# Impact of community organization of women on perinatal outcomes in rural Bolivia

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**ABSTRACT** *An intervention to improve maternal and child health was conducted in a remote Bolivian province with limited access to modern medical facilities. The intervention focused on initiating and strengthening women's organizations, developing women's skills in problem identification and prioritization, and training community members in safe birthing techniques. Its impact was evaluated by comparing perinatal mortality rates and obstetric behavior among 409 women before and after the intervention. Perinatal mortality decreased from 117 deaths per 1 000 births before the intervention to 43.8 deaths per 1 000 births after. There was a significant increase in the number of women participating in women's organizations following the intervention, as well as in the number of organizations. The proportion of women receiving prenatal care and initiating breast-feeding on the first day after birth was also significantly larger. The number of infants attended to immediately after delivery likewise increased, but the change was not statistically significant. This study demonstrates that community organization can improve maternal and child health in remote areas.*

## INTRODUCTION

Infant mortality has been attacked in developing countries with varying degrees of success. Costa Rica, with one of the most successful programs, lowered infant mortality from 68 per 1 000 live births in 1970 to 20 per 1 000 in 1980 (*1*). Costa Rica's success has been attributed largely to the development of primary and secondary health care (*2*). Increasing access to health services and to primary care practitioners, predominantly nurses, also dramatically reduced infant mortality in Nicaragua (*3*).

Bolivia has one of the highest rates of infant mortality in Latin America. Estimates indicate that in 1994, between 75 and 105 of every 1 000 Bolivian infants died in the first year of life (*4*). Within Bolivia, infant mortality varies regionally and rates are approximately 50% higher in rural areas than in urban areas. Rates are higher among the country's Aymara and Quechua indigenous groups than in the Ladino population (persons of Spanish or mixed heritage) (*4*). Because health care resources are limited in many rural areas, one recommended approach for reducing infant mortality is through training relatively inexpensive and culturally appropriate providers, such as nurses and community health workers (*5*).

An evaluation of local community health workers in Bolivia concluded that they did not fit easily into leadership roles in either modern or traditional medicine (*6*). The medical and local communities were more accepting of community health workers whose roles and responsibilities they helped define (*6*). Training women to evaluate the health status of their children and family members has been shown to be a cost-effective means of improving the health of communities in which there is limited access to modern health care (*7*).

### The Warmi project

The Warmi project, conducted from July 1990 to June 1993, attempted to improve maternal and child health through involving communities in health care. The World Health Organization (WHO) endorsed this strategy at the Alma-Ata conference (1978),

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with the recommendation that health programs strive for "community participation and ultimately self-reliance, with individuals, families, and communities assuming more responsibility for their [own] health" (*8*).

The province of Inquivisi was selected as the Warmi project site based on its remoteness, rural character, and limited access to modern medical care. In addition, this area had previously been the site of Save the Children/Bolivia projects. Consequently, population census results and maternal mortality data were available.

Key project components included (a) organizing women's groups, (b) developing an approach to identifying problems, (c) implementing a "formal action plan" for the problems identified, and (d) training birth attendants and husbands in safe birthing techniques.

The primary purpose of this study was to evaluate the potential effect of organizing women's groups on perinatal mortality in a remote, rural area of a developing country. A secondary goal was to identify the impact of specific components of the project, such as increasing prenatal care, improving immediate newborn care and breast-feeding, and increasing the number of deliveries attended by trained personnel.

### Health care infrastructure

Inquivisi Province encompasses three geographic zones—Inquivisi, Licoma, and Circuata—each of which has one health post. The posts in Inquivisi and Licoma are staffed by one physician and an auxiliary nurse, while the one in Circuata has only an auxiliary nurse. All three posts possess only basic medicines and equipment. Two referral hospitals are located outside the project area at a distance of one to two hours' travel. These hospitals fall short of minimum WHO standards, lacking sterilization and anesthesia equipment and properly trained staff.

Local health facilities are underutilized by the population. This is partly due to economic and cultural factors, but also because people do not consider the facilities adequate to deal with medically complicated situations. Consequently, women who develop obstetric complications during pregnancy and labor are usually referred to hospitals in La Paz or Oruro, a journey of four to six hours by road.

In rural Bolivia, only 23% of deliveries are attended by either a physician or trained nurse. The majority of births (55%) are attended by relatives, usually the fathers; 14% are attended by midwives or traditional birth attendants; 6% are unattended (i.e., the woman gives birth without a helper); and the circumstances are unknown for the remaining 2% (*9*). In Bolivia the term "midwife" refers to trained medical personnel who deliver babies, while traditional birth attendants (TBAs) are individuals within the community who deliver babies but are not trained as part of the formal medical system.

## MATERIALS AND METHODS

Fifty communities in Inquivisi Province participated in the Warmi project. They varied greatly in traditions and demographic characteristics depending on the geographic zone in which they were located. Settlements in the zone of Inquivisi consist of long-established, stable communities with widely dispersed houses. The villages in Circuata, in contrast, are newer and contain large numbers of recent immigrants. Housing is more densely concentrated than in Inquivisi, and the women are more apt to be bilingual. Licoma is a mixed zone that combines characteristics found in both of the others (*10*). Villages comprise 40 to 300 families. The total population in the demonstration area is 15 000.

Study personnel included five to six teams, each consisting of two auxiliary nurses from the Save the Children staff. Monthly or more frequently, each team met individually with all of the zone's women's organizations, which numbered approximately 50. At these meetings, attended by approximately 10–30 group members, a technique called "autodiagnosis" was employed to address community problems. Autodiagnosis consists of the following four steps: (a) identification and prioritization of problems, (b) group development of a formal action plan, (c) implementation of the plan, and (d) evaluation.

Each community identified a different set of problems and approaches, and, accordingly, specific interventions varied by community. However, certain objectives were addressed by all the women's groups: to (a) increase knowledge of reproduction, contraceptive use, danger signs of complications, and self-care, (b) improve immediate newborn care, and (c) increase the percentage of women who receive delivery care from trained birth attendants. Further details of the study protocol can be found in the project implementers' manual (*10*).

Prior to the implementation of the Warmi project interventions, a study of perinatal mortality (infant deaths occurring from the 28th week of pregnancy through 28 days of life) was conducted. This study identified all births and perinatal deaths in the community area for the prior two years (November 1988–October 1990). For each infant who died, two community controls were randomly selected among children who were born in the same year, lived in similar communities, and survived for at least 28 days. Following the intervention, which took place from January 1991 through June 1993, a second case-control study was conducted. Again, all births and perinatal deaths that occurred in the two years prior to the survey (April 1991–March 1993) were identified, and each deceased infant was matched with four to five controls.

During the first case-control study, a questionnaire was administered to 237 mothers in their homes (or to other family members when the mothers were not available). Demographic characteristics, obstetric history, and details of the most recent childbirth were elicited. In the second study, 172 questionnaires were administered.

Outcome variables included perinatal mortality; the numbers of women's

organizations and the extent of women's participation in them; the prevalence of specific obstetric practices, including prenatal care and utilization of trained birth attendants; and the timing of newborn care and initiation of breast-feeding. Mortality data were based upon total numbers of births and perinatal deaths recorded in the community registry and thus were not limited to the study population. In the analysis of assistance at delivery, trained attendants were considered to include TBAs, health promoters,[3] physicians, and nurses.

The central program strategy was to increase participation in women's groups. As described elsewhere (*10*), there were a variety of types of women's groups in the Inquivisi area, including women's organizations, cooperatives, mothers' clubs, and agrarian unions. The groups' functions varied together with their degrees of effectiveness. The project staff considered women's organizations best able to organize women around health issues. Consequently, the staff focused on these groups, initiating or strengthening 50 women's organizations.

Statistical analyses were performed using SPSS statistical software (*11*). Chi-square tests were performed on categorical outcomes as defined above. The Breslow-Day test for homogeneity of odds ratios was used to compare the degrees of change seen in cases and controls (*12*).

## RESULTS

### Demographic comparisons of communities

Table 1 compares relevant sociodemographic characteristics in the three study zones at baseline. Women in Inquivisi were more likely to be married than women in Circuata and Licoma. The language spoken at home was used as a surrogate for ethnicity. By this criterion, the majority of women in all communities were Aymara, with Inquivisi having a higher percentage of Aymaras and fewer Quechuas than the other zones. The presence of a dirt floor was used as an indicator of lower socioeconomic status. The majority of women in every community had dirt floors, but the highest percentage was found in Inquivisi. Overall, prior to the study intervention, women in Circuata participated in women's organizations at a higher rate than women in the other zones.

### Mortality

Perinatal and neonatal mortality decreased significantly between the pre-intervention and the post-intervention periods (Table 2). During the first study period, 639 births were identified. Of these, 36 infants were classified as either fetal deaths or stillbirths, and 38 others were born alive but died within 28 days of birth (data not shown). One perinatal death could not be classified as prenatal or postnatal. During the second period, 708 births were identified. Of these, 21 were classified as fetal deaths or stillbirths, and 10 as postnatal deaths. Therefore, the perinatal mortality rate decreased from 117 per 1 000 before the intervention to 43.8 per 1 000 births after.

### Intermediate outcome data

Table 3 presents the numbers of women who were aware of women's

**TABLE 1. Comparison of baseline sociodemographic characteristics of women living in three zones of Inquivisi Province, Bolivia**

| Characteristic | Zone: Inquivisi (n = 72) No. | (%) | Licoma (n = 68) No. | (%) | Circuata (n = 97) No. | (%) | $P$[a] |
|---|---|---|---|---|---|---|---|
| Married[b] | 67 | (93.1) | 57 | (83.8) | 83 | (85.6) | 0.206 |
| Language spoken[c] | | | | | | | |
| Spanish | 66 | (95.7) | 56 | (87.5) | 85 | (95.5) | 0.094 |
| Aymara | 65 | (94.2) | 53 | (82.8) | 66 | (74.2) | 0.004 |
| Quechua | 15 | (21.7) | 16 | (25.0) | 26 | (29.2) | 0.560 |
| Literate | 58 | (80.6) | 53 | (77.9) | 80 | (82.5) | 0.769 |
| Dirt floor | 66 | (91.7) | 49 | (72.1) | 82 | (84.5) | 0.007 |
| Participate in women's organizations | 27 | (37.5) | 20 | (29.4) | 53 | (54.6) | 0.003 |

[a] Chi-square test.
[b] Includes women living with a partner but not legally married.
[c] Information not available for three women from Inquivisi, four from Licoma, and eight from Circuata.

**TABLE 2. Outcome of births during two study periods (n = 1 347), showing number of infants surviving at least 28 days ("living") and number dying in the perinatal period ("not living"), Inquivisi Province, Bolivia**

| Period | Living No. | (%) | Not living[a] No. | (%)[b] | Total |
|---|---|---|---|---|---|
| Pre-intervention (1988–1990) | 564 | (88.3) | 75 | (11.7) | 639 |
| Post-intervention (1991–1993) | 677 | (95.6) | 31 | (4.4) | 708 |

[a] Includes deaths from 28 weeks gestation through 28 days after birth.
[b] $\chi^2$: $P < 0.001$, 1 df.

[3] Health promoters are health workers, both male and female, selected by the community to provide care. They receive training in primary health care from the Ministry of Health.

**TABLE 3. Awareness of and participation of women in women's organizations in pre- and post-intervention periods (n = 409)**

| Group | Awareness of groups: Aware n (%) | *P*-value | Participation in group: Member n (%) | *P*-value |
|---|---|---|---|---|
| Mother's clubs | | <0.001 | | 0.072 |
| Pre-intervention | 41 (17.3) | | 26 (11.0) | |
| Post-intervention | 1 (0.6) | | 10 (5.8) | |
| Women's organization | | <0.001 | | <0.001 |
| Pre-intervention | 75 (31.6) | | 18 (7.6) | |
| Post-intervention | 119 (69.2) | | 93 (54.4) | |
| Any group[a] | | 0.779 | | <0.001 |
| Pre-intervention | 231 (97.5) | | 100 (42.2) | |
| Post-intervention | 162 (97.0) | | 147 (86.5) | |

[a] Includes mother's clubs, women's organizations, agrarian unions, co-operatives, neighborhood committees, and credit programs.

groups in their communities together with the numbers of women participating in groups, pre- and post-intervention. Mothers' clubs had distributed food prior to this study, but had recently ceased doing so because the international organization that supplied the food left the area. Their numbers declined sharply from pre- to post-intervention. Meanwhile, women's organizations proliferated with growing membership. Overall, more women were participating in groups of one kind or another at the end of the intervention.

Table 4 presents changes in the use of prenatal care, the presence of a trained attendant at birth, and the timing of newborn care between the two study periods. Separate results are presented for cases and controls, together with the results of Breslow-Day tests for significant differences in the magnitudes of change in the two groups.

**Prenatal care.** Both cases and controls were more likely to receive prenatal care following the intervention, with a statistically significant change for controls. However, the increases in use of prenatal care were not statistically different in cases and controls.

**TABLE 4. Comparison of obstetrical practices in pre- and post-intervention periods for cases and controls, Inquivisi Province, Bolivia**

| Variable | Cases: Yes n (%) | *P*-value | Controls: Yes n (%) | *P*-value | Breslow-Day *P*-value[a] |
|---|---|---|---|---|---|
| Received prenatal care | | 0.175 | | 0.009 | 0.952 |
| Pre-intervention | 34 (45.3) | | 74 (49.0) | | |
| Post-intervention | 18 (60.0) | | 86 (64.2) | | |
| Trained attendant at birth | | 0.497 | | 0.169 | 0.206 |
| Pre-intervention | 21 (28.8) | | 56 (37.1) | | |
| Post-intervention | 11 (35.5) | | 40 (29.4) | | |
| Immediate newborn care | | 0.106 | | 0.276 | 0.058 |
| Pre-intervention | 15 (24.6) | | 50 (34.2) | | |
| Post-intervention | 2 (8.7) | | 52 (40.6) | | |

[a] Breslow-Day test for homogeneity of the odds ratios

**Presence of traditional birth attendants.** Results were mixed for this objective. While the percentage of childbearing women attended by TBAs increased for cases following the intervention, it decreased for controls. These differences, however, were not statistically significant.

**Timing of newborn care.** The percentage of newborn controls who were attended immediately after delivery rose between studies, while the opposite occurred among cases. The Breslow-Day test for homogeneity approached statistical significance ($P = 0.058$), suggesting a difference in the amount of change registered between the two groups.

**Timing of breast-feeding.** This objective was evaluated for control infants only, as most of the cases did not survive childbirth. A significantly greater percentage of control infants were breast-fed on the first day of life following the intervention—50.3% as compared with 25.3% prior to the intervention ($\chi^2 = 18.77$, $P < 0.001$, data not shown).

## DISCUSSION

### Mortality rates

Infant mortality rates provide an important measure of community health status and are often used as an indicator of overall socioeconomic development. Perinatal mortality rates, on the other hand, are a measure of women's health and the quality of health care provided during pregnancy and the intrapartum period (*13*).

Prior to the intervention described here, rates of perinatal mortality were extremely high in the Inquivisi area, with approximately 117 deaths per 1 000 births. Following the interven-

tion, perinatal mortality in the project area decreased by 65%.

Because there was no control community, it is difficult to say with certainty whether the intervention or other factors caused the decrease in mortality. A possible alternative explanation credits the effect of changes in the survey populations between the two studies. Such changes could occur in more than one way: (a) if more women from a given zone were surveyed following the intervention than before, or (b) if demographic changes occurred within the area due to migration. However, neither of these explanations is likely. The pre-intervention and post-intervention surveys both sampled the same percentages of women from each zone. Furthermore, between the pre-intervention and post-intervention periods, there was no statistically significant change in socioeconomic variables such as maternal literacy, housing characteristics, or language spoken (data not shown).

One possible cause of the decrease in perinatal mortality may have been a regression towards the mean owing to the initially high rate during the first period. This is not likely to be the full explanation, however, because of the magnitude of the decrease. Thus, while it is not possible to say with certainty that the decrease in mortality resulted from the intervention program, it seems reasonable that the program was responsible for at least some of the impact.

### Women's organizations

One of the greatest changes observed in this study was a doubling of participation in women's organizations. Women in these groups were encouraged to become more actively involved in identifying health needs and designing programs to address them. They were encouraged to discuss obstetric complications, and in the process they learned that many features of reproduction which they had supposed to be matters of course could in fact be altered. For example, women were taught to care for their babies immediately after delivery rather than wait for the delivery of the placenta. Other specific activities varied by community and included training in literacy, fostering use of credit programs, presenting educational programs about safe pregnancy, and implementing family planning.

The increase in participation in women's organizations was accompanied by a concurrent decrease in the number of mothers' clubs. As a result, there was not an overall increase in the numbers of groups in the community, but rather a restructuring of the types of groups women attended.

### Improvement in pre- and postnatal practices

The number of women who received prenatal care during their pregnancies was significantly greater after the intervention. Previous studies have identified decreased risk of stillbirth and neonatal mortality for women who receive prenatal care (*14*). In Mexico, expanded use of prenatal care was identified as a major determinant of lower perinatal mortality (*15*). While the exact mechanism by which prenatal care reduces mortality is not known, such care provides health professionals with a means of identifying potential problems and educating women about health in pregnancy, labor, delivery, and postpartum.

Although changes in the timing of infant care were not statistically significant, there was an increase in the percentage of control infants who received care immediately after delivery. Fewer cases received immediate care, but this may be due in part to the lack of attention given to stillborn infants.

There was also a significant increase in the number of women who breast-fed their infants on the first day of life. While changes in breast-feeding practices would not affect fetal deaths or stillbirths, early breast-feeding can increase the likelihood that breast-feeding is successful and could prevent mortality related to unsanitary infant feeding practices (*16*).

### Study limitations

Reporting bias could potentially influence results. This is unlikely, however, since the same community registration methodology was utilized for the studies before and after the intervention. In fact, the project staff identified more births along with fewer deaths during the second set of interviews.

Classification of the time of death was based upon maternal recall and should be considered approximate. It is not clear how well women were able to differentiate between a fetal death, which occurred prior to the onset of labor, and death that occurred during labor and delivery. Furthermore, infants were not always attended to immediately after delivery. It is therefore possible that some infants who were born alive but died shortly after delivery were incorrectly classified as stillborn. Consequently, for purposes of this evaluation, all deaths were grouped together and no subanalyses were done by time of death.

One project goal that could not be fully evaluated was the training of birth attendants and husbands in safe birthing techniques. In Inquivisi, few individuals function in the role of traditional birth attendant—that is, a person within the community who delivers babies and has acquired her skills by working with other TBAs. Thus, in the project, the objective of increasing the pool of trained birth attendants led to a focus on teaching basic skills to individuals who were identified as potential birth attendants rather than on improving the skills of existing traditional birth attendants. Husbands were trained in safe birthing skills, but it was not possible to identify the training status of the husband from the women's interview responses. Thus, the analysis of care provided by trained birth attendants did not include trained husbands.

## CONCLUSIONS

Indirect causes of infant mortality are not well understood. Infant mor-

tality has been consistently associated with low socioeconomic status (*13*), decreased maternal educational level (*17*), and low social status of women (*18*). These associations remain even when analyses control for access to care (*19*). It is not known precisely how improving women's decision-making ability could affect the outcome of their pregnancies.

In general, the results of this study support the use of community training and organization of women as a means of improving pregnancy outcomes for women residing in remote areas with limited access to modern health care. However, there is limited evidence defining the impact of individual components of the program, such as increasing prenatal care, improving immediate newborn care and breastfeeding, and providing trained birth attendants. Further studies should focus on specific aspects of this type of program to identify which components are most effective, as well as the efficacy of this approach in urbanized areas and in different populations.

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**RESUMEN**

## Impacto de la organización de las mujeres en la comunidad sobre los resultados perinatales en zonas rurales de Bolivia

Se llevó a cabo una intervención destinada a mejorar la salud materna e infantil en una provincia aislada de Bolivia con acceso limitado a instalaciones de salud modernas. La intervención se centró en la creación y el fortalecimiento de organizaciones para mujeres, en el desarrollo de habilidades entre las mujeres, en la identificación de problemas y la determinación de prioridades y en el adiestramiento de habitantes de la comunidad en la aplicación de técnicas seguras para la atención del parto. Para evaluar su impacto se compararon las tasas de mortalidad perinatal y las prácticas obstétricas de 409 mujeres antes y después de la intervención. La mortalidad perinatal bajó de 117 defunciones por 1 000 nacimientos antes de la intervención a 43,8 defunciones por 1 000 nacimientos después de ella. Se produjo un aumento significativo del número de mujeres que participaron en organizaciones femeninas después de la intervención, así como del número de dichas organizaciones. Asimismo, hubo un aumento significativo de la proporción de mujeres que recibieron atención prenatal y que iniciaron la lactancia materna desde el primer día después del parto. El número de neonatos atendidos inmediatamente después del alumbramiento también aumentó, pero el cambio no fue estadísticamente significativo. Este estudio demuestra que la organización comunitaria puede mejorar la salud materna e infantil en lugares aislados.