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Health reporting system in two subdistricts in Eastern Indonesia: Highlighting the role of village midwives

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ABSTRACT

Objective: to describe the system of health reporting by village midwives and two rural clinics in eastern Indonesia and solve some of the problems in this system through consultation.

Design: participatory action research model where problems are identified by those most affected and solutions sought. Clinic staff were observed and interviewed regarding their work roles and reporting duties. Allocation of work time to various tasks was recorded by all clinic staff before and after the implementation of a new health recording system. Several information sessions and focus group discussions were held with village midwives and other health staff to identify and address problems.

Setting: Indonesia initiated a programme in 1989, aiming to place a midwife in every village, in response to high maternal mortality rates and low rates of births attended by trained birth assistants. Remote rural villages in eastern Indonesia have difficulty recruiting and retaining village midwives. These midwives play a crucial role in health reporting. During 2010 a new system of recording and reporting by clinics was implemented.

Participants: village and clinic health staff in two rural subdistricts in eastern Indonesia.

Findings: there was incomplete coverage by village midwives in the two subdistricts studied; 28% of villages had a resident midwife, 48% had a visiting midwife and 24% had only monthly visits by a mobile clinic. Village midwives performed duties additional to their official duties and training. Village midwives had problems associated with the reporting system including inconsistency in reporting, poor access to individual patient histories and poor access to clinics. These problems resulted in incompleteness and poor timeliness of data transfer.

Key conclusions: midwives in remote villages felt compelled to provide services for which they were not trained. Poor quality of data reporting resulted from inconsistent reporting methods. Local staff can successfully change and manage reporting systems if given appropriate support and training.

Implications for practice: socialisation of health reporting systems among all staff involved can lead to improved data consistency and completeness. Effective systems for data transfer and reporting may reduce time spent on these tasks by some staff. Improvements to accuracy of data and availability of individual patient histories have the potential to contribute to improved health care. Quality of health care by village midwives should be addressed by adequate training and improved transport.

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Introduction

The eastern Indonesian province of East Nusa Tenggara (NTT) is one of the poorest provinces in Indonesia and has low health outcomes (Government of Indonesia, 2009). The majority of the population lives in rural villages, with a strong dependence on

largely subsistence agriculture. The provision of equitable health services to remote rural villagers presents challenges for the district health department and subdistrict clinics (*puskesmas*). Health information, collated from reports by village midwives and clinic staff, is reported monthly by subdistrict clinics to the district health department. This project addressed some of the issues associated with poor accuracy and timeliness of reporting which are inherent in this system.

The Indonesian government launched a 'Midwife in Village' (*Bidan di Desa*) programme in 1989 (Government of Indonesia, 1989) because of high rates of maternal mortality and low rates of

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attendance at births by trained birth assistants in rural Indonesia. By 1997 midwives had been trained and posted to 54,000 of Indonesia's 67,000 villages. However, capacity to provide maternal care was limited by brief training, poor facilities and the social difficulties of remote postings (Shankar et al., 2008). Official duties of village midwives were originally restricted to assisting at normal deliveries, and later modified to include providing life-saving functions (D'Ambruoso et al., 2009). In 1999 Geefhuysen outlined a number of factors that weakened the maternal health system that continue today; such as poor record keeping, duplication and flawed data processing by health staff (Berer and Ravindran, 1999). In 2009, in a study of midwives in two rural areas of Java, D'Ambruoso and colleagues reported that coverage by village midwives was low, with some midwives responsible for five villages. Although the primary duty of village midwives is the care of reproductive age women, the services they provided were broader, including curative care, dispensing medicines and advising on health promoting behaviours to both obstetric and non-obstetric patients (D'Ambruoso et al., 2009). This is confirmed by other authors (Achadi et al., 2007; Makowiecka et al., 2008).

The aim of this study was to describe and improve the health reporting system in rural eastern Indonesia at the level of village and subdistrict clinic. The description included an audit of midwife health-care coverage and roles of village midwives in two subdistricts in West Timor (NTT).

The study was carried out during the implementation to clinics across the province of NTT of a new health reporting system SIKDA (*Sistem Informasi Kesehatan Daerah*, System of Health Information of Region) developed by GTZ (the German NGO, Deutsche Gesellschaft für Technische Zusammenarbeit). The first author was aware of the difficulties faced by the clinic staff and village midwives, particularly in relation to implementing SIKDA. This study describes the assistance given, using an action research approach, for implementation of the system at two clinics, and provides recommendations about approaches to support effective health data management.

Action research intentionally attempts to monitor and change the environment and is used in organisation development and education (Baskerville and Myers, 2004). It can be used to improve health systems (Khreshah and Barclay, 2008). Action research is premised in practical application of problem solving by engaging those people who have an investment in the problem and the solution. Health information systems in developing countries are particularly challenged and can respond well to this approach of collaborative learning through research (Braa et al., 2004). It is acknowledged that improvements to health reporting do not necessarily imply improvements to either quality of health care or the health status of the population; however, more efficient and accurate reporting with access to individual patient histories may contribute to improved care and health outcomes.

Study site and population

The study sites were two subdistricts in West Timor, referred to as A and B to preserve the confidentiality of the respondents. In NTT province, most of the population lives in rural areas and the population densities in the study subdistricts (Table 1) are an

Table 1
Population data for the study sites.

Source: Data recorded and compiled at clinics A and B in 2009.

Subdistrict	Population	Households	Villages	Area (km ²)	Population density (people/km ²)
A	35,564	8,284	14	229	155
B	20,974	5,354	11	154	136

order of magnitude lower than those of central and west Java (982 and 1126 people/km², respectively, in 2005; www.datastatistik.indonesia.com). The study subdistricts are dominated by rugged terrain, with over 90% of the population living in rural villages.

Health facilities

Each subdistrict has a clinic that provides community health care, including patient registration, general doctor, nurse practitioner and dentist services, maternal and neonatal care, family planning, emergency, laboratory, pharmaceuticals, sanitation, nutrition, malaria and tuberculosis clinics. Health services are also provided through a range of other health facilities, managed by each clinic, which include subdistrict health centres (*puskesmas*), village maternity posts (*polindes*), integrated service posts for children under 5 years or old people (*posyandu balita* and *posyandu lansia*, respectively) and malaria posts (*posmaldes*), as well as mobile clinics (*pusling*).

Each village midwife is responsible for a village maternity post or a sub-health centre. During session times, when the integrated service post is open once a month, the midwife is helped by some cadres who are volunteers. Mobile clinics make monthly visits to villages that do not have a sub-health clinic or village maternity post, or a midwife.

The populations of the two subdistricts of this study included a total of about 7,000 women of reproductive age and there were about 1,300 births/year. Each village included about 300 children who were under 5 years of age, and there were about 60 births annually in each village. The official data for 2009 and 2010 indicated a total of six (2009) and four (2010) maternal deaths in the two subdistricts. This corresponded to 459 and 308 maternal deaths per 100,000 live births, respectively. The closest comprehensive emergency obstetric care (PONEK) is available at the hospital in a town, which is 15 km and 45 km by road from clinics A and B, respectively. Travelling by private car, these distances are equivalent to travel times of 30 mins for clinic A and 2 hrs for clinic B. The study village furthest from the hospital is more than 3 hrs travel by private car from the hospital with emergency obstetric care including caesarian section and blood transfusion services.

Health reporting system

Since 2001, health data have been collected and reported at clinics by a system called SP2TP (*Sistem Pencatatan dan Pelaporan Terpadu Puskesmas*). This system is based on the Ministry of Health of the Republic of Indonesia decree (no. 63/MENKES/SK/II/81). Each clinic has a reporting officer called the SP2TP Coordinator who collects data from each level of the health service, including from the village midwives at each maternity post or sub-health centre. The SP2TP Coordinator compiles reports every month and distributes these reports to the Programme Coordinators at the clinic (programs including nutrition, maternal health, sanitation and malaria). The SP2TP Coordinator at the clinic submits the reports to the Coordinator of Reporting at the district health department.

Methods

Audit of health facilities and village midwives, and data visualisation

An audit of the health facilities and village midwife staff was made in the study subdistricts by district health staff who visited all health facilities and recorded their locations along with some basic information about staff and resources using simple data collection methods. A PDA (personal digital assistant) device with free *CyberTracker* software was used to locate and collect the data. Clinic

and district health staff were trained in health mapping, as described by Fisher and Myers (2011), and visualised information about the health infrastructure and patient health indicators using free, open source mapping software 'open jump' were employed.

Roles of village midwives

Information about the roles and duties of health staff and the systems of recording and reporting health data was collected by interviews with health staff at two clinics (27 interviews in subdistrict A and 24 interviews in subdistrict B). The interviews comprised open-ended questions (see the appendix) and were conducted in Indonesian language. Focus group discussions were also conducted separately with village midwives, dental nurses, nurses and nutrition staff in these subdistricts. The focus group discussions had participant numbers ranging from two to six and durations from 22 to 60 mins. The consistency of the health data reporting was assessed by cross-checking between register books of patient data and the reported data, and by cross-checking between reports from different programmes at the clinics. The methods used were approved by the Charles Darwin University Human Research Ethics Committee (#H09057).

Work time allocation to reporting by clinic staff

All staff at the two study clinics recorded the work time they spent on various tasks for 15 mins intervals throughout a period of two weeks. This was carried out twice: before the introduction of SIKDA, in December 2009, and after the implementation of SIKDA, in December 2010. Work duties were classified according to the following categories: (i) recording data, (ii) reporting data to the clinic, (iii) reporting data to the district health department (from where information was reported to the provincial health department), (iv) consultation and service of patients and (v) other duties. The average time spent on each task was calculated for each individual and then according to the position description within the clinic staff, i.e. midwife, nurse, dental nurse, dentist, doctor or administrative staff.

Implementation of a new health reporting system (SIKDA)

In January 2010, all clinics in NTT province were directed to start using the new SIKDA database. Unfortunately there was inadequate introduction and training to introduce the database to staff who had to implement it. Health staff in the clinics and villages were uncertain about how to use the new system.

During the initial collection of data with the new system it became apparent that there were problems of inaccurate, inconsistent and incomplete reporting of health data. These problems were exacerbated by difficulties with the implementation of the new clinic database (SIKDA). The first author used a participatory action research (PAR) approach to address these problems during the implementation of SIKDA. PAR was used to encourage participation and thus empower the users of the health reporting system with the aim of adoption of improvements to the reporting system (Baum et al., 2004).

Box 1 describes the participatory action approach taken to assist with the implementation of the new clinic database.

Findings

Coverage by village midwives

A third of villages had a resident midwife, about half the villages received the services of a visiting village midwife, and

Box 1

1. Clinic staff were interviewed and clinic staff recorded the time spent on various work duties in December 2009.
2. Focus group discussions were held in December 2009 with village midwives to identify problems with recording and reporting data within the health information system.
3. The first author observed the reporting process and cross-checked data at various stages in the reporting process.
4. At a workshop in March 2010 the district head of the health information system introduced and explained the SP2TP, and another staff member from the district health department gave training in mapping health data using simple software.
5. The first author observed again the reporting process and cross-checked data at various stages in reporting process based on the new SIKDA, which was used from January 2010.
6. A laptop computer with Microsoft Office, a printer and a PDA were provided to each clinic to support this database.
7. The first author worked with village midwives to design recording sheets that enabled consistency of reporting from village midwives to clinics and through to the district health office.
8. Clinic staff were trained in how to modify the clinic database based on findings from steps 1–3, 5 and 7.
9. In July 2010, the first author further tailored the database to the needs of each clinic, based on findings from step 8.
10. Clinic staff were trained in how to use and maintain the clinic database.
11. To evaluate the implementation of the database, the first author interviewed the clinic staff and repeated the survey of time spent on various duties in December 2010.

three villages in each subdistrict received midwifery services only once a month when the mobile clinic visited (Table 2).

Health reporting system in two clinics

Village midwives reported the incidence of diseases to the clinic every week, usually by text message on mobile phones (SMS). If there were problems with poor mobile phone signal or lack of credit, the village midwives sent the information by motorbike delivery. Before the implementation of SIKDA, there were 10 different register books at each village maternity post or sub-health centre, and 24 different register books at each clinic. After the implementation of SIKDA, village midwives provided 14 types of reports, which provided the health data required for 57 reports created at the clinic. The monthly reports compiled by the clinics include data for patients who visited the clinic, as well as data compiled from the reports from the village midwives. The clinic reported health information to the district health department once a month.

Roles of village midwives

Village midwives had both official and unofficial roles. Midwives were concerned about the legality of the unofficial duties they performed. Their official duties were mostly performed alone and included caring for pregnant women, providing delivery care and postpartum check-ups for women and infants, and providing health care to children under 5 years of age. Their unofficial duties included providing general medical care to adults, visiting schools for public health programs, visiting houses for environmental public health programs, providing health care to elderly people and providing family planning. Staff reported that it was difficult

Table 2
Health facilities and village midwifery services associated with two rural health clinics.

	Subdistrict A	Subdistrict B
Number of villages	14	11
Health facilities		
Sub-Health Centre (<i>Pustu</i>)	5	4
Village Maternity Post (<i>Polindes</i>)	7	8
Integrated Service Post for children under 5 years old (<i>Posyandu Balita</i>)	38	34
Integrated Service Post for elderly people (<i>Posyandu Lansia</i>)	3	7
Malaria Post (<i>Posmaldes</i>)	3	5
Visiting Mobile Clinic (<i>Pusling</i>)	1	1
Village midwives		
Resident village midwives	3	4
Visiting village midwives	8	4
No village midwife (resident or visiting)	3	3

to schedule the working time of the village midwives, because their duties were many and varied. Our respondents said:

[Village Midwife 1] There are no other staff so I give consultations to sick patients. I do all the tasks in the village. Nobody helps me! All sick people, pregnant women, and the dental patients also. I serve them. In addition, I also provide family planning, nutrition, immunisation...I do all those tasks.

[Village Midwife 2] We have no legal authority to do nursing tasks but we still do them. If something wrong happens we are not covered legally. We don't have enough staff so we are asked to do that, but in our heart, we just want to do our main task, to be a midwife.

[Village Midwife 3] I work like a doctor, a nurse, a sanitarian, a nutritionist but I don't have any training, only my experience. If I give the wrong medicine to the patient and then the patient dies, I will be sent to prison. I need training to give medicine. Sometimes, I ask my family to help me as they understand medicine, sometimes I just guess the type of medicine.

In the clinics, most staff members worked on many programs and all staff did some reporting of health data. Most clinic staff performed tasks in addition to their official duties. Some examples included dental nurses dispensing drugs at the pharmacy, nutritionists acting as translators, and non-midwifery staff being asked to assist a midwife, especially during birth.

Monthly reporting from the clinic was the duty of one officer, SP2TP officer, who compiled data from various sources and generally did not discuss reporting with the people who collected the data. If there was a report about a maternal death at a village then the district health department called the midwife to investigate the cause. Clinic midwives spent about a third of their working hours recording patient data, both before and after the implementation of the new database (Fig. 1). However, the implementation of the new database was associated with a decrease in the time spent by clinic nurses on recording and reporting, and an increase in the time spent consulting with patients (Fig. 1).

Quality of recording and reporting

Before the implementation of the new clinic database, contradictions and inconsistency in the data were observed. There were discrepancies between data from different sources, inconsistency in method of counting cases, inaccuracy of diagnosis (particularly malaria), inconsistency in calculating expected delivery date,

duplication in recording and missing and incomplete data. Our respondents said:

[Nurse] We have problems counting. For example, as a rule from the health department the age range must be from 0 to 1 year old, from 1 to 4 years, then more than 5 years. But my co-worker made different [age] ranges; she goes from 5 to 9 years, from 9 to 14 years. She decided this herself, so we always have different data.

There were some problems with recording diagnoses of diseases by district health department staff based on the national diagnostic coding for diseases (LCD X code):

[Nurse] This format is difficult for us. Almost all types of diagnoses that are written are not usual diagnoses which can be found here locally. Meanwhile the local diagnoses cannot be written in this format.

For example, a clinic nurse may make her own code for a diagnosis if she does not find an appropriate code on the form, such as recording family planning as diagnosis KB (*Keluarga Berencana*), which is not included in the LCD X code. When a dentist found diagnoses written on the reporting form which were not standard types of diseases, she believed the data to be wrong. A medical doctor found mistakes in diagnoses recorded by the midwife:

[Dentist] I thought this diagnosis was wrong. I never learned of diagnosis like this.

[Medical doctor] Sometimes I find that diagnoses which were written by the midwife were not consistent with the medicine which she had given. So I changed the type of diagnosis [recorded] based on the medicine [given].

The SP2TP officer at the clinic did not routinely check the data, although some programme staff checked the data that related to the public health programme for which they were responsible. For example, nutrition staff checked data related to malnutrition because they based their programs on these data.

Systemic dysfunction

Many health posts were poorly equipped: often with no water or power, equipment that did not work, and medicine, which was poorly stored and damaged. Poor facilities were also a disincentive for midwives to live in the villages. The midwives said:

[Village Midwife 4] Not all midwives stay in the village. Because at the village maternity post (*polindes*) there is no electricity, no water and not even a house! Most of the buildings are broken.

[Village Midwife 5] I work at the village maternity post (*polindes*) office. There are mice that always drink the infusion water because I don't have a cupboard for storing it. The mice there are very big. They like the infusion liquid because it is sweet.

Operational funds were inadequate, with not enough funds for photocopying new forms, buying patient cards and register books. Sometimes midwives buy these with their own money or ask patients to pay for these:

[Village Midwife 6] I use one book for 1 family, but only use for 6 months. I asked each new patient family to buy one book for 1000 rupiahs.

[Village Midwife 7] We spent too much of our own money for reporting. We have served patients but we still must do

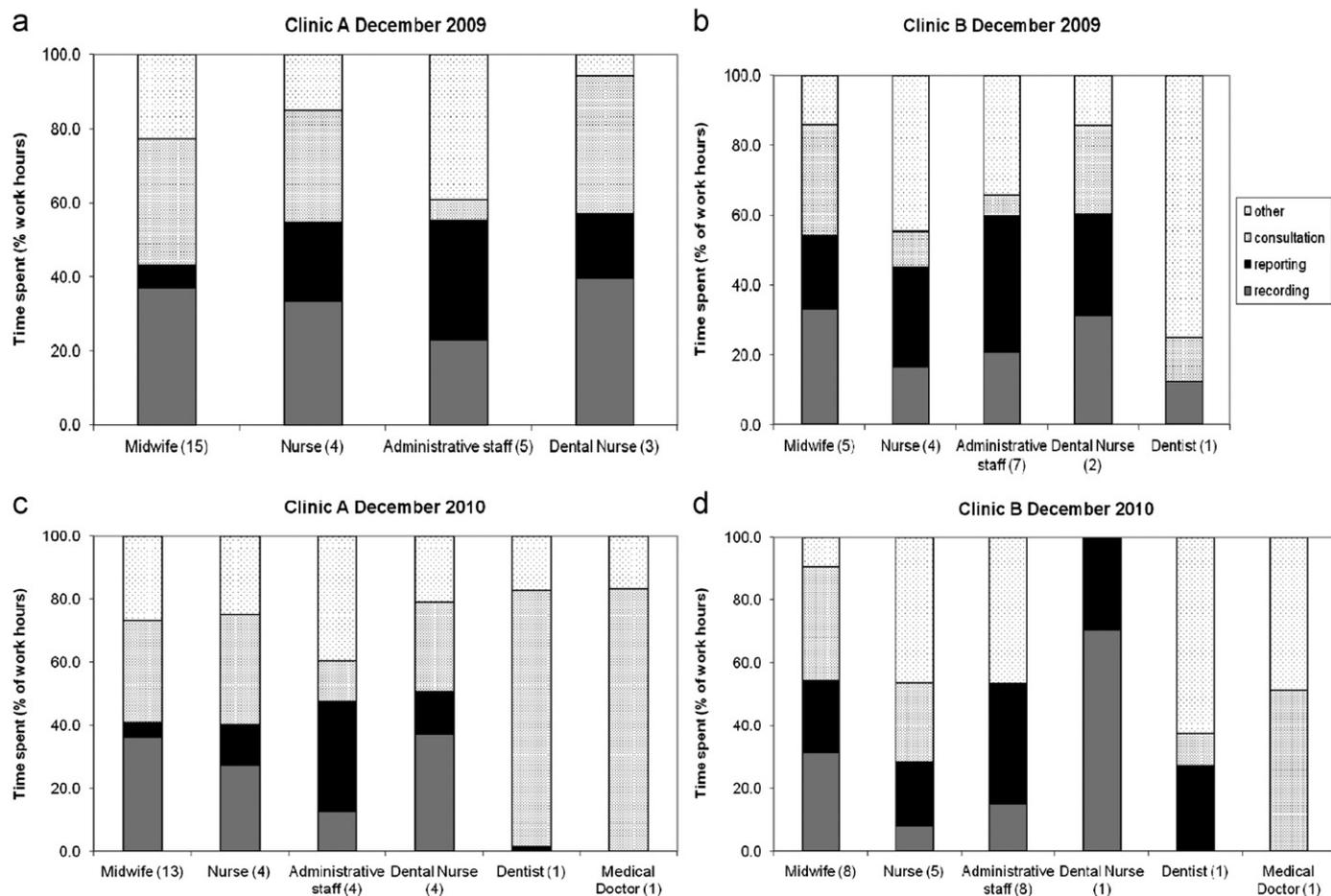


Fig. 1. Percentage of work time spent on different categories of work duties, i.e. recording, reporting, consulting and other (see legend in (b)), by various staff in two clinics in West Timor. Data were averaged over a 2 week period, before (a) and (b) and 6 months after (c) and (d) the introduction of the new SIKDA clinic database. The number of staff in each category is given in brackets.

reporting. We are tired from making reports. The reporting makes us stressed.

Before the introduction of the clinic reporting system (SP2TP) there was no socialisation for midwives, so that each midwife had a different understanding of SP2TP. The level of specificity of reporting diseases varied between village midwives and clinics: e.g. village midwives reported numbers of cases of malaria, while clinics attempted to also report numbers for different types of malaria and the age ranges of the patients concerned. Village midwives sent blood samples to the clinic laboratory for analysis but there were often delays in getting samples to the laboratory and consequently the samples were sometimes thrown away:

[Village Midwife 8] Usually it takes 2–3 days to get a malaria result from the laboratory, so I ask the patient to go directly [to the clinic]. But sometimes the patient is reluctant to go because it is too far and they would need to pay for transportation.

[Village Midwife 9] There is a problem of sending blood for malaria screening in the laboratory. I usually ask the bus driver or motorbike driver [to take sample to the clinic]. But sometimes I feel shy to ask for help from them so I take it home. If I do not have time to take it to the laboratory, I throw it away.

There was no standard system for identifying individual patients, and different clinics had different systems. A family was usually allocated one number to identify all members of that family. It was difficult to access individual patient histories, and

most health staff did not realise the importance of referring to a patient's history in determining appropriate treatment. When a midwife left and was replaced, the new midwife had difficulty understanding the system used by the previous midwife and did not understand past records.

Staff reported holding onto the data they were due to report while checking to see if their salary had arrived, thus purposely retaining the data in order to have some bargaining power to ensure being paid. By the same token, salaries were sometimes withheld if staff did not submit their reports on time.

Clinic staff reported that despite collecting and reporting data, it was not useful in their daily work and sometimes caused negativity. Our respondents said:

[Village Midwife 10] When we report the maternal death data, if it is high, we always receive pressure from the health district staff. So, sometimes we think that it's better if we don't report the maternal deaths. Actually, they should see our problems. Not only [is the health department] angry with the midwife by saying that the midwife did not provide care during delivery but also angry that the traditional birth attendant provided birth assistance.

Health-care seeking behaviour

The timing and frequency of visits to clinics were sometimes affected by factors other than health. Villagers often chose to wait for the monthly mobile clinic to visit, instead of taking sick people

to the clinic. More children attended the integrated service post for check-ups when there was food provided for them. Villagers rarely visited the clinic more than once if they began to feel better after one treatment. On market day few villagers visited the clinic.

Villagers thought that maternal care clinics were also medical clinics and expected to receive general medical care. Diagnoses and treatment by village midwives were often not based on conclusive tests, despite recommended guidelines (Directorate General of Disease Control and Environmental Health, 2006): a fever could be assumed to be a case of malaria, and medicines for common complaints were given without definitive diagnoses.

Many villagers had greater faith in traditional birth attendants than trained midwives. To discourage dependence on traditional birth assistance, since 2010, staff at clinic B have fined mothers who gave birth with only a traditional birth attendant and also fined the traditional birth attendants involved. Some public health initiatives were not culturally appropriate. For example, mosquito nets were distributed at subdistrict B in response to high malaria incidence. However, these nets were not used in the villages, where malaria incidence was highest, because the nets were difficult to use in the traditional round houses that are common in these villages.

PAR to support the implementation of new reporting system

The participatory action research (PAR) approach to support the implementation of the new reporting system resulted in both the modification and acceptance of the new reporting system. Clinic staff and village midwives identified improvements to the system of health reporting associated with the successful implementation of the SIKDA database, which included a more reliable tool for counting and recording patient cases, preparation of patient cards by health department so that midwives have access to patient histories, development of databases for the pharmaceuticals store and maternal care, and a system, which ensured that all patient data were recorded at the clinic. The PAR approach had other positive outcomes including clarification of the legality of midwives performing general medicine duties for which they may not be trained, and the opportunity for staff to request improved facilities and salaries.

By December 2010, clinic and district health staff presented monthly reports of patient health indicators in maps, sometimes including graphs of trends with season and year, using skills gained from training in health mapping (described by Fisher and Myers, 2011). This improved system of recording and reporting enabled a more rational and located use of data although little change to time spent on recording by health staff. Further modifications are still required for further improvements to the system.

Discussion

Findings of health practitioners working beyond their professional practice, poor quality of recording, systemic dysfunction and localised health seeking behaviours are already reported in the literature (Makowiecka et al., 2008; D'Ambruso et al., 2009). However, this study is unique in that it provided health practitioners with skills to be more involved in solving their problems and changing the system to a more appropriate form. We have not only collected information to describe problems within the reporting system but also worked alongside health staff to improve the system and use the data they collect for meaningful analysis in their workplace.

Guidelines exist to assess accessibility, capacity and need in health systems (WHO et al., 1997; World Health Organization,

2010). Inadequate coverage by health staff in remote and rural areas can mean that village midwives are expected to work beyond their training and capacity (Achadi et al., 2007). Despite a large proportion of the work time of village midwives being spent in recording and reporting, the quality of the reporting was poor. Recording was haphazard and inconsistent in many cases. For example, simple definitions of the age ranges of the patients to be reported were confused. It is understandable that practitioners may not understand the needs for, or parameters of, data collection, however by working with practitioners, managers and bureaucrats, it is possible to streamline health reporting. Systemic dysfunction was exacerbated by introducing a new data reporting system without comprehensive training, leaving staff to struggle to make sense of it by themselves. Staff then interpreted to the best of their ability but in idiosyncratic ways, which were not helpful in a macro understanding of health needs. A participatory action research process of consultation and modification to the reporting system resulted in acceptance and uptake of the new system. With the new system, the time spent by midwives in reporting was not reduced; however the quality of reporting was improved.

Patients may use health systems in ways that were not intended yet make sense to local people (Zwi et al., 2009). The Ottawa Charter for health suggested reorienting health systems to meet community needs (World Health Organization, 1986). So in West Timor, market days for example may dictate what activities occur. If villagers are busy at market and chose not to attend the clinic, staff could use these days for administrative work or alternatively opportunistic screening and health promotion at the local market.

Perhaps the case of the midwife who threw the clinical samples away highlights the dilemma of a village midwife. This action suggests incompetence, yet this midwife may be, as her colleagues tell us, overworked, doing work that is not her core duty, and spending hours reporting data that appears not to have any relevance to her or her patients. Developing capacity to visualise data at the clinic and district levels has resulted in health staff using the data they collect to inform their work practices and to result in improved data quality (Fisher and Myers, 2011). Tailoring systems of collection and management of health data to local needs can engage the staff collecting the data in the process of reporting, and enable these staff to use the data to inform their practice, with benefits to health service provision, health-care providers and patients.

Conclusion

Participatory action research is a useful tool to facilitate beneficial changes in health system reporting. By a process of reviewing and providing reflections back to respondents, we were able to modify and influence aspects of the health reporting systems, making it better suited to the requirements of clinic staff. Together with staff, we were able to improve the quality and accuracy of the health data. There was a reduction in the number of registers used, and uniform indicators were agreed upon which match the SIKDA database. However, there remained a large number of reports with duplicated information which might still be excessive. Staff may need to further consider what is essential to report for their own use, and the district and provinces' management and accountability needs. While there was no reduction in recording and reporting time for midwives, nurses were able to spend more time with their patients.

By December 2010, 6 months after PAR, both clinics used the SIKDA database for collecting and reporting patient data. Village midwives were sending patient data by SMS to the clinic every

week. The midwives were also sending a copy of their register books to the clinic each month so the database staff could enter patient data in a timely manner. There were two staff members who helped the SP2TP officer to enter data in the clinic database. Finally as a good example in decentralisation of health governance, it was possible for clinic staff to modify the SIKDA clinic database so that it meets local needs.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.midw.2011.09.005.

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