

## Maternal health phone line: Analysis of first phase results

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### Abstract

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 paper provides initial findings from the first phase of the project. Early indications provide much valuable data, indicating 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.

**Key words:** Aid project evaluation, Australian aid, childbirth, communication, health, maternal health, maternal morbidity, maternal mortality, Milne Bay Province, mobile communication network, mobile phone, Papua New Guinea, phone, rural health, telephone.

### Introduction

The Childbirth Emergency Phone is a project of the Milne Bay Provincial Health Authority, funded by the Australian Agency for International Development (AusAID) through the Economic and Public Sector Program, managed by Coffey International Development. The National Department of Health is a key partner. Professor Glen Mola of the University of Papua New Guinea School of Medicine and Health Sciences suggested the establishment of an emergency phone connecting remote areas to labour wards. The authors have designed and implemented the project in Milne Bay Province (MBP). The project has involved the establishment of a free-call phone number for rural health workers to phone during childbirth complications or for other maternal health problems. The phone handset is located in the labour ward of the hospital in Alotau. A complementary element of the project has involved the distribution of solar mobile phone chargers to health centres throughout the province.

MBP has concerning levels of maternal deaths. MBP is a maritime province consisting of many islands, as well as coastal communities with no road access. The difficulty of travelling by sea 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 (Kirby 2010, p. 3; Kirby 2011, p. 59, pp. 100-101; Ulbricht and Macdonald 2011).

MBP is 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 (Ministerial Forum 2011, p. 12). This synthesis of health system management has created an ideal opportunity to run the phone line, while in other provinces division between the main hospital and other health facilities has had a negative impact on maternal health outcomes (National Department of Health 2009, p. viii). MBP has widespread mobile phone reception, provided almost exclusively by Digicel PNG.

### **Maternal health and communication**

The maternal mortality rate in PNG is alarmingly high (Fifer 2010, p. 3; Giris et al. 2005, p. 5; Ministerial Forum 2011, p. 3). In fact, PNG has one of the highest maternal mortality rates in the world: 733 deaths per 100,000 live births (Department of National Planning and Monitoring 2010a, p. 28; Department of National Planning and Monitoring 2010b, p. 48). In other words, there are “five women dying every day while giving birth” (AusAID PNG 2010, p. 1) and “currently a woman in rural PNG has a one in 25 chance of dying in her lifetime as a result of childbirth” (Department of National Planning and Monitoring 2010a, p. 28; Kirby (2011, p. 57) calculates the lifetime risk in PNG to be as high as one in 20). It is sobering to note that the maternal mortality rate in PNG doubled between 1996 and 2006 (National Department of Health 2009, p. v). In addition, infant mortality is “57 deaths per 1,000 live births” (Department of National Planning and Monitoring 2010a, p. 28). There are “more women and children dying during birthing, than dying of malaria” (Giris et al. 2005, p. 5).

There is evidence that PNG’s “leading indicators of women and children’s health ... are among the lowest in the Pacific” (Giris et al. 2005, p. 5). The maternal mortality rate is “four times higher than the average among Pacific islands” (Department of National Planning and Monitoring 2010b, p. 10). In addition, for every maternal death, another 30 women sustain “significant disability, much of it life-lasting” (National Department of Health 2009, p. vi). Rural health workers are often uncertain about what to do when birthing complications arise (Kirby 2011, p. 59). 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 (Department of National Planning and Monitoring 2010a, p. 31). Infant mortality and maternal mortality are key health indicators to be addressed under current government plans (Department

of National Planning and Monitoring 2010b, p. 48). 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” (Commonwealth of Australia 2011, p. 4).

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)” (Ministerial Forum 2011, p. 3). There is an intention to increase “the numbers of health workers with midwifery skills” (Ministerial Forum 2011, p. 3). 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 (United Nations 2010).

Maternal health is a complex problem requiring multi-faceted responses (National Department of Health 2009). 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 (National Department of Health 2009, p. xiii; National Department of Health and AusAID 2011, p. 29; see also Erbs 2012, p. 14). Communication is essential for crucial “timely referral” (National Department of Health 2009, p. xiv, p. xx). 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 (National Department of Health 2009, p. xv, p. xix).

Mobile phone service has spread to rural areas in PNG in recent years (Watson 2011, p. 48) and this has created the necessary conditions and the impetus for testing the use of mobile phones in service delivery, particularly in rural localities (Watson 2012, pp.50-51). 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 (Erbs 2012, p. 6) and included installation of HF/VHF radios in health facilities around the country. In MBP, radios were installed in numerous rural health centres and at the hospital. This allowed significant improvement in communication between rural facilities and medical staff located in town. Health centres with working radios were calling in about obstetric cases.

However, many radios are not being serviced and repaired. Due to the declining serviceability of the NHSRN throughout PNG (Erbs 2012), the incorporation of mobile phones into healthcare delivery systems has been recommended in a recent review of the NHSRN (Erbs 2012, p. 6). Mobile phones are portable, easy-to-use, and allow health workers to access help and support wherever they are located, including when out on patrols. They are cheap to purchase and can be readily at hand. Mobile phones enable confidential discussion of cases. Nonetheless, the NHSRN remains vital (Erbs

2012), particularly in places with no mobile phone coverage (Erbs 2012, p. 13). Irrespective of the technology used, it is clear that “improving direct communication to a referral obstetrician can make a difference” (Kirby 2011, p. 59) with respect to the number of women dying during labour. The distribution of solar mobile phone chargers as part of the current 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 (Watson 2011, p. 275).

### Research design

Research has been 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, informed and voluntary consent and responsible communication of research results. The primary research question guiding the research is: 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 have been informed by a health communication model developed by Chib et al. (2008) and relate to the benefits and constraints associated with the project.

Interviews with rural health workers in health centres and aid posts have been undertaken. Interviews of labour ward staff, recent mothers and village leaders have also been completed. Analysed and included in this paper are 18 interviews, as shown in Figure 1. The data represents eight rural health facilities in two districts: Alotau District and Kiriwina-Goodenough District. 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. The paper also includes analysis of phone calls from the first three months of phone calls (November 2012, December 2012 and January 2013), based on logbook entries and completed clinical notes sheets.

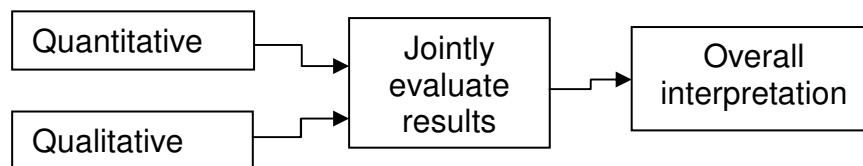
#### Type of interviewees



**Figure 1: Interviews included in this paper**

Mixed methods research allows for the collection and analysis of both qualitative and quantitative data (Creswell 2003, p. 12) and can therefore “result in a better understanding of the problem being studied” (Plano Clark et al. 2008, p. 365) as it “provides an opportunity to take advantage of the strengths of each” (Cowger and Menon 2001, p. 477; see also Creswell 2003, p. 22; Plano Clark et al. 2008, p. 365). The research takes a mixed methods approach (Cowger and Menon 2001, p. 477), capturing quantitative data regarding the number and type of phone calls, as well as qualitative data from research interviews. The mixed methods approach is pertinent here as quantifiable data is essential for understanding the operational and funding requirements for sustaining the project, while social, organisational, and process-related factors are also highly relevant.

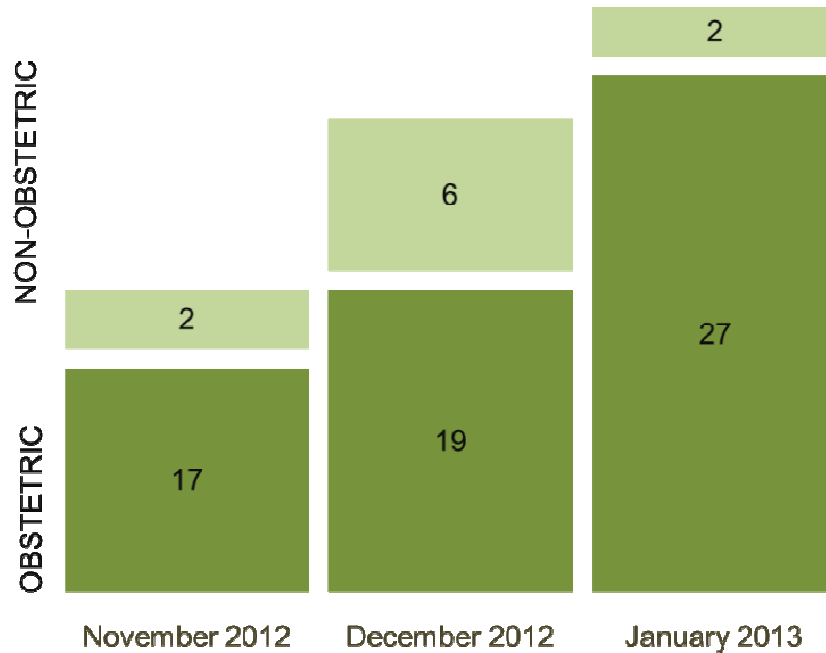
The strategy adopted is a concurrent strategy, meaning that qualitative and quantitative data have been collected during the same project phase (Creswell 2003, p. 16), and have been synthesised together during data analysis and reporting (Plano Clark et al. 2008, p. 372; see also Creswell 2003, p. 217). Figure 2 demonstrates a typical concurrent strategy, in which the two types of data are collected at the same time and are given equal weighting (Creswell 2003, p. 211; Plano Clark et al. 2008, p. 372). The qualitative and quantitative data are complementary in this study.



**Figure 2: Concurrent strategy (based on Plano Clark et al. 2008, p. 372).**

### Key findings

The Childbirth Emergency Phone project is helping rural health workers. They are calling in to get advice on obstetric cases. Figure 3 indicates the number of calls to the phone line in its first three months of operation. In the month of November 2012, according to the logbook, phone calls were received regarding 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. 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.



**Figure3: New cases indicated in labour ward logbook**

A more detailed clinical outline of each obstetric case is recorded by labour ward staff on a form designed for the project, known as a clinical notes sheet. On such forms, labour ward staff note patient medical history, patient symptoms, treatment and advice given. Analysis of clinical notes sheets for the three months from November 1 2012 to January 31 2013 indicates that the most common type of case is antenatal(see Table 1). The clinical notes sheets contain 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.

**Table 1: types of cases indicated on clinical notes sheets**

Month	Ante-natal	In Labour	Post-partum	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

Mobile phones enable private and confidential discussion of cases. This difference compared to HF radios was highlighted as an advantage of the new system by two labour ward staff members in research interviews. Most of the cases discussed over the phone were obstetric (antenatal, in labour and postpartum).The most common type of case was antenatal, as compared to in

labour, postpartum or non-obstetric. The main use of the phone line was rural health workers calling in with obstetric cases and seeking advice on how to manage these cases. Other calls were to arrange for patient transfer and transport. Some calls were seeking advice, getting a second opinion or reporting back on the outcome of an obstetric case. The highest number of follow-up calls about a particular case was six calls about one case (according to logbook records). No maternal deaths were recorded on the clinical notes sheets during the three months from November 1 2012 to January 31 2013.

A rural health worker said “it saves cost to call the emergency line, [rather] than calling the main line” (research interview). During phone calls, most advice was given by a HEO, midwife or doctor. All the general nurses and community health workers (CHWs) taking calls referred calls to the on-call HEO, midwife or doctor. Nurses and CHWs were reluctant to give advice. When a doctor, HEO or midwife was not available, other staff advised the caller to call back to discuss the problem at a later time (for example, in five minutes or ten minutes). The staff member would then try to locate an on-call HEO, midwife or doctor. Four out of five labour ward staff members recommended in research interviews refresher training for all labour ward staff, both covering skills required for giving advice on the emergency phone as well as other maternal health training.

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.” (research interview)

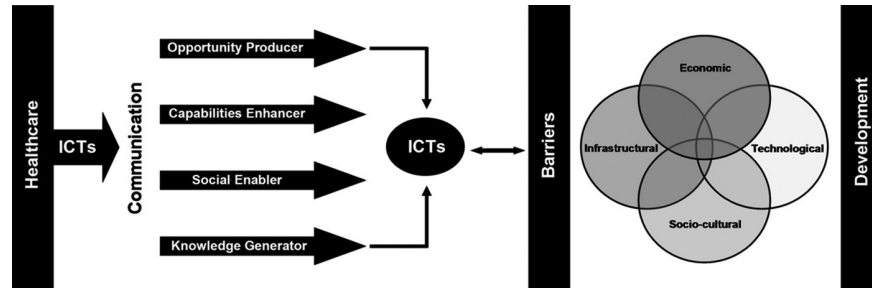
Other issues of concern for rural health workers included: HF radios falling into disrepair; HF radios not being installed in aid posts, and facilities not having transport options. Since mobile network coverage became available in recent years (see Watson 2011, pp. 46-48), health workers have been using their own money to make work-related calls and have struggled to find power sources to keep mobile phone batteries charged. The Childbirth Emergency Phone project has included donation of solar panels for mobile phone battery charging to health centres throughout Milne Bay Province. As one rural health worker explained, this is beneficial in terms of service delivery:

“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.” (research interview)

### ICT4H model

The term ‘information and communication technologies’ (ICTs) can include “the whole range of technologies designed to access, process and transmit information” (Weigel 2004, p. 19). 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 (Chib et al. 2008, pp. 349-352)**

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” (Chib et al. 2008, p. 350) or increase the number of patients attended to (Chib et al. 2008, p. 350); ICTs could enhance the capability of a health system to “make more timely referrals” (Chib et al. 2008, p. 350); ICTs could enable social relationships “and professional engagement between healthcare workers” (Chib et al. 2008, p. 350), and ICTs could generate knowledge “by improving access to medical information for healthcare workers” (Chib et al. 2008, p. 350).

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” (Chib et al. 2008, p. 351); socio-cultural inhibitors, such as those evidenced in “traditional values and practices” (Chib et al. 2008, p. 351) that may cause reluctance to utilise ICTs, and technological barriers, including difficulties with using ICTs stemming from “unfamiliarity and insufficient skills” (Chib et al. 2008, p. 351).



### **ICT4H model in relation to key findings**

The findings of the present study indicate some synergies with the ICT4H 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 numerous advantages, including: 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 access to 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.

The numerous benefits indicated here reflect the facilitation of work productivity (Chib et al. 2008, p. 350) 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” (Chib et al. 2008, p. 350).

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; the capability of the healthcare system to “make more timely referrals to more advanced facilities” (Chib et al. 2008, p. 350), usually Alotau Provincial Hospital, has been strengthened, and “the process of seeking for assistance” (Chib et al. 2008, p. 356) from fellow health practitioners has been made easier.

Chib et al. studied a project in Indonesia in which rural midwives were given mobile phones (2008). The research found that the new tools were deemed to be capability enhancers (Chib et al. 2008, pp. 356-357). Midwives “believed that mobile phones enhanced their ability to handle medical situations” (Chib et al. 2008, p. 356). Similarly in this case, the 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 (Chib et al. 2008, p. 356). 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” (informal conversation with rural health worker). In the Indonesian example, “villagers’ respect and trust towards midwives increased as a result of midwives’ instantaneous access to expert medical advice” (Chib et al. 2008, p. 357). Within the health system, relationships also improved in the Indonesian case, including relationships with “colleagues and superiors in the healthcare hierarchy” (Chib et al. 2008, p. 357). Further research will need to be undertaken to ascertain whether similar outcomes are emerging from the project in MBP.

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” (research interview), and in one notable case reported in an interview, a rural health worker was guided through managing an unfamiliar obstetric complication with help from labour ward staff. 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 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 (Erbs 2012, pp. 31-32). 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.” (research interview)

Technological barriers have not been significant as most health workers own mobile phones and know how to make phone calls with them. Technological literacy refers to the ability of an individual to operate a piece of technology (Chib et al. 2008, p. 351). Barriers around technological literacy have been negligible in this case. 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 (Kirby 2011, p. 58).

### Conclusion

Distinct benefits of the Childbirth Emergency Phone project in MBP have been articulated by rural health workers and labour ward staff members during research interviews. Comparing to the ICT4H model used, the project has demonstrated some of the expected benefits, whilst overcoming specific anticipated barriers, for example economic barriers and technological literacy. Clear indication of some benefits shown in the model has not yet been found and some particular barriers, such as socio-cultural beliefs, will continue to hinder the effectiveness of the phone line. Further research will be necessary to ascertain more fully the impacts of the intervention. In particular, clinical analysis of the clinical notes sheets and the advice given during phone calls will allow assessment of whether or not the phone line is enabling concrete improvements in maternal healthcare delivery and patient outcomes.

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