



## AVERTING MATERNAL DEATH AND DISABILITY

# Strengthening emergency obstetric care in Ayacucho, Peru

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### Abstract

*Objective:* With support from the Averting Maternal Death and Disability (AMDD) Program, CARE began the FEMME Project in 2000 to increase access and utilization of emergency obstetric care (EmOC) services for the approximately 48,000 pregnant women in the northern provinces of Ayacucho. *Methods:* The project targeted 5 facilities with a comprehensive package of interventions designed to improve capacity to provide quality EmOC services and to promote a human rights approach in health care. Key program activities included improvements in infrastructure, human resources capacity development, development of service standards and protocols, quality improvement activities, and promoting a rights-based approach to health. *Results:* By the end of the project, northern Ayacucho had 6 functioning EmOC facilities: 3 comprehensive (including a non-FEMME project facility) and 3 basic. This exceeds the UN minimum recommendation of 5 EmOC facilities per 500,000 population. Other changes in the UN process indicators indicate an increase in quality and utilization of EmOC services. Met need for EmOC

*Abbreviations:* DIRESA, Dirección Regional de Salud (MoH at the regional level); FEMME, Foundations to Enhance Management of Maternal Emergencies; GoP, Government of Peru; IMP, Instituto Materno Perinatal; MoH, Ministry of Health; RHA, Regional Hospital of Ayacucho.

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increased significantly from 30% in 2000 to a high of 84% in 2004. Case fatality rates declined and the number of maternal deaths in the entire region declined. *Conclusion:* CARE's work in Ayacucho made an impact on policies and programs related to EmOC throughout the region. Within CARE, project experiences have supported maternal health programs particularly in the Latin American/Caribbean region.

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## 1. Introduction and background

CARE's maternal health program in Peru is set in the northern region of Ayacucho situated in the sierra at elevations from 2500 to 4000 m. This mountainous, isolated and rural region is located southeast of Lima and northwest of Machu Picchu. The geography of northern Ayacucho is diverse and includes the Andes Mountains, jungle, and high plateaus. The project area consists of the provinces of Huamanga, Huanta, La Mar, Cangallo, Vilcashuaman, Victor Fajardo, and Sucre. These provinces are economically linked to the capital in Huamanga province.

Ayacucho has a young population. Forty-two percent of its estimated 562,489 people (2003) are <15 years old and 5% are >65. Languages spoken include Spanish and indigenous Quechua. There are large disparities in education for men and women with literacy rates of 82% and 54%, respectively. Approximately 65% of the population lives in poverty with an average monthly income of US\$40, about half the national average.

Ayacucho is ranked 20th among the 24 Peruvian regions on health indicators. The crude mortality and birthrates are 10.7 and 22 per 1000 population, respectively, while the fertility rate is 4.4 and life expectancy is 61.9 years. There are 4.3 physicians and 5.7 nurses per 10,000 persons, and 3.7 ob-gyn professionals per 10,000 women of reproductive age [1]. In 2000 the infant mortality rate was 69 per 1000 live births and the maternal mortality ratio was 560 per 100,000 live births. Ayacucho was the region with the third highest maternal mortality in Peru [2]. Major direct causes of institutional maternal deaths include hemorrhage, pre-eclampsia/eclampsia, and infection.

In 1996, the Government of Peru (GoP) initiated health sector reform: services were structured in a system of networks and administration was shared with locally elected committees called *Local Community Health Administration*. In the region of Ayacucho the Ministry of Health (MoH) administers a network of 8 hospitals, 44 health centers, and 308 health posts. The Regional Hospital of Ayacucho (RHA) is the referral hospital for northern Ayacucho

while the DIRESA (*Dirección Regional de Salud-MoH* at the regional level) serves as the Regional Health Department of the national MoH system.

In Ayacucho, the ratio of hospital beds to 100,000 inhabitants is 8.2 compared to 143.3 for Peru as a whole [1]. Nonetheless, health facilities in the region have received significant inputs during the past 6 years (1998–2004) from 2 national bi-laterally funded projects. Project 2000 was a USAID-sponsored maternal and child health project that focused on improving the quality of existing health care facilities and increasing their use. The GoP *Basic Health for All Program* has been instrumental in organizing health services into a more efficient micro-network system, expanding hours of operation to 12 or 24 h, increasing the number of staff at all health facilities, and instituting performance based evaluation.

In spite of this support, community use of health services, particularly obstetric care, was not universal. In Ayacucho, it was estimated that 58% of births occurred in health care establishments while prenatal care coverage (>1 visit with a skilled attendant) was 81% [3]. Factors that limited the use of maternal health services include the poor quality and inefficiency of the services, especially at addressing obstetric emergencies. While health providers received little support and suffered from poor management systems they, in turn, gave little attention to clients' needs and show little respect for local cultures. The factors led to women's reluctance to use the services [4].

### 1.1. Objectives and design

With support from AMDD, CARE initiated the FEMME (*Foundations to Enhance Management of Maternal Emergencies*) Project in 2000 and sought to increase access, availability and utilization of emergency obstetric care (EmOC) services for approximately 48,000 pregnant women in the northern provinces of Ayacucho. FEMME did not create new facilities but addressed availability by upgrading existing facilities into functional units that could provide either comprehensive or basic EmOC services. The project targeted 5 facilities: the RHA, 2 smaller

hospitals at San Francisco and Cangallo, and health centers at Vilcashuaman and Tambo. Sites were chosen based on their geographic location. San Francisco is located in the jungle on the border with the region of Cusco and also provides critical services to *cusqueños*. In 2000, San Francisco provided erratic obstetric surgery and occasional blood transfusions without the security of a blood bank. Cangallo served a more administrative role for the DIRESA than it did a patient care center for neighboring smaller facilities; women who suspected an obstetric emergency traveled directly to RHA several hours away. The two health centers had strong ties with their rural communities, increasing our motivation to invest in them.

## 2. Methods

As with other projects supported under the CARE/AMDD collaboration, overall project design and implementation was guided by the “Implementation Stages Framework” that emphasizes the following as key building blocks for the establishment of EmOC services [5]:

- improvements in infrastructure and facility set-up;
- data collection and information systems;
- staff development and placement, quality improvement and supervision.

In addition to these building blocks, the project addressed the referral and communication system and the mobilization of civil society.

### 2.1. Infrastructure improvements and facility set-up

Facility set-up, including adequate infrastructure, equipment and supplies, is crucial to the provision of quality EmOC services. Due to Peru’s relatively high level of socio-economic development, the infrastructure improvements were less significant than those undertaken for CARE’s work in Africa. Reconstruction efforts focused on the specific needs of the various health facilities. The RHA received support for minor renovations, for example, placement of elbow taps for sinks outside the operating room and small modifications to the obstetric wards, creating a more efficient working environment for providers and more privacy for patients. Hospital staff also requested an intermediate intensive care unit for critically ill women undergoing treatment for obstetric complications. This renovation was co-fi-

nanced by the hospital and FEMME. The project also intervened with the MoH to provide emergency drugs such as magnesium sulfate, antihypertensives and other basic equipment and supplies.

Other facilities carried out renovations too. These involved reconstruction of ramps and entryways at the emergency entrances for the two health centers. In Vilcashuaman and San Francisco, renovations included providing separate rooms for general and obstetric emergency admissions along with aesthetic improvements to the in-patient and emergency receiving areas. The health centers also created a separate space for radio communication that facilitates the referral system.

### 2.2. Data collection and information systems

One of the most important interventions at the facility level was the development of a more efficient and systematic mechanism for record-keeping and data collection. Before the FEMME Project, health facilities used approximately 20 different registers for obstetric patients. The project team assisted the EmOC centers to standardize and streamline patient registers for the entry and tabulation of key maternal and newborn data. The goal was to get health personnel in the habit of monitoring the availability and use of EmOC and to make decisions for improving the quality of services. There are now only 3 registers for collecting information on emergency treatment, prenatal care, and delivery. These registries are now used throughout the region. To facilitate data analysis, information on obstetric complications was added to the registers and the analysis of maternal deaths was refined by separating indirectly from direct causes. These data also were used to support project monitoring every 6 months using the UN process indicators.

### 2.3. Staff development and placement

FEMME’s interventions were also designed to improve the technical capacity of staff at the 5 facilities through advanced clinical training in emergency obstetric interventions and use of standardized protocols. From 2001–2002, 42 physicians, midwives and nurses participated in an intensive 2-week training program at the Maternal Perinatal Institute (IMP or *Instituto Materno Perinatal*) in Lima, with financial support from FEMME.

#### 2.3.1. Training

A high turnover rate of trained personnel was and remains a major challenge for the health system in

Ayacucho. Because training in Lima is costly, the project worked with the IMP and the DIRESA to develop a regional training centre at RHA, which was accredited by the IMP in 2003. The specialists who originally trained in Lima enthusiastically supported an on-going clinical training program for physicians, nurses, midwives, and more recently for technicians and anesthetists. Training sessions are for 15 days with on-call duty. After an analysis of the causes of maternal death, the treatment and prevention of postpartum hemorrhage received special emphasis in the trainings. Checklists are used to monitor performance and competency. Trainees produce a work plan that is implemented when they return to their place of work. Training includes subsequent supportive supervision to ensure actual service delivery at all facilities according to international standards and guidelines. Between 2002 and 2003 PARSALUD (an International Development Bank funded project that supports health reform in Peru) invested heavily in the training of providers and staff from the DIRESA. A total of 204 professionals were trained (59 physicians, 93 midwives and 52 nurses).

As a result of these interventions, RHA staff has become increasingly motivated and enthusiastic about their improved capacity to respond to obstetric emergencies. Two physicians are on call 24 h a day to assure adequate and prompt emergency response. New procedures such as vacuum extraction (and the necessary equipment) have been re-introduced to support the management of prolonged/obstructed labor. Other achievements include teaching midwives at the RHA and throughout the region new practices such as active management of the third stage of labor.

Another benefit of the training has been the improved relationships between staff at RHA and peripheral health centers. Many of the professionals who make referrals to RHA or who accompany referrals are people who have trained at RHA. The personal familiarity from both sides has led to a more agile and positive referral system. Although the evidence is only anecdotal, a receptive environment has replaced one that was sometimes hostile.

### 2.3.2. Staff placement

Placement of trained staff was coordinated with the DIRESA to ensure a wide distribution of technical capability to resolve obstetric emergencies. Staffing was a particular challenge at the hospitals of San Francisco and Cangallo. At San Francisco the availability of a surgeon and an anesthetist was erratic for several years. The combination of a determined hospital medical director and the DIRESA enabled the hiring of more

permanent staff. Infrastructure rebuilding at Cangallo led to the staffing of specialists there too. By the end of the project, both facilities were staffed with specialists and the capacity for obstetric surgery had increased.

### 2.3.3. Development of protocols and standards for care

In addition to imparting clinical skills, the training strongly emphasized adherence to evidence-based care. FEMME and the DIRESA sponsored the development, design and publication of protocols titled “*Guidelines for the Management of Obstetric Emergencies*” (*Guía de Atención de Emergencias Obstétricas*) [6]. Using a participatory approach, FEMME brought together providers from the health facilities in Ayacucho, the RHA, and national level staff from IMP to develop the EmOC Protocols. The development of the protocols was based on 3 criteria: (1) they were evidence based; (2) they specified the competencies/ functions by cadre of staff and level of facility; and (3) they outlined the step-by-step process in the management of obstetric problems.

The protocols were designed following a review of national and international standards and guidelines. Thereafter a validation process was undertaken during which the guidelines were assessed in different facilities for acceptability. With the third edition, the regional government passed a law that recognizes these as the official EmOC protocols, and promotes EmOC as a critical component of any safe motherhood intervention in the region. A fourth edition includes a section on evidence based antenatal care (a combined effort between pediatrics and the ob-gyn department) and the essential steps of normal delivery.

Today, the *Guidelines* are used throughout the region and are increasingly shared with other regional DIRESAs. The IMP trainers also continue to use the *Guidelines* in their training in EmOC. The success of these protocols has motivated the development of a parallel series for newborn care.

## 2.4. Improving quality and external supervision

### 2.4.1. Quality improvement approaches

In addition to clinical training and the development of protocols, quality of care was enhanced through the use of Criterion-Based Audits (CBA), a quality improvement approach that compares clinical and management practices with set standards and criteria [7,8]. The *Guidelines* are the technical reference from which to draw the criteria. Audit

empowers health workers to address locally identified problems utilizing a step-by-step process to find appropriate solutions and improve practice. Case reviews of near misses and maternal deaths are now performed regularly as a learning tool for staff at rural health centers and the RHA.

#### 2.4.2. Supportive supervision

External supportive supervision and on-site quality improvement processes were used to enhance efficient service delivery. Project staff conducted monthly supervisory visits to the health facilities. Each visit typically included an inspection of the facility with a checklist to assess facility readiness, a staff meeting to prepare monthly management work plans, and a discussion of case management procedures. Supervisory visits often included a training component on topics such as infection prevention, thereby contributing to capacity building among staff and an increased commitment to quality service delivery. The IMP provided significant supportive supervision to RHA staff, who subsequently have assumed greater supervisory responsibility locally. Today RHA staff performs the role of tutor to individual facilities throughout the region. This participatory mode of supervision served to improve supervisor–employee relationships, build trust, and support problem solving.

Staff visits from AMDD and CARE (Lima and Atlanta) encouraged the EmOC facilities to update skills and procedures, improve the client–provider relationships and quality of care based on a human rights approach.

#### 2.4.3. Promoting human rights approach

In addition to these interventions, the project used a rights-based framework to support quality improvements and increased access to services. The project worked with staff to address key barriers that women in the community had identified as limiting their use of existing care. At the facility level, this involved various initiatives, such as the specific effort to provide non-discriminatory services to local cultures (i.e. the indigenous people). At the RHA and 2 of the health centers, new signs were designed and put in place to provide accurate information on health services. This was also done in the local language to address the needs of the non-Spanish speaking members of the population. In the health center of Vilcashuaman, a community survey found that women preferred vertical to horizontal birthing positions. The health team then designed birthing chairs which enabled women to adopt different positions. They encouraged family members to accompany women during childbirth in a manner similar to traditional home

births. Other facilities have now acquired birthing chairs. Nearly all the facilities redesigned their labor and delivery wards and placed curtains to ensure privacy for women throughout the process of childbirth. At RHA in response to women's complaints about no food or cold food after hours, they bought a microwave oven. Women's names appear at each bedside and staff refers to women by their names instead of their bed numbers.

These innovations make the services more client-centered and acceptable. Ongoing community interventions on human rights have empowered the community to demand that the health system be accountable to the people it serves.

### 2.5. Referral and counter-referral system

Although not directly instigated by FEMME, another initiative that strengthened the health system was the referral and counter-referral mechanism to ensure continuity of care for women. The system was established in January 2003 as a joint effort among the DIRESA, the RHA and the Assistance to Dispersed Communities Project (*Proyecto de Atención a Comunidades Dispersas* or PAC). The Dutch-funded PAC collaborated with the MoH to improve service provision in rural areas of Peru. The referral system includes procedures and policies for communication between health centers and the RHA to prepare for the arrival of an urgent case, ensure transportation and clinical stabilization of patients, accompaniment during referral, and follow-up of each case. At the RHA, attendants are encouraged to stay at the hospital with the referred patients and this professional courtesy has improved compliance with the referral system.

The system has functioned for almost 2 years now, and FEMME, together with RHA staff, launched a contest for the most dramatic and best documented referral process. Another competition is planned for 2005. This initiative complemented the goals of the project by publicizing cases where health personnel and the community worked successfully to save a woman's life. The public recognition of the winning facilities has personally motivated staff and is in stark contrast to the punitive environment of only 5 years ago.

### 2.6. Community and civil society involvement

The FEMME Project worked with community groups to form local committees that complemented work at the 5 facilities. The main purpose of these committees was to enlist community participation

and involvement in addressing maternal mortality, especially in overcoming many of the barriers experienced during Delays I and II (making the decision to seek medical attention and actually reaching that care) [9].

The committees in the rural areas include personnel from each health facility and representatives from local NGOs, political authorities and women's groups. They are responsible for reviewing maternal deaths, mobilizing local actors to prevent deaths, and they help families understand the need for modern medical care in the event of an emergency. Joint planning to arrange transport to the referral hospital is done in coordination with local authorities and families. In some cases, committees have worked with the police and the military to provide emergency transport.

At the regional level a Multi-Sectoral Committee for the Reduction of Maternal Mortality was formed in December 2002. Their first action was to launch a contingency plan with support of the DIRESA to ensure that all hospitals, health centers and posts have staff capable of providing EmOC during the holiday season and vacation periods rather than leave health centers with only auxiliary health staff to cover emergencies.

The membership of the regional Multi-Sectoral Committee is diverse and includes representatives from the University of Ayacucho, its School of Nursing and Midwifery, the police and armed forces, municipal officials, regional government officials and various civil society organizations. Members have created task forces to manage different activities of the committee. CARE serves as the secretariat to the committee, which has facilitated organization and helped to consolidate the committee into a solid regional organization.

## 2.7. Partnerships

CARE's most important partners in the FEMME Project have been the IMP in Lima, the Ayacucho DIRESA and the Regional Hospital. The Institute is the policymaking and normative body for maternal and perinatal health in Peru. There are 3 main ways in which the participation of the Institute was crucial: (1) technical assistance for the design of the *Guidelines for the Management of Obstetric Emergencies*, (2) training, and (3) supervision of the training programs and services in general. The RHA training programs have also benefited the IMP in their desire to establish regional training centers. Ayacucho has been their first regional center.

The close relationship between the DIRESA and CARE has enhanced the institutional acceptability of FEMME activities and innovations. The participation of DIRESA personnel in all aspects of the project and the allocation of material resources has increased the sustainability of the FEMME activities. The project model has now been transferred to the south of the region and has influenced how other donors spend their resources.

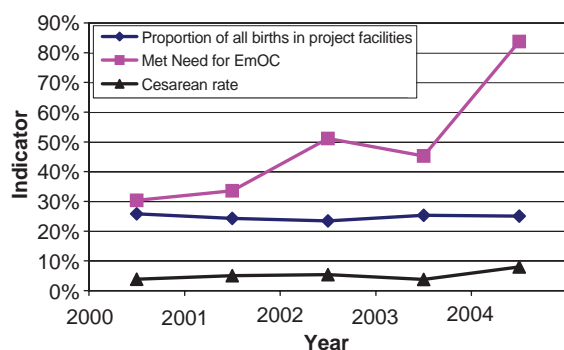
The RHA is an essential partner because of its role as the regional referral hospital, a training center, and for its new role in supervising and mentoring staff at the basic and non-EmOC facilities. The School of Nursing and Midwifery at the University of Ayacucho has approached CARE for assistance to improve the curriculum for nurses and midwives. CARE has supported the university to include life saving skills as an essential component of their midwifery curriculum. Both the RHA and the School of Nursing have also provided leadership and support for the activities of the Multi-Sectoral Committee on Maternal Mortality.

CARE played the role of broker in bringing different partners together to work towards reducing maternal deaths in the region. Prior to FEMME, these institutions rarely collaborated with each other, and certainly did not strategize together to reach a common objective. Several synergies arose out of the partnerships as changes were made from the bottom up and then formalized in regional policies and procedures. The most dramatic example is the development of the *Guidelines for the Management of Obstetric Emergencies*. Each partner made a contribution: FEMME organized meetings and workshops, arranged for the participation of expert consultants and facilitated communication; professional health staff provided the official approval of the guidelines and distributed them to all health facilities in the region.

FEMME also became a resource for programmatic changes within CARE itself as well as a resource for other CARE offices outside the region. Within CARE the FEMME experiences have been shared with other maternal health programs, and field visits have been organized for staff from CARE projects in Nicaragua, Guatemala, Bolivia, and with representatives from the University of Cuenca, Ecuador.

## 3. Results

This section highlights the changes in the availability and utilization of obstetric services during the lifetime of the project using data collected from the biannual monitoring system.



**Figure 1** UN process indicators: Trend data over 4 years, Ayacucho, Peru.

### 3.1. Availability of EmOC services

The UN process indicators recommend a minimum of one comprehensive EmOC facility and 4 basic EmOC facilities per 500,000 inhabitants [10]. The baseline facility survey of 2000 covered 31 institutions. Comprehensive EmOC was available at the RHA and basic care at two hospitals, both of which could perform obstetric surgery (if only sporadically in the case of San Francisco), but neither had a blood bank. Thus, the population of 500,000 had access to 3 EmOC facilities rather than the recommended 5.

In addition to the RHA, the project targeted San Francisco to become a fully functioning comprehensive EmOC unit. By 2004 San Francisco had a

full-time surgeon, a nurse anesthetist and a blood bank. By 2005 Cangallo hospital provided some obstetric surgery and Vilcashuaman and Tambo provided basic care. But neither provided assisted vaginal delivery, only RHA performed an occasional vacuum extraction. Thus, by the end of the project, northern Ayacucho had 6 functioning EmOC facilities (including one non-project facility): 3 comprehensive and 3 basic, more than achieving the recommended minimum.

### 3.2. Quality and use of EmOC services

Fig. 1 shows the changes in the other 4 UN indicators that reflect utilization and quality of EmOC services based on the 5 project facilities. The data show an increase in met need for EmOC, from 30% in Year 1 to 84% in Year 5. The overall increase in met need is a promising sign, as this implies that more women in need of emergency care are seeking and receiving this service. While no changes were observed in the proportion of births in EmOC facilities, a small increase in cesarean section rate from 4% in year 1 to 6% in year 5 was detected. This corresponds with the increase in the numbers of complications managed. There has been a progressive decline in the case fatality rate (CFR) from 1.7% to 0.1%, which is in keeping with the UN recommendation of less than 1%. The decreases in CFR also suggest an

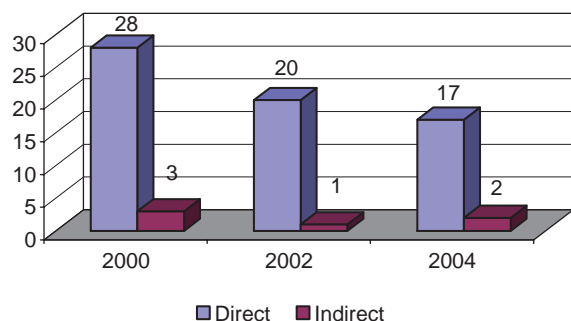
**Table 1** Emergency obstetric care services: availability and utilization in Ayacucho, Peru

	Baseline (Year 1)	2001 (Year 2)	2002 (Year 3)	2003 (Year 4)	2004 (Year 5)
Population	527,463	536,430	545,549	554,824	564,256
Expected number of deliveries <sup>a</sup>					
(Live Births)	11,604	11,801	12,002	12,206	12,414
Expected number of complications	1741	1770	1800	1831	1862
<i>Actual data for five project facilities<sup>b</sup></i>					
Total number of deliveries	3002	2868	2818	3099	3119
Total number of complications	530	596	922	830	1562
Number of cesarean sections	450	597	651	459	750
Maternal deaths	9	10	5	4	2
<i>Process indicators for five project facilities<sup>c</sup></i>					
Proportion of all births in project EmOC facilities	25.9%	24.3%	23.5%	25.4%	25.1%
Met need for EmOC	30.4%	33.7%	51.2%	45.3%	83.9%
C/Section rate	3.9%	5.1%	5.4%	3.8%	6.0%
Case fatality rate	1.7%	1.7%	0.5%	0.5%	0.1%

<sup>a</sup> Crude birth rate is 22 per 1000 (Peru DHS 2000) and the population growth rate is 1.7%.

<sup>b</sup> Data presented for only the five facilities supported by CARE's FEMME project.

<sup>c</sup> Process indicators calculated for the five facilities supported by the project—Huamanga (RHA), San Francisco, Cangallo, Vilcashuaman and Tambo Health Centers.



**Figure 2** Ayacucho region: Number of maternal deaths by direct and indirect causes, by year.

increase in the quality of care at the facilities (Table 1).

Fig. 2 shows progress in the reduction of maternal mortality for the entire region of Ayacucho (including facilities not supported by the project). It shows a dramatic decrease in the number of maternal deaths due to direct causes between 2000 and 2004. Deaths due to indirect causes have not changed significantly during this time period.

#### 4. Discussion

FEMME interventions have contributed to reducing maternal mortality throughout Ayacucho. Earlier programs are likely to have contributed too such as the Health Sector Reform Project, Project 2000, and the establishment of a Maternal Insurance Program by the GoP in 2000. Previous program interventions in the area had resulted in a large increase in the number of health facilities but these services lacked adequate capacity and quality to address obstetric complications. Often they were unresponsive to the specific cultural needs of the women served which limited the utilization of these services.

FEMME was designed to reduce the high level of maternal mortality in the rural region of Ayacucho. The main interventions were to build the functional capacity of existing facilities to provide quality EmOC services adapted to the local needs, and to promote a human rights approach to health service delivery. Progress has been made in increasing the availability, quality and utilization of EmOC services. Emergency obstetric care is offered 24 h a day, 7 days a week, at all targeted facilities for a population of approximately 48,000 pregnant women. The indicator for use of obstetric services by women most in need of emergency services (met need) increased significantly from 30% in Year 1 to

84% in Year 5 and the number of maternal deaths decreased in the entire region of Ayacucho. Although we cannot provide direct evidence for this, we believe that the interventions at the project sites, especially at the main referral hospital, made a significant contribution.

#### 5. Conclusions

CARE's work in the Ayacucho region of Peru provides some useful lessons for programs working to improve maternal survival. The scientific evidence is very clear on what is required to save women's lives, and the technology has been available for decades. Yet it can be challenging to apply this knowledge to result in improved health outcomes for women. Access to quality EmOC is critical to saving women's lives and making this care available requires functional and organized service delivery systems. Increased funding and support are required to address the wide array of challenges faced by many health systems. CARE supported the implementation of a comprehensive package of interventions that included building staff capacity and competence, strengthening management systems, promoting human rights in health care delivery and developing partnerships and policies that promote EmOC.

Besides financial resources, greater collaboration between donors, civil society and governments is critical. CARE worked to bring key partners together in this effort: the Ayacucho Health Department, the Regional Hospital of Ayacucho and the National Maternal-Perinatal Institute. These factors contributed to the accomplishments, and the enhanced partnership will facilitate the sustainability of program interventions.

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## References

- [1] UNDP. Human development report. New York: UNDP; 1999.
- [2] Health System Country Profiles. Pan American Health Organization. 1999. Retrieved from <http://www.lachsr.org/documents/healthsystemprofileofperu>.
- [3] Instituto Nacional de Estadística e Informática. Encuesta Demográfica y de Salud Familiar 2000 Perú. INEI, DHS, Macro, USAID, UNICEF. Lima, Peru 2001.
- [4] Leslie J, Gupta GR. Utilization of formal services for maternal nutrition and health care. Washington (DC): International Center for Research on Women; 1989, February.
- [5] Gill Z, Bailey P, Waxman R, Smith JB. A tool for assessing 'readiness' in emergency obstetric care: the room by room 'walk-through'. *Int J Gynaecol Obstet* 2005;89:191-9.
- [6] Guía De Atención De Emergencias Obstétricas. Gobierno Regional de Ayacucho, Ministerio de Salud, Dirección Regional de Salud, CARE, Instituto Materno Perinatal; 2002.
- [7] World Health Organization. Beyond the numbers, reviewing maternal deaths and complications to make pregnancy safer. Geneva: WHO; 2004.
- [8] Averting Maternal Death and Disability Program. AMDD Improving emergency obstetric care through criterion-based audit. New York: AMDD, Columbia University; 2002.
- [9] Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med* 1994;38:1091-110.
- [10] UNICEF, WHO, UNFPA. Guidelines for monitoring the availability and use of obstetric services. New York: UNICEF; 1997.