

6.6 PILOT STUDY ON REFERRAL SYSTEM

The National Health Plan for 1999 – 2004 recognises that one of the major problems related to health services delivery in Malawi is limited access to quality and effective health care. In this pilot study, we looked at issues related to physical access and the referral system by applying various research methodologies. The issues explored here include:

- 1) Occurrence of Emergency cases and Availability of Ambulances in Remote Areas
- 2) Use of Health Facilities for Delivery – Review of Birth Register at Health Facilities
- 3) Facility Based Maternal Mortality Rate
- 4) Relationship between Euclidean Measurement of Distance and Actual Travel Time to Health Facility
- 5) Physical Access to Health Facility – District-wise Assessment
- 6) Improvement of Physical Access to Health Services – Optimising Locations for New Health Facilities
- 7) Catchment Area Assessment – Mzimba District Hospital for Maternal Patients
- 8) Role of Ambulances in the Referral System

These findings were reflected in the Master Plans and prioritised projects.

6.6.1 Occurrence of Emergency Cases and Availability of Ambulances in Remote Areas

1) Introduction

Proper handling of obstetrical emergencies is apparently crucial to reduce Malawi's Maternal Mortality Rate. Currently, treatment for emergency cases is provided exclusively at district hospitals, so therefore these cases should be transferred in a timely manner from peripheral health facilities or communities to hospitals. In this survey the team searched for any kind of emergency cases in the past three months including obstetrical emergencies, cerebral malaria, and trauma, and then detailed their occurrence, availability of ambulance and outcome.

2) Methodology

Type used: descriptive research on emergency cases in the past three months

Period 1: from August 3 (Tue.) to August 7 (Sat.)

Target area: Mzimba District (southern part)

Period 2: from August 9 (Mon.) to August 14 (Sat.)

Target area: Dedza District (excluding eastern part)

Survey team: two male health workers and two female midwives (Malawians)
one male medical doctor (Japanese): the leader

Survey team was divided into two subgroups. The research was conducted as follows:

- A) Each subgroup visited a health centre and asked a health worker if there was any sick patient who needed emergency referral for advanced life support procedure in the area.

- If the answer was "No", the survey team moved to the next health centre.
- If the answer was "Yes", they asked further details about the case, such as:
 - name of village the patient came from
 - diagnosis or signs of illness
 - method of communication from the community to the HC and from HC to hospital
 - method of transportation to and from the HC
 - approximate time (hours) required for the transportation
 - outcome of the illness(see attached questionnaire 1)

B) Then they visited the patient or his/her family in order to ask them the same questions directly (see attached questionnaire 2):

- diagnosis or signs of illness
- method of communication from the community to the HC and from HC to hospital
- method of transportation to and from the HC
- approximate time (hours) required for the transportation
- outcome of the illness

C) Admission logbooks at the wards of district hospitals were reviewed to ascertain the diagnosis, treatment and outcome of the referred patients.

D) Team leader reviewed the sets of questionnaires completed by the survey groups. Cases were included in the study when at least two different questionnaires were completed. The data were then analysed on a computer using "Excel" software.

3) Results

3-a) MZIMBA STUDY

In the central and southern parts of Mzimba District the study team primarily visited MOHP health centres as entry points. A total of 40 cases which were either actually referred or died before referral were found. Out of the forty, 23 were OPD patients including children, and 17 were maternal cases including twin newborns who were counted as one case.

Transportation to the nearby health centre: Half of the cases who needed to be referred walked to a health centre. Nearly two out of three pregnant women came by walking. Ox carts were the second most common means of transportation to a health centre for both OPD and maternal patients (Table 6.7).

Table 6.7 Transportation to a HC (Mzimba)

	OPD	Maternal	Total	
Walking	9	11	20	50.0%
Ox cart	7	4	11	27.5%
Bicycle	6	0	6	15.0%
Car	0	1	1	2.5%
Other	1	1	2	5.0%
Total	23	17	40	

Calls for an ambulance: An ambulance was requested for 27 (16 OPD and 11 maternal) cases out of 40 (67.5%). The means of communication used to request an ambulance were as follows. For 16 cases, a telecommunication system was used: radio (13 cases, 48.1%), telephone (3 cases, 11.1%). For 10 cases, messengers were sent by the following means to request an ambulance: *matola* (six cases, 22.2%), car (one case, 3.7%), bicycle (two cases, 7.4%), and walking (one case, 3.7%)(Table 6.8).

Table 6.8 Means of Communication/Transportation Used to Request an Ambulance

Means	Cases	
Radio	13	48.1%
Telephone	3	11.1%
Car	1	3.7%
<i>Matola</i>	6	22.2%
Bicycle	2	7.4%
Walking	1	3.7%
D.N.K.	1	3.7%
TOTAL	27	100.0%

Transportation for the referral: Concerning the 27 cases for which a DHO ambulance was called, the means of transportation actually used were as follows: DHO ambulance was used for 14 cases in response to the request and a circulating ambulance brought an additional three cases. A total of seven cases used *matola* and another case took a bus. One patient took a hired car, one was carried on a pushbike and another walked to the hospital. Seven cases did not go to a hospital. (Table 6.9)

Table 6.9 Means of Transportation from HC to Referral Hospital

	General	Maternity	TOTAL
DHO ambulance	7	7	14
Circulating ambulance	1	2	3
HC ambulance	0	0	0
Matola	4	3	7
Own car	0	0	0
Hired car	1	0	1
Bus	2	0	2
Bicycle	1	0	1
Walking	1	0	1
JICA Study Team	1	1	2
Other means	1	1	2
Did not go	4	3	7
Total	23	17	40

Lag time from visiting HC to decision-making on referral and outcome: Of the 40 referred cases, the decision for referral was made by health personnel within one hour of arrival for nine patients (22.5%). An additional 20 patients (50%) were referred within three hours, but four of them died. In two cases (5%) the referral was delayed for 3-6 hours and for another two cases (5%) 6-12 hours. Five patients (12.5%) had to wait for more than one day before the decision to refer was made (Table 6.10).

Concerning the 27 cases for which a DHO ambulance was called, six patients (22.2%) were referred by health personnel within one hour of arrival, but two of them died. An additional 15 patients (55.6%) were referred within three hours, but three of them died. One case (3.7%) waited for 3-6 hours and other two (7.4%) waited for 6-12 hours before the decision was made. Two patients (7.4%) had to wait for more than one day before the decision to refer was made (Table 6.10).

Table 6.10 Lag Time from Visiting HC to Decision-making on Referral and Outcome

Lag time (less than)	Ambulance called		Ambulance not called		TOTAL	
	Cases	Mortality	Cases	Mortality	Cases	Mortality
1hr	6	(2)	3		9	(2)
3hrs	15	(3)	5	(1)	20	(4)
6hrs	1	(1)	1		2	(1)
12hrs	2		0		2	
24hrs	0		0		0	
3days	1		3		4	
1week	1		0		1	
?	1		1		2	
Total	27	(6)	13	(1)	40	(7)

Lag time from decision-making on referral to requesting an ambulance and outcome: Concerning the 27 cases for which a DHO ambulance was called, an ambulance was requested immediately once the decision was made on 13 patients (48.1%) and within one hour for 11 patients (40.7%). The request was delayed for 3-6 hours after decision-making on two cases and other two waited for 12-24 hours (Table 6.11).

Table 6.11 Lag Time from Decision-making to Requesting an Ambulance and Outcome

Lag time (less than)	Ambulance called	
	Cases	Mortality
Immediately	13	(3)
1hr	11	(1)
3hrs	0	
6hrs	2	(1)
12hrs	0	
24hrs	1	
3days	0	
Total	27	(5)

Lag time from requesting an ambulance to leaving the HC and outcome: Concerning the 27 cases for which a DHO ambulance was called, none left the HC within one hour. Only three patients left within three hours after the request. Most commonly, patients had to wait for 3-6 hours before they left the HC (eight cases, 29.6%), and one of them died while waiting for an ambulance. Five patients (18.5%) waited for 6-12 hours, and one died. Three patients (11.1%) waited for 12-24 hours, and two died. Two patients (18.5%) waited for 1-3 days. Five patients (18.5%) waited for 4-7 days, and one died (Table 6.12).

Table 6.12 Lag Time from Requesting an Ambulance to Leaving the HC and Outcome

Lag time (less than)	Ambulance called	
	Cases	Mortality
Immediately	0	
1hr	0	
3hrs	3	
6hrs	8	(1)
12hrs	5	(1)
24hrs	3	(2)
3days	2	
1week	5	(1)
1month	1	
Total	27	(5)

Total lag time from decision-making to actual departure from HC and outcome: Concerning the 27 cases for which DHO ambulance was called, none were transferred within one hour of the visit, and only two departed within 3 hours. Six patients were transferred within 6 hours, but one died. Another six patients left within 12 hours, but one died. Five patients left within 24 hours, but two died. A total of 7 patients (25.9%) had to wait for more than one day, and one of the seven died (Table 6.13).

Concerning the 13 cases for which a DHO ambulance was not called, one patient each left the HC within one, three and six hours respectively from the visit (7.7% each). Two patients (15.4%) left within 24 hours, and six patients (46.2%) had to wait for more than one day (2 patients waited for 1-3 days, 2 patients waited for 4-7 days, and 2 patients waited for more than 1 week), but none of them died.

Table 6.13 Total Lag Time from Decision-making to Actual Departure from HC and Outcome

Lag time (less than)	Ambulance called		Ambulance not called		TOTAL	
	No. cases	Mortality	No. cases	Mortality	No. cases	Mortality
1hr	0		1		1	
3hrs	2		1		3	
6hrs	6	(1)	1		7	(1)
12hrs	6	(1)	0		6	(1)
24hrs	5	(2)	2		7	(2)
3days	1		2		3	
1week	5	(1)	2		7	(1)
1month	1		2		3	
?	1		2		3	
Total	27	(5)	13	(0)	40	(5)

Diagnosis and outcome of studied cases:

Table 6.14 Diagnosis and Outcome

General	Ambulance called	
	Yes	No
Anaemia	*	
ARI	*oo	
Fracture	oo	
Hypertension	o	
(C.) Malaria	**	*
Meningitis	o	
TB	o	o
Trauma	o	oo
Others	*ooo	ooo
TOTAL	16(5)	7(1)

"o" means a survived case, "*" means a mortality case

Maternity	Ambulance called	
	Yes	No
Abn. presentation	o	
Eclampsia		
Haemorrhage		
Obstructed labour	ooo	o
Previous C/S	o	
Primipara		ooo
Rupture of uterine		
ROM		o
PPH		
Twin	o	
Others	*oooo	o
TOTAL	11(1)	6

3-b) DEDZA STUDY

In Dedza District the team visited both MOHP and CHAM facilities. A total of 44 cases were found, of which 23 were OPD patients including children and 21 were maternal cases.

Transportation to the nearby health centre: More than half of the patients who needed to be referred walked to a health centre. Nearly three out of four pregnant women came by walking. Ox carts were the second most common means of transportation to a health centre (Table 6.15).

Table 6.15 Transportation to a HC (Dedza)

	OPD	Maternal	Total	
Walking	9	15	24	54.5%
Ox cart	7	5	12	27.3%
Bicycle	3	0	3	6.8%
Car	2	1	3	6.8%
Other	2	0	2	4.5%
Total	23	21	44	

Calls for an ambulance: An ambulance was requested for only 12 (6 OPD and 6 maternal) cases out of 44 (27.3%). The means of communication used to request an ambulance were as follows. For seven cases, a radio was used (58.3%) and for 5 cases, a messenger was sent by bicycle to request (41.7%) (Table 6.16).

Table 6.16 Means of Communication/Transportation Used to Request an Ambulance

Means	Cases	
Radio	7	58.3%
Telephone	0	0.0%
Car	0	0.0%
<i>Matola</i>	0	0.0%
Bicycle	5	41.7%
Walking	0	0.0%
D.N.K.	0	0.0%
TOTAL	12	100.0%

Transportation for the referral: The means of transportation actually used for the referral from HCs to hospitals were as follows. The most common means was an ambulance owned by a CHAM HC (12 cases). A DHO ambulance was used for 5 cases in response to the request, and a circulating ambulance brought an additional 3 cases. As many as 10 patients hired a car. One case used *matola* and another case took a bus. One patient was carried on a pushbike and another walked to a hospital. Four cases did not go to a hospital (Table 6.17).

Concerning the 12 cases for which a DHO ambulance was called, the means of transportation actually used were as follows. A DHO ambulance was used for 5 cases in response to the request, and a circulating ambulance brought an additional 3 cases.

Table 6.17 Means of Transportation from HC to Referral Hospital

	General	Maternity	TOTAL
DHO ambulance	2	3	5
Circulating ambulance	0	3	3
HC ambulance	8	4	12
Matola	2	0	2
Own car	1	0	1
Hired car	3	7	10
Bus	0	1	1
Bicycle	1	0	1
Walking	1	0	1
JICA Study Team	1	0	1
Other means	2	1	3
Did not go	2	2	4
Total	23	21	44

Lag time from visiting HC to decision-making on referral and outcome: Ten patients (22.7%) were referred by the health personnel within one hour from the visit, but three died. An additional 15 patients (34.1%) were referred within three hours, but two died. Four cases waited for 3-6 hours, two of which died, and another one waited for 6-12 hours before decision of referral was made. Three cases waited for 12-24 hours, and one died. Ten patients (22.7%) had to wait for more than one day before the decision was made (Table 6.18).

Concerning the 12 cases for which a DHO ambulance was called, two patients (16.7%) were referred within one hour from the visit, but one died. An additional nine patients (75.0%) were referred within three hours, but one died. Another case waited for 3-6 hours and died (Table 6.18).

Table 6.18 Lag Time from Visiting HC to Decision-making on Referral and Outcome

Lag time (less than)	Ambulance called		Ambulance not called		TOTAL	
	Cases	Mortality	Cases	Mortality	Cases	Mortality
1hr	2	(1)	8	(2)	10	(3)
3hrs	9	(1)	6	(1)	15	(2)
6hrs	1	(1)	3	(1)	4	(2)
12hrs	0		1		1	
24hrs	0		3	(1)	3	(1)
3days	0		6	(2)	6	(2)
1week	0		4	(1)	4	(1)
?	0		1		1	
Total	12	(3)	32	(8)	44	(11)

Lag time from decision-making on referral to requesting an ambulance and outcome: Concerning the 12 cases for which a DHO ambulance was called, an ambulance was requested immediately and within one hour after the decision for 9 (75.0%) and one patient (8.3%), respectively. The request was delayed 3-6 hours after decision-making for one case and another waited for 1-3 days (Table 6.19).

Table 6.19 Lag Time from Decision-making to Requesting an Ambulance and Outcome

Lag time (less than)	Ambulance called	
	Cases	Mortality
Immediately	9	(3)
1hr	1	
3hrs	1	
6hrs	0	
12hrs	0	
24hrs	0	
3days	1	
Total	12	(3)

Lag time from requesting an ambulance to leaving the HC and outcome: Concerning the 12 cases for which a DHO ambulance was called, none left the HC within one hour. Only one patient (8.3%) left within three hours after the request. Most commonly, patients had to wait for 3-6 hours before they left (four cases, 33.3%), and two of them died while waiting for an ambulance. Two patients (16.7%) waited for 6-12 hours, and one died. One patient (8.3%) waited for 12-24 hours, two (16.7%) waited for 1-3 days, and another one (8.3%) waited for 4-7 days (Table 6.20).

Table 6.20 Lag Time from Requesting an Ambulance to Leaving the HC and Outcome

Lag time (less than)	Ambulance called	
	Cases	Mortality
Immediately	0	
1hr	0	
3hrs	1	
6hrs	4	(2)
12hrs	2	(1)
24hrs	1	
3days	2	
1week	1	
1month	0	
?	1	
Total	12	(3)

Total lag time from decision-making to actual departure from HC and outcome: Concerning the 12 cases for which a DHO ambulance was called, none left within one hour

from the visit, and only two (16.7%) left within 3 hours and survived. Four patients (33.3%) left within 6 hours, but two died. Two patients were transferred within 12 hours, but one died. One patient left within 24 hours, and three patients (25.0%) had to wait for more than one day, but none of those four died (Table 6.21).

Concerning the 32 cases for which a DHO ambulance was not called, patients most commonly left the HC or died within one hour from the visit (12 cases, 37.5%). Six cases (18.8%) left within 3 hours and all but one survived. Similarly, five patients (15.6%) were transferred within 6 hours, and none died. Four patients left within 24 hours, and only two patients (6.3%) had to wait for more than one day, but none of them died (Table 6.21).

Table 6.21 Total Lag Time from Decision-making to Actual Departure from HC and Outcome

Lag time (less than)	Ambulance called		Ambulance not called		TOTAL	
	Cases	Mortality	Cases	Mortality	Cases	Mortality
1hr	0		12	(5)	12	(5)
3hrs	2		6	(1)	8	(1)
6hrs	4	(2)	5	(1)	9	(3)
12hrs	2	(1)	0		2	(1)
24hrs	1		4		5	
3days	1		1		2	
1week	2		1		3	
1month	0		0		0	
?	0		3	(1)	3	(1)
Total	12	(3)	32	(8)	44	(11)

Diagnosis and outcome of studied cases:

Table 6.22 Diagnosis and Outcome

OPD	Ambulance called		Maternity	Ambulance called	
	Yes	No		Yes	No
Anaemia	o	*o	Abn. presentation	o	o
ARI	*o	*oo	Eclampsia		o
Fracture		o	Haemorrhage	o	
Hypertension		o	Obstructed labour		oooo
(C.) Malaria	**o	***	Previous C/S		o
Meningitis		oo	Primipara		o
TB	o		Rupture of uterine	o	**
Trauma	o	o	ROM		o
Others		oooo	PPH		*
			Twin	o	o
			Others	oo	oo
TOTAL	6(3)	17(5)	TOTAL	6(0)	15(3)

"o" means a survived case, "***" means a mortality case

4) Discussion

The study team observed that the role of public ambulances is somehow different in the two study districts. In Mzimba, they are more commonly requested but patients tend to wait longer for their arrival; however, in Dedza more patients leave HC sooner by some other mode of transportation. The sampling method adopted in this study exaggerated these tendencies because the referral pattern is much different between patients who visit a MOHP HC first and those who select a CHAM facility.

MOHP HCs refer patients principally to district hospitals. The decision to refer is usually made within three hours and predominantly an ambulance is called from the DHO by some means of communication. Patients wait for hours or, sometimes, days until an ambulance comes or alternative transport such as *matola*, bus or hired car is sought. The majority of mortality cases pass away while they wait for an ambulance. In Mzimba, HCs located far from the town are equipped with either a radio communication system or a telephone. Their effect is very limited chiefly because the ambulance covers those remote areas less frequently. HCs, which are not so far from the hospital, do not have any telecommunications system, and, therefore, someone must go to the hospital to ask for an ambulance directly. Despite this fact, the waiting time until the ambulance arrives is generally not as long as the cases in the remote area.

Patients who select a CHAM HC for the first contact show a different behaviour pattern. CHAM HCs refer the patients to a nearby hospital owned by either CHAM or MOHP. The decision for referral is promptly made and patients are recommended to use HC's own vehicle as long as it is available. Patients are usually charged several hundred MK, but most patients can pay it and get to the hospital without delay. If it is not available, patients tend to leave the HC by some other mode of transportation, for example, a hired car. According to the results, there is a big difference in lag time from decision-making to leaving the HC between the patients who request a free ambulance from DHO's and those who can pay for the transportation like visitors to CHAM's facilities.

6.6.2 Use of Health Facilities for Delivery – Review of Birth Registers at Health Facilities

As discussed elsewhere in this report, the household survey found that a fairly large percentage of deliveries were conducted at health facilities. In the Northern Region, about 74 percent of respondents said that their last deliveries were attended at health facilities, while 67 percent in the Southern region said the same.

In this study, a survey team visited all MOHP and CHAM health centres in Mzimba and Dedza Districts and reviewed birth registers. The information collected included the number of initial and subsequent ANC visits and the number of deliveries and maternal deaths, still births, and neonatal deaths. Data were collected for 1st January 1998 to 31st December 1998.

In Mzimba District, there were 15,003 deliveries attended at health facilities. According to the 1998 census, the population of the district was 610,058. Using the crude birth rate (CBR) of 1992, the estimated number of deliveries in 1998 was 28,551, therefore the proportion of deliveries attended at health facilities was 53 percent. Since the 1992 CBR is expected to be higher than that of 1998, this proportion could be underestimating the actual proportion of facility deliveries. Based on 1998 census preliminary results, the number of deliveries in Mzimba District can be estimated between 21,000 and 25,000. When 23,000 is used, the proportion is 66 percent.

In Dedza District, the number of facility deliveries recorded is 8,642. The 1998 population of the district was 483,136. Based on 1992 CBR, the estimated number of deliveries in the district is 22,611. Therefore the proportion of facility delivery is estimated to be 39 percent.

An accurate comparison of data between household survey and this study will be possible once a more updated CBR is announced for each district.

6.6.3 Facility Based Maternal Mortality Rate

In Mzimba District, 65 maternal death cases were found. The facility based maternal mortality rate is 434 per 100,000 live births in 1998. There is a high possibility that the actual MMR is higher than this estimate; some patients with severe complications were transferred to the Bottom hospital in Lilongwe and their deaths are not included in this calculation. In addition, those patients who passed away on the way to a health facility were not included.

Of 65 maternal deaths, 25 cases were found at the District Hospital. Three CHAM hospitals (Embangweni, Ekwendeni, and St. John's) had 33 case reports in 1998. Combined, these four hospitals account for 90 percent of maternal deaths in the district, indicating that most of the very severe maternal cases were likely to be transferred to hospitals from primary level facilities or villages.

There were 35 maternal deaths recorded at health facilities in Dedza District in 1998. The MMR is estimated to be 405 per 100,000 live births. A large proportion of health centres reported that they referred patients to Nkhoma hospital in Lilongwe district, which is not included in this analysis, therefore, it is likely that this figure is underestimating the actual situation.

6.6.4 Relationship between Euclidean Measurement of Distance and Actual Travel Time to Health Facility

According to various surveys and research conducted under the PHC Study, one of the major factors determining usage of a health facility is physical access. MOHP uses Euclidean distances⁵ as the measurement of physical access. However, as demonstrated in the Study conducted in Salima District, physical access determined by Euclidean distance tends to overestimate actual physical access.

In this pilot study, attempts were made to identify the relationship between Euclidean distance and actual travel time. Since the most frequently used mode of transportation between villages and health centres is walking, travel time by walking was used as the measurement of access in this study.

Six health centres were randomly selected. HSAs or HAs from these health centres were recruited for the fieldwork. They were healthy males between 30 and 45 years old. Five locations were pre-selected for each health centre and their geographical co-ordinates were measured with Global Positioning System. HSAs and HAs walked from these points to the designated health centres and travel time was measured by the Study team. The results are presented in Table 6.23.

Euclidean distances between starting points and health centres were calculated by using GIS software, ArcView version 3.1. The relationship between distance and travel time is shown in Fig. 6.2. The line indicates the most fitted curve illustrating the relationship between distance and travel time.

The study indicates that five and eight kilometers used by the MOHP to measure physical access to health facilities are equivalent to 70 minutes and 115 minutes of walking time, respectively.

6.6.5 Physical Access to Health Facility – District-wise Assessment

Using the above findings, physical access to health facilities per capita was calculated for each district by using the following methodology:

⁵ Euclidean distance is same as distance between two points measured by a straight line.

- 1) Using ArcView, the centroid of each census enumeration area for 1987 was identified.
- 2) For each centroid, 1998 population was calculated based on 1987 census population and TA wise intercensal population growth rates between 1987 and 1998.
- 3) The closest health facility was found for each centroid and Euclidean distance was calculated between centroid and the closest health facility.
- 4) For each centroid, a product of the distance and the 1998 population was calculated.
- 5) For each district, sum of the products of the step 4) was calculated, then the sum was divided by the population of the district. This calculation gave an average distance between an individual and his/her closest health facility for each district.
- 6) Using Fig. 6.2, travel time was estimated for each district.

In addition to the travel distance per capita, the percentage of populations located more than five and eight kilometers from the closest health facility were calculated by using ArcView. The results of the above calculation are presented in Table 6.24.

As shown in Fig. 6.3 and 6.4, physical access varies significantly from district to district. Average travel time ranges from 50 minutes to over 120 minutes. In Districts like Chiradzulu, Zomba, Blantyre, and Thyolo, less than five percent of the population live more than eight kilometres from the closest health facility, whereas in Kasungu and Chitipa, about 50 percent are more than eight kilometres.

Although districts in the Southern Region had been believed to have better access, the results of this analysis demonstrates otherwise. Districts such as Mangochi, Mwanza, Machinga and Chikwawa were found to be worse than the national average. On the other hand, Nkhata Bay and Karonga Districts in the north were found to have better access. These counter-intuitive results were caused by differences in population distribution patterns. Districts with an even population distribution tend to have a relatively higher percentage of population in areas far away from health facilities, whereas districts with population concentration in a few townships have few people in areas without access. A good example is Nkhata Bay where most of the population is concentrated along the lakeshore; thus the travel distance is shorter than the national average.

In both measurements of physical access, Kasungu District is the worst in the country. This is partially due to the existence of large estates in the district. As shown in Fig. 6.5, the centre of the district has no health facility despite the relatively high population density. Recently, an NGO has started providing health care to the population in the estate with support from estate companies and USAID.

6.6.6 Improvement of Physical Access to Health Services – Optimising Locations for New Health Facilities

According to MOHP, primary health centres should cater for a catchment population of 10,000. In order to fulfill this condition, MOHP is required to construct at least 470 new health centres based on population data of the 1998 census. On the other hand, MOHP

uses 8 kilometres as access distance to primary health services. In order to cover the entire population within 8 kilometres and at least 80 percent within 5 kilometres, MOHP will need to build an additional 283 health centres. This calculation excludes Lilongwe, Nkhhotakota, and Mangochi districts due to non-availability of data, therefore the total requirement is actually higher.

The distribution of existing health facilities and suggested locations of 283 health facilities are presented in Fig. 6.6. Blue points indicate existing health facilities operated by MOHP, other Ministries, or CHAM and red points indicate suggested locations of additional facilities. The additional facilities were located in order to minimise the number of additional facilities based on geographical distribution of population and locations of existing health facilities.

The northern part of the country requires a greater number of additional facilities than the southern or central parts. The assigned catchment population per health facility is smaller in the north than that of the south. This indicates that in the south, rather than constructing new health centres, increasing the capacity of already existing health centres will be more cost effective to improve access to health services. In the meantime, increasing the number of health centres, though the capacity of individual facilities might be limited, is more crucial in improving the situation of the north. Although the minimum level of services at each health centre needs to be maintained, MOHP should allow districts to determine the capacity of health centres according to the situation of the district.

6.6.7 Catchment Area Assessment – Mzimba District Hospital for Maternal Patients

As discussed, four hospitals function as providers of secondary maternal care in Mzimba district. The major care provider is the District Hospital, which takes care of 10 percent of deliveries in the district. MOHP normally sets the catchment area of a district hospital as the entire district, however, in reality, it is limited to nearby areas. In addition to the geographical proximity, other factors influence catchment area of the hospital. One such factor is user charges. Unlike the other three hospitals, which are operated by CHAM, the district hospital is operated by MOHP and does not charge fees to its patients. The others belong to CHAM and charge a small fee for their services. Therefore, some patients might travel longer distances to the district hospital to obtain free health care.

In this assessment, census enumeration areas (1998 census) of all maternal patients who delivered at the district hospital between April 1999 and August 1999 were recorded. There were 633 deliveries recorded during this period. The data were analysed by using ArcView. Fig. 6.7 presents the distribution of maternal cases.

When classified by the distance from the hospital, 33 percent of the maternal cases came from less than 5 kilometres and 53 percent came from less than 10 kilometres (Fig. 6.8). This indicates that the primary catchment area of the district hospital is within a 10-kilometre radius. Fig. 6.8 also indicates that most patients are from the middle part of the district.

Patients from the northern part are likely to go to hospitals near Mzuzu and patients from the southern part would likely to go to hospitals in neighboring districts.

As shown in Fig. 6.9, more maternal patients came from areas near health centres than areas that are not neighbouring to health centres. According to the household survey, usage of health facilities is higher among women who live close (less than 2 kilometres) to health facilities. Therefore, if the proportion of maternal cases requiring referral is uniform throughout the district, the chances of referral of women who live close to health centres or hospitals are higher than that of women from remote areas.

6.6.8 Role of Ambulances in the Referral System

In order to determine the demand for ambulances in the referral system, all ambulance requests at Mzimba District Hospital were recorded from 9 August 1999 to 15 September 1999. There were 68 requests recorded. Of these 68 requests, 50 percent were maternal cases. Ambulance dispatches were recorded for a shorter period of time due to the sudden illness of the transportation officer. However, during the period that both requests and dispatches were recorded, only 17 out of 46 requests resulted in the actual dispatch of an ambulance.

The limited availability of ambulances at the district level is one of the reasons that the needs for an ambulance are not met. In Mzimba District, with a population of more than 600,000, only three ambulances were on the road for MOHP health facilities. Preliminary analysis of ambulance movement in Mzimba and Dedza Districts revealed that ambulances are usually dispatched once a day for patient transfer. Since there are about two to three requests per day, only half to a third of ambulance demands are met at the district level.

Table 6.23 Travel Time by Health Centre

H.C.	S	E	Starting Point	S	E	TIME
Sante	013.28.07	033.22.40	Mboola	013.27.23	033.24.23	00:21:00
			Chigodi	013.29.04	033.24.01	00:29:00
			Thasa	013.25.21	033.24.42	01:24:00
			Mangulu	013.26.20	033.21.09	01:27:00
			Chipisa	013.25.40	033.22.06	01:13:00
Mtunthama	013.01.55	033.41.09	Mphonongo	013.02.52	033.41.19	00:31:00
			Estate 22	013.01.24	033.42.15	00:37:00
			Estate 24	013.00.44	033.43.35	01:08:00
			Chanjowa	013.03.25	033.38.30	01:17:00
			Mtunthama school	013.01.46	033.38.18	01:10:00
Kazyozyo	013.34.26	032.51.48	Katoto	013.33.24	032.51.46	00:27:00
			Anon	013.35.39	032.52.23	00:34:00
			Guzani	013.34.20	032.54.31	01:16:00
			Thandiwe	013.36.00	032.56.08	01:57:00
			Zikantima	013.32.03	032.52.08	01:00:00
Mikundi	013.42.23	033.08.20	Goseni	013.42.43	033.07.09	00:32:00
			Pungula	013.43.15	033.09.10	00:29:00
			Mikuwa	013.39.39	033.08.35	01:03:00
			Chidangwe	013.40.49	033.05.57	01:12:00
			Lezani (Map)	013.44.47	033.06.47	00:56:00
Khombedza	013.35.40	034.18.40	Mtanda	013.34.45	034.19.56	00:36:00
			Kasonda	013.35.50	034.17.32	00:28:00
			Matika	013.37.07	034.21.08	01:45:00
			Lumwira	013.38.27	034.17.40	01:06:00
			Manyika	013.34.20	034.21.14	01:10:00
Chipoka	013.59.13	034.30.35	Chikoko	013.58.16	034.30.41	00:27:00
			Mikuju	013.00.14	034.30.04	00:31:00
			Mphamba	013.57.00	034.29.19	01:02:00
			Ndebvu	014.02.00	034.31.37	01:08:00
			Kapiri	014.00.10	034.28.23	01:02:00

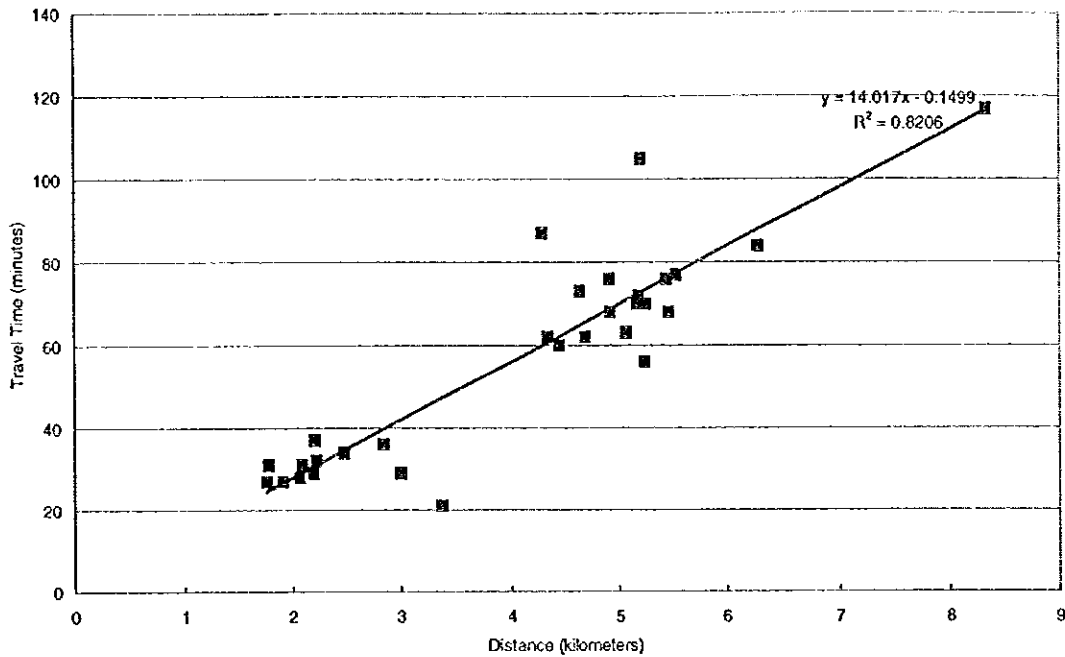


Fig. 6.2 Euclidean Distance and Travel Time

Table 6.24 Physical Access to Health Facilities

District	Average Distance per capita (meter)	Time (minutes)	% of Population > 5km from HF	Population > 5km	% of Population > 8km from HF	Population > 8km
Chitipa	7,865	122	70.8%	83,717	48.2%	57042
Karonga	5,141	75	48.7%	88,125	16.7%	31498
Nkhata Bay	4,997	73	42.1%	78,219	16.5%	29868
Rumphi	5,432	80	49.7%	62,698	21.8%	27512
Mzimba	6,381	96	61.3%	317,297	28.7%	148722
Kasungu	7,919	123	71.3%	327,204	48.9%	224489
Nkhosakota	6,028	90	53.5%	122,508	24.6%	56422
Nichisi	5,191	78	45.0%	96,581	13.9%	29860
Dowa	5,045	74	52.6%	212,331	11.2%	45301
Sailima	5,262	77	49.3%	113,472	19.9%	45796
Litongwe	5,168	76	50.3%	450,823	13.7%	122983
Mchinji	6,449	98	61.1%	194,135	24.6%	78081
Dedza	4,461	64	37.3%	174,991	7.6%	35837
Nicheu	4,300	61	34.3%	124,618	8.1%	29579
Mangochi	5,926	89	52.5%	294,363	24.2%	135790
Machinga	6,717	102	65.6%	383,904	32.5%	190936
Zomba	4,397	62	32.7%	156,363	3.0%	14188
Chiradzulu	3,649	50	23.1%	54,384	0.8%	1953
Blantyre	3,848	53	24.4%	74,659	2.0%	6028
Mwanza	5,594	83	50.8%	67,986	18.3%	24517
Thyolo	3,795	52	26.1%	115,541	3.6%	15996
Mulanje	4,360	62	37.1%	233,296	7.6%	47489
Chikwawa	5,510	81	51.9%	178,751	22.4%	77246
Nsanje	3,735	51	25.8%	47,337	7.0%	12904
Malawi	5,303	78	47.0%	4,051,301	17.3%	1490036

Travel Time to the Closest Health Facility (minutes)

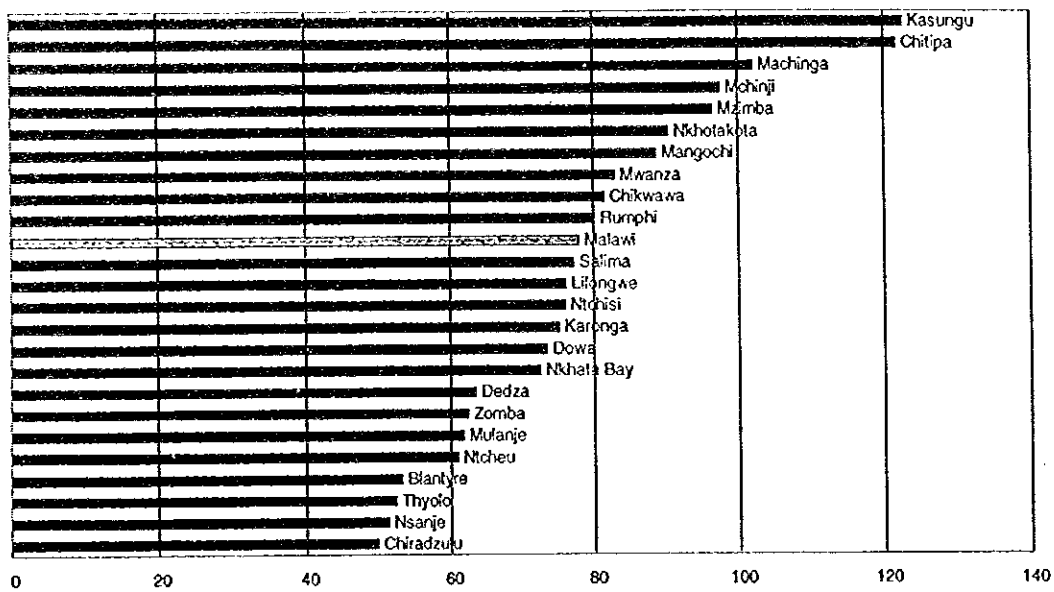


Fig. 6.3 Travel Time to the Closest Health Facility

% of Population > 8km from HF

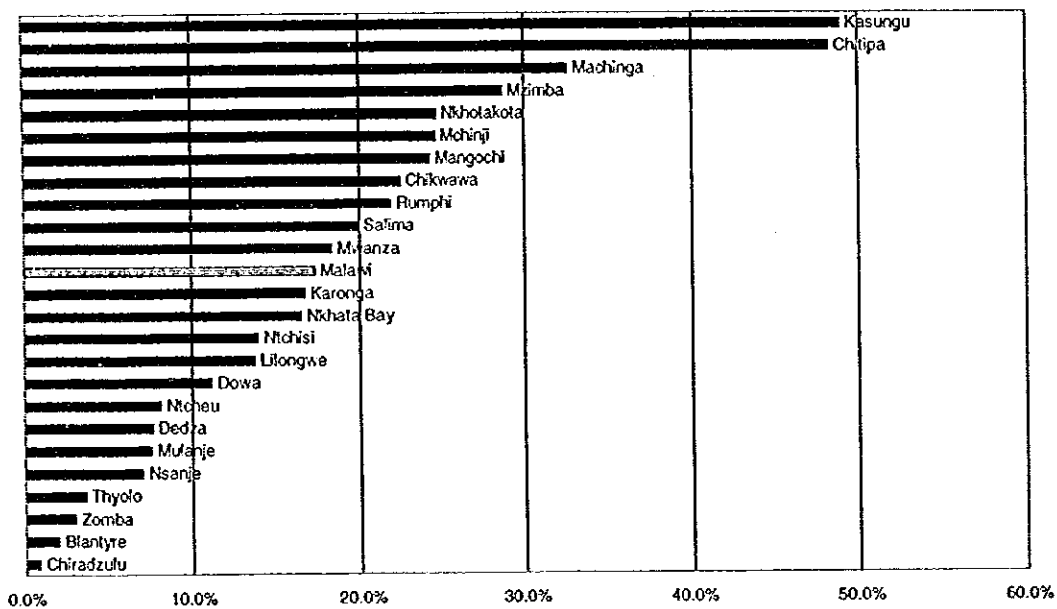


Fig. 6.4 Percentage of Population more than 8 km from the Closest Health Facility

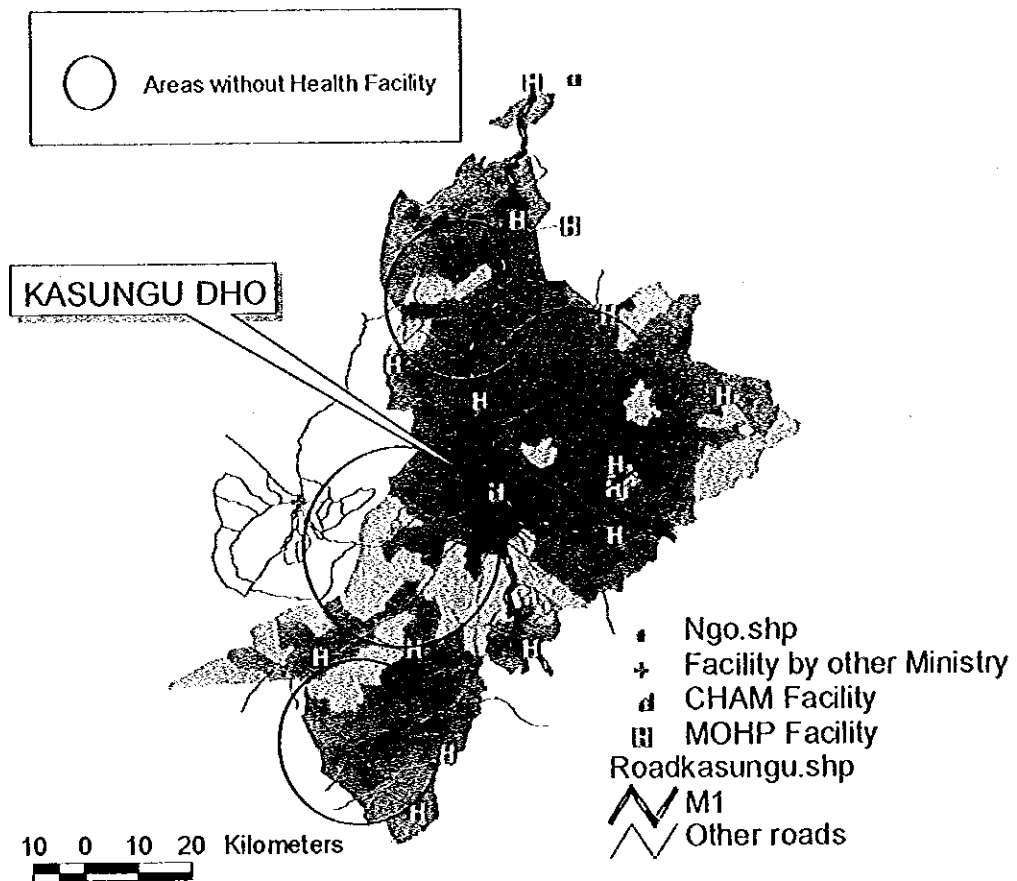


Fig. 6.5 Access to Health Facilities in Kasungu District

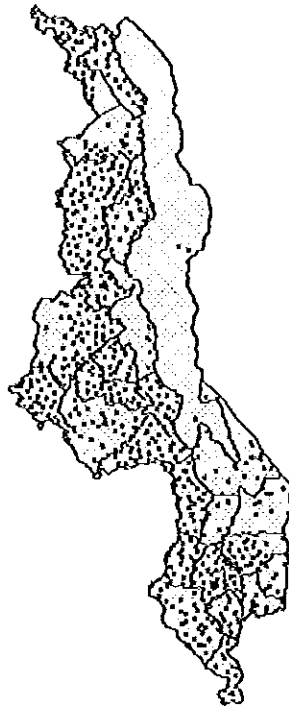


Fig. 6.6 Location of Existing Health Facilities and Suggested Locations of Additional Health Facilities

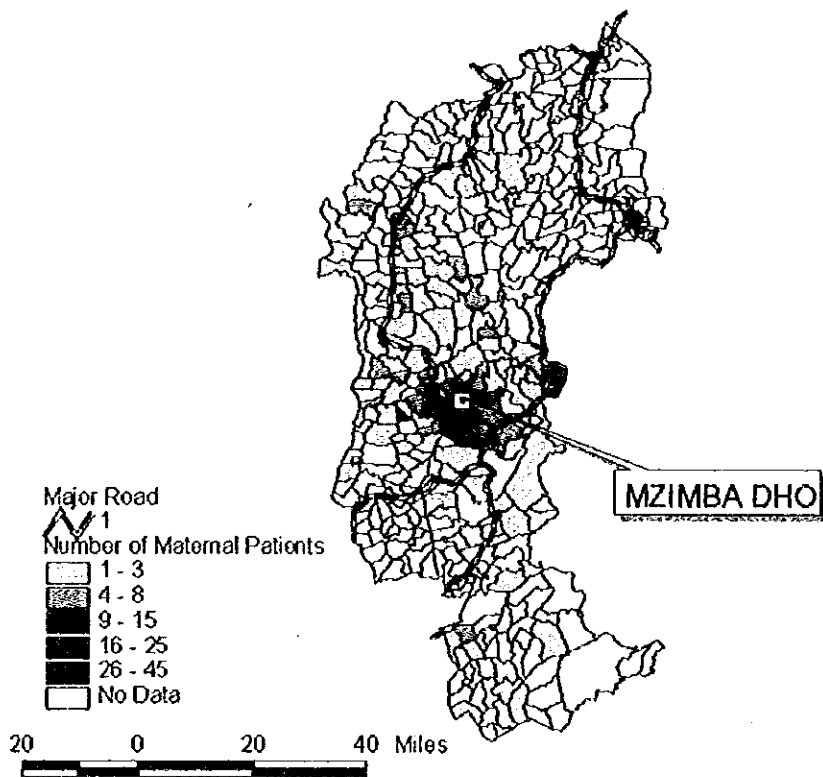


Fig. 6.7 Geographical Distribution of Maternal Patients In Mzimba District

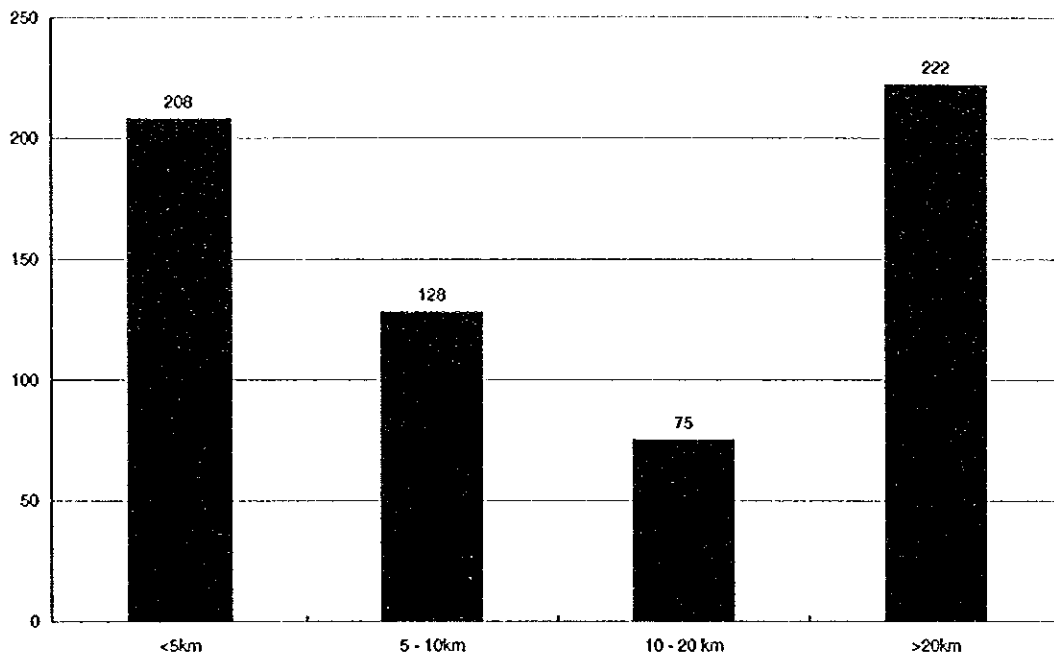


Fig. 6.8 Number of Maternal Patients Classified by Distance from the District Hospital

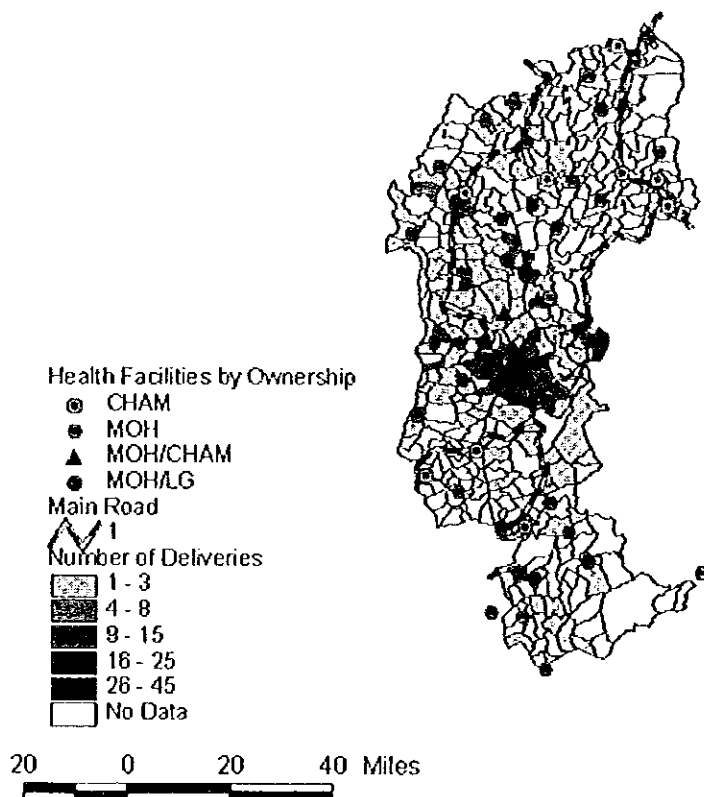


Fig. 6.9 Distribution of Maternal Patients and Locations of other Health Facilities



Questionnaire for Case Study (2) Mzimba/Dedza
Emergency Referral Case / Mortality Case

2. Information from the case / someone else()
 relationship with the case()

Name of the patient ()
 TA(), Village()
 Age (), Sex (m / f)

When did the event occur?

Date: (),(),99 Time: (:) AM / PM or don't know

When was the patient brought to a nearby health facility?

Date: (),(),99 Time: (:) AM / PM or don't know

What was the event?

Chief complaint / Situation:

Time course of the illness:

Diagnosis given: ? / ()

Treatment given:

Outcome:

Transferred to an upper facility? No / Yes, to()

When did the health worker decide to refer the patient?

Date: (),(),99 Time: (:) AM / PM or don't know

When did the patient actually leave the health facility?

Date: (),(),99 Time: (:) AM / PM or don't know

When did the patient arrive at the referral hospital?

Date: (),(),99 Time: (:) AM / PM or don't know

Means of communication	Village – the Facility	For referral
transportation		

Questionnaire for Case Study (3)

Mzimba/Dedza

3. Information from a record / recall

Name of health facility () (MOHP / CHAM / other)

Name of health worker () (male / female)

Name of the patient ()

TA(), Village()

Age (), Sex (m / f)

When was the patient admitted to the hospital?

Date: (),(),99 Time: (:) AM / PM or don't know

What was the event?

Chief complaint / Situation:

Time course of the illness:

Diagnosis: ? / ()

Treatment:

Outcome:

Transferred from a lower facility? No / Yes, from()

When did the hospital accept the request to send an ambulance?

Date: (),(),99 Time: (:) AM / PM or don't know

When did the hospital actually dispatch the ambulance?

Date: (),(),99 Time: (:) AM / PM or don't know

When did the patient actually arrive at the referral hospital?

Date: (),(),99 Time: (:) AM / PM or don't know

Means of communication transportation	Village – the Facility	For referral

Chapter 7

PROPOSALS OF PRIORITISED PROJECT

CHAPTER 7: PROPOSALS OF PRIORITISED PROJECTS

This chapter contains the proposals for six prioritised projects that have been developed based on the problems spelled out in the master plans. Although possible to consider separately, the greatest impacts to primary health care will be achieved if all are implemented together.

PROJECT 1: IMPROVEMENT OF HEALTH FACILITIES FOR PROVISION OF ESSENTIAL OBSTETRICS CARE

7.1.1 Introduction

This project corresponds to the Master Plan for Maternal Mortality, Component 3: Improvement of basic infrastructure at health facilities and increased availability of facilities with EOC.

7.1.2 Problems Addressed

1) Lack of basic infrastructure at health facilities

Past studies as well as the PHC Study pointed out that difficult access to a health facility is the major reason that women decide to deliver at home or at TBA. Difficult access is also listed as one of the major factors contributing to maternal mortality. Though Malawi in general has relatively better health service access than other sub-Saharan African countries, the real situation is far from ideal. The PHC Study found that more than half of all women need to walk more than one hour to get to a health facility and even then they are not guaranteed the availability of essential care. Lack of essential infrastructure such as water and electricity at health facilities further aggravates the situation.

2) Difficult access to health facilities with Essential Obstetrics Care (EOC)

Once a woman is found with a complication during delivery, she should be transferred to a referral health centre as soon as possible to save her life or prevent her from having permanent complications. With the absence of radio communication systems in many health

facilities, these women with complications must often wait several hours before an ambulance is even called. Since most rural hospitals are not capable of providing essential obstetrics care, many cases need to be referred to district hospitals for necessary treatment.

7.1.3 Overall Goal, Project Purpose and Specific Objectives

Overall Goal

Maternal mortality reduced by 50 percent by the year 2004

Project Purpose

Increased access to, usage of, and benefits from improved Essential Obstetrics Care

Specific Objectives (Outputs)

- 1) All health facilities (including MOHP, other ministries, and CHAM) in five districts equipped with:
 - standardised radio system
 - reliable water supply
 - electrical power system
 - autoclaves/sterilisers
 - solar hot water system
- 2) Maintenance and repair skills are in place for all five districts in collaboration with the Physical Assets Management Programme
- 3) Selected key rural hospitals upgraded to provide Essential Obstetrics Care
- 4) All MOHP-owned dispensaries in the five districts upgraded to full health centre to provide maternity care
- 5) (Optional) Effective radio communication system established for emergency referral in all districts

7.1.4 Strategies

1) Selection of target districts

The health facility index was used to select target districts for the project. The following variables were used to calculate the index: infant mortality rate from 1987 National Census, district population from 1998 National Census, number of health facilities, number of facilities with radio system, number of facilities with electrical power supply, number of facilities with functioning water system, and area of each district. Z values were then calculated for each district based on the availability of a health facility with water, radio system, and electricity per 100,000 population, IMR, and health facility access by using the above variables. The total score of Z values for a district is the health facility index for the district, with lower values indicating a greater need for improvement. Districts are ranked in order of Health Facility Index (priority need) in Table 7.1 below.

In order to avoid duplication of donor sponsored capital investment, districts with existing or planned capital investments in the health sector were then excluded from the selection.

Table 7.1 District Health Facility Index

DISTNAME	Population	Area(SqKM)	Number of Facility	IMR (1987)	DONOR	Facility Index
Kasungu	476018	7878	16	177		-0.804145
Mchinji	318759	3356	13	186	ADB	-0.758941
Chikwawa	342664	4755	16	174	DIFD	-0.576787
Dedza	483136	3624	23	167		-0.567538
Ntchisi	167353	1655	10	169	ADB	-0.517567
Mangochi	599935	6273	31	169	DIFD	-0.428567
Lilongwe	1337777	6159	41	171	DUTCH	-0.390854
Dowa	409087	3041	19	185		-0.38808
Nkhotakota	230361	4259	14	154	ADB	-0.355508
Machinga	618242	5964	24	167	DIFD	-0.320746
Salima	248157	2196	18	167	ADB	-0.157353
Nsanje	194482	1942	17	191	DIFD	-0.150429
Karonga	194275	3355	14	128		-0.110466
Mzimba	523028	10430	37	148		-0.066353
Nkhata Bay	171134	4089	20	119		-0.016049
Chitipa	125619	4288	9	106		0.0359919
Zomba	540428	2580	24	162	DIFD	0.1608818
Blantyre	782126	2012	25	121	DIFD	0.1702653
Thyolo	457954	1715	23	144	DIFD	0.1902295
Chiradzulu	235123	767	12	152	DIFD	0.2443072
Mulanje	428079	2056	32	152	DIFD	0.3821709
Ntcheu	370988	3424	31	162		0.8568943
Rumphi	128274	4769	20	114		1.6043354
Mwanza	136910	2295	13	154		1.9823979

Based on the above calculation, the following five districts were selected for this project: Kasungu, Dedza, Dowa, Karonga and Mzimba.

2) Identification of health facilities requiring basic infrastructure

There are at present 109 health facilities in the five districts run by MOHP, other ministries and CHAM. According to the MOHP baseline study of physical assets (December 1998), of these 109 facilities, 80 lack a radio system, 60 are without a water system functioning as designed, and 71 lack electric power supply. Accordingly, these facilities will be provided with the infrastructure needed (water supply, electricity, and/or radio system) under the project.

3) Selection of health facilities for upgrade

The following rural hospitals and health centres were identified in the National Health Plan 1999 – 2004 to be upgraded to full community hospitals: Kaluluma, Mtunthuma (Kasungu), Mponela (Dowa), Kaphuka (Dedza), and Kaporo (Karonga). In addition, Euthini (Mzimba) rural hospital was listed for rehabilitation in the Plan. Among these facilities, Kaporo hospital was already rehabilitated by the World Bank funded Population, Health and Nutrition Project in 1997. Therefore, it will be excluded from the project.

The following dispensaries were identified to be upgraded to full health centres in the Plan: Bua, Chamwabvi (Kasungu), Dzeleka (Dowa), and Mlangali (Dedza).

4) Function/level of care of community hospitals

The Draft National Health Facility Plan defines a community hospital as:

A public or private facility that offers general in-patient, medical, surgical, obstetrics/gynaecological and diagnostic services through a medical officer, clinical officer, and a registered nurse. It may act as a referral centre for surrounding health centres. It acts as a health centre for the surrounding 10,000 population.

The exact level of care to be provided by community hospitals has yet to be defined by MOHP, which makes it difficult to determine the types of fittings and equipment required for upgrade. As soon as MOHP finalises the care level, a needs assessment for fittings and equipment will be conducted to ensure the provision of appropriate health services.

5) Selection of sustainable systems for water, radio and power

Water: According to the JICA PHC Study, the non-functioning of water systems was largely attributed to problems associated with climax pumps. The project proposes using a solar powered pump system in place of a climax pump. Solar powered pumps have been used by remote health centres in nearby countries and were proven to be cost-effective and relatively easy to maintain (ref: http://www.bp.com/bpsolar/rural_track.html).

In some cases, communities had disconnected water pipes from health centres so that water could be provided to the residential area of the community. Therefore, an additional borehole with Afridev water pump will be provided for communities lacking water supply.

Radio: A functioning referral system requires that all health facilities in a district can communicate directly with an assigned referral health facility. Intra-district radio communication will be provided by a VHF radio system supported by a repeater transmitter where required. An inter-district radio system will be established to link district hospitals to the nearest central hospital for tertiary care referral. Ambulances allocated to the five districts will be installed with radio communication systems.

Solar power: Battery life often determines the survival of a solar energy system. In order to minimise the replacement costs for batteries and other consumables, the system will be limited to provide solar powered lighting only. As an incentive for health workers, an additional outlet will be included for them to charge their personal batteries. This move should minimise the disconnection of the system by health workers wanting to charge their batteries.

6) Prevention of bat infestation

The acidity of bat deposits shortens the length of life of construction materials. BubbleFoil was found to prevent bat infestation in other countries and is currently being adopted by the

DFID-funded Safe Motherhood Project in the Southern Region. This or alternative technology will be used in this project.

7) Environmental considerations

Using bricks as construction materials has been questioned from the environmental point of view. In Malawi, the process of producing bricks consumes a lot of wood. Alternative technologies such as stabilised soil blocks using the action pack block press will be used in this project in place of conventional bricks to reduce any adverse environmental impacts.

8) Cultural acceptability

Through qualitative research, it was found that many women place great importance on bathing before and after delivery. In the Southern Region, one of the reasons women choose not to deliver at a health facility is the lack of hot water for bathing. Therefore, the project plans to provide a solar hot water system, which will allow women to bathe with hot water.

9) Capacity building for operation and maintenance

A Project Implementation Unit will be established in MOHP to oversee the implementation of the project. The unit will work closely with the Physical Assets Management Programme to ensure that all appropriate health workers are trained on the proper operation and routine maintenance of the installed equipment. District maintenance units will also be trained in necessary maintenance procedures.

Technical support for establishing effective radio communication guidelines and prioritisation of emergency cases by radio dispatchers is incorporated in Project 2: Comprehensive Maternal Health. If the project is implemented on its own, then the technical support will be incorporated into this project.

7.1.5 Linkages

1) Linkages with other proposed projects under the master plan

This project will have the greatest impact on the reduction of maternal mortality if implemented together with Projects 2 and 5, which build capacity among health workers. Skilled health workers and a sufficient supply of consumables such as drugs are necessary for the desired outcome of the project.

2) Linkages with other donor supported projects

Districts with planned or existing large capital investments in infrastructure were given lower priority to avoid duplication of efforts in the same geographical area.

Proposed standardisation of the radio communication system cannot be achieved by one project alone—co-ordination with other similar efforts is necessary. MOHP is expected to guide donor co-ordination in this regard. Likewise, the experiences of other projects, especially PHN and Safe Motherhood Project, on the use of solar power system, solar water

pump, radio system, and ambulance radio system will be extensively reviewed during the project planning phase.

As discussed earlier, maintenance of installed systems will be carried out in collaboration with the MOHP Physical Assets Management Programme to ensure that provided items are properly used and maintained.

The Safe Motherhood Programme in the Southern Region supported by DFID developed a set of plans for construction of health facilities including fittings and equipment. In order to avoid duplication of efforts in developing a similar design, the project will adopt the design developed by the Safe Motherhood Project after review by the Project Implementation Unit and approval by the Steering Committee.

3) Linkages with Essential Health Package

MOHP is undertaking the task of developing an Essential Health Package based on disease burdens and the availability of cost-effective interventions. This component of the National Health Plan states that MOHP will ensure that all citizens will be provided with the package. The actual content of the package has not yet been finalised, but priority will be given to the following areas:

- Safe delivery services (both primary and backup)
- HIV/AIDS and STD prevention and treatment services
- Family planning services
- Childhood immunisation services
- Growth monitoring and other malnutrition prevention services
- Management of common childhood illnesses including hospital backup services
- Rehabilitation of severely malnourished children
- Health promotion services
- Disease prevention services
- Acute rehabilitation services
- Treatment of common medical and surgical conditions

This project primarily focuses on improving the provision of essential obstetrics care, which correlates to the provision of safe delivery services listed above. However, the improvement of health facilities and provision of basic utilities for EOC should bring significant benefits to other health services. The upgrading of rural hospitals is expected to have great impact on back-up services for safe delivery, treatment of common childhood illnesses, and the treatment of medical and surgical conditions.

7.1.6 Beneficiary Groups

The primary beneficiaries of the project are women of reproductive age in the five target districts. The estimated population is 437,964. The secondary beneficiaries are the remainder of the population in these districts who will also benefit from the improved physical condition of health facilities.

7.1.7 Activities

Prepare the Project Implementation Unit

- Establish working relationship between the Project Steering Committee and the Project Implementation Unit (see the Administrative Structure section for details).
- Foster collaboration between the Project Implementation Unit and the following partners:
 - Population, Health and Nutrition Project (PHN)
 - Central African Building Advisory Team (CABAT/ DFID)
 - Safe Motherhood Project (Southern Region)
 - Physical Assets Management Programme, MOHP
- Reassess status of health facilities in the target districts
- Reassess the status of the radio system, water system, electric power supply, hot water supply and autoclaves/sterilisers of all health facilities in the target districts
- Reassess the status of the physical condition and equipment of target health facilities scheduled for upgrade
- Update list of infrastructure and equipment required
- Review existing designs and plans for health facilities developed by partner projects such as CABAT and PHN
- Develop detailed plans and designs for health facilities upgrade
- Develop detailed implementation plan for installation and rehabilitation of water supply, radio, and electrical power supply

1) Equip all health facilities (including MOHP, other ministries, and CHAM) and ambulances in the five districts with standardised radio system, reliable water supply, electrical power system, autoclaves/sterilisers and solar hot water system

- 1-1) Equip all health facilities and ambulances with standardised radio system
 - Standardise radio communication system for referral system
 - Negotiate with Telecom for obtaining frequency for radio system
 - Prepare tender
 - Purchase required system
 - Install radio system
 - Train users and maintenance staff
 - Monitor usage of radio system
- 1-2) Equip all health facilities in the five districts with functioning water system

- Prepare final list of health facilities and villages to be installed with new water system and those requiring rehabilitation
 - Prepare tender
 - Finalise contract
 - Install and rehabilitate
 - Train users and maintenance staff (including villagers)
 - Monitor maintenance of system
- 1-3) Equip all required health facilities in the five districts with electric power supply
- Demarcate areas where extension of ESCOM lines would be more cost effective than installation of solar energy system
 - Prepare tender
 - Finalise contract
 - Install and rehabilitate
 - Train users and maintenance staff
 - Monitor usage of system
- 1-4) Equip all health facilities in the five districts with autoclaves/sterilisers
- Prepare tender
 - Finalise contract
 - Install
 - Train users and maintenance staff
 - Monitor usage
- 1-5) Equip all health facilities in the five districts with solar hot water system
- Prepare tender
 - Purchase systems
 - Install
 - Monitor usage

2) Develop maintenance skills in all five districts in collaboration with the Physical Assets Management Programme (PAM)

- Support PAM to conduct training workshops for use and maintenance of installed systems
- Monitor use and status of installed systems
- Issue six-monthly progress reports

3) and 4) Upgrade selected key rural hospitals and dispensaries to provide EOC

- Prepare tender based on implementation plan
- Finalise contract
- Upgrade and rehabilitate facilities
- Monitor construction and equipment installation
- Develop maintenance skills

5) (Optional activities) Establish effective radio communication system for emergency referral in each district

These activities are proposed under Project 2: Comprehensive Maternal Health. In the event that this project is implemented on its own, the following activities should be incorporated to ensure the effective use of the radio communication system:

- Develop clear guidelines for prioritisation of ambulance dispatch
- Review existing ambulance dispatch mechanism
- Organise a workshop for formulation of dispatch guidelines
- Formulate guidelines
- Issue wall poster of guidelines
- Train transportation officers and hospital administrators on prioritisation guidelines
- Develop training module and materials
- Conduct training of trainers
- Conduct training of transportation officers and hospital administrators
- Train drivers on prioritisation guidelines
- Develop module and materials for training
- Conduct training of trainers
- Conduct training of ambulance drivers
- Carry out six-monthly audit of ambulance logbook

7.1.8 Administrative Structure

A Project Steering Committee will be established. The committee will be responsible for the overall management and evaluation of the project. The proposed committee will be headed by the Principal Secretary, MOHP. The principal secretary will be assisted by a controller who will be appointed by the Principal Secretary. Proposed members of the committee will include the Controller of Clinical Medicine, the Controller of Preventive Medicine, the Controller of Health Planning, the National Safe Motherhood Co-ordinator, a representative from Physical Assets Management, representatives of the Water Board and the Ministry of Works, and project technical advisors. The committee will meet every six months to review progress made by the project and revise project plans.

The project will be implemented by a Project Implementation Unit that will be situated within MOHP. The Unit will be managed by a Project Co-ordinator who will be appointed by MOHP. The Project Co-ordinator will also act as the secretary of the Project Steering Committee.

The Project Implementation Unit will consist of the project manager and technical advisors (an architect, a quantity surveyor, and a procurement officer). The Project Implementation Unit will be responsible for technical planning and daily implementation and management of the project and will issue six-monthly project reports prior to Project Steering Committee meetings. The Project Implementation Unit will make detailed implementation plans in consultation with district health offices of the five target districts.

7.1.9 Monitoring and Evaluation

Field monitoring will be the responsibility of the Project Implementation Unit, however committee members will also occasionally be invited to monitor in the field.

All facilities will be inspected prior to the installation of any system by the Unit and a representative from the district health office. All facilities will be fully inspected at the completion of installation. Additional inspections will be carried out after one year from the time of completion. The results of field monitoring and status of project implementation will be reported every six months to the committee by the Unit.

A long-term evaluation will be carried out to measure the impact of facility upgrades and installation of basic infrastructure on utilisation of health facilities. The steering committee will finalise the list of indicators to measure the impact. Suggested indicators include number of OPD, in-patients, deliveries, deaths, disease patterns and number of staff in place. This information will be collected at the initial inspection by the Unit and used as a baseline. After three years from the completion of the project, these data will again be collected to compare to the baseline data. The Health Management Information System should allow MOHP to collect the above information.

7.1.10 Specifications

1) Technical Specifications

Electric Main Supply:

Electricity: 240 Volt single phase
 415 Volt three phases
Frequency: 50 Hertz

Every main connection cord on portable or movable equipment should be made of one solid piece with the three-pin plug. The main plug should be BS (British Standard) 1363.

All marking and labels on equipment should be in English.

Submersible water pumping system for health centres:

Water pumps shall be a single-stage submersible, stainless steel pump, with upward pointing discharge point. It shall be complete with all necessary filters. The motor will be single phase with an asynchronous canned motor with liquid-filled rotor chamber and water lubricated bearings. Enclosure Class IP 68 and Insulation Class F. The pump will be powered by means of solar energy. The pump shall discharge water into a suitable water storage tank complete with ball-valve, overflow, lid, insect screens and control valves, sized to provide 24 hours storage capacity for the building. The estimated storage capacity required for health centres is 2000-3000 litres per day. Total pumping heads depend on the locations of health centres, however, it is estimated to range from 60 to 120 metres. All water reticulation pipework and fittings shall conform to the Water Authorities By-Laws.

Solar lighting system:

The solar panel peak amps should be 10 amps to provide an 11-lights system. The system will include solar panel, a charge controller, batteries (12 Vdc), eleven lights (9-11 watts), twenty-two spare tubes, battery box, mounting frames, voltage dropper (VD12-9V), and electrical spares. The system should be open circuit, short circuit, and reverse polarity protected. The system will provide power to the radio system.

Radio system:

- Base Radio Station: VHF FM radio system for operation from 230V AC within frequency band 136 – 174 MHz, 25Khz channel spacing, 25W transmitter power. 3db gain omnidirectional base antenna, 20m length of coaxial cable and plugs, 12m free-standing antenna mast with base plate. Battery backup system c/w 55 am-hour 12 Vdc battery, automatic battery switch and trickle charger to connect the radio to the 12 V battery automatically in the event of main electricity failure.
- Solar powered radio system: VHF FM radio system for operation from 12 Vdc within the frequency band 136 – 174 MHz, 25Khz channel spacing, 25W transmit power. 3db gain omnidirectional base antenna, 20m length of coaxial cable and plugs, 12m free-standing antenna mast with base plate, 23 volt connecting cables, cable ties, fasteners, mounting board.
- Ambulance radio system: VHF FM radio system for operation from 12 Vdc within the frequency band 136 – 174 MHz, 25Khz channel spacing, 25W transmit power, with antenna for mobile vehicle.
- Radio transmitter with solar power system and batteries.

Autoclave/Steriliser:

- Autoclave, pressure, electric/non-electric: Autoclave, pressure, to operate at sterilising pressure of 2,2 bar and temperature of 134 degrees centigrade. To be fitted with pressure gauge and safety valve. To be fitted with siphon tube to remove steam and water after sterilisation thus creating a partial vacuum in order to dry the contents. Chamber size +- 600mm deep and 350mm diameter. In the event of electrical failure the autoclave is to be capable of operating by being heated by a Primus stove or other oil burning heating devices (included). Including sterile goods basket, bottle basket, and lifting hooks.
- Drum, sterilising, circular 33 x 23cm. To be used with the above autoclave.
- Steriliser, boiling water, electric, instrument steriliser with heat control and automatic safety cut-out device, seamless reinforced boiler, automatic lifting tray and insulated handle, hinged drip proof lid, chromium-plated finish. Fitted with hand reset cut-out. +- 50 x 25 x 18 cm dimensions.
- Steriliser, boiling water, non-electric, instrument steriliser with flat overlapping cover and perforated lift-out tray with straight turned sides; stainless steel. Cover fitted with strap handle spot-welded over centre recess. One-piece, die-stamped perforated tray, resting on four 6.5mm high studs dimpled proximal to corner, fitted with lifting handles (hooked ends curving inward) spotwelded to outside of ends. Construction: stainless steel, size

+430mm L x +250mm W x +-180mm D. Heated by a Primus stove or other oil burning heating device (included).

- Autoclave Porous Load (for Mponella Hospital): Automatic steam steriliser, chamber dimensions 400X400X600mm, +-100 litres, to sterilise instruments, textiles, rubber, and liquids in open container. With built-in electrical steam generator and pre- and post-vacuum by a liquid-ring pump, with water saving facility. Including Bowie/Dick and leak tests. Both automatic and manual operations. All process parameters manually adjustable. All instrumentation and controls on front panel, with a temperature/pressure recorder. Single door, recessed installation. Including chamber racks and tray.

Upgrade of dispensaries to health centres:

A maternity unit will be added to the dispensaries. Six-bed ante/post natal ward and one delivery room will be constructed. The design of both rooms will follow the maternity unit design developed for the Safe Motherhood Project.

Upgrade of rural hospitals to community hospitals:

Unlike dispensaries and health centres, there is no standard design for rural hospitals in Malawi. Consequently, the present physical structures and conditions of the four rural hospitals are very different from each other. The lack of decisions regarding functions and care level of community hospitals also makes it difficult to come up with standard specifications for this project at this time.

Mponella Rural Hospital (Dowa):

Mponella Hospital is the only hospital connected to ESCOM power supply among the five facilities. Mponella is also the biggest hospital among the five facilities, serving the population of Western Dowa district; the catchment population claimed by the hospital amounts to more than 200,000. The hospital is in poor condition overall, except for the family planning and ANC unit, which were built by PHN Project in 1998. Despite the busy maternity ward and general OPD, the hospital has no X-ray machine or operating theatre. The hospital building needs reconstructing, except for FP/ANC unit and some small offices. It will require four 15-bed wards (male, female, maternity and paediatrics), one operating theatre, delivery room, pharmacy room, laboratory, X-ray room, guardian shelter with cooking facility, kitchen, staff housing and administration office.

- X-Ray Machine, basic diagnostic radiography: Basic Diagnostic radiography stands for exposures of standing, sitting, or recumbent patients. According to the World Health Organisation, the specifications for a Basic Radiology System are:
 - Vertical column for fixation on floor and wall. U-shaped carrier, tiltable around horizontal axis for 120 degrees, from vertical to horizontal beam and oblique beam 30 degrees upward. The upper part with fixation for a tube assembly, the lower part with a cassette holder for colour-coded 18 x 24 cm, 24 x 30 cm, 18 x 43 cm, and 35 x 43 cassettes. S.I.D. 140cm and stationary grid 60/10.
 - Generator, battery operated x-ray generator for conventional radiography up to 125 kV, using a rechargeable battery pack for x-ray generation. Comprises x-ray converter generator, nominal rating 30kW.

- Rechargeable battery pack. Comprises charging unit 108V 2.5A, set of nine Pb-batteries 12 V each, total capacity 100ah, pack of sulphuric acid to activate batteries, rack to form a battery block, and set of cables and connecting materials.
- X-ray tube assembly 125KV, with nominal focal spot value 0.75 and manual collimator.
- High voltage cable, 2 pieces.
- Operating Table, major, should be adjustable in height by means of hydraulic foot pump from 74 – 98cm.
- Oxygen Concentrator, Mobile oxygen concentrator with oxygen and air outlet.
- Operating light, ceiling mounted. Unit shall provide illumination required for surgical procedures. Two light heads with reflectors. One support arm for each light head, with both support arms suspended from a single ceiling suspension. One copula with five halogen light sources and one satellite type copula with three halogen sources, high light intensity of daylight colour, +-90,000 lux at 1 metre, including heat protection filters, focus ability, and anchor plate. Should be complete with battery power supply with automatic changeover from mains to battery. Battery should be re-chargeable via mains and built-in charging unit.
- Operating light floor standing: Operating light. Mobile on anti-static castors diameter 75 mm. With special gas-tight, service free lead battery. Automatic switchover from main power to battery operation. Rechargeable via mains and built-in charging unit. Three reflectors, field of illumination +- 200 mm diameter. 44,000 lux at one metre.

Other rural hospitals:

The other rural hospitals are substantially smaller in size than Mponella Hospital. They are also not connected to ESCOM power supply. These facilities will not be provided with X-ray machines or operating theatre. Some parts of the physical structures will be upgraded depending on requirements.

7.1.11 Budget

1) Cost estimate summary (font and heading)

Water system (including solar pump and hot water system):	US\$ 1,559,250.00
Radio system:	US\$ 263,278.13
Solar power lighting system:	US\$ 343,640.00
Autoclave/Sterilisers:	US\$ 295,600.00
Upgrade of rural hospitals to community hospitals:	US\$ 2,576,275.00
Upgrade of dispensaries to health centres:	US\$ 998,687.50
Training of maintenance staff (US\$7,000 for 20 participants x one week course):	US\$7,000 x 4 = US\$ 28,000.00
Orientation of health workers (US\$1,500 for ten participants x three-day course):	US\$1,500 x 20 = US\$ 30,000.00
Project Implementation Unit (including technical advisors, office running costs, and support staff. Office to be provided by MOHP):	US\$ 1,000,000.00

Evaluation:	US\$50,000 x 2 =	US\$ 100,000.00
	Total:	US\$ 7,194,730.63

2) Cost estimate of individual items

Water system

Solar water pump (for health centres):	US\$5,000 x 60 =	US\$ 300,000
Solar water system (for health centres):	US\$3,000 x 100 =	US\$ 300,000
Boreholes (for health centres):	US\$11,000 x 30 =	US\$ 330,000
Boreholes (for villages which lack water supply):	US\$11,000 x 30 =	US\$ 330,000
Sub-total:		US\$ 1,260,000

Provision for professional fees (@ 12.5%):		US\$ 157,500
Sub-total:		US\$ 1,417,500

Provision for contingencies and location factors including transportation charges (@ 10%)		US\$ 14,1750
Total water system:		US\$ 1,559,250

Solar lighting system (one unit)

Lighting system with 22 spare tubes:		US\$ 3,600
Installation cost:		US\$ 800
Sub-total:		US\$ 4,400

Provision for contingencies and location factors including transportation charges (@ 10%)		US\$ 440
Sub-Total (per health centre):		US\$ 4,840

Total Solar lighting system: US\$4,840 x 71 health centres = US\$ 343,640

Radio system

Base radio station:	US\$3,000 x 5 base stations =	US\$ 15,000.00
Base radio station backup battery:	US\$250 x 5 base stations =	US\$ 1,250.00

Solar powered radio system

(excluding solar system as power will be provided from solar lighting system):

	US\$1,300 x 80 radio system =	US\$ 104,000.00
Ambulance radio system	US\$3,500 x 20 =	US\$ 70,000.00
Radio transmitter (one per district)	US\$3,500 x 5 =	US\$ 17,500.00
Solar system for transmitter (one per district):	US\$1,000 x 5 =	US\$ 5,000.00
Sub-total:		US\$ 212,750.00

Provision for professional fees including installation (@ 12.5%)		US\$ 26,593.75
Sub-total (2):		US\$ 239,343.75

Provision for contingencies and location factors
including transportation (@ 10%)

US\$ 23,934.38

Total radio system: US\$ 263,278.13

Autoclaves/Sterilisers:

Autoclave, pressure, electric/non-electric: US\$1,200 x 140 = US\$ 168,000

Steriliser, boiling water, electric or non-electric: US\$260 x 260 = US\$ 67,600.00

Autoclave, porous load: US\$30,000 x 2 = US\$ 60,000.00

Total autoclaves/sterilisers: US\$ 295,600.00

Upgrade of rural hospitals to community hospitals

- Upgrade of Mponella Hospital

Mobile X-ray machine

X-ray machine: US\$ 80,000.00

Film processing unit: US\$ 8,000.00

Total mobile x-ray machine: US\$ 88,000.00

Major equipment for operating theatre

Operating table: US\$ 9,800.00

Oxygen concentrator: US\$ 2,500.00

Operating light (ceiling mounted): US\$ 15,000.00

Operating light (floor standing): US\$5,000 x 3 = US\$ 15,000.00

Total equipment for operating theatre: US\$ 42,300.00

Reconstruction of physical structures

15-bed ward: US\$30,000 x 4 = US\$ 120,000.00

Operating theatre: US\$ 27,000.00

Delivery room: US\$ 25,000.00

Laboratory, administration, pharmacy: US\$15,000 x 3 = US\$ 45,000.00

X-ray room with darkroom: US\$ 50,000.00

Guardian shelter with cooking facility: US\$ 35,000.00

Kitchen for hospital: US\$ 20,000.00

Staff housing: US\$40,000 x 5 = US\$ 200,000.00

Sub-total: US\$ 522,000.00

Professional fees (@ 12.5%): US\$ 65,250.00

Sub-total (2): US\$587,250.00

Contingencies and location factors (@10%): US\$ 58,725.00

Total reconstruction: US\$ 645,975.00

Equipment and fittings (excluding items above):

Approximate cost: US\$ 200,000.00

- Upgrade of other rural hospitals

Estimated cost for physical rehabilitation and re-construction
(inclusive of professional fees, contingencies, and transportation):
US\$250,000 x 4 = US\$ 1,000,000.00

Estimated cost for fittings and equipment: US\$150,000 x 4 = US\$ 600,000.00
Total upgrade of other rural hospitals US\$ 1,600,000.00

Total upgrade of rural hospitals: US\$ 2,576,275.00

Upgrade of dispensaries to health centres

Construction of maternity unit

Maternity unit: US\$16,000 x 5 = US\$ 80,000.00
Professional fees (@ 12.5%): US\$ 10,000
Sub-total: US\$ 90,000.00

Provision for contingencies and location factors (@ 10%) US\$ 9,000.00
Total construction of maternity unit: US\$ 99,000.00

Construction of delivery room

Delivery room: US\$25,000 x 5 = US\$ 125,000.00
Professional fees (@ 12.5%): US\$ 15,625
Sub-total: US\$ 140,625.00

Provision for contingencies and location factors (@ 10%) US\$ 14,062.50
Total construction of delivery room: US\$ 154,687.50

Staff housing

(two houses per facility) US\$40,000 x 2 x 5 = US\$ 400,000
Professional fees (@ 12.5%) US\$ 50,000
Sub-total: US\$ 450,000.00

Provision for contingencies and location factors (@ 10%) US\$ 45,000.00
Total staff housing: US\$ 495,000.00

Estimated cost for fittings and equipment: US\$50,000 x 5 = US\$ 250,000.00

Total upgrade of dispensaries to health centres: US\$998,687.50

7.1.12 Important Assumptions

- The function and care level of community hospitals is determined by MOHP prior to the planning stage of the project.
- At minimum, the current level of health staff is maintained at all health facilities.

- Administrators of facilities operated by CHAM are willing to allow the installation of equipment and infrastructure.
- Full support is given for capacity building of health workers and community IEC activities.
- Ambulance management is improved with support from the European Union or other donor agency.
- Village water committees are willing and able to maintain water systems, with assistance from local authorities.
- MOHP will negotiate with Telecom for installation of radio system, frequency, and usage.

7.1.13 PDM

PDM is shown as Table 7.2.

7.1.14 Timetable

The timetable for project activities is shown as Table 7.3.

Table 7.2 PDM for Project 1

PROJECT TITLE: Improvement of Health Facilities for Provision of Essential Obstetrics Care DURATION: five years

PROJECT DESIGN MATRIX (PDM)

PROJECT DESIGN MATRIX (PDM)		OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
NARRATIVE SUMMARY				
OVERALL GOAL The maternal mortality rate is reduced by 50% by 2004		Reduction in the maternal mortality ratio	DHS; Census	National data will accurately reflect the changes in the project area
PROJECT PURPOSE Improved access to, usage of, and benefits from improved EOC		(suggested indicators) - No. of outpatients, in-patients, deliveries - No. of maternal deaths at health facilities - No. of staff in place - Ratio of maternal deaths to number of deliveries at health facilities - No. of maternal referrals	- Surveys (baseline and evaluation) - Health Management Information System - 6-monthly progress reports - 6-monthly audits of ambulance logbooks	Project benefits are sustained long enough to demonstrate impact on project goal
SPECIFIC OBJECTIVES (OUTPUTS)				
1	All health facilities in five districts are equipped with: - standardised radio system - reliable water supply - electrical power system - autoclaves/sterilisers - solar hot water system	1 % of facilities equipped with: - standardised radio system - reliable water supply - electrical power system - autoclaves/sterilisers - solar hot water system	- 6-monthly progress reports - Physical Assets Management report - Facility database	- At minimum, the current level of health staff is maintained at all health facilities - Full support is given for capacity building of health workers and community IEC activities - Ambulance management is improved with support from the EU or other donor agency - Village water committees are improved and able to maintain water systems, with assistance from local authorities - Standardised radio communication system is installed at all health facilities by another proposed project
2	Maintenance and repair skills are in place	No. of personnel trained on maintenance and repair	- 6-monthly progress reports - Progress reports	
3	Selected key rural hospitals upgraded to provide EOC	No. of rural hospitals upgraded to provide EOC	- Progress reports	
4	All MOHP-owned dispensaries upgraded to health centre to provide maternity care (Optional) Effective radio communication system established for emergency referral	No. of dispensaries upgraded to health centre	- Progress reports	
5		No. of emergency referrals responded to with ambulances	- 6-monthly audits of ambulance logbooks	
ACTIVITIES		INPUTS		
1.1	Equip all health facilities and ambulances with standardised radio system	Water system (including solar pump and hot water system)	US\$ 1,559,250.00	MOHP will negotiate with Telecom for installation of radio system, frequency and usage
1.2	Equip all health facilities with functioning water system	Radio system	US\$ 263,278.13	The project activities are supported by the national policy
1.3	Equip all required health facilities with electric power	Solar power lighting system (US\$7,000 x 71) Autoclave/ Sterilisers	US\$ 343,640.00 US\$ 295,600.00	
1.4	Equip all health facilities with autoclaves/sterilisers	Upgrade of rural hospital to community hospital	US\$ 2,576,275.00	
1.5	Equip all health facilities with solar hot water system	Upgrade of dispensaries to health centers Training of maintenance staff (US\$7000 x 4) (20 participants x one week course costed at US\$7000)	US\$ 998,687.50 US\$ 28,000.00	
2	Develop maintenance skills in collaboration with the Physical Assets Management Programme (PAM)	Orientation of health workers (US\$1500 x 20) Project implementation unit (including technical advisors, office running costs and support staff. Office to be provided by MOHP)	US\$ 30,000.00 US\$ 1,000,000.00	
3-4	Upgrade selected key rural hospitals and dispensaries to provide EOC (Optional activities) Establish effective radio communication system for emergency referral in each district	Evaluation (US\$50,000 x 2)	US\$ 100,000.00	
5		Grand total	US\$ 7,194,790.63	PRE-CONDITIONS - The function and care of community hospitals is determined by MOHP prior to the planning stage of the project - Administrators of facilities operated by CHAM are willing to allow the installation of equipment and infrastructure

Table 7.3 Timetable for Project 1

Activities	1st year	2nd year	3rd year	4th year	5th year
Prepare for Project	_____				
Equip all health facilities with radio, water system, electrical power, autoclaves/sterilisers, hot water system		_____			
Develop maintenance skills at district level		_____			
Update key rural hospitals and dispensaries to provide EOC		_____			
Develop guidelines for prioritization of ambulance dispatch		_____			
Train drivers on prioritization guidelines		_____			
Baseline information collection (as part of M&E)	_____				
Evaluation (long term evaluation)					_____
Monitoring	_____	_____			

PROJECT 2: COMPREHENSIVE MATERNAL HEALTH

7.2.1 Introduction

This proposal refers to the problems analysed in the Master Plan of Operations for Reducing Maternal Mortality. The objectives and strategies of the Master Plan are combined here into four overall objectives, which correspond to four of the five components of the Master Plan:

- Improved quality and availability of Essential Obstetrics Care (EOC) at health facilities
- More effective Antenatal Care
- Improved Obstetrics Referral System
- Improved Information, Education and Communication (IEC) on Maternal Health

The four components are combined in this project because they are all related to each other and each is fundamental for an overall improvement in maternal health care and the demand for it. Approaching one or two of the components separately is not likely to yield a meaningful reduction in maternal mortality.

The proposed project addresses the following problems:

1) Many complications during pregnancy are not controlled

Although most women attend ANC in Malawi, ANC is often not effective enough to identify and control complications due to various factors such as inadequate skills among health workers, substandard quality of ANC examinations, little time allocated for individual examinations, and an ineffective referral system. Problems also exist on the side of the clients, who sometimes do not follow a proper ANC schedule or advice given at ANC due to financial, social or cultural constraints, or simply because they do not understand the importance of attending ANC or following advice.

2) Many pregnant women do not receive Essential Obstetrics Care (EOC)

The high MMR of the country means that each single pregnancy is potentially at risk and deserves essential obstetrics care. Yet, some women decide to deliver outside of health facilities while others who had intended to deliver at a health facility could not reach it on time. Because most health centres are not capable of providing EOC in Malawi, even reaching a health centre does not guarantee access to EOC. Even when a health facility is equipped with EOC, a substandard quality of care is often provided, as many health workers are not confident to perform some essential care tasks.

3) Many women with complications do not receive proper emergency obstetrics care

Access to emergency care is often obstructed by a delay in making the decision to seek care on the side of clients, lack of mode of communication to a health facility or an ambulance, or unavailability of an ambulance. The quality of emergency care is another

problem, caused by various factors such as lack of health workers capable of performing emergency care, insufficient supply of drugs and equipment and poor patient management.

4) Socio-economic and cultural constraints for women to access health care services

Socio-economic and cultural factors greatly influence health seeking behaviour during pregnancy and delivery in Malawi. Socialisation regarding gender roles which reinforce the inferior position of women in society occurs through many means including the formal school environment. Most women have little understanding regarding their rights. Policy makers, community leaders and other decision makers, as well as the general public, are not well aware of the low status of women, and how it affects women's health.

7.2.2 Overall Goal, Project Purpose and Specific Objectives

Overall Goal

Maternal mortality reduced from 620 to 310 per 100,000 live births by 2004.

Project Purpose

More women receive improved essential obstetrics care (EOC).

Specific Objectives (Outputs)

- 1) Programme management capacity built
- 2) Improved quality and availability of EOC at health facilities
- 3) Improved routine obstetrics referral system
- 4) Delays in obtaining emergency obstetric care reduced
- 5) Reproductive Health Information System strengthened
- 6) Research on maternal mortality and morbidity in Malawi strengthened
- 7) Increased understanding of safe motherhood, gender and women's rights issues among women, family members, and community members
- 8) Increased understanding of women's health, women's rights and gender issues among policy makers

7.2.3 Strategies

1) Integrated approach

Because the high MMR is attributed to many complex inter-related factors, an integrated approach that addresses the different causes simultaneously will yield the best results. Therefore, the project will focus on the following three areas:

Skills development of health workers in the areas of:

- Clinical management (EOC/LSS)
- Interpersonal Communication and Counselling (IPCC)

All nurse/midwives and clinicians (clinical officers and medical assistants) working in the area of reproductive health in health facilities run by MOHP, other ministries and CHAM in the project area will be trained at least once on each subject during the project period.

Strengthening of referral system: The current obstetrics referral system is weak. The proposed project aims to provide technical support to strengthen both the routine and emergency referral systems.

IEC for communities and policy makers: The lack of knowledge on maternal health issues at different levels is a major problem. In order to lower maternal mortality in Malawi, it is important that project activities target not only the health care providers, but also community members and policy makers.

2) Information and communication for better planning and decision-making at all levels

The proposed project aims at providing technical support at different levels: national, district, and community. The extensive information obtained from the baseline studies and evaluation will be used not only to develop the training programmes and IEC activities, but also to assist decision makers and planners at all levels concerning safe motherhood and gender issues.

3) Networking and collaboration

The proposed project will strengthen networking and collaboration among donors to avoid duplication of efforts and improve overall co-ordination.

4) Geographic coverage

The proposed project covers Dowa and Dedza districts during the first phase, and then will extend to another three districts: Kasungu, Mzimba and Karonga. These districts were selected by analysing four indicators: 1) health facility basic infrastructure, 2) Infant Mortality Rate (1987 data), 3) population (1998 census) and 4) access to health facilities. Districts in the Southern Region were excluded, as they are under the coverage of the DFID-supported Safe Motherhood Project.

5) Time frame

The proposed length of the project is five years with possible extension for another five years.

7.2.4 Linkages

1) Linkage with the other projects proposed under the Master Plan

Two projects have been proposed as part of the Master Plan for reducing maternal mortality: one focuses on capacity building for health workers and improving IEC for maternal health (this project), and the other seeks to improve facilities and infrastructure. The two projects need to be implemented together to achieve the desired results.

2) Linkage with the National Safe Motherhood Programme

The project will be implemented as part of the National Safe Motherhood Programme. As proposed in the Administrative Structure section of this proposal, the Project Support Group will be located at the National Safe Motherhood Programme office to establish and maintain strong ties.

3) Co-ordination with National Health Management Information System (HMIS) /Reproductive Health Information System (RHIS)

The proposed project will use the data available from the National Health Management Information System to monitor the effect of inputs. The Dutch-supported HMIS project will eventually include RHIS. The project will coordinate with the forthcoming RHIS/HMIS and provide support for implementing in the project districts.

4) Co-ordination with National Human Resource Development Plan

The proposed project expects to contribute to improved staff retention by providing training opportunities to existing health workers. The number of health workers to be trained will be updated in accordance with the National Human Resource Development Plan.

5) Linkages with other donor funded projects

There are several projects with similar objectives in the country supported by various donors. One very significant project is the Safe Motherhood Project in the Southern Region supported by DFID. Other organisations including UNFPA, UNICEF, WHO, and the European Union have been implementing programmes/projects on safe motherhood and related areas, and coordination with them is important. The proposed project will assist the National Safe Motherhood Programme to establish a forum where projects with the same interests can share their experiences and products. Areas where close coordination is anticipated include 1) training modules and manuals, 2) research and studies, 3) monitoring and evaluation, and 4) procurement and supplies.

This project does not include activities for family planning or prevention of sexually transmitted diseases. There are projects in Malawi which deal with these issues, including those funded by USAID, DFID and others. The proposed project will collaborate with other reproductive health projects.

7.2.5 Beneficiary Groups

1) Primary beneficiary groups

Women of reproductive age will be the primary beneficiary group. They will benefit from better quality care during the antenatal, natal and postnatal periods. They will be provided with information and knowledge to increase their understanding of women's health, safe motherhood, gender, and women's rights. Based on the 1998 census data, the population of women of reproductive age (15-49) in the five project districts is approximately 438,000

(according to 1992 Malawi Demographic and Health Survey, 21% of the total population is women aged 15-49 years).

2) Secondary beneficiary groups

Project beneficiaries at the central level include policy makers, health planners and technicians. At the district and sub-district levels, they include the District Health Management Teams (a team which consists of the district health officer, clinical superintendent, district nursing officer, district environmental health officer and hospital administrator and has the role of supervising health facilities within the district), health workers and the community. Beneficiaries at the central level will gain from better capacity for planning and management and decision making. Beneficiaries at the district and sub-district levels will gain from better capacity for service provision through training and provision of essential equipment and supplies. The knowledge and skills of the service providers and implementers of the project will be upgraded through specific technical training. Health planners at all levels will also benefit from the better information available for designing maternal health interventions.

It is important to note that the beneficiaries are not limited to MOHP, but belong to other relevant government ministries as well (e.g., Women, Youth and Community Services, and Education). The donors and NGOs dealing with maternal health and gender issues should also benefit from the proposed project.

At the community level, family members will gain from the better health status of women of reproductive age, who as wives and mothers shoulder the bulk of productive work for the family. Community members who implement the IEC activities should also benefit from the information and communication skills gained.

Though the project primarily aims to reduce MMR, many of the identified causes of maternal mortality are in fact causes of other health problems such as high neonatal death rate, high IMR, and inadequate care for adult patients. By improving capacity of health workers, it is expected that the general population, especially children under five, would also benefit from the project.

7.2.6 Activities

Preparatory activities:

- Establish working relationships among the Project Management Committee, the Project Support Group, the district project teams, and government and donor partners (see Administrative Structure section for details)
- Foster collaboration between the Project Support Group and the following partners:
 - District project teams
 - Project Management Committee
 - Ministry of Women, Youth and Community Services, and Ministry of Education
 - DFID-funded Safe Motherhood Project and the reproductive health project

- UNFPA, UNICEF, WHO, the European Union, and other organisations that implement reproductive health and other related projects/programmes
- NGOs concerned with women's health, gender issues and women's rights

1) Build programme management capacity

At the national level, the project manager and National Safe Motherhood Co-ordinator will be trained at the masters level in programme management in their relevant fields. At the district level, the District Health Management Team will be trained in reproductive health management and supervision.

- 1-1) Identify candidates for graduate level training
- 1-2) Develop training plan for graduate level training
- 1-3) Send candidates for training
- 1-4) Identify trainers for DHMT training
- 1-5) Develop training plan for DHMT training
- 1-6) Conduct DHMT training

2) Improve quality and availability of Essential Obstetric Care (EOC) at health facilities

2-1) Refine care protocols

- Review and revise the care protocols for normal delivery and for the six main causes of maternal death and morbidity (obstructive labour, postpartum haemorrhage, puerperal infections, eclampsia, complications from abortion, and anaemia)
- Produce wall charts of above revised protocols and distribute at the time of in-service training

2-2) Develop skills of health workers in Essential Obstetrics Care and Life Saving Skills (EOC/LSS)

The project proposes to train all nurse/midwives, clinical officers and medical assistants working in the area of reproductive health in project districts in EOC/LSS at least once during the project life. Two master trainers from each district will be identified and trained for three weeks. They will conduct the training for health workers. The duration of the EOC/LSS course is two weeks. The training will be carried out in Lilongwe (at Malawi College of Health Sciences or Kamuzu College of Nursing) and in Mzuzu at the Central Hospital which is currently under construction. The training module and materials used for EOC/LSS will be a revised version of those developed by the Safe Motherhood Project in the Southern Region. To ensure uninterrupted health services, the project will provide locum tenens to health facilities while staff are in training.

- Assess training status of health workers on EOC/LSS
- Identify master trainers
- Review and revise training module and materials
- Identify locum tenens during training of master trainers

- Provide locum tenens during training period
- Train master trainers
- Develop training plan
- Identify locum tenens who will work at health facilities during training period
- Provide locum tenens during training period
- Conduct training of health workers
- Carry out evaluation of training

2-3) Develop skills of health workers in interpersonal communication and counselling (IPCC)

All nurse/midwives medical assistants and clinical officers working in the area of reproductive health and district medical officers will be trained in interpersonal communication skills at least once during the life of the project. Two master trainers from each district will be identified and trained. They will conduct the training for health workers. The duration of the course is one week. The training module developed by the Southern Region Safe Motherhood Project will be modified according to the local culture and based on the requirements for each type of health worker. The materials will be pre-tested and translated into local languages.

- Adapt training module and materials
- Assess training status of health workers on interpersonal communication
- Identify master trainers
- Identify locum tenens during training of master trainers
- Provide locum tenens during training period
- Train master trainers
- Develop training plan
- Identify locum tenens for health facilities during training period
- Provide locum tenens during training period
- Conduct training of health workers
- Carry out evaluation of training

2-4) Conduct on-site facility management and motivational training

This proposed training will be conducted periodically as a follow-up to 2-2 and 2-3 above, to reinforce the skills learned in the actual work setting. The wall charts of care protocols developed under 2-1 and the guidelines under 3-1 will be utilised in the training.

- Develop training modules and materials
- Develop training plan
- Identify trainers
- Conduct training of trainers
- Conduct on-site training
- Carry out evaluation of training

2-5) Provide in-country OB/GYN skills enhancement training for clinical officers

Four clinical officers from each district (two from the district hospital and two from community hospitals) will be trained in Obstetrics/Gynaecology for six months. The

trained officers will be required to sign contracts to remain in their position for at least four years after completion of the training course.

- Negotiate with College of Medicine to conduct skills enhancement course for clinical officers in obstetrics and gynaecology
- Identify clinical officers to be trained
- Conduct training of clinical officers

2-6) Provide essential equipment, drugs and supplies

Most health facilities lack proper equipment and supplies for EOC. A standard list of equipment, supplies and drugs will be developed in relation to the Essential Health Care Package (EHP) for the referral hospital and health-centre levels. Referral hospitals will be provided equipment for provision of comprehensive essential obstetrics care (CEOC) and health centres will be provided equipment for provision of basic essential obstetrics care (BEOC). Training on maintenance and repair (in collaboration with the EU/GTZ-funded Physical Assets Management project) will directly follow the distribution of equipment. Supplementary drugs and supplies for provision of EOC will be provided for a limit of two years per district, while waiting for the reform of Central Medical Stores to be completed.

- Review inventory of existing equipment and conduct needs assessment
- Develop standard PHC equipment package in relation to EHP
- Purchase required PHC equipment package and distribute/install at target health facilities
- Provide maintenance and repair training in collaboration with Physical Assets - Management
- Purchase required drugs and supplies
- Provide necessary drugs and supplies to the districts

3) Improve routine obstetrics referral system

3-1) Revise ANC guidelines

Existing ANC guidelines will be reviewed and revised to improve diagnostic tests including Hb and VDRL, timely referrals and interpersonal communication

- Review and revise existing ANC guidelines
- Produce wall charts of revised guidelines and distribute at in-service training

3-2) Establish monitoring system for feedback on referrals

An efficient and effective referral system requires a monitoring system for feedback. As MOHP has expressed its intention to implement a referral feedback system in the National Health Plan, coordination is needed to ensure the use of standardised forms.

- Develop forms and system for monitoring of referrals and back referrals
- Produce and distribute developed forms
- Provide training on use of forms
- Gather records periodically and report on obstetrics referrals
- Evaluate effect of monitoring

3-3) Conduct operational research for reproductive health handbook

Operational research for a "Reproductive Health Handbook" which will combine the antenatal card, information on family planning, antenatal health message, and the under five card for children will be carried out in a pilot area. The booklet will serve as a standardised referral/antenatal form and also as a resource for health communication/counselling. The research will be conducted in the catchment area of one referral centre, which covers approximately 5,000 pregnant mothers per year. The implementation period is tentatively set at two years

- Formulate a working group to develop draft handbook
- Conduct focus group discussions to examine appropriateness of design and message
- Refine final draft and conduct pilot test
- Train health workers in health communication and counselling using the handbook
- Print and disseminate through ANC in the pilot area
- Evaluate effect of the handbook

4) Reduce delays in obtaining emergency obstetrics care

The proposed project aims to reduce delays in obtaining care by improving distribution and dispatch management of ambulances for emergency care. An audit of ambulance logbooks will be carried out every six months in order to monitor the effect of interventions. The project will also examine possible alternative systems for accessing care promptly when an emergency occurs.

4-1) Develop clear guidelines for distribution of ambulances

The current distribution of ambulances between districts and within district will be assessed and modified to achieve optimal use.

- Evaluate current distribution of ambulances
- Develop guidelines for distribution of ambulances
- Modify distribution of ambulances under the guidelines

4-2) Develop clear guidelines for prioritisation of ambulance dispatch

- Review existing dispatch system of ambulances
- Organise a workshop to formulate dispatch guidelines
- Formulate guidelines
- Issue wall poster of guidelines

4-3) Train transportation officers and hospital administrators on prioritisation guidelines

- Develop training module and materials
- Conduct training of trainers
- Conduct training of transportation officers and hospital administrators

4-4) Train drivers on prioritisation guidelines

- Develop module and materials for training
- Conduct training of trainers
- Conduct training of ambulance drivers

4-5) Carry out audit of ambulance logbooks every six months

4-6) Conduct operational research on alternative transfer systems between villages and health facilities

Three types of operational research will be carried out. The first two aim to reduce the time period for accessing care by providing alternative means of transport. The last one aims to reduce both distance and time for access to care by providing a waiting home inside or near health facilities. These will be tested in a pilot study and assessed before considering wider implementation.

Research 1: Conduct pilot study on community co-operative transportation system

- Conduct needs assessment and pilot study on community co-operative transportation system in one TA
- Monitor use of the transportation system
- Evaluate effect of the transportation system

Research 2: Conduct pilot study on village level radio communication system and motorcycle ambulance

- Design and implement pilot study on village level radio communication system and motorcycle ambulance in four villages
- Monitor use of the system
- Evaluate effect of the radio communication system and motorcycle ambulances

Research 3: Conduct pilot study on waiting home for pregnant women

- Conduct needs assessment on waiting home for pregnant women with difficult access to health facilities
- Construct a waiting home in one hospital
- Monitor use of waiting home
- Evaluate effect of waiting home

5) Strengthen Reproductive Health Information System at district level

UNFPA in conjunction with MOHP and CHSU has proposed to introduce new indicators for reproductive health into the Health Management Information System. This project will collaborate with UNFPA's plan in order to avoid duplication of efforts and creation of unnecessary forms. The project will provide suggestions and support for implementation so that the data generated from the Reproductive Health Information System/Health Management Information System can be utilised to monitor the effect of interventions made by the project.

5-1) Review national training manual and forms for Reproductive Health Information System

5-2) Make any necessary modifications to forms

5-3) Train staff concerned in Reproductive Health Information System at district and health facility levels

- 5-4) Send generated data to the Project Support Group for compilation
- 5-5) Evaluate the information system

6) Strengthen research on maternal mortality and morbidity in Malawi

The proposed project promotes research to broaden the knowledge base and improve motivation among health workers in providing care and filling out the forms for the Reproductive Health Information System/Health Information System.

- 6-1) Produce confidential national report on maternal deaths based on annual hospital maternal mortality records
- 6-2) Investigate relationship between HIV infection and maternal mortality
- 6-3) Investigate incidence of maternal morbidity and prevalence of permanent complications related to pregnancy/delivery
- 6-4) Review all maternal deaths at the district level
 - Establish maternal mortality review technical committee
 - Re-establish hospital maternal mortality committees
 - Conduct training of hospital committee members in maternal deaths audit
 - Issue annual district maternal deaths report

7) Increase understanding of safe motherhood, gender and women's rights issues among women, family members, and community members

This objective will be achieved through IEC. IEC materials will be partially based on the findings of the community maternal death audit programme.

IEC activities

IEC activities will focus on the following:

- Increasing the recognition of danger signs and complications during pregnancy, delivery and the neonatal period by women and their families, as well as improving the response to such problems, i.e., seeking medical attention
- Increasing the understanding of the importance of the husband's role in safe motherhood by women, their husbands, and other family members
- Raising awareness on women's rights and gender issues

7-1) Conduct baseline studies

A baseline study will be conducted in each project district by the district project team with the assistance of the project support unit. Prior to implementation of the baseline studies, members of district project teams will be trained on how to conduct the study.

The baseline studies are expected to identify the existing barriers to successful promotion of safe motherhood and women's rights in the target population. Both quantitative and qualitative research tools including focus group discussions, in-depth interviews and observation will be used to conduct the baseline studies.

7-2) Design IEC activities

Information obtained from the baseline studies will be used to design appropriate interventions. The following will result from the baseline studies:

- Main IEC messages based on existing knowledge and beliefs in the communities
- Target populations: Although the IEC activities will target the whole district, some activities will be implemented in only certain villages at first, and then be expanded during the course of the project.

Implementation schedule for IEC activities

Detailed implementation plan for the maternal death audit programme (selection criteria of the communities, the number of the communities, etc.)

Behaviour change objectives

- Providers of the IEC messages
- Most appropriate and effective channels of information
- Form of IEC materials

7-3) Identify a group of community members as providers of IEC activities

The district project teams will conduct briefings with village leaders (chiefs, village health committee (VHC) members, etc.). These village leaders will identify possible providers of IEC activities. VHC members, religious leaders, initiation instructors, schoolteachers and TBAs are all possible providers.

7-4) Develop training modules and materials for training of IEC providers

A workshop will be held to develop training modules and materials.

7-5) Develop IEC materials

A workshop(s) will be held to develop IEC materials. Possible types of materials include the following: booklets, flip charts, thematic shows, dramas, radio series, and audio-visual materials. All IEC materials will be pre-tested in the community prior to implementation.

7-6) Conduct training of IEC providers

Participatory methods will be employed in the training. The training will include an explanation on how to use the materials and the importance of IEC activities, and an explanation on each safe motherhood issue, the target population, monitoring and evaluation.

7-7) Carry out planned IEC activities

7-8) Monitor IEC activities

Regular field visits will be done by the members of the district project team.

7-9) Evaluate IEC activities

Both quantitative and qualitative methods will be used to evaluate the IEC activities. The data will be compared to the findings of the baseline studies.

Community Maternal Death Audit Programme

7-10) Adapt existing materials and formulate working group

In order to implement the community maternal death audit programme, the existing materials will need to be reviewed and adapted if necessary to make them culturally appropriate. A working group comprised of approximately 10 persons from the district (including health workers and district government officials) will be formed to implement the programme.

7-11) Train working group

7-12) Train community members

7-13) Implement the programme

Members of the working group will be trained as trainers for the community activities. After selecting the communities where the programme will be implemented, a group of people in each community will be identified and trained.

7-14) Monitor the programme

The district working group will monitor the programme activities. They will also organise regular meetings (e.g., every six months) with community members and report the results of monitoring to the district project team. The reports will be issued every six months and will be utilised to improve future IEC activities.

8) Increase understanding of women's health, women's rights and gender issues among policy makers

8-1) Organise meetings with partners to develop IEC strategy

Experiences will be shared and an IEC strategy for policy makers will be developed.

8-2) Develop IEC materials targeting policy makers

Possible IEC materials include the following: booklets, brochures, and flyers.

8-3) Conduct IEC activities

8-4) Organise advocacy meetings and workshops

Advocacy meetings and workshops with policy makers will be held at the national and local levels through development committees (district, area, and village).

8-5) Monitor and evaluate IEC activities

Three to six months after IEC activities are implemented, the target groups (planners, decision makers, etc.) will be interviewed to find out whether or not the messages are reaching them. The findings from the interviews will be used to revise IEC materials.