
Original Article

Availability and use of emergency obstetric care services in public hospitals in Laos PDR: A systems analysis

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Summary

The maternal mortality ratio in Laos in 2005 was 660 per 100,000 lives birth which was the third highest in Asia-Pacific Region. The objective was to determine the availability and use of emergency obstetric care (EmOC) in provincial and district hospitals in Borikhamxay, Khammouane, and Savannakhet provinces using UN guidelines. A hospital-based cross sectional survey was conducted from January to March 2008. All district (30) and provincial hospitals (3) from three provinces were included. Analysis was based on hospital records reflecting 12 months of facility data. Data indicates that only 14 hospitals (42.4%) were providing EmOC services, *i.e.*, 9 basic, 5 comprehensive services. The proportion of births in EmOC facilities was only 11.2%, the met need was a very low 14.5%, and the cesarean section rate was only 0.9%. The case fatality rate in Borikhamxay province was 2.8%; in Khammouane and in Savannakhet provinces it was less than 1%. Record keeping at hospitals was poor. Signal functions provided in the last three months showed only 48.5% of the facilities performed assisted vaginal delivery. This is the first study in Lao PDR to assess EmOC services. Almost all the indicators were below the UN recommendations. Health planners must take evidence-based decisions to rectify and improve the situation in the hospitals regarding EmOC services. These data can therefore help government to assign and allocate budgets appropriately, and help policymakers and planners to identify systemic bottlenecks and prioritize solutions and will help in improving maternal health.

Keywords: Emergency obstetric care, maternal health, process indicators, public hospitals, Lao PDR

1. Introduction

Maternal mortality remains a major public health problem worldwide; ninety-eight percent of cases occur in the developing countries (1,2). According to the United Nations Population Fund, half a million women die annually from treatable or preventable complications of pregnancy and childbirth (3,4). The majority of the deaths were due to hemorrhage, prolonged/obstructed labor, and post-partum sepsis,

complications of abortion, pre-eclampsia/eclampsia, ectopic pregnancy, and ruptured uterus (5).

Numerous studies demonstrated that woman's lives could be saved, if the emergency obstetric care (EmOC) was available (6-14). To address this issue, a set of process indicators was formally issued by UNICEF, WHO, and UNFPA in 1997 (14). They have been used in research surveys and to assess services available at selected hospitals. They are useful in determining the availability, use, and to some extent, the quality of EmOC. They are also useful for monitoring changes in availability, utilization, and quality (14).

According to the UN guidelines, EmOC services are classified into basic and comprehensive based on the number of signal functions which are provided. Basic EmOC comprises of six signal functions *i.e.*,

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provision and administration of intravenous (IV) and intramuscular (IM) antibiotics, oxytocin, and anticonvulsants, manual removal of placenta, assisted vaginal delivery, and removal of retained products of placenta. Comprehensive emergency obstetric care (EmOC) comprises all basic EmOC signal functions and plus cesarean section and blood transfusion (14,15). The guideline also recommended at least five basic EmOC and one comprehensive should be available for every 500,000 populations (14).

Maternal health poses a serious problem in the Lao PDR. According to the WHO, maternal mortality ratio (MMR) in Laos in 2005 was 660 per 100,000 live births, which was the highest in the Southeast Asia Region (16-18), owing to the lack of quality obstetric care services, the dearth of trained birth assistants and non-functional referral systems (19). It is uncertain whether Laos can achieve the Millennium Development Goal 5 of reducing MMR to 185 per 100,000 live births by the year 2015 (20).

To combat the high MMR, the government of Laos initiated strategies. The Ministry of Health launched the Safe motherhood, safe deliveries and neonatal care (SMICD) project in 2005 in collaboration with United Nations for Children Fund (UNICEF). To reduce maternal deaths it has also focused on improving access to quality reproductive health services, antenatal, perinatal and postnatal care, EmOC services, and better referral system (21). According to the Lao PDR's national health policy, the EmOC should be available in provincial and district hospitals nationwide (22). However, there is no baseline study on the existence of EmOC availability and quality of services in Laos. This study tried to assess the availability and utilization of EmOC services in selected central rural provinces of Laos using the UN guidelines.

2. Methods

2.1. Study design

A hospital-based, cross-sectional study was carried in January to March 2008 in three central rural provinces to collect information from district and provincial hospitals using the UN guidelines. Besides interviewing key persons for example the director and deputy director to acquire the information on the availability of EmOC services, we also obtained information from hospital records in past 12-month period to assess its quality and the utilization of EmOC services.

2.2. Study site and sampling

Laos has seventeen provinces spread across three regions of North, Center and South. From these three regions we selected central region for data collection keeping in view the ease of access, time and monetary

constraints. From the central region, out of seven provinces, we randomly selected three rural provinces – Borikhamxay, Khammouane, and Savannakhet. The total population of these three provinces in 2005 was 1.4 million that accounted for 25% of the national population of Laos. There are three provincial (one from each province) and 30 district hospitals (six hospitals in Bolikhamxay, nine in Khuammouane and fifteen in Savannakhet) in these provinces. All these thirty-three hospitals were recruited in this study.

2.3. Field procedure, study tool and analysis

Three teams, one in each province, who were trained by the chief investigator on research purpose, design and questionnaire, undertook the study. Data sources were the health facility's records, including the labor and birth registry, the operating theater registry, the antenatal registry, and the gynecological ward registry. To ensure consistency of responses and to minimize errors in data entry, 10% of the total sample was randomly checked before final data entry.

The need assessment was conducted mainly using pre-established tools (14), by the UN guidelines along with a few additional questions to interview hospital directors and senior health care workers available at the time of the study (23). The English questionnaire stated-above was translated into Lao language and was later back translated into English to ensure consistency and clarity by independent translators.

The questionnaire focused on obtaining information on availability of EmOC services *i.e.*, according to UN recommendations, there should be at least one comprehensive and four basic EmOC facilities per 500,000 populations. It also looked at proportion of births taking place in hospitals, *i.e.*, according to UN minimum recommendations and based on the assumption that at least 15% of pregnant women in a given population will develop complications and require access to EmOC, at least 15% of all births should occur in health facilities. It also assessed the met needs; *i.e.*, all pregnant women with complications should have access to and be treated at health facilities providing EmOC. The minimum recommendation is 100%. It also looked at caesarean section rate; UN process indicators recommend that at least 5% of births be undertaken by caesarean section and, keeping in mind the overuse of this technique, no more than 15%.

Finally the quality aspect was also explored by estimating case fatality rate; a measure of the quality of services provided by health facilities, estimates the number of women who come to the facility with complications and die there.

A pilot study was conducted before the actual survey and adjustment were made in questionnaire based on the feedback. Data collection took place from January to March 2008. The records reflect 12 months of

facility data. The crude birth rate used to calculate the expected number of births was 31.6/1,000 population. Incomplete forms were returned immediately for collection of information. Data sources from district and provincial hospitals included delivery, operating theater, antenatal, and gynecology ward registers. Study permission was obtained from the ethics review committees of the University of Tokyo, Japan, and the University of Health Sciences, Ministry of Health, Lao PDR.

To assess EmOC services, data were coded and analysis was carried out using Microsoft Excel; it was used to produce frequencies and percentages.

3. Results

3.1. Brief profile of the study areas

In three provinces the per capital income were US\$ 491. Access to TV per 1,000 was 10% and radio per 1,000 was 2.7 (24).

Borikhamxay: All 6 districts were recruited in our study from Borikhamxay province. The combined population of these districts was 231,544, with a population density of 15 persons/km². The average literacy rate was 77.2% (female literacy 68.1%), and the average village per district was 55 villages. The urban population was 26.3%, with an unemployment rate of 1.2%. Only 4.3% had access to piped water. Electricity was 51.6% (24).

Khammouane: All 9 districts were recruited in our study from Khammouane province. The combined population of these districts was 349,542, with a population density of 21 persons/km². The average literacy rate was 69.9% (female literacy 59.6%), and the average village per district was 89 villages. The urban population was 21.3%, with an unemployment rate of 0.9%. Only 4.8% had access to piped water. Electricity was 57% (24).

Savannakhet: All 15 districts were recruited in my study from Savannakhet province. The combined population of these districts was 857,581, with a population density of 38 persons/km². The average literacy rate was 68.5% (female literacy 59.2%), and the average village per district was 103 villages. The urban population was 22.4%, with an unemployment rate of 1%. Only 4.7% had access to piped water. Electricity was 40.2% (24).

3.2. Availability of EmOC and signal functions

Of 33 hospitals in the study sites, only 14 hospitals were providing either basic or comprehensive EmOC service. Of 14 hospitals providing EmOC, nine offered basic EmOC hospitals, and five comprehensive EmOC hospitals. According to the UN recommendation, however, 11.5 basic hospitals and 2.9 comprehensive

hospitals were needed to cover 1,442,233 populations.

We also noted the signal functions for basic EmOC specifically in the three months preceding data collection in the selected hospitals (Table 1). Of 33 hospitals, 32 (97.0%) were providing parental antibiotics and oxytocin; 18 (54.5%) parental sedatives; 31 (93.9%) manual removal of placenta; 25 (75.8%) removal of retained product of placenta; and 16 (48.5%) provided assisted vaginal delivery.

In addition, among 33 hospitals, we also found that only 11 hospitals had functioning ambulances to transfer patients with emergency obstetric complications to a higher level of care.

3.3. Proportion of all births and met needs in basic and comprehensive EmOC facilities

We found that only 11.2% of all births in the three provinces studied occurred in health facilities, the coverage by province from the highest to the lowest were 15.5% in Borikhamxay, 14.7% in Khammouane and 8.6% in Savannakhet (Table 2).

According to UN guidelines, all pregnant women with complications (100%) should have access to and be treated at health facilities providing EmOC. The estimated proportion of women, who suffered from delivery complications and received EmOC services, was 14.5% as the whole. The proportions by province of complications treated in hospitals varied; from the highest to the lowest were 21.0% in Khammouane, 18.0% in Borikhamxay and 11.0% in Savannakhet (Table 3).

3.4. Cesarean deliveries as a proportion of all births

In our study, cesarean section accounted for 0.9%, with all estimated births at health care facilities in three provinces combined. No health facilities performed cesarean section at a rate near recommended 5% (Table 4). The rates varied by province from the highest to the lowest were 1.5% in Khammouane, 0.9% in Borikhamxay, and 0.7% in Savannakhet, respectively.

3.5. Case fatality rate

The case fatality rate among women with obstetric complications in an EmOC facility should not exceed one percent. This indicator, the combined case fatality rate, a measure of the quality of services provided by health facilities in three provinces, results showed the average case fatality rate of three provinces was 0.9%, which was highest in Borikhamxay (2.8%) while 0.5% in Khammouane and 0.0% in Savannakhet (Table 5).

4. Discussion

This is the first study in Lao PDR that utilized the

Table 1. Signal function in three provinces

Signal functions of EmOC in selected districts in three provinces (<i>n</i> = 33)	Present (services provided in the last three months) (%)	Absent (services not provided in the last three months) (%)
Parental antibiotics	97.0	3.0
Parental oxytocics	97.0	3.0
Parental sedatives	54.5	45.5
Manual removal of placenta	93.9	6.1
Removal of retained products of placenta	75.8	24.2
Assisted vaginal delivery	48.5	51.5

Table 2. Proportion of births in EmOC facilities, Lao PDR

	Total population	Number of deliveries	Expected number of births	Proportion (%)	Recommended by UN (%)
Combined data from three provinces	1,442,233	5,089	45,462	11.2	
Borikhamxay	231,544	1,133	7,317	15.5	> 15
Khammouane	349,542	1,619	11,046	14.7	
Savannakhet	857,581	2,337	27,099	8.6	

Table 3. Met needs in EmOC facilities, Lao PDR

	Total population	Number of women with complications treated	Expected number of complications in population	Met needs (%)	Recommended by UN (%)
Combined data from three provinces	1,442,233	989	6,819.3	14.5	
Borikhamxay	231,544	198	1,097.5	18.0	100
Khammouane	349,542	347	1,656.9	20.9	
Savannakhet	857,581	444	4,064.9	10.9	

Table 4. Cesarean deliveries as a proportion of population

	Total population	Number of cesarean sections	Expected number of births	Proportion (%)	Recommended range by UN (%)
Combined data from three provinces	1,442,233	412	45,462	0.9	
Borikhamxay	231,544	64	7,317	0.9	5-15
Khammouane	349,542	170	11,046	1.5	
Savannakhet	857,581	178	27,099	0.7	

Table 5. Case fatality rate, Lao PDR

	Total population	Number of maternal deaths/complications	Case fatality rate (%)	Recommended maximum by UN (%)
Combined data from three provinces	1,442,233	6/641	0.9	
Borikhamxay	231,544	5/176	2.8	1
Khammouane	349,542	1/189	0.5	
Savannakhet	857,581	0/276	0.0	

standardized UN guidelines (14) in assessment of availability and quality of the emergency obstetric care services. The study collected hospital data from three central rural provinces in Lao PDR. Our study findings showed that the number of hospitals providing basic EmOC was less than desired, however as in other studies hospitals providing comprehensive EmOC services were adequate. Our study substantiated findings from other studies in Gambia, Kenya and Pakistan (25-27). That showed that the availability and quality of the EmOC services – coverage of institutional birth, proportion of women with complications received EmOC services, caesarean section rate and case fatality rate – were also generally lower than the recommended levels.

According to UN recommendations, there should be at least one comprehensive and four basic

EmOC facilities per 500,000 populations. Based on the UN estimates, approximately 11.5 basic and 3 comprehensive EmOC facilities are needed in the three provinces. Our study showed that only 9 hospitals offered basic EmOC and 5 provided comprehensive EmOC services. The comprehensive EmOC were higher than UN recommendations while basic EmOC were lower, similar tendency was reported in previous papers (5,28). For basic EmOC services, compared to Khammouane province, Borikhamxay, and Savannakhet province could not meet the UN recommendations. Thus highlighting the need to upgrade the existing and where necessary, to build hospitals especially for basic EmOC to provide services for treating common obstetric complications. It has to be noted that out of nine basic EmOC, six were in Khammouane province that was mainly attributed to

Nam Theun 2 hydroelectric project, which is obliged by the government to use income generated by the project to fund the Lao national growth and poverty eradication strategy. It specially emphasizes the health sector, education, and basic infrastructure targeting the poor and has focused on increasing road access and developing new health facilities as the Nhommalath district hospital and health centers in this province (29).

According to UN minimum recommendations and based on the assumption that at least 15% of pregnant women in a given population will develop complications and require access to EmOC, thus at least 15% of all births should occur in health facilities. If fewer than 15% of all births take place in health facilities providing EmOC facilities that means that women in need of services are not receiving them. We found that only 11.2% of all births in the three provinces studied occurred in health facilities, which means that some women who need life-saving assistance from EmOC services did not receive it. The use of EmOC services in Savannakhet province was particularly low, and the proportion of complications treated at health facilities was also only 8.6%; we conjecture that it could be attributed to the fact that many women in Laos, like in many other developing countries, could not attend the facilities due to lack of knowledge, low education, poverty, distance from health facilities, and self-efficacy beliefs (30-32).

Cesarean section is a life saving procedure, and its rate is an important indicator in monitoring facilities providing comprehensive EmOC services. This study found that the number of cesarean sections was also very low (0.9%), indicating that many women in need may not be getting it. Its importance to save lives necessitates its provision through skilled personnel in hospitals (33). In addition, as found also in other studies, it was noted that only 11 in 33 health facilities had functioning ambulances, and what ambulances were available were used mainly to transfer and refer patients to a higher level of care in emergencies (23,34).

The combined percentage at all health facilities in the three provinces studied showed the case fatality rate to be 0.9%, which seems acceptable and in line with the UN guidelines. However, in light of other facts, a closer assessment is warranted. During the study we found that in hospitals the records of the complications and deaths are not responsibly kept and maintained. In Borikhamxay province, the case fatality rate was highest, unacceptably high, at 2.8%. The alleged reason is that the transportation system here is much worse than that of other provinces due to poor road conditions, especially in the rainy season, making the terrain inaccessible, leaving people with little choice regarding hospital selection, thus the high case fatality rate reported there. In Savannakhet province where the case fatality rate was 0%, we found poor record-keeping in hospitals, and this presumably accounts for the better

case fatality rate results (*i.e.*, < 1%). Thus one has to be careful in interpretation of the results from this study due to general poor quality of record keeping, there is possibility that many deaths reports were not recorded and could have affected the results.

Monitoring the performance of key functions informs us of the capacity of the health system to provide crucial interventions when obstetric emergencies occur (14,35). Data from all health facilities in the three provinces showed that although most of the facilities were performing signal functions like administration of oxytocics, antibiotics, manual removal of placenta, followed by removal of retained products of placenta, but only 48.5% of the facilities performed assisted vaginal delivery. It was noted that many studied health facilities did not have the infrastructure to perform surgery and provide blood transfusions. These data can therefore help government to assign and allocate budgets appropriately, and help policymakers and planners to identify systemic bottlenecks and prioritize solutions.

The situation is challenging to policymakers who must redirect monetary and skilled human resources to fill the deficit in EmOC service provision and do everything possible to achieve MDG5 and reduce the maternal mortality ratio to 185 deaths per 100,000 live births by the year 2015.

5. Conclusions and Recommendation

To reduce maternal mortality among these three provinces, we recommend strengthening and upgrading the existing basis EmOC facilities, and required establishing more basic EmOC facilities because many obstetric complications can be resolved by provision of quality EmOC services at these levels. Better record keeping, an efficient referral system, and better access to emergency care, especially by providing ambulances, are also needed in these provinces to effectively prevent maternal deaths and complications during pregnancy.

The application, regular and proper monitoring of process indicators can provide timely and accurate information about the situation of health systems, enabling immediate action to be taken to rectify deficits and ultimately to reduce maternal deaths.

To improve utilization, policymakers need to emphasize the importance and the quality of hospital services to promote community's confidence in them. The starting point can be improvements in human resources and in management and monitoring to ensure the availability of supplies and maintain accurate medical records (36,37). It is important to strengthen institutional/hospital capacity through regular staff training and self-confidence building to allow medical staff in skillfully performing EmOC services, including assisted vaginal delivery, cesarean section, and other life-saving procedures. In addition, a large scale,

national level survey is required to clearly estimate the health systems needs at hospital, district and at national level in order to realistically divert more resources based on evidence.

Finally, measures must be taken to increase the people's confidence in the quality of available services from public sector. Through education, there is also a need to create awareness of obstetric complications and maternal and prenatal morbidity and mortality issues in the communities to understand the risks involved in pregnancy that can lead to timely and appropriate decisions in saving women lives.

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(Declaration: *When the study was conducted the corresponding author was employed at The University of Tokyo, Tokyo, Japan. This report contains the collective views of an international group of experts, and does not necessarily represent the decisions or the stated policy of the World Health Organization.*)