IMPROVING OBSTETRIC CARE IN NORTHEAST BRAZIL[1]

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A pilot project to train traditional birth attendants and to set up maternity centers in the rural areas surrounding the city of Fortaleza, Brazil, was implemented in 1975. This article reports outcomes for women receiving care at these centers from October 1980 through July 1981.

Introduction

More than half the babies delivered into the world are not attended by a trained midwife or doctor. For that reason, various programs around the globe have attempted to upgrade the performance of the traditional birth attendants who help with a large number of these deliveries. Such programs usually involve three elements: basic training in delivery procedures, provision of some type of equipment, and a system for referring women thought to be at high risk of obstetric complications to institutional settings.

One such pilot program was implemented in 1975 in rural areas surrounding the city of Fortaleza in northeastern Brazil. This program was developed to improve maternal and infant health care using previously untrained local personnel and limited resources *(1, 2)*. The ongoing program has been unusual, in that not only have traditional birth attendants received basic training in obstetrics, but they have also overseen deliveries in small maternity centers provided by the local communities involved, instead of overseeing them in the expectant mothers' homes.

The northeast of Brazil is the poorest region of the country, with a per capita income less than half that of the country as a whole *(3)*. The region's infant mortality rate (142 per 1,000 live births) is higher than that of any other region in Brazil and is typical of countries with low levels of development *(3)*. Ceará, a state in this region, has a population of approximately 5.5 million inhabitants, of which 25 per cent live in its capital city, Fortaleza *(4)*. Health resources are extremely limited, with a population-to-physician ratio of approximately 3,000:1, compared to 1,500:1 for Brazil as a whole *(4, 5)*. While an estimate of the proportion of deliveries attended at hospitals in Ceará is not available, data from neighboring states show that about 75 per cent of all deliveries occur in hospitals *(6-9)*. However, the proportion of hospital deliveries is lower in rural areas (about 59 per cent of the total) than it is in major urban areas such as Fortaleza (where it is around 96 per cent) or in smaller urban areas (where the percentage is on the order of 85 per cent).

The Traditional Birth Attendant

Typically, the traditional birth attendant of northeastern Brazil is a middle-aged woman who in the past has been asked to help neighbors or friends at the time of delivery. After numerous such experiences she becomes recognized as a midwife in her community. She acquires her knowledge from her own ex-

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periences and observations, or from information handed down by her mother or passed along by her colleagues.

Most traditional birth attendants are illiterate but have a keen sense of the practical and the obvious. At delivery, they almost always maintain their patients in a sitting or squatting position during the expulsion period (usually 10-15 minutes), using low benches or birthing stools. They have also been trained to put the baby to the breast immediately after delivery, even before the cord is cut.

The Program Training Center

The Assis Chateaubriand Teaching Maternity Hospital, one of the two free maternity hospitals in Fortaleza, is part of the medical school of the Federal University of Ceará. This 150-bed hospital, the largest in the city, accommodates about 8,000 deliveries a year and provides the most sophisticated obstetric care in the area. Approximately 30,000 women are seen each year at its various outpatient department clinics that provide prenatal and postpartum care as well as family planning and gynecological cancer prevention services.

Development of the Program

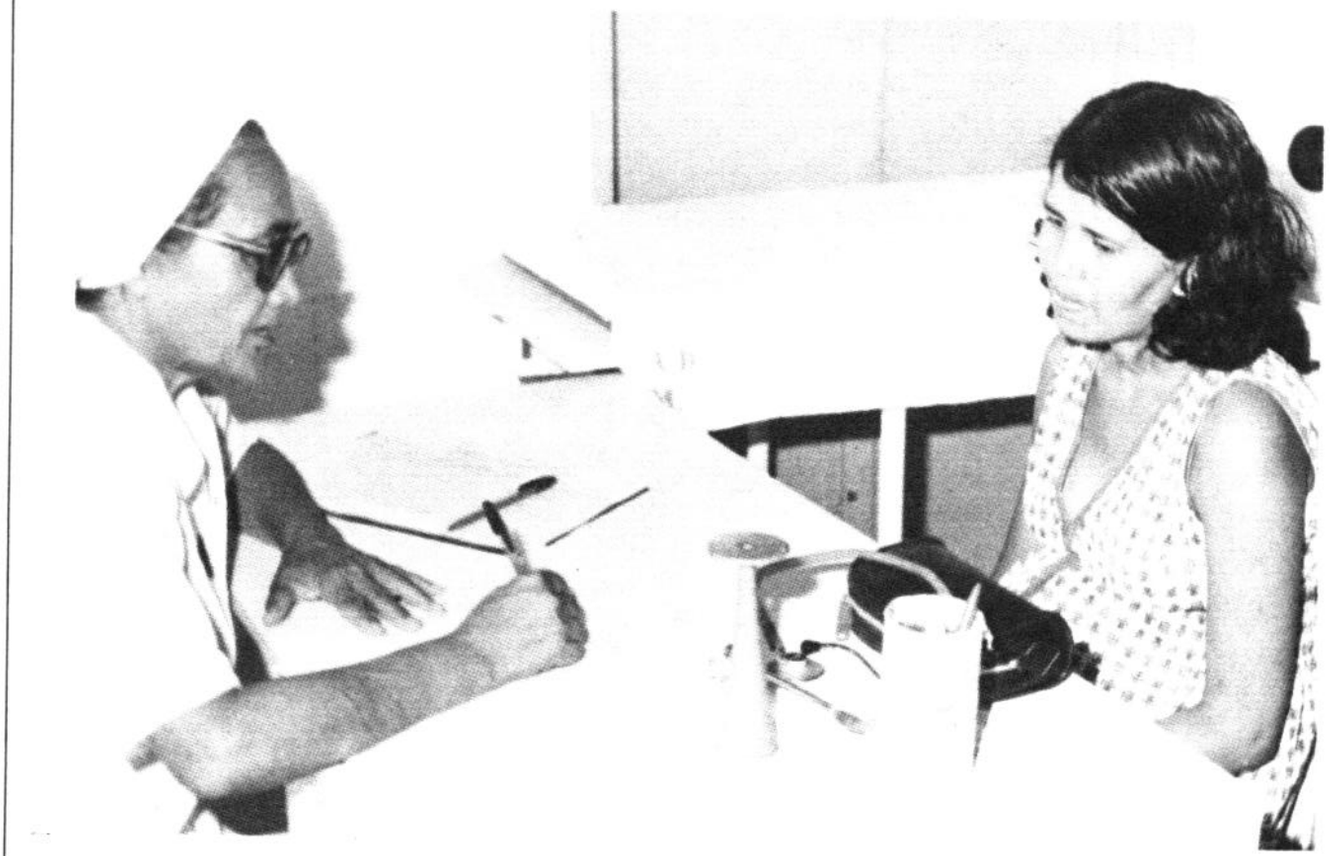
For many years, hospital staff members had been concerned about the need to develop a rural health care delivery system that would help poor women in surrounding rural areas who received no formal medical care. The impetus for developing a system that would meet these women's maternity care needs came from the senior author's observation that each year seven or eight women from the area surrounding the village of Guaiuba were dying in childbirth at the hospital. It was felt that if maternity care could be improved in the area, maternal mortality would decrease. Therefore, after several discussions with community leaders in Guaiuba, support was enlisted for recruiting local traditional birth attendants who would participate in a program designed to upgrade their skills. In addition, community leaders offered the use of a vacant building to serve as an obstetric unit.

The first group of attendants received a three-month practical and theoretical course at the hospital. Subsequent courses were given at the obstetric unit, however, because experience with the course at the hospital indicated that a sophisticated medical setting was an inappropriate place for training unskilled personnel. After the course, the best of the attendants were put to work at the obstetric unit. The others were sent back to the community to continue their work at private homes, having been given general instructions about referral of high-risk pregnancies.

After the success of the Guaiuba project, other communities in the area requested assistance with setting up similar projects. Such assistance was provided, and as of 1982 approximately 15 autonomous obstetric units had been established.

These obstetric units each have an outpatient clinic, a delivery room, and a room with two to seven beds for postpartum recovery. They are furnished with rather simple equipment: obstetric and clinical stethoscopes, sphygmomanometers, adult and infant weighing scales, and (occasionally) reactive strips and saline solution for intravenous infusions. The obstetric units are open to the community every day of the week, 24 hours a day, with at least one trained traditional birth attendant always on duty. An ambulance and driver, provided by the rural social security insurance program, are available at all times to transport women with delivery complications to the Assis Chateaubriand Hospital.

A team of one obstetrician and one nurse from the hospital visits each of the units twice a week to supervise the traditional attendants' activities and to provide prenatal care for high-risk patients. Patients to be included in the high-risk group are selected by applying a prenatal risk index based on each patient's age, parity, birth interval, outcome of previous pregnancies, and socioeconomic status. All patients are classified as being at high, medium, or low risk.



A traditional birth attendant at an obstetric unit obtaining information from an expectant mother (above) and performing a prenatal examination (below).

Funding for the project is provided primarily by the Brazilian social security system, which pays the salaries of all the obstetric units' employees. The salaries of the visiting physician and nurse are paid by the hospital. Operating costs for the obstetric units range from US$200 per month for the small units to US$2,000 per month for the larger ones.

The basic questions addressed by the study reported here are as follows:

1) How do deliveries by traditional birth attendants at the obstetric units compare with hospital deliveries in terms of maternal and infant morbidity and mortality?

2) Do the attendants recognize high-risk patients and make appropriate referrals?

3) What are the factors affecting the decision to refer a patient? Do the attendants refer the appropriate patients, or should they be referring more, fewer, or different types of patients?

4) Do complication rates suggest additional areas of training for the attendants or additional services that could be provided to improve perinatal and maternal health?

Materials and Methods

Data were obtained on women delivering at four obstetric units—one located in a semiurban area just outside Fortaleza (Lagoa Redonda) and the other three in rural areas (Aguiraz, Guaiuba, and Antonio Diogo)—and on women transferred to the hospital from these obstetric units. The study was carried out over a ten-month period from October 1980 through July 1981. Overall, records were obtained on 1,646 women delivering at the obstetrics units and on 235 women referred by the units to the hospital for delivery.

A maternity record form was used to collect information about both the women delivering at the obstetric units and those referred to the hospital. This form requested information on the woman's previous obstetric history, her prenatal condition, the management of labor and delivery, and the outcome of her current pregnancy. Women who were transferred to the hospital received a transfer slip from the referring obstetric unit indicating the reason(s) for referral. A maternity record form was then completed for the transferred women at the hospital. These data collection activities were supervised at the hospital by a physician; at the obstetric units they were supervised by two nurses who were responsible for helping the traditional birth attendants complete the forms.

The original study design sought to include domiciliary deliveries by traditional birth attendants (both trained and untrained) using a pictorial record. The inclusion of these deliveries would have permitted a more comprehensive evaluation of the training's impact. However, since the number of forms received was well below the estimated number of births in the area, we were reasonably certain that we did not have records for all deliveries. Without knowing whether the deliveries for which we did have records were a "random sample" of all deliveries by the traditional attendants, these data were not interpretable. This experience in attempting to collect records on home deliveries should serve as a warning to other investigators about the difficulties of such a project.

Results

Factors Influencing Referral

Table 1 shows the number of women presenting at each of the four obstetric units and the percentage of women referred to the hospital for delivery from each of these units. The greatest number of women presented at Lagoa Redonda and the smallest at Antonio Diogo. The percentage of women referred to the hospital was highest at Guaiuba and lowest at Antonio Diogo, the unit furthest from Fortaleza.

Before our survey, referral of women to the hospital was thought to be associated with factors such as age, parity, education, and prenatal problems. As Table 2 shows, the survey found that almost 30 per cent of the women over 39 years of age and 20 per cent of those

Table 1. The number of patients attending the four obstetric units studied and the percentage referred to the hospital for delivery.

Location of obstetric unit	No. of patients in study period	% of patients referred to hospital before delivery[a]	Travel time to hospital
Lagoa Redonda	778	11.1	20 minutes
Aguiraz	587	13.5	30 "
Guaiuba	411	16.8	60 "
Antonio Diogo	115	1.7	90 "
Total	1,881	12.5	

[a]Ten women who delivered at the obstetric units were later transferred to the hospital for treatment of postpartum problems.

Table 2. A list of conditions potentially influencing referral rates among obstetric patients attending the four obstetric units studied, showing the actual referral rates involved.

Condition	Patients in each category[a]		% referred to the hospital for delivery
	No.	%	
Age in years:			
<20	392	20.9	12.0
20-29	986	52.4	9.3
30-39	415	22.1	16.9
≥40	87	4.6	28.7
Total	1,880	100	
Parity:			
0	549	29.2	12.9
1-3	710	37.7	9.2
4-5	265	14.1	10.6
≥6	357	19.0	19.9
Total	1,881	100	
Education:			
None	665	35.4	14.6
1-4 years	1,054	56.1	11.3
≥5 years	161	8.6	11.2
Total	1,880	100	
Prenatal problems:			
None	1,766	93.9	7.0
Hemorrhage	20	1.1	95.0
Hypertensive disorders	71	3.8	95.8
Premature rupture of membranes	15	0.8	100.0
Other	9	0.5	100.0
Total	1,881	100	
Risk index:			
High (≥5)	444	23.6	19.6
Medium (3-4)	262	13.9	15.3
Low (<3)	1,173	62.4	9.2
Total	1,879	100	

[a]In each category, patients for whom relevant data were unknown have been excluded from the sample.

with six or more previous live births were indeed referred. However, there was very little difference in referral rates between women with no schooling and those with some education.

As anticipated, women with prenatal problems were far more likely to have been referred than women who had no problems. Specifically, some 95 per cent of those with prepartum hemorrhage or hypertensive disorders were referred, and all those with reported premature rupture of the membranes were referred.

The data also show that almost 25 per cent of the women presenting at the obstetric units were designated as being at high risk (having a risk index ≥5). Twenty per cent of these women were referred to the hospital for delivery. In contrast, of the nearly two-thirds (62 per cent) of the women designated as being at low risk (with a risk index <3), only 9 per cent were referred to the hospital for delivery. As the purpose of the risk index was not to determine referrals, but rather to determine which women should be scheduled for prenatal care with a doctor or nurse, it is interesting to note that the probability of referral was still positively related to the risk index score.

The data in Table 3 show that referral rates were much higher among women with abnormal presentations during labor than among women with cephalic presentations. In general, women who had problems with labor or delivery—including prolonged or obstructed labor, placenta previa, or abrupto placentae—were much more frequently referred than women who had no problems. Also, 83 per

Table 3. Noteworthy characteristics of labor among the patients at the four obstetric units and the percentage in each group referred to the hospital.

	Patients in each category[a]		% referred to the hospital for delivery
	No.	%	
Presentation during labor:			
Vertex; occiput anterior, or transverse	1,816	96.5	10 9
Brow or face	21	1.1	28.6
Breech	34	1.8	61.8
Transverse	9	0.5	100.0
Compound	1	0.0	100.0
Total	1,881	100	
Complications of labor or delivery:			
None	1,815	96.5	9.7
Prolonged or obstructed labor	44	2.3	97.7
Placenta previa	7	0.4	100.0
Abrupto placentae	7	0.4	85.7
Other complications	8	0.4	37.5
Total	1,881	100	
Condition of fetus or neonate:			
Normal	1,811	96.3	9 9
Fetal distress	59	3.1	83.1
Other conditions	10	0.5	60.0
Total	1,880	100	

[a]In each category, patients for whom relevant data were unknown have been excluded from the sample.

cent of the reported cases of fetal distress during labor were referred to the hospital, as compared to only 10 per cent of the cases with a normal fetal condition during labor.

Delivery

As indicated in Table 4, columns 1-3, all of the women delivering at the obstetric units had spontaneous deliveries, while 22 per cent of the women referred to the hospital required operative intervention (4 per cent were assisted with low, mid, or high forceps, and 18 per cent were delivered by cesarean section).

All but six of the women delivered at the obstetric units were attended by traditional birth attendants. Four had no attendant and the other two were delivered by a nurse and a physician. Nearly two-thirds (64 per cent) of the women referred to the hospital were delivered by physicians, 16 per cent were delivered by medical students, and 20 per cent had nurses or student nurses in attendance.

Outcome of Delivery

Almost 98 per cent of the women presenting at the obstetric units delivered babies who were alive at discharge (see Table 5, columns 1-3). The stillbirth rate was 18 per thousand deliveries, and five babies per thousand born alive died before discharge. As anticipated, both the stillbirth rate and the rate of death before discharge were much higher for referred patients than for those delivered at the units. Almost 13 per cent of the infants born to women referred to the hospital were stillborn or died before discharge, while less than 1 per cent of those born to women delivering at the units were in either of these categories.

The percentage of low-birth-weight babies (< 2500 gm) was much higher among the transferred women, as was the percentage of babies with a five-minute Apgar score below seven. The percentage of women with some puerperal problem was low in both groups, but it was higher among the referred women. There were no maternal deaths among women delivering at the obstetric units or among women referred from the units to the hospital during the period covered.

Comparison of Patients Presenting at the Obstetric Units and at the Hospital

The traditional birth attendant training project achieved its primary goal of making deliveries safer for rural women, and also demonstrated by way of the present evaluation that traditional birth attendants with little or no formal education can be trained to refer high-risk women for hospital delivery while conducting safe deliveries in their own communities.

To further evaluate the performance of these attendants, we compared the birth out-

Table 4. Percentages of women with different types of deliveries and attendants among those delivering at the obstetric units, those presenting at the obstetric units but referred to the hospital, and those presenting at the hospital.[a]

	% among patients delivering at obstetric units	% among patients presenting at obstetric units but referred to hospital for delivery	Totals among patients presenting at obstetric units		Totals among patients presenting at the Assis Chateaubriand Hospital[b]	
			No.	%	No.	%
Type of delivery:						
Spontaneous (including breech extraction)	100.0	78.3	1,830	97.3	4,492	89.7
Forceps (low, mid, high)	0.0	3.8	9	0.5	79	1.6
Cesarean section	0.0	17.9	42	2.2	432	8.6
Total	100	100	1,881	100	5,003	100
Attendant present at delivery:						
Traditional birth attendant	99.6	0.0	1,639	87.2	0	0.0
Student nurse	0.0	18.3	43	2.3	1,374	27.5
Nurse	0.1	1.7	5	0.3	76	1.5
Medical student	0.0	16.2	38	2.0	1,057	21.1
Physician	0.1	63.8	151	8.0	2,492	49.8
None	0.2	0.0	4	0.2	6	0.1
Total	100	100	1,880	100	5,005	100

[a]In each category, patients for whom relevant data were unknown have been excluded from the sample.
[b]Excluding private patients and referrals.

Table 5. Percentages of different delivery outcomes among women delivering at the obstetric units, women presenting at the obstetric units but referred to the hospital, and women presenting at the hospital.[a]

	% among infants delivered at obstetric units	% among infants born to mothers presenting at obstetric units but referred to hospital for delivery	Totals among infants born to mothers presenting at obstetric units		Total among infants born to mothers presenting at the Assis Chateaubriand Hospital[b]	
			No.	%	No.	%
Neonatal status:						
Alive at discharge	99.2	87.2	1,838	97.7	4,711	94.1
Stillbirth	0.7	9.4	33	1.8	182	3.6
Postpartum death	0.1	3.4	10	0.5	113	2.3
Total	100	100	1,881	100	5,006	100
Birth-weight:						
<2500 gm	4.1	14.2	99	5.3	465	9.4
≥2500 gm	95.9	85.8	1,782	94.7	4,465	90.6
Total	100	100	1,881	100	4,930	100
5-minute Apgar score.						
<7	1.4	14.9	53	2.9	253	5.3
7-10	98.6	85.1	1,793	97.1	4,480	94.7
Total	100	100	1,846	100	4,733	100
Puerperal condition·						
Normal	99.7	95.7	1,866	99.2	4,908	98.0
Fever	0.1	2.1	6	0.3	34	0.7
Bleeding	0.2	0.4	5	0.3	37	0.7
Other	0.0	1.7	4	0.2	27	0.5
Total	100	100	1,881	100	5,006	100

[a]In each category, patients for whom relevant data were unknown have been excluded from the sample.
[b]Excluding private patients and referrals.

comes of women presenting at the obstetric units with those of women presenting at the hospital (excluding private patients and all referrals).

The age distribution of the women in the hospital group was similar to that of the women presenting at the obstetric units, with comparable percentages of women in the youngest (<20 years) and the oldest (≥ 40 years) categories. The parity of women in the two groups was also similar. However, 83 per cent of the women presenting at the hospital, as compared to 65 per cent of those in the obstetric unit group, had received some formal education (data not shown).

The two groups were comparable in terms of presentation of the fetus during labor, with 5 per cent of the women in the obstetric unit group and 6 per cent of those in the hospital group having a malpresentation. However, only 4 per cent of the obstetric unit women were reported as having labor or delivery complications, compared to 9 per cent of the hospital group. Similarly, a higher percentage of women in the hospital group were reported to have experienced prenatal problems (18 per cent, as compared to 5 per cent in the obstetric unit group). These two latter findings may be partially explained by the tendency of traditional birth attendants to leave unrecorded problems they consider to be usual or not serious (data not shown).

On the other hand, our findings indicate that when the comparisons were limited to variables not requiring interpretation by the attendant (e.g., age, parity, education, and presentation of the fetus), data on the two groups were very similar, with the hospital group perhaps enjoying a slightly more favorable condition. Despite these circumstances, however, no maternal deaths were seen in this review of 1,881 women either delivered in obstetric units or referred to the hospital for delivery. In contrast, among a similar group of women delivering at the hospital, three of 5,006 patients died. (This latter group of 5,006 consisted of nonprivate patients who had not been referred to Assis Chateaubriand from other hospitals.)

The stillbirth rate among the women who presented at the obstetric units (including both women delivered at those units and those referred to the hospital) was 18 per 1,000 deliveries, half the rate among the comparable hospital group (see Table 5, columns 3 and 4). Likewise, the percentage of babies who died before leaving the hospital was much lower among those born to women presenting at the obstetric units (0.5 per cent) than among those born to the comparable hospital group (2.3 per cent).

It should be noted, however, that besides reflecting the referral system's effectiveness and the ability of the trained traditional birth attendants to deal with normal deliveries, these indices also reflect the relative health status of the two groups of women served. In this regard, one health status indicator—that of low birth-weight—suggests the health status of the hospital group was poorer than that of the obstetric unit group, because the percentage of low-birth-weight babies born to the hospital group was relatively high (9.4 per cent, as compared to 5.3 per cent in the obstetric unit group).

In nearly all cases, the traditional birth attendants were able to identify women of above-average risk and refer them to the hospital for delivery. However, a small group of referred women were later diagnosed at the hospital as having no problem. (For example, six women referred for malpresentations were reported to have had cephalic presentations at delivery.) All in all, over-referral is probably preferable to a situation where women with problems are not referred, even though unnecessary referrals do place an added strain on already scarce hospital resources and monopolize the ambulance that might be needed for more urgent cases.

It might be expected that obstetric units further from the Assis Chateaubriand Hospital would be less likely to refer patients because of the longer travel time necessary to reach the hospital. However, while Antonio Diogo (the obstetric unit furthest from the hospital) did have the lowest referral rate, it appears that the most likely reason for this was not so much

its distance from Assis Chateaubriand as it was the availability of other, closer hospitals. A more detailed analysis of referral patterns is planned.

Conclusions

In an area such as Northeast Brazil where health resources are very scarce, a system for training women who are already active in delivering obstetric care is an efficient way of upgrading the obstetric care received by women in rural areas and an important step in the improvement of health services in seriously disadvantaged locations. Such a system can greatly extend the coverage provided by a hospital at very little extra cost. For example, whereas only 10 per cent of the women presenting at the obstetric units in our study were delivered by physicians or medical students, 71 per cent in the group presenting at the hospital were so delivered. In addition, only 2.2 per cent of the women presenting at the obstetric units were delivered by cesarean, as compared to 8.6 per cent of those in the hospital group (see Table 4, columns 3 and 4).

Overall, the use of trained traditional birth attendants in this part of Brazil appears to demonstrate a way in which a developing country with a limited health budget and severe shortages of trained midwives and physicians can achieve a cost-effective improvement of obstetric services. It also points to a need for simple ongoing evaluation of rural health services, so that existing problems can be identified and dealt with using whatever resources are available.

It should also be pointed out in our case that the communities themselves have contributed resources to the improvement of health care by making available the buildings in which the traditional birth attendants work, and that community cooperation is an important ingredient contributing to the program's success.

This success, in turn, has prompted expansion of the program, which now includes facilities for carrying out deliveries at the homes of trained traditional birth attendants. That is, as of 1982 there were five functioning one-bed units, and 20 more were being planned for 1983. Each of these units was attached to the home of a traditional birth attendant, providing a place where women from the most remote communities could deliver their babies. Overall, the innovations provided through this program have brought good maternity care to a large number of rural women who found delivery at a distant maternity hospital impractical. It is therefore hoped that this experience will serve as an example of how health care can be improved at low cost, and with community participation, in other parts of the world.

SUMMARY

In 1975 personnel at the Assis Chateaubriand Teaching Maternity Hospital in Fortaleza, Brazil, began a pilot program designed to train the traditional birth attendants overseeing many of the births in surrounding rural communities. In this manner the program sought to improve maternal and infant health care in the region using previously untrained personnel and limited resources. A good deal of emphasis was placed on community relations, and a pattern emerged whereby the communities served donated building space for obstetric units staffed by some of the traditional birth attendants. Through their training and in a variety of other ways, the attendants were encouraged to refer women at high risk of developing complications to the hospital for delivery.

Some years after this successful program had been established, the authors made a study of maternity patients who gave birth at four of the obstetric units, who were referred by the four units to the Assis Chateaubriand Hospital for delivery, and who delivered at the hospital without having been referred. In general, this study found that the four obstetric units were performing well. Most women at risk of complications were being referred, so that less than 1 per cent of the babies born at the units were stillborn or died before discharge from the units, as compared to 13 per cent of those whose

mothers were referred to the hospital for delivery. In all, nearly 98 per cent of the 1,881 mothers presenting at the four units during the study period delivered babies who were alive at discharge. No maternal deaths occurred among these patients.

These and related findings suggest that this program could serve as an important model for those seeking to upgrade maternal and infant health services in severely disadvantaged rural areas. It is therefore hoped that the information presented here will provide guidelines that could prove useful for other programs of this kind.

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