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**DESCRIPTION AND IMPACT EVALUATION
OF A MODEL COMMUNITY-BASED PRIMARY HEALTH CARE
PROGRAM IN MONTERO, BOLIVIA**

By

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**An abstract of
a thesis submitted to
the Faculty of the Rollins School of Public Health of Emory University
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2011**

Abstract

DESCRIPTION AND IMPACT EVALUATION OF A MODEL COMMUNITY-BASED PRIMARY HEALTH CARE PROGRAM IN MONTERO, BOLIVIA

By Hilary S. Moshman

Background: Community-Based Primary Health Care (CBPHC) has been identified as the optimum strategy to achieve desired reductions in under-five mortality. However, such programs are, at present, more the exception than the norm, and awareness of their potential is lacking in the global health field. More research on the effectiveness and methodology of CBPHC and dissemination of results are needed. Only then will countries, donors, foundations, and individuals increase their support

Objective: This paper examines a model CBPHC program in Montero, Bolivia, called Consejo de Salud Rural Andino (CSRA), and its utilization of the Census-Based, Impact Oriented (CBIO) principles. The development and current program of CSRA is described in order to share best practices and describe how community-based care is linked with facility-based care. This paper also assesses the change in infant and under-five mortality from 1991 to 2009 to assess the potential impact of CBPHC and those which use CBIO principles so that such programs may be further developed and scaled up.

Methods: Data on the history and description of the current program and the CBIO principles were gathered from literature and on the ground through observation, informal interviews with program staff, and formal interviews with key informants. Mortality data from the target population was gathered from CSRA records to assess the trend in infant and under-five mortality over the past 19 years.

Results: Annual infant mortality and under-five mortality in the CSRA service area declined by over 90% from 1991/1992 to 2009. Infant mortality declined from 54 deaths per 1000 live births in 1991 to 5 in 2009; under-five mortality declined from 96 deaths per 1000 live births in 1992 to 6 in 2009. The difference between the CSRA infant and under-five mortality rates at the beginning of the program and the rates at the end of the program are statistically significant at the conventional level.

Discussion: While it is likely that the decreasing infant and under-five mortality rates over 19 years is the result to the CSRA program, it cannot, without a control or comparison area, be proven beyond a reasonable doubt.

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Chapter 1: Introduction

In 1978, World Health Organization (WHO) member states established a goal of Health for All by the Year 2000 through a strategy of Primary Health Care. This goal was, however, not achieved. In the year 2000, the Millennium Development Goals were established to be achieved by 2015. Progress toward reaching two of the MDG Goals, reducing under-five and maternal mortality, is still lagging in many under-resourced countries, especially in Africa. (UNICEF, 2010; World Health Organization, UNICEF, UNFPA, & World Bank, 2010).

Global under-five mortality has declined from 90 deaths for every 1000 live births in 1990 to 65 in 2008 (UNICEF, 2010). A 28% decline in 18 years is unacceptably slow progress on one of humanity's most pressing challenges. Furthermore, this global decline masks the higher mortality among the world's poorest in sub-Saharan Africa and South Asia (UNICEF, 2010). Under-five mortality rates, on average, are more than twice as high among the poorest 20% of households compared to the wealthiest 20% of households in the same countries (UNICEF, 2010).

Using revised estimates, the maternal mortality ratio declined from 450 deaths for every 100,000 live births in 1990 to 290 in 2008 in the developing world, a decline of 34% (World Health Organization, et al., 2010). Maternal deaths are more likely to occur among the poor. In low-resource countries, only 28% of women in the lowest wealth quintile receive skilled birth attendance at delivery as compared to 84% of deliveries among women in the highest quintile (UNICEF, 2010).

“Community-based primary health care (CBPHC) is defined as health activities, such as health services or health education, which occur outside of the health facility and which may or may not be directly related to health activities occurring within health facilities” (H. Perry, 2011).

Community-Based Primary Health Care (CBPHC) has been identified as the optimum strategy to achieve desired reductions in under-five mortality; emerging evidence regarding the potential for CBPHC for improving maternal health is promising. A recent comprehensive review of CBPHC programs revealed that its strengthening has the potential to greatly accelerate progress to meet the MDGs for health, not only for mothers and children but also for controlling HIV/AIDS, tuberculosis and malaria (H. B. Perry, Freeman, Gupta, & Bahie, 2009). However, sustainable, comprehensive and community-based primary health care programs are at present more the exception than the norm; awareness of the potential of CBPHC is lacking in the global health field (H. B. Perry, et al., 2009). More research on the effectiveness of CBPHC and dissemination of results are needed. Only then will governments, communities, bilateral and multilateral donors, foundations, and individuals increase their support.

Problem Statement

Given that CBPHC has been promoted as the optimum strategy to achieve Health-for-All and the Millennium Development Goals for maternal and under five mortality, it is imperative that CBPHC programs be described and assessed for effectiveness and cost. A recent report on community-based primary health care (CBPHC) noted the lack of studies documenting effectiveness of both long-term programs and programs in peri-urban areas (H. Perry et al., 2007; H. B. Perry, et al., 2009). Current literature also lacks analysis of the synergy of community-based health care workers and health facilities. Despite the increasing interest in CBPHC and a growing recognition that community participation further improves health outcomes, studies on the role of the community are lacking (H. B. Perry, et al., 2009).

Furthermore, a few articles have been written about CBPHC and the use of Census-Based, Impact Oriented (CBIO) principles that focus attention on the sub-populations at greatest risk of morbidity and mortality (H. Perry, 1993; H. B. Perry et al., 1998). The Consejo de Salud Rural Andino (CSRA) Primary Health Care Program in Montero, Bolivia has been recognized as an international model of primary health care.¹ CSRA/Montero (hereafter referred to as CSRA) was initiated in Montero in 1989 and is widely recognized as one of Bolivia's leading primary health care programs. Only one comprehensive impact evaluation of the CSRA program in Montero has been published (H. Perry, 1993). No history of the program, such as how it started and evolved, has been published. Such a history and description of the program can inform other health projects how a CBPHC program that uses CBIO principles starts and develops over time.

Without further evidence of the long-term effectiveness and sustainability of CBPHC programs and those which use CBIO principles, these types of approaches cannot be promoted and adapted. This case study is directed at describing and measuring the effectiveness of the CSRA CBPHC Program. If there is strong evidence that it is effective in reducing maternal and child mortality, the findings would support the use of similar approaches at other program sites in other low-resource countries.

Purpose Statement

This thesis provides a description of the CSRA program and its use of CBIO principles from its inception in 1989 to the present. This paper also assesses the change in infant and under-five mortality from 1991 to 2009. This description and history of the CSRA program and assessment of change in mortality in the CSRA population will supplement the scant literature on CBPHC programs and those which utilize the CBIO methodology; this

¹ Although CSRA in Bolivia includes several different programs, CSRA in this paper is limited to the Montero program.

case study will provide new documentation of particular aspects of this program, namely long-term and peri-urban CBPHC programs, and the linkages between community, community health care workers and volunteers, and health facilities.

Research Questions

- What is the history of the CSRA program?
- How has the CSRA program implemented CBIO principles?
- How did the program link facility-based care with the community-based care and community health workers?
- What is the time-trend in infant and under-five mortality within the CSRA population from the program's inception until the present?

Significance

This paper's findings and the plausibility evaluation framework will be used to write papers for peer-reviewed journals. In addition to the findings from this paper, a plausibility evaluation will be completed to assess the impact of the program on infant and under-five mortality. When published, the documentation of this model and a scientific analysis of the evidence of its impact on the health of the population will be shared with public health workers, community leaders, government officials, policy makers, donors and communities. If the impact of the program on infant and under-five mortality is found to be positive, it is hoped that the model may be further developed, replicated and scaled up in high-mortality, low-resource settings to achieve similar improvements in child survival. While it was hoped that this thesis would also be able to address maternal mortality, analysis of the data revealed that the number of maternal deaths is so small that meaningful quantitative analysis is not possible.

Chapter 2: Literature Review

This literature review evaluates published literature on the health impact of CBPHC programs in the developing world. First, there will be a discussion of the existing evidence for the health impact of CBPHC programs and the debate around the evidence for the positive impact by CBPHC programs. Then the criteria for the inclusion in the review of case studies with evidence of impact of CBPHC programs will be described; this will be followed by nine case studies of eight programs, including a description of the CBPHC program and the impact found.

Introduction

While CBPHC is often cited as an optimum strategy for low-resource populations, most available literature lacks a description of essential components such as a defined target population, a comparative comparison population, or appropriate measures of impact or cost. It is not possible to compare the impact of CBPHC programs and their interventions with each other because of differing outcome measures used. For example, in Macinko et al.'s review, the authors found that

“...PHC has only rarely been evaluated in a consistent and reproducible way. Rather, it is often only various aspects of health services that are assumed to be part of PHC that have been the focus of attention. For example, all but 3 studies measured PHC exposure as residence within a geographic area in which the PHC program or project was implemented. In addition, the definition of the PHC program also varied considerably, from the mere presence of a VHW in a community to the use of specific services to the development of an integrated network of health and social services in the community” (Macinko, Starfield, & Erinosh, 2009, p. 158).

Conducting a rigorous scientific evaluation is time-consuming and expensive, and is judged by some as unnecessary. “Such evaluations are expensive, carry the risk of showing negative results and are under-appreciated by donors. Consequently, there are few credible

data on the impact of ongoing aid work” (Mann, Eble, Frost, Premkumar, & Boone, 2010, p. 727).

In addition, there is a lack of evaluations of the long-term impact of long-term programs (H. B. Perry, et al., 2009). Health indicators that continue to improve over time—such as over periods of 10 years or more—are essential to assess the sustainability of benefits. Given that 50% of the world will be urban by 2050, there is also an urgent need for documentation of CBPHC effectiveness in urban areas.

Evaluation of CBPHC Programs

In addition to the lack of evidence of the long-term impact of CBPHC programs, there is “considerable debate” about the effectiveness of PHC based on the current literature (Macinko, et al., 2009, p. 151) who cited (Filmer et al., 2000; Lewis et al., 2004). Scholars debate the effectiveness of PHC versus single interventions, which may or may not be community-based. UNICEF argues that integrated health systems that utilize “home, community, outreach and facility-based care” are more effective than “myriad separate initiatives” (UNICEF, 2009, p. 18). Hill et al. disagree.

“A few of the more carefully studied interventions have suggested that broadly based approaches such as Primary Health Care (PHC) have been relatively ineffective (Greenwood *et al.* 1990a,b; De Francisco *et al.* 1994; Magnani *et al.* 1996; Jaffar *et al.* 1997), whereas disease-specific interventions, especially vaccination programs, appear to have had a clearer impact on mortality (World Bank 1994; Desgrées du Loû *et al.* 1996). The evidence so far on the effectiveness of PHC is rather slim.... (Cham *et al.* 1987; Kasonde & Martin 1994; Chabot *et al.* 1995)” (Hill, MacLeod, Joof, Gomez, & Walraven, 2000, p. 107).

The reason for evidence of the ineffectiveness of CBPHC could be due to an ineffectively operated CBPHC program, not to the grassroots approach itself. Hill et al. explains.

“In recent World Bank publications there is a shift in attention from community-based health care at village level to strengthening basic health services at higher levels (World Bank 1993, 1994). This is in part a reaction to discouraging assessments of the contributions of village health care systems to health improvements. In many cases, the apparent lack of success may be partly due to poor functioning of dispensaries, health centres and district hospitals to support the village health care initiatives, the lack of supervision and continuing education of VHWs and TBAs rather than to the system itself’ (Hill, et al., 2000, p. 116).

Like Hill et al.’s review, Perry et al.’s review of CBPHC programs also found that there is evidence of impact on child mortality of singular interventions (H. B. Perry, et al., 2009). They did not conclude, however, that the CBPHC programs were ineffective, but that there was a need for stronger quality of evidence for integrated programming.

Criteria for Selection of Literature for This Review

The criteria for inclusion of an impact evaluation of a CBPHC program in this review included the following:

- The target population served by the program must be poor and underserved in health care prior to the program.
- The population studied could reside in rural, urban or peri-urban areas.
- The program must be in a low-resource country.
- The program must be “community-based” in that it must involve lay members of the community in some aspect of the program, such as needs assessment, program planning, provision of health care, health education, qualitative evaluation or feedback.
- The evaluation must be scientifically rigorous. It must have a suitable control or comparison population not exposed to the program. Assessment of comparability of the two populations must use reliable data on demographic, socio-economic, or health service utilization indicators, and mortality.

- The evaluation must measure the impact on maternal health, child health or both using mortality indicators.
- Since seven years is the minimum time recommended to demonstrate longer-term and sustained impact (Bossert, 1990), the study must have covered a time period which ended at least seven years after the inception of the program. There is no minimum time period which the study must cover.
- The evaluation does not have to show either a positive or negative impact on health.

CBPHC Evaluations Meeting Criteria

This review of the literature identifies nine impact evaluations of eight CBPHC programs in Africa, Asia and the Caribbean. (see Table 1). This impact evaluation of Consejo de Salud Rural Andino in Bolivia will add to the more limited evidence of CBPHC programs in the Western Hemisphere as well as in Latin America.

All programs utilized members of the community to voluntarily provide basic health education and/or primary health care in the home. These volunteers, almost always women, were called Community Health Workers (CHWs), Community Health Volunteers (CHVs), Village Health Workers (VHWs), or Health Agents. Two of the programs – both in Africa – were started by governments. The other programs were started by individuals or international NGOs.

All studies measured the impact on childhood mortality (i.e. infant, one-to-four, and/or under-five mortality). Evaluations measured impact over the span of seven to forty one years.

Program	Interventions of PHC program	Community-based	Comprehensive PHC	Length of study	Impact found
Comprehensive Rural Health Project, Jamkhed, Maharashtra, India (Arole & Arole, 2002; Mann, Eble, Frost, Premkumar, & Boone, 2010)	Comprehensive primary health care with an emphasis on maternal and child health, women's empowerment, and community empowerment. First-level hospital care also provided.	VHWs, women's groups, men's groups, mobile health team	Yes	1992-2007	Neonatal mortality rate neonatal was 37.7 in program area and 35.7 in comparison area for 15-year period. U5MR was 55.5 (49.6, 62) in program area and 60.8 (54.7, 67.5) in control area. Both IMR and U5MR were not different between the groups at a statistically significant level. The reduction in post-neonatal mortality rate from 1992-2007 was statistically significant (hazard ratio=0.70, 95% CI: 0.52, 0.94, p<0.02).
Society for Education, Action and Research for Community Health (SEARCH), Maharashtra, India (Bang, Bang, Baitule, Reddy, & Deshmukh, 1999)	Comprehensive primary health care with an emphasis on maternal and child health, women's empowerment, and community empowerment. First-level hospital care also provided.	Trained TBAs, VHWs, participatory research	Yes	1995-1998	Perinatal mortality decreased by 30% from 68 deaths per 1000 births in 1993-5 to 48 in 1997-8; Neonatal mortality decreased by 59% from 62 deaths per 1000 live births in 1993-5 to 25.5 in 1997-8; IMR decreased by 49% from 75.5 deaths per 1000 live births in 1993-5 to 39 in 1997-8. All differences were significantly lower than in the comparison area at the p=<0.001 level
MATLAB, Maternal and Child Health and Family Planning (MCH-FP) Project, Matlab, Bangladesh (Fauveau, Stewart, Khan, & Chakraborty, 1991; Fauveau, Stewart, Chakraborty, & Khan, 1992)	MCH, FP, EPI, OR, nutrition, delivery care, clinic-based services, first-level hospital care	CHWs, resident nurses	Yes	1987-1990 1988-1989	Obstetric MMR decreased by 68% from 440 to 140 in intervention area and by 2.5% from 390 to 380 in control area. There was a statistically significant difference between MMRs of the 2 areas for the three year study period (p=.02). U5 ALRI-specific mortality decreased by 32% from 4.7 deaths per 1000 person-years of exposure during 1986-1987 before the intervention to 3.2 for the two year intervention period of 1988-1989 (p<0.01) and decreased by 6% from 6.5 in 1986-87 to 6.1 in 1988-89 in control area but the change over time was not statistically significant.
Light for Life, Mozambique (Edward et al., 2007)	Community-based Integrated Management of Childhood Illness, health education	CHVs, Care Groups, trained village health committees, pastors, traditional healers	No (a limited number of MCH interventions provided)	2000-2003	IMR declined by 66% from 70 deaths per 1000 births (62.4—77.2) to 24 (20.2—27.6) from 2000-2003 and decreased by 25% from 135 to 101 in comparison 1997-2003. U5MR declined by 62% from 119 deaths per 1000 live births (109.6—128.4) to 45 (40.0—50.2) 2000-2003 and declined by 24%, from 201 to 153 1997-2003. No p-value stated.

Table 1

Table 1

Program	Interventions of PHC program	Community-based	Comprehensive PHC	Length of study	Impact found
Light for Life Child Survival Project, Ponhea-Kriek and Dombe Districts, Cambodia (H Perry et al., 2011)	Community-based maternal and child health	Women health educators, village leader, Care Groups	No (a limited number of MCH interventions provided)	2000-2005	U5MR declined by 73% from 129 in 2000 in the project area to 35 in 2005. National U5MR declined by 30% from approximately 118 in 2000 to approximately 83 in 2005, No mention of statistical significance.
Community Health and Family Planning Project (CHPS), Northern Ghana (Binka et al., 2007; Nyongator, Awoonor-Williams, Phillips, Jones, & Miller, 2005)	Vitamin A supp, ITNs, clinical services + FP, vaccines, curative care	Traditional leaders, women's groups, community input, community volunteer	Yes	1996-2003	Child mortality declined 55% from 224 to 100 per 1000 person-years in cell with community volunteers & nurses, while child mortality declined 32% from 212 to 145 deaths per 1000 person-years in comparison area. Paper did not mention statistical significance.
The Gambia national health system, The North Bank Division, The Gambia (Hill, MacLeod, Joof, Gomez, & Walraven, 2000)	EPI, MCH, prenatal post-natal care, deliveries in both intervention and comparison area; + health education	Community Health Nurse, Village Development Committee, VHW, trained TBA,	Yes	1982-1996	No significant difference in IMR between PHC areas and comparison for whole period. Child mortality rate ratios of both groups similar 1982-86. CMR lower in PHC area (23.1) than in comparison area (34.6) at statistically significant level in 1989-1992. CMR lower in PHC area than in comparison area at nearly statistically significant level 1992-94. No difference between CMRs between both groups 1994-96. No p-values stated.
Hôpital Albert Schweitzer, Artibonite Valley, Haiti (Henry Perry et al., 2007; Henry Perry et al., 2006)	MCH, FP, vaccines, nutrition, AIDS, TB, education, delivery	CHVs, Health Agents, mobile clinics, trained lay midwives and traditional healers, participatory research	Yes	1970-1999	IMR in HAS area declined from 47 deaths per 1000 live births in 1970 to 34 in 1972 but increased back to 47.3 (39.3, 56.6) by the 1995-1999 period and in Haiti declined by 45% from 147 in 1970 to 80.3 (68.7, 91.7) in 1995-1999 period. HAS U5MR declined 23% from 81 per 1000 births in 1970 to 62.3 (53, 72.8) in 1995-1999 and in Haiti decreased by 53% from 253 in 1970 to 118.6 (101.7, 135.6) in 1995-1999. Differences between intervention rates and national rates for same or similar period were statistically significant.
<p>IMR: infant mortality rate (infant deaths per 1000 live births) U5MR: under-five mortality rate (under-five deaths per 1000 live births) CMR: Child (age one to four) mortality rate (one-to-four deaths per 1000 live births) ALRI: Acute Lower Respiratory Infection MMR: maternal mortality ratio (maternal deaths per 100,000 live births) PHC: primary health care</p>					

Three reviews conducted in 2009 aided the search for evidence of the impact of CBPHC programs on maternal and child health. One review by Macinko et al. 2009 assessed the impact of primary health care programs; not all were community-based. The authors conducted a systematic literature review and found 10,000 articles which contained their search words and narrowed down the stack to 36 studies which were peer-reviewed evaluations of PHC programs in the developing world and which specified interventions; not all studies used a control or comparison (Macinko, et al., 2009, pp. 151-152). The review found that “nearly all studies point to a positive impact of the PHC intervention studied; only five articles show no improvement attributable to PHC. The magnitude of impact varied considerably. Reductions in infant and under-5 mortality attributed to PHC averaged more than 40% and varied from a low of 0% to a high of 71%; interventions lasted from 2 years to more than 10 years” (Macinko, et al., 2009, p. 152).

Perry et al. conducted a 2009 review of the evidence of the impact of CBPHC on children’s health (H. B. Perry, et al., 2009). In order for the evidence to be considered, the CBPHC program had to include at least one community-based intervention to improve child health and had to be located in a high mortality low-resource setting. Based on “416 published articles and program documents” and “53 published literature reviews,” the authors found strong evidence of singular interventions; however, evidence of effectiveness of comprehensive and established CBPHC programs was limited (H. B. Perry, et al., 2009, pp. 4, 6, 15). There were “very few high-quality studies of the effectiveness of integrated programs in improving child health in routine settings. The evidence is encouraging, but more studies are needed....” (H. B. Perry, et al., 2009, p. 15).

In another 2009 review of the impact of CBPHC on child health, Freeman et al. identified four programs which lasted ten years or more with evidence of long-term impact

on under-five mortality (Freeman, Perry, Gupta, & Rassekh, 2009, p. 5). These programs are the Jamkhed Comprehensive Health Care Project in Jamkhed, India; the Society for Education, Action and Research in Community Health (SEARCH) in Gadchiroli, India, the International Center for Diarrheal Disease Research in Bangladesh's (ICDDR) Maternal and Child Health-Family Planning program in Matlab, Bangladesh, and the Hospital Albert Schweitzer program in Haiti (Freeman, et al., 2009). Impact evaluations of these four programs are discussed below.

Jamkhed Comprehensive Rural Health Project (CRHP), Jamkhed, Maharashtra, India

The Comprehensive Rural Health Project started in 1970 with a health center in a rural area of Maharashtra state in central India (Arole & Arole, 2002). This program has not only addressed issues in health; it is an integrated development program addressing economic, environmental and cultural challenges. "The aim of the community-based primary health care (CBPHC) approach to health and development is to enable and empower people and communities to take health in their own hands" (Jamkhed Comprehensive Rural Health Project, 2011).

A recent retrospective long-term evaluation of under-five mortality was conducted in the Comprehensive Rural Health Project area (Mann, et al., 2010). A survey was conducted between September 2007 and January 2008 of 2,508 mothers in 75 villages in the comparison area and 2,432 mothers in 75 villages in the project area where the Village Health Worker (VHW) had been working for at least five years. The villages in the comparison area were at least five kilometers away from the CRHP intervention area. The survey collected data on births and deaths of children in the last fifteen years before the survey (1992 to 2007). Only births that occurred five years after the project had started in the particular village were counted in the survey in order to allow the project to make an

impact. There were 5,379 eligible live births in the project area and 5,515 eligible live births in the comparison area. The survey also collected data on four confounding variables: mother's age, type of irrigation used, caste and religion of the mother (Mann, et al., 2010). The study adjusted for irrigation type and mother's caste and religion. There was not a statistically significant difference between median age of the two groups so age adjustment was not carried out.

Mortality rates and relative risks for mortality based on categorical independent variables (expressed as hazard ratios) were calculated for the entire fifteen-year period for the intervention and comparison group (Mann, et al., 2010). Neonatal mortality rate in the program area was 37.7 (33, 43.2) and the rate in the control area was 35.7 (31.1, 41), lower than the program area. The difference in the neonatal mortality rates between the two groups for the fifteen year period was statistically significant. There was no statistically significant *reduction in hazard* of neonatal death in the intervention area compared to the comparison area from 1992 to 2007. However, there was a statistically significant *reduction* in the 1-59-month *mortality* in the intervention area from 1992 to 2007 (hazard ratio=0.70, 95% CI: 0.52, 0.94, $p<0.02$). The under-five mortality for the fifteen- year period in the program area was 55.5 (49.6, 62) and the under-five mortality in the control area was 60.8 (54.7, 67.5). The under-five mortality rates were not different between the groups at a statistically significant level (Mann et al. 2010).

Society for Education, Action and Research in Community Health (SEARCH), Maharashtra, India

The Society for Education, Action and Research for Community Health (SEARCH) started in 1986 in Gadchiroli District, in Maharashtra state in India. Since 1988, the program facilitators have trained female VHWs and female traditional birth attendants (TBAs) in an increasing number of health interventions. This started with the case management of childhood pneumonia in the intervention area (Bang, Bang, Baitule, Reddy, & Deshmukh, 1999). This training in case management of childhood pneumonia was not given in the comparison area, “where these tasks were done by the government health services” (Bang, et al., 1999, p. 1956). TBAs also “distribute iron and calcium tablets to pregnant women, treat common reproductive-tract infections in women, and undertake hygienic delivery” (Bang, et al., 1999, p. 1956).

However, in 1994, when the first study started, the program was already providing other services to both comparison and intervention areas such as “reproductive health education for adolescents, management by village health workers of minor health problems such as malaria, scabies, diarrhea, or wounds, and consultation and prenatal care at the referral clinic outside the field research area” (Bang, et al., 1999, p. 1956). Female VHWs gathered baseline data on live births, neonatal and infant deaths from 1993 to 1995 in the intervention and comparison villages. Baseline neonatal mortality rate in the intervention and comparison area were considered similar: 62 per 1,000 in the intervention area and 58 in the comparison area. Socio-economic characteristics in both areas were also considered similar.

When community meetings identified neonatal mortality as a major health problem and surveillance data described above documented high rates of neonatal mortality, village women with five to ten years of education in 39 of the 53 intervention villages were trained in neonatal care, including airway management, sleeping bags for warming, immediate breast feeding, and identification and treatment of sepsis (Bang, et al., 1999). Female VHWs were not utilized in the 47 comparison villages (Bang, et al., 1999, p. 1957).

After the third year of implementation, perinatal mortality had decreased from 68 deaths per 1000 births in 1993-5 to 48 in 1997-8, a decrease of 30%; neonatal mortality had decreased from 62 deaths per 1000 live births in 1993-5 to 25.5 in 1997-8, a decrease of 59%; and infant mortality had decreased from 75.5 deaths per 1000 live births in 1993-5 to 39 in 1997-8, a decrease of 49%. All differences were significantly lower than in the comparison area at the $p < 0.001$ level (Bang, et al., 1999).

The authors conclude, “Even in populations with poor economic and nutritional status and low female literacy, the infant mortality rate can be reduced by nearly half through health education and home-based neonatal care. This model can be replicated in other developing countries, in which it should become part of primary health-care and part of the Integrated Management of Sick Children approach proposed by WHO” (Bang, et al., 1999, p. 1961). The fact that “in many developing countries, deaths of newborns account for over half of all deaths in infancy, with the vast majority occurring in the first few days of life” means that an effective strategy to reduce neonatal mortality should be recognized and replicated (Bhutta, 2009, p. 57). In UNICEF’s State of the World’s Children 2009 report, this study and the effectiveness of the community-based strategy were recognized (Bhutta, 2009).

ICDDR, B Maternal and Child Health—Family Planning (MCH-FP) Program, Matlab, Bangladesh

The Maternal and Child Health—Family Planning (MCH-FP) program, an initiative of the International Centre for Diarrheal Disease Research, Bangladesh (ICDDR, B), was established in 1977 in Matlab, Bangladesh (Fauveau, Stewart, Khan, & Chakraborty, 1991; Fauveau, Stewart, Chakraborty, & Khan, 1992).

In the intervention area in 1977, young women with at least a high school education were trained as Community Health Workers (CHWs) for the new MCH-FP program (Aziz & Mosley, 1991). The CHWs, “administered EPI (Expanded Programme on Immunization) vaccines, promoted oral rehydration, distributed vitamin A capsules, provided nutritional education, detected and referred malnourished children, distributed safe-delivery kits and iron tablets to pregnant women, and provided family planning counseling and contraceptives. Using motor boat ambulances or rickshaws, severely sick children or mothers were transported to one of four decentralized MCH-FP outposts staffed by paramedics, or to the central Matlab clinic where at least one female physician was always available” (Fauveau, et al., 1991, p. 1184).

A study of the effect of a maternity care program within the MCH-FP program on obstetric maternal mortality was conducted from 1987 to 1990. Obstetric deaths were defined as “those that occurred during pregnancy, delivery, or six weeks after termination of pregnancy and were attributed to obstetric complications” (Fauveau, et al., 1991, p. 1184). The comparison area, then and still today, receives “basic government services where coverage and utilization is low” (Fauveau, et al., 1992). “Demographic, socioeconomic, and health-service use indicators were similar in both” the comparison and intervention areas in 1986 (Fauveau, et al., 1991, p. 1186). Also, for three years before the intervention, other

health and family planning services and the obstetric maternal mortality ratio were similar between the two study areas.

The maternity care program was implemented in 1987 within the MCH-FP program in 39 villages with 48,000 people, including 10,260 women aged 15 to 44. The comparison area had about 51,000 people with 11,564 women of reproductive age. Government trained nurse midwives were posted in villages to provide prenatal care, attend deliveries, “detect and manage obstetric complications at onset, and accompany patients requiring referral for higher-level care to the project central maternity hospital,” and visit women soon after the delivery (Fauveau, et al., 1991, p. 1183).

The obstetric maternal mortality ratio in the intervention area decreased from 440 per 100,000 live births in 1987 to 140 in 1990, a decrease of 68%, while the maternal mortality in the comparison area decreased from 390 in 1987 to 380 in 1990, a decrease of 2.5%. There was a statistically significant difference between the mortality ratios of the two areas for the intervention period ($p=.02$). Although the children were not randomly assigned to be in the comparison or intervention area, the authors state that the observed decline in maternal mortality in the intervention area was due to the intervention since the two populations were so similar before the implementation of the intervention (Fauveau, et al., 1991).

Another study on the effect of community management of acute lower respiratory infection (ALRI) on under-five mortality was conducted at the same site and at the same time as the study above (Fauveau, et al., 1992). In 1986 and 1987, ALRI-specific under-five mortality rates were calculated for both intervention and comparison areas. During the intervention period, there were 33,679 children in the comparison area and 30,350 children in the intervention area. The intervention lasted from 1988 to 1989. CHWs were trained

“to detect children with ALRIs, assess the severity, and treat or refer them” (Fauveau, et al., 1992, p. 110). For the two- year period of 1986 to 1987 before the intervention began, “the ALRI-specific mortality rate (calculated as number of deaths per 1000 person-years of exposure) for children under five was 28% lower in the intervention area than in the comparison area. The ALRI-specific mortality rate in the intervention area decreased by 32%, from 4.7 deaths per 1000 person-years of exposure during the two- year period of 1986-1987 before the intervention to 3.2 for the two-year intervention period of 1988-1989 ($p < 0.01$) (Fauveau, et al., 1992). The ALRI-specific mortality rate in the comparison area decreased by 6%, from 6.5 deaths per 1000 person-years of exposure in 1986-87 to 6.1 in 1988-89 ($p > 0.05$). For the two- year intervention period of 1988 to 1989, the ALRI-specific mortality rate of 3.2 in the intervention area was 48% lower than the rate of 6.1 in the comparison area ($p < 0.001$) (Fauveau, et al., 1992). The difference between the reduction in mortality over the two time periods for the two areas was statistically significant (χ^2 test for heterogeneity: 4.1, $p < 0.05$) (Fauveau, et al., 1992).

Although the children were not randomly assigned to be in the comparison or intervention area, the authors believe that the observed differences can reasonably be accredited to the intervention because pre-intervention data had shown that the two populations were very similar. “This is reinforced by the observation that the decline in ALRI-specific mortality was statistically significant, while the decline in mortality due to other causes was not” (Fauveau et al. 1992, p.112).

In summary, the study “suggests that the nonspecific MCH-FP interventions reduced ALRI mortality among under-5-year-olds by one fourth and that the additional specific community-based ALRI treatment programme reduced it further by one third” (Fauveau, et al., 1992, p. 112).

World Relief Child Survival Project, Mozambique

The international NGO World Relief implemented and operated a community-based child survival program in Mozambique, Gaza province in Guija and Mabalane districts from 1996 to 1999 (Edward et al., 2007). In 2000, the program was scaled up to five additional districts in the most rural and isolated portions of Gaza Province, reaching a total population of 247,000 people. Community members were trained as Community Health Volunteers (CHVs) to make monthly home visits to ten of their neighboring homes where children under age five reside. During the visit they provided health education. Ten to fifteen CHVs and a program staff person convened monthly as a Care Group. The Care Group model “supported the effective implementation of community Integrated Management of Childhood Illness (IMCI) by linking communities and health systems” (Edward, et al., 2007, p. 815). The program “also created strategic partnerships and training for village health committees, village pastors and traditional healers” (Edward, et al., 2007, p. 815).

According to data from the project’s vital registration system for Chokwe district, over the three year period 2000-2003, infant mortality rate declined from 70 infant deaths per 1000 live births (62.4-77.2) to 24 infant deaths per 1000 live birth (20.2-27.6), a decrease of 66%. Over the same period, under-five mortality rate declined from 119 deaths per 1000 live births (109.6—128.4) to 45 deaths per 1000 live births, (40.0—50.2), a decrease of 62% (Edward, et al., 2007). According to a retrospective pregnancy history survey in the same district, infant mortality declined from 129.4 infant deaths per 1000 live births (79.179.9) in the 1998-99 one-year period to 45.3 (21.2-69.4) in the 2003-2004 one-year period, a decrease of 65% over five years. Under-five mortality declined from 162.7 deaths per 1000 live births (112.6-212.7) in the 2000-2001 one-year period to 90.6 (57.4-123.8) in the 2003-2004 one-year period, a decline of 44% over three years.

In contrast, Mozambique as a whole did not achieve such large reductions in childhood mortality over a six-year period. The authors used mortality data from the Demographic and Health Survey in Mozambique. According to the DHS, from 1997 to 2003 infant mortality rate declined by 25%, from 135 to 101, and under-five mortality rate declined by 24%, from 201 to 153. The paper did not cite a p-value for the difference between the two rates over time. The authors warn that “attributing causal factors for mortality reduction requires rigorous field trials; therefore these findings must be interpreted with caution” (Edward, et al., 2007, p. 819).

According to two 30-cluster Knowledge, Practice and Coverage surveys conducted in 1999 and 2003, health service coverage and utilization significantly improved in the child survival program. “Coverage and access to basic health services was increased to 99% of households” from 1999 to 2003 (Edward, et al., 2007, p. 820). A year after the program was initiated, children treated for fever at a health facility within 24 hours increased from 28% to 86%. It is very likely that the rest of the country did not demonstrate such increase in utilization of health services and behavior change, and therefore the findings strongly suggest that it was the child-survival project that caused the decline in infant and under-five mortality.

The authors listed a variety of health interventions and program strategies that they believe contributed to the significant drop in mortality. One mentioned was the support provided to the CHVs by the program staff through the Care Groups. Another was the high number of contacts between the CHV and the child’s caretaker due to the fact that the CHV was only in charge of ten households. More contact allowed the CHV to provide more health education and encourage utilization of health care services.

World Relief, Light For Life Child Survival Project, Cambodia

World Relief established the Light for Life Child Survival project which was funded by USAID and its Child Survival and Health Grants program (H. Perry et al., 2011). The program began in 1998 in the Ponhea-Kriek District with a population of 78,000; it expanded to Dombe District in 2003 to 185,000 people with 20,000 children under age five and 26,000 women of reproductive age. During the first part of the project, the Ministry of Health provided health care to the area and in the latter part such health activities were managed by Save the Children Australia through a contract with the district Ministry of Health. Throughout the entire period, World Relief managed the community-based activities of the Care Groups and their interaction with the local health care system.

In 1998, the project conducted a baseline household survey and decided to focus interventions on maternal and child health “in harmony with the MOH system” (H. Perry, et al., 2011, p. 170). Voluntary women health educators were given responsibility for ten to fifteen households around her home. They visited homes to teach mothers of children under age five about disease prevention and the importance of utilization of health services for both prevention and treatment. These women volunteers met monthly in Care Groups, where a staff supervisor taught a new health message for the women to relay to the households of which they were in charge. Monthly, the supervisors and a village leader met with health facility staff to inform them of the health status of their village while the facility staff told them anything they should know, such as when the vaccination team would be coming to their village. “The project also worked to strengthen the quality of care provided to sick children at the health centers” (H. Perry, et al., 2011, p. 171).

Using vital events data gathered monthly by the health educators from 2000 to 2005, the under-five mortality rate declined by from 129 deaths per 1000 live births in 2000 in the project area to 35 deaths per 1000 live births in 2005, a decrease of 73%. The under-five mortality nationally fell from approximately 118 in 2000 to approximately 83 in 2005, a decline of 30%, less than half that observed in the project area. A similar and slower rate of decline was also observed for the province in which the project was located. The statistical significance of the differences was not reported. According to qualitative research conducted by an external party, community participation was an important “contributor to success” and “local authorities and community leaders were involved in the project and claimed ownership in it” (H. Perry, et al., 2011, p. 171).

Community Health and Family Planning Project, Ghana

In 1994, the Navrongo Health Research Centre (NHRC), an institution of the Ghana Ministry of Health/Ghana Health Service, initiated a pilot project in three villages in Northern Ghana (Binka et al., 2007; Nyonator, Awoonor-Williams, Phillips, Jones, & Miller, 2005). The purpose of the Community Health and Family Planning Project (CHFP) was to explore appropriate interventions for a “community health care programme” (Nyonator, et al., 2005, p. 26).

In 1995, the CHFP project began a randomized plausibility trial to assess the impact of community volunteer health workers and nurses on child survival (Binka, et al., 2007; Phillips, Bawah, & Binka, 2006). “Clusters of villages were randomized into four contiguous areas” (Binka, et al., 2007, p. 580; Phillips, et al., 2006).

One cell implemented health services provided by community volunteers. Women were also encouraged to participate in community activities traditionally done by men in order to increase their autonomy in seeking reproductive and child health services (Phillips et al. 2006). Supervisors were trained to “organize community supervision” of the volunteers’ work (Binka, et al., 2007, p. 580).

The second cell used nurses trained to be Community Health Officers who lived and worked in a small health facility built by volunteer labor, and whose work was supported by community members. The nurse provided health care at the small health facility and visited households. The nurse administered immunizations and provided family planning and curative services (Phillips, et al., 2006).

The third cell included the same community volunteer services provided in the first cell as well as the same services provided by the Community Health Officers in the second cell. A fourth cell served as the comparison area.

A demographic surveillance system assessed the impact of the four interventions that were provided in a total population of 139,000 people.

From 1995 to 2003, under-five mortality declined in the combined experimental area from 224 deaths per thousand person-years to 100 deaths per thousand person years, a decline of 55%. In the comparison area under-five mortality declined from 212 deaths per 1000 live births to 145 per 1000 person-years, a decline of 32% (Phillips, et al., 2006). Statistical significance was not provided in the paper.

The cell with the community volunteers showed no greater impact on under-five mortality than in the comparison cell. The decline in child mortality in the comparison cell was thought to be due to the impact of vitamin A supplementation and provision of insecticide-treated bednets, two interventions implemented previously, as well as to other interventions (Binka, et al., 2007). The trial demonstrated that the combination of interventions in the cell with the nurses made possible the achievement of the MDG for child survival within eight years (Phillips, et al., 2006). “By combining the provision of cheap and effective technologies with strategies for mobilizing community participation and extending access to nursing services, Navrongo has demonstrated feasible means of accelerating the pace of child survival improvement” (Binka, et al., 2007, p. 581).

The results of this study are reinforced by the 2003 Ghana DHS which showed that Ghana’s overall infant and under-five mortality rates rose from 1998 to 2003 while in the Upper East Region of Ghana, where the CHFP project resides, infant mortality rates declined by 61%, from 85 to 33 between 1993 and 2003, and under-five mortality declined by 63%, from 188 to 70. “These declines have occurred despite the fact that the Upper East is Ghana’s poorest and most remote region. Progress achieved in the locality cannot be explained by rapid economic progress or social change” (Binka, et al., 2007, p. 579).

The study did not provide sufficient detail regarding the work of the community volunteers or any possible explanation for their ineffectiveness. This is the only study in the literature review that found that the community volunteers had no positive impact on mortality. Of interest is that these volunteers were all men.

National Primary Health Care, The Gambia

The Gambia implemented PHC in part of the country in 1983. For every five villages, a Community Health Nurse provided PHC, referred people to the health facilities, and supervised the CHWs and trained TBAs (Hill, et al., 2000).

The UK Medical Research Council conducted a longitudinal study starting in 1981 using “data collected over a 15-year period in 40 villages” with 17,000 people in central Gambia (Hill, et al., 2000, p. 108). Fifteen villages received PHC and 25 villages did not. The villages were geographically mixed together instead of separated into two areas. At the start of the study in 1981, the population was 12,313. At the end of the study in 1996, it was 16,416. The population of infants and children age one to four was not available in the paper. The surveillance system was established just before 1983, the same year the program was started.

By 1985, all fifteen villages had fully implemented the PHC program. The study was split into temporal stages. The first stage was 1983 to 1986 for start up and implementation. During the second stage, 1989 to 1992, the PHC program was fully established and well-supported by a strong economy. During the third stage, 1992 to 1994, the PHC program suffered from “reduced supervision of the PHC system by the Medical and Health Department” (Hill, et al., 2000, p. 112). The fourth period, 1994 to 1996, suffered from reduced donor and national funding. The study compared characteristics of PHC and non-PHC villages, such as income, education and wealth, and found no significant difference except village size (Hill, et al., 2000). Although the ethnic make-up of PHC villages was different from that of non-PHC villages, the investigators found no effect of ethnicity on mortality (Hill, et al., 2000).

Both intervention and control villages achieved a similar percent decline in infant mortality from 1982-3 to 1992-4. Infant mortality declined in the PHC villages from 134 deaths per 1000 live births in 1982-83 to 69 in 1992-94, a decline of 49%, and in the control villages it declined from 155 deaths per 1000 live births to 91 over the same period, a decline of 41% (see Figure 1) (Hill, et al., 2000). “Infant mortality rates were lower in the PHC villages” from 1982-3 to 1992-4 “but the differences were not statistically significant” (Hill, et al., 2000, p. 114). “Since 1994, when supervision of the PHC system had weakened, infant mortality rates in the PHC villages had risen” from 69 in 1992-4 to 89 in 1994-96 (Hill, et al., 2000, p. 107). In contrast, the rates in the non-PHC villages continued to fall to 78 for this period, lower than the rate of 89 in the PHC villages (Hill, et al., 2000, p. 107). “But further analysis shows that the trend in the rate ratios over the whole period was not significantly different from one period to another” (Hill, et al., 2000, p. 114).

One-to-four-year mortality declined in the PHC villages from 42 deaths per 1000 live births in 1982-83 to 28 in 1992-4 a decline of 33%, and declined in the control villages from 45 deaths per 1000 live births to 38 over the same time period, a decline of 16% (see Figure 2) (Hill, et al., 2000). “Rate ratios for the mortality of 1-4 year-olds indicate that the rates were very similar” from 1982-3 to 1983-6 (Hill, et al., 2000, p. 107). From 1989-92 to 1992-94, one-to-four mortality rates in PHC villages were lower than in non-PHC villages. The differences are statistically significant for 1989-92 and nearly significant at the 95% level for 1992-4. P-values were not stated. When the PHC program was receiving adequate support, one-to-four-year mortality was lower in the intervention villages than the control villages. After support for PHC declined after 1994, “the differences between the PHC and the non-PHC villages disappeared.”

Figure 1 (Hill, et al., 2000)

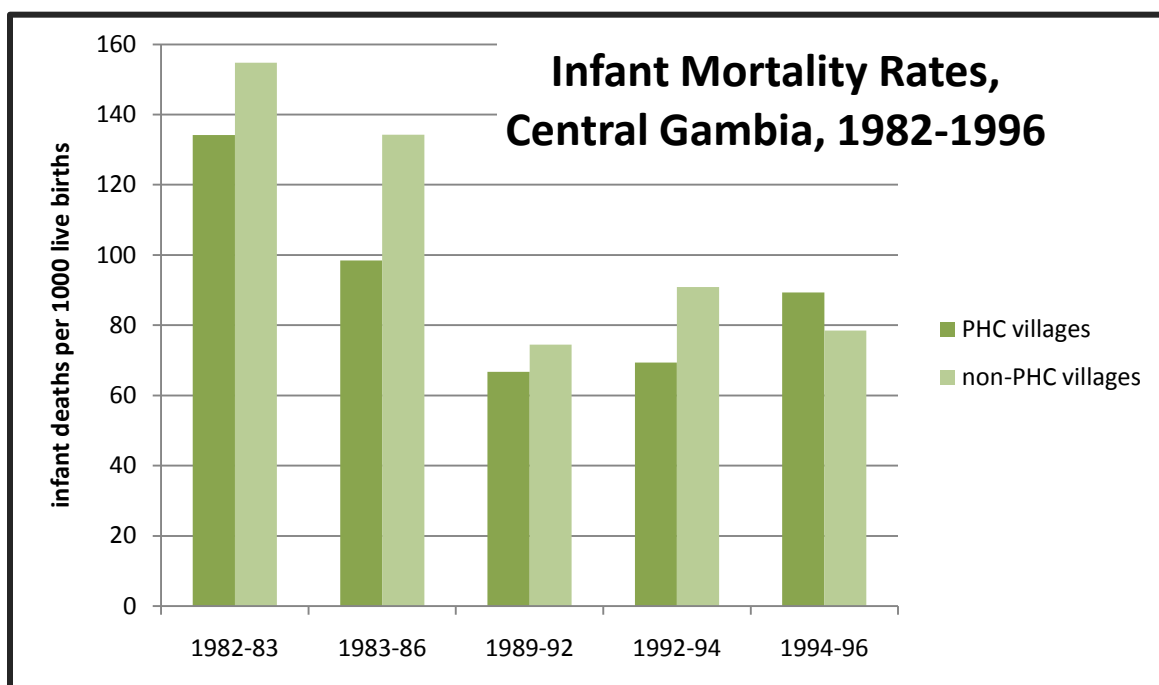
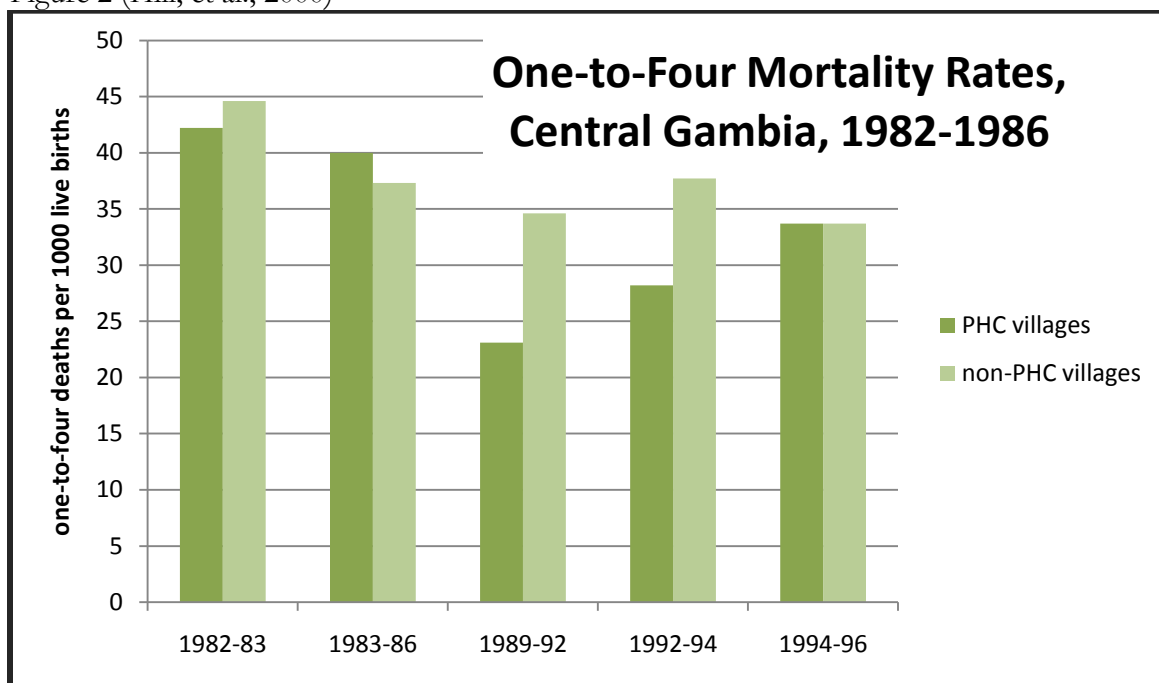


Figure 2 (Hill, et al., 2000)



Hospital Albert Schweitzer, Haiti

The Hospital Albert Schweitzer (HAS) program started in 1956 in the Artibonite Valley in Haiti with hospital services and limited hospital-based outpatient clinic care, including provision of tetanus immunization and teaching of sterile cutting of the umbilical cord (with provision of sterile supplies) for midwives who were delivering all births in the home. A decade later, HAS established a comprehensive community-based maternal and child health outreach program (H. Perry, et al., 2007; H. Perry et al., 2006). The primary health care program now serves a rural population of 148,000. Volunteer community health workers “promote community involvement in planning, implementation and evaluation of services” and provide health education to fifteen households each, and refer patients (H. Perry, et al., 2006, p. 220). Paid Health Agents each regularly visit 400 to 500 households monthly and also run the monthly “Rally Posts for immunizations, growth monitoring/nutritional counseling and referral” (H. Perry, et al., 2006, p. 220). Auxiliary nurses run mobile clinics in “isolated communities every 1–2 months to provide basic curative and family planning services and to refer patients” as needed (H. Perry, et al., 2006, p. 220). The area’s seven health centers also provide “curative care, immunizations and family planning services” (H. Perry, et al., 2006, p. 220). A directly observed therapy program for tuberculosis patients is provided at the household level. The program also provides family planning services, AIDS prevention education, and care for women with high-risk pregnancies. The program has also trained traditional birth attendants and traditional healers.

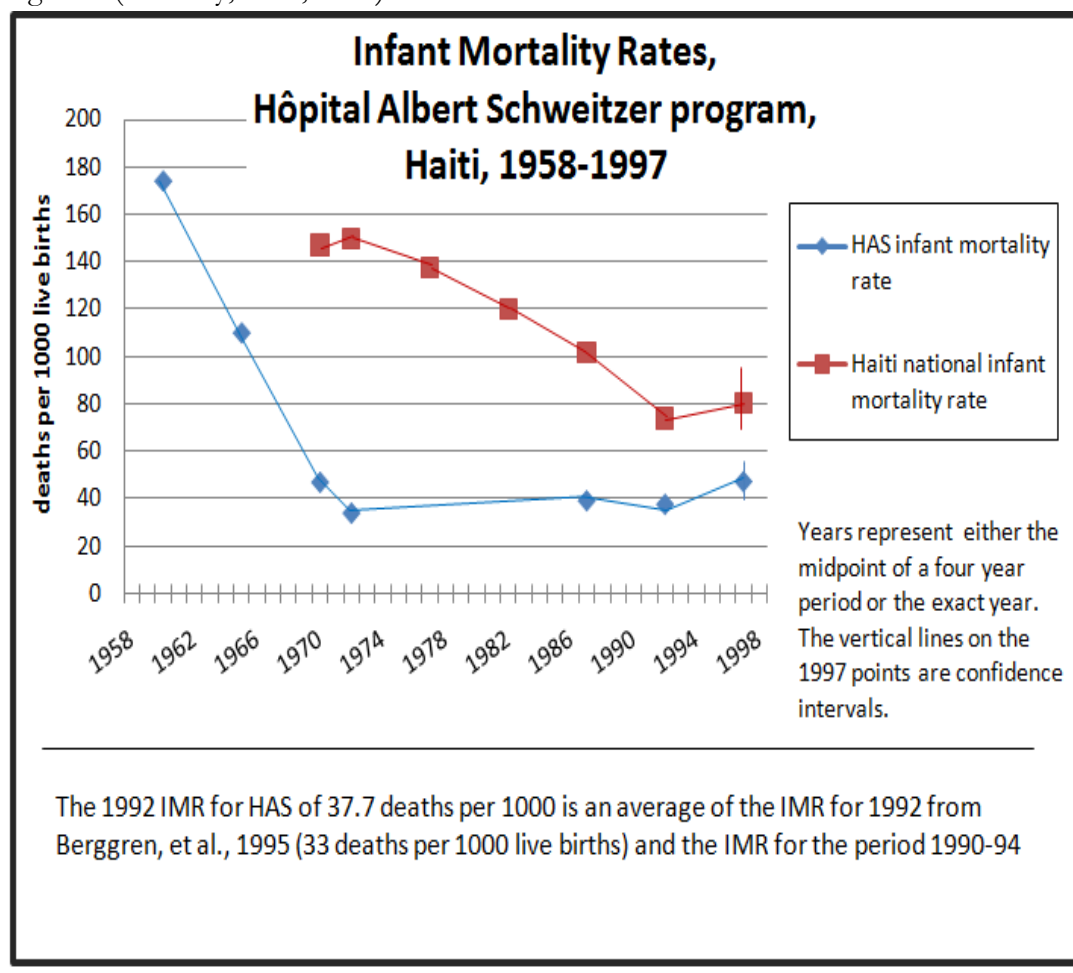
A study was conducted to compare infant and under-five mortality rates in the HAS service area to rates in the rest of the country for the same or similar periods. In terms of socio-economic characteristics (level of education, electrification of households, sanitation,

source of drinking water) and levels of childhood nutrition, the national population and the rural population in Haiti (like the population in the HAS service area) were similar (H. Perry, et al., 2006). Five-year mortality rates for the HAS area from 1985 to 1999 were calculated using data from a 1999/2000 household survey of the birth history of a representative sample of 3,427 women of reproductive age in the service area and the results of “previously published studies on under-5 mortality rates between 1958 and 1992 in the HAS service area,” (H. Perry, et al., 2007, p. 241).

After the beginning of the hospital-based program in 1956, the infant mortality rate in a small population (8,820 people) immediately surrounding the hospital declined dramatically from 174 deaths per 1000 live births in the 1958-62 period, to 110 in the 1963-7 period, a decline of 37% (see Figure 3). Under-five mortality declined from 250 deaths per 1000 live births in the 1958-62 period to 158.5 deaths per 1000 live births in the 1963-7 period, a decline of 37% (see Figure 4) (H. Perry, et al., 2007). There are no data on mortality rates in a similar population in Haiti before 1970. With no comparison of rates from a similar population, one cannot be certain that the decline in mortality in the HAS service area was due to the hospital, to the tetanus immunization program and teaching sanitary cord cutting to midwives, or to other unmeasured influences. However, because the service population was immediately around the hospital, because there was a large drop in neonatal tetanus mortality during this period (which constituted a major portion of infant mortality), and because maternal tetanus immunization and training of midwives (with provision of sterile cord-cutting instruments) were being provided at hospital outpatient clinics, it is reasonable to conclude that it was the services provided at the hospital, including in the hospital outpatient clinic, which were major contributors to the decline in infant and under-five mortality.

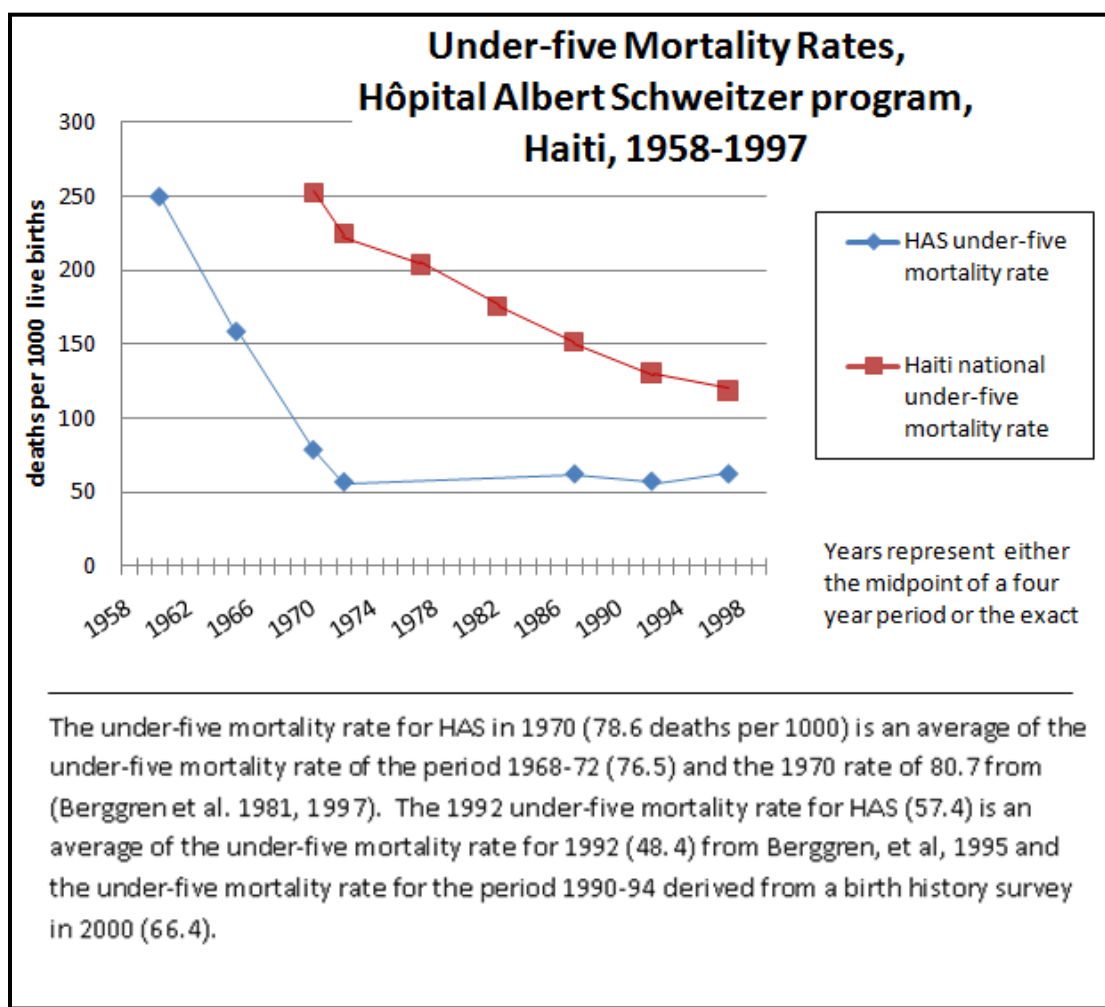
Starting in 1970 because comparison data are only available from this year, the infant mortality rate in the HAS service area declined from 47 deaths per 1000 live births in 1970 to 34 in 1972 but increased back to 47.3 (39.3, 56.6) by the 1995-1999 period (H. Perry, et al., 2007).

Figure 3 (H. Perry, et al., 2007)



Starting in 1970 because comparison data are only available from this year, the infant mortality rate in the HAS service area declined from 47 deaths per 1000 live births in 1970 to 34 in 1972 but increased back to 47.3 (39.3, 56.6) by the 1995-1999 period (H. Perry, et al., 2007). In contrast, the national IMR declined from 147 in 1970 to 80.3 (68.7, 91.7) in the 1995 to 1999 period, a decrease of 45%.

Figure 4 (H. Perry, et al., 2007)



HAS under-five mortality declined from 81 per 1000 births in 1970 to 62.3 (53, 72.8) per 1000 births in the 1995 to 1999 period, a decrease of 23% (H. Perry, et al., 2007). The national under-five mortality rate in Haiti decreased from 253 in 1970 to 118.6 (101.7, 135.6) in the 1995 to 1999 period, a decline of 53%, 1.9 times higher than the under-five mortality in HAS' service area for the same period. The differences between the lower infant and under-five mortality rates for the HAS service area and the higher rates of Haiti were statistically significant. Even though the HAS population and the population of rural Haiti had similar socioeconomic characteristics in the late 1990s (as was previously mentioned), these longer-term results should be interpreted with caution due to lack of data

on the similarity between the HAS population and the population of Haiti during the earlier time periods shown in Figures 3 and 4.

Although the HAS infant and under-five mortality did not continue to drop after 1972 as did the national mortality rate, the rates remained relatively low for Haiti as the service population rapidly expanded 20-fold from 1,305 children under five in 1972 to 26,640 in 1996. The authors concluded,

“The inputs, processes, and outputs of the health services at HAS during the late 1990s, when compared with those for Haiti nationally, support the conclusion that the differences in under-5 mortality can be attributed to the integrated system of primary health care, hospital referral care, and community development programs operated by HAS”(H. Perry, et al., 2007, p. 242).

Due to the rapid expansion of the population starting at the beginning of the CBPHC program through 1996, only a very small proportion of children in the HAS service area obtained hospital services. Thus, the impact of the HAS program on under-five mortality was most certainly not due to the hospital services alone. Also, because there was a high coverage of proven child survival interventions provided through preventive and educational services in the community outside of the hospital and even outside of the dispensaries (compared to the much lower coverage in the rest of Haiti), the CBPHC program is the most likely mechanism for explaining reductions in mortality from vaccine-preventable diseases.

One obstacle to the HAS service experiencing an even greater or temporally longer decline in mortality could be the highly mobile population, where “the challenges for continuity of care in child health programs and reducing child mortality further are enormous” (H. Perry, et al., 2007, p. 244).

Conclusion

Six of the studies on five programs used a comparison with either “similar” or no statistically significant difference in socio-economic indicators between the intervention and comparison groups. The study of the program in Ghana used a control in a random plausibility trial. Two studies of two programs compared mortality rates between the intervention group and the country and province using DHS data, but did not provide data to compare the socioeconomic characteristics between the intervention and comparison groups. Hence, although there was a positive improvement in under-five mortality in the intervention group in all nine studies of the eight CBPHC programs and there was a positive improvement in obstetric-related maternal mortality in one study, only seven studies of six programs could demonstrate an impact by the CBPHC program which was greater than its comparison population.

The studies of the programs in Mozambique, Cambodia and Ghana did not state whether there was a statistically significant difference between the indicator of the intervention group and that of the comparison or control group (see Table 2). There was not a statistically significant difference in neonatal and under-five mortality for the program in Jamkhed, India, and in infant mortality for the program in The Gambia. Five programs, including the programs in The Gambia, did demonstrate a statistically significant difference between the lower mortality for age groups under five years in the intervention groups and the higher mortality in the comparison or control groups. The only program in which maternal mortality was studied was in Matlab, Bangladesh. There was a statistically significant difference between the lower obstetric-related maternal mortality of the

intervention area and the higher mortality in the comparison area. The time period over which the five programs demonstrated a statistically significant difference in the indicators between the two groups ranged from three to 29 years.

Table 2 (Arole & Arole, 2002; Bang, et al., 1999; Binka, et al., 2007; Edward, et al., 2007; Fauveau, et al., 1991; Fauveau, et al., 1992; Hill, et al., 2000; Mann, et al., 2010; Nyongator, et al., 2005; H. Perry, et al., 2007; H. Perry, et al., 2006; H. Perry, et al., 2011)

CBPHC program	Indicator	Statistical significance between intervention & control/ comparison group?	Years of statistical significance
CRHP, Jamkhed, India	NNMR	no	15
	U5MR	no	15
	HR for neonatals	yes	15
	HR for post-neonatals	yes	15
SEARCH, India	NNMR, PNMR, IMR	yes	3
MCH-FP, Matlab, Bangladesh	Obstetric MMR	yes	3
	ALRI-specific U5MR	yes	4
World Relief, Child Survival, Cambodia	U5MR	NA	5
World Relief, Light for Life Child Survival, Mozambique	IMR, U5MR	NA	3
CHFP Project, Ghana	CMRatio	NA	7
National health system, The Gambia	IMR	No	15
	CMR	yes (no p-value stated)	3
HAS, Haiti	IMR, U5MR	yes	29
NA: not available; HR: hazard ratio; ALRI: Acute Lower Respiratory Infection			

Chapter 3: Methodology

Research Objectives

The purpose of this study is to describe the model CBPHC program in Montero, Bolivia, from its inception in 1989 through March, 2011 and the change in infant and under-five mortality in the program's target population. The study was carried out in Montero, Bolivia, in June and July of 2010 and in Atlanta, GA, from August 2010 to April 2011. After submitting a full application to the Emory International Review Board (IRB), the IRB determined that the results were not "generalizable" as defined by the Emory IRB and that IRB approval was not required.

Population

Montero is a city of about 100,000 people and is located in the Department of Santa Cruz, one of the nine departments in Bolivia. Montero is organized into nine health districts, each with a health center to serve the residents of that district.

This study focuses on the populations living in the three districts (Villa Cochabamba, Cruz Roja and Distrito 2) served by Consejo de Salud Rural Andino (CSRA). Each district has a health center run by CSRA and is called by the name of its district. Cruz Roja is located in the city of Montero and is therefore urban. Villa Cochabamba and Distrito 2 are located both inside the boundaries of Montero and on the outskirts of the city's borders; these districts are considered urban and peri-urban. The peri-urban areas include a grid of dirt and paved roads, houses with yards sitting next to each other, some restaurants and small shops, and in one neighborhood of Villa Cochabamba, there are restaurant/bars on almost every block.

Residents vary by district and neighborhood in terms of wealth, type of employment, mobility, educational level, and ethno-linguistic background. Many of the residents in Villa

Cochabamba are wholly indigenous and have migrated from the highlands in the north of the country or the highland valleys near the city of Cochabamba, hence the name of the district. They are highly mobile, some moving to Villa Cochabamba in the winter to cut sugarcane and returning to their permanent homes in the highlands or valley when agricultural work is available in the summer. The residents of Cruz Roja are financially better off and have higher educational levels than those in Villa Cochabamba, are more ethnically mixed, and more willing to utilize the health services of CSRA. The residents of Distrito 2 are a combination of the types of residents in Villa Cochabamba and Cruz Roja. A small minority of residents has their own health insurance and receives their services in non-CSRA facilities.

Procedures

During the summer of 2010, the researcher lived in Montero and worked with CSRA staff and area residents to learn about the organization's philosophy, values, and history. Data were collected through informal interviews with program staff and through observations of activities inside the health center and in the program neighborhoods. Areas addressed included organizational structure, management procedures, program operations and operational principles.

Qualitative research

Key informant interviews were conducted to obtain individual perspectives and in-depth information. A semi-structured question guide was created for the interviewers to follow during the interviews with the key informants. The objectives, central research questions, and the domains were determined.

Objectives

- Understand the history of CSRA in Bolivia with a focus on the program in Montero.
- Understand the best practices of CSRA, lessons learned and impact of the program in Montero on the health and well-being of the target population.

Central Research Questions

- How did CSRA start and evolve over time?
- What CSRA strategies have led to the greatest improvements in health?
- What have been the changes in health and general well-being in the community as a result of CSRA's program?

Key Informant Interview Questions

- How did CSRA start and evolve over time?
- What are the best strategies of CSRA that affect the greatest improvement in health?
- What important lessons did CSRA learn about starting, developing and running a community-based primary health care program?
- What have been the changes in health and general well-being in the community as a result of CSRA's program?

Domains

- History
- CSRA today
- Best practices
- Impact
- Sustainability
- Replicability
- Lessons learned

Interviewer Guide

Questions for the key informants were developed and are provided in the Key Informant Interview Guide, Appendix B. After CSRA's interpreter had translated the question guides into Spanish, the translated guides were approved by the Executive Director and supervisor for the Montero program.

Recruitment

Recruitment of key informants was conducted through maximum variation sampling, criterion sampling and purposive sampling. Maximum variation sampling is the selection of individuals that provide a wide range of experiences (Rice and Ezzy, 1999). Criterion sampling is the selection of cases that meet particular criteria. Purposive sampling is the selection of information-rich individuals. First, the type of people desired for the key informant interviews were selected. One criterion was for the interviewees to have sufficient experience with the program so as to provide rich information. Those who had experience with CSRA from the beginning were preferable to those who had only one year of experience. The other criterion was for the informants to have a maximum range of type of experience in terms of staff or volunteer positions, leadership within the community or government, and a range of age and gender. With significant input from CSRA's supervisor in Montero and other head program staff, individuals that fit these criteria were chosen. Other reasons for the selection of some key informants over others were that they were still alive and they were still living in Montero.

Once the individuals to be interviewed were chosen, the Executive Director and/or supervisor contacted them by phone or in person, asked them if they were available for the interview and scheduled the interview in the most convenient and private location.

Training

Before the start of the interviews, training was conducted for three individuals fluent in Bolivian Spanish and English. They were taught to perform two jobs: lead the interviews, and translate and transcribe the recorded conversations from Spanish into English. There were two reasons that three people were trained for two different jobs. First, if one person becomes unable to perform his job, the other person is already trained in that job and can serve as substitute. Secondly, in case the person assigned to be transcriber is much better at interviewing than the person assigned to the latter, they can switch jobs. Training included the objectives and significance of the research project; explanation of the interview guide including the central research question and key domains; how to translate and transcribe the recorded interviews; how to conduct an interview; conducting a pilot interview with feedback to the interviewer on his performance; and more practice conducting the interviews using the revised guide.

Data collection

The key informant interviews were conducted in July of 2010 by two of the trained individuals. Locations of the interviews were the interviewee's home or yard, office or at a CSRA health center. When possible, interviews were conducted outside the health center so that participants would feel more freedom to express their views in a neutral space.

For all key informant interviews, potential participants were explained the purpose of the interview and the study, how long it would take, that it was completely voluntary and they could leave at any time before or during the interview, that they didn't have to answer any question they didn't feel comfortable answering, and that everything said during the interview would be confidential. The interviewer obtained written consent from the key informants for permission to record the interviews.

The recorded interviews were simultaneously translated and transcribed from Spanish into English from July to October 2010. Each key informant was assigned a numerical code to protect his or her identity when referencing him or her in the history and description of the program.

Qualitative Data Analysis

The qualitative data from the key informant interviews did not merit systematic analysis due to lack of depth. This was not due to poor data collection but the nature of the domains. Nine of the 16 key informant interviews were utilized for the history and description of the program. They included six senior and junior staff persons, a leader within the local Ministry of Health, and two community leaders, one who had also been a community health volunteer. Only the domains of history, CSRA today, lessons learned and best practices were analyzed for this paper.

Synthesis of Qualitative Data

Data gathered from observations, informal interviews and key informant interviews were synthesized into a concise history and description of the CSRA Montero program. Review of the literature was used to briefly describe CBIO principles.

Quantitative Research

An adequacy assessment was conducted, which seeks to ascertain the change in the indicator over time. The indicators of interest were infant and under-five mortality rates. Quantitative program data included CSRA's data of annual number of live births and annual number of deaths by age at death and cause. Deaths excluded stillbirths. These data were separated for the three health districts and were available starting in 1991 for Villa Cochabamba, 1997 for Cruz Roja and 2002 for Distrito 2. These data were used to calculate

annual infant and under-five mortality rates for the three districts combined using Microsoft Office Excel 2007. The annual infant and under-five mortality rates for the CSRA population were graphed to visualize the trend in mortality from 1991 to 2009. Because the number of maternal deaths per year and over a four or five-year period were too small to create meaningful maternal mortality ratios, the ratios were not calculated or graphed.

Confidence intervals for each rate were calculated in Microsoft Office Excel 2007 using a formula for population-based data, that is, data derived from a whole population instead of from a sample of the population. The formula for the confidence interval of the infant and under-five mortality rate was

$$((\text{Number of events} \pm (2\sqrt{\text{number of events}}))/\text{population}) * 1000 \text{ (Selvin, 1991).}$$

Events are infant or under-five deaths which occurred in the time period, and the population is the number of live births which occurred in the same time period.

After calculating the confidence intervals in terms of the upper and lower limit of the rate, the confidence interval in terms of percent of the rate was calculated in Microsoft Office Excel 2007. These calculations used the unrounded rates and unrounded confidence intervals. The rates were then rounded to the nearest whole number.

Chapter 4: Results

First, the Census-Based, Impact-Oriented (CBIO) principles are described, followed by a brief history of the CSRA program in Montero, followed by a brief description of the program today. Finally, infant and under-five mortality of the CSRA population are described.

Census-Based, Impact-Oriented Principles

“The census-based, impact-oriented (CBIO) approach to health improvement is a methodology for defining and addressing local health priorities” (H. B. Perry, et al., 1998, p. 140). CBIO principles were first developed and implemented in Bolivia in the early 1980s. In 1984, a U.S.-based private voluntary organization, Andean Rural Health Care, and its Bolivian sister organization, Consejo de Salud Rural Andino, implemented a primary health care program on the Northern Altiplano of rural Bolivia in Carabuco, near La Paz (H. B. Perry, Shanklin, & Schroeder, 2003). In 1987, CSRA began another program in the mountainous valley region near the city of Cochabamba, called Mallco Rancho. In 1989, CSRA began a third program in Montero (H. B. Perry, et al., 2003). Andean Rural Health Care, now called Curamericas Global, Inc., is a non-governmental organization that partners with community-based organizations in Bolivia, Guatemala, Haiti and Liberia to develop primary health care programs with a strong community-based component using the CBIO approach (H. Perry et al., 1999). It was founded by Dr. Henry Perry in 1983 in Bolivia. Andean Rural Health Care/Curamericas has supported CSRA in Bolivia with technical and financial assistance from the beginning; current support, however, is limited.

The CBIO approach utilizes census information and community collaboration to identify the most frequent, serious, preventable or readily treatable health problems and the most at-risk age sector in the population on which to focus program interventions to achieve the greatest impact on health. Hence CBIO principles can be applied in any setting to meet the needs of the local population. Although CBPHC targets the most at-risk groups, such as children under five, with interventions for the health conditions which cause the greatest burden, CBIO principles further developed this approach. The CBIO approach emphasizes the need to identify a specific age group, such as the neonatal period, and health conditions, such as diarrhea, which may vary from one small area to another.

The medium through which the methodology is conducted is “routine systematic home visitation” (RSHV) to the target population. RSHV includes becoming acquainted with and building trust between program staff and residents, the delivery of health education, the identification of at-risk populations and the greatest health problems, the provision of appropriate primitive, preventive, and curative services, the registration of vital events, and the updating of census data. There is greater frequency of visitation to sectors of the community which have the most serious health risks and/or problems, oftentimes a particular age group of very young children, or women of reproductive age (H. B. Perry, et al., 1998, p. 141).

The CBIO approach addresses a major weakness in many facility-based health programs in low-resource countries, which is the disconnect between the community and the health facility and/or program staff (H. Perry, et al., 1999). Given that in many health care settings the majority of the population, and particularly those at the greatest risk of serious morbidity and mortality, do not seek services at the health facility for a variety of reasons, facility staff can never prevent or treat such patients if they never leave the grounds of the

health center. The CBIO approach links the community with the health facility through household visitation by program staff or volunteers.

In addition to making a community diagnosis (that is, identifying the most serious health problems and demographic groups most at risk of such problems), another aspect of CBIO principles is to understand the underlying causes of morbidity and mortality. Through conduct of the census and home visitation, the staff seek to understand their living and social conditions as well as health knowledge and beliefs that prevent people from seeking care at the health facility, the behaviours that causes morbidity and mortality, and community perceptions of their greatest health problems.

The establishment of trust starts with community visits. A central component of the CBIO approach is that the community should be involved in all stages of the program cycle. Genuine community involvement fosters trust between the community and the health program staff and it also promotes community ownership of the program, thereby contributing to the long-term sustainability of the program (H. Perry, et al., 1999). The community identifies their own health priorities, which may or may not differ from the epidemiological priorities.

First, a census is conducted on a manageable part of the target population. After analysis of the census data, the program staff and community together make the community diagnosis and collectively plan and implement the most important targeted interventions. The community's perceptions of their health priorities are obtained through discussions with community members and community leaders during household visits and community meetings.

Staff members provide preventive care and early treatment in the homes. Home visitation and health education allow the program to focus on prevention and early treatment

of the epidemiologic priorities among those most at risk; this decreases the disease burden at health facilities (H. Perry, et al., 1999). The regular update of epidemiologic information and vital events informs the program staff of the progress made and identifies continuing or emerging needs. After three to five years, a new community diagnosis is carried out. Over time, epidemiological priorities and well as community-perceived priorities are likely to shift.

History

Establishment of Program

The founder of the CSRA program in Montero is Dr. Dardo Chavez, a Montero native. After learning of the CSRA program in Bolivia and CBIO principles, he decided in 1988 to establish a program in the health district of Villa Cochabamba, which at that time consisted of six neighbourhoods with a population of 6,000 in both urban and peri-urban areas. Dr. Chavez decided to establish the program in Villa Cochabamba because of the great need for health education and health service and because there were no Ministry of Health staff working in that area (H. Perry, 1993). Before the program was established, Dr. Chavez and a small team of personnel, with the help of the community, conducted the first census in 1988. The census collected data on the following:

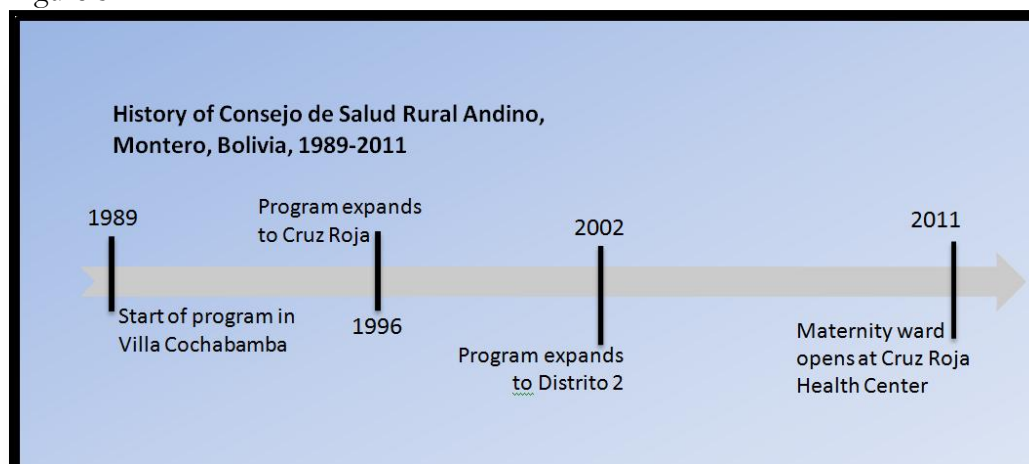
- household make-up
- occupation and birth dates of the residents
- relationship to the head of household
- living conditions, such as type of roof, type of sanitation, source of drinking water
- and most importantly, the health problems which are most frequent, serious, and preventable and/or treatable; the underlying causes of these problems; and who is most at risk of morbidity and mortality from these health problems.

The first censuses revealed that diarrhea was the primary cause of death among children and those under two years of age were most at risk of diarrhea morbidity and mortality (H. Perry, 1993; H. Perry, et al., 1999). Thus in 1991, CSRA undertook “extensive educational efforts” in community meetings, during household visits, and at health center encounters in diarrhea prevention and treatment (H. Perry, 1993, p. 233). In 1992, CSRA and the Montero Rotary Club negotiated an affordable and extended payment plan with the local water cooperative so that the residents could afford the installation of the pipes and connection to the house to increase the residents’ access to clean drinking water. A revolving loan fund was made available by Rotary (Interview #16; (H. Perry, et al., 1999). This is an example of CSRA using the social-environmental-determinant approach to community diagnosis to address the underlying conditions and influences on individual and community health.

Villa Cochabamba Health Center

At the same time the second census was being conducted in 1989, CSRA started a small clinic in the health district of Villa Cochabamba to provide curative care (see Figure 5) (H. Perry, 1993). In the startup of the program, the priority was to first provide “acute curative primary health care services as well as to begin the vaccination and nutritional monitoring of children under five. Household visitation was initiated in 1990” (H. Perry, 1993, p. 234). In 1990, the seven CSRA staff started household visitation with census-updating in the neighbourhood of Villa Cochabamba. By 1994, the staff had covered all six neighbourhoods in the health district of Villa Cochabamba, covering 6,000 people (Interview #12).

Figure 5



In 1990, an adequately-sized health center was built for the residents of the health district of Villa Cochabamba (H. Perry, 1993). This health center also serves as the headquarters for the CSRA program in Montero. In addition to consultation rooms, offices, a pharmacy and a lab, the Villa Cochabamba Health Center includes a small optical/eyeglasses shop where lenses are made and frames and lenses are purchased.

The evaluation conducted by Andean Rural Health Care in 1993 showed significant growth of the program from 1989 to 1992 (H. Perry, 1993). In these first four years of the program, the number of consultations increased from 1,031 in 1989 to 4,682 in 1992, vaccinations increased from 3,898 to 10,576 over the same period, and home visits increased from 51 to 6,504 (H. Perry, 1993). Coverage of child survival interventions is an important measure of program effectiveness (H. Perry, 1993). In the Villa Cochabamba neighbourhood, where household visitation had been established, completed vaccination rates for children 12 to 23 months of age for BCG, DTP3, OPV3, and measles rose from 45% in 1991 to 82% in 1992 (H. Perry, 1993).

Household Visitation

As household visitation expanded from one neighbourhood in 1990 to all six neighbourhoods by 1994, CSRA needed additional help. In 1992, the program recruited three community health volunteers (CHVs), which helped CSRA increase its outreach to the community and increase trust with the community (H. Perry, 1993). Both the health center staff and the CHVs were responsible for household visitation; CHVs took on a greater number of households per worker. The CHVs could be men or women (but were mostly women), must have lived in the neighbourhood for at least a year, know their neighbours well, and be liked by their neighbours.

As the program and its geographical service area grew, more CHVs were hired to conduct household visitation. The duties of the CHVs were that of promotion and prevention in their own neighborhoods. The CHVs provided community-based care up to the level at which they were trained, and they referred residents to the health facility when they needed more advanced care. In this way, the CHVs served as a constant link between the community and the CSRA health facility and health professionals. When a CHV saw an ill or pregnant person, or someone with respiratory symptoms of TB, they referred the person to the health center. They also carried out follow-up visits when instructed by the auxiliary nurse in charge of the same neighborhood. After a person visited a health center or remained sick at home, the CHV made a house visit to make sure the person was getting better, taking his medicine properly, and following the doctor's instructions. If a CHV gave a woman a referral note to go to the clinic, the CHV would go with her and support her. The CHVs educated families with newborns on newborn care using a government picture book. They also gave vitamin A capsules, ferrous sulfate to treat iron deficiency anemia, and vaccinations. In addition, they weighed the children. They also inquired about, educated and

referred the children over age five and the men. The CHV was supervised and monitored by an auxiliary nurse who worked in the same neighbourhood and in the health center. Thus, the auxiliary nurse formed the link between the community volunteer and the health facility.

From 1992 to 2002, the CHVs were not paid, but their nuclear family received free medical care as well as a 50% discount on medicines and lab tests. In 2002, the CHVs were added to the payroll; their name was changed to a *vigilante* because they were responsible for being vigilant of the health status of their neighbourhood. From 2002 to 2009, it was possible to pay a *vigilante* one Boliviano per vaccination (equivalent to fourteen cents), one Boliviano for discovery of a pregnancy, and five Bolivianos if the pregnant woman completed four prenatal visits. In 2009, CSRA discontinued this policy due to lack of funding and started to pay the *vigilantes* a fixed monthly salary with fixed hours.

In the early 1990s, the staff and CHVs visited the homes of children under age 24 months every month and children age 24 to 59 months every three months (H. Perry, 1993). By about 2002, the 12-to59-month age group was no longer considered a high-risk age group. At that time, those less than six months old began to be visited every month and those 6-11 months of age every three months. However, this system was—and still is—not applied to every family and neighborhood. If a family is new to the area, they receive visits more often, even if they have children older than age one. New families may not trust CSRA, may refuse vaccinations, may arrive with illnesses, or not possess the same level of health education as the rest of the more stable community. Some neighbourhoods of low socio-economic status receive a higher frequency of visits than other neighbourhoods.

Other high-risk groups visited more frequently are malnourished children, children with diarrhea, patients with acute respiratory infections, patients with TB or symptoms of TB, and pregnant women (H. Perry, 1993). The CHV or auxiliary nurse can identify a high-

risk case from household visits and refer and accompany them to the health center or hospital to seek treatment. If the parents refuses to take the child to the health center or hospital and instead seeks alternative treatment such as from a local healer, then the auxiliary nurse returns to the house the next day to check the status of the child (H. Perry, 1993).

In 2007, there were five auxiliary nurses. In 2008, the Villa Cochabamba health district added five neighbourhoods. The number of auxiliary nurses annually increased by one starting in 2008, reaching eight auxiliary nurses in 2010. The Villa Cochabamba health district has a population of 19,000 today.

Cruz Roja Health Center

In 1996, the Red Cross branch in Santa Cruz, the capital of the Department of Santa Cruz, asked CSRA to open up another health center on its land next to the Red Cross Center in Montero. The community leaders from the health district of Cruz Roja in Montero also asked CSRA to open up a health center. In 1998, CSRA signed a five-year contract with the Red Cross. In 2003, the five year contract with the Red Cross was extended to 22 years. At the completion of this contract, CSRA will pass on the Cruz Roja Health Center to the administration of the Red Cross of Montero. The Cruz Roja Health Center is the largest of the three CSRA health centers; there are more consultation rooms and more staff. The health district currently has a population of 13,000.

In the area of Cruz Roja, CSRA did not have difficulty earning the trust of the population. The community leaders requested the health center. “The culture is different. The culture in that area is more stable, is a *camba* culture [*cambas* are Bolivians from the lowlands in eastern Bolivia]; 80% of the people are native to Montero. We *cambas* by nature give more importance to the care of our health, to cleaning and improving our houses, to

taking care of the health of our children, and to the stability of the family” (Interview #13). In Cruz Roja, the people can be more easily reached during home visits because they are at home during the day and evening. They participate more than the people in the Villa Cochabamba health district because they are more accepting of home visits, utilize health services more frequently, and are more likely to participate in the community meetings with their community’s leaders to discuss issues such as the schools, paved roads and the health center.

Distrito 2 Health Center

In 2002, a British organization asked for help from CSRA to start a health center in the health district of Distrito 2. They wanted CSRA to start and manage the health center for the first five years (2002-2007) and then take over the health center themselves. CSRA and the organization signed a five-year contract and started the health center. In 2007, CSRA relinquished control over the health center and told the community of the health center’s change in management. The community wanted CSRA to continue managing it. Subsequently, community leaders wrote a letter to Montero’s health office to communicate their wishes. In the end, CSRA continued to manage the Distrito 2 Health Center.

The Distrito 2 Health Center is the smallest of the three health centers, but it has a doctor and a pharmacy. The health district has a population of 7,000. The residents in the service area of Distrito 2 are mostly *campesinos* like those in Cruz Roja with a higher socio-economic status and healthier behaviours than in Villa Cochabamba.

Health Insurance

In about 1997, the government started a new health insurance for pregnant women and children under age five who didn’t have their own health insurance. In 2002, it was

called *Seguro Universal Materno Infantil* (SUMI), or Universal Maternal and Infant Insurance, which provided free prenatal visits, delivery, and all care for pregnant women and children under age five. SUMI pays 1500 Bolivianos (\$214) to parents if their child completes all scheduled vaccinations by 23 months and receives checkups every two months for the first two years to check the weight and height for nutritional status. In 2005, CSRA started to accept SUMI. As a result of these incentives, more mothers started to bring their children to the health center to receive scheduled vaccinations, weighing and counseling.

In 2009, the national government created a policy to pay pregnant women 200 Bolivianos (\$28) if they get four prenatal visits every two months. They get 120 Bolivianos (\$17) for both delivery at the hospital and visiting the clinic with her infant within seven days of delivery. Although she doesn't receive a specific bonus for attending the educational sessions at the clinic, she must attend them in order to receive the other bonuses.

At the beginning of the program in 1989, CSRA staff reported that 90% of the women delivered at home. To encourage the women to deliver at the hospital, the health staff went to the hospital with them for the delivery and made sure the newborn received proper care. At that time, the quality of maternity care at the city hospital was perceived to be poor because the health staff did not treat the people with respect and the doctors did not appear to care about the quality of care they provided. This provided a strong deterrent to the women delivering there. CSRA worked with the hospital to improve the quality of care at the hospital. Now the care is better, and CSRA staff report that 98% of women deliver at the hospital.

Information System

Starting about a year after the program began providing service in each of the three health districts, CSRA collected data on population size and mortality by age and cause. However, it did not collect data annually on all other key health indicators. Different health centers collected different indicators for different years. Some data stored in hard copy have been lost. As a result, in each of the three health districts, some data are missing for some years. Since 2005, data on all key indicators for all years and all three health districts are complete.

In 2006, two local university students designed a new computer software program to fit CSRA's unique data storage needs. This is called *Sistema de Información de Base Censal*, or Census-Based Information System (SIBACE). This record system is organized by family, as CSRA keeps records of household visits in a family file instead of individual files. It contains census records on all households from the Villa Cochabamba health district, and all data from the family files, including health-related data and activities from household visits. SIBACE only stores data on women of reproductive age and children under age five. The reasons SIBACE is present only in Villa Cochabamba are explained below.

SIBACE enables easier and quicker retrieval and analysis of data. Before this information system was utilized in 2008, an auxiliary nurse had to go through the hard copy of every family folder to calculate health indicators and add up activities during household visits to compile a monthly report to submit to the government. Now she can easily access such data from SIBACE.

SIBACE can summarize data at the individual, family, neighbourhood and area level, can provide the coverage rate for any intervention, such as the percentage of children age 24 months who are fully immunized, the percentage of children lacking a particular

immunization by a particular age, the number of deaths or proportion of deaths by cause, or the number of births between certain dates.

The other two health centers do not use SIBACE for two reasons. Because the auxiliary nurses return to the health centers at the same time after conducting household visits, there are not enough computers to allow them to simultaneously input the data from their household visits. The other reason is that the staff do not have the time to manually enter all the data from the family files into the information system so that SIBACE could be used.

CSRA Relationship with Government

Two of CSRA's major partners are the municipal government and the local Ministry of Health, which provide two separate sources of funding. Until 2000, the local government did not financially support CSRA due to the common notion that non-governmental organizations were adequately funded. Furthermore, the local government did not want CSRA to be part of the local health care network. Gradually, CSRA earned the trust of the local government through evidence of the improvement in community health and through its transparency. This trust developed because CSRA regularly informed the community, the community leaders, the municipal government and the Ministry of Health of its activities and its health indicators.

From the beginning of the program until 2006, Curamericas provided a significant amount of funding, mostly through special grants such as those provided by the USAID Child Survival and Health Grants Program. The senior staff at CSRA always knew CSRA would gradually have to increase its local funding for long-term sustainability. First, CSRA

secured funding from the Ministry of Health starting in 2000 and then from the municipal government starting in 2007.

By 2000, CSRA was providing high-quality primary health care to about one-third of Montero's population without any financial support from the municipal government. The local and national government in Bolivia have the view that NGOs receive funding from the West, have enough funding, and don't need funding from the government. In 2000, Dr. Chavez sent a letter to the municipal government and the local Ministry of Health with an ultimatum saying that if the government didn't pay for the salaries of some of their staff by a certain date, CSRA would close its health centers and cease its program. Three days before the deadline, CSRA announced on television that CSRA had sent a letter and due to no response from the government, CSRA would cease its services. As a result, the community leaders went to the government to insist that the government financially support CSRA. The next day CSRA was informed that it will receive funds from the Ministry of Health for the salaries of three staff persons: a nurse, an auxiliary nurse and a health information specialist.

In 2007, the municipal government started to pay for salaries. By that point, salary support from the Ministry of Health and the municipal government made up 50% of CSRA's funds. When CSRA started to receive funding from the Ministry of Health in 2000, it also started to receive less funding from CSRA's main office in La Paz which, by that point, had begun to obtain funding from other sources beyond Curamericas in the US. In 2000, the CSRA/Montero program asked for additional funds from the national office and from Curamericas to pay for staff hired for a USAID-funded project which had just ended, but this request was denied. CSRA then decided to try to become more self-reliant and less dependent on funding outside of Montero. Also, the CSRA headquarters in La Paz

managed and made decisions for the CSRA Montero program. In addition to financial autonomy, CSRA Montero wanted greater managerial autonomy. In 2000, CSRA/Montero began to resist the centralization of the organization. Simultaneously, CSRA Montero received less funding from the central office. By 2008, CSRA Montero had achieved the autonomy it sought; it is, however, still officially part of CSRA.

Current Program

Today the CSRA/Montero Primary Health Care Program serves about 40,000 people, or about 40% of the population of Montero. Each of the three health districts has a CSRA health center. At present the Villa Cochabamba health district serves a population of 19,000; Cruz Roja serves 13,000 people; and Distrito 2 serves 7,000 people. Each health district has about six or seven neighborhoods. Each neighborhood is governed by a board of a Territory-Based Organization (OTB).

Health Centers

Today the Villa Cochabamba health district has eight auxiliary nurses, the Cruz Roja health district has six, and Distrito 2 has three. When the population of each health district and the number of auxiliary nurses is taken into account, each auxiliary nurse is in charge of about 2,300 residents. The supervisor of the Montero program reports that each auxiliary nurse is responsible for an average of 3,000 people. Since about 2009, there is one *vigilante* in each health district. Hence, in the beginning of program, the community-based health work, namely household visitation, was carried out by CHVs and all CSRA staff, then it was carried out by CHVs and auxiliary nurses, and since 2009 the auxiliary nurses do the large majority of the community-based health work.

The Villa Cochabamba Health Center has three doctors, Cruz Roja has four doctors and two part-time dentists, and Distrito 2 has one doctor. The Villa Cochabamba Health Center also provides ophthalmology services. Once a week three ophthalmologists come on a separate day to give consultations, but they do not perform surgery.

The Cruz Roja Health Center opened up a maternity ward in 2011 for low-risk deliveries. Construction of the maternity ward started in 2004, but the Center was not able to admit patients until 2011 when the new mayor agreed to pay for the salaries of the staff. The municipal government pays for all deliveries at this maternity ward through its health insurance program for women. A newspaper article on the opening of the maternity ward said that this satisfied one of Montero's greatest needs due to the overcrowded conditions and lower quality of care at the city hospital (Ortega Moreno, 2011). The equipping of the maternity ward was funded by CSRA, the municipal government, and donors from the U.S. (Ortega Moreno, 2011). The maternity ward accepts women from outside the CSRA service area.

Program Components

Every program component was developed by CSRA Montero as the need for it arose. The most important components of the program include:

- *Tuberculosis.* There is a tuberculosis program at the Villa Cochabamba and Cruz Roja Health Centers. The programs started in 1990 and 1996, respectively. CSRA practices the WHO recommended Directly Observed Treatment –Short Course (DOTS) strategy. The Villa Cochabamba Health Center is the only health facility in Bolivia with a certified DOTS program. Its TB program boasts a 100% completion rate and a 100% cure rate. It has received several national awards as the best TB program in the country.

- *Specialist Medicine Campaigns.* Every year an American pediatric gastroenterologist and other pediatricians visit the three health centers providing care to those inside and outside the CSRA service area. American ophthalmologists and optometrists have been coming to CSRA Montero since the early 1990s. The eye campaigns draw people from around the country to receive free or reduced-cost eye consultations and eye surgeries.
- *Education.* CSRA provides educational sessions for the community outside of home visits. The sessions for pregnant women are provided at the health centers, and the sessions for parents of children who are cared for at a local child care center are provided at the child care center itself.
- *The Rosa Vera Fund.* CSRA receives financial support from the Rosa Vera Fund (RVF), which since 2003 has sponsored health care for about fifty children in Montero who have chronic health conditions. CSRA is in charge of the selection of beneficiaries, management of funds, fund accounting and reporting, and administration of the health and social services for the beneficiaries (Lee-Melk & Calabrese; The Rosa Vera Fund).
- *Vision-Screening.* Starting in 2006 with a USAID-funded project, the auxiliary nurses conducted visual screening of all school-aged children in the CSRA service area. When the USAID funding ended in 2008, CSRA continued by conducting the visual screenings for all students age five to fourteen in all of Montero as well as in some Guaraní villages outside the city (Interview #15).
- *Teen Health Training.* Through funding from Save the Children, the CSRA trained 250 high schools students in teen-related health issues, including sex education, STDs, adolescent pregnancy and birth control. These 250 teens were trained as leaders who would then

teach the topics to their peers. The project covered 10,000 to 15,000 teens. Although funding for the project ended in 2009, CSRA has sustained it with government funding as of 2010.

- *Diabetes.* A diabetes program was started in all three health centers in 2009. The program pays for the patients' hospital visits and doctor visits at the health center if they lack the financial means or health insurance to pay for their health care.

Regular Public Meetings

Public meetings are the primary channel of communication between CSRA staff and the community, and through these meetings the community participates in the planning and evaluation of the program. Some OTBs in the health district of Villa Cochabamba hold community meetings one to three times a month. CSRA staff members are invited so that they can receive input from the community on their health needs.

CSRA holds public meetings with OTB representatives and community members every two months and at the end of the year to evaluate the program's activities, changes in health-related indicators, and how well the goals were met. During these meetings, they collectively plan future activities and set new goals based on health indicators and community-expressed needs. CSRA also holds public meetings with OTB representatives every six to twelve months to analyze mortality cases so that similar deaths may be avoided in the future.

Sources of Funding

At present, 60% of CSRA's funding comes from the municipal, departmental and national government, and this supports staff salaries and provides for supplies. The

municipal government is paying for 66% of the salaries of the personnel at the Cruz Roja Health Center (Ortega Moreno, 2011). Dr. Chavez says that receiving such a large portion of funding for an NGO from the national, state or local government was initially unheard of in Bolivia. “We believe this outlook change is due to the fact that we as CSRA with our three clinics—Villa Cochabamba, Red Cross and Distrito #2—made radical changes in the health of the people of Montero and surrounding areas” (Chavez, 2011). The remaining sources of CSRA’s funds are internal revenue from service fees, private donations, the Rosa Vera Fund, CSRA Bolivia, earmarked funding for projects from institutions such as USAID, and a very small amount from Curamericas Global in the United States.

Most Effective Strategies

When asked what part of the program brought the greatest benefit, many CSRA staff interviewed answered that it was the home visits and quality of the health staff. Dr. Chavez and the supervisor of the Montero program replied that the routine home visits, the follow-up home visits to monitor the status of sick children, and the quality of outpatient care at the health center brought the greatest benefit to the people’s health (Interviews #12, 13).

Many interviewed staff also answered that the program’s most effective strategy is the provision of high-quality health care. This is possible because of the support for and training of staff, the teamwork, and the staff’s attitude towards their work. The CSRA work culture is such that the management encourages all personnel to think independently and creatively, and to develop personally and professionally through their work, such as through the pursuit of higher education, improvement of work performance, and development of new skills (Interview #13). The support for all staff to develop their abilities means that each staff member contributes as an equal on the team and that all are committed to their

work and to the organization. They contribute towards the joint decision-making process and the growth of the program. Decision-making by the whole team averts a mistake that might be made by just one person.

The health personnel are committed to and believe in CBIO principles and the work derived from them. For the staff, their job at CSRA is not just a job, but a source of pride and empowerment. They are motivated, enthusiastic and hard working. One staff person said they will even administer vaccinations at night or in the rain, and do whatever is necessary (Interview #14).

Also, one interviewee mentioned that CSRA seeks out funds from other sources so they can develop new programs instead of waiting for the government to give them funds like the other health centers in Montero do (Interview #15).

The program has also empowered the female community health volunteers, now called *vigilantes*. The CSRA/Montero program's regional supervisor reported that whether the *vigilantes* are old or young, illiterate or literate, being a *vigilante* has brought positive changes to the lives of the women, their children and their husbands (Interview #12). According to the supervisor of the Montero program, the *vigilantes* have developed better communication and leadership skills, become more confident in making their own decisions, and have increased their self-esteem and empowerment through having been given important responsibilities. Although the salary of *vigilantes* is minimal, being able to contribute to their household income is empowering. Five *vigilantes* have decided to study to become auxiliary nurses, and some of them have received educational scholarships from CSRA to do so. One *vigilante* became a licensed nurse, and many have started their own small businesses, such as selling cell phones, bread, *tamales*, or clothing.

Challenges

Gaining trust from the community

Although virtually all CSRA staff members are Montero natives, gaining trust and support from the community has been a great challenge. When CSRA initiated household visitation in 1990, the staff encountered this lack of trust. Many residents refused home visits. By about 1993, most accepted the home visits, but about 60% of mothers refused vaccinations for themselves and their children ((H. Perry, 1993); Interview #13). One reason was that the Catholic Church opposed the immunizations (Interview #13). During household visits, the auxiliary nurses educated the mothers about immunizations, and they encouraged and persuaded the mothers to allow their children and themselves to be vaccinated. Now, most mothers not only accept vaccinations, but bring their children to the health center to be vaccinated. The auxiliary nurses must administer vaccinations to a minority of children during visits to the home or to the parents' market stalls because their parents do not bring their children to the health center (Interview #15). New families who move into the area are still a challenge. They must be educated on health topics and also be convinced of the benefit of immunizations.

Residents and community leaders have also encouraged the communities to accept the immunizations. For example, a new family arrived from the highland Cochabamba area of Bolivia. The pregnant mother repeatedly refused the tetanus toxoid vaccine. Her newborn died of tetanus, and she later became one of the best promoters of immunizations. The CSRA staff told community leaders about this incident and the leaders also encouraged the residents to receive the necessary immunizations.

In addition to the community's gradual gain in trust in CSRA through acceptance of home visits and vaccinations, CSRA has gradually gained the support and involvement of the

community. OTB leaders' attendance at the program's public meetings and various campaigns as well as their active solicitation of support for CSRA from the municipal government and Ministry of Health has steadily increased over time.

Although most of the residents in the CSRA service area accept and seek services from CSRA, some families have not changed their health behaviours and attitudes. One CSRA staff person related that it's very frustrating for staff to put in much effort to educate residents and then see no change in health behaviour. A coordinator for one of the health districts reported how hard it is to persuade the residents to take care of their own health through prevention and seeking treatment at the health center (Interview #14).

“Look,’ we always say, ‘Do you want to see your children grow? Do you want to work tomorrow? Take some of your time. Come to the health center.’ We invite them, ‘Come,’ and it’s very hard to make them come. Nowadays I’m coordinating in the markets and it’s really hard to convince them to come. We’ve implemented *thousands* of strategies and it’s really difficult, really difficult” (Interview #14).

From the point of view of the supervisor of the Montero program, the health personnel have the responsibility to convince each family of the importance of their health. The following is also an indication of the commitment and attitude of CSRA staff towards their work.

“How will I convince this family to change its way of thinking that their health is important and they have to do something about it? I have had the experience that—I have been face to face with professionals that say ‘She doesn’t want to receive help. It’s not important for her, and I have visited her three or four times and she still doesn’t care. So if she doesn’t come anymore it’s her responsibility.’ And I have learned through this methodology that it’s not her responsibility. It’s my responsibility. How can I make her to learn? How can I make her to really change her attitude? If it takes two years for this family to change, it’s my responsibility for two years to walk beside them so they’ll learn. That’s what I’ve learned with the methodology. This is what I teach to young professionals” (Interview #12, p. 14-15).

Household visits

Although CSRA has largely overcome the issue of residents refusing home visits, the time spent visiting the houses is another challenge, and perhaps it is a weakness of the program. Because some residents are not home at the time of the house visit, have moved since the last visit, or the house cannot be found, the auxiliary nurses spend much of their time visiting homes without being able to deliver the intended service. When asked what has been done to try to make the time of the auxiliary nurses more fruitful, the supervisor of the Montero program said that it is difficult to address this challenge. “The only way of identifying whether the people have moved is to visit the home to find out,” the supervisor responded.

To address the issue of visiting homes when the women from the Villa Cochabamba health district were working in the market, CSRA held large meetings with the market leaders and with the market sellers to obtain permission to visit the women and their children in the market. The auxiliary nurses now go to the market stalls to vaccinate the women and children.

Regarding the large amount of time required to conduct household visits, Dr. Chavez and the District Supervisor of the Ministry of Health replied that the time and cost required to conduct visits is worth the benefit derived (Interviews #13, 19). Dr. Chavez said,

“This has a cost but compared to the benefit, it’s very cheap. Because the success of this visit has such a great benefit in the community that it will help to save the life of children and women, and this is our objective. That’s our goal—that children don’t die. [...] The model [CBIO principles] tells me that visits shouldn’t have a cost; they have to be an investment. We’re investing; it’s an investment” (Interview #13, p.15).

The District Supervisor of the Ministry of Health said that the preventive care and health promotion provided during household visits are economical and cost-effective in the long run because they prevent illness and thereby reduce care-seeking at the health center and the city hospital (Interview #19).

Discontinuity of Community Leaders

Another challenge is the discontinuity of government and community leaders (Interview #12). To obtain support for CSRA from the leaders of the OTBs and the government, CSRA staff members have to invest their time to educate them on the importance of community health. If the leaders serve more than one two-year term, which is often, CSRA has more time to educate them and to benefit from their support.

Quantitative Results

The mortality rates from 1991 to 1996 were based solely on the Villa Cochabamba health district and steadily declined during this time. The introduction of the program in Cruz Roja health district in 1996 and Distrito 2 in 2002 did not increase the mortality rates—these areas never experienced the higher mortality observed in Villa Cochabamba, and even contributed to the further decline in mortality rates.

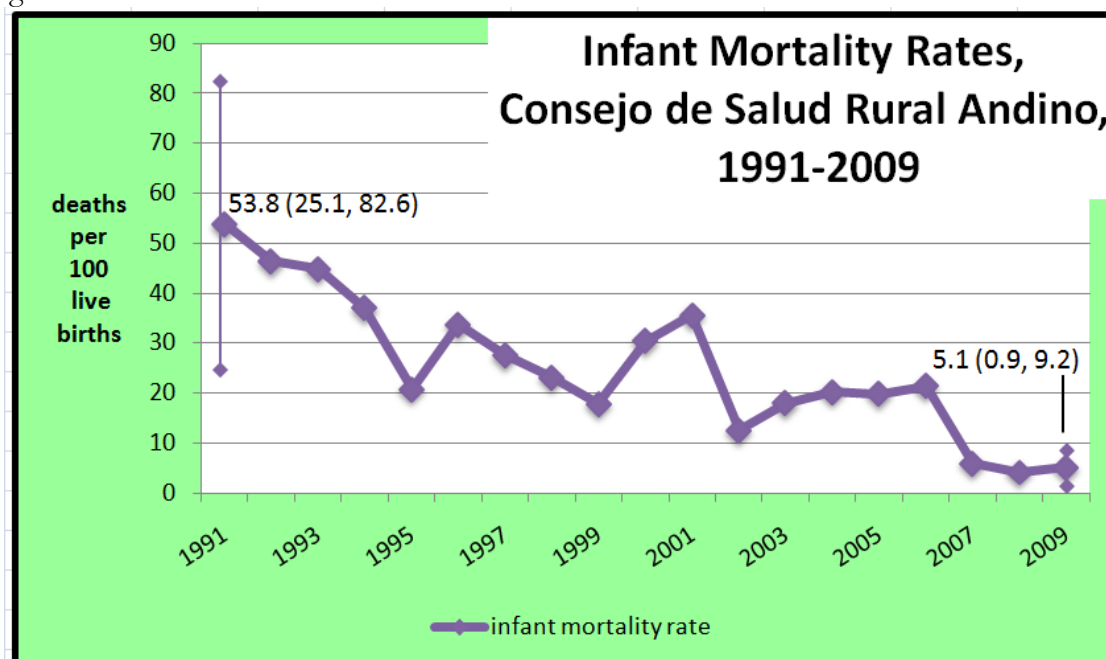
Infant Mortality

The infant mortality rate in 1991 was 54 (25, 83) infant deaths per 1000 live births and dropped to 5 (1, 9) infant deaths per 1000 live births by 2009, a decrease of 91% (see Table 3, Figure 6). The difference between the infant mortality rate at the beginning of the program in 1991 and the rate in 2009 is statistically significant.

Table 3

year	V. Cbba births /yr	Cruz Roja births /yr	Distrito2 births /yr	total CSRA births /yr	V. Cbba infant deaths/ yr	Cruz Roja infant deaths/ yr	Dist.2 infant deaths/ yr	total CSRA infant deaths/ yr	total CSRA IMR/yr
1991	260			260	14			14	54
1992	345			345	16			16	46
1993	356			356	16			16	45
1994	351			351	13			13	37
1995	384			384	8			8	21
1996	415			415	14			14	34
1997	281	227		508	12	2		14	28
1998	288	230		518	10	2		12	23
1999	420	253		673	9	3		12	18
2000	445	310		755	20	3		23	30
2001	353	320		673	21	3		24	36
2002	475	322		797	7	1	2	10	13
2003	327	332	120	779	7	5	2	14	18
2004	332	350	156	838	9	5	3	17	20
2005	338	326	142	806	8	6	2	16	20
2006	352	334	153	839	12	5	1	18	21
2007	357	328	167	852	3	1	1	5	6
2008	686	320	192	1198	3	1	1	5	4
2009	645	340	194	1179	1	2	3	6	5

Figure 6



Under-Five Mortality

The under-five mortality rate in 1992, the earliest year for which data are available, was 96 (62, 129) under-five deaths per 1000 live births and dropped to 6 (1, 10) deaths per 1000 live births by 2009, a decrease of 94% (see Table 4, Figure 7). The difference between the under-five mortality rate in 1992 and the rate in 2009 is statistically significant.

As shown in Figure 8 below, the gap between under-five and infant mortality has decreased over time. This indicates that the mortality decline was initially greatest among children age one to four. This gap has disappeared over the last five years, indicating that the CBIO focus on under-fives has succeeded.

Table 4

year	V. Cbba births /yr	Cruz Roja births /yr	Distrito2 births /yr	total CSRA births /yr	V. Cbba U5 deaths /yr	Cruz Roja U5 deaths /yr	Dist.2 U5 deaths /yr	total CSRA U5 deaths /yr	CSRA U5MR/yr
1992	345			345	33			33	96
1993	356			356	23			23	65
1994	351			351	22			22	63
1995	384			384	17			17	44
1996	415			415	25			25	60
1997	281	227		508	30	4		34	67
1998	288	230		518	24	4		28	54
1999	420	253		673	15	4		19	28
2000	445	310		755	29	7		36	48
2001	353	320		673	26	4		30	45
2002	475	322		797	13	3		16	20
2003	327	332	120	779	12	5	3	20	26
2004	332	350	156	838	10	7	3	20	24
2005	338	326	142	806	10	7	3	20	25
2006	352	334	153	839	16	7	1	24	29
2007	357	328	167	852	3	1	1	5	6
2008	686	320	192	1198	3	2	2	7	6
2009	645	340	194	1179	1	3	3	7	6

Figure 7

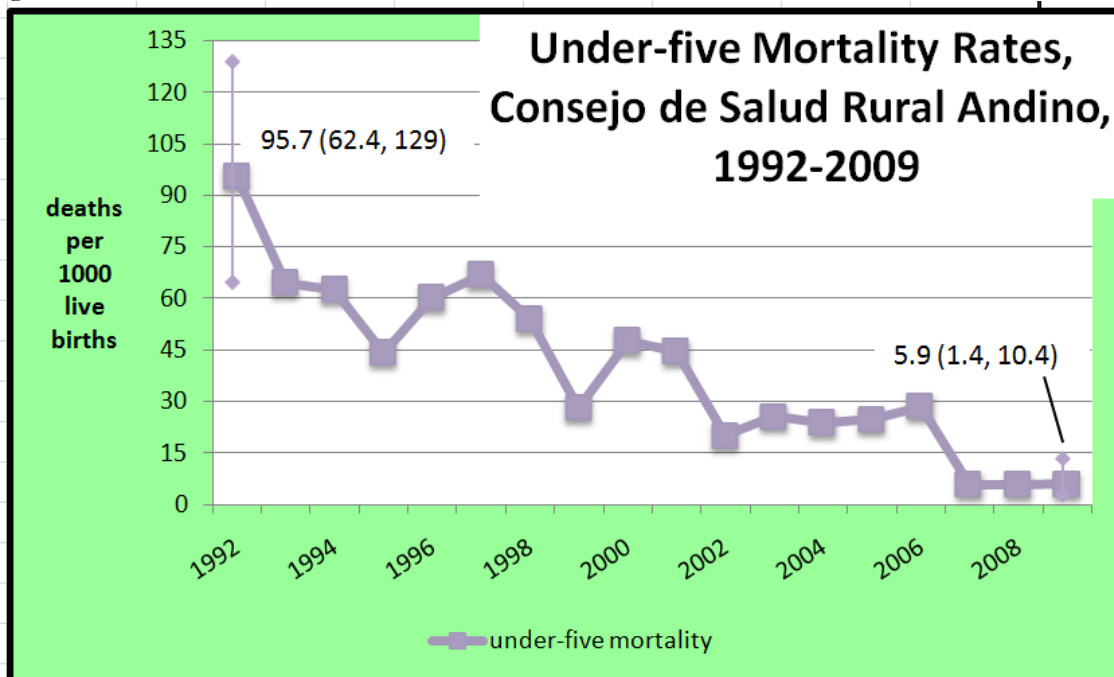
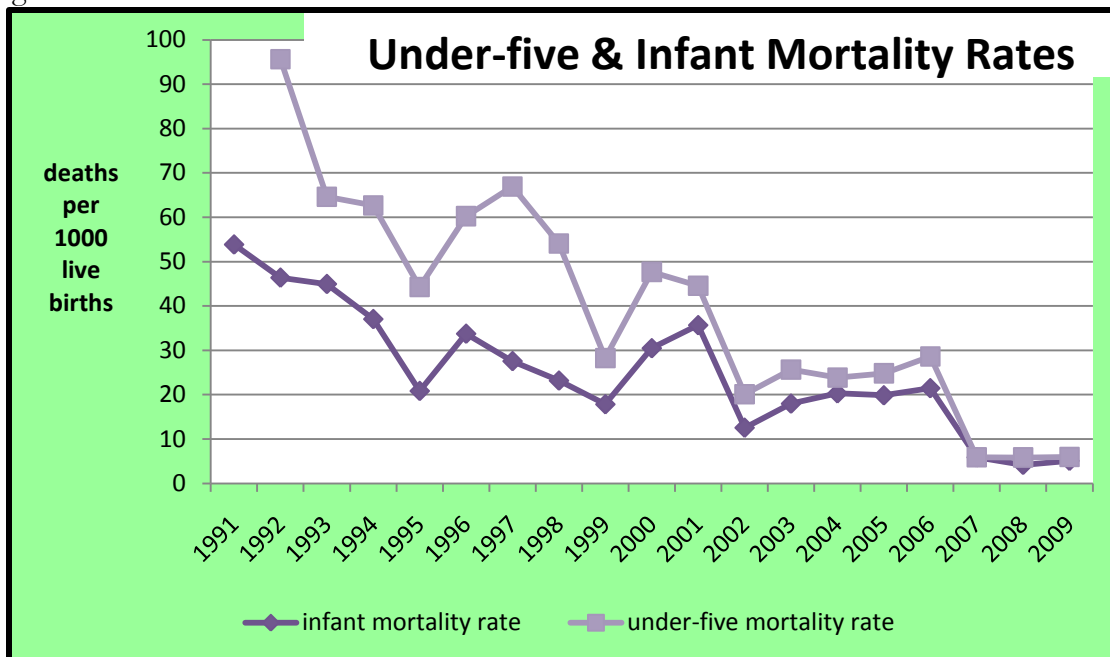


Figure 8



Maternal Health

Prenatal Care

Health personnel have made major efforts to encourage women to have at least four prenatal visits and to make their first prenatal visit as early in the pregnancy as possible.

CSRA has worked to improve the quality of maternal care at Montero's hospital so as to alleviate the inhibition women feel in delivering there. During prenatal visits, CSRA doctors help the pregnant women fill out a birth plan, and this encourages them to make the necessary plans to ensure that an institutional delivery is possible.

Hospital Delivery

One potential proxy indicator of the effectiveness of the maternal health program is the rate of institutional delivery. While the exact rate of institutional delivery in the CSRA population is unavailable, senior staff report that about 10% of residents delivered at the hospital at the beginning of the program and 98% delivered at the hospital as of 2010. Data documenting this trend were not available.

Maternal Mortality

Since the denominator (live births) to calculate the maternal mortality ratio in the CSRA area is so small relative to the 100,000 live births in the denominator of the ratio, it is not meaningful to evaluate the change in maternal mortality ratio in the CSRA population. For example, one maternal death in the CSRA population renders a ratio of 290 deaths per 100,000 live births. The maternal mortality ratios in four or five-year periods have 95% confidence intervals of ± 67 -141%. For these reasons, it is difficult to meaningfully assess the change in maternal mortality using an annual or four or five-year period maternal mortality ratio.

Chapter 5: Discussion

This paper describes how a model CBPHC program was established and implemented using the Census-Based, Impact Oriented principles, and how community-based care and facility-based care are linked together. Collectively, the narratives and the mortality data document the evolution of an effective primary health care system over a period of 22 years. Although data are not available for a nearby comparison area with similar socioeconomic characteristics, the declines are much greater and the rates at present are much lower than for other areas of Bolivia, both urban and rural (data not shown).

One obstacle to the CSRA Montero program experiencing an even greater decline in infant and under-five mortality could be the highly mobile population. Like the Hôpital Albert Schweitzer program in rural Haiti, it is difficult to provide continuity of care to a highly mobile target population, especially to children under age two who need regular scheduled immunizations.

Strengths

A major strength of the study is its external validity. The fact that CBIO principles can be adapted to high-mortality, low-resource contexts gives this study external validity. Use of the CBIO principles has enabled the program to focus limited resources on those most at risk. In terms of developing cost-effective strategies to improve health and well being, CBPHC using CBIO principles has great potential. To provide a solid evidence base, future studies will require a study design with a data base providing comparability at the beginning and the monitoring of change in both areas over time. The long length of time over which the study assessed the change in mortality is a key strength of this evaluation. Dr. Perry of Curamericas writes, “The CBIO approach is a long-term process which ideally

requires a minimum of 10-15 years of monitored operation for the process to reach its full potential” (H. Perry, et al., 1999, p. 1063).

The long length of time over which the study assessed the change in mortality is a key strength of this evaluation. Dr. Perry of Curamericas writes, “The CBIO approach is a long-term process which requires [...] ideally a minimum of 10-15 years of involvement in order for the process to reach its full potential” (H. Perry, et al., 1999, p. 1063). Since the trend in mortality of 18 and 19 years of the program was evaluated, it can be said that the program has had sufficient time to demonstrate a sustained and long-term decline in under-five and infant mortality. The 18 and 19 years over which the program was evaluated also strengthen the indication that the consistent decline in infant and under-five mortality is true, not a result of chance, and was resistant to external shocks.

The confidence intervals of the CSRA infant and under-five mortality rates are relatively large due to the small number of deaths which occurred each year ($\pm 21-28\%$ of the underlying rate). Even so, the large confidence intervals do not obscure the steep decline in both infant and under-five mortality over nineteen years.

Another strength of all the mortality data of the CSRA area is the validity of such data. Because CBIO principles require the registration of all vital events through routine, systematic household visitation, it is unlikely that under-five and maternal deaths were significantly undercounted.

Limitations

Data provided are insufficient to document the role of communities in the setting of priorities, making of decisions, and use of services. Certain questions remain unanswered. Were community meetings held to discuss the epidemiological priorities and the community’s perceived health priorities? What were the community’s perceived health

priorities? Did they differ from the epidemiological priorities? If so, how did CSRA and the community come to an agreement of the community diagnosis? Did the program follow the three to five- year cycle of community diagnosis, planning and implementation of the program interventions, as CPIO principles call for?

The major limitation of any adequacy assessment is that it cannot be determined if any observed improvement in the indicator of interest was due to background trends or to the program itself. There was no control or comparison group to ensure without reasonable doubt that the decreases in mortality were program related. “It could be the case that the decreases in mortality may have been caused by outside influences such as secular trends in mortality or malnutrition, [or] general socioeconomic improvements” (Habicht, 1999, p.12). However, it is nevertheless quite possible that the program was responsible for a major part of the decline. If there had been no decline or if there were the same levels of mortality as were present in the rest of Bolivia, it would be much more difficult to claim that the program had had a mortality impact.

Furthermore, there is supporting evidence that suggests that the CSRA program is responsible, at least partly, for the significant decline in infant and under-five mortality in its service area. There is extensive evidence of the effectiveness of the interventions implemented by the CSRA program in improving child survival (H. B. Perry, et al., 2009). These interventions have been previously developed and tested elsewhere and are promoted by global child health organizations such as the World Health Organization, UNICEF, and USAID. Such interventions implemented by CSRA are immunizations for children and tetanus toxoid immunization for women of reproductive age and pregnant women; Vitamin A supplementation for children age six to 59 months; the promotion of breastfeeding

immediately after birth, exclusively the first six months and continuing after this period; promotion of appropriate complementary feeding after six months of age; hygiene promotion; promotion of oral rehydration therapy (ORT) and accessibility to ORT packets; and institutional delivery (H. B. Perry, et al., 2009; UNICEF, 2010). Hence, previous scientific evidence that the types of child survival interventions that CSRA employs are effective in reducing infant and under-five mortality in other settings strengthens the plausibility that these interventions are responsible, at least in part, for the observed decline in infant and under-five mortality in the CSRA service area.

Chapter 6: Conclusion

Recommendations and Implications

This history and description of a community-based primary health care program in Montero, Bolivia, adds to the scant literature by describing an urban and peri-urban CBPHC program in detail over its 22-year history, including how the program coordinates health care between the community, community health workers, health facility staff and the care provided at the health facility itself. The program described here is one of the longest reported in the literature, one of the few using CBIO principles, and one of the few describing a CBPHC program in an urban area.

In order to build a stronger case regarding the contribution of the CSRA program on the observed significant decline in infant and under-five mortality, mortality data from other parts of Bolivia with similar socioeconomic characteristics will be needed. The lack of data on the socioeconomic characteristics of the CSRA population made this impossible for this report. In addition, a cost-analysis of the CSRA program should be conducted to determine its cost-effectiveness, including cost per beneficiary under five years old and the cost per beneficiary over five years old. These data would help to determine the scalability and the affordability of the approach.

An Expert Review Panel commissioned by USAID in 1994 to review the CSRA program recommended to USAID that CSRA “should, with the support of AID-Bolivia, work together with Bolivian health authorities and other health agencies to adopt and to test the CBIO approach at the district level. AID should support the testing of the CBIO approach, with the enhancements suggested, in other countries” (Ofosu-Ammah, 1994).

A published description of CBIO principles and how CSRA utilized such principles over its 22-year history, and the findings of a forthcoming plausibility evaluation to

determine the program's contribution to the significant improvement in child survival has the potential to demonstrate to the global health field the potential of CBPHC programs and those which use the CBIO principles in the hopes that such programs will be established and scaled-up in other settings.

Appendices

Appendix A: Definition of Terms

- *Census-Based, Impact Oriented (CBIO) principles* are a practical approach to providing community-based primary health care and addresses local health priorities (H. B. Perry, et al., 1998).
- *Confidence interval (CI)* is “a range of values computed in such a way that it contains the estimated” measurement of the population “a high proportion of the time” (Lane, 2006). For example, if a sample of the population or the entire population was measured 100 times (such as 100 surveys were taken), 95% of the confidence intervals would contain the true measurement of interest, such as a mortality rate. All confidence intervals in this paper are 95%.
- *Community-based primary health care (CBPHC)* is defined as health activities, such as health services or health education, which occurs outside of the health facility and which may or may not be directly related to health activities occurring within health facilities.
- *Infant mortality rate (IMR)* is the number of infant deaths in a given time period for every 1000 live births. Infants are age zero to less than 12 months
- *Maternal mortality ratio (MMR)* is the number of maternal deaths in a given time period for every 100,000 live births which occurred in the same time period; the likelihood a pregnant woman will *die from complications* of pregnancy.
- *Neonatal* is an infant age zero to 28 days.

- *Under-five mortality rate (U5MR)* is the number of deaths among children under age five in a certain time period for every 1000 live births.

Appendix B: Question Guide for Key Informant Interview

CENTRAL RESEARCH QUESTIONS FOR STUDY

How did CSRA start and evolve over time?

What are the best strategies of CSRA that affect the greatest improvement in health?

What have been the changes in health and general well-being in the community as a result of CSRA's program?

KEY INFORMANT INTERVIEW QUESTIONS

How did CSRA start and evolve over time?

What are the best strategies of CSRA that affect the greatest improvement in health?

What important lessons did CSRA learn about starting, establishing, developing and running a community-based primary health care program?

What have been the changes in health and general well-being in the community as a result of CSRA's program?

Objectives

Understand the history of CSRA in Bolivia with a focus on the program in Montero.

Understand the best practices of CSRA, lessons learned and impact of the program in Montero on the health and well-being of the target population.

Domains

History

CSRA today

Sustainability

Best practices

Replicability

Lessons learned

Impact

Introduction

Good Day. Thank you for agreeing to talk with us. I'm _____ and I'm going to be asking you questions about your experience working with Consejo de Salud. Hilary is the one is doing the research for her studies but because she doesn't speak Spanish well, I am doing it for her. She may take some notes during the discussion. Everything you say will be confidential; we won't tell anybody what was discussed here, but Hilary will use the information to write her thesis and several articles based on the findings from all the interviews and group discussions we are doing. Remember, there are no right or wrong answers, this will last about an hour and 15 minutes, and as written in the informed consent form, we will record the conversation so we can write it down later.

Do you have any questions before we start? Are you ready? Ok, I'm going to start recording now.

Warm-up

Tell me about your general experience and role with CSRA.

What year did you come to know about CSRA in Bolivia?

What did you think about CSRA when you first heard about it?

Key Questions

Domains: History

How and when did the program in Montero start?

How did the Montero program evolve and expand?

How have the health services in Montero changed?

How has the staff make-up in Montero changed?

How have the mission or values changed?

Domain: Sustainability

Is the program able to operate financially forever?

What resources does the program need to continue forever?

What are the risks of the program failing or weakening?

What is the history of CSRA Montero's funding?

What is the sustainability of that funding?

What are the risks to these sources of funding no longer being available in the future?

How likely is a change in government to withdraw or decrease support from the government?

How likely is a negative change in the economic situation in the country to change the patients' ability to pay for services?

How would this inability to pay affect your ability to run your program?

What system is in place to ensure that the skills of the employees who will leave the program first (retire, etc) are passed along to those who take their place?

Domain: CSRA today

How does CSRA define success?

What are the targets/goals of CSRA, both short term and long term?

What are the most expensive parts of your program?

What are the cheapest parts?

What part costs very little but brings a big change in health to the people?

Domain: Best practices, replicability

What makes CSRA's program in Montero unique?

What are the best strategies that CSRA employs that makes CSRA successful, or that brings the most improvement in health and well-being to the community?

What is the role of the community in the program?

What is the role of the government in the program?

What parts of the program or best practices can be replicated in other parts of Bolivia?

What parts of the program or best practices cannot be replicated in other parts of Bolivia?

Domain: Lessons Learned

What have been the most important lessons you have learned from working with the program?

If people from another organization were to start a program like CSRA's in another place, whether in Bolivia or another country, what advice would you give them?

If you were to establish the program/work with the program from the beginning again, what would you do differently?

What are you proud of that you did right?

Domain: Impact

What have been the positive changes in the health and lives of the community since the inception of the program in 1990?

Are any of these positive changes due to something other than CSRA?

What have been the negative changes in the health and lives of the community since the inception of the program in 1990?

How has working for CSRA changed you personally (personal impact: self esteem, work life, relationships)?

Closing

How has your experience with CSRA shaped your view of health care?

Do you have anything else to add?

Thank you again for your participation in the interview. Your input will be very valuable for our understanding of CSRA's work and impact on the community.

QUESTION GUIDE FOR KEY INFORMANT INTERVIEW
Translated into Spanish

GUÍA DE PREGUNTAS PARA ENTREVISTAS A INFORMANTES CLAVES

PREGUNTAS DE LA INVESTIGACIÓN CENTRAL PARA EL ESTUDIO

Cómo comenzó CSRA y evolucionó con el tiempo?

Cuáles son las mejores estrategias de CSRA que afectan la mejora más grande en salud?

Qué han sido los cambios en salud y bienestar general en la comunidad como resultado del programa de de CSRA?

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Cómo comenzó CSRA y evolucionó con el tiempo?

Cuáles son las mejores estrategias de CSRA que afectan a la mejora más grande en salud?

Qué lecciones importantes aprendió CSRA sobre cómo empezar, establecer, desarrollar y dirigir un programa de atención en salud primaria de base comunitaria?

Qué han sido los cambios en salud y bienestar general en la comunidad como resultado del programa de

Objetivos

Comprender la historia de CSRA en Bolivia con enfoque en el programa en Montero.

Comprender las mejores prácticas de CSRA e impacto del programa en Montero sobre la salud y bienestar de la población objetivo.

Dominos

Historia

El presente de CSRA

Sostenibilidad

Mejores prácticas

Replicabilidad

Lecciones aprendidas

Impacto

Presentación

Buen día. Gracias por estar de acuerdo en hablar con nosotros. Voy a hacerles preguntas sobre la experiencia de ustedes con Consejo de Salud R.A. Están listos?

Pre-ejercicio

Cuénteme sobre su experiencia general con CSRA.

Cuándo y cómo llegó a saber del CSRA?

Qué pensó de CSRA cuando escuchó de ellos por primera vez?

Preguntas Importantes

Dominios: Historia

Cómo y cuándo CSRA y Curamericas empezaron en Bolivia?

Qué otros socios estuvieron involucrados al principio?

Porqué ustedes (fundadores) decidieron empezar CSRA?

Por favor explique la historia del establecimiento de los varios lugares.

Porqué fueron escogidos esos lugares?

Hay todavía algún programa en funcionamiento en esos lugares?

Cómo y cuándo empezó el programa en Montero?

Cómo evolucionó y se expandió el programa en Montero?

Cómo cambiaron los servicios de salud en Montero?

Cómo ha cambiado la estructura del personal en Montero?

Cómo han cambiado la misión o valores?

Dominio: Sostenibilidad

Qué partes de su programa hacen sostenible, económicamente, que funcionen/operen el programa, al mantener el apoyo de la comunidad?

Cuáles son los riesgos del fracaso o debilidad del programa?

Cuál es la historia del financiamiento de CSRA Montero?

Cuál es la sostenibilidad de ese financiamiento?

Cuáles son los riesgos de estas fuentes de financiamiento que no ya no estén disponibles en el futuro?

Qué tan probable es que un cambio en el gobierno quite o disminuya su apoyo financiero?

Qué tan probable es que un cambio en la situación económica en el país de cambie la solvencia de los pacientes de pagar por estos servicios?

Cómo afectaría esta imposibilidad de pagar la solvencia de ustedes para hacer funcionar el programa?

Qué sistema existe para garantizar que las destrezas de los empleados que dejen el programa (se jubilen, etc) sean pasadas a aquellos que tomen su lugar?

Dominio: CSRA hoy

Cómo define CSRA éxito? Por ejemplo, es en términos de resultados logrados en salud, o...?

Cuáles son las metas/fines de CSRA, a corto y largo plazo?

Cuáles son las partes más caras de del programa?

Cuáles son las partes más baratas?

Qué parte cuesta muy poco pero trae un cambio grande en la salud de las personas?

Dominio: Mejores prácticas, replicabilidad

Qué hace que los programas de CSRA sean únicos?

Cuáles son las mejores estrategias que CSRA emplea que CSRA sea exitoso, o que trae la mejor mejora en salud y el bienestar a la comunidad?

Cuál es el rol de la comunidad y el gobierno en el programa?

Qué partes del programa o mejores prácticas pueden ser replicadas en otras partes de Bolivia?

Qué partes del programa o mejores prácticas no pueden ser replicadas en otras partes de Bolivia?

Qué partes del programa o mejores prácticas pueden ser replicadas en otras partes del mundo y dónde? (solo para Dr. Perry?)

Qué partes del programa o mejores prácticas no pueden ser replicadas en otras partes del mundo y dónde? (solo para Dr. Perry?)

Dominio: Lecciones Aprendidas

Cuáles han sido las lecciones aprendidas más importantes que han aprendido de trabajar con el programa?

Si personas de otra organización fueran a comenzar un programa como CSRA en otro lugar, ya sea en Bolivia u otro país, qué consejos les darían?

Si ustedes fueran a establecer o trabajar con el programa otra vez, qué harían diferente?

De qué está orgulloso que haya hecho bien?

Dominio: Impacto

Cuál ha sido su observación de los cambios positivos en la salud y vidas en general de la población objetivo desde el inicio del programa en 1992, ya sea que hayan recibido servicios de salud de CSRA o no?

Cuáles de estos cambios positivos se deben a los servicios proporcionados por CSRA?

Cuáles de estos cambios positivos se deben a otra cosa que no sea CSRA?

Cuál ha sido su observación de los cambios negativos en la salud y vidas en general de la comunidad desde que usted escuchó por primera vez del programa en 1992, ya sea que se haya recibido algún servicio de CSRA o no?

Cuáles de estos cambios negativos se deben a servicios proporcionados por CSRA?

Cuáles de estos cambios negativos se deben a otra cosa que no sea CSRA?

Cómo explica la tendencia en mortalidad maternal/infantil (etc.)? qué pasó en el programa que explica estos cambios en el resultado de la salud? (mostrar gráficos)

Para cerrar

Cómo ha moldeado su experiencia con CSRA su punto de vista de la atención de salud?

Tienen algo más para agregar?

Gracia nuevamente por su participación. Su contribución sera valorable para nuestro entendimiento del trabajo e impacto de CSRA en la comunidad.

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