capacity for addressing public health and primary health care problems can be strengthened. The strengthening of this local capacity is one of the great needs today of poor people around the world (Abed, 1996). Through the implementation of the CBIO approach, an integrated 'package' of services can be rigorously evaluated in typical field settings, including the impact of the 'package' on mortality. The need for such assessments of mortality impact have been pointed out by others (Ewbank and Gribble, 1993).

## Conclusion

The CBIO approach to primary health care described here has been developed during more than a decade of practical experience in Bolivia, South America. The concepts behind this approach have been derived from several generations of innovative community-based health activities around the world. While the application of CBIO concepts has been tailored to the Bolivian context, the methodology deserves wider application and evaluation. The experience with this and similar methodologies can contribute to the gradual emergence of a more effective paradigm for promoting the health of poor people in developing countries (Perry, 1996).

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