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Phase One Report

Childbirth Emergency Phone Project in Milne Bay Province

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This report is the opinion of the authors and not necessarily of AusAID, Coffey International Development, the National Department of Health or the Milne Bay Provincial Health Authority.

Papua New Guinea

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Executive Summary

As a first-of-its-kind project in Papua New Guinea (PNG), the Childbirth Emergency Phone Project targets rural health facilities and aid posts in Milne Bay Province (MBP). Rural health workers are advised to call a toll-free number to seek advice and assistance in managing obstetric complications. Experienced labour ward staff at Alotau Provincial Hospital, including midwives, doctors, health extension officers (HEOs) and nurses, are available 24 hours a day to assist with emergency calls.

The trial project launched on 1 November 2012. This report provides initial findings from Phase One of the project. Early indications provide much valuable data, as outlined herein, while more detailed analysis of research data and wider coverage of research sites around the province will be presented when reporting on Phase Two of the project.

In brief, the findings indicate widespread enthusiasm for the project, with both rural health workers and labour ward staff pleased to be able to communicate more effectively regarding childbirth complications. During the three months from 1 November 2012 to 31 January 2013, there were 63 separate obstetric cases addressed in phone calls to the free-call number. Additional follow-up calls were made in relation to these cases, indicating that the phone was well-utilised during the quarter.

It is recommended that the Childbirth Emergency Phone project continue in MBP, with support from the Australian Agency for International Development (AusAID) extending into Phase Two of the project. The Chief Executive Officer (CEO) of the Milne Bay Provincial Health Authority (MBPHA), Mr. Billy Naidi, has indicated that the MBPHA would fund the phone number after AusAID funding concludes. Based on the successful implementation of this project in MBP, extension of the service to include other provinces of PNG is recommended.

Acronyms

AusAID	Australian Agency for International Development
CEO	Chief Executive Officer
CHW	Community health worker
EPSP	Economic and Public Sector Program
HEO	Health extension officer
ICTs	Information and communication technologies
ICT4H	ICTs for healthcare development
MBP	Milne Bay Province
MBPHA	Milne Bay Provincial Health Authority
mHealth	Health projects involving mobile phones
NDoH	National Department of Health
NHSRN	National Health Services Radio Network
O&G	Obstetric and gynaecological
PNG	Papua New Guinea
PPH	Postpartum haemorrhage
UPNG	University of Papua New Guinea
VBA	Village Birth Attendant
VSAT	Very Small Aperture Terminal (a satellite-based system that can provide phone services in remote areas)

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1. INTRODUCTION

1.1 Background to project

On 24 November 2011, a consultative forum was held in Port Moresby, PNG, with representatives of the health sector[1]. In the forum, various ideas for health projects involving mobile phones (known as mHealth projects) were raised and discussed. Professor Glen Mola from the University of Papua New Guinea (UPNG) School of Medicine and Health Sciences suggested a system for emergency phones connecting remote areas to labour wards.

Early in 2012, Dr. Amanda H A Watson was contracted to the Economic and Public Sector Program (EPSP), funded by AusAID and managed by Coffey International Development, to develop detailed proposals for three trial mobile phone projects, including Professor Glen Mola's idea. AusAID funding for a trial project in MBP was confirmed in mid-2012, and Dr. Watson was then contracted to implement the project. Dr. Watson was also tasked with implementing two other projects: in the education sector and the law and justice sector. The coordinated operation of three mobile phone projects was designed to ensure that lessons could be shared across sectors. The intention was that the lessons learnt would give indications as to how to utilise mobile phone technology in development efforts and service delivery in PNG.

In preparation for the mHealth trial, research assistant Mr. Gaius Sabumei was hired and re-located to Alotau in October 2012. The Childbirth Emergency Phone became active on 1 November 2012, with an official launching ceremony held in Alotau on 31 October 2012. Around the time of the launch, much excitement was generated about the Childbirth Emergency Phone, both in MBP and further afield. It soon became apparent that key stakeholders were keen to determine with some urgency the best course of action regarding communication options for maternal health cases throughout PNG[2]. Both the Government of PNG and AusAID are committed to addressing maternal health issues as an important priority[3], due to the high maternal mortality rate in PNG[4]. Therefore, it is important that this research project is utilised to inform strategy regarding health communication in PNG.

1.2 Key stakeholders

The Childbirth Emergency Phone Project is funded by AusAID through EPSP, managed by Coffey International Development. The National Department of Health (NDoH) is a key partner. Digicel PNG has offered some assistance, particularly the waiving of monthly fees for the first six months of the

[1] The consultative forum was organised by Dr. Amanda H A Watson, in partnership with Jeroen Segers and John Tacken of Conict Consultants.
[2] For example, maternal health communication options were the main agenda item in a meeting in Port Moresby on 22 October 2012 organised by Dr. Geoff Clark, Director of the AusAID Health Program in PNG, and attended by Dr. Amanda H A Watson, research consultant; Gary Seddon, Director of Business Solutions with Digicel PNG; Andrew Elborn of AusAID, and Conrad Bulenda of AusAID. Options were also discussed in a meeting between Dr. Amanda H A Watson and David Meehan, the head of JTAI operations in PNG, in Port Moresby on 19 December 2012.
[3] Ministerial Forum, 2011, p. 3.
[4] Ministerial Forum, 2011, p. 3.

project. In MBP, collaboration has been with the MBPHA, MBPHA Board, MBP Public Health Office, church health services (Catholic, Anglican and United Church), and rural health facilities.

1.3 Why Milne Bay Province was chosen

PNG has 22 provinces, representing diverse topographical and cultural contexts. Any project in one province is not necessarily replicable in other places. However, it is felt that lessons learnt can be more widely applied, with specific reference to each local or regional context. The maternal mortality rate is high throughout the country, although some places are notoriously troubled. In discussions about possible locations for this trial, numerous subject area experts suggested MBP as a strong candidate due to its concerning levels of maternal deaths[5]. MBP is a maritime province consisting of many islands, as well as coastal communities with no road access. The difficulty of travelling from islands to the hospital in Alotau provided a solid rationale for trialling support through telephony in MBP. MBP records of maternal deaths provide indications that most deaths are preventable[6].

MBP is one of the AusAID Health Program's five Priority Provinces[7]. It is also one of the first provinces to be trialling a new model of health service delivery, through the combination of the main hospital and the other health facilities under a newly established Provincial Health Authority[8]. This synthesis of health system management has created an ideal opportunity to run the phone line[9], while in other provinces division between the main hospital and other health facilities has had a negative impact on maternal health outcomes[10]. The Provincial Health Authority model is helpful for this project in two key respects: encouraging hospital-based staff to feel a sense of connection to rural facilities, and enabling more efficient organisation of transport when patient evacuation is required. MBP has widespread mobile phone reception, provided almost exclusively by Digicel PNG.

1.4 Setup of project

One officer, Dr. Amanda H A Watson, was solely responsible for establishing the project. This took three months, with support and assistance from EPSP colleagues, particularly the logistics and finance teams. A second officer, Mr. Gaius Sabumei, was hired in the lead-up to the launch, and provided invaluable help in the days leading up to the launch in MBP. The setup phase consisted of four key components: purchasing materials, stakeholder engagement, research design (see Section 2) and launching ceremony.

Materials purchased or acquired for this project included: maternal health books from the UPNG Bookshop; standard treatment manuals from the medical standards branch of NDoH; solar mobile phone chargers from Project Support Services in Lae; Digicel sim-based desktop handset from Digicel

[5] Consultative discussions with Prof. Glen Mola, Dr. Lahui Geita, Dr. Ligo Augerea, Dr. Miriam O'Connor and others.
[6] Kirby 2010, p. 3; Kirby 2011, p. 59; Ulbricht and Macdonald 2011.
[7] National Department of Health and AusAID 2011, p. 1.
[8] Ministerial Forum 2011, p. 12.
[9] Conversation with Billy Naidi in Alotau, March 17 2012.
[10] National Department of Health 2009, p. viii.

PNG, and a Digicel mobile phone from Digicel PNG. Research-related materials which were purchased included: one laptop computer; one desktop computer; two licenses for phone call recording software from Electrodata; a UPS device, and a portable audio recorder for use in research interviews.

A graphic artist was hired to design a logo for the project. Once the design was finalised, t-shirts, stickers and posters were printed. Stickers came in two sizes, one of which was small enough for placement on the back of mobile phone handsets (30mm by 60mm). Negotiations with Digicel PNG included the establishment of a suitable phone number, and contractual arrangements for a toll-free number. Some specific requirements were requested from Digicel, for example barring the phone from making outgoing calls.

Stakeholder engagement was a key part of project preparation. Relevant NDoH officers and AusAID staff were consulted as required. The board and senior managers of the MBPHA were consulted. Crucial to the success of the trial was ownership of the project by the labour ward staff and the wider obstetric and gynaecological (O&G) team at the hospital in Alotau. Effective engagement with these groups was possible only through project staff being in Alotau, as well as ongoing communication between visits.

Before the phone line went 'live', Professor Glen Mola and Dr. Miriam O'Connor travelled to Alotau and spent time with health managers and O&G team members. A key element of their visit was the consultative development of a clinical notes sheet to be used when answering emergency phone calls. Coaching of O&G team members in the use of this form included role plays of emergency phone calls.

The launching ceremony held on 31 October 2012 generated media coverage in PNG media (print, radio and television) as well as international media (notably Radio Australia) and online sites. The help of the AusAID Public Affairs unit and the EPSP communication officer enhanced the outcomes in relation to media coverage, particularly through the preparation of a high-quality media release. The program for the launch was developed by a local committee, and performances and speeches at the ceremony were by local staff. The ceremony was crucial for building the morale of O&G team members and encouraging them to feel confident and authorised to answer emergency calls.

1.5 Day-to-day operation of project

There are two facets of the operation of this project: the research component (see Section 2) and the non-research component. In the non-research part of the project, the project supervisor and the research assistant have constant engagement with MBPHA, Public Health Office, the Director of Curative Services at Alotau Provincial Hospital and rural health workers. Meetings with the CEO of the MBPHA, Mr. Billy Naidi, have been a priority during the establishment phase and also throughout the project. Such meetings occur whenever the project supervisor travels to Alotau and the CEO is at hand to have a briefing on the progress of the project.

The emergency phone is located in the labour ward. The research assistant ensures: the phone is fully charged; clinical notes sheets to be completed by the labour ward staff are in surplus, and the computer is continuing to record all calls.

The research assistant has been going out to rural health facilities distributing solar mobile phone chargers, standard treatment manuals and books. Stickers have also been distributed whilst carrying out awareness about the project. The public health office is being consulted by the research assistant with regard to every field trip. Attempts are made to relay a message through the VHF radio informing rural health officers of an impending trip. District Health Managers are also consulted.

Excited about the project are MBPHA's Dr. Perista Mamadi, EPSP's Mr. Samson Vartovo and MBPHA's Dr. Noel Yaubihi

Dr. Miriam O'Connor refining the clinical notes sheet

2. RESEARCH DESIGN

This trial project has incorporated well-designed and meaningful research, through a substantial investment in resources. Research questions and methods are outlined below, while research findings form the body of this report (see Section 3). Research was undertaken in an ethical manner, by adherence to accepted standards of good practice in research ethics**.** Guiding principles which informed the research included honesty, integrity, respect for participants, and responsible communication of research results.

2.1 Research questions

Primary Research Question:

Can the use of mobile phones and a free-call emergency number assist in improving maternal health outcomes and/or health system efficiency in Papua New Guinea?

Sub-Questions:

What are the benefits of mobile phone usage in the rural healthcare context, specifically opportunity production, capabilities enhancement, social enabling and knowledge generation?

What are the inter-related constraints to mobile phone usage in the rural healthcare context, specifically infrastructural, economic, technological, and socio-cultural factors?

Regarding communication systems, what are the key factors, benefits and barriers that contribute to, or detract from, healthcare system outcomes and health impacts?

Is the emergency phone methodology cost effective and efficient?

Is the emergency phone methodology scalable and sustainable?

2.2 Research methods

Interviews with rural health workers in health centres and aid posts have been undertaken in the health facilities visited. Interviews of recent mothers, village leaders and labour ward staff have also been completed. Further interviews will be undertaken as the officer goes out to other health facilities.

All phone calls to the emergency phone are recorded. Recordings have been taking place since the launching of this project on 1 November 2012.

Labour ward staff have been asked to note down all calls in a logbook. In addition, a clinical notes sheet was devised by Dr. Miriam O'Connor and Professor Glen Mola for labour ward staff to use when dealing with each new case.

2.3 Data included in Phase One report

Approximately 50 research interviews have been conducted, primarily with health workers. Analysed and included in this report are 18 interviews, as shown in Figure 1 (more detail is available in Appendix 1). The data represents eight rural health facilities in two districts: Alotau District and Kiriwina-Goodenough District. The audio files of recorded phone calls are yet to be analysed in detail. This report includes analysis of phone calls based on paperwork in the labour ward: logbook entries and completed clinical notes sheets.

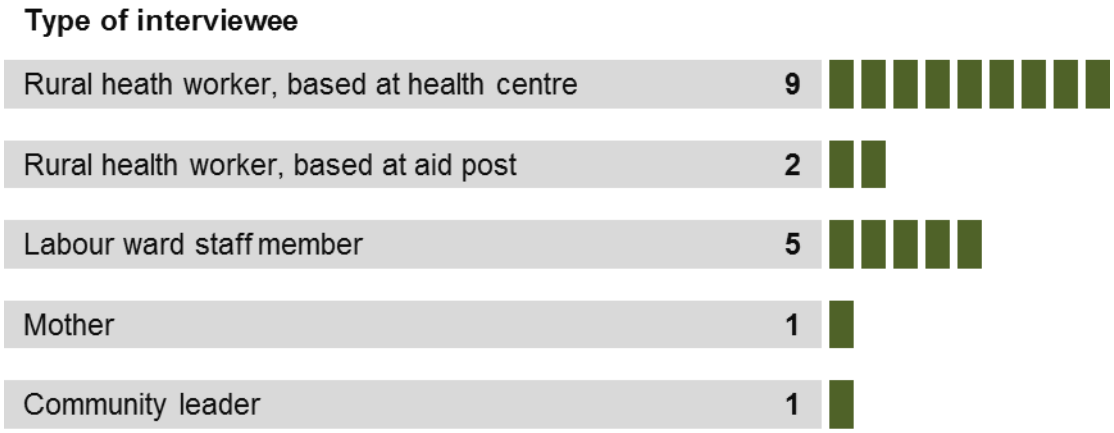

Figure 1: Interviews included in Phase One report

3. KEY FINDINGS

3.1 Communications

For years, communication regarding childbirth emergencies has remained challenging for health workers in MBP. The introduction of the National Health Services Radio Network (NHSRN) began in 1999[11] and included installation of HF/VHF radios in numerous rural health centres and at the hospital. This allowed significant improvement in communication between rural facilities and medical staff located in town, although the labour ward staff have repeatedly requested for a radio to be installed in the labour ward in addition to the present location on the hospital grounds which is at some distance from the labour ward.

Since the establishment of the NHSRN, emergencies have been communicated through to the hospital labour ward through the landline phone (an extension of the hospital switch) and the VHF radio situated at the revenue office. From well before the implementation of this project, health centres with working radios were calling in about obstetric cases. A challenge of using the radio located in the revenue office was that confidential information was discussed in a public space.

Many of the health centres once had VHF radios installed. However, most are not being serviced and repaired (see Appendix 3 for the current status of radios at the health centres visited thus far).
It was not until 2007 that mobile communication began to roll out to rural areas in PNG[12]. Since mobile phone network expansion, the usage of VHF radio for emergencies and other medical reasons has decreased. Mobile phone usage has typically incurred costs for individual health workers, although some health managers have attempted to provide mobile phone credit to staff[13].

> "It was [through] the use of private mobile phone that we found out about the mother and referral. From this we prepared for her arrival at the hospital."[14]

Mobile phones are portable, easy-to-use, and allow health workers to access help and support wherever they are located, including when they are out on patrols. They are cheap to purchase and can be readily at hand. Mobile phones enable private and confidential discussion of cases with staff talking on the labour ward extension, rather than the HF radio in the revenue office[15]. The Childbirth Emergency Phone project is helping rural health workers. They are calling in to get advice on obstetric cases. Table 1 summarises communication-related findings from research interviews.

[11] Erbs 2012, p. 6.
[12] Watson 2011, pp. 46-48.
[13] Informal conversation with a District Health Manager.
[14] Research Interview, Alotau Provincial Hospital Labour Ward Staff member, 26/12/12.
[15] During October 2012, the hospital switch landline extension in the labour ward was inoperable. This meant that during that period, all obstetric cases were discussed on the landline extension at the revenue office. This was unsatisfactory due to the confidential nature of matters discussed.

SITUATION BEFORE IMPLEMENTATION	CURRENT SITUATION	SOLUTIONS SUGGESTED BY INTERVIEWEES
-Communication was a substantial problem. VHF radios installed were rarely serviced. -Some facilities have radios, while others do not. -Health workers bought flex cards from their own money to make referrals and seek advice. -Many rural villagers speak only the local language and do not speak Tok Pisin and English. This makes it very difficult for the local people to understand health information given through awareness and health education.	-Sometimes health workers do not get through to the free-toll number due to poor network coverage or weather. -Sometimes sound quality is not clear during phone calls. -There can be a language barrier between workers with different levels of education (technical/medical terminology) -Rural health workers occasionally call in with non-obstetric emergencies. -Some health centres are working with church groups and companies in disseminating health education and awareness.	-Service all radios in all health facilities and install radios in aid posts. -The people need more health advocacy and awareness. -Extend mobile coverage to all health centres. -Extend the project to cater for other emergencies.

Table 1: Communication-related findings from research interviews

Communication has been a great problem for rural health workers due to the deteriorating VHF radio service and health facilities that do not have the equipment. However, the mobile phone network system has solved this problem for health facilities that have mobile coverage.

Out of the 11 rural health workers interviewed, 6 requested a VHF radio to be installed in their respective health centre. A further 3 rural health workers wanted their VHF radio to be serviced or fixed. Referring to this project, 2 labour ward staff members said that the new system is more private and that this is valuable when talking about confidential obstetric cases, rather than using the revenue office handset. Furthermore, 7 out of 11 rural health workers strongly recommended more emphasis to be put into informing and educating people on all medical illnesses, including pregnancy-related health.

Case Box One

The following is a case described by a rural health worker in December 2012:

"Straight after we got this information about the free-call to the labour ward, I had this retained placenta. And I went. For three days, this mother was, you know, placenta was retained, and when I went to the clinic site, straight away from there I talked to the labour ward staff and I got advice on what to do. Had I not, you know, if this project was not here and I didn't have any means to communicate, we could have lost this mother because she was already septicaemic. And so I find it very helpful. It's very good. From anywhere, any point, I could seek advice. Very isolated or what, I could seek advice and I can help the patients."

3.2 Phone calls

The labour ward is open, with staff in attendance, 24 hours a day, 7 days a week. The staff consists of midwives, HEOs, general nurses, community health workers (CHWs) and doctors. Staff in the labour ward have been asked to document in a logbook all calls received on the emergency phone. One factor indicated in the logbook is whether a call is about a new case or follow-up (see Figure 2 for a summary of calls logged regarding new cases).

In the month of November 2012, according to the logbook, there were phone calls about a total of 19 new cases: 17 were maternal cases, while 2 were non-maternal. In the month of December 2012, there were calls recorded in the logbook regarding 25 new cases: 19 calls for new obstetric cases and 6 non-obstetric cases. Within these two months, there was a total of 49 new cases (plus additional follow-up calls), of which 36 calls were obstetric cases and 13 were non-obstetric. Including follow-up calls, over 100 medical-related calls were made through the project line during those two months.

In the month of January 2013, the logbook indicated there were calls regarding 29 new cases: 27 calls for new obstetric cases and 2 calls for new non-obstetric cases. There were 22 follow-up calls, making up a total of 51 medical calls to the emergency phone line in January 2013.

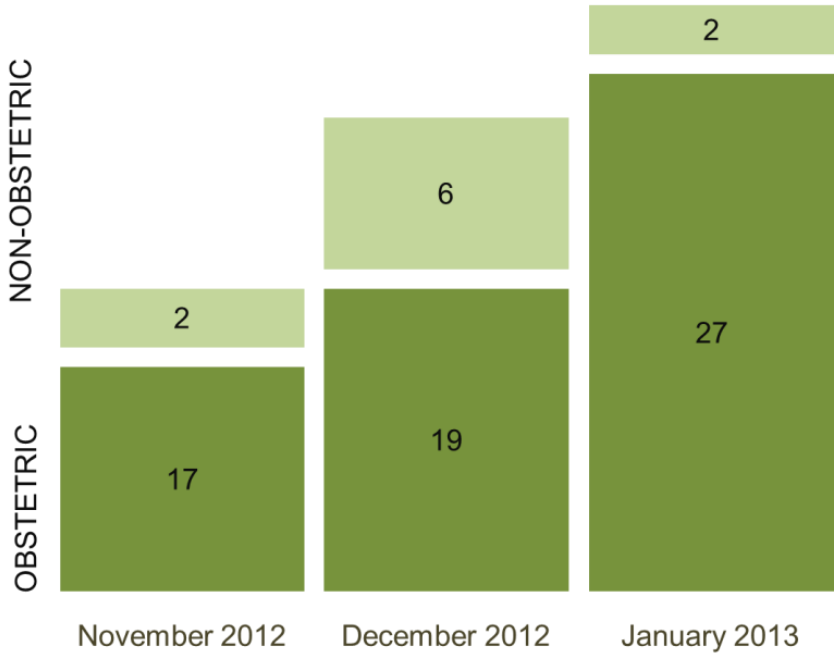

Figure 2: New cases indicated in labour ward logbook

Clinical notes sheets were completed for obstetric cases, as indicated in Figure 3.

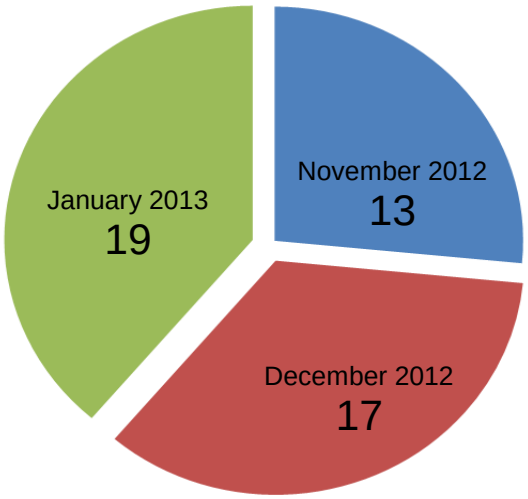

Figure 3: Cases indicated on clinical notes sheets

Analysis of clinical notes sheets for the three months from November 1 2012 to January 31 2013 follows. The most common type of case is antenatal (see Table 2).

MONTH	ANTENATAL	IN LABOUR	POSTPARTUM	NON-OBSTETRIC	NOT INDICATED
November 2012	5	1	3	1	3
December 2012	8	3	2	1	3
January 2013	11	4	2	2	0

Table 2: types of cases indicated on clinical notes sheets

The clinical notes sheets contained a field for staff to write in the 'main reason' for the call. However, this was completed infrequently. Case types were unclear, based on analysis of the clinical notes sheets by the non-clinicians in the research team. Some indication of case types was given in the logbook, as can be seen in Table 3.

NUMBER OF CASES RECORDED	ECLAMPSIA[16]	ECTOPIC PREGNANCY	ABORTION	RETAINED PLACENTA	PPH[17]	NOT CLEARLY STATED OR NON-OBSTETRIC
	4	3	5	4	7	40

Table 3: specific types of cases indicated in the logbook (cases recorded in November 2012, December 2012 and January 2013)

[16] Eclampsia, or seizures, is different to pre-eclampsia. There is no reference to pre-eclampsia in the logbook.
[17] Postpartum haemorrhage, or excessive bleeding after delivery.

Actions which were recommended for obstetric cases, based on information received in phone calls are shown in Table 4. As can be seen, in a number of cases, the recommended action was not noted on the clinical notes sheet.

MONTH	TRANSFER TO A HOSPITAL	KEEP AT FACILITY	UNKNOWN
November 2012	4	5	4
December 2012	6	8	3
January 2013	5	6	8

Table 4: actions resulting from cases indicated on clinical notes sheets

Other patterns observed in the clinical notes sheets are represented in Table 5.

PHONE USAGE	CASE TYPES
-Most calls are from health facilities that have mobile coverage and have been informed about the project, e.g. been informed by a visit from the research assistant, or with information from the District Health Manager. -The main use of the phone line is rural health workers calling in with obstetric cases and seeking advice on how to manage these cases. -Other calls are to arrange for patient transfer and transport. -Other calls are mainly seeking advice and getting a second opinion or reporting back on the outcome of a certain obstetric case. -The highest number of follow-up calls noted in the logbook was 6 calls about one case. -Between December and January, there was a decrease in non-obstetric calls coming in, when compared to the number of new obstetric cases, possibly reflecting increased awareness of the function of the phone line.	Most of the cases discussed over the phone were obstetric (antenatal, in labour and postpartum). No maternal deaths were recorded on the clinical notes sheets during the three months from November 1 2012 to January 31 2013.

Table 5: Patterns emerging from clinical notes sheets

The phone was used by rural health workers to call in with non-obstetric emergencies, such as appendicitis and a fitting child, to seek advice and make referrals. This was because they were unable to get through to the hospital using the main hospital line or VHF radio. A rural health worker said "it saves cost to call the emergency line, [rather] than calling the main line"[18]. During the calls, most advice was given by a HEO, midwife or doctor. All the general nurses and CHWs taking calls referred calls to the on-call HEO, midwife or doctor. Nurses and CHWs were reluctant to give advice.

[18] Comment from informal conversation with rural health worker, following research interview, 6/12/12.

When a doctor, HEO or midwife was not available, these staff advised the caller to call back to discuss the problem at a later time (for example, five minutes of ten minutes). The staff member would then try to locate an on-call HEO, midwife or doctor. From the research interviews, 4 out of 5 labour ward staff members recommended refresher training for all staff members of the labour ward, both covering skills required for giving advice on the emergency phone as well as other maternal health training.

3.3 Maternal health data

Many pregnant women do not make it to health centres for supervised delivery because of distance and other factors (see section 3.4 for a discussion of traditional beliefs restricting attendance for supervised deliveries in some communities). Many maternal, still birth and neonatal deaths are due to difficulties with communication, transportation, road infrastructure and weather. Some pregnant women do not attend antenatal clinics. Language barriers and misunderstanding of awareness and health education are also associated with maternal complications.

> "Most of our people around here, they think that health is, it's the health workers, that's our business. We have to go and attend to them. They don't really take ownership of [their health], you know."[19]

There are some indications that maternal and neonatal deaths occurring in villages are not being recorded in rural health centre statistics[20], with two different interview respondents mentioning this issue: "Mothers die in the village and the story is just being told to us by other people"[21]; "Mothers in the rural villages die when giving birth. We only hear stories"[22].

Customs and traditions have played a part in maternal complications in some places, such as the Trobriand Islands, where such beliefs forbid mothers from giving birth in the hands of a man or people outside the clan. Clan members may disapprove of women delivering at a health centre.

> "With some areas, I think there are some taboos. […] Because sometimes some mothers, as I am a male staff, male health worker, some mothers might feel too hesitant to, you know, approach me. […] "I sometimes, you know, when mothers come for clinic and all that, I encourage them. I mean, since there's no female staff here with me, I get somebody female to be with me: maybe a family relative, who is a female, to be with me."[23]

Poverty and low standard of living have also been cited as factors deterring some women from attending health facilities for supervised deliveries. This is because they are embarrassed about not having supplies such as linen and baby clothes. They are concerned about negative gossip and what

[19] Research Interview, Rural Health Worker, 6/12/12.
[20] Kirby 2010, p. 2.
[21] Research Interview, Rural Health Worker, 6/12/12.
[22] Research Interview, Rural Health Worker, 6/12/12.
[23] Research Interview, Rural Health Worker, 5/12/12.

people will think of them: "Most of the women here cannot afford basic babies needs like clothing and toiletries. So that is why mothers don't come for supervised deliveries at the health centre. They don't want to be the centre of women's gossips."[24] Other issues emerging in research interviews are represented in Table 6.

CHALLENGES FACED		SOLUTIONS SUGGESTED BY INTERVIEWEES
HEALTH-RELATED	**OTHER THAN HEALTH-RELATED**	
-Mothers far from the health facility deliver when on their way to the health facility. -Mothers giving birth in the village only come when there is a problem, by which time they can be quite unwell. -Pregnant women do not attend antenatal clinics. -Inexperienced health workers trying to manage labour complications, with minimal supervision and medical equipment. -Mothers sometimes do not bring their babies for immunisation.	-Transportation to the health centre can be a challenge (e.g. walking long distances). -There are no records of maternal deaths in villages. -There is no available waiting house at most health centres. -Too much tough physical work places strain on women's bodies, especially oil palm plantation workers[25].	-Mothers should come for antenatal clinics. -Giving incentives to women to encourage giving birth at the health centre[26]. -Build a waiting house at all health centres for pregnant women[27]. -Early detection and early referral. -Emphasis on giving health education and awareness in the local language.

Table 6: Maternal health issues raised in interviews

Newborn at Alotau Provincial Hospital

[24] Research Interview, Rural Health Worker, 22/01/13.
[25] This was mentioned by three rural health workers who are based within oil palm plantations. They believe this to be a factor, particularly with women continuing to work during pregnancy. They believe this leads to early labour.
[26] See also Kirby 2011, 59 about the value of baby bundles as incentives.
[27] While some health professionals do not support this approach, the construction of waiting houses at some facilities in MBP was suggested in a previous document (National Department of Health and AusAID 2011, p. 29).

3.4 Village birth attendants

Fieldwork by the authors in the Trobriand Islands, Kiriwina-Goodenough District, revealed the key role played by Village Birth Attendants (VBAs) in maternal healthcare in the area. In the Trobriand Islands, women typically do not go to a health facility for a supervised delivery[28]. Traditional beliefs dictate that a woman in labour must to be attended to only by a woman from her own clan. This precludes most health workers from attending to the woman in labour[29].

Losuia Health Centre ambulance

VBAs were introduced in 1990 by Joseph Anan, an African nutritionist who was in the Trobriand Islands to conduct research. He found that most of the women in the Trobriand Islands delivered at home and not at a health facility because of the restrictions imposed by their traditions.


Project Researcher Mr. Gaius Sabumei interviewing Sr. Rose Elliot, a rural health worker, at Omarakana Health Centre in Kiriwina-Goodenough District

Based on these findings, he instigated the idea of VBAs. Women were selected or appointed by villages. Bringing in the selected women from villages, Mr. Anan trained them to be VBAs on a voluntary basis. In the project, women were trained for 3 weeks before returning back to their villages. In the training, women were taught how to palpate, and how to deliver in a clean way. Sanitation and cleanliness of all equipment used was emphasised.

The health centre at Losuia issued VBAs with gloves, gauze and a kidney dish. With the dish, VBAs were taught how to assess if a woman has lost too much blood. When VBAs notice that the 500mL kidney dish is filled to the top, they know that the mother has lost a lot of blood, so they send the mother to the health centre. VBAs are still working in villages in the Trobriand Islands, but they are not being well-supported. The last VBA training was conducted in 2009. A rural health worker in Alotau District also mentioned a desire to see VBA training conducted in that locality.

[28] Kiriwina-Goodenough District has a low rate of supervised deliveries (National Department of Health and AusAID 2011, p. 15).
[29] According to the National Department of Health and AusAID (2011, p. 15), the existence of the VBA model may be the cause of the low number of supervised deliveries in Kiriwina-Goodenough District.

3.5 Health workers

All the rural health workers interviewed said they work 8 hours on weekdays, are on shift after hours and are on-call during weekends. They also talked about conducting clinics and patrols throughout catchment areas, visiting designated clinic points in villages. These rural health workers are CHWs, general nurses and a small number of midwives. At the health facilities visited (see Appendix 2), it was found that there was only one HEO working (one health centre out of 21). In other words, 20 health facilities visited did not have a HEO on staff. All the health centres visited had nursing officers as the Officer in Charge (OIC). Interviewees felt that a shortage of staff in rural health facilities has been an ongoing issue for some years.

> "Sometimes it's only one person working too and it's quite difficult. Especially when we have a mother in labour and then we also have other patients to attend to. And when the staff strength is down and only one person is working, it's very difficult."[30]

Other issues of concern for rural health workers are summarised in Table 7.

PROBLEMS FACED	SOLUTIONS SUGGESTED BY INTERVIEWEES
-Communication has been a significant problem. VHF radios installed were never serviced. Some facilities have radios while others do not. -No transportation for some facilities. -Since mobile network availability, workers have used their own money to seek help and advice. -No electricity/power to charge phone batteries. -Not much training given to health workers. -No funds to support health centre patrols. -Health workers calling are not always confident to do what labour ward staff advise them.	-Refresher training for all rural health workers. -Service all radios in all health facilities and install radios at aid posts. -More HEOs to work in rural health facilities. -More medical clinicians are needed in all health facilities in order to help with the workload.

Table 7: Issues of concern raised by rural health workers

[30] Research Interview, Rural Health Worker, 5/12/12.

3.6 Comments and views on the project

Here is a comment conveyed by a labour ward staff member:

> "It's easy, where we can help give advice. And that advice is a fast help. That advice or instructions on how to attend to the emergency, to those who do not have the skills or knowledge to attend to emergency cases, such as retained placenta that needs a manual removal. We can help over the phone."[31]

The following comments were made by rural health workers:

> "This project will definitely help solve this ongoing problem of communication. All health centres do have the same problem. However, it will be of great help to health centres which have mobile coverage thus all health workers do have mobile phones and have used their own money to buy flex card to refer and get help from doctors and HEOs. This project will help with the communication load all health centre has. We don't have any power supply here but with the portable solar charger, it will at least help the health workers with charging their phone batteries to be ready when there's any emergency."[32]

Sr. Rose Elliot is happy to charge her phone with the new solar charger given to Omarakana Health Centre

> "The project will very much help with emergency cases because I have had experience [of] many complications and see that we have the problem of communication in getting help to attend to these complications."[33]

> "In the past, when we were without doctor and HEO, we the nurses and CHW attend to the complications and we found it very hard. Even with the VHF radios, it did not really help in communicating with the hospitals. Even though with the mobile phone coming in, we still have problems with the power in charging our phone batteries. Moreover, we use our own units to call the doctors. So with this project, I believe it will very much help in minimising the problems."[34]

[31] Research Interview, Labour Ward Staff, 18/12/12.
[32] Research Interview, Rural Health Worker, 3/12/12.
[33] Research Interview, Rural Health Worker, 6/12/12.
[34] Research Interview, Rural Health Worker, 6/12/12.

"I think it's doing a good job. I think so far it's been just installed recently but I think so far we, it helped about 3 or 4 cases so far. We used and that helped us. Like, ahh, because we, with our case, we, like I said, sometimes we don't have flex. But since this thing was installed, it helped. When we don't have units in our phone, but we still manage to call out and discuss cases."[35]

"This is a very good project. It's doing a very good thing. Because, like, sometimes with using the normal process to go through to the hospital for such things, with mothers, like, we need urgent attention, especially when mother is about to deliver or is just losing blood or so and so. We need an urgent attention apart from the medical, the normal, routine thing we do, we call through to the hospital and we go through those, whatever, those ones at ahh, those receptionists and then it takes time for them to transfer the call. And then the ward, those general doctors or whatever, they are busy and they're doing other things and then it takes some time before we receive some feedbacks. Sometimes it takes a very long time; even we wait hours to receive call backs if they are busy with all this stuff. But I think this is much better. It's going directly through [to] the labour ward and somebody is there within few minutes answering the phone and our answer is just a bit faster than what it used to be before."[36]

Alice Siwawata, Health Extension Officer at Alotau Provincial Hospital

Health workers at Alotau Provincial Hospital practice answering emergency calls

[35] Research Interview, Rural Health Worker, 4/12/12.
[36] Research Interview, Rural Health Worker, 10/12/12.

4. LITERATURE

4.1 ICT4H model

The term 'information and communication technologies' (ICTs) can include "the whole range of technologies designed to access, process and transmit information"[37]. Mobile phones and landline phones are key ICTs. This research study aims to investigate the impact of the Childbirth Emergency Phone on childbirth healthcare service in MBP using the 'ICTs for healthcare development' (ICT4H) model designed by Chib et al. (see Figure 4).

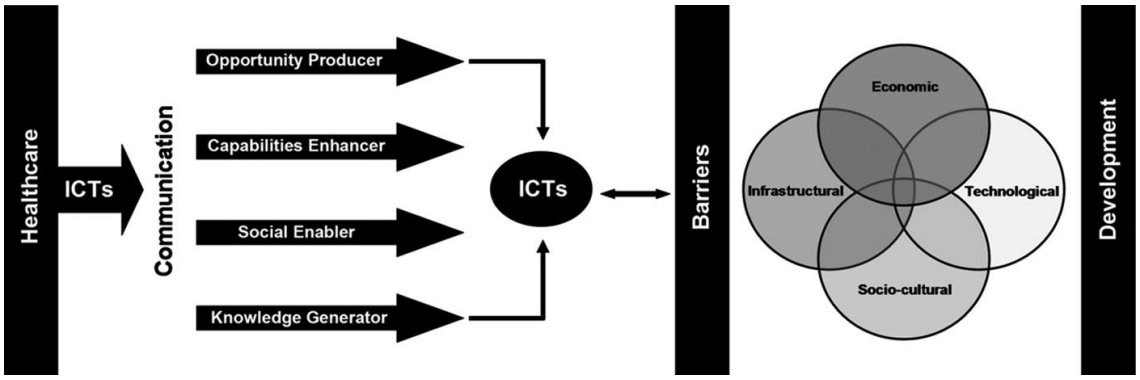

Figure 4: ICTs for healthcare development model[38]

The left-hand-side of the figure indicates four benefits enabled by the use of ICTs in healthcare delivery. Chib et al. explain these benefits, as follows: ICTs could be seen as opportunity producers if they "facilitate work productivity"[39] or increase the number of patients attended to[40]; ICTs could enhance the capability of a health system to "make more timely referrals"[41]; ICTs could enable social relationships "and professional engagement between healthcare workers"[42], and ICTs could generate knowledge "by improving access to medical information for healthcare workers"[43].

The right-hand-side of Figure 4 demonstrates four potential barriers to the effective implementation of ICTs. These barriers may act to limit the achievement of the benefits depicted on the left-hand-side of the diagram. The four barriers posed are inter-related, as follows: economic barriers to uptake or use of ICTs; infrastructural barriers such as limited "rollout of telecommunication networks, especially in remote areas"[44]; socio-cultural inhibitors, such as those evidenced in "traditional values and practices"[45] that may cause reluctance to utilise ICTs, and technological barriers, including difficulties with using ICTs stemming from "unfamiliarity and insufficient skills"[46].

[37] Weigel 2004, p. 19.
[38] Chib et al. 2008, pp. 349-352.
[39] Chib et al. 2008, p. 350.
[40] Chib et al. 2008, p. 350.
[41] Chib et al. 2008, p. 350.
[42] Chib et al. 2008, p. 350.
[43] Chib et al. 2008, p. 350.
[44] Chib et al. 2008, p. 351.
[45] Chib et al. 2008, p. 351.
[46] Chib et al. 2008, p. 351.

4.2 ICT4H model in relation to key findings

Guided by the theoretical framework of the ICT4H model, this study is utilising qualitative research methods to test the ICT4H model. The findings of the present study indicate some synergies with the model. Wide-ranging benefits of the Childbirth Emergency Phone have been found to relate in particular to two benefits indicated in the ICT4H model.

As an opportunity producer, the Childbirth Emergency Phone project has provided the following benefits:

- allowing communication to occur in settings where other forms of communication technology are not available,
- allowing health workers to phone the hospital even when they have no credit in their mobile phone,
- enabling communication with the best available level of midwifery advice,
- enabling communication at any time, including outside of office hours,
- enabling more patients to benefit from the healthcare expertise within the province,
- providing access to the best available level of midwifery advice while a patient is still located at a rural facility, and
- allowing supplies to be transported to a rural health facility as required (one notable case involved sending the required blood to a facility after a call about a mother, thus avoiding the need to transport the mother to Alotau).

The numerous benefits indicated here reflect the facilitation of work productivity[47] enabled through the use of communication technology. Health staff have become able to support one another in attending to a greater number of patients, "thus creating an opportunity for increased monetary benefits for the healthcare provider"[48].

In terms of being a capability enhancer, the Childbirth Emergency Phone project has allowed the following to occur:

- individual capabilities of health workers have been improved, for example in instances where a health worker has learnt a new skill (for an example, see Case Box Two),
- the capability of the healthcare system to "make more timely referrals to more advanced facilities"[49], usually Alotau Provincial Hospital, has been strengthened, and
- "the process of seeking for assistance"[50] from fellow health practitioners has been made easier.

Chib et al. studied a project in Indonesia in which rural midwives were given mobile phones[51]. The research found that the new tools were deemed to be capability enhancers[52]. Midwives "believed that mobile phones enhanced their ability to handle medical situations"[53]. Similarly in this case, the

[47] Chib et al. 2008, p. 350.
[48] Chib et al. 2008, p. 350.
[49] Chib et al. 2008, p. 350.
[50] Chib et al. 2008, p. 356.
[51] Chib et al. 2008.
[52] Chib et al. 2008, pp. 356-357.
[53] Chib et al. 2008, p. 356.

existence of the free-call number has enabled health workers in MBP to feel more confident in handling cases. In the Indonesian case, mobile phones were used during emergencies not only as a vital communication tool, but also for arranging transport of patients[54]. Likewise in this project in PNG, the free-call number has become helpful in providing timely support and also for coordinating transport of patients when necessary.

Strong indication of the Childbirth Emergency Phone project acting as a social enabler has not become apparent in the data analysed thus far. It is early in the project and clear evidence of the presence of the social enabler benefit is yet to come to light. One health worker did express a decreased sense of isolation and a feeling of being supported through this project: "it feels like the project is getting the labour ward staff to be with us in the rural area in times of emergencies"[55]. In the Indonesian example, "villagers' respect and trust towards midwives increased as a result of midwives' instantaneous access to expert medical advice"[56]. Within the health system, relationships also improved in the Indonesian case, including relationships with "colleagues and superiors in the healthcare hierarchy"[57]. Further research will need to be undertaken to ascertain whether similar outcomes are emerging from the project in MBP.

Case Box Two

The following is a case described by a staff member at the labour ward at the hospital in Alotau in November 2012:

"A good example happened yesterday when a nursing officer from a rural health centre called to the emergency phone line with a case of a mother with premature labour. The nursing officer checked the mother and she was […] afraid she would break the baby's water. Present were the HEO and Doctor so I was telling them the problem and relaying instructions to the nursing officer. The instruction was to rupture the membrane and guide the head down. The nursing officer was afraid, but did what she was advised to do over the phone. I assured her that everything will be alright if she does everything told. She did, and the mother delivered without problem. That was a good outcome. Initially, the nursing officer was determined to bring the mother to the hospital, but didn't when everything went well."

With regard to being seen as a knowledge generator, there has to date been sparse evidence that the Childbirth Emergency Phone project has worked in this way, at least in the first few months of its operation. Instead, health workers repeatedly made requests for training during research interviews and other discussions. Some limited evidence of the project generating knowledge has been found, with one rural health worker having said the project "will help bring our capabilities [up] more"[58], and in one case reported in an interview, a rural health worker was guided through managing an unfamiliar obstetric complication with help from labour ward staff (see Case Box Two). There may be potential for the project to help in generating skills and knowledge, for example labour ward staff learning more about common obstetric cases occurring in rural areas or rural

[54] Chib et al. 2008, p. 356.
[55] Informal conversation with a rural health worker.
[56] Chib et al. 2008, p. 357.
[57] Chib et al. 2008, p. 357.
[58] Research Interview, Rural Health Worker, 4/12/12.

workers learning new obstetric procedures. However, from the data gathered thus far, there is limited evidence of this benefit.

In the context of the Childbirth Emergency Phone project in MBP, economic barriers have largely been removed as a key feature of the project is the free-call phone line. Rural health workers have expressed much enthusiasm about being able to phone the hospital for free. Previously, they were spending their own money to make work-related phone calls on their personal mobile phones[59]. Labour ward staff are also pleased to be saving money on phone calls, given how much money they were previously spending on work-related calls:

> "200% [of the] time we use our own units to even communicate with the staff out at the rural or peripheries settings. And they call us at home, even using, they're using their own phones to call us at homes to give advices. So most times we use our own units, and it's quite expensive to be doing this every day."[60]

Technological barriers have not been significant as most health workers own mobile phones and know how to make phone calls with them. Thus, barriers around technological literacy (the ability of an individual to operate a piece of technology[61]) have been negligible. Infrastructural barriers have impact in remote areas without mobile phone coverage. Health managers have been asking what can be done to address the communication challenges faced in places without mobile phone network coverage, such as Woodlark Island and the Conflict Group. An infrastructure-related problem also became apparent when mobile phone network coverage was down for at least three days during fieldwork in the Trobriand Islands.

Socio-cultural impediments were particularly evident in the Trobriand Islands, where strongly held traditional beliefs prevent women from travelling to health facilities for supervised deliveries, even when they reside close to a health facility. This socio-cultural barrier can have significant negative impact on the ability of the project to be effective in that geographical area as health workers are typically not informed about patients until their complications are very well advanced. Socio-cultural barriers were also identified in a study of maternal deaths throughout MBP[62].

4.3 Other relevant literature

The maternal mortality rate in PNG is alarmingly high[63]. In fact, PNG has one of the highest maternal mortality rates in the world: 733 deaths per 100,000 live births[64]. In other words, there are "five women dying every day while giving birth"[65] and "currently a woman in rural PNG has a one in 25

[59] Erbs 2012, pp. 31-32.
[60] Research Interview, labour ward staff member, 30/10/12.
[61] Chib et al. 2008, p. 351.
[62] Kirby 2011, p. 58.
[63] Fifer 2010, p. 3; Giris et al. 2005, p. 5; Ministerial Forum 2011, p. 3.
[64] Department of National Planning and Monitoring 2010a, p. 28; Department of National Planning and Monitoring 2010b, p. 48.
[65] AusAID PNG 2010, p. 1.

chance of dying in her lifetime as a result of childbirth"[66]. It is sobering to note that the maternal mortality rate in PNG doubled between 1996 and 2006[67]. In addition, infant mortality is "57 deaths per 1,000 live births"[68]. There are "more women and children dying during birthing, than dying of malaria"[69], which is "a marker of both gender inequity and health system weakness"[70].

There is evidence that PNG's "leading indicators of women and children's health … are among the lowest in the Pacific"[71]. The maternal mortality rate is "four times higher than the average among Pacific islands"[72]. In addition, for every maternal death, another 30 women sustain "significant disability, much of it life-lasting"[73]. Rural health workers are often uncertain of what to do when birthing complications arise[74]. They typically have no support services or communication options.

Two key strategies of the government of PNG are to improve child survival and to improve maternal health[75]. Infant mortality and maternal mortality are key health indicators to be addressed under current government plans[76]. In line with this, AusAID is also prioritising infant and maternal health, particularly "saving the lives of poor women and children through greater access to quality maternal and child health services"[77].

The partnership agreement between the two governments acknowledges the importance of maternal health and has a "focus on improving the accessibility of women to a safe delivery environment through the rehabilitation of the rural health infrastructure (including facilities, staff housing and essential emergency obstetric equipment)"[78]. There is an intention to increase "the numbers of health workers with midwifery skills"[79]. While the emphasis of this particular project is slightly different, it nonetheless aims to address the same concerns about maternal mortality rates and childbirth complications. On a global scale, the Millennium Development Goals place great emphasis on women: there are goals which specifically address maternal health, child health and gender equality[80].

Maternal health is a complex problem requiring multi-faceted responses[81]. One area which is addressed by this project is the critical area of communication. Prior literature has emphasised the need for communication options to be available in all health facilities[82]. Communication is essential

[66] Department of National Planning and Monitoring 2010a, p. 28. Kirby calculates the lifetime risk in PNG to be as high as one in 20 (2011, p. 57).
[67] National Department of Health 2009, p. v.
[68] Department of National Planning and Monitoring 2010a, p. 28.
[69] Giris et al. 2005, p. 5.
[70] Morgan 2010, p. 7.
[71] Giris et al. 2005, p. 5.
[72] Department of National Planning and Monitoring 2010b, p. 10.
[73] National Department of Health 2009, p. vi.
[74] Kirby 2011, p. 59.
[75] Department of National Planning and Monitoring 2010a, p. 31.
[76] Department of National Planning and Monitoring 2010b, p. 48.
[77] Commonwealth of Australia 2011, p. 4.
[78] Ministerial Forum 2011, p. 3.
[79] Ministerial Forum 2011, p. 3.
[80] United Nations 2010.
[81] National Department of Health 2009.
[82] National Department of Health 2009, p. xiii; National Department of Health and AusAID 2011, p. 29. See also Erbs 2012, p. 14.

for crucial "timely referral"[83]. Along with family planning and care of patients throughout pregnancy and delivery, provision of and access to emergency obstetric care is vital for saving lives[84].

Due to the well-documented declining serviceability of the NHSRN[85], the incorporation of mobile phones into healthcare delivery systems has been recommended in a recent review of the NHSRN[86]. Nonetheless, the NHSRN remains vital[87], particularly in places with no mobile phone coverage[88]. Irrespective of the technology used, it is clear that "improving direct communication to a referral obstetrician can make a difference"[89] with respect to the number of women dying during labour.

The distribution of solar mobile phone chargers as part of this project is a strategy well-supported by previous research, which found that recharging mobile phone handset batteries is a challenging, and often costly, exercise in rural PNG[90].

[83] National Department of Health 2009, p. xiv (see also p. xx).
[84] National Department of Health 2009, p. xv (see also p. xix).
[85] Erbs 2012.
[86] Erbs 2012, p. 6.
[87] Erbs 2012.
[88] Erbs 2012, p. 13.
[89] Kirby 2011, p. 59.
[90] Watson 2011, p. 275.

5. LESSONS LEARNT

This section of the report will outline lessons learnt, based on implementation in MBP. It is hoped that this section would be instructional for any reader considering the establishment of a similar project. In most respects, project establishment and implementation has gone well and could be replicated. In certain key respects, lessons have been learnt which could be applied, in order to avoid repetition of these mistakes in other locations or projects.

5.1 Project launch

Early planning for the MBP trial did not envisage a project launch. Fortunately, this omission was identified in time to have a launch in Alotau. MBPHA set up a committee to organise the launch, for example inviting a women's group to perform, preparing the program, inviting key local figures etc. The launch was a joyful celebration and demonstrated MBPHA's capacity to improve service delivery and the shared desire of staff to decrease maternal mortality and improve maternal morbidity.

AusAID's Jimmy Morona and MBPHA CEO Billy Naidi

5.2 Radio announcements

From the outset, announcements about the project were aired on the local radio station. Announcements were addressed to health workers and included reference to the free-call phone number. Public broadcasting of the phone number led to certain individuals making prank calls to the free-call number. The exact number of prank calls received is unclear, but there was certainly a spate of such calls around the time of the radio announcement being aired. At other times, there were no prank calls. Prank calls were irritating for labour ward staff, particularly if they were attending to patients at the time of the call. An important lesson is to avoid broadcasting the phone number to the public in any way, including through radio broadcasting or publicly available printed materials.

Dr. Amanda Watson and Mr. Gaius Sabumei at NBC studios in Alotau

5.3 Coaching for labour ward staff

In advance of the phone line becoming live, labour ward staff were offered coaching around how to handle emergency calls. This was vital and must be included in any similar projects. Through the coaching process, labour ward staff came to feel confident about answering calls and offering advice. A clinical notes sheet was designed as a guide to assist with handling calls (see Appendix 4) and was incorporated into coaching sessions. Meetings at which local health authorities were in attendance confirmed that labour ward staff had the authority to answer calls and offer advice.

5.4 Logistics

The logistics of planning and coordinating travel to rural areas of PNG is time-consuming and is most efficient when done in close consultation with an officer with detailed local knowledge. While the trial in MBP has gone well overall, it may have been enhanced with the addition of a logistics officer with local knowledge and contacts. This would have allowed the project officer to concentrate on awareness-raising, stakeholder engagement and other core functions.

If a local health officer could be assigned to travel with the project officer on all field trips, this would improve engagement with staff at health facilities. Prior contact with health facilities is beneficial, and can be facilitated through the public health office or through District Health Managers. Such advance discussions would identify operational dates of health centres before going there, so officers are more likely to be free for meetings when project staff visit.

Stickers featuring the free-call number were printed in two sizes: large stickers for health workers to place on folders, patrol kits and so on, and very small stickers for placement on mobile phone handsets. In the latter case, the initial print run proved ineffective as the paper stickers quickly faded through regular handling. A second printer was engaged to produce plastic stickers, designed to be more long-lasting.

It is advisable for distribution of materials, such as solar chargers and books, to be conducted at health facilities, rather than when staff are visiting town, as experience has shown that the latter approach can lead to goods not being located or used in the intended manner. In the MBP trial, solar mobile phone chargers have been given to health centres but not to aid posts. However, aid posts have been requesting them. Project planning could have considered inclusion of aid posts in all aspects of the project, including distribution of maternal health books and solar mobile phone chargers to aid posts.

The free-call line has been blocked for outgoing calls. The idea of this is to ensure that the line is free for any incoming emergency calls. However, labour ward staff were not initially clear that they could use the pre-existing hospital switch extension for follow-up calls relating to emergency cases. It is important to explain clearly to labour ward staff that they can use the hospital line to follow up cases with rural health workers.

5.5 Local context

It is valuable to undertake research in order to understand the local cultural context before visiting rural areas. Such research aids in ensuring culturally appropriate and sensitive community entry. Community exit strategies are important and include being honest about project goals and limitations and not making promises that are undeliverable. All contact with rural staff and communities should be undertaken in an empathetic manner, using simple, clear language. Project officers must carry with them at all times a letter of authorisation from an appropriate local authority, for example the CEO of MBPHA.

5.6 Administration

As a research project, this pilot required labour ward staff to complete a logbook for all calls, as well as clinical notes sheets for each new obstetric case. Thus the project increased the burden of administration for already busy health staff. In the first three months of the trial, the logbook was filled in accurately and diligently. As of March 2013, the logbook has been left blank. Clinical notes sheets have been started for most obstetric cases, although not all fields have been completed.

In March 2013, labour ward staff informed project staff that the clinical notes sheet was too complicated. Discussions and consultation resulted in the design of a simplified, one-page clinical notes sheet. The original clinical notes sheet, designed by Dr. Miriam O'Connor and Professor Glen Mola as a draft to be altered as required, is attached in Appendix 4. The simplified clinical notes sheet preferred by labour ward staff is attached in Appendix 5.

6. RECOMMENDATIONS

6.1 Milne Bay Province

It is recommended that the Childbirth Emergency Phone in MBP should continue to remain in operation. The project is seen to be beneficial, as evidenced in repeated assertions by various key stakeholders, in particular rural health workers and labour ward staff[91]. The project is referred to as "saving women's lives". The project is helping rural health workers to feel supported. It also saves them money. From the calls received to date, it can be seen that at least 17 obstetric cases have been discussed on the phone line each month. It is evident that the phone line is helping to address a gap in the service of women's health needs. For a relatively low cost, the project is effective and it is recommended that the Childbirth Emergency Phone should remain in operation. MBPHA has made a commitment to support and fund this phone line once AusAID involvement is concluded.

In MBP, the following recommendations could assist in improving communication for the management of obstetric emergencies: placement of a VHF radio in the labour ward; repair of VHF radios in rural health facilities; additional training for rural health workers[92]; positioning HEOs and midwives in rural areas[93], and rotating health staff between urban and rural areas to increase understanding of both settings[94]. Repeated encouragement should be made for rural health workers to call early when problems arise in obstetric cases.

6.2 Phase Two

This report marks the completion of Phase One of the project. It is recommended that the project continue to Phase Two. Phase Two should be supported and funded by AusAID, in partnership with MBPHA, whilst maintaining ongoing working relationships with NDoH and Digicel PNG. Phase One has involved distribution of solar mobile phone chargers, books and stickers to health centres in two of the four districts in MBP. Implementation of Phase Two would focus on the remaining two districts, with the team conducting awareness, conducting research and distributing materials at the health centres that have not yet been visited. Phase Two may also allow for input from an obstetric or medical professional into the analysis of clinical notes sheets and phone calls. Funding for Phase Two would also allow for more detailed analysis of the project with respect to the ICT4H model[95]. The benefit of continuing to Phase Two of the project is that it would allow time for: further analysis of existing data, more extension work, and collection of additional data[96]. This would result in solid and rigorous data analysis, with a strong theoretical basis[97].

[91] In both informal conversations and in research interviews. See Section 3.6 of this report for examples.
[92] Generally in PNG, professional development opportunities for health workers are below acceptable levels (National Department of Health 2009, p. x). Additional training for health workers in MBP was also suggested in a previous document (National Department of Health and AusAID 2011, p. 29).
[93] Placement of additional midwives in rural areas in MBP was also suggested in a previous document (National Department of Health and AusAID 2011, p. 29).
[94] This strategy was also suggested previously (National Department of Health and AusAID 2011, p. 29).
[95] See Chapter 4.
[96] If desired, other health-related data could be collected during project trips (for example, data for National Health Information Survey).
[97] According to Kelly and Minges (2012, p. 5), the mHealth field is suffering from a paucity of thorough research.

6.3 Other Provinces

Given the findings in MBP, an argument could be made for making this kind of service available in other provinces of PNG. There are three main options for how this could be set up: establish similar projects in every province; open a call centre in a central place, or incorporate both approaches into a purpose-built system. The third option, the purpose-built system, is the recommended approach. As shown in Figure 5, this would involve rural health workers calling to a central call centre and being transferred to their respective labour wards. Personnel at the central call centre would not need to be medical clinicians. All calls would be monitored and transferred promptly, with simple, brief questions being asked by call centre staff, such as where the call is coming from (which province) and what kind of health case has prompted the call (obstetric or non-obstetric).

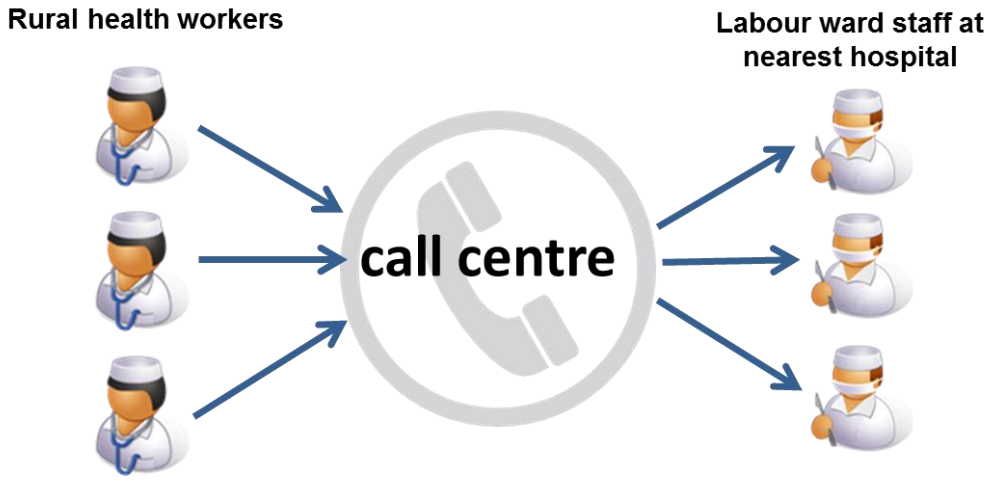

Figure 5: Proposed system for multi-province obstetric phones

The benefits of adopting the approach shown in Figure 5 are: the establishment of a common phone number across the country (rather than 22 different phone numbers); not requiring medical clinicians to be based at a call centre; utilising the skills and knowledge of labour ward staff members; local decision-making, approval and coordination of patient transfers (fuel, dinghy, ambulance etc); use of appropriate language (local dialect of Tok Pisin, police Motu etc), and utilising local knowledge. In addition, call centre staff could quickly and easily establish whether each caller is a health worker, thus screening out any prank calls.

A phased approach to the introduction of this system could be adopted, with additional provinces being added in sequence. Expansion of the project to each new province could be conducted as either a research project or a non-research project (implementation only). Each province could be given the choice as to whether they wish for the early stages of establishment to include research. It would cost less to expand to each new province as a non-research project. Including each new province would involve: consulting key stakeholders in the province; ordering equipment such as solar mobile phone chargers; offering coaching to labour ward staff in how to answer calls, and conducting awareness visits to rural health facilities. Research sites would also incorporate research interviews, recording of phone calls and analysis of data. Non-research sites would be cheaper and

quicker to establish. At the central call centre level, research could be conducted, with data analysis to ascertain the type of calls coming in, the time of day, the location, etc.

It is estimated that stakeholder engagement in a province should commence no less than three months prior to the phone line becoming available in that province. At that time, a project launch should be held, organised jointly with local health authorities. At least one locally based project officer should be in place for the first stage of the phone line's availability. Primary activities would involve travelling to rural health facilities to distribute project materials and conduct awareness about the project. The length of time required for the local officer's employment contract would be some months, depending on the number of health facilities to be visited, the travel times involved, and whether or not research interviews are planned. In the long-term, once the system is well established for obstetric cases, it may be possible to expand it to include non-obstetric cases, with calls being transferred to hospital accident and emergency wards.

References

AusAID PNG. (2010), *TokTaim: AusAID PNG Update*, Edition 13, October – December.

Chib, Arul, Lwin, May O., Ang, Justina, Lin, Hsu and Santoso, Fiana (2008), Midwives and Mobiles: Using ICTs to Improve Healthcare in Aceh Besar, Indonesia. Asian Journal of Communication, 18:4, 348-364.

Commonwealth of Australia. (2011), *An Effective Aid Program for Australia: Making a real difference—Delivering real results*.

Department of National Planning and Monitoring. (2010a), *Papua New Guinea Medium Term Development Plan 2011-2015*, Port Moresby. ISBN: 978-9980-86-261-7.

Department of National Planning and Monitoring. (2010b), *Papua New Guinea Development Strategic Plan 2010-2030*, Port Moresby. ISBN: 978-9980-86-235-8.

Erbs, Andrew (2012), NDoH National Health Services Radio Network Review: Options to strengthen and support rural and remote communications in the health sector for PNG, February.

Fifer, D. (2010), Comment. *AV: Australian Volunteers International Magazine* (2): 3.

Giris, J., T. Rynkiewich, I. Dick Kapinias and P. Winfrey. (2005), *Emerging Issues for Women and Children in Papua New Guinea*. Goroka, PNG: Melanesian Institute.

Kelly, Tim and Michael Minges (2012), Executive Summary, pp. 3-7, in The World Bank, Maximising Mobile: Information and Communications for Development, Washington DC.

Kirby, Barry (2010), Too Far to Travel: Maternal Mortality in Milne Bay Province: Beyond the Numbers, November 23.

Kirby, Barry (2011), Maternal Deaths in PNG. O&G Magazine Australia, 13:3, 57-59.

Ministerial Forum. (2011), Schedule to the Papua New Guinea – Australia Partnership for Development, Priority Outcome 2: Health and HIV/AIDS, Partnership for Development Between the Government of Papua New Guinea and the Government of Australia, 12 October.

Morgan, A. (2010), MDG5: A Comprehensive Approach Required. *AV: Australian Volunteers International Magazine* (2): 6-7.

National Department of Health. (2009), Ministerial Taskforce on Maternal Health in Papua New Guinea, Report, May 2009.

National Department of Health and AusAID. (2011), Milne Bay Provincial Health Capacity Diagnostic Assessment, 5-9 December, Draft Report.

Ulbricht, J. and Macdonald, E. (2012), Where Childbirth is Risky and Dangerous Business, *Sydney Morning Herald*, March 8.

United Nations. (2010), *Millennium Development Goals*, http://www.un.org/millenniumgoals/, accessed March 7 2012.

Watson, Amanda H A (2011), The Mobile Phone: The New Communication Drum of Papua New Guinea, unpublished PhD thesis, Queensland University of Technology, available from http://eprints.qut.edu.au/47170/

Weigel, G. (2004), Part 1: ICT4D Today - Enhancing Knowledge and People-centred Communication for Development and Poverty Reduction. In ICT4D - Connecting People for a Better World: Lessons, Innovations and Perspectives of Information and Communication Technologies in Development, eds. G. Weigel and D. Waldburger, 15-42. Switzerland: Swiss Agency for Development and Cooperation, and the Global Knowledge Partnership, Malaysia.

Appendices

Appendix 1: Interviews included in Phase One report

Appendix 2: Health facilities visited

Appendix 3: Communications at health facilities

Appendix 4: Original clinical notes sheet

Appendix 5: Simplified clinical notes sheet

Appendix 1: Interviews included in Phase One report

NAME OF FACILITY	TYPE OF FACILITY	DISTRICT	TYPE OF INTERVIEWEE
Nube	Health Centre	Alotau	Rural health worker, based at health centre
Nube	Health Centre	Alotau	Rural health worker, based at health centre
Nube	Health Centre	Alotau	Rural health worker, based at health centre
Sagarai	Sub-Health Centre	Alotau	Rural health worker, based at health centre
Ho'owalai	Health Centre – not registered	Alotau	Rural health worker, based at health centre
Ho'owalai	Health Centre – not registered	Alotau	Rural health worker, based at health centre
Mariawata	Company clinic (like an aid post)	Alotau	Rural health worker, based at aid post
Losuia	Health Centre	Kiriwina-Goodenough	Rural health worker, based at health centre
Garuahi	Health Centre	Alotau	Rural health worker, based at health centre
Toupota	Aid post	Alotau	Rural health worker, based at aid post
Kitava	Health Centre	Kiriwina-Goodenough	Rural health worker, based at health centre
Alotau	Hospital	Alotau	Labour ward staff member
Alotau	Hospital	Alotau	Labour ward staff member
Alotau	Hospital	Alotau	Labour ward staff member
Alotau	Hospital	Alotau	Labour ward staff member
Alotau	Hospital	Alotau	Labour ward staff member
Sagarai	Sub-Health Centre	Alotau	Community leader
Nube	Health Centre	Alotau	Mother

Appendix 2: Health facilities visited

NAME OF FACILITY	TYPE OF FACILITY	AGENCY	DISTRICT
Nube	Health centre	United Church	Alotau
Sagarai	Health centre	Government	Alotau
Ho'owalai	Health centre	Catholic Church	Alotau
Daio	Health centre	Catholic Church	Alotau
Garuahi	Health centre	Anglican Church	Alotau
East Cape	Health centre	United Church	Alotau
Losuia	Health centre	Government	Kiriwina-Goodenough
Omarakana	Health centre	Government	Kiriwina-Goodenough
Kitava	Health centre	Government	Kiriwina-Goodenough
Gurney	Health centre	Government	Alotau
Hagita	Company clinic	Company	Alotau
Huhuna	Aid post	Government	Alotau
Watunou	Aid post	Government	Alotau
Bubuleta	Aid post	Catholic Church	Alotau
Taopota	Aid post	United Church	Alotau
Naura	Aid post	Government	Alotau
Mariawata	Company clinic	Company	Alotau
Sagarai	Company clinic	Company	Alotau
Taupowada	Aid post	Government	Kiriwina-Goodenough
Ketuvi	Aid post	Government	Kiriwina-Goodenough
Kaiboli	Aid post	Government	Kiriwina-Goodenough

Appendix 3: Communications at health facilities

NAME OF FACILITY	LANDLINE		MOBILE COVERAGE	VSAT	VHF RADIO	
	STATUS	WORK DESCRIPTION			STATUS	WORK DESCRIPTION
Sagarai	NIL	NIL	YES	NIL	NIL	REQUIRED
Ho'owalai	NIL	NIL	YES	NIL	NIL	REQUIRED
Daio	NIL	NIL	YES	NIL	WORKING	NEEDS SERVICE
Garuahi	YES	NOT WORKING	YES – 50 METRES	YES – NOT WORKING	WORKING	NEEDS SERVICE
East Cape	YES	NOT WORKING	YES	YES – NOT WORKING	WORKING	NEEDS SERVICE
Nube	NIL	NIL	YES	NIL	NOT WORKING	NEEDS SERVICE AND REPAIR
Losuia	YES	NOT WORKING	YES	NIL	NOT WORKING	NEEDS SERVICE AND REPAIR
Kitava	NIL	NIL	YES – POOR – 1 KILOMETRE	NIL	NOT WORKING	NEEDS REPAIR AND SERVICE
Omarakana	NIL	NIL	YES	NIL	NOT WORKING	NEEDS SERVICE AND REPAIR

Appendix 4:
Original clinical notes sheet

Name of staff member taking initial history and giving advice ..... NO/CHEO/MW/MO (circle)	**Time:** ..... a.m./p.m., **Day**..... & **Date**...../...../..... **Enter the phone number that appears on the Hotline phone** .....

What is <u>main</u> reason you are ringing the Hotline?			Is this the 1st call you have made about this patient? **Y/N**	If yes: when did you make the first call? .....am/pm ...../...../.....

1. Establish if is *immediately* life threatening (ie problem with airway, shocked ++) by asking the following questions:					
Can she talk to you? **Y/N**	Is she very SOB? **Y/N**	Is she agitated/confused or talking nonsense? **Y/N**	Is she bleeding now or has she bled a lot? **No bleeding / a small amount / a big amount**		Dr ..... called at ..... a.m./p.m. to come to <u>urgently</u> take call/ring back
Current Observations: ⇨	Resp. Rate =	Pulse =	BP =	Temperature =	

ACTION for immediately life-threatening emergency:	**1. Calm the Health Worker if needed and explain you and your team will help them.** **2. Get colleague to urgently call for MO to attend and take the call/call back** **3. Give emergency advice (DRABC etc) for initial resuscitation of the pregnant woman**

2. Once any immediately life-threatening problem is excluded or under control, get caller and patient information. You *may* need to go to 3 (below first)				
Name of patient:	Facility name:	Name of *health worker calling* ..... CHW/NO/HEO/MW	Name of *worker caring for patient:* ..... CHW/NO/HEO/MW	Phone number of your facility labour room's Hotline
	Age	Number of previous pregnancies/deliveries	How many weeks/months pregnant is she? .....wks/months (circle)	☐ Antenatal ☐ In labour ☐ Post partum ☐ Non-obstetric patient

3. If not *immediately* life threatening (as in 1, above) but <u>still an emergency</u>, get further information:				
ASK: "Is the main problem....." .....any of the following:			**ACTION** **See Hotline Flipchart on....**	**2010 O&G STM page/s**
i.	**Bleeding?** Y/N APH/PPH/retained placenta /miscarriage (Circle)	⇨ **Then go to flipchart &/or O&G STM** ⇨	APH or PPH or MISCARRIAGE/ECTOPIC Resuscitation	See references to relevant pages which will be on the new Hotline flipcharts
ii.	**Unconscious/agitated/confused/unable to cooperate? Y/N**		Shock/maternal collapse and meningitis & malaria	
iii.	**Fitting or high BP? Y/N**		PET/eclampsia/meningitis & malaria	
iv.	**Fever or sepsis? Y/N**		Sepsis	
v.	**Poor progress in labour Y/N**		Progress in labour	
vi.	**SOB +++ Y/N**		Severe breathlessness	
vii.	**Other problem** (see section, 'more details' ....below) Y/N		Discuss with appropriate Doctor, who can then call back	

4. Ask for more history and clinical observations that might be important							
Previous CS **Y/N**	Previous SB or NND	Clinical anaemia **Pale + / ++ / +++**	Fundal ht .....**cm**	Presentation & Station of PP	Contractions **.....seconds/.....minutes**	Cervical dilatation **.....cm**	FHR: **Present/absent**

5. Ask: "Does your patient have a different problem to the emergencies I have already asked about?"(describe)

.....

.....

6. M.O. (Dr. .....) called at ..... a.m./p.m.to notify re this case

ADVICE/MANAGEMENT PLAN

Initial advice given by MO/MW/CHEO/NO:	**Call back plan:**
☐ per Hotline Emergency Obstetric Flip Chart/s .....(state which flip charts)	☐ **Special arrangement:** at .....a.m./p.m. today/tomorrow by MO/MW/C'HEO
☐ Per 2010 O&G STM	☐ **Routine**(by MO, this evening if now morning, tomorrow morning if now night)
☐ Any other advice given	
⇩ **If problem stabilizes, additional management recommended:** ⇩	⇩ **If the patient dies in a facility or during transfer:** ⇩
☐ Arrange transfer (when resuscitated and stable) to AGH using usual protocol	1. Support the Health Worker: ask them if they have any questions for you. Consider ringing them back in a few days to discuss further. Encourage them to discuss openly with the family.
☐ Keep her at facility and continue management. Call back any time.	2. Encourage the Health Worker and OIC to complete the *Maternal Mortality Report* form (if they don't have one, suggest they just write it using the example in the 2010 O&G STM, page 96
If all goes well, before going home check: ☐ She knows the *Warning Signs* ☐ There is an appropriate *plan for review* by health worker ☐ Has adequate *Family Planning plan* ☐ Give her advice re importance of *Supervised Health Facility Delivery* in any future pregnancy (FOR ALL WOMEN)	3. Ask them to ring the Hotline and let you know, then get the MO to complete a *Maternal Mortality Report* form as well **MATERNAL DEATH on** ...../ ...../..... **at Facility / AGH / Other place**.....

Appendix 5:
Simplified clinical notes sheet

Name of the staff member taking the initial call?		
Date and Time of call?		
Phone number on hotline phone?		
Patient details	Name? Age? Facility name? Parity and Gravidity? Gestational age?	
What is **main reason** for ringing the hotline?		
Details of the main problem and patient's condition?		
Clinical Observations?	Previous C/S? Previous SB or NND? Clinical anaemia? Fundal ht?	Presentation/ Station? Contractions (D/F)? Cervical dilatation? FHR?
Patients **vital signs**	Resp Rate? Pulse?	BP? Temp?
Does the patient have any **other previous or current medical issues**?		
Type of case	**Antenatal?** **In labour?** **Postpartum?** **Non-obstetric case?**	
Action	**Is the case life threatening?** **Is the case non-life threatening?**	Requires immediate referral Give advice/ use flipcharts
M.O/ HEO/ senior midwife called to notify about this case?	Name? Date/Time?	
Advice given to caller?		
Management plan/ **Follow up** arrangements?	Arrange transfer to AGH using protocol? Keep at facility and continue management and follow up calls?	
Maternal death (if there is a death at facility ask them to call at let you know)	Maternal Death Date? At Facility/ AGH? Maternal Mortality Report filled in by M.O? Y/N	

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