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**COSTS, EFFECTS AND COST-EFFECTIVENESS ANALYSIS OF THE MOTHERCARE IN-SERVICE
EDUCATION AND PEER REVIEW ACTIVITIES IN SOUTH KALIMANTAN, INDONESIA**

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ACRONYMS

ABC	activity-based costing
ACNM	American College of Nurse Midwives
BDD	bidan di desa (village midwife)
BDD1	trained BDD from MC districts that received Basic LSS training and participate in IBI Peer Review and Continuing Education systems
BDD 2	intern BDD who participated in internship programme from non-MC districts and do not participate in IBI Peer Review and Continuing Education systems
Bidan	midwife
Bidan 1	trained bidan from MC districts who received Advanced LSS training and participate in IBI Peer Review and Continuing Education systems
Bidan 2	clinical instructors bidan who serve as clinical instructors in the internship programme from non-MC districts (had Advanced LSS training, do not participate in IBI Peer Review and Continuing Education systems but received one additional week site prep
CE	continuing education
CEA	cost-effectiveness analysis
DALY	disability-adjusted life-year
DINAS	Provincial Health Office/Ministry of Home Affairs
FR	fundraising
HMHN	Healthy Mother Healthy Newborn
HSS	Hulu Sengai Seletan
HST	Hulu Sengai Tengah
IBI	Ikatan Bidan Indonesia (Indonesian Midwifery Association)
Kanwil	Provincial Health Office/Ministry of Health
LSS	life saving skills
MC	MotherCare
MCH	maternal and child health
MLSS	mini life saving skills
MMR	maternal mortality rate
MOH	Ministry of Health
ObGyn	obstetrician/gynaecologist
PR	peer review
TA	technical assistance
TBA	traditional birth attendant
TNA	training needs assessment
TOT	training of trainers

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EXECUTIVE SUMMARY

Introduction

To improve the knowledge and skills of midwives at facilities (bidan) and midwives based in the village (bidan di desa - BDD), MotherCare has worked with the Indonesian Ministry of Health and the Indonesian Midwifery Association to develop a training and continuing education system in three districts in South Kalimantan. The main aims of this study were to calculate the costs, effects and cost-effectiveness of expanding existing MC programmes in South Kalimantan to improve the quality of care of bidan and BDD, and replicating these programmes to new areas.

Methods

This study was carried out from the perspective of the health care provider. Data is presented by training scheme and activities from 1995-1998. Actual costs of the existing programmes were ascertained through retrospective reviews of expenditure records held in South Kalimantan, Jakarta and Washington. To approximate the costs of expanding the training programmes within South Kalimantan, the costs of international technical assistance (TA), central MC administration and start-up cost were excluded. To approximate the costs of local replication of the training programmes, the costs of TA and central MC administration were excluded.

Two sources of information were used to define effectiveness measures: a training evaluation and surveys of BDD. The training evaluation, conducted in August 1999, provides quantitative scores for overall performance of five key skills. In addition, the percentage of providers deemed 'competent' defined as a score $\geq 70\%$ was identified. The bidan and BDD from the various training schemes were compared among themselves and to bidan and BDD who had not participated in MC programmes to estimate the increased skill provided by the training programme

Results

A total of 10 bidan training cycles were held at two institutions each (Ulin and Banjarbaru) during 1996 and 1997. In total, 128 bidan were trained, of which 110 were bidan from MC districts who received advanced LSS training and participated in IBI Peer Review and Continuing Education systems. The remaining 18 were bidan trainers. In addition, Kanwil funded training for 28 bidan who served as clinical instructors in the internship programme from non-MC districts (received advanced LSS training, but did not participate in IBI Peer Review and Continuing Education systems, however they received an additional week of site preparation).

From 1996 to 1998, 51 BDD training cycles were held at three institutions (Ulin, Banjarbaru and Martapura). In total, 284 BDD were trained from MC districts who received basic LSS training and participated in IBI Peer Review and Continuing Education systems. In addition, 48 BDD participated in the internship programme from non-MC districts. They did not participate in IBI Peer Review and Continuing Education systems.

Findings from this study show that the MC LSS training programmes significantly improved the knowledge, confidence and skills of bidan and BDD. In addition, significantly more of the

bidans and BDD who participated in the MC training programmes were 'competent' in their knowledge and in their ability to perform key skills. These achievements were accomplished at an incremental cost of approximately \$570,000, of which \$346,456, \$145,755, \$50,989 and \$29,607 was spent on BDD1, Bidan 1, BDD2 and Bidan 2 respectively. The cost of the training was insensitive to changes in the cost per bidan and BDD training cycle (using 95% confidence intervals as upper and lower limits), and the proportion of MC central administration costs allocated to the programmes. The training programme for bidan who serve as clinical instructors in the internship programme from non-MC districts was more cost-effective than that of trained bidan from MC districts - \$44.06 vs. \$49.41 per % increase in mean skill score and \$25.7 vs. \$29 per % increase in % with mean skill score $\geq 70\%$. Trained BDD from MC districts were more cost-effective than BDD who participated in internship programme from non-MC districts - \$61 vs. \$96.57 per % increase in mean skill score and \$20 vs. \$55.91 per % increase in % with mean skill score $\geq 70\%$.

Discussion

Given the interdependent nature of the training programmes, it is difficult to accurately ascertain individual costs of the training. In addition, the limitations of a two-week in-service education programme to increase the skill level of bidan and BDD to an acceptable level need to be recognised.

The exclusion of TA, central administration and start-up costs means that the current system could train 94% of the BDD by 2001 at a cost of \$133,078 using the BDD 1 training programme. However, the expansion of services will need to address the issue of sustainability because of the high level of recurrent costs. Although there seems to be a commitment to expanding services within South Kalimantan, evidenced by the fact that Ratu Zalecha has already begun to train bidan and BDDs in LSS and modified-LSS training courses, it will be important to assess both the quality and cost of these programmes. The cost of future training cycles could be greatly reduced by the payment of reduced per diems compared to those paid by MC. In addition, an increase in class sizes would reduce unit costs, but may have detrimental effects on quality and therefore impact.

Replication of this project to other parts of Kalimantan or other islands should use local expertise developed during the course of the project, thus reducing overall costs. There is already interest in replicating the training schemes, evidenced by the fact that Ulin hospital has already received a request from Central Kalimantan Province to provide LSS training. Perhaps the most important issue to bear in mind if these training packages are to be replicated is that of start-up activities, especially the contents of the training needs assessment (TNA).

It is difficult to ascertain whether the training package described in this report is cost-effective, primarily because the outcome indicators are so specific limiting comparisons with other safe motherhood interventions and other health care interventions. However, it should be borne in mind that the future costs will probably be less than those actually incurred during 1995-1998. Ultimately the MOH who will have to decide whether they feel the additional costs are worth the additional benefits and hence whether these training programmes represent 'value for money'.

Recommendations

A. To MotherCare

1. Help develop the specific requirements of future training needs assessments in other parts of Kalimantan and elsewhere. It would be important to get additional information that would help with project implementation. Therefore information such as the following would help:
 - What equipment do midwives already have?
 - Which skills taught in LSS training are the most important?
 - Are potential trainers available, and do they have time to do extra work?
 - What additional equipment does the hospital need to implement protocols taught in LSS?
 - How can IBI be more incorporated into activities?
 - How can schools of midwifery be incorporated into future training?
2. Plan economic evaluations alongside future interventions from the outset in order to facilitate appropriate collection of data, analysis, presentation and dissemination of results;
3. Encourage the development of outcome indicators that can be compared between and beyond reproductive health research.

B. To MOH South Kalimantan

1. Help supervise the new training courses being develop for implementation in Central Kalimantan;
2. Plan for future investments in training over time. Given the limited capacity of the existing training institutions, future training will not be a one-off activity, but will occur over several years. In addition, most of the these costs will be recurrent, and hence careful budgeting will be required;
3. Further training at existing institutions should be encouraged so that sunk costs can be exploited;
4. Discuss the possibility that the existing training sites in South Kalimantan become Regional training sites;
5. Consider ways in which training costs can be reduced without reducing their quality and hence impact, e.g. increase in class size, reduction per diem for trainers and trainees.

C. To MOH Indonesia

1. Discuss the role of local Master trainers in future training programmes;
2. Prepare central training budgets carefully given the high level of recurrent costs associated with training programmes;
3. Discuss the possibility of centrally funded training sites and full-time trainers. The costs of transporting trainees to facilities outside their locality may be outweighed by the costs of setting-up new sites;
4. Decide which additional hospitals could be selected as training centres based on accepted criteria.

D. To future evaluators of similar training programmes

1. Develop a more meaningful outcome measure;
2. Develop modelling techniques to estimate the impact of changes in knowledge and practice on key outcome variables, i.e. reduction in unmet need and the impact on maternal mortality;
3. Develop standardised data collection techniques that to increase the level of comparability between studies.

1. INTRODUCTION

MotherCare (MC) activities began in South Kalimantan in 1994 with the aim of supporting and enhancing the ongoing government of Indonesia's safe motherhood programme. Given the government's ambitious goal of reducing the maternal mortality rate (MMR) of 543 per 100,000 live births in South Kalimantan to 225 per 100,000 by the year 2000, the main focus of MC activities has been to increase the use, and improve the quality, of services provided at the community level, where the majority of births occur (MotherCare Matters, 1997). MC's strategy to improve quality of care in Indonesia includes several components: in-service training, peer review visits and continuing education for midwives, intensive postpartum home visiting programme, maternal and perinatal death audits, and improved maternal and child health (MCH) programme management and referral systems.

To improve the knowledge and skills of midwives at facilities (bidan) and midwives based in the village (bidan di desa - BDD), MC has worked with the Indonesian Ministry of Health (MOH) and the Indonesian Midwifery Association (IBI) to develop a training and continuing education system in three districts in South Kalimantan: Banjar, Barito Kuala, and Hulu Sungai Selatan. To build on the national strategy to improve maternal and newborn care at the community level, MC has worked with the MOH to ensure the presence of a 'competent' BDD at every delivery, exclusive of whether the actual home delivery is by the village midwife or the traditional birth attendant (TBA). This strategy is expected to decrease iatrogenic causes of obstetric and neonatal complications, and to increase the opportunity for recognition of complications, for initiation of management in the early stages of a complication and for more prompt referrals when necessary.

The main objectives of these MC programmes in Indonesia were to:

1. Improve care provided to mothers and newborns by bidan and BDD so that Bidan and BDD are better able to:
 - Recognize what is happening (normal and abnormal);
 - Know what needs to be done (management at this level or emergency care with referral);
 - Be able to provide care at the expected level of competency for level of bidan and BDD;
 - Have the confidence to provide the necessary care.
2. Improve communication of bidan and BDD with women and their families so that bidan and BDD are better able to:
 - Obtain a more complete history from woman/family;
 - Initiate discussion with woman/family about issues that may be sensitive (family planning, need for referral, death);
 - Counsel women to improve compliance with treatment/interventions;
 - Involve woman/family in decision-making about management or treatment.
3. Improve record keeping and registers:
 - Implement use of partographs by bidan and BDD;
 - Improve recording on partographs and other medical records;
 - Improve completeness and accuracy of registers.

MC is interested in estimating the costs and evaluating the cost effectiveness of these different training programmes. It is anticipated that the results will provide some key information concerning training strategy recommendations for the MOH in Indonesia and to the region as a whole. A cost and cost-effectiveness analysis of the different training schemes will provide an indication of the 'value for money' of the alternative training options.¹

Following the aims and objectives of the study, the report² is divided into three main sections: a description of the research methods; results; and discussion and conclusion. The research methods describe the study site; alternative training programmes considered; sources of data; costing approach; training evaluation; timeframe; and sensitivity analysis. The results section presents the results of the cost analysis and the training evaluation separately and in combination. The final section discusses the results with particular reference to the existing MC programme versus existing services; the expansion of the MC programme within South Kalimantan; and replication of the MC programme beyond South Kalimantan. A series of recommendations for MC, the MOH in Indonesia, MOH in South Kalimantan and future evaluators of similar training programmes complete the report.

2. AIMS

There are several aims that need to be met. These are:

1. To calculate the costs of expanding existing MC programmes in South Kalimantan to improve the quality of care of bidan and BDD, and replicating these programmes in new areas. The programmes of interest are Advanced Life Saving Skills training for bidan, Basic Life Saving Skills training for BDD, BDD Internship programme and Peer Review/Continuing Education/Fundraising programmes;
2. To calculate the cost-effectiveness of the training programmes in increasing the skills of BDD and in establishing and maintaining a workforce of competent BDD compared with current practices. This will facilitate future budgeting, planning and management by helping identify those training options that represent most 'value for money'.

3. OBJECTIVES

1. Identify and describe the alternatives to be compared;
2. Identify the sources of data available;
3. Define the costing approach;
4. Define the different training programmes;
5. Select the timeframe;
6. Cost the various steps of the training programmes;
7. Evaluate the bidan and BDD training programmes;

¹ In August 1998, Fox-Rushby *et al.* (1998) visited Indonesia to assess the potential study design of a cost-effectiveness analysis of the MotherCare programme based in South Kalimantan. They recommended that a cost-effectiveness analysis compare the package of maternal and child health (MCH) services provided by the government and MC in three districts in South Kalimantan with government health care services usually provided. However, following further discussions, it was decided that, given the limited resources available and lack of specific outcome indicators for most aspects of the programme, an economic evaluation of just the MotherCare in-service education and peer review activities would be performed.

² See Annex A and B for the Scope of Work and Trip Report respectively.

8. Combine the cost and effectiveness data into various cost-effectiveness measures;
9. Perform a sensitivity analysis;
10. Discuss the implications of the results and develop a series of recommendations regarding the potential expansion and replication of the training programmes.

4. STUDY SITE³

In 1994, the population of South Kalimantan was estimated at 2,784,000 inhabitants (see Figure 1). The target population of pregnant women was estimated to about 75,000 women per year. In the three districts of Banjar, HSS and Barito Kuala, the population was estimated to be 492,000, 187,000 and 227,000 respectively. Among these districts, the estimated number of pregnant women was estimated at 14,000, 5,600 and 6,600 respectively.

The level of literacy is relatively high in South Kalimantan. The literacy rate among women aged ten and above is estimated at 91% in the urban areas and 77% in the rural areas. The marriage age is still quite young, however, with an estimated 60% of women entering into their first marriage before the age of 19. However, the contraceptive prevalence in South Kalimantan is quite high (47%), which undoubtedly contributes to the relatively low total fertility rate, which was estimated at 3.2% in 1990.

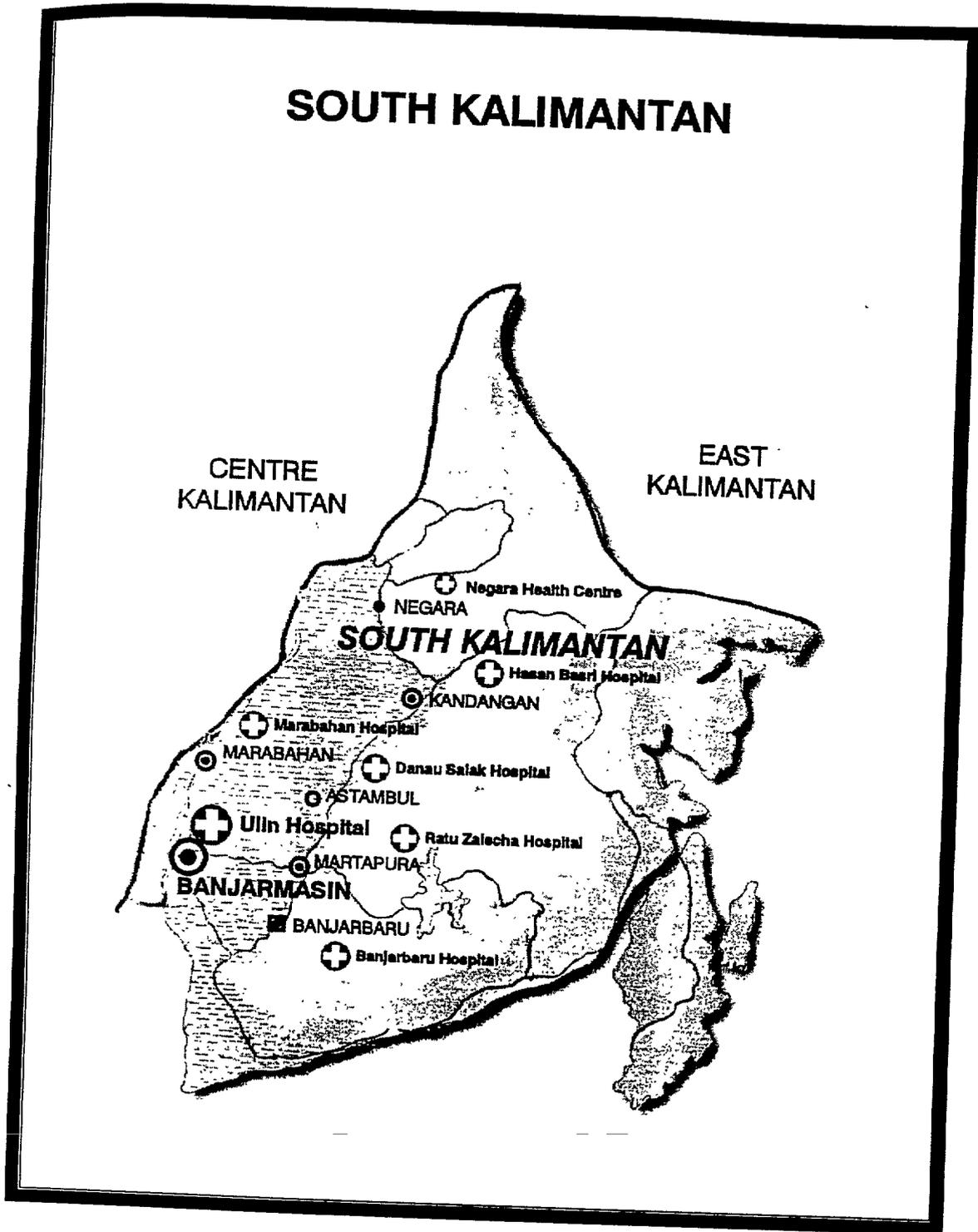
It is estimated that there is one TBA per 24 pregnant women in South Kalimantan. In the three districts of Banjar, HSS and Barito Kuala, the ratio of TBAs to pregnant women is one to 28, 25 and 18 respectively. Of the 495 TBAs in Banjar, 334 have received training from the government. In HSS, 186 out of 227 TBAs have been trained, and in Barito Kuala, 295 out of 373 TBAs have been trained.

Six to seven hundred health sub-centres and 186 health centres (25 of which have beds) are currently operating in South Kalimantan. There are 23 health centres (two of which have beds) and 67 sub-centres in Banjar, 18 health centres (three of which have beds) and 62 sub-centres in HSS, and 16 health centres (five of which have beds) and 60 sub-centres in Barito Kuala. There are 18 government hospitals with 1,509 beds in South Kalimantan. There are two government hospitals and one private hospital in Banjar, and one government hospital each in HSS and Barito Kuala.

About 32% of pregnant women do not seek any prenatal care. In the public sector, health centres are the main source of prenatal care, serving 37% of all pregnant women. The next most utilised source of prenatal care is the village health posts, which serve only 9% of pregnant women. Fourteen percent of pregnant women chose the private sector for prenatal care, primarily private midwives, who alone serve 11% of pregnant women. Trained health providers assist about 29% of deliveries, and 24% are assisted by trained TBAs. However, 80% of deliveries occur at home.

³ This description is taken from Diop & Leighton (1995).

Figure 1: Map of South Kalimantan



5. STUDY METHODS

5.1 Identification and description of alternatives to be compared

5.1.1 Government training

In 1989, the Indonesian Safe Motherhood Initiative was launched with the aim of working intensively towards reducing maternal mortality; before this date, there were no trained midwives in the villages. Therefore, one strategy was to bring health services closer to the community by placing BDD in every village, especially those villages that were more remote. The strategy was to train as many service providers as possible, as quickly as possible, so the maternal mortality situation would receive immediate attention. To fulfil this large quota of entrants, admission into training after nine years of schooling was permitted. There were three different training programmes based in nursing schools, with different intake criteria. Courses included a variable length of general nursing training, followed by one year of midwifery training (Geefhuysen, 1999). In 1993, the MOH began deploying the first of 60,000 BDD trained through this 'crash' programme. However, as the quality of the training was compromised by the need to place BDD in villages as quickly as possible: "...Many young girls have graduated with little experience in conducting a delivery and even less experience of handling complications. Failure rates in examination have deliberately been kept low, with those who fail being allowed to sit examinations again, most of whom pass the second time around." (Geefhuysen, 1999). Therefore, due to their limited experience and relative youth, needed additional support in the form of further in-service training and continuing education.

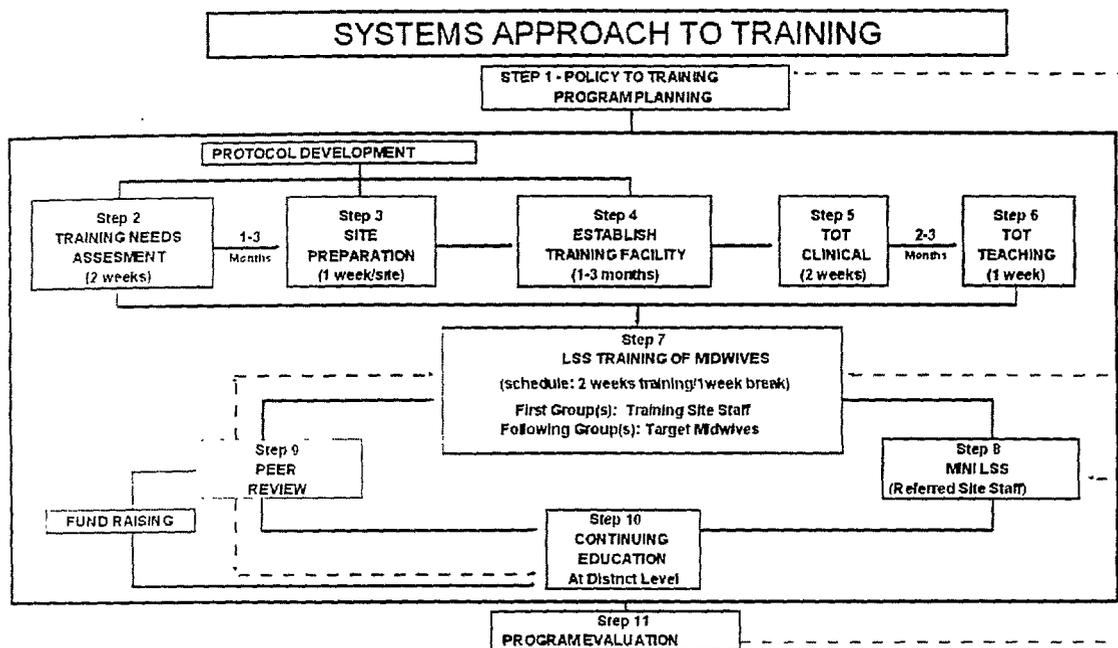
An abundance of short courses was developed centrally to be offered at district level. However, both participants and independent evaluators complained that there were too many participants and too little hands-on care (Geefhuysen, 1999). Those responsible for the training of BDD were, and remain today, bidan. Due to the pressure of these in-service training duties, bidan have not yet had their training updated through refresher courses. While two national training centres for the training of trainers provide in-service training, similar problems to those highlighted for BDD training are apparent; lack of capacity such that only a few bidan in each group are able to practise new techniques under supervision (Geefhuysen, 1999).

5.1.2 MotherCare training

Experience in developing countries has illustrated that it is critical to the success of a training programme that a 'Systems Approach' to training is adopted (Cohen, 1998). A 'systems approach' implies not only the systematic development of a quality training programme including preparation, training and follow-up, but also the development of a number of inter-linking systems that support each other to produce an overall Training and Continuing Education System. While this process requires a more intensive investment of human resources and time during the set-up phase, as well as for ongoing monitoring and support, it results in a stronger training system with better prepared people to meet programme goals. Each step of the system should be followed to establish and maintain an appropriate and effective training system. These steps can be grouped in phases as follows: (A) building consensus at the national level on programme needs and goals; (B) assessment of local needs and setting up training centres; (C) integration of in-service training with peer review/continuing education; and (D) programme monitoring/evaluation. See Figure 2 below. A full description can be found in Annex C.

With technical assistance from the American College of Nurse Midwives (ACNM), Life Saving Skills (LSS) training was adapted to meet the needs of the midwives and the community, as determined by a training needs assessment (TNA) conducted in South Kalimantan in November 1995. The bidan were found to need reinforcement in the handling of obstetrical emergencies and to have the clinical volume to maintain these skills once trained. However, because the BDD were fairly new in the community and had limited clinical volume (average of about one delivery per month), the LSS training content was modified to reinforce their knowledge in normal aspects of antenatal, labour and delivery, postpartum care, and in the management of postpartum haemorrhage and neonatal asphyxia. The TNA also indicated that the BDD needed support to become better integrated into the communities they service. MC and ACNM developed a new manual, *Healthy Mother Healthy Newborn Care*, to meet the needs of the BDD. The bidan LSS training became known as Advanced LSS (the full 10 modules in LSS 2nd edition) and the BDD training as Basic LSS (Healthy Mother and Healthy Newborn Care and the LSS module on Haemorrhage).

Figure 2: Systems approach to training



LSS training centres in South Kalimantan were selected based on their capacity to support competency based training, particularly the availability of adequate clinical experiences for each participant. Two hospitals, Ulin (provincial hospital for South Kalimantan) and Banjarbaru (Banjar district level hospital), were initially selected, and in 1996, work was begun to establish them as LSS training facilities. At the urging of the MOH, a third training centre was established at Ratu Zalecha hospital, (Banjar district hospital) in March 1998. Each hospital underwent a one-week site preparation during which the training programme was introduced, clinical protocols were revised as needed to be consistent with LSS training and agreed upon by all

relevant staff, and procedures for use of the partograph and infection prevention were established. A 'Mini LSS' training for all the staff in antenatal, labour and delivery and postpartum wards was conducted at each training centre to ensure that the facility as a unit was using the same skills and techniques that were taught in LSS.

LSS trainers received a Training of Trainers for clinical skills in LSS over a two-week period and a one-week Training of Trainers for training skills in March-April 1996. The training approach for the Training of Trainers, using the same competency-based training, participatory learning methods and adult learning principles, was as important to establishing the quality of the training team as the review of the clinical content. Five trainers from each facility were trained to be trainers at Ulin and Banjarbaru. Additional trainers (two from Ulin Hospital and one from Banjarbaru Hospital) were trained with the five trainers from the Ratu Zalecha centre. These additional trainers provide backup to the trainers at the two initial training centres. There are now a total of 18 LSS trainers at the three centres in South Kalimantan.

The training of 128 bidan in LSS was conducted in a series of two-week courses from 8 April to 27 September 1996 and 16 June to 8 August 1997. The trainees included 9 clinical instructors from local midwifery schools, 13 hospital midwives, 2 midwives from the district health office, 2 midwives from IBI and 108 health centre midwives.

Since the LSS Trainers were expected to train BDD on different clinical content (Basic LSS) than that for the hospital and health centre bidan (Advanced LSS), the trainers were given a separate clinical Training of Trainers for the Basic LSS course on November 11-22, 1996. The training of BDD began in November 25 1996 and was completed in September 1998. A total of 284 village midwives were trained from the three districts: 140 from HSS, 84 from Banjar and 60 from Barito Kuala through MC. As of March 1999, 52% of the BDD in the three MC districts had received LSS training, 93% from HSS, 39% from Barito-Kuala, and 35% from Banjar (1999 BDD Survey, MC).

The training for bidan and BDD has been complemented by other supporting activities. In September 1997, two two-day Mini LSS workshops were conducted for the doctors and midwives who had not received LSS training at the district hospitals and health centres within the MC districts. They were given an overview of LSS training with special emphasis on infant resuscitation, infection prevention, use of the partograph and postpartum haemorrhage. Two related programmes support the LSS training: Peer Review and Continuing Education. These were developed by MC and IBI and are managed by IBI. This model of government-NGO partnership takes advantage of the fact that most government midwives in Indonesia are IBI members and maximises support to the midwives.

All LSS-trained bidan in the three districts, are trained as Peer Reviewers and expected to visit each other and BDD who had received in-service education twice a year. Through these peer review visits, the clinical practice of each LSS-trained provider is reviewed based on the standards and protocols taught during the LSS training. Providers also received additional support and information as needed. The results of the peer review visits are discussed in semi-annual district Peer Review meetings. From the results of these meetings, decisions are made on

areas in which bidan and BDD need continuing education. This continuing education is offered by specially trained district continuing educators at regularly scheduled IBI chapter meetings.

The system of peer review and continuing education has already been established in all three MC districts. The financial resources to maintain the system are expected to come from fundraising activities. A Fundraising Workshop was held for each district in which the national IBI Fundraising Team trained district-level IBI Fundraisers. After the training, the districts were provided with seed money through the MC project and began fund-raising activities through a variety of methods including small loans to midwives to expand their practices. The experience with the fundraising effort during the period of the MC project has led to the conclusion that IBI will only be able to support one peer review visit for each provider per year. The schedule of semi-annual peer review and continuing education meetings and three-monthly continuing education sessions can be supported through the fundraising system. Meetings to review structure and management of FR/PR/CE system have been held regularly and will continue to ensure the smooth operation of the system.

As a result of the process of establishing the training centres and of the training, it is anticipated that the functioning of the medical 'team' within a facility and from one level to another can also improve as providers understand each other's roles and capabilities better.

In mid 1997, the provincial MOH in South Kalimantan requested MC to establish LSS training centres in the other six districts in South Kalimantan Province, so that more bidan and BDD could receive the benefits of the Basic and Advanced LSS training.⁴ Unfortunately, the volume of deliveries in the hospitals in these six non-MC districts did not meet the criterion for an LSS training centre (at least 15 births per trainee), and these facilities could not qualify as LSS training centres. However, to meet the MOH's request to train more BDD and to support the MOH's enthusiasm for LSS training, MC worked with the MOH to develop an LSS Internship Programme at these six hospitals. The internship programme allows BDD to spend a period of time (recommended one month but in reality defined by the hospital) in the hospital working under the guidance of a LSS trained bidan who served as a clinical instructor to fill gaps in her knowledge and skills which she herself identifies. The preparation of the hospitals to be sites for LSS Internships included procurement of equipment and supplies for the hospitals, orientation of hospital directors and the district-level MOH to LSS training, and LSS training of four midwife 'clinical instructors' from each hospital at the Ulin LSS training centre (October 1997). The establishment of the internship programme has also meant conducting Mini-LSS, Site Preparations and an orientation to the LSS Internship programme at each hospital. The MC Long-term Advisor, a midwife intern from ACNM and the LSS trainers from Ulin, Banjarbaru, and Ratu Zalecha hospitals worked in teams to visit each district hospital for one week to conduct these activities (June-August 1998). As a result of this effort, MC has been able to explore additional ways to meet the need to upgrade the knowledge and skills of the large number of BDD in the field as rapidly as possible.

⁴ The six districts were Tanah Laut; HSU; Tapin; Tabalong; HST; and Kota Baru.

5.2 Costing approach

In this analysis, the health care provider's perspective (MC and Kanwil) was taken⁵, and an incremental analysis was performed by estimating the extra costs inherent in adding each training scheme to existing training programmes.⁶ The choice of whether to use financial, economic or both approaches depends on the objectives of the analysis. In this instance, both approaches were adopted as the efficiency, affordability, sustainability and replicability of the training programme needed to be assessed. Financial costs represent actual expenditure on goods and services purchased.⁷ Costs are thus described in terms of how much money has been paid for the resources used in the project or service. Economic costs include the estimated value of goods or services for which there are no financial transactions or when the price of the good does not reflect the cost of using it productively elsewhere.⁸ In addition, people's preference for receiving goods and services now rather than later (or equivalently, for postponing spending) is taken into account by applying a discount rate to the costs in constant prices and expressing all the costs in terms of their present value. The present value of costs incurred in year n is equal to costs in year n , divided by 1 plus the discount rate (expressed as a decimal) to the power of n .⁹ The key differences between financial and economic costs were that the latter included:

- Rooms for accommodation, storage and teaching at the training institutions;
- Utilities (e.g. electricity, gas);
- Basic salaries of the trainers;
- Various supplies and equipment not reflected in the financial costs.

A discount rate of 3% was used to obtain the present value (World Bank, 1993).¹⁰ The following exchange rates and consumer price indices were used to calculate costs:

Table 1: Selected financial statistics

Financial statistic	Indonesian CPI	Official exchange rate: US\$ 1 = (yearly average)
1996	100	2327.33
1997	111.83	2889.97
1998	198.64	10102.64

Source: www.bps.go.id/

⁵ A provider perspective excludes costs incurred by consumers and households. As participants were provided with per diems to cover the costs of living during training courses, these costs were not necessary to include.

⁶ An incremental cost analysis does not attempt to provide cost estimates for exiting services. This is in contrast to a full cost analysis that estimates the costs of all resources that are being employed in running a project or programme, including basic infrastructure (Kumaranayake *et al.*, 2000). An incremental analysis was adopted due to the budgetary and temporal constraints of the analysis.

⁷ Financial figures are reported real in 1998 prices (US\$) using local consumer price indices and exchange rates (see Table 1).

⁸ Economic figures are presented in 1998 prices (US\$).

⁹ The general formula for converting costs incurred in year n (i.e. $C(n)$) to their equivalent economic cost if they had been incurred in year 0 (i.e. $C(0)$ – their 'present value') when the discount rate is r % per annum is:

$$C(0) = C(n) / (1+r)^n$$

¹⁰ We have assumed that all costs occur at the beginning of each year. This implies that year 1 costs are not discounted.

Cost data is presented by training scheme. Because there is a substantial difference in the costs depending on whether the value of technical assistance and central administration costs are included, costs were estimated both with and without the valuation of these inputs. In an effort to approximate the costs of expanding the training programmes within South Kalimantan, the costs of start-up activities were also excluded. However, there are also several issues which need to be carefully considered if these training packages were to be either expanded within South Kalimantan, or replicated to another province. In particular, these issues revolve around the start-up activities, especially the TNA. In a new province (e.g. Central Kalimantan), specific aspects of a TNA are likely to be required, but it is unlikely that a full TNA would be necessary. Even within those districts where MC training took place, it is likely that selected aspects of the TNA might need to be repeated in 3-5 years time. Therefore, in the sensitivity analysis, we have used half of the actual TNA costs incurred to approximate the cost of a limited TNA.

Each cost has been classified by inputs as well as activities. Bringing together measures of cost and output by 'activity', rather than by the more aggregated 'strategy', can provide an extra tool in project evaluation. Cost items fall into two categories: stand-alone and joint (or shared) costs. Stand-alone costs are costs that are fully incurred by one activity only. Therefore, in these instances, 100% of the cost has been allocated to the appropriate activity and 0% to others, e.g. TOT for bidans and BDD. Joint costs are costs that are shared among two or more activities. Due to the manner in which MC's expenditure data is kept, most inputs have been carefully recorded under each activity heading. However, this is not the case for central administration costs borne by MC and technical assistance. Therefore it was necessary to allocate these costs between activities. In addition, the costs of the fundraising, peer review and continuing education activities have to be allocated between the bidan and BDD programmes. This was done according to the ratio between the number of bidan and BDD that have been trained on each scheme.¹¹

5.3 Sources of funding

MC provided funding for all aspects of the training programmes with the exception of LSS training for bidan who served as clinical instructors in the internship programme and BDD on the internship programme in non-MC districts. Kanwil funded these aspects of the training.

5.4 Sources of activity and cost data

Most data was collected from MC expenditure records, held in Jakarta, for the period 1995-1998. These records are prepared by Marwan Tanjung, and are kept by main activity and have several line items as well. The main activities are:

1. Training needs assessment (TNA) (Step 2)
2. Site preparation (Step 3, 4 & 8);
3. Training of trainers (Steps 5 & 6);
4. LSS Training of Bidan and BDD (Step 7);
5. Peer review (Step 9);
6. Continuing education (Step 10);

¹¹ An analysis of the expenditure records in conjunction with a timetable of events was not sufficient to extract the specific details as many of the activities occurred at the same time.

7. Fund raising.

The main inputs were technical assistance¹², equipment and supplies¹³, per diem and other direct costs.¹⁴ Suzanne Jessop (MC Washington) provided data pertaining to technical assistance, equipment and supplies. Because records were kept by main activity, detailed information concerning the price and quantity of resources was not always possible to obtain.

Information pertaining to the consumption of resources for which no monetary transaction took place (i.e. economic costs), was collected during a tour of MC and non-MC districts in South Kalimantan.

Kanwil HQ and non-MC districts were visited in order to collect expenditure records to identify the cost of Kanwil-funded aspects of the training programmes. However, it was not possible to obtain the expenditure records for the Kanwil-funded *bidan* who served as clinical instructors for the internship programme. Therefore, we have used the cost of the *bidan* trained by MC to approximate these costs.

5.5 Description of methods to define effectiveness measures¹⁵

The measurement of effectiveness is crucial to the calculation of cost-effectiveness. The simplest definition of effectiveness for use in economic evaluation is that services are considered effective 'to the extent they achieve health improvements in real practice settings' (Gold *et al.*, 1996). Ideally, a measure which combines changes in quantity and quality of life should be used, such as the quality-adjusted life-year (QALY) (Gold *et al.*, 1996) or disability-adjusted life-year (DALY) (Murray, 1994) as this facilitates comparisons across disease and interventions. However, in this instance, the aim of the programme was to measure the improvement in knowledge, therefore QALYs, DALYs and such measures are not appropriate measures. While an attempt was made to measure the impact of the training on selected practices, it may be too early to expect demonstrable changes in service provision as a result of LSS training, and hence any impact on morbidity or mortality. This results in narrowing the choice of potential effectiveness measures available, which has implications for comparing different health care interventions.¹⁶

¹² Diana Beck served as a long-term consultant on the project between September 1995 – September 1998. The following individuals served as short-term consultants on the project: Sandra Buffington (December 1995, March/April 1996 and November 1996); Charlotte Quimby (January 1996); and Jane Ann Fontenant (March-September 1998).

¹³ See Annex D for a list of resources used and their unit costs.

¹⁴ See Annex E for an illustration of the resources used per training cycle.

¹⁵ A full description can be found in Annex F.

¹⁶ The selection of an appropriate measure of effectiveness for safe motherhood programmes is problematic and has been well documented elsewhere (Campbell *et al.*, 1995; Graham *et al.*, 1996; Koblinsky *et al.*, 1994). Annex G tabulates the type of indicators of output and effectiveness used in a selection of other studies of the cost and cost effectiveness of safe motherhood programmes, and illustrates the restrictiveness of the measures. This shows that the most common outcome indicators used (or suggested) were process/output, disease specific and non-disease specific measures, e.g. number of pregnant women served, reduction in the level of anaemia.

This report presents information on process¹⁷ and intermediate outcome measures.¹⁸ The number of training cycles and trainees was ascertained through reviewing expenditure records. Two sources of information were used to define the intermediate effectiveness measures: a training evaluation and surveys of BDD. The training evaluation, conducted in August 1999, provides quantitative scores for overall performance of five key skills: infection prevention (how to get equipment ready for next delivery); use of partograph; manual removal of placenta; bimanual compression for management of postpartum hemorrhage; and neonatal resuscitation. In addition, the percentage of 'competent' providers defined as an overall score $\geq 70\%$ was identified.¹⁹ The Bidan and BDD from the various training schemes were compared among themselves and to bidan and BDD who had not participated in MC programmes to estimate the increased skill provided by the training programme.²⁰

The target sample size was 30 individuals for each of the groups. Only 24 clinical instructor bidan were trained so this was the maximum possible for this group. Thirty-four bidan and BDD who received LSS training were randomly selected from training participant lists and requested to participate in the evaluation. All 24 clinical instructor bidan were requested to participate in the evaluation. Thirty-four interns were also selected. Thirty-four bidan and BDD who had not received LSS training were selected from three non-MC districts (Tanah Laut, HST and Tapin).

The original BDD Profile Survey was designed in early 1997 with the general intent of getting a comprehensive 'portrait' of all the BDD working in the three MC districts. Information was collected on socio-demographic characteristics, education and employment histories, and profile of services provided. The survey was repeated in 1999 to measure change in BDD district coverage (in and out migration) and services (deliveries alone or with TBA and 1st week postpartum visits) over time. The volume of services can be compared among trained and untrained BDD in three MC districts to detect any differences.

¹⁷ Measure the activities or outputs of an intervention, e.g. number of trainees.

¹⁸ Measure intermediate changes due to an intervention which are necessary before there is a health impact, e.g. increase in knowledge.

¹⁹ The passing score of 70% was arbitrarily chosen to define a level of knowledge or skill that we would consider "competent/generally safe". However, it was felt that this score is fairly objective as it was chosen after completion of the evaluation and independent of those who assigned the scores (bidan evaluators). This contrasts to educational programmes where the passing grade is well known by teacher and students from the onset, and grades are assigned with the passing grade in mind.

²⁰ Three groups of bidan were defined: trained bidan from MC districts who received Advanced LSS training and participate in IBI Peer Review and Continuing Education systems (bidan 1); clinical instructors bidan who serve as clinical instructors in the internship programme from non-MC districts (had Advanced LSS training, do not participate in IBI Peer Review and Continuing Education systems but received one additional week site prep (bidan 2); untrained bidan from non-MC districts who do not participate in any of the MC training or support programmes. Also, three groups of BDD were defined: trained BDD from MC districts who received Basic LSS training and participate in IBI Peer Review and Continuing Education systems (BDD 1); intern BDD who participated in internship programme from non-MC districts and do not participate in IBI Peer Review and Continuing Education systems (BDD 2); untrained BDD from non-MC districts who do not participate in any of the MC training or support programmes.

5.6 Incremental cost-effectiveness analysis

The combination of cost and effectiveness information provides an indication of the relative efficiency of the new intervention being considered. It can also facilitate future budgeting, planning and management by helping identify those interventions that represent most value for money. Cost-effectiveness ratios have been calculated by dividing appropriate additional total costs by an indicator of change in effectiveness.

5.7 Timeframe

Information on all costs incurred over the history of the training programme since its inception was collected: November 1995 – September 1998.

5.8 Sensitivity analysis

One-way sensitivity analysis²¹ was performed to assess the robustness of the results to changes in selected input variables. Analysis was confined to: major components of cost such as the inclusion/exclusion of certain activities (technical assistance, MC central administration, TNA, site preparation and TOT); testing assumptions made (allocation of joint costs); and sampling variability using 95% confidence intervals to guide the analysis. No sensitivity analysis was performed on the incremental cost-effectiveness ratios due to the difficulty of interpreting them.

²¹ In which one parameter is varied at a time and all others are held constant.

6. RESULTS

This section presents the results of the cost analysis, the training evaluation and the cost-effectiveness analysis.

6.1 Cost analysis²²

6.1.1 Financial costs

Table 2 shows that, in real terms, the four different training schemes cost around \$570,000 during 1995-1998, of which \$6,473 was incurred by Kanwil and the remainder by MC. Technical assistance and central MC administration represent 63% and 5% of total overall costs respectively. It also shows that 43% of costs were borne in the final year.

Table 2: Total financial cost over time by main activity in 1998 prices (US\$)

Activity	1995	1996	1997	1998	Financial cost	% of total
Central administration ²³		4,434	16,483	8,566	29,483	5%
Technical assistance (TA)		98,330	80,583	182,998	361,911	63%
<i>Sub-total</i>		102,763	97,066	191,565	391,394	68%
Start-up ²⁴						
TNA	2,528	1,528	88	2,412	6,556	1%
Site preparation	1,890	39,513	462	11,201	53,066	9%
TOT		3,671	5,281		8,952	2%
<i>Sub-total</i>	4,418	44,712	5,831	13,613	68,574	12%
Operational						
LSS ²⁵		20,912	26,465	21,279	68,656	12%
PR		3,803	18,034	11,377	33,213	6%
CE			197	4,424	4,621	1%
FR		2,955	397	3,997	7,349	1%
<i>Sub-total</i>		27,670	45,093	41,077	113,839	20%
Total	4,418	175,145	147,989	246,255	573,808	100%

Bidan 1

Table 3 shows that the total financial cost to train 110 bidan was approximately \$146,755 for the period 1995-1998, most of which was spent in 1996; this equates to 26% of total costs. Figure 3 shows that, in the absence of TA, that LSS training represents the largest amount of total costs; \$22,556. Site preparation and training of trainers account for \$11,489 and \$7,382 respectively, and continuing education accounts for the smallest amount of costs (\$1,290).

²² Because this study adopted an incremental approach, cost data was not collected for untrained BDD and bidan from non-MC districts that do not participate in any of the MC training or support programmes.

²³ 26% of costs borne by the MC offices in Jakarta and Banjarmasin were included because that was the percentage of project funds that were used for the LSS training component of MC II Indonesia activities.

²⁴ While the TNA was conducted in November 1995, some payments for associated services were made between 1996-98, e.g. a local consultancy fee was paid in 1998 because the report was several years late.

²⁵ Of which \$6,948 was borne by Kanwil for Bidan 2 and BDD 2 training.

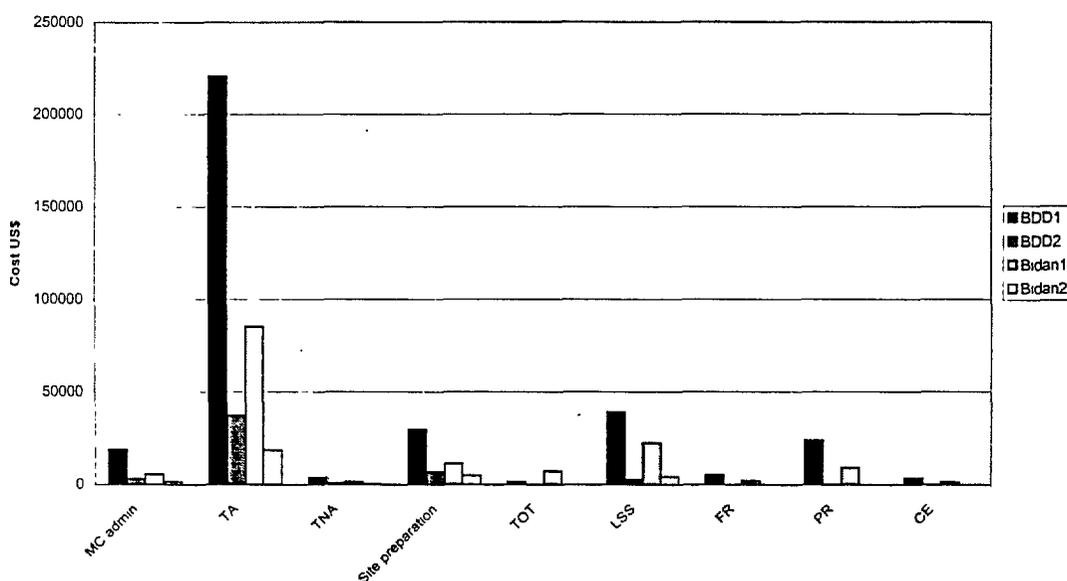
Bidan 2

Table 3 illustrates that total financial costs for this training programme were approximately \$30,000 for the period 1995-1998, most of which was spent in 1996 and 1997 when training took place. Again, after TA, LSS training accounts for the largest amount of costs, which was funded by Kanwil. Because this training programme did not provide PR/CE/FR services, the next most expensive activity was site preparation (see Figure 3).

Table 3: Total financial cost over time by training programme in 1998 prices (US\$)

Activity	Number of trainees	1995	1996	1997	1998	Total	% of cost
BDD1	284	2,825	101,606	89,534	152,492	346,456	60%
BDD2	48	260	10,767	10,099	29,862	50,989	9%
Bidan1	110	1,094	55,120	39,109	51,432	146,755	26%
Bidan2	24	239	7,652	9,247	12,469	29,607	5%
Total	466	4,418	175,145	147,989	246,262	573,814	100%

Figure 3: Total financial cost of the training programmes by activity in 1998 prices (US\$)



BDD 1

Table 3 shows that total financial costs for BDD 1 training were \$346,456 for the period 1995-1998; approximately 60% of total overall costs. TA was the largest cost category, followed by LSS training, site preparation²⁶ and peer review activities (see Figure 3).

²⁶ Site preparation 2 relates to the site preparation provided total the non-MC districts involved in the BDD internship programme. It has been assumed that the bidan clinical instructors will have also benefited from the site preparation, and therefore a proportion of its costs has been allocated to them.

BDD 2

Total financial costs for BDD 1 training were approximately \$50,989 (Table 3). The largest cost category was site preparation that accounted for 67% of costs, while the LSS training only accounted for 26% - this was Manwil funded (Figure 3)

Table 4 shows that the cost per trainee varies across the different training programmes depending upon the purpose of the study. For example, the cost analysis of the existing in South Kalimantan results in the highest unit costs - \$1,334 per bidan 1 trained. When central administration, technical assistance and start-up costs are excluded (to approximate future costs of expansion within South Kalimantan), the cost per bidan 1 trained is \$320. The inclusion of start-up costs and exclusion of central administration and TA costs (to approximate future costs of replication beyond South Kalimantan) costs \$505 per bidan 1 trained.

Table 4: Unit costs of the different training programmes in 1998 prices (US\$)

Training programme	Bidan 1	Bidan 2	BDD1	BDD2
Number of trainees	110	24	284	48
Cost per trainee				
• Including central administration & TA	1334.14	1233.64	1219.92	1062.27
• Excluding central administration & TA	505.35	390.30	376.58	218.93
• Excluding central administration & TA and start-up costs	319.73	173.78	252.54	57.86

Table 5 presents unit costs (with 95% confidence intervals attached) for the MC funded LSS training cycles. The cost per cycle is most expensive at Ulin, but the unit costs are the cheapest.

Table 5: Unit costs per cycle and trainee in 1998 prices (US\$)

Training programme	Ulin	Banjarbaru	Martapura	Total
Bidan				
Number of cycles	10	10		20
Cost per cycle*	1292.74 ± 143.37	962.81 ± 147.63		1127.78 ± 121.90
Number of trainees	70	40		110
Cost per trainee*	188.25 ± 29.53	240.70 ± 36.91		214.45 ± 24.74
BDD				
Number of cycles	19	21	8	48
Cost per cycle*	1078.71 ± 134.36	711.02 ± 102.78	532.25 ± 37.97	833.04 ± 92.05
Number of trainees	160	92	32	284
Cost per trainee*	134.84 ± 16.79	177.76 ± 25.69	133.06 ± 9.49	153.75 ± 14.23

*95% confidence intervals included.

6.1.2 Economic costs

Consultations with health staff involved in training, discovered that the opportunity cost of using rooms for accommodation, storage and teaching, and various supplies and equipment not provided by MC, during the training programmes was zero since these items ~~would not have been used productively elsewhere. However, it is important to bear in mind that this may not be~~ the case in another setting where a health care institution may be operating at or beyond full capacity, and hence all available resources would have an opportunity cost.

The application of a 3% discount rate on total costs over time, resulted in a cost of \$539,120 - a difference of 12.9% between financial costs for the same period.

6.2 Effectiveness measures

6.2.1 Process outcome measures

Table 6 shows that a total of 10 training cycles were held at two institutions each (Ulin and Banjarbaru) during 1996 and 1997. In total, 128 bidan were trained, of which 110 were bidan from MC districts who received advanced LSS training and participated in IBI Peer Review and Continuing Education systems. The remaining 18 were bidan trainers. In addition, 24 bidan who served as clinical instructors in the internship programme from non-MC districts (they had received advanced LSS training, but did not participate in IBI Peer Review and Continuing Education systems – however they did receive an additional week of site preparation) were trained at Ulin in October 1997.

Table 6: Number of cycles of bidan training and trainees

	Ulin	Banjarbaru	Cumulative total
Cycle 1 – 1996	6	4	10
Cycle 2	6	4	20
Cycle 3	6	4	30
Cycle 4	6	4	40
Cycle 5	6	4	50
Cycle 6	8	4	62
Cycle 7	8	4	74
Cycle 8 – 1997	8	4	86
Cycle 9	8	4	98
Cycle 10	8	4	110

Table 7: Number of cycles and BDD trained

	Ulin	Banjarbaru	Martapura	Total
Cycles				
1996	2	1		3
1997	7	10		17
1998	11	12	8	31
Total cycles	20	23	8	51
Trainees				
1996	16	4	0	20
1997	56	40	0	96
1998	88	48	32	168
Total trainees	160	92	32	284

Table 7 shows that between 1996 and 1998, 51 training cycles were held at three institutions (Ulin, Banjarbaru and Martapura). In total, 284 BDD were trained from MC districts²⁷ who

²⁷ 140 from HSS, 60 from Batola and 84 from Banjar.

received basic LSS training and participated in IBI Peer Review and Continuing Education systems. In addition, 48 BDD participated in the internship programme from non-MC districts.²⁸ They did not participate in IBI Peer Review and Continuing Education systems.

6.2.2 Intermediate outcome measures

Tables 8 and 9 show that the MC LSS training programmes showed a statistically significant improvement ($p \leq 0.03$) in the skills of bidan and BDD. Bidan and BDD who received the training scored higher than untrained bidan and BDD. Also, significantly more of the bidan and BDD who participated in the MC training programme were 'competent' (defined as an overall score $\geq 70\%$ - $p \leq 0.03$) in ability to perform the key skills of manual removal of placenta, neonatal resuscitation and use of the partograph than untrained bidan and BDD. However, few differences were observed in skills when trained Bidan 1 (who received Advanced LSS training and participated in PR/CE programmes) were compared to (the clinical instructor) Bidan 2 who also received Advanced LSS training but did not participate in the PR/CE programmes. The overall score for the five skills, and the proportion of bidan identified as 'competent' are essentially the same for the trained bidan and clinical instructor bidan (67-68%). It was noted that the internship programme increased the skills of the BDD, but not to the same level as the MC LSS training and PR/CE programmes. BDD1 scored significantly higher in overall the skill assessment and significantly more BDD1 were identified as 'competent' than BDD2 (internship programme) ($p \leq 0.003$).

Table 8: Mean skill scores and % 'competent' providers for Bidans

BIDANS			
Measures	Bidan 1	Bidan 2	Untrained
	n=33	n=23	n=24
Mean skill score	67%*	68%*,**	40%
% with mean skill score $\geq 70\%$	46%*	48%*,**	0%

* $p < 0.001$ when compared with untrained bidan

** $p \geq 0.75$ when compared with Bidan 1

Table 9: Mean skill scores and % 'competent' providers for BDD

BIDAN DI DESA			
Measures	BDD 1	BDD 2	Untrained
	n=33	n=28	n=47
Mean skill score	71%*	62%*,**	51%
% with mean skill score $\geq 70\%$	67%*	25%*,**	6%

* $p \leq 0.03$ when compared with untrained BDD

** $p \leq 0.003$ when compared with BDD1

²⁸ This has been assumed on the basis of six non-MC districts holding two training cycles each, at 4 participants each cycle.

Table 10 shows the difference in services provided by trained and untrained BDD. The only statistically significant difference seems to be that the trained BDD are doing more deliveries with TBAs in 1999 than they were 1997 ($p \leq 0.001$). Also, differences existed among the districts in 1997 with the BDD in Banjar being the most active and those in HSS the least active. While the 115 BDD from HSS make up 26% of the total 498 BDD, they comprise 47% of the trained BDD (113/242).

Table 10: Increase in services provided by BDDs

BIDAN DI DESA			
Measures	Trained ²⁹	Untrained	P values
Change in mean services offered	N=242	N=196	—
Deliveries alone	0.2	0.69	0.29
Deliveries with TBA	0.9	0.04	0.001
Deliveries-total	1.1	0.7	0.36
Postpartum visits	0.6	0.9	0.67

6.2.3 Other outcome measures

Table 11 presents data from the two profile surveys provided information about the number of BDD in the MC districts at two points in time: 1997 and 1999. From these data, in- and out-migration rates can be estimated. In the 1999 survey, information was collected from 498 BDD: 27% came from Hulu Sungai Selatan (HSS) District; 35% from Barito Kuala District; and 38% from Banjar District. The absolute number of BDD decreased from the 1997 survey, although the percent distribution among the districts remained the same. Between the two surveys, there was a 7.4% net loss of BDD from the three MC districts. Of the 538 BDD who responded in the first survey, 438 (81.4%) also responded in the 1999 survey. Sixty BDD responded in the 1999 survey but were not included in the 1997 survey (in-migration rate of 11.2%), and 100 BDD who responded in the 1997 survey did not respond in the 1999 survey (out-migration rate of 18.6%). The out- and in-migration was highest in Banjar (21.5% and 13.2%, respectively), although the net loss rate was lowest in this district (6.8%). Nine BDD moved among the three districts between the surveys.

Information in Table 11 can be combined with the information from the training evaluation to project the impact and cost of continuing the in-service education programme until 2005 (see Table 12).

²⁹ Difference in mean services reported in 1999 and 1997 for BDD included in both surveys.

Table 11: Coverage of BDD in the three MC districts – data from BDD profile surveys: April-May 1997 and March 1999

	HSS	BARITO-KUALA	BANJAR	TOTAL
Number in 1997 Survey	145 (27%)	189 (35%)	204 (38%)	538
Number in 1999 Survey	134 (27%)	174 (35%)	190 (38%)	498
Number in Both Surveys	115 (26%)	160 (37%)	163 (37%)	438
Not in 1999 Survey	28	28	44	100
Out-migration ³⁰	19.3%	14.8%	21.5%	18.6%
New in 1999 Survey	19	14	27	60
In-Migration ³¹	13.1%	7.4%	13.2%	11.2%
Net loss ³²	7.6%	7.9%	6.8%	7.4%

Table 12: Projected coverage and cost of trained and competent BDD in the three MC districts at the beginning of each two-year period.

	1997	1999	2001	2003	2005
Number of BDD	538	498	461	427	396
Number left (out-migration)		100	93	86	79
Number new (in-migration)		60	56	52	48
TRAINED		259	433	401	372
% Trained		52%	94%	94%	94%
NEED TRAINING	538	239	28	26	24
% 'competent'		38%	63%	63%	63%
Number trained in period		259	267	26	24
Cost of training per period		\$65,527	\$67,551	\$6,578	\$6,072
Cumulative cost of training		\$65,527	\$133,078	\$139,656	\$145,728

* From training evaluation, 63% of the trained BDD are 'competent' and 6% of the untrained BDD are 'competent'.

** Based on a cost of \$253/BDD 1.

The data for 1997 and 1999 are from their respective BDD profile surveys. Data for 2001, 2003, and 2005 are based upon the following assumptions:

- Out-migration rate is 18.6% and is same for trained and untrained BDD;
- In-migration rate is 11.2% and at end of period 50% of the new BDD received training;
- Net loss rate is 7.4%.

An assumption that the Peer Review and Continuing Education system will maintain the clinical competency of those who have been trained has also been made. The current system could have trained 94% of the BDD by 2001 at a cost of \$133,078 and thereafter maintain that level of trained BDD. However, the competency level will not go above 63%.

³⁰ Number not in 1999 survey/number in 1997 survey.

³¹ Number new in 1999 survey/number in 1997 survey.

³² Difference between numbers in 1997 and 1999 surveys/number in 1997 survey.

6.3 Incremental cost-effectiveness

Table 13 presents the cost-effectiveness of the bidan and BDD training programmes.

Table 13: Incremental effectiveness and cost-effectiveness of the different training programmes

	Mean skill score			% with mean skill score \geq 70%		
Scores*						
BDD – untrained	51			6		
BDD1 – trained	71			67		
BDD2 – interns	62			25		
Bidan – untrained	40			0		
Bidan 1	67			46		
Bidan 2	68			48		
Incremental % increase in scores**						
BDD1 – trained	20			61		
BDD2 – interns	11			19		
Bidan 1	27			46		
Bidan 2	28			48		
Incremental effectiveness per incremental dollar spent***	Actual ^α	Repli- cation ^β	Expan- sion ^χ	Actual ^α	Repli- cation ^β	Expan- sion ^χ
BDD1 – trained	0.016%	0.053%	0.079%	0.050%	0.162%	0.242%
BDD2 – interns	0.010%	0.050%	0.190%	0.018%	0.087%	0.328%
Bidan 1	0.020%	0.053%	0.084%	0.034%	0.091%	0.144%
Bidan 2	0.023%	0.072%	0.161%	0.039%	0.123%	0.276%
Incremental cost****						
BDD1 – trained	61.00	18.83	12.63	20.00	6.17	4.14
BDD2 – interns	96.57	19.90	5.26	55.91	11.52	3.05
Bidan 1	49.41	18.72	11.84	29.00	10.99	6.95
Bidan 2	44.06	13.94	6.21	25.70	8.13	3.62

* From Tables 8 and 9.

** Computed by subtracting the score attained by the untrained bidans and BDD from those trained.

*** Percentage of incremental effectiveness attributable to the training schemes, per dollar spent.

**** Incremental cost required to gain an additional 1% improvement in score.

^α Actual results

^β Projected results if replicated (excluding central administration and TA activities)

^χ Projected results if expanded (excluding central administration, TA and start-up activities)

Table 13 illustrates that, for those bidan who received advanced LSS training and participated in IBI Peer Review and Continuing Education systems, it cost \$1334 per trainee to increase mean scores by 27 percent (40-67%), and the number of 'competent' bidans by 46 percent (0-46%). In other words, this equates to a 0.020% increase in mean scores and 0.034% increase in the number

of 'competent' bidan per dollar spent. Alternatively, it cost \$49.41 to increase mean scores and \$29 to increase the percent of 'competent' bidans by 1%.

For those bidan who served as clinical instructors in the internship programme from non-MC districts, it cost \$1234 per trainee to increase mean scores by 28 percent, and the number of 'competent' bidans by 48 percent. In other words, this equates to a 0.023% increase in mean scores and 0.039% increase in the number of 'competent' bidan per dollar spent. Alternatively, it cost \$44.06 and \$25.70 to increase mean scores and the percent of 'competent' bidans by 1% respectively.

For those BDD from MC districts who received basic LSS training and participated in IBI Peer Review and Continuing Education systems, it cost \$1220 per trainee to increase mean scores by 20 percent, and the number of 'competent' BDD by 60 percent. In other words, this equates to a 0.016% increase in mean scores and 0.050% increase in the number of 'competent' BDD per dollar spent. Alternatively, it cost \$61 to increase mean scores and \$20 to increase the percent of 'competent' BDD by 1% respectively.

For those BDD from non-MC districts who participated in the internship programme, it cost \$1062 per trainee to increase mean scores by 11 percent and the number of 'competent' BDD by 19 percent. In other words, this equates to a 0.010% increase in mean scores and 0.018% increase in the number of 'competent' BDD per dollar spent. Alternatively, it cost \$96.57 and \$55.91 to increase mean scores and the percent of 'competent' BDD by 1% respectively.

It is notable that the training for bidan who served as clinical instructors in the internship programme from non-MC districts was less cost-effective than the training for bidan who received advanced LSS training and participated in IBI Peer Review and Continuing Education systems. Likewise, the training for BDD from non-MC districts who participated in the internship programme was the less cost-effective compared to the training for BDD from MC districts who received basic LSS training and participated in IBI Peer Review and Continuing Education systems.

Table 13 also illustrates the projected incremental cost-effectiveness of expanding services within South Kalimantan (excluding central administration, TA and start-up costs) and replicating the services elsewhere (excluding central administration and TA). The same ranking of cost-effectiveness between training programmes for bidan and BDD holds, except when considering expanding the BDD programmes. In this instance, the training for BDD from non-MC districts who participated in the internship programme is projected to be more cost-effective compared to the training for BDD from MC districts who received basic LSS training and participated in IBI Peer Review and Continuing Education systems.

6.4 Sensitivity analysis

Table 14 illustrates the results of the one-way sensitivity analyses that were undertaken to test the robustness of the cost-effectiveness estimates to changes in underlying assumptions. Variation of factors influencing the cost of the training programmes had a small impact on cost-effectiveness. For example, the application of a 6% real discount rate led to a divergence of

12.9% from the central total cost estimate. However, the exclusion of technical assistance led to a 70.8% divergence from the central estimate.

Table 14: Analysis of sensitivity of cost estimates to assumptions in 1998 prices (US\$)

Assumption tested	Total cost of the training programmes	% divergence from central estimate of total cost
Discount rate applied to account for differential timing		
0%*	573,808	
3%*	539,314	- 6.4%
6%	508,120	- 12.9%
Proportion of TA costs included		
100%*	573,808	
50%	392,852	- 46.1%
0%	211,897	- 70.8%
Proportion of central support allocated to programmes		
26%*	573,808	
13%	559,066	- 2.6%
0%	544,324	- 5.4%
Proportion of start-up costs included		
100%*	573,808	
50%	539,520	- 6.4%
0%	505,233	- 13.6%
Cost per bidan LSS cycle		
1005.88	571,370	- 0.3%
1127.78*	573,808	
1249.68	576,246	+ 0.4%
Cost per BDD LSS cycle		
740.99	570,222	- 0.6%
833.04*	573,808	
925.09	579,059	+ 0.9%

* Baseline estimate

** Based on 95% confidence intervals.

7. DISCUSSION

This report has presented the costs, effects and cost-effectiveness of the LSS training component of MC II project in South Kalimantan, Indonesia. It has been illustrated that the MC LSS training programmes significantly improved the knowledge, confidence and skills of bidan and BDD. In addition, significantly more of the bidans and BDD who participated in the MC training programmes were 'competent' (defined as a score $\geq 70\%$) in their knowledge and in their ability to perform key skills. These achievements were accomplished at an incremental cost of approximately \$570,000, of which \$346,456, \$145,755, \$50,989 and \$29,607 was spent on BDD1, Bidan 1, BDD2 and Bidan 2 respectively. While, 63% of total cost was for international consultancies, it is important not to overlook these costs, as their input is usually crucial to the successful development and initial implementation and running of the programmes. The cost of the training was insensitive to changes in the cost per bidan and BDD training cycle (using 95% confidence intervals as upper and lower limits), and the proportion of MC central administration costs allocated to the programmes.

The training programme for bidan who serve as clinical instructors in the internship programme from non-MC districts was more cost-effective than that of trained bidan from MC districts - \$44.06 vs. \$49.41 per % increase in mean skill score and \$25.7 vs. \$29 per % increase in % with mean skill score $\geq 70\%$. Trained BDD from MC districts were more cost-effective than BDD who participated in internship programme from non-MC districts - \$61 vs. \$96.57 per % increase in mean skill score and \$20 vs. \$55.91 per % increase in % with mean skill score $\geq 70\%$. However, there is a potential methodological problem with separating the cost of these programmes; *economies of scope*.³³ Given the interdependent nature of the training programmes, e.g. Bidan 1 training is required to provide peer review and continuing education activities for BDD1, the description of training programmes in isolation may be misleading. Therefore, it should be recognised that the costs of delivering each training programme individually are difficult to ascertain accurately, and should be treated with caution. Also, the calculation of costs by main activity was problematic, i.e. activity-based costing (ABC). ABC emphasises the importance of identifying the activities that drive the final cost of a service (Drummond *et al.*, 1997). However, the allocation of 'joint', or 'shared', costs was based on assumptions that can undermine the robustness of results. Although sensitivity analysis explored the impact on results of variations in the rate of apportionment and found small changes, it is generally acknowledged that an 'ingredients' approach to costing is preferable³⁴, as fewer assumptions are required. In addition, government MCH records are kept by main item. Therefore interpretation of results and comparison with government expenditure records would have been facilitated had it been possible to collect, analyse and present data by main ingredient as opposed to activity.

The limitations of a two-week in-service education programme to increase the skill level of bidan and BDD to an acceptable level need to be recognised. High levels of competency in all five skills were not achieved by all the participants in the training programmes. A short in-service

³³ Economies of scope are cost-saving externalities between product lines (e.g. the production of good A reduces the production of good B) (Tirole, 1997).

³⁴ In which the total quantities of goods and services actually employed in applying an intervention are recorded and multiplied by their respective unit prices.

education course cannot substitute for a 2-3 year midwifery programme. Also, it may be too early to expect demonstrable changes in service provision as a result of the LSS training; certainly, no statistically significant changes in practices were documented in this study. This meant that the main outcome measures used in this study were the improvement in mean skill scores and increase in the number of 'competent' midwives. While these types of intermediate outcome measures may offer substantial 'scope for economies in data collection' (Drummond, 1993), the attractions of reduced data needs are greatly outweighed by the disadvantages of reduced relevance of the endpoint. The difficulty in developing a meaningful measure of outcome for reproductive health interventions has been well documented (Campbell, 1999), the interpretation of process and intermediate outcome measures can be problematic, and hence the dissemination of the findings to policy-makers difficult.

The expansion of the existing MC services in South Kalimantan provides an opportunity to exploit the *sunk costs*³⁵ incurred by MC during the start-up phase of the project in South Kalimantan, and to produce *economies of scale* in the long-term.³⁶ The exclusion of TA, central administration and start-up costs means that the current system could train 94% of the BDD by 2001 at a cost of \$133,078 using the BDD 1 training programme.³⁷ Nevertheless, whatever strategy adopted, the expansion of services would need to address the issue of sustainability because of the high level of recurrent costs. Yet, the cost of LSS training cycles for bidan and BDD appeared to be relatively stable over time as evidenced by the 95% confidence intervals. Certainly there seems to be a commitment to expanding services within South Kalimantan which is evidenced by the fact that Ratu Zalecha has already begun to train bidan and BDDs in LSS and modified-LSS training courses. However, it will be important to assess both the quality and cost of these programmes. The cost of future training cycles could be greatly reduced by the payment of reduced per diems compared to those issues by MC. In addition, an increase in class sizes would reduce unit costs, but either may have detrimental effects on quality and therefore impact. Another issue to bear in mind is whether another TNA might be required in the future again. Even within those districts where MC training took place, it is likely that some aspects of the TNA might need to be repeated 3-5 years later in order to keep abreast of any developments. Another issue is whether one would need to do a TNA in a new district in South Kalimantan or could you rely on the results of the original TNA to hold for other districts in South Kalimantan. It is clear that there are no other hospitals that could be developed into training centres in South Kalimantan, so no TNA would need to be done to get hospital information. Also, other information already collected on bidan and BDD needs could probably be generalised to other districts. Therefore, no other TNA exercise would be required to expand training to other parts of South Kalimantan.

³⁵ Sunk costs are those investment costs that produce a stream of benefits over a long horizon but can never be recouped (Tirole, 1997).

³⁶ Economies of scale exist when the production of a product decreases with the number of units produced (Tirole, 1997).

³⁷ Although the results suggest that the BDD internship programme would be more cost-effective than the LSS-trained BDD if expanded, given the highly interdependent nature of the BDD internship and bidan clinical instructor programme, it is doubtful that the same effectiveness and hence cost-effectiveness would be realised if the BDD internship were implemented in isolation. By way of contrast, the LSS-trained BDD programme is more independent, and therefore the cost-effectiveness of expansion is likely to be more robust.

In the case of Indonesia, it is likely that any replication of this project to other parts of Kalimantan and other islands would rely on the local expertise developed during the course of the project, thus reducing overall costs. Assuming a similar scale of production (i.e. 110 bidan and 284 BDD), the cost of replicating the training programmes to new areas within Indonesia would cost from \$377 (BDD 1) to \$505 (Bidan 1) per trainee. Again, there already appears to be a lot of interest in replicating the training schemes. This is evidenced by the fact that Ulin hospital has already received a request from Central Kalimantan Province to provide LSS training. Perhaps the most important issue to bear in mind if these training packages are to be replicated to another province is that of start-up activities, especially the TNA. Would one need to do a TNA in a new province (e.g. Central Kalimantan)? The answer is probably yes, but not a full TNA. Much is known with respect to the major causes of death among pregnant women, and also it is common knowledge that BDD need more help with integration into the community. But it would be important to get additional information that would help with project implementation. Therefore information such as the following would help:

- 1) What equipment do midwives already have and what to they most urgently need to learn from LSS training?
- 2) What hospital(s) should be selected as the training centre(s) based on accepted criteria?
- 3) Are potential trainers available, and do they have time to do extra work?
- 3) What equipment does the hospital need to implement protocols taught in LSS?
- 4) How can IBI be incorporated into the activities?
- 5) How can schools of midwifery be incorporated into the training?

It has been estimated that it would take approximately one week to collect this information (Diana Beck, personal communication). In addition, all other site preparation activities would still have to take place. It would therefore be important to consider the costs of such a modified TNA prior to any replication of training beyond South Kalimantan.

Unfortunately, there is very little published literature that could provide an indicator of the efficiency of the MC training project relative to other health care interventions. A comprehensive review of reproductive health costs failed to identify any evaluations of similar training programmes for midwives (Mumford *et al.*, 1998). Indeed, the review only identified two studies from Indonesia, but they were describing a maternal tetanus immunisation programme in Aceh Province (Berman *et al.*, 1991) and a family planning project (Perkumpulan Kontrasepsi Mantap Indonesia, 1988). An additional literature review performed in order to identify cost or cost-effectiveness analyses of training programmes for any health care staff managed to identify two reports.³⁸ The first evaluated an immuniser-training immuniser programme in Maluku, Indonesia, that matched highly performing immunisers with inexperienced, poorly-performing immunisers for a 1- to 2-week on-the-job training session (Robinson *et al.*, 1998). Training improved both problem-solving skills and particular techniques among trainees at a cost of about \$53 per trainee (1998 prices). The second study from Peru, compared a new system of continual, individual retraining of family planning distributors by their supervisors in the field with the traditional system of initial group training followed by group retraining (Leon *et al.*, 1989). The new system cost \$0.54 per percentage point of knowledge recovered and/or gained per distributor above that learned during initial

³⁸ The following databases were searched: Medline, HealthStar and Popline.

training compared to \$1.11 for group retraining (1998 prices). The point to note here is that comparison between these training programmes is meaningless as the final health impact of each is likely to be very different, even though the intermediate outcome measures are similar. Also, the skills that were assessed in these two examples are much easier than the skills taught during LSS training cycles, hence the costs are likely to be lower for these simpler skills. More research is required in this area in order to increase the policy relevance of such results relative to other interventions to improve health.

Finally, it is important to note that all cost-effectiveness ratios are context specific due to time and space. Table 15 summarises some of the reasons why the results documented in this report are likely to be highly context-specific, and therefore, why the transferability of these findings should be questioned. It is interesting to note that the same variable can have both a potentially positive and negative impact on cost-effectiveness e.g. changes in the number of trainees per cycle. Some of the reasons outlined below relate directly to the results reported here and illustrate the difficulty in providing highly accurate estimates of cost and cost-effectiveness at any given point in time. In addition, cost-effectiveness is a function of time and space and the results presented here should be recognised as such.

Table 15: Context specific nature of results

Reasons why cost-effectiveness may be higher (worse) than presented here	Reasons why cost-effectiveness may be lower (better) than presented here
Economic crisis	Economic improvement
Increase the number of trainees – reduce impact	Increase the number of trainees – reduce unit costs
Decrease the duration of training cycles – reduce impact	Decrease the duration of training cycles – reduce unit costs
Better scores in the future under revised MOH training curricula which would change the incremental effectiveness scores	Level of knowledge among untrained bidan and BDD may be worse – incremental effectiveness scores could be higher in different settings
Difficulty of separating-out costs due to economies of scale	Effectiveness measure does not capture all the positive effects
Economic costs may be present in other settings	Local technical expertise could be used in future training programmes
	Economies of scale should reduce production costs over time
	Local per diems could be paid

It is difficult to ascertain whether the training package described in this report are cost-effective, primarily because the outcome indicators are so specific and hence limit comparisons with other safe motherhood programmes and health care interventions. Ultimately the MOH who will have to decide whether the extra benefits are worth the extra costs and hence whether they feel these training programmes represent 'value for money'.

RECOMMENDATIONS

A. To MotherCare

1. Help develop the specific requirements of future training needs assessments in other parts of Kalimantan and elsewhere. It would be important to get additional information that would help with project implementation. Therefore information such as the following would help:
 - What equipment do midwives already have?
 - Which skills taught in LSS training are the most important?
 - Are potential trainers available, and do they have time to do extra work?
 - What additional equipment does the hospital need to implement protocols taught in LSS?
 - How can IBI be more incorporated into activities?
 - How can schools of midwifery be incorporated into future training?
2. Plan economic evaluations alongside future interventions from the outset in order to facilitate appropriate collection of data, analysis, presentation and dissemination of results;
3. Encourage the development of outcome indicators that can be compared between and beyond reproductive health research.

B. To MOH South Kalimantan

1. Help supervise the new training courses being develop for implementation in Central Kalimantan;
2. Plan for future investments in training over time. Given the limited capacity of the existing training institutions, future training will not be a one-off activity, but will occur over several years. In addition, most of the these costs will be recurrent, and hence careful budgeting will be required;
3. Further training at existing institutions should be encouraged so that sunk costs can be exploited;
4. Discuss the possibility that the existing training sites in South Kalimantan become Regional training sites;
5. Consider ways in which training costs can be reduced without reducing their quality and hence impact, e.g. increase in class size, reduction per diem for trainers and trainees.

C. To MOH Indonesia

1. Discuss the role of local Master trainers in future training programmes;
2. Prepare central training budgets carefully given the high level of recurrent costs associated with training programmes;
3. Discuss the possibility of centrally funded training sites and full-time trainers. The costs of transporting trainees to facilities outside their locality may be outweighed by the costs of setting-up new sites;
4. Decide which additional hospitals could be selected as training centres based on accepted criteria.

D. To future evaluators of similar training programmes

1. Develop a more meaningful outcome measure;
2. Develop modelling techniques to estimate the impact of changes in knowledge and practice on key outcome variables, i.e. reduction in unmet need and the impact on maternal mortality;
3. Develop standardised data collection techniques that to increase the level of comparability between studies.

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ANNEX A: SCOPE OF WORK

1. Prepare data requirements and send to MC/INDO for preparation prior to visit.
2. Meet with MC/INDO staff and local consultants to confirm data needs, sources and methods to collect the data
3. Meet with representatives from IBI in Jakarta and obtain necessary cost data.
4. Travel to Banjarmasin and meet with MC/INDO staff, officials from the three training sites (Ulin Hospital, Banjarbaru Hospital, and Ratu Zalecha Hospital), representatives of the local IBI chapters and provincial office to obtain necessary data.
5. Define data needs and plan to obtain data for the HMHN/LSS trainers and peer review teams with MC/INDO staff and local consultants.
6. Work with Jeanne McDermott, MC Training Advisor to define an appropriate effectiveness measure from the training evaluation (Jeanne will be in Indonesia conducting the training evaluation with Diana Beck from August 4-30).
7. Prepare one report that includes trip report and cost-effectiveness analysis, and submit to Jeanne McDermott

ANNEX B: TRIP REPORT – FIELD VISIT TO INDONESIA 7-20 AUGUST 1999

7th Aug: Damian left UK

8th Aug: Arrived Jakarta

9th Aug: In the morning Damian and Endang met Molly Gingerich and Lana Dakan at the USAID office to discuss the aims and objectives of the cost-effectiveness analysis. Later in the morning, and during the afternoon, at the MotherCare Jakarta Office, Damian, Mardiati, Dono, Marwan and Endang discussed the scope of work, aims and objectives, methods for cost analysis, appropriate effectiveness measures and a provisional timetable.

10th Aug: In the morning Damian, Mardiati, Dono and Marwan travelled to Banjarmasin, South Kalimantan. Dr Asra was briefed on the purpose of our trip and began to organise our meetings for the forthcoming week. The rest of the day was spent reviewing the MotherCare expenditure records held in Banjarmasin, and discussing the approach to the cost analysis. An early draft of the costing spreadsheets was developed.

11th Aug: In the morning, two meetings were held with government officials. The first was held at Kanwil-Depkes (Provincial Health Office/Ministry of Health) with Dr Manahan K. Pangaribuan, the Administrative Co-ordinator, and Arvin Dyanto, the Head of the Planning Department. The second was held at Dinas I (District Health Office/Ministry of Home Affairs). The main reason for these meetings was to discuss the purpose of our trip, and to seek formal permission in order to collect data from the provincial and district hospitals involved in MotherCare training schemes. The team then visited Ulin provincial hospital, Banjarmasin, where we met Dr Suharto, Head of OB-GYN Ward; Dr Susanto, Treasurer/Secretary; and LSS trainers. In the afternoon, a meeting was held at Bapelkes (Education and Training Centre) in Banjar district with Jeanne McDermott, Diana Beck and Endang Achadi. During this meeting, the team presented their approach to the costing, clarified various aspects of MotherCare training, and discussed potential problems of combining the cost analysis and the results of the training evaluation.

12th Aug: In the morning, the team went to Banjarbaru district hospital, Banjar District, where we met Dr Dahlan, the Head of OB-GYN ward, Gusti Mason, Head of Medical Care, Siti Sultang, Head of Finance and Administration and bidan trainers. We gathered information relating to the LSS training. In particular, we collected data relating to any resources which were consumed during LSS training that were not provided by MotherCare (space, additional equipment & supplies and utilities). Later we travelled to Ratu Zalekha hospital, another LSS training site. We requested similar information from the staff that we met at this facility: Dr Muslich and LSS trainers. Travelled to Barabai.

13th Aug: We visited Damanhuri hospital in Barabai District, where we met Dr Agus Bintang Susyadi (Acting Director of Damanhuri Hospital, Dr Pribahri Birdinuejeya (Head of OB-GYN Ward) and two bidans. Damanhuri Hospital is situated in a non-MotherCare district and provided the internship programme to BDD. We obtained a description of the internship and collected a detailed report of their activities that they had submitted to KANWIL. We were also

given a copy of the budget received prior to the internship, and were told that a financial report had been submitted to KANWIL. Travelled to Amungtai. We visited Pambalah Batung District Hospital where we met Dr Dharmaputra (Head of DINAS II, and Director of the hospital), bidans Nurjannah and Fathiah, and Mr H M Yunus Sulaeman (DINAS II). We discussed the contents of the internship. We also discovered that Amuntai receive funds from an ADB-FHN loan which they have used to support additional internships. We collected relevant data and were given the contact names of staff based in KANWIL who could provide us with additional information. Travelled to Banjarmasin.

14th Aug: At the MotherCare office, we sent a fax to KANWIL requesting various data in preparation for a meeting on Monday morning. We continued to develop the spreadsheets, and began to input available data. In the afternoon, we met two IBI officials: bidans Sugiarti and Syarifah. They provided a description of IBI activities in MotherCare and non-MC districts.

15th Aug: The team had a meeting to discuss our achievements to date, document missing data, and prepare for our forthcoming meetings. Mardiati, Dono and Marwan were given various Indonesian documents we had collected to translate and summarise. Mardiati returned to Jakarta. Met Diana and Jeanne to discuss various aspects of LSS training, and in particular, consultancies during the project lifetime, and approximate time allocation for Diana. Damian wrote-up various meetings and continued report writing.

16th Aug: In the morning we met KANWIL officials: Dr Manahan; Arvin Dyanto; Dr Handy Indrajaya, Head of 'Hospital Service Improvement and Referral' project; Sukanto, Project Officer of ADB-FHN loan; and Dyah Praswati, Financial Officer. We collected information relating to the cost of the LSS training schemes funded by MotherCare, KANWIL and ADB-FHN loan. Unfortunately, the treasurer was not available; therefore the detailed expenditure reports were not collected. We also collected an official salary scale for Ministry of Health staff and Pelahuri. We then sent a fax to Suzanne Jessop, MotherCare Washington, requesting information about consultancies. Later we travelled Pelaihari hospital, where we met: Yuyu Susmiati, Director of Hospital; Dr Subandi, Paediatrician; and bidans Artik, Supiyah, H. Rusidiana, Ainun and Wahyini. We collected information pertaining to LSS training. Dr Asra will return in order to collect financial reports for the ADB-FHN funded LSS training which are held at DINAS II. Travelled to Jakarta.

17th Aug: National holiday. Damian reviewed MotherCare files prepared by Diana Beck on various aspects of LSS training. Continued report writing.

18th Aug: Marwan, Dono and Damian spent the day collating expenditure data from the MotherCare records at MotherCare Jakarta Office.

19th Aug: Mardiati, Marwan, Dono and Damian spent the day collating, and entering into our spreadsheets, expenditure data from the MotherCare records at MotherCare Jakarta Office.

20th Aug: Damian left Jakarta for the UK

ANNEX C: A 'SYSTEMS APPROACH' TO TRAINING FOR BIDAN AND BIDAN DI DESA³⁹

A. BUILDING CONSENSUS AT THE NATIONAL LEVEL

Step 1: Policy Level Planning

Prior to developing a training programme, consensus must be reached at the national level that improving provider skills can strengthen MCH services and goals for the programme must be developed. In addition, agreements must be made between all involved on funding as well as roles and responsibilities. These preliminary steps are critical for the establishment of a sustainable programme.

B. ASSESSMENT OF LOCAL NEEDS AND SETTING UP TRAINING CENTRES

Step 2: Training Needs Assessment

Once there is consensus to conduct LSS training, as in any programme a needs assessment is important to refine perceived needs and better target interventions that are undertaken. The Training Needs Assessment (TNA) should include a profile of community needs and the demands placed on the providers (bidan and bidan di desa). This is complemented by a profile of provider skills, knowledge, equipment on hand, referral patterns, and a description of the provider's practice. In addition, information is collected to identify potential training sites. Important criteria include sufficient numbers of patients and limited competition with other students so each training participant can be assured the clinical experiences needed during the length of the training course to achieve competency. To assure availability of adequate clinical experiences for participants, the hospital must have available at least 15 births per participant trained during that month. In addition, potential training sites should be assessed to determine: clinical protocols being used and modifications needed, adequate staffing to cover trainers when teaching, staff interest in participating in a training programme, equipment available, documentation systems being used, and facilities to accommodate students on site. From these findings decisions can be made on which facilities can serve as training sites, how many trainers are needed, how many participants per class, equipment needed, what the course length should be and the exact content of the training.

In South Kalimantan, the TNA highlighted the need to tailor the LSS training content for the different needs of bidan and bidan di desa. Bidan were found to need reinforcement in the handling of obstetrical emergencies (the full *10 Life Saving Skills* modules) and had the clinical volume to maintain these skills once trained. However, because bidan di desa had limited clinical volume, averaging about one delivery per month, the training content for bidan di desa was modified to reinforce their knowledge in normal aspects of antenatal, labour and delivery, and postpartum care, as well as some aspects of LSS. Bidan di desa also showed the need for support on how to better integrate into the communities they service. Focus was given to this as well as counselling skills through the development of a second manual entitled *Healthy Mother Healthy Newborn*.

³⁹ Cohen (1998).

The TNA findings in South Kalimantan were used to select one provincial level hospital and one district-level hospital with sufficient numbers of deliveries to serve as training sites. The findings also helped to determine that based on the training content needed and the number of deliveries available, the training would require 11 days per cycle with a class size of eight at the provincial hospital and four at the district-level hospital.

Step 3: Site Preparation

Upon completion of analysis of the TNA data and decisions about the structure of the training system, the site preparation can be done. This activity requires one week at each training site. It provides an opportunity to review the results of the TNA, to ensure everyone at the facility understands the training programme, and to finalise agreements about clinical protocols and procedures for use of the partograph (a labour management tool) and infection prevention. Trainers maybe selected during this week or later when the training centre is being established. However discussions must take place during the Site Preparation to ensure that administrators and potential trainers understand the time commitment required and release trainers from some of their previous responsibilities.

The Site Preparation also includes an equipment and supplies inventory, a review of hospital records, decisions about logistics, and discussions about the training centre administrative structure. Including all key departments during this process orients them to the programme and facilitates the establishment and running of the centre.

A key component of the Site Preparation is a 'Mini LSS' training (see Step 8 for details) for all the staff in the antenatal, labour and delivery, and postpartum wards of the hospital to ensure that the facility as a unit is using the same skills and techniques that will be taught to the LSS trainees. One potential major weakness of a training programme is the staff at the training facility practising differently from what training participants are taught. Through the 'mini-LSS' training consistency can be assured between the learning environments in the classroom and the hospital wards, and potential conflict between trainers and other hospital staff can be averted.

Step 4: Establishing a Training Facility

The process of establishing a training centre can take from 1 to 3 months. This time is critical to allow implementation of clinical procedures, protocols, and documentation procedures agreed upon during the site preparation. In addition, the selection of the trainers can be finalised, needed supplies and equipment ordered, systems to select and organise participants established, the training centre administrative structure and procedures finalised, and the physical space (for classroom, on-call sleeping area, etc.) prepared. The final selection of the trainers is critical to the success of the training; therefore, clear criteria must be used. The two most important criteria are that: (1) trainers must be clinically active (five to ten clinical experiences per week) and (2) the training team should be composed of a balance of staff from the antenatal, labour and delivery, and postpartum wards. Trainers should also have good communication skills, and ideally trainers should be the peers of the trainees, i.e., bidan should train bidan and bidan di desa.

Step 5: Training of Trainers (Clinical)

The Training of Trainers (TOT) for the clinical portion takes approximately two weeks and uses the same methods as trainers are expected to model when they themselves conduct training for *bidan* and *bidan di desa*. The TOT uses competency-based training, participatory learning methods, and adult learning principles. The transfer of this training approach is equally important to ensuring the quality of the training team and success of the training as the review of clinical content.

Competency-based training focuses on learning by doing and emphasises the most essential steps required to do a skill well. These steps are listed in a *skills checklist* which can then be used as a teaching and evaluation tool. The checklist is an easy way for trainers and participants to determine when a participant has reached competency, i.e., the participant can perform each step of a skill at 100%. Equally critical to learning is the inclusion of sufficient clinical practice. Thus, competency-based training must be flexible to allow each trainee access to as many clinical experiences as needed to become competent. There is no fixed number of experiences required per trainee, but the training and call schedules must be flexible. This allows each participant, depending on her starting point and rate at which she learns, as much practice as she needs.

In addition to a TOT, trainers must remain clinically active to maintain their *competence and confidence*. Confidence in this case implies that not only are they able to do a skill, but are also confident to teach it. This is usually accomplished by giving the trainers a 2-3 month 'internship' period after the clinical TOT to allow them time to practice what they have learned and gain confidence. In the South Kalimantan programme, due to time constraints this internship period was not possible. As a result, trainers expressed great concern about having to conduct training immediately and required extra support beyond the first class. Since the success of the training depends largely on the trainers, it is critical to give them support and sufficient time to absorb and integrate any new skills they have received.

If trainers are expected to train on different clinical content for different levels of providers, they should receive separate clinical TOTs for each curriculum. In South Kalimantan for example, the trainers were given separate TOTs for the LSS training of *bidan* and the modified LSS training for *bidan di desa*.

Step 6: Training of Trainers (Training Skills)

The TOT for training skills should be conducted after the internship period for trainers, once they are feeling confident in their clinical skills. This second training usually requires 1 week at the facility (or 3 weeks if training Master Trainers) and focuses on teaching approaches, with time given for practice and to provide extensive feedback. During this TOT, responsibilities for administrative and teaching tasks are also divided among the trainers. Trainers teach topics based on their area of expertise (antenatal, labour and delivery, or postpartum). Schedules are arranged so that two trainers per day teach while the remainder can continue with their clinical responsibilities. This puts less strain on the facility and is also important to maintaining the trainers' clinical acuity.

Step 7: Training of Bidan and Bidan di Desa

Once the trainers and the facility are ready, training can begin, with the training site staff (bidan) as the first group. Training all the bidan at the hospital strengthens the training site as a model facility and enables all the bidan on staff to be competent clinical instructors. The training schedule should be designed to be flexible to take advantage of clinical opportunities that may arise. Participants remain on call 24 hours a day for the same reason. The training course in South Kalimantan was two weeks long with a one week break for trainers between each cycle to allow time for routine clinical and administrative duties, evaluation of the training, and preparation for the next class. Trainers are given support through intensive monitoring of the first class and then sporadic monitoring and meetings every three months.

Step 8: 'Mini LSS'

As important as having consistency within the training facility is to the quality of training, it is equally critical to the quality of care to have consistency at all levels of service provision. The standardisation of protocols, documentation methods (e.g. partograph) and knowledge in critical areas provided to bidan and bidan di desa through the LSS training with that of providers at all referral sites is a critical step. Therefore, a two to three-day 'Mini LSS' workshop should be conducted for all providers not participating in the LSS training and who may receive referrals from bidan or bidan di desa. This orients them to the Training and Continuing Education System, develops their support for the programme, and ensures use of similar protocols and documentation.

In South Kalimantan, workshops were held with doctors and bidan from the district hospitals and from all the community health centres in the three project districts. These providers were given an overview of the LSS training with special emphasis on infant resuscitation, infection prevention, use of the partograph, and postpartum haemorrhage (added subsequently due to the importance of haemorrhage as a maternal health complication). The training was conducted by the LSS trainers with support from ObGyn consultants.

C. INTEGRATION OF IN-SERVICE TRAINING WITH PEER REVIEW/ CONTINUING EDUCATION

Since training providers without any follow-up has been shown repeatedly to have limited effect, the training for bidan and bidan di desa must be supported by an ongoing system for monitoring and continuing support. This integrated Training and Continuing Education System follows LSS training with a two-part process of *Peer Review* and *Continuing Education*. In South Kalimantan, the LSS training structure was developed by the provincial MOH. To reduce the burden on the MOH system, the system for Peer Review and Continuing Education was developed and is managed by Ikatan Bidan Indonesia (IBI), the national midwife professional organisation. This model of government-NGO partnership takes advantage of the fact that most government midwives in Indonesia are IBI members and maximises support to the bidan and bidan di desa.

Step 9: Peer Review

In the Peer Review system, all LSS-trained bidan serve as peer reviewers, visiting each other as well as bidan di desa twice a year. The Peer Review visits comprise a review of the provider's

clinical practice and documentation compared with the standards and protocols taught in the LSS training. Additional support and information is given to the bidan/bidan di desa as needed. The visit is guided by a Peer Review Visit Form as well as the peer review process taught during a 5-day workshop, which in South Kalimantan was conducted by the national level IBI team using the IBI Peer Review Manual. Peer Review is currently underway in the three project districts for all bidan and bidan di desa who have been trained. Information from the visit is also used to determine broader continuing education needs. The Peer Review Visit Form is summarised in a Recap Form for Bidan, and then compiled in a Recap Form at a regional level. In South Kalimantan, IBI at the district level uses the recap form to see how well skills are being integrated and whether documentation like the pantograph is being used. The information gathered at this level is discussed during district-level Peer Review Meetings every six months to identify areas of decreased knowledge and skills. The information is then used to strengthen the LSS training programme and to establish priorities for Continuing Education. The Peer Review meetings in South Kalimantan are attended by the district-level IBI leaders, the MOH Maternal Child Health Co-ordinator at the district level, the LSS trainers, and all peer reviewers to ensure that information is collected from and disseminated to all parts of the system.

Step 10: Continuing Education

The Continuing Education process is based on information from the Peer Review system and supports LSS areas of focus. Continuing Educators (five per district) selected from among the bidan trained in LSS and Peer Review, are trained in a 5-day workshop by the IBI National Continuing Education Training Team. They then become responsible for taking information from the Peer Review meetings and developing Continuing Education sessions addressing gaps in knowledge and skills. In South Kalimantan, this continuing education is offered at IBI Chapter meetings every three months. Since IBI membership includes both LSS-trained and untrained bidan and bidan di desa this is an opportunity to share knowledge about LSS to a wider audience. The continuing educators also attend district-level Maternal and Perinatal Audit (MPA) meetings organised by the MOH where cases of maternal and neonatal mortality are discussed and incorporate this information in developing Continuing Education materials.

This integrated training, peer review and continuing education system, supports adherence to standards, reinforces provider knowledge and skills, assures the safety of services given and helps to maintain and improve the competence of providers. Through such linkages in training and ongoing support systems, the quality of maternal health care can be assured. The sustainability of such intensive ongoing support depends on funding, which can be addressed through the establishment of a **Fundraising** system. In South Kalimantan, teams of five IBI members from each project district, selected from among the bidan trained in LSS, also received fundraising training from the IBI National Fundraising team approximately 6-9 months prior to the start of Peer Review activities. The fundraising team in each district first develops a plan that is approved by the provincial level. The district then receives start-up funds to generate additional revenues. The monies raised are used for transport costs for Peer Review and Continuing Education meetings, and for meeting supplies.

In South Kalimantan, it was found that the maintenance of this integrated training and continuing education system requires a full-time technical and administrative Training Co-ordinator.

D. PROGRAMME MONITORING EVALUATION

Though not specific to the Training and Continuing Education System, programme evaluation is also a critical component of this process. Using a variety of monitoring tools including hospital delivery registers, bidan di desa registers, data on maternal and perinatal mortality from the MPA, peer review recap forms, etc., information is gathered which helps to determine what has worked and what has not worked. The programme can be modified accordingly at all levels including the training itself, protocols, documentation systems, and the monitoring systems.

**ANNEX D: GENERAL TRAINING EQUIPMENT AND SUPPLIES PER TRAINING CENTRE IN 1998
PRICES (US\$)**

Category	Item	Quantity	Unit cost	
Video	Why did Mrs X die?	1	100.00	
	Alternate birthing positions	1		
Models	Pelvic model (delivery model)	1	49.95	
	Bony pelvis	1	49.00	
	Soft pelvis for above foetus	1	59.95	
	Placenta and membranes for above foetus	1	39.95	
	Episiotomy repair model	1	39.95	
	Infant resuscitation model	1	230.00	
	Air conditioners (to increase life of models)	2	1046.00	
	Equipment for practice episiotomy	Rolls/spools thread	4	
		Reusable round body ½ circle suture needles	48	3.91
Needle holders		4	20.75	
Tissue forceps without teeth		4	2.50	
Pair suture scissors		4	14.50	
Sponge (foam) cushion to practice episiotomy		1 per LSS participant	.35	
Laminated posters		Laminated poster: muscles of the pelvic floor	1	31.50
	Laminated poster: episiotomy repair	1	16.95	
	Laminated partograph and pens	1	2.75	
Cervical dilatation model		1	13.50	
Measuring device and tape for making height measures		1		
A/V equipment	Film projector		350.00	
	Video machine		250.00	
Each trainer to receive	Myles textbook for midwives (paperback)	1	12.00	
	LSS for midwives manual (10 modules in Indonesian)	1	13.00	

LSS equipment (kit) for each bidan and BDD trained: Bidan and BDD LSS training

Item	Quantity	Unit cost
Haemostats/artery forceps 7 inches	2	6.85
Cord/bandage scissors 6 inches	1	14.50
Pinard fetalscope	1	.75
Blood pressure machine	1	13.48
Stethoscope	1	2.65
Bulb or ear syringes, 2oz, rubber	2	.87
Urinary straight catheters, rubber, size 12	2	
Urine testing set (2 test tubes, 1 test tube holder, 1 local spirit burner, 1 dropper bottle with acetic acid)	1	2.00
Heavy cotton/canvas apron	1	4.35
Pair surgical latex gloves, reusable size 7	12	.17
Pair heavy rubber cleaning gloves	1	
Surgical lap sponges, reusable	6	.35
Disposable 2 cc syringes with 23 gauge needle 1 ½ inches	100	.12
Non-disposable 3 cc nylon or glass syringes	5	
Non-disposable 23 gauge needles 1 ½ inches long	12	3.91
Stainless steel container with lid, 12 inches x 12 inches, 4 inches deep to keep equipment	1	6.09

LSS equipment (kit) for each bidan and BDD trained: Bidan LSS training additional needs

Item	Quantity	Unit cost
Small vaginal speculum	1	7.50
Medium vaginal speculum	1	8.65
Episiotomy scissors, 6 inches, sharp/blunt	1	16.35
Needle holder, 7 inches	1	20.75
Tissue/dissecting forceps without teeth, 6 inches	1	2.50
Smooth sponge holding forceps, 10 inches	1	23.55
Infant airway	1	1.15
Packets absorbable suture without needle	20	
Round body, ½ circle non-disposable suture needles	6	3.91

ANNEX E: EXAMPLE OF THE COST OF A BIDAN TRAINING CYCLE AT ULIN IN 1998 PRICES (RUPIAH)

Item	Unit	Quantity	Unit cost	Total cost
Advisory Committee for LSS	person days	6	130,000	780,000
Trainers Honorarium	persons	7	400,000	2,800,000
Training Team Leaders Honorarium	person days	3	110,000	330,000
Participants				-
Lumpsum	person days	16	110,000	1,760,000
Transportation	persons	8	60,000	480,000
Supplies	persons	8	20,000	160,000
Implementation cost	person days	96	30,000	2,880,000
			TOTAL	9,190,000

ANNEX F: EFFECTIVENESS MEASURES USED IN OTHER STUDIES OF THE COST AND COST-EFFECTIVENESS OF SAFE MOTHERHOOD PROGRAMMES

Type of measure	Maine 1991	Attanayake <i>et al.</i> , 1993	Diop & Leighton 1995	Fox-Rushby & Foord, 1996	ADB report 1998	Weissman <i>et al.</i> , 1998
<i>PROCESS/OUTPUT MEASURES</i>						
Improved use of appropriate services for women and new-borns with complications			*			
Better decision-making capacity					*	
Better management (improvement in skills)			*			
Case treated		*				
Contraceptive users generated		*				
Higher quality services			*			
Improved access to care in non-pregnancy situations					*	
Improved access to emergency services					*	
Increase demand/utilisation of formal pre-natal, delivery care and neo natal care services			*			
Increase in knowledge of health risks			*			
More referrals / referral rate			*	*		
Number of mothers with adequate weight gain during pregnancy					*	
Number of village workers trained and provided education materials					*	
Number of field sites with adequate trained staff supply throughout the year					*	
Number of Hb tests				*		
Number of postpartum women who receive dose at the proper time					*	
Number of women delivering				*		
Number of women who used prescribed iron tablets during last pregnancy					*	
Number of ANC attendances				*		
Number of women trained			*			
Per birth						*

Per capita						*
Pregnant woman covered/served		*	*			*
<i>DISEASE SPECIFIC OUTCOME MEASURES</i>						
Disease averted: reduction in STDs/ RTI/HIV/AIDS, iodine deficiency, palpable goitre, fetal wastage and cretinism, vitamin A deficiency					*	
Increase in learning capacity					*	
Increase in mothers knowledge of maternal health issues			*			
Increase in quality of hospital services			*			
Increase in skills of BDD			*			
Increase in structural quality of maternal and neo-natal infrastructure			*			
Increase knowledge					*	
Mean week presentation for ANC				*		
More effective referrals (increase in referral of complicated deliveries)			*			
More effective referrals (increased referrals per ANC risk score)			*	*		
Reduction in the level of infection in pregnant women related to maternal and peri-natal health outcomes			*			
Reduction in incidence of low birth weight					*	
Reduction in the level of anaemia (increase in haemoglobin levels)			*	*	*	
Reduction in % anaemic infants					*	
Reduction incidence of anaemia					*	
Cause specific death rates		*				
Births prevented		*				
<i>NON-DISEASE SPECIFIC OUTCOME MEASURES</i>						
Increase in cognition in children					*	
Neo-natal death rate				*		
Newborn (perinatal) mortality			*			
Reduction in childhood mortality					*	
Still birth rate				*		
Maternal mortality			*	*		
Deaths prevented/averted	*	*	*	*	*	
Life years saved				*		
Discounted life years saved				*		
Disability adjusted life year (DALY)					*	

Improved health of children, new born, families and community as a whole'	*					
Improved health of women'	*		*			
Increase in labour force participation					*	
Increased earnings					*	
Increased productivity					*	
Reduction in family / community hardship					*	

ANNEX G: DESCRIPTION OF METHODS TO ESTIMATE EFFECTIVENESS MEASURES

1. Training Evaluation:

The training evaluation was designed to:

- Evaluate the ability of the LSS training to increase the knowledge, confidence, and skills of bidan and BDD to provide quality maternal and newborn care;
- Compare the ability of the internship programme and the MC programme (LSS & PR/CE) to increase the knowledge, confidence, and skills of BDD to provide quality maternal and newborn care.

To achieve these objectives, the evaluation compared groups of bidan and BDD with various levels of in-service education and support. Three groups of bidan were defined:

1. Trained bidan from MC districts who received Advanced LSS training and participate in IBI Peer Review and Continuing Education systems;
2. Clinical instructors bidan who serve as clinical instructors in the internship programme from non-MC districts (had Advanced LSS training, do not participate in IBI Peer Review and Continuing Education systems but received one additional week site prep);
3. Untrained bidan from non-MC districts who do not participate in any of the MC training or support programmes.

The three BDD groups were:

1. Trained BDD from MC districts who received Basic LSS training and participate in IBI Peer Review and Continuing Education systems;
2. Intern BDD who participated in internship programme from non-MC districts and do not participate in IBI Peer Review and Continuing Education systems;
3. Untrained BDD from non-MC districts who do not participate in any of the MC training or support programmes.

To evaluate the first objective, the ability of the LSS training to increase knowledge, confidence, and skills of bidan and BDD to provide quality maternal and newborn care, comparisons of scores and responses were made among four different pairs:

- Trained bidan and untrained bidan;
- Trained BDD and untrained BDD;
- Trained bidan and clinical instructor bidan;
- Clinical instructor bidan and untrained bidan.

To evaluate the second objective, to compare the ability of the internship programme and the MC programme (LSS & PR/CE) to increase knowledge, confidence, and skills of BDD to provide quality maternal and newborn care, comparisons of scores and responses were made among two different pairs of BDD:

- Trained BDD and intern BDD;
- Intern BDD and untrained BDD.

The untrained groups were included to represent the level of knowledge and skills of the trained, clinical instructors, interns providers before they participated in the MC programme.

Evaluation Sample

Target sample size was 30 providers for each of the groups. Only 24 clinical instructor bidan were trained so this was the maximum possible for this group. Thirty-four bidan and BDD who received LSS training were randomly selected from training participant lists and requested to participate in the evaluation. All 24 clinical instructor bidan were requested to participate in the evaluation. Thirty-four interns were also selected. Thirty-four bidan and BDD who had not received LSS training were selected from three non-MC districts (Tanah Laut, HST and Tapin). Letters to request their participation in the evaluation were sent to those selected from District MOH.

Evaluation Tools

Skills assessments for five skills were designed to assess the competency in application of selected key skills, using case scenario and models for demonstration of care provided in particular situations. Five key skills were chosen which were felt to be important to reduce maternal and perinatal mortality and were considered to have had a low level of competency before the training. The five skills were:

- Infection prevention (how to get equipment ready for next delivery);
- Use of partograph;
- Manual removal of placenta and;
- Bimanual compression for management of postpartum hemorrhage;
- Neonatal resuscitation.

Clinical and interpersonal skills were evaluated using skill checklists adapted from the HMHN or LSS manuals. The skills assessment took the longest, estimated at 1.75 hours per participant. Each action defined in the checklist for the skills of infection prevention, manual removal of placenta, bi-manual compression and neonatal resuscitation was worth a total of 2 points if the action was correctly applied, 1 point if the action was partially-correct or prompted, and 0 points for not applying or incorrectly applying the action.

The partograph case study included 10 observations that were plotted four times and, thus, were assessed four times on the skill checklist. This was taken into consideration when allocating points. Two points were given if the item was recorded correctly each time it was asked, 1 point if only some of the time, and 0 points if never recorded correctly. This resulted in 10 items worth 20 points and categorised as 'Completion'. In addition, a series of questions worth 17 points assessed the ability of the participant to interpret the observations on the partograph and to suggest management based on the interpretation. These questions were categorised as 'Interpretation & Management'.

Implementation

The evaluation was conducted at one central site in South Kalimantan over a nine-day period. Bidan were evaluated during the first 4 days and BDD in the last 4 days. On day 5, the participants were a mix of bidan and BDD. The participants were divided into two groups for the skill assessment and complication audit. One group completed the evaluation in morning and the

other group returned in the afternoon. Five stations were set up for each of the skills in the skill assessment. Performance at each station was evaluated by the same evaluator to facilitate internal consistency. The complication audit was administered at a sixth station as an interview by the sixth evaluator.

Seven bidan who were LSS trainers from Jakarta (IBI National and Midwifery Academy) were selected to serve as evaluators at the stations. This provided evaluators familiar with LSS but who were blinded to (i.e. did not know) the participants' training status. Two days were used to orientate the evaluators to the evaluation tools and process. Group meetings were held with the evaluators after each day of evaluation to discuss issues that arose.

Each participant was provided with a unique identifier consisting of an alphabetic letter (A-I) for each day and a number 1-24. This unique number was used to identify participants' responses throughout the evaluation.

Analysis

Data collected in skill assessments were entered each day. Double-entry was used to screen for data entry errors. These data were analysed in EPI-INFO Version 6 by Jeanne McDermott.

Mean scores were calculated for clinical skill assessment (absolute and percentage). Overall score for the clinical skill assessment was obtained by averaging the percent mean score for each of the five skills, hence giving each skill equal weight in the overall score. Because the mean scores were not necessarily normally distributed, non-parametric statistics (Kruskal-Wallis test) were used to determine p values. Statistical significance was set at $p < 0.05$.

We also chose 70% as the 'passing' score for the knowledge test and the skill assessments. We calculate the percentage of providers who had achieved a score of at least 70% to identify differences between the various in-service education options. Statistical significance was set a $P < 0.05$.

2. BDD survey

The original Bidan di Desa (village-based midwife) Profile Survey was designed in early 1997 with the general intent of getting a comprehensive 'portrait' of all the BDD working in the three MC districts of South Kalimantan (Banjar, Barito Kuala and Hulu Sungai Selatan districts). Information was collected on socio-demographic characteristics, education and employment histories, and current profile of services they provide. The survey was conducted during interpersonal communication and counselling (IPCC) training in April-May 1997. All of the BDD in the three MC districts were intended to attend this training, so the expectations was that most of the BDD could be covered at this time. MC staff from South Kalimantan administered the survey and were responsible for quality control on site. Questionnaires were returned to individual BDD who had left pieces incomplete or whose data was inconsistent. A total of nine bidan di desa were unable to attend the IPCC training and the MC staff administered the survey separately to these nine women. Thus, the vast majority of the bidan di desa completed the questionnaire in staggered groups over a one month interval while nine bidan di desa completed

the questionnaire some two months later than the rest (July 1997). One BDD could not be located, and is assumed to be inactive.

The survey was repeated in March 1999 to document turnover among BDD, to measure change in BDD district coverage and services over time.

Information (all self-reported) from these profile surveys should provide:

- List of all BDD in MC districts as of May 1997 and as of March 1999;
- Socio-demographic profile;
- Place of work (district and village);
- Employee type (government or contract);
- Length of employment;
- Expected employment in the district;
- Pre-service and in-service training;
- Volume of clients and place of service BDD currently provides (antenatal care, intrapartum care, postnatal care);
- List of any pregnancy, intrapartum, postpartum or neonatal complications they have seen/managed.

The results from these surveys are used to:

- Provide a list of BDD in each of the districts;
- Provide a profile of the characteristics of the BDD (mean age; proportion married; proportion childless; fluency in local language; educational preparation for midwifery; distribution and mean number of deliveries attended in last 3 months; distribution and mean number of postpartum visits, types of complications they have encountered);
- Determine coverage of MC Life Saving Skills (LSS) training of BDD;
- Estimate the amount and coverage of services provided by BDD.