Evaluating the Impact and Cost of Interventions with Community Health Workers on Child Health: A Brazilian Experience

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Summary

To increase the availability of health services with low cost and high quality is one of the most important challenges to governments. Primary Health Care (PHC) is viewed as a possible solution for this impasse. In this case, the community health workers (CHWs) were considered as the best means to achieve these goals. To test this idea, 12 CHWs were trained to offer basic health care to all residents under five years old in a small county in Sao Paulo State, Brazil. These services included diagnosis, early treatment and management of diarrhea, infectious respiratory diseases, growth monitoring and incentives to complete basic immunization. In a three year period, 410 children received weekly home visits from CHWs. During this time, the infant mortality rate (IMR) was reduced by 4.2 times and the hospitalization rate decreased six times. Oral re-hydration therapy (ORT) was administered in 90 percent of the diarrhea episodes and full immunization became practically universal. The prevalence of growth stunting was reduced by 27.1 percent. Program costs averaged $12.90 per capita per year and $8.12 per child per month. In this program, the CHWs were able to increase the availability of health services with relatively low cost, and to drastically reduce infant morbidity and mortality.

Keywords: Community health worker, primary health care, maternal and child health, cost benefit analysis, program evaluation, developing countries.

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Introduction

One of the most important challenges to governments in the health sector is to increase the availability, to improve the quality, and to reduce the cost of services. In 1978, the Alma-Ata Conference chose Primary Health Care (PHC) as a possible solution for this problem (World Health Organization, 1978). For this purpose, community health workers (CHWs) were identified as a viable means to achieve the goal of health care for all by 2000. CHWs were chosen because they live in their communities, know and respect the local customs, and therefore are able to merge the use of technology with local beliefs. CHWs are also vital in the local political context (Vaughan, 1980; Walt, 1990).

Many programs reveal that CHWs are efficient in many circumstances, but not in all situations as previously stated (Skeet, 1984; Berman et al, 1987; Witmer, 1995). This occurs because the CHWs receive an excessive number of tasks and are inadequately selected, trained and supervised. Likewise, the CHWs many times work voluntarily or receive low wages (Skeet, 1984; Walt, 1990; Witmer, 1995).

In spite of these limitations, many programs with CHWs have been implemented in Brazil in the last years. This has occurred for two reasons. First, the program with CHWs conducted in Ceara State, northeast Brazil, reduced the infant mortality rate (IMR) and the prevalence of malnutrition by 33 percent and tripled the immunization indices against measles and poliomyelitis just in four years. Second, the counties receive technical and financial support from the federal government to implement it.

All Brazilian states now ave projects with CHWs. Only the Programa de Agentes Comunitarios de Saude (Community Health Workers Program) of the federal government has approximately 55,000 CHWs acting in 2,084 counties in 22 Brazilian states. These CHWs visit about 10 million families and 35 million residents at least one time each month. These numbers will double by the end of 1998 (MS/PACS, 1998).

In spite of the great number of projects implemented, few evaluations have been conducted (McAuliffe et al, 1995; Victora et al, 1992; César JA et al, 1992). Moreover, none of these evaluations was carried out in a typical county where these projects were implemented. The typical Brazilian County with a CHW project has less than 10,000 residents, is distant from metropolitan areas and has limited medical resources.

Itapirapua Paulista, located in Sao Paulo State, Brazil, has this profile. In 1994, a program named Mainha Project was implemented in this county. The objective this project was to improve the main child-health indicators for children under five years through home visits by CHWs. After three years, we decided to evaluate the impact and the cost of these interventions. This paper describes the results of this evaluation.

Methods
The Mainha Project was carried out in Itapirapua Paulista. Located in Vale do Ribeira, one of the poorest areas in the Brazilian State of Sao Paulo, this county has approximately 3,100 residents. This population is scattered throughout 455 square kilometers. Half of this population lives in a radius of less than five square kilometers. The other 1550 residents live in 450 square kilometers. This county is essentially agricultural, without any kind of industry. In this county there is a health center where one physician and three attendants work as a team. There are two other mini health centers located in rural areas, where this team works one day a week. Only two-thirds of the urban population has a treated water supply and sewage disposal in their homes. The Brazilian government spends $1 million per year to maintain the public services of the county. Two-thirds of this money goes to the salary of public employees. There is one public employee for every 20 residents.

In 1988 a survey was conducted in the urban area of this county. This study identified low immunization coverage, high infant morbidity and mortality and an elevated hospitalization rate among children less than five years of age (César and Victora, 1990). After this survey, an intervention program, the Mainha Project, was created to improve this situation. The project proposal was developed with estimated cost of $33,000 in 1988. However, only five years later, in 1993, financial aid was obtained from the Sao Paulo State Department of Health and UNICEF of Brazil.

The project began in April 1994. The county was divided into 12 sectors and one resident was selected as CHW in each sector. This evaluation was designed by an expert of the Sao Paulo State Department of Health and the project's technical coordinator (JAC), who, responsible for training, designed this evaluation.

During two weeks, 18 candidates were trained for eight hours per day in how to diagnose and treat diarrhea and infectious respiratory diseases, and how to instruct mothers about infant immunizations and when to take their children to health services for serious illnesses. CHWs also were trained to monitor infant growth and to facilitate the linkage between the community and local health services. Among these candidates, 12 were selected: nine women and three men. The schooling level of these new CHWs varied between three and 10 years.

These new CHWs made weekly visits to all children under five years of age who lived in their sectors. A medical record, in which visits and procedures performed for each week was recorded, was created for each child. The records were then delivered at the end of each month to the project's local coordination office. There, the data was processed and then sent to Fundacao Universidade do Rio Grande (FURG) in Southern Brazil.

Each trimester, the project's technical coordinator visited Itapirapua Paulista and discussed with the community the results of the collected data. The goal of these meetings was to instruct the people and to find the best way to improve the quality of care offered by the CHWs.

During the visits, the coordinator performed quality control of the interventions. This quality control consisted at least of five visits to children randomly chosen by a computer. The coordinator compared the CHWs' notes in the medical record with that actually received by the child for the last
month. No important differences were found between notes of CHWS and information obtained by the coordinator.

The Mainha Project's local team consisted of the 12 CHWs, one local supervisor and one secretary. The supervisor was responsible for supporting CHWs during their home visits, while the secretary was responsible for revising and processing the children's records. This team was re-trained each trimester by the technical coordinator. Each CHW received a salary of $140 in U.S. currency per month. The local supervisor and secretary received $220 in U.S. currency per month. The coordinator worked for the program one week per trimester and his salary was paid by FURG, and UNICEF financed the tickets to visit the project.

This paper compares the data from records of children followed between April 1994 to March 1997 to the data from the 1988 survey. The mayor's office provided the data referring to the program's expenditures and received grants. In 1988 all 171 children living in the urban area of Itapirapua Paulista were included (César and Victora, 1990). The Mainha Project included all the children living in that county between April 1994 to March 1997. During that time, the CHWs followed, on an average, 410 children per week.

In this paper two groups of variables are mentioned. The first group consists of variables related to cost: home visits, salary, equipment, drugs and others. In the second group, the variables associated with measurement of impact of the interventions include hospitalizations, malnutrition, oral re-hydration therapy (ORT) and immunization coverage.

Below are the definitions of these variables according to their usage in the Mainha Project:

**Home visit**: Each time the CHW visited a residence to offer basic health care for the child was considered a visit. This occurred at least once per week.

**Salary**: This item included the regular monthly payment to CHWs' work and social contribution (security and fringe benefits). The social contribution represented approximately one-third of the value of the CHWs' payment.

**Equipment**: Refers to purchase of a computer, printer, desks, chairs and air conditioner used in the local office. Also included in this category are bicycles, scales, infantometers, thermometers, and bags CHWs used for home visits.

**Drugs**: Includes medications against helminthes and scabies, analgesics, antipyretics and ointments.

**Others**: In this item, supplies that were used in the acquisition of medical records, pens, pencils, diskettes, erasers, etc. were included. Also, the payments of the transportation of sick children to the local health centers and to other cities in the region were considered.

**Infant mortality rate**: Was obtained by dividing the number of children that died before one year by the number of live births in the same period. This coefficient is normally per thousand.

**Hospitalizations**: A child who stayed in any hospital for a 24 hour period or more in the 12 months before the home visit was considered.

**Malnutrition**: Indices height-for-age according to National Center for Health Statistics (NCHS) pattern were calculated. Children who were two or more standard deviations away from this pattern were considered to be suffering from moderate or severe malnutrition (NCHS, 1977).

**Oral Re-hydration Therapy (ORT)**: The only preparation made with the spoon pattern, the ORT was provided by the government or bought directly in the drugstore.
Full immunizations: This analysis was restricted to children between the ages of 12 to 59 months. They were considered only if their doses were recorded on the vaccinial card. The children who had received three doses of vaccines against poliomyelitis, diphtheria, tetanus, whooping cough, and one dose against tuberculosis and measles after the age of one year were considered fully immunized.

Only one child among 171 was not examined in the study of 1998. In the Mainha Project, the number of children who were not followed was seven. To sum up, in both studies the loss was less than two percent. This guarantees the internal validity of this study (Rothmann and Greenland, 1998).

Results

During three years, 67,283 home visits were conducted. This represents 22,427 visits per year or 1,869 visits per month. Considering that the program followed 410 children during this period, each child was visited on average four or five times per month. In the third year, there were a higher number of visits because nearly 30 families with children under age five moved into the county to work in agriculture sector. See Table 1.

Table 2 shows that the expenditures for the program during this period were $119,918.82. This represents $39,972.94 per year, or $3,331.08 per month. Eighty-four percent paid the salaries of the CHWs, the office secretary and a local supervisor. Eight percent was spent on medications, 4.5 percent on the other expenses and 3.4 percent on equipment.

This table also shows that there was a substantial increase in the cost of the program from the first to the third year. In the first year, the expenditures were $30,335.60, with the expenditures rising to $47,738.00 - a 54 percent increase. This occurred because the team's project payment increased by 35 percent. The social contribution also increased by the same proportion. The other factor is that the program paid all expenses in transporting sick children. During the first year, the expenses with this item represented 0.8 percent of the total cost of the program. In the third year, this expense reached 5.2 percent, or 6.5 times more costly.

Each child cost the program $6.17 per month in the first year, $8.70 in the second year and $9.50 the third year. These values were obtained by dividing the total of expenses per year by 12, and this result by 410, the number of children followed. For instance, in the first year, the program cost $30,335.34 or $2,527.94 per month. If we divide the total cost of the project, $119,918.91, by three, the result, $39,972.97, which indicates the cost of the program per year. This $39,972.97 divided by 3,100, the average number of residents in the county during this period, $12.90 results as the cost per resident per year. The average cost of each home visit for the program was $1.78 ($119,918.91/67,283 total number of home's visits performed in three years).

For each home visit, the Brazilian government paid $2 to the municipality. At the end of three years, $134,566.00 was received. This represents $44,855.33 per year (Table 3). The difference between income received and expenditures in this period was $14,647.09 in U.S. currency. The Mainha Project gave a $4,882.36 per year, or $406.86 per month surplus. If the program paid the
salary of the technical coordinator and for his travel, this difference would have been reduced to $3,507.08. The average cost per child per month then would change from $8.12 to $8.87. This would denote an increase of nine percent per child per year.

Table 5 refers to basic health care indicators in Itapirapua Paulista. In 1988, the infant mortality rate was 83 per 1,000. Considering that a mean of 100 children was born per year in this county, this represents nine deaths among infants (children less than one year old). When this project was implemented, the IMR had been reduced to 65 per 1,000, or seven deaths per year. During the first year of intervention, only two children died. The following year, one child died and in the third year, two deaths occurred. If the same IMR was maintained, seven deaths per years, then 21 deaths would have occurred during this period. In reality, however, only five children died. This indicates that the IMR was reduced by 4.2 times in three years.

Twelve months before implementation of this program, 17 percent, or 68 children had been hospitalized. In April 1988, this rate was 13 percent or 53 hospitalizations during the 12 months. During the first year of intervention, seven children (1.7 percent) remained hospitalized for 24 hours or more. In the second year, this occurred for nine children (2.2 per cent) and in the third year 11 children (2.7 per cent) were hospitalized. The average hospitalization rate of these children during this period was 2.2 percent. This rate is six times less that it had been before implementation of this program. If the same rate of hospitalization had continued, 159 hospitalizations during these three years would have occurred. Only 27 children were hospitalized during this period. This indicates that 132 hospitalizations did not occur.

The survey conducted in 1988 showed that one-third of the children had moderate or severe deficits in height-for-age according to the NCHS pattern. When this program began, the prevalence of this deficit had been reduced from 33 percent to 28 percent. During these three years, this deficit decreased from 28 percent to 23 percent. This represents a reduction of 21.7 percent in the prevalence of moderate or severe stunting.

In 1988, only two of 10 children with diarrhea have received ORT during their bouts with the disease. In 1993, this percentage doubled. During these three years, approximately 90 percent of the children received ORT during the diarrhea episodes. This denotes that the ORT was used 2.5 times more.

According to the Programa Nacional de Imunizacoes (National Program of Immunization) of the Brazilian government, a child who received three doses of the vaccine against poliomyelitis, diphtheria, whooping cough and one dose against measles and tuberculosis was considered fully vaccinated.

Only 50 percent of the children were fully immunized in 1988. Five years later, this percentage reached 73 percent. The average rate of complete vaccinial coverage during this three-year period was 96 percent. This represents an increase of 32 percent in the immunization rate.

**Discussion**
Three important limitations about this study must be considered. First, it is a small experiment carried out in a poor region. This implies that the extrapolations of these results for larger counties must not be done. Second, if these results were observed in other counties with the same characteristics as Itapirapuã Paulista, but without this kind of intervention, the impact observed would not be able to be attributed to the CHWs. Third, the influence of local factors is not considered in this analysis. Improvement that occurred in other sectors, such as education, employment, household conditions, etc. can also be credited for these changes. Obviously, many of these sectors had improved during this period, as in Brazil, as in the county under intervention, but the progress had not been observed enough to explain the improvements.

Many results will be discussed in this study, beginning with the expansion of the health service. During the three years, all homes with children under age five received at least one visit per week by the CHW. This indicates that there was an increase in health service availability. This evidence reinforces the idea that the CHWs were an excellent means through which basic health services could be expanded (Vaughan, 1980; Berman et al, 1987; Love et al, 1997).

The infant mortality rate was reduced 4.2 times. This means that the IMR decreased to 15 in 1,000 from 65 in 1,000. A few projects experienced faster improvements. In Jamkhed, one of the most poorest areas of the Maharashtra, a state in India, for example, the IMR decreased three times in four years to 60 in 1,000 from 176 in 1,000. Sixteen years later, in 1993, the IMR in this area was 20 deaths per 1,000 (Arole and Arole, 1994). In Brazil, the program with CHWs in Ceará's state diminished the IMR by nearly 30 percent from 74 in 1,000 to 57 per 1,000 after eight years of intervention (McAuliffe et al, 1995). This comparison, however, should be done carefully because of the number of families assisted. The Indian program attended approximately 50,000 families, while in Ceará, 200,000 families were covered. The Mainha Project assisted only 1,000 families.

The stressed reduction on IMR in a short time shows that is easy to reduce the infant mortality rate when the indices are high. This phenomenon was named by Tendler as a honeymoon period between interventions and results (Tendler, 1997).

The hospitalization rate among children under age five was reduced six times, from 13 percent to 2.2 percent per year. No study obtained since 1975 showed as significant an impact on this indicator. Sometimes, the opposite was observed. In Ceará State, for example, the hospitalization rate in less than three years increased by approximately 50 percent after the implementation of the CHW program. This rate changed from 10.2 percent in 1990 to 15 percent in 1994 (McAuliffe et al, 1995). This may mainly be a result of the improvement of the identification of severe cases or inadequate management of some diseases such as diarrhea and respiratory infections.

The hospitalization rate in the first year of a child's life, whether it be in a poor or a rich region in Brazil is high (César et al, 1997). This occurs because the doctors and hospitals' directors log in the increase of cases (César, 1998).

Comparing with other results, the impact of the prevalence of malnutrition was discrete. During this period, the prevalence of stunting decreased 21.7 percent from 28 percent to 23 percent. In the Pastoral da Criança, the largest program to work with CHWs in Brazil, the evidence of reduced malnutrition was also vague. However, this program recruited children in the worst stages of
malnutrition (Victora et all, 1992). It the Integrated Actions in Nutrition and Maternal Child Health (AISMIN), performed in Sao Luis, the capital of Maranhao, Brazilian State, the prevalence of this deficit was 24.9 percent after seven years of interventions (César et all, 1992). This study did not have an initial evaluation therefore, it was not possible to estimate the impact CHW interventions had on this indicator. In the Ceara program, the reduction of malnutrition was 53 percent after eight years of intervention. The prevalence of stunting reduced to 18 percent from 27.6 percent (McAuliffe et all, 1995). This study was restricted to children younger than three years old. It is less difficult for children under three years to recuperate from this kind of deficit. However, the results obtained were impressive.

In all regions of Brazil, the prevalence of malnutrition from 1986 to 1996 was reduced 4.8 percent per year. According to Monteiro, this decrease can be attributed to the expansion of the health service, improvements in instructions of the mothers and the enlargement of the distribution of treated water and high interpartal interval (Monteiro, 1997).

It is extremely difficult for the community to recover from a nutritional deficit, especially height-for-age. In these cases, the problem is mainly the quality of food, more than the quantity. In the Mainha Project, the CHWs worked with only one of the determinants of malnutrition, the occurrence of disease (Ghosh, 1995).

A special food supplement was recently given to children with malnutrition. The Airton Senna Institute, the Brazilian Foundation, donated the food. Nearly 100 children will receive three meals per day until they reach five years of age. With this new intervention, we expect to see that the prevalence of malnutrition decreases more rapidly.

The use of ORT during the diarrhea episodes increased to 91 percent from 38 per cent. This represents an increase of the usage by 2.4 times. In northeast Brazilian region, where diarrhea is the most important cause of the medical consultations, hospitalization and death, the use of ORT during the bouts with this disease reached 36 percent (Barros and Victora, 1989). In Ceara’s program, the ORT was used in 52 percent of the children with diarrhea (McAuliffe et all, 1995). In the AISMIN Program, the ORT’s use reached 63 percent (César et all, 1992). In these studies, the solution with sugar and salt including the home preparations were considered. In the Mainha Project, only the solutions with the spoon pattern, ORT solutions distributed by the Brazilian government or drugstore bought solutions were considered. The other solutions prepared at home many times were considered inappropiate for consumption. Usually, these solutions have great quantity of salt and sugar and little quantity of water (Barros et all, 1989).

The basic immunization for children between the ages of 12 to 59 months increased 31.5 percent during this period, a change to 96 percent from 73 percent. These percentages refer only to dosages recorded on the vaccine cards. The Brazilian Ministry of Health estimates that 56 percent of children in this age group are with complete vaccinial coverage (MS, 1997). In the Ceara, the complete immunization for children of ages 12 to 23 months increased from nearly 30 percent to 87 percent in eight years. In the AISMIN program, these indicators reached 73 percent of the children (César et all, 1992). The percentage would have been higher had the children up to age 59 months been included in this grouping. On the other hand, these studies considered doses noted on the
vaccinial card and the doses that the mothers had said were discharged. This information is more reliable than that given by the mothers.

The cost per child per month was $8.12, while the annual cost per capita reached $11.42 in U.S. currency. There are many different ways to analyze this data. For Itapirapua Paulista, the Mainha Project expanded the availability of the health service, substantially decreased infant morbidity and mortality and brought in almost $5,000 per year. Moreover, the indirect expenses (transportation of patients, medical consultation, purchase of medicine, etc.) would not be considered. Finally, the deaths of 16 children were avoided. Also, the cost of this program was acceptable to the Brazilian government. During this period, each resident had $80 to spend on health. The cost per child per year was $97.44 or 21 percent greater. It is important to remember that this population, along with the elderly spent the greater part of its resources on health (Green, 1992).

Meanwhile comparing the cost of this program with other shows that it's much more expensive. The Ceara program cost $1.50 per capita per year (Tendler, 1997). There are many programs in Africa, Asia and Latin America that cost less than $5 per year (Mills and Drummond, 1987; Berman et al., 1987). The Kasongo project, for instance, conducted in the former Zaire (Democratic Republic of Congo), cost less than $1 per resident per year (Kasongo Team, 1984). The Mainha Project cost $11.42 per capita per year. The cost of the Mainha Project is at least two times greater than the other programs.

The values must be interpreted with caution because there are important differences among them. In this program, for example, all expenses were included except those of the acquisition of vaccines and medicines prescribed by doctors to children during medical consultations. This did not occur with the other programs (Kasongo Team, 1984; Mills and Drummond, 1987; Berman et al., 1987; Tendler, 1997). Likewise, other programs did not pay CHWs salary or did not pay job security and fringe benefits. In this program, the CHWS received both.

Finally, the county where this program is being carried out has peculiar geographic and demographics characteristics. The residents are unequally distributed as was previously mentioned. In the urban area, 350 are living people per square kilometer. This permits that one CHW assists 70 children. In the rural area the demographic density is 3.9 residents per square kilometer, nearly 100 times less density than other area. In this area, one CHW assists only 10 children. There are, yet, two other limitations. This region is very mountainous and the dirt roads are precarious. Many communities are reached only by horses or by walking. These factors must be considered when interpreter compares the results of the studies.

The Mainha Project conducted more home visits in the last 20 years than any other programs described in the literature. This occurred because we wished to improve the basic health indicators in a short period of time. We think that frequent home visits may allow opportunities of interventions and reinforce contact among CHWs, mothers and children. Moreover, the resources available permitted this to be done. Table 5 shows that this really occurred. At the end of the first year, the main results of this project had already been achieved. It took approximately three years to happen in the other programs. Furthermore, the improvements reached in other programs were not impressive as in Mainha Project. However, Table 5 also shows that significant improvements had not occurred in the second and third years of interventions as in the first. This suggests that frequent
visits are more important at the beginning of interventions when there are a great number of situations in which the CHW can intercede. After the first year, the opportunity of intervention was drastically reduced. The mothers solved many of the situations and the preventive services were used more frequently for this population. From these evidences it is possible to suggest that the number of home visits could be reduced after the first year without hurting the program.

At the end of the second year, this was verified for the project coordination. It was decided to observe this phenomenon for an additional year to determine whether the frequency of home visits could be reduced. The number of home visits will be reduced because this really happened. This will allow the cost of the program to diminish. If, for instance, home visits were conducted two times per month, the reduction would allow the Mainha Project to continue with only eight CHWs. This reduction would decrease the cost of program by 40 percent. Another possibility would be to expand the home visits to other population groups such as the elderly, pregnant women, and diabetics, without reducing the number of CHWs. With these changes, it would be possible to reproduce this model in other areas including more densely populated counties. The annual cost per child or resident would be considerably less.

The Sao Paulo State Department of Health donated nearly $33,000 to implement this program. However, the value of the home visits was enough to maintain it. Of this donation one-third was for use by the Mainha Project. According to the information given to the program's coordinator, the remaining two-thirds of this donation was used for other programs by the municipality.

Recently, the program's coordinator was informed that the CHWs could not vote and that the current mayor would be let go. These CHWs would be replaced by persons designated by the new mayor.

The replacement of CHWs and the misappropriation of the money designed for the program for other unclear activities reveal the difficulties of continuing this program. This shows how fragile the program is. This weakness occurs because the program is directly subordinated to the mayor. Because of these problems, the continuity this program is threatened. A possible solution for these difficulties is to create a nongovernmental organization (NGO). Resources from the Brazilian government for the specific use of home visits would maintain this NGO. The legal aspects of this change are being evaluated.

The impacts observed in this program result more from the reduction of mistakes than from new ways of interventions in primary health care. This statement is supported by five points: the frequency of home visits is higher than others; the CHWs had limited tasks; the geographic area was clearly defined; the CHWs received adequate pay for their duties; a preliminary survey was carried out. The execution of an initial diagnosis allowed a definition of target priorities of interventions and served as a basis for posterior evaluations of the program.

After three years of interventions, the Mainha Project reinforced the idea that primary health care will continue to be an excellent way to expand health service, to reduce morbidity and infant mortality, and to increase the utilization of preventive health service.
Finally, though this project was an acceptable cost for Brazilian government, it was be considered an expensive program. Because of this, it is impracticable on a large scale. Its continuity and reproduction depends on reduction of costs. At its inception, the improvement of the quality of the home visits and the reduction of their frequency may be the solution.
References

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### Table 1. Number of home visits performed by year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of visits</th>
</tr>
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<tbody>
<tr>
<td>First (Apr/94 – Mar/95)</td>
<td>21,982</td>
</tr>
<tr>
<td>Second (Apr/95 – Mar/96)</td>
<td>21,752</td>
</tr>
<tr>
<td>Third (Apr/96 – Mar/97)</td>
<td>23,549</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>67,283</strong></td>
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### Table 2. Expenditures for three years:

<table>
<thead>
<tr>
<th>Expenses ($ U.S)</th>
<th>Year</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>First</td>
<td>Second</td>
<td>Third</td>
<td>Total</td>
</tr>
<tr>
<td>Salaries*</td>
<td>23,171.30</td>
<td>37,051.57</td>
<td>40,757.63</td>
<td>100,980.53</td>
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<tr>
<td>Equipment</td>
<td>3,722.89</td>
<td>320.00</td>
<td>0.00</td>
<td>4,042.89</td>
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<tr>
<td>Medication</td>
<td>3,201.55</td>
<td>2,898.63</td>
<td>3,551.64</td>
<td>9,651.82</td>
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<tr>
<td>Others</td>
<td>239.60</td>
<td>2,574.91</td>
<td>2,429.16</td>
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<td><strong>Total</strong></td>
<td>30,335.34</td>
<td>42,845.11</td>
<td>46,738.43</td>
<td>119,918.91</td>
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</table>

* include social contribution

### Table 3. Total received per year for the home visits.

<table>
<thead>
<tr>
<th>Year ($ U.S)</th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>First</td>
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<tr>
<td>Second</td>
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</tr>
<tr>
<td>Third</td>
<td>47,098.00</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>134,566.00</td>
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</tbody>
</table>

### Table 4. Balance receipts income and expenditures for 3 years ($ U.S).

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Expenditures</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>134,566.00</td>
<td>119,918.91</td>
<td>14,647.09</td>
</tr>
</tbody>
</table>
Table 5. Main results of impact of interventions.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>1988</th>
<th>1993&amp;</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant mortality rate/1000(†)</td>
<td>83(9)</td>
<td>65(7)</td>
<td>18(2)</td>
<td>9(1)</td>
<td>18(2)</td>
</tr>
<tr>
<td>Hospitalizations♣</td>
<td>17%</td>
<td>13%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Malnutrition∞</td>
<td>33%</td>
<td>28%</td>
<td>24%</td>
<td>24%</td>
<td>23%</td>
</tr>
<tr>
<td>Oral Re-hydration Therapy ψ</td>
<td>21%</td>
<td>38%</td>
<td>83%</td>
<td>96%</td>
<td>93%</td>
</tr>
<tr>
<td>Fully Immunization ψ♦</td>
<td>52%</td>
<td>73%</td>
<td>95%</td>
<td>98%</td>
<td>95%</td>
</tr>
</tbody>
</table>

& When the interventions were started.
† The value between parenthesis indicates the number of children deaths per year.
♣ Last twelve months for under five years.
∞ Deficit height-for-age (=< -2 Standard deviation).
ψ Monthly mean.
♦ Only children age 12 to 59 months who received three doses of vaccine against poliomyelitis, diphtheria, tetanus and whooping cough and one dose against tuberculosis and measles.