

CICRED'S SEMINAR

**Investing in safe motherhood – An operations  
research project in Maputo, Mozambique**

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**Investing in safe motherhood – an operations research project in Maputo,  
Mozambique.**

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## **INTRODUCTION**

In the most recent years, attention has been devoted to the issue of emergency obstetric services (EOS) as one core intervention that may reduce maternal mortality and morbidity. These interventions are neither very cheap, nor delivered through a primary care package of interventions. But it does benefit all pregnant women given that they by this get access either directly or through referral to comprehensive life saving skills and obstetric health care. But there is so far fairly little documentation of what this really means, what it costs, and how effective it may be. Some global analyses on factors that are associated with low maternal mortality rates (MMR) claim that ordinary development or wealth indicators alone cannot explain the differences between countries, but if a country invests a larger proportion of their GNP into health services they tend to get a lower MMR. Malaysia and Sri Lanka are two often referred to countries that have managed to reduce maternal mortality ratios through health care investments over time. It is also believed that women's educational level as well as the proportion of deliveries assisted by trained health personnel count just as much (J.Shiffman, Studies in family planning, 2000) on the global indicator level. But hard core outcomes, like a reduction in maternal deaths or serious complications may be difficult to assess simply because the event – a maternal death - is fairly rare. Maternal morbidity levels are hard to quantify (Bhatia & Cleland, Studies in family planning 2000). Thus, it is also difficult to evaluate impact of interventions in maternal health.

There has been considerable efforts invested in developing good reproductive health indicators (WHO 2001). Adverse health outcomes are often underestimated. Process indicators and patient flow outcomes, however, may be feasible to monitor. There are several determinants of women's utilization of health services. Care quality is one, affordability is another. There are also cultural barriers for women to reach quality health care (Kowalewski, Jahn, Afr. J reprod health 2000). But it is also assumed that even poor women have some resources. These can be mobilized if

maternal health services are strengthened and this is made known to the community of pregnant women.

In most poor countries, including Mozambique, maternal and perinatal morbidity is invariably linked to medical problems or risks that can be handled during antenatal care, such as positive syphilis serology, malaria in pregnancy, anemia, low weight gain, and high blood pressure complications (Osman, Challis; Journal of tropical pediatrics, 2001). But a substantial proportion of maternal deaths is found in women with no significant medical risk factor (Granja 2002, Mashingo, 2002). A positive outcome may be entirely dependent on a health facility's ability to respond to maternal urgencies. In Mozambique, access to services that can provide both basic and comprehensive emergency obstetric care including caesarian section is very limited. Caesarian section coverage for many parts of the country is no more than 1-5% of all deliveries (SM needs assessment, 2000). Increasing access to such services is one goal for health development in the country.

UNFPA and NORAD among others, are co-founders of a large reproductive health program in Mozambique. The maternal health component is implemented by the Ministry of Health and the Maputo City Health Authorities. The objective of this project was to establish one more hospital providing Comprehensive Emergency Obstetric Services in Maputo City. We here aim to present some results from the first three years of the project.

### **Operations Research design.**

An operations research model for the evaluation of maternity services in Maputo City was designed. Improvements due to the implemented project were assessed. The operations research effort has followed the project from its start. The following report aims at demonstrating how needs are both created and met in an effort to improve services for pregnant women. The changes have come about very quickly, so even if the method of the research is a "before-after" design, and not a controlled trial, we believe that it is the project itself that has initiated the changes.

### **Background**

Maputo City is the capital of Mozambique, and a typical urban growth center. The city and its surroundings are inhabited by more than one million people, and adding the province, population catchment area increases till well above 1.5 million. Compared with the rest of Mozambique, the health infrastructure and access to services is fair, and there are several hospitals in the area. Maputo has about 50 000 maternal deliveries annually within its city limits. Most deliveries (80%) are believed to be assisted by a trained health care worker. This training is most often a three-year post primary education to conduct normal deliveries, a so-called basic midwife. This *MCH nurse* as she is called, has many duties, and she covers services like ANC, Deliveries, Post-Partum Care, Child Health, and FP. The antenatal care coverage is high (more than 90%). The number of visits are actually sufficient but the quality of ANC is still inadequate. One example: four out of every five criteria for identifying a "High Risk" pregnancy relate to outcome of

previous pregnancy, making it difficult for primipara to be identified as at risk (Granja, 2000). Updated clinical guidelines are still in the pipeline (2002).

The maternal mortality ratio (MMR) in Mozambique is estimated to be high (at 500 to 1500/100 000 live births, (National Maternal Mortality review, 1999), and a large proportion of women in the rest of the country deliver their babies without assistance from skilled health workers. The situation in Maputo is somewhat better than in the rest of the country, and because it is an urban center, many women seek clinic or hospital care for delivery. There are nevertheless a significant number of women that die, even within the institutions.

Before this project, the only comprehensive referral hospital was the Hospital Central Maputo (HCM) which is the university teaching hospital, and the only hospital that until 1999 offered 24 hour comprehensive emergency obstetric services (CEOS). The other two maternity hospitals and several peripheral maternities in the city could take care of normal deliveries, but had to refer all deliveries in need of specialist care including caesarian sections. Thus, the referral maternity hospital was suffering from severe overburden of patients needing emergency and/or surgical interventions. In order to restrict admittance to this hospital, patients who self-refer have to pay an admission fee. Referred patients from other units were supposed to be exempt from this fee. Because of this hospital congestion, there was an urgent need to upgrade maternity services in other hospitals in Maputo City. On the other hand, the surrounding Province also suffers from a lack of proper provincial hospital facilities. It is a justified assumption that the Central Hospital also catered for a number of patients residing in the Province.

### **Project justification and objectives.**

There are several reproductive health indicators in Mozambique in general and in Maputo specifically that justifies intensified effort to do something about maternal and reproductive health services. There is hardly any quality coverage of postnatal care including family planning. Integration of various reproductive health components into one comprehensive program is not yet implemented. Because of sub optimal functioning of first level maternity services, too many normal deliveries self refer to the hospitals, and women with anticipated complication risks are transferred to the central hospital, which is overburdened patients with a variety of small or serious complications, some of which could have been handled at a more peripheral level.

The core activity in this sub-program was to renovate and upgrade the facilities both regarding physical infrastructure and quality of care, in order to increase the capacity in one major hospital, Hospital Geral Jose Macamo (HGJM), and its satellite clinics with maternities. The aim was that it would function as an around the clock emergency obstetric unit, with the ability to perform the basic life saving skills like surgical deliveries including caesarian sections, blood transfusions and resuscitation of neonates.

With this service in place, it was anticipated that some of the burden at the central hospital would be relieved. But it was also thought that this 'new' hospital could be designated to serve as a teaching site for training of postgraduate medical doctors, midwives and other personnel that need special skills training. Thus, upgrading this facility will not only benefit the immediate

recipients of care, but also the central level and the teaching and training ability of the country at large.

### **Operations research methodology**

The methodology of the operations research is varied. A lot of effort has been spent trying to get the best out of existing routinely collected data, both from this facility and the whole area. Typical sources of quantitative data are case registration in transfer books, admission books, maternal delivery books, theatre records, and antenatal care cards. There is actually an abundance of data, but most of it is never made available in electronic forms for detailed analysis. We have entered time series of consecutive cases at certain intervals, to be able to monitor changes. We have also kept track of patient flow data continuously. In addition, several smaller surveys and studies have been conducted throughout the period. These center around patient satisfaction and utilization issues, quality of care and cost issues, as well as participatory observations and a project diary. Our baseline data are from 1999, and we have followed the project up to the middle of 2002. Thus, our presentation will be geared towards presenting the challenges and gradual changes at many levels of care provision and structure. We have also aimed at going beyond the most often used process indicators used for such assessments (SM needs assessments, Mozambique 2000-2001) in order to get a more detailed picture of the situation

### **Baseline situation analysis**

At the start of the project, the maternity at this hospital (JMH) was only functioning as a basic maternity unit with no provision of emergency obstetric services besides what midwives could provide. After lunch hours, there was no specialist a doctor on call. There was a functional theatre, but as there was a conflict of priority in use of the facility for CEOS procedures. There was a need for both increased capacity and for renovation. There was no specific theatre assigned to emergency obstetric use. The only OB/GYN specialist was also the hospital director, and he had not been in this service for very long. He could, however, perform some elective surgery, in competition for theatre space with any other surgical procedures. All emergencies, women in need of caesarians, and all complications had to be referred to the Central Hospital. There were some planned elective caesarian sections during mornings, but never more than one or two per week.

### **Physical infrastructure.**

The hospitals main asset was its strategic location nearby one of the main roads out- and in of Maputo City. Several types of public transport serve this area. The building itself is old, and severely dilapidated: in acute need of renovation. The physical infrastructure of the hospital building was also marginal for the large burden of maternity patients seen, the wards and admission room being crowded and not systematically organized for a smooth running of routine maternity services. There were no specific facilities for outpatient routine gynecological procedures, and most of the equipment and infrastructure was not in a well functioning condition. Water supply and electricity was unstable.

## **Investments and interventions**

The project has as a primary aim renovated the surgical theatre and established one designated theatre for emergency cesarean sections and other obstetric interventions. In addition, the program sought to renovate the various wards, including maternity reception area, delivery room, postnatal room, gynecology emergency outpatient theatre and gynecological in-patient rooms, doctor's quarters, and other facilities in the hospital. These now look fresh and new, function well and patients are admitted in a structured way. In order to make it attractive and technically rewarding to work in the unit for young professionals and trainees, it was also decided to procure necessary technical apparatus, incl. surgical tools for emergency and elective caesarian sections, CTG for selective fetal heart rate monitoring, and a ultrasound scanner for selective fetal observations. There is also 24-hour electric supply with emergency backup, a running blood bank that can do HIV-screening of donated blood, and running water in the delivery room. Toilets, baths and wards are also being renovated, and the post partum wards are expanded due to an anticipated increase in patient load.

In the satellite clinics in the periphery, namely the Bagamoyo and Catembe maternities, renovation also took place and there was a provision of some basic infrastructure. In order to help facilitate needed referral transport, procurement of an ambulance and other vehicles, and radio communication systems between the facilities and vehicles was necessary. It was decided that local manufacturers should be responsible for the supply of consumables, like gloves and sutures. These consumables were acquired locally with project funds when they were not available or sufficient in the normal government supply.

## **Manpower**

The hospital director and the program manager act as project coordinators. The hospital director who is also head of the maternity is the project coordinator; he is the national counterpart of the project technical adviser. Both are trained specialists in OB/GYN, and therefore very key persons in charge of the planning and implementation of the change process and day to day program management. On the other hand, it is completely unrealistic to run a 24-hour service with two specialist doctors only. Due to a general shortage of trained OB/GYN specialists in the country, this was an urgent problem that has to be solved by inputs from external sources. Thus it has been necessary to explore the possibility to recruit expatriate doctors for the first period, and two – one Egyptian posted under Egyptian assistance to Mozambique and one Cuban paid by UNFPA, are already working in the wards. Two more Mozambican doctors were also posted by the Ministry.

The surgical procedures are during daytime performed by surgical technicians. They could theoretically also work night shifts, but so far not enough numbers of this cadre is employed. They may sometimes need medical supervision. The anesthetists are also trained technicians, but also this cadre of staff needs supervision from a trained medical person, like an expatriate trained specialist in anesthetic techniques . The remaining uncovered night and some weekends' shifts

are shared by senior postgraduate trainees in obs/gynae from the central Hospital who are then paid by the project as overtime work.

There has also been a shortage of trained nurse midwife staff in the hospital. The hospital has recruited an extra core group of skilled midwives to deliver services but also to act as supervisors/trainers and to overlook the quality of services in the hospital. A critical issue was also to recruit theatre nurses and surgical technicians trained in medical techniques for evening and night shifts and to establish a running shift schedule for doctors, including a tertiary level advisory back up system. There is now one doctor on call present in the hospital itself at all hours. Fortunately, cellular telephone networks are working well in Maputo, so distance consultations are possible in urgencies. One of the hospital's obs/gynae specialists is on standby each day for any support that may be needed especially when a postgraduate trainee is on duty.

### **Clinical routines**

To improve quality of care, it was also decided to establish good clinical ward routines, and to provide an ongoing medical supervision of staff by initiating a routine of doctor-lead morning grand rounds every day, plus follow up during the afternoon and evening. In order to provide comprehensive care, one sought to establish some emergency clinical services like a gynecology outpatient clinic and a safe abortion clinic. They have been running somewhat longer than the emergency services for delivery. An observation ward for complicated maternities (preeclampsia, malaria) is also in place. Malaria in pregnancy is one leading cause of maternal deaths (Granja, 2002).

In order to motivate and train core staff, it was decided to establish regular supervision and monitoring routines in the hospital and its catchment area, by regular supervisory visits and monthly review meetings in hospital and with city health staff. It was also decided to train and give refresher courses to core staff, in order to increase their knowledge of the basic concept of reproductive health, to increase their skills in handling emergencies, to broaden their scope of services to include proactive STD assessment, FP advise and services and postnatal care of the woman and her child. After the emergency clinical services became the core daily activity also for project staff, peripheral supervision has suffered from time constraints. Formal training sessions and staff exchange between maternities do take place, but regular supervision and audit meetings are somewhat compromised.

### **Baseline data collection**

In order to monitor progress, it was necessary to establish some core knowledge about the starting point situation.

In the following section we will briefly summarize some of the highlights from the baseline data collection, both qualitative and quantitative data are discussed.

## **Quality of care**

The core baseline research activities has also focused on several aspects of quality of care from both patient and provider perspectives. In 1999, the project staff and some consultants conducted a Patient Satisfaction survey, and another consultant did a Staff Satisfaction study later in 1999. The results of the studies were discussed with project staff during the first part of 2000. Two medical students did a participant observation Quality of Care study, and later in 2000 and 2001 project staff implement a study on clients' reasons for use of maternity services and patient and staff evaluation of service components in various units. A description of major changes in the facility conditions has also been demonstrated by photographic documentation of physical infrastructure.

The core messages from the patient satisfaction studies have to be interpreted with caution, as it is difficult to interpret patient satisfaction simply because many patients have no realistic expectations about quality services as such. They may provide a researcher with information that does not really reflect their core concerns. This being said, however, the studies both show that the clients are unaware of what they can expect from the health units, like their right to information, privacy etc. , but also raises some areas of real concern. For example they came to HGJM once they knew there was a doctor 24hrs or an ambulance available, but they did not worry much about overcrowding, lack of counselling or were not aware about biosecurity. Patient do seem to seek a health care institution where they anticipate to get good quality technical care. They are, however, not content with the adequacy of the food they get, the ward conditions, and the staffs ability to relate to their relatives. Counseling by the health workers and communication in general between the health worker and her client was weak. As such, the clients knew very little about her pregnancy, the methods of family planning they were taking and similar things.

## **Staff satisfaction**

There also has to be a careful interpretation of the staff satisfaction studies. Firstly, the staff was reluctant to discuss issues in a focus group, and did not want to be public with their complaints or concerns. Individual interviews functioned somewhat better. Key messages were, however, that staff seemed to be under constant pressure by the burden of daily routines. They seem to have little time or motivation to put a lot of emphasis on broadening their scope of work to include newer issues, like FP/condom counseling and STD/HIV advise or counseling. Another issue is that of reaching out to men about STD care. It seems as if staff is more comfortable with handling technical or skills related jobs than the communicative parts of their work. And the staff did not pay a lot of attention to their patients' needs for specific information. Staff, however, is concerned with working hours, shifts and workload, low pay and lack of supplies.

There is a general wish to receive upgrading and refresher courses on core issues, maybe most of all motivated by economic incentives, even if most of the staff feel comfortable about performing basic obstetric care for normal deliveries. There is also an expressed need to discuss the issue and contents of postnatal care. There was also an expressed need for better communication between ANC care/health centers, and maternities.

Concerning the work organization, the main message is around the issue of involving staff in discussing and deciding upon work schedules and work plans. In general, many staff has a too low job motivation due to low salaries, poor working conditions, unfavorable work schedules etc.

There is still considerable scope for improvement of quality. Due to high patient turnover, and scarcity of facilities for hand washing and other water outlets, the hygienic standards can still improve. Sometimes delivery beds are not decontaminated with disinfectants between deliveries, but the project has provided enough clean gloves and bed sheets to give basic protection to staff and patients. Electric and water supplies are, fortunately, relatively stable due to reconstruction due to alternative sources.

### **Patient flow patterns**

In order to monitor patient flow, the routine patient registries like admission books, maternity delivery books and other registries were examined and core data were extracted on a monthly basis. Some new registries were established, like outpatient emergency registers. The data were exposed on the hospital walls, so that anyone could follow the progress.

Data collected were number of admissions, number of deliveries, number (and %) of transfers from the project hospital to the central hospital, or from peripheral maternities to central hospital. Also collected was data on number of stillbirths and early neonatal deaths (< 24 hours), number of preterm babies (< 2500 g), and a selection of other clinical data from a large sample (n: 6129) of delivery and antenatal records.

Procedures registered were number of caesarian sections. No emergency sections were performed at the start of the project in 1999. We also record number of tubal ligations, number of emergency gynecological cases treated by diagnoses, and number of safe abortions and post abortion cases treated (table).

Other outcome data are number and causes of maternal deaths - if any, and types of obstetric complications seen. We did most of the data analysis by establishing a computerized patient information system by entering core data from samples of antenatal records and maternity books. For the antenatal records, the data entry is time consuming, so this activity will be done for specific time periods for survey purposes only. The maternity protocol data was entered and analyzed on a monthly basis, to have a clear picture of all changes taking place at all times.

## **Central hospital data collection**

In addition, there was an effort to request the data management officers in the Central Hospital to provide some core data on changes in patient load and transfers from the JMHS and its catchment area in the project time period. These data are also shown in some of the tables.

## **Core patient flow data**

The tables 1 and 2 and 3 show that there has been a fourfold increase in deliveries during the second half of 2000 as compared with baseline data. There is also a substantial increase in referrals to HGJM after the project launch, and there are many more referrals from the peripheral maternities inside and outside the catchment area. Number of admissions has increased more than three hundred percent. Still, the largest number of deliveries (70%) is self-referred from home, and the numbers steadily go up. These changes have come about without any public advertising whatsoever. Patients learn about good services through gossip and use them accordingly. The following tables, 6, 7 and 8 demonstrate how transfer patterns have shifted away from the central hospital and towards HGJM. At the end of 2001, most of the transferred patients now come from outside the hospital catchment area, either from smaller maternities in Maputo or from Maputo Province (50%).

The HGJM caesarian section rate, for the period April 2000 to October 2001 is as high as 12-13 %, similar to that of other referral tertiary units, while most provincial hospitals have minimum c.s. rates, around 5%. The caesarian section rate at the central hospital has also gone up (table 10), even if the total number has decreased somewhat. This is due to the proportionally larger decrease in normal self-referred deliveries (table 11). This university hospital now receives a larger fraction of the really complicated deliveries from the area.

We also demonstrate an increase in admission of patients with other gynecological needs. Ca. 600 patients are seen each month, and 300 of these are abortion related. Mortality from abortion complications has not occurred. The hospital does provide safe medical/surgical abortion services for a fee, and treat all types of complications of clandestinely induced and spontaneous abortions with vacuum aspiration.

## **Mortality and Morbidity**

Because of increased patient flow and more complicated deliveries, we also see more fatal outcomes. Before *April* 2000, all complications were referred to the central hospital. There have been 10 maternal deaths in 2000, and 8 in 2001 up to October. The institutional maternal mortality rate is 121/100000. Case fatality rates are between 1.2 and 1.5 %. The institutional perinatal mortality rate is 44/1000, but unfortunately this is a minimum estimate, up to the first 24 hours of life, as mothers and their babies are discharged already on the second day. Late neonatal deaths may not be registered. But stillbirths are numerous, and during the first six months of 2001 there were altogether 51 intra-partum deaths. This is of course related to quality

of monitoring as well as delays in actions. Usually it takes one to two hours to effectuate an indicated caesarian section. If the theatre is occupied already, the waiting period may be longer, as there is only one theatre team functioning in the evenings and at night. This is like the situation in maternal and newborn health in Mozambique at large. In HGJM & HCM things have improved and most operations are performed within 30-45 minutes from when the decision is made but in most provincial and rural hospital the delay is still long.

The most frequent morbidities seen are hypertension (285 cases in 6 months), malaria (266), obstructed labor (141) and hemorrhage (81), while ectopic pregnancies and sepsis were less frequent. Being a country where HIV/AIDS is on the increase, these patterns may be expected to change even to the worse in the near future.

### **Can the changes be attributed to any other events?**

We do believe that the changes are directly related to the interventions applied. The change came about quickly after the launch, and admissions have steadily gone up since then. There have been some other events that have influenced the progress. In some months around December 1999 and January 2000 the wards and the theatre suffered from closure due to reconstruction, and in February the whole hospital as well as the rest of Mozambique was flooded both with rain and with patients suffering from cholera and malaria. Other than that, the increase in patient load has been steady. This is threatening to overwhelm and exhaust the current staff, so the situation is by no means under control. But it has been possible to change the situation dramatically for the women.

### **Cost issues**

This is not a cheap project. Both the investment and running costs are substantial. The total investments for the three years are 1,028 817 US dollars. Paying overtime for core staff and increased use of consumables increases monthly running costs. It is estimated that the added cost on top of the Ministry of Health budget per safe delivery at the current level of expenditure is some 16 US dollars. This is much more than the government can pay for health services per capita. But the project has not been extravagant in any sense, it has just provided what pregnant women should have and want to have in a world that has passed its second millenium. Because this hospital does not require user fees, it attracts patients from all layers of society, and half of the patients actually come from outside the official catchment area, like Maputo Province. A large proportion of patients are normal deliveries that could have been handled at a peripheral maternity, but it seems as if the added security of access to CEOS is important for womens' choice of place of delivery. The Maputo Province has very limited capacity for CEOS (less than 1 %).

Sustainability is still a problem, as the current staffing scheme is designed after the previous, not the current workload of the hospital. There is a chronic shortage of doctors in Mozambique, especially specialist trained ones. In this hospital as in many other parts of Mozambique, hospitals rely heavily on other types of staff, namely the MCH nurse midwife who can deliver

babies, and the surgical technician who can do caesarian sections. This relieves the burden off the doctor on call, who may have to monitor and care for some 30-40 deliveries during one 24 hour shift, many of those being complicated by malaria, obstructed labor, hypertension, sepsis or anemia.

## **DISCUSSION**

### **Obstacles and advantages of project**

There are several issues that already stand out as problem areas that need to be addressed. Some of these issues are related to manpower, quality of care and sustainability.

**Manpower.** As by now, it will not be possible to run these services without more inputs on the manpower side than what is planned for this service from the government norms. It may also be difficult to sustain some of this manpower, as some of the recruited staff has already resigned. These are normal events in service delivery, and tell us that those concerns for staff sustainability have to be addressed, both sustaining employed staff and preparedness for hiring new staff.

**Quality of care.** Although the basic care is of appropriate technical quality most of the time, there are many small entry points for improving quality. Correct filling out of report forms, partographs and other tools for monitoring work processes help staff improve services, and daily supervision ward rounds are important working tools for doctors and nurses. Regular supervision may be necessary as a routine, because some staff seem to relapse back to "old practices" just for convenience or because some infrastructure has breakdowns or is not available at all times. There is considerable scope for improvement in the part of caring that involves communication and sensitivity for clients' needs and perspectives. It may be difficult to actually measure these aspects of quality improvements, but tools like the UNICEF "Baby friendly hospital" accreditation and direct observations can be used. It is also important to implement improved measures to protect both the provider and client from problem of HIV.

**High patient load/burden.** As this project picks up, we have experienced an actual increase in the patient load to the facilities, and an increasing number of more complicated cases to be handled. This may affect staff motivation temporarily, before they get used to this increase in the demands on their skills, but could also contribute to making work more varied and interesting for them. The staff are already at some times working under hard pressure, especially in mornings, but better routines and competency building may increase staff self esteem and feeling of mastery.

**Facilitating factors.** Fortunately, this project also has some very good and facilitating conditions that enhance development. There are two very committed and competent staff members that run the project, both of them being highly skilled in OB/GYN and reproductive health issues and with very good ties to the local context. There is a non-bureaucratic attitude and management style of project leaders, which facilitates rapid changes. The core project staff competence also seems very good, and motivation is high.

## **Summary and conclusions**

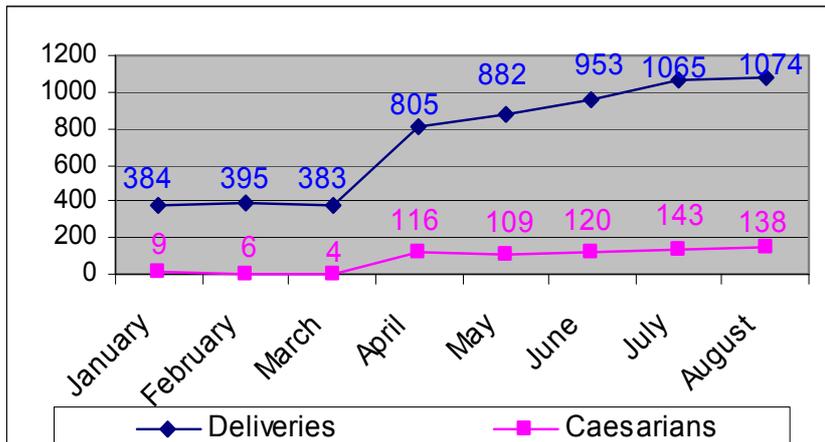
This project clearly demonstrates that improving maternal health and obstetric care can be achieved even in poor countries. It demonstrates that there is a need for the services, and that women utilize them once they are there. Women seem to prefer to deliver in a place where they know it is safe and they can be assisted, if they have a choice. This is demonstrated by the fact that the real increase in patient flow came after the launch of comprehensive services. The peripheral maternities, even if upgraded somewhat, did not experience the same increase. They still cater for normal uncomplicated deliveries for the most, as they only have basic level staff limited logistics and equipment.

The project also demonstrates that it is not enough to invest in only one or two components of maternity services. A whole system has to be improved, and teamwork with devoted leadership is important. Demonstrating changes and challenges through documentation helps motivate those who work in the project. Sustainability has to be addressed, and there is a need for better communication with central health administrations about staff and cost issues. Maternal health and obstetric services are necessary, as several background factors as well as new emerging factors like HIV/AIDS contribute to a high maternal morbidity and case fatality in Mozambique as in other poor countries. The relative cost compared to the large number of life years saved through survival of both mother and her baby and remaining children justifies the input.

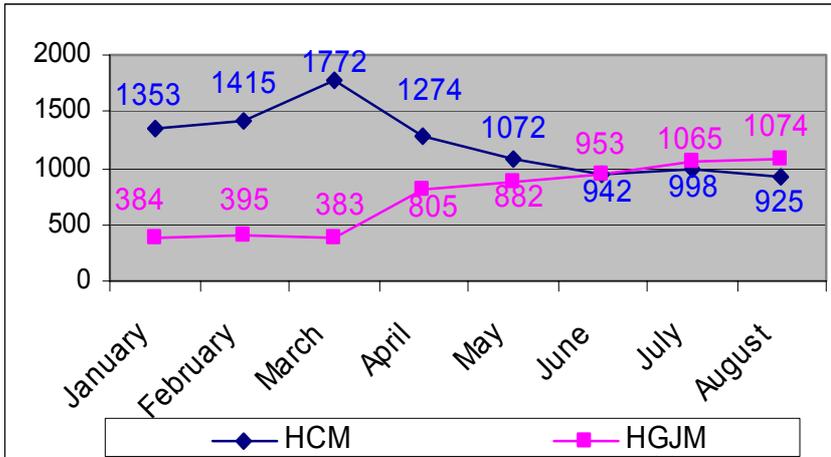
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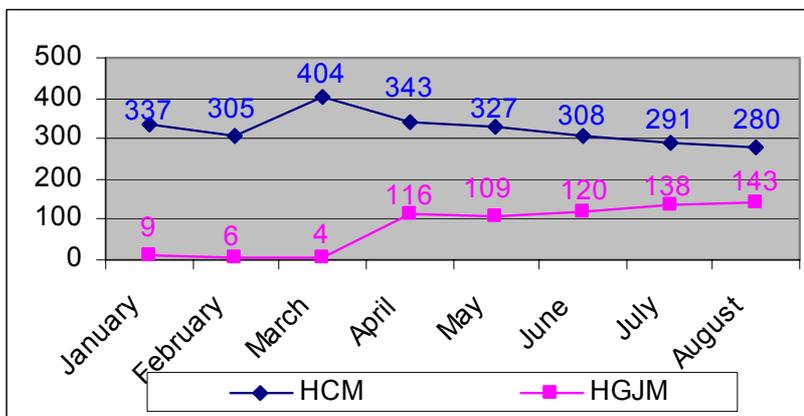


## Admissions to the delivery ward at HGJM - Jan - Aug 2000



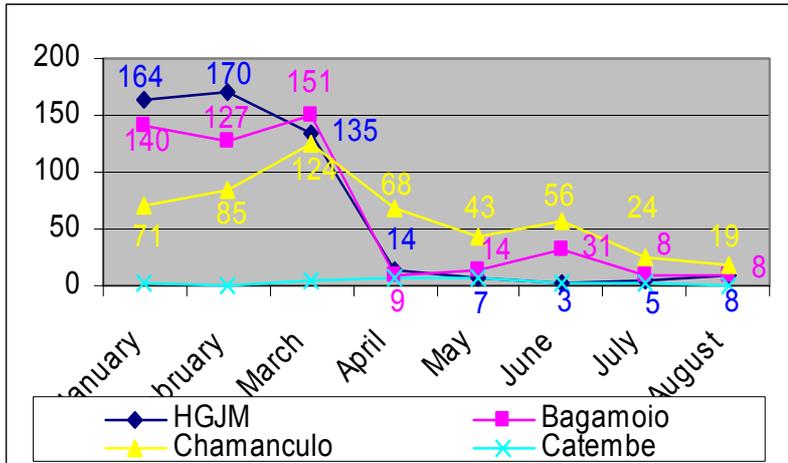
**Comparison of number of births at the central hospital (HCM) versus the intervention hospital (HGJM) Jan - Aug 2000**

2



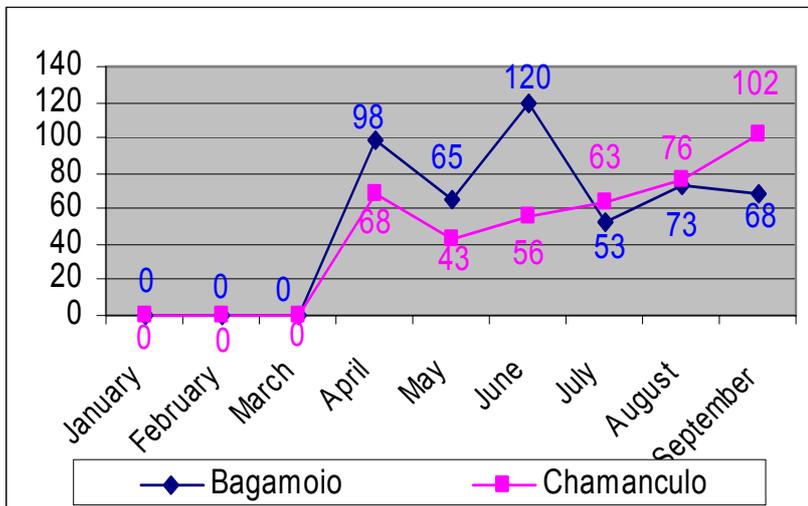
**Comparing numbers of caesarian sections in HCM versus HGJM- Jan - Aug 2000**

3



**Patients transferred from peripheral units and HGJM to the Central Hospital  
Jan - Aug 2000**

4



**Transfers from the peripheral units to the intervention hospital HGJM Jan - Aug 2000**

5

**Percentage of caesarian sections at the  
intervention hospital - HGJM - 2000**

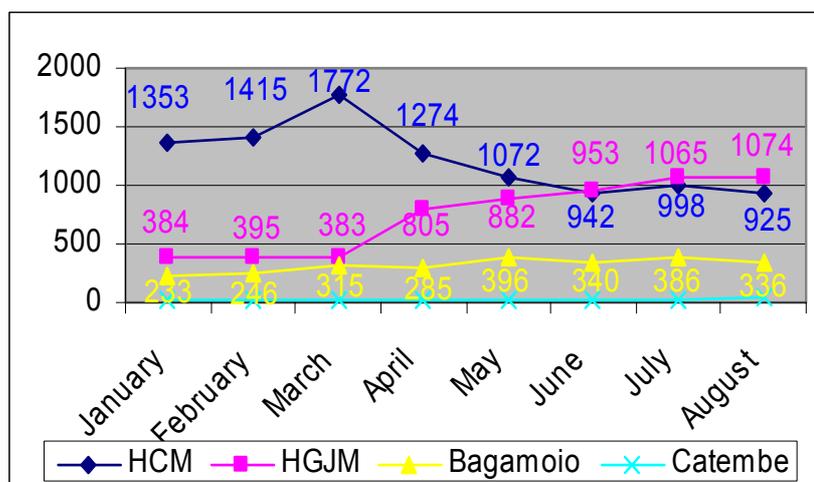
|       | Births | Caesarians | %Caesarians |
|-------|--------|------------|-------------|
| Jan   | 384    | 9          | 2,3         |
| Feb   | 395    | 6          | 1,5         |
| Mar   | 383    | 4          | 1,04        |
| Apr   | 805    | 116        | 14,4        |
| May   | 882    | 109        | 12,5        |
| June  | 953    | 120        | 12,6        |
| July  | 1065   | 138        | 13          |
| Aug   | 1074   | 143        | 13,3        |
| Total | 5941   | 645        | 13,5*       |

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## Percentage of caesarian sections at the central hospital

|       | Births | Caesarians | %Caesarians |
|-------|--------|------------|-------------|
| Jan   | 1353   | 337        | 24,9        |
| Feb   | 1415   | 305        | 21,6        |
| Mar   | 1772   | 404        | 22,8        |
| Apr   | 1274   | 343        | 26,9        |
| May   | 1072   | 327        | 30,5        |
| June  | 942    | 308        | 32,7        |
| July  | 998    | 291        | 29,2        |
| Aug   | 925    | 280        | 30,3        |
| Total | 9751   | 2595       | 26,6        |

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Comparing births at the Maputo Central Hospital (HCM) versus HGJM and its catchment area, **Jan - Aug 2000**

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**Obstetric complications seen at the  
intervention hospital HGJM  
Jan - Aug 2000**

| Month                           | Jan | Feb | Mar | Apr | may | June | July | Aug |
|---------------------------------|-----|-----|-----|-----|-----|------|------|-----|
| Prolonged/obstructed labor      |     |     |     | 60  | 49  | 57   | 54   | 62  |
| Uterine rupture                 |     |     |     | 1   | 1   | 2    | 1    | 0   |
| Sepsis Post Partum              |     |     |     | 3   | 2   | 2    | 1    | 2   |
| Pre-Eclampsia/Eclampsia         |     |     |     | 26  | 13  | 28   | 11   | 25  |
| Abortion, septic/spont/ruptured | 91  | 70  | 87  | 124 | 151 | 108  | 134  | 152 |
| Ectopic pregnancy               |     |     |     | 2   | 3   | 4    | 3    | 7   |
| Malaria in Gravidity            |     |     |     | *   | 72  | 59   | 42   | 45  |
| Other complications             |     |     |     | 45  | 49  | 57   | 60   | 71  |
| Stillbirths, total              | 2   | 3   | 4   | 44  | 47  | 53   | 55   | 48  |
| Lacerated foetus                | 0   | 2   | 2   | 6   | 5   | 6    | 5    | 6   |
| Maternal death - Hemorragia     |     |     |     |     | 1   | 0    | 1    | 0   |
| Maternal death - Sepsis         |     |     |     |     | 1   | 0    | 0    | 0   |
| Maternal death, other           |     |     |     | 1   | 1   | 0    | 0    | 0   |
| Maternal death, Total           |     |     |     | 1   | 3   | 0    | 1    | 0   |

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