

ADVANTAGES OF TRAINED TBA AND THE PERCEPTION OF FEMALES AND THEIR EXPERIENCES WITH REPRODUCTIVE HEALTH IN TWO DISTRICTS OF THE LUANGPRABANG PROVINCE, LAO PDR

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Abstract. The study describes reproductive health in two districts of the Luangprabang Province in northern Lao PDR. The aim was to find out whether training traditional birth attendants (TBA) might have an impact on reproductive health. In June/July 2000, a total of 298 women of reproductive age, with children below two years of age, from 30 villages were interviewed by means of a closed questionnaire. In 1996/1997, a training course for TBA was conducted in one of the districts under survey. Information was obtained for demography, symptoms and risks during pregnancy and delivery, antenatal care (ANC), tetanus immunization, food taboos, place of delivery, birth attendant, practising of birth spacing and their attitude towards the services of TBA. The results obtained indirectly pointed towards a high fertility rate and a high rate of child death and abortion. An overwhelming majority of the women delivered at home, attended only by untrained individuals. During pregnancy and after delivery, the women claimed that they often suffered from edema of legs and feet, high fever and hemorrhages. Only 50% of the females in the district where TBA training were conducted, made use of the services of trained TBA. Nevertheless, females in the district with trained TBA, who made use of the TBA service in comparison with women in the same district not using the service of TBA, were 3.8 times more likely to also make use of the ANC service; 3.3 times more likely to seek immunization, and 8.6 times more likely to give colostrum to their new-borns. The educational level of the females proved to be an important factor. Literate women were more likely to practise birth spacing and have been vaccinated. Illiterate women were more likely to be at higher risk for losing a child. In the district without TBA service the loss of a child was less likely among literate than illiterate women. It is concluded that through adequately trained TBA and through their continuous support and supervision, ANC and health education can be improved. In addition to the improvement of the referral system for emergency cases and manpower development within the obstetric curative service, the training of TBA will have a positive impact on reproductive health. However, maternal health depends, to a large extent, on the educational level of the women.

INTRODUCTION

In 1994, the International Conference on Population and Development (ICPD) in Cairo initiated the term "reproductive health" into a worldwide important concept. This includes reducing the adverse outcomes of pregnancy, *ie* maternal death and disabilities, abortion complications,

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miscarriages, stillbirths and neonatal death. The goals of reproductive health should be achieved not only by preventing and treating diseases, but also by supporting women during pregnancy and childbirth, enabling people to have safe and fulfilling sexual relationships and to decide on the question of having children and when to have them (Vaughan and AbouZahr, 2000). Major efforts were made already back in the early 1950s to develop strategies to reduce maternal morbidity and mortality. Since then, little has changed.

The efforts made were concentrated mostly on providing antenatal services and health education to mothers. Later, family planning measures were also implemented. In the 1970s, another attempt to improve reproductive health was to train and promote traditional birth attendants (TBA) (de Brouwere *et al*, 1998). Recently, the role of TBA was questioned. A major argument against the further support of TBA services was that TBA services were thought to have little impact on reducing maternal mortality rates (de Brouwere *et al*, 1998, Kamal, 1998, de Bernis *et al*, 2000). This view has been challenged. Those persons in favor of promoting the training of TBA argued that the effectiveness of TBA services is hampered by lack of supervision and support. Instead of abandoning the whole concept, supervision and support have to be improved (Piper, 1997; Walraven and Weeks, 1999).

The government of Lao PDR is making great efforts to improve the health delivery system in the country, with particular emphasis on Mother and Child Health Care (MCH). Constraints include: limited resources for health care, poverty, illiteracy, inaccessibility to health care facilities, and an urgent need for manpower development in this sector. In 1994, the total fertility rate was estimated to be 6.5. The infant mortality rate was 120 per 1,000 live births and the maternal mortality rate was 653 per 100,000 live births (Senhsathit *et al*, 1994). In the meantime, due to the efforts of the health delivery system of the government of Lao PDR, the situation improved significantly in that the fertility rate decreased to 5.6, the infant mortality to 82 per 1,000 live births and the maternal mortality rate to 530 per 100,000 live births, whereas the under five mortality rate was estimated to be 102 per 1,000 (National Institute of Public Health, 2000; National Statistical Center, 2000). Despite recent improvements, these indicators still underline the need to enhance reproductive health care by making use of all resources. Up to now, the training of TBA was considered to be a meaningful one. This investigation assessed the perception of females, in two districts of the Luangprabang Province in the north of Lao PDR, towards reproductive health in connection with problems and constraints experienced during pregnancy and delivery. TBA were trained in one of the two districts. Besides describing the situation in the two districts, the purpose of this study was to find out whether or not the training of TBA

had an impact on reproductive health.

MATERIALS AND METHODS

Study area and population

The investigation was carried out from June to July 2000 in two districts of the Luangprabang Province in northern Lao PDR. The study Period corresponded with the rainy season in the country. The two districts are located in rather remote rural areas with hilly surroundings. In 1996/1997 TBA were trained for two weeks in the Xieng Ngeun district consisting of 103 villages. Funds for this undertaking were drawn from the UNICEF Save Motherhood Project. No refresher training courses and supervision were carried out since that time.

Sampling and study design

In each district, 15 villages were included in the study. The villages were selected through a random sampling method. In the Xieng Ngeun district, the villages were drawn from the 103 villages out of which TBA had been selected for training in 1996/1997. In the Pakou district, the sample was drawn from the 63 villages of the district. Females with children less than two years of age were interviewed. In each of the villages selected, the number of eligible women were assessed. It was intended to select 10 eligible women from each village under study. In a small village where only 10 or less eligible women were found all females were taken. In larger villages, where more than 10 eligible women were present, every sixth woman were selected up to the total number of 10 for that particular village. The villages were grouped according to their location from the nearest community hospital. Distance was expressed as zones 0 to 3 and defined in Table 1. In the Xieng Ngeun district, two villages were located in zone 0; 5 villages in zone 1; 6 villages in zone 2, and 2 villages in zone 3. The distribution of villages in zones in the Pakou district was 1, 6, 1 and 7 villages respectively.

Questionnaire

Every woman investigated was questioned by a health official from the Luangprabang Provincial Health Office using a closed questionnaire. The questionnaire was developed by the health officials in the Laotian language. The questionnaire was tested for feasibility before it was used to question the women. The following information was obtained through the questionnaire: de-

mography, symptoms and risks during pregnancy and delivery and in the postnatal period, antenatal care (ANC), tetanus immunization, food taboos during pregnancy and after delivery, place of delivery, birth attendant, practice of birth spacing and attitude towards the services of TBA.

Statistical evaluation

The software programs Minitab (State College, PA, USA, Release 12.2), and SPSS (Release 10) were used for computing. Tables 1 to 6 present the results of the investigation in the form of proportions. The chi-square test was applied to test for statistically significant differences between the two districts. Table 7 shows the importance of various dependent variables in relation to reproductive health and its relation to the following independent variables: TBA services (only for Xieng Ngeun district), distance from community hospital, belonging to ethnic groups and educational level. The models were computed by

applying a logistic regression where all relevant variables were entered into the model at one time.

The study was approved by the Provincial Health Department of the Luangprabang Province.

RESULTS

In the Xieng Ngeun district, 148 females between the ages of 16 to 49 years, and in the Pakou district, 150 females within the same age range, were questioned (Table 1). As mentioned earlier, in 1996/1997 TBA training was conducted in the Xieng Ngeun district. To compare the age distribution in the two districts, the females were divided into 6 age groups. No statistically significant differences were found between the two locations. When questioned about their occupation, over 85% of females claimed to be farmers. Only about 6% were running a small business and about 3% were

Table 1
Number of females in the reproductive age, distribution of females into ethnic groups and educational levels, distance from their homes to the nearest community hospital in two districts of the Luangprabang Province, Lao PDR.

Variables	Xieng Ngeun district ^a		Pakou district ^a		Total		Chi-square	DF	p-value
	N	%	N	%	N	%			
Females (15-49 years)	148	49.67	150	50.33	298	100.00	2.436 ^b	5 ^b	0.786
Ethnic groups							146.647	2	0.000
Lao Lum	38	25.68	128	85.91	166	55.89			
Lao Theung	6	4.05	17	11.41	23	7.74			
Lao Sung	104	70.27	4	2.68	108	36.36			
Education							18.703	3	0.000
Illiterate	56	37.84	26	17.33	82	27.52			
Can read and write	32	21.62	40	26.67	72	24.16			
Primary school	37	25.00	63	42.00	100	33.56			
Secondary school	23	15.54	21	14.00	44	14.77			
Distance from community hospital ^c							113.216	3	0.000
Zone 0	20	13.51	9	6.00	29	9.73			
Zone 1	40	27.03	50	33.33	90	30.20			
Zone 2	78	52.70	10	6.67	88	29.53			
Zone 3	10	6.76	81	54.00	91	30.54			

^aXieng Ngeun district with and Pakou district without TBA training; ^bfor statistical analysis the females had been divided into age groups: 16-18; 19-20; 21-25; 26-30; 31-35; 36-47; ^czone 0: Homes within a radius of 3 km from community hospital; zone 1: villagers, who visit the hospital are able to return home within 1 day by foot or using a bicycle; zone 2: villagers are able to return within one day by using a motorcycle or a car driven by a multipurpose engine; zone 3: villagers cannot return within 1 day.

government officials. The results obtained on the women's occupation are not shown in the tables.

From the three main ethnic groups in Lao PDR, less than 8% of all females questioned belonged to the Lao Theung group (Table 1). Most of the females participating in the Xieng Ngeun district belonged to the Lao Sung group, and most of the women in the Pakou district belonged to the Lao Lum group.

A total of about 28% of the females investigated were illiterate. These were mostly from the Xieng Ngeun district (Table 1).

The homes of more than 30% of the females were located quite far from the nearest community hospital, which means that these females would not be able to reach the hospital and return home on the same day (zone 3) (Table 1). Only about 7% of the females in the Xieng Ngeun district were living in the area classified as zone 3. In the Pakou district, 54% of the females lived in zone 3.

Table 2 gives the number of pregnancies including abortions and stillbirths according to age groups. More than 23% of the females who were pregnant once belonged to the 16 to 18 years age group. Over 40% of the females with four and more children belonged to the 26 to 30 years age group.

Over 80% of the females in both districts gave birth likewise at home (Table 3). In the Xieng Ngeun district where TBA were trained, about 18% of the females were attended by TBA during delivery. Over 50% of all the females were attended by relatives during the birth of their children. Over 85% of all the females questioned claimed to have had a normal delivery. About 17% of women in the Xieng

Ngeun district and less than 10% in the Pakou district claimed to have had an abnormal delivery. The difference between the two districts was not statistically different ($p < 0.053$). A breech birth, for instance, would be classified as an abnormal birth.

Almost 30% of all the women questioned claimed to have experienced a death of a child once, about 12% have experienced an abortion, while 6% even had more than one abortion. No statistically significant difference was found between the two districts for these two variables.

Some indicators of reproductive health are given in Table 4. Over 80% of the females investigated participated in ANC in the Xieng Ngeun district. This was less than 60% in the Pakou district. Over 70% of all the females received tetanus immunization, with no statistically significant difference between the districts. In the Xieng Ngeun district, 80% of the women gave colostrum to their new-born. In the Pakou district, this was less than 60%. Over 20% of all the women investigated practised birth spacing and no difference was observed between the two locations. Almost 40% of the females observed food taboos such as avoiding meat or eggs. No significant difference was observed between the two districts.

Table 5 lists the complaints and problems experienced by the women during pregnancy and delivery. Besides common complaints such as vomiting, nausea etc, the most common complaint, for almost 35% of all the females, was hemorrhage more than 5 days after delivery. Forteen percent of the females claimed to suffer from edema of the legs and feet, about 27% had high fever some time during pregnancy and almost

Table 2
Number of pregnancies including abortion and stillbirth according to age groups.

Age (Years)	Pregnancies									
	One		Two		Three		Four and more		Total	
	N	%	N	%	N	%	N	%	N	%
16-18	19	23.46	*	*	1	2.44	1	0.93	21	7.05
19-20	33	40.74	22	31.88	5	12.2	3	21.14	63	21.14
21-25	21	25.93	38	55.07	21	51.22	16	14.95	96	32.21
26-30	7	8.64	8	11.59	13	31.71	44	41.12	72	24.16
31-35	*	*	*	*	*	*	27	25.23	27	9.06
36-47	1	1.23	1	1.45	1	2.44	16	14.95	19	6.38

Table 3
Place of delivery, type of assistance during delivery, type of delivery, and ever experiences of death of child and abortion.

Variables	Xieng Ngeun district ^a		Pakou district ^a		Total		Chi-square	DF	p-value
	N	%	N	%	N	%			
Delivery at							0.055	1	0.815
Hospital	24	16.33	23	15.33	47	15.82			
Home	123	83.67	127	84.67	250	84.18			
Assistance							36.338	5	0.000
Medical staff	37	25	44	29.33	81	27.18			
TBA trained	27	18.24	1	0.67	28	9.4			
TBA not trained	9	6.08	12	8	21	7.05			
Relatives	73	49.32	77	51.33	150	50.34			
Retired staff	0	0	3	2	3	1.01			
No assistance	2	1.35	13	8.67	15	5.03			
Delivery							3.742	1	0.053
Normal	123	83.11	136	90.67	259	86.91			
Abnormal	25	16.89	14	9.33	39	13.09			
Death of child							0.943	1	0.331
No	102	68.92	111	74.00	213	71.48			
Yes	46	31.08	39	26.00	85	28.52			
Abortion							4.303	3	0.231
Never	129	87.16	133	88.67	262	87.92			
Once	7	4.73	12	8.00	19	6.38			
Twice	8	5.41	3	2.00	11	3.69			
Three and more	4	2.7	2	1.33	6	2.01			

^aXieng Ngeun district with and Pakou district without TBA training.

Table 4
Taking part in antenatal care, receiving immunization, giving colostrum, practising birth spacing and food taboos.

Variables	Xieng Ngeun district ^a			Pakou district ^a			Total		p-value
	Total N	N	%	Total N	N	%	N	%	
Antenatal care	148	121	81.76	150	87	58.00	208	69.80	0.000
Receiving immunization	148	108	72.97	150	102	68.00	210	70.47	0.347
Giving colostrum	148	119	80.41	150	86	57.33	205	68.79	0.000
Practising birth spacing	148	27	18.24	150	38	25.33	65	21.81	0.138
Practising taboo	148	54	36.49	150	58	38.67	112	37.58	0.698

^aXieng Ngeun district with and Pakou district without TBA training.

20% had heavy hemorrhage during delivery.

Over 50% of the females in the Xieng Ngeun district made use of the TBA service. From those who used the service, about 45% of them consulted the TBA and claimed to receive advice from

them. About 20% of the females claimed to have had an abdominal examination done by the TBA, and over 30% of them asked the TBA to assist during delivery (Table 6). Two main reasons were given by those women who did not use the TBA

Table 5
Complaints and problems during pregnancy and delivery.

	Total N	N	%
Edema (leg + foot)	298	42	14.09
Convulsion, headache	298	21	7.05
Vaginal bleeding (during pregnancy)	298	18	6.04
Vaginal discharge (during pregnancy)	298	25	8.39
High fever (during pregnancy)	298	79	26.51
Vomiting, nausea, no appetite, insomnia	298	109	36.58
Delivery by forceps	298	1	0.34
Cesarean	298	5	1.68
Fetus died	298	1	0.34
Strong hemorrhage during delivery ^a	298	59	19.80
Hemorrhage >5 days after delivery	298	103	34.56
Pain and spasm after delivery	298	39	13.09

^aTwo and more sarongs were soaked with blood.

Table 6
Services of traditional birth attendants (TBA) in the Xieng Ngeun district.

	Total N	N	%
Getting TBA services	148	76	51.35
Kind of assistance	76		
Abdominal examination		14	18.42
Assistance during delivery		24	31.58
Consultation and health education		34	44.74
Assistance post-partum		4	5.26
Reasons not to get TBA services	72		
Husband does not agree		1	1.39
Shy		2	2.78
TBA left village		14	19.44
Prefer to go to hospital		22	30.56
Delivery easy		33	45.83
Villagers satisfy with TBA services	146		
Yes		101	69.18
No		45	30.82

service. One was that they preferred to go to the hospital and the other was that the delivery was easy anyway. About 70% of all the women in the Xieng Ngeun district felt that the villagers in their village were satisfied with the TBA services.

The variables ANC, immunization, giving colostrum, practising birth spacing, experiencing death of a child and abortion were correlated as indicators of reproductive health with the distance of homes from the nearest community hospital, the belonging to ethnic groups and the level of educa-

tion. This was done separately for the two districts and for the Xieng Ngeun district. TBA services as an independent variable was added as well (Table 7). Only statistically significant results are given. The females in the Xieng Ngeun district were 3.8 times more likely to make use of the TBA service for ANC; 3.3 times more likely to get immunization, and 8.6 times more likely to give colostrum to their new-borns when they made use of the TBA service. These results are controlled for distance from the community hospital, belonging to a par-

Table 7
 Indicators of reproductive health in relation to TBA services (in Xieng Ngeun district only), distance from community hospital, ethnic groups and education.

Area	Dependent variables	Categories for logistic regression	Independent variables	Categories for logistic regression	Adjusted OR	95% CI
Xieng Ngeun district ^a	ANC	0: Yes 1: No	TBA services ^b	0: Yes 1: No	3.842	1.47 - 10.05
	Immunization	0: Yes 1: No	TBA services ^b	0: Yes 1: No	3.331	1.50 - 7.41
	Giving colostrum	0: Yes 1: No	Education ^b	0: Illiterate 1: Literate	0.541	0.25 - 1.18
	Birth spacing	0: Yes 1: No	TBA services ^b	0: Yes 1: No	8.65	2.98 - 25.07
Pakou district ^a	Taboo	0: Yes 1: No	Education ^b	0: Illiterate 1: Literate	0.27	0.08 - 0.84
	ANC	0: Yes 1: No	Ethnic group ^b	0: Lao Lum 1: Lao Theung + Lao Sung	0.33	0.13 - 0.82
	Immunization	0: Yes 1: No	Distance ^c	0: Zone 0 + 1 1: Zone 2 + 3	8.19	3.41 - 19.67
	Giving colostrum	0: Yes 1: No	Education ^c	0: Illiterate 1: Literate	0.14	0.04 - 0.48
	Taboo	0: Yes 1: No	Distance ^c	0: Zone 0 + 1 1: Zone 2 + 3	6.87	3.06 - 15.43
	Child death	0: No 1: Yes	Distance ^c	0: Zone 0 + 1 1: Zone 2 + 3	0.25	0.11 - 0.54
			Ethnic group ^c	0: Lao Lum 1: Lao Theung + Lao Sung	9.56	1.87 - 48.82
			Education ^c	0: Illiterate 1: Literate	0.26	0.80 - 0.88

^aXieng Ngeun district with and Pakou district without TBA training; ^bcontrolled for - TBA services: distance, ethnic groups, education; education: TBA services, distance, ethnic groups; ethnic group: TBA services: distance, education; ^ccontrolled for - distance: ethnic groups, education; education: distance, ethnic groups; ethnic group: distance, education.

ticular ethnic group, and whether the women were literate or illiterate. Independently, education played a role in whether or not the females received immunization. Literate women were more likely to participate in the immunization program. An adjusted odds ratio (OR) of 0.27 indicated that literate women are also more likely to practice birth spacing. Females belonging to the Lao Lum ethnic group were less likely to follow food taboos in the Xieng Ngeun district. In the case of birth spacing, the OR was adjusted for TBA service, distance from hospital and ethnic group. In the case of observing food taboos, the OR was adjusted for TBA service, distance from hospital and education.

In the Pakou district, the distance of the homes from the community hospital plays a major role. Those females with homes closer to the hospital were more likely to participate in ANC, gave colostrum to their new-borns and disregard food taboos. Belonging to a certain ethnic group also played a role as to whether a female observed food taboos or not. Females belonging to the Lao Lum ethnic groups were more likely to follow food taboos, in contrast to those in the Xieng Ngeun district where the two other ethnic groups were more likely to follow food taboos. Independent from other variables, literate females in the Pakou district were more likely to be immunized. In the Pakou district, chances were less for literate women than for illiterate women to experience the death of a child.

DISCUSSION

The results of this investigation shed light on the difficulty of promoting reproductive health in the study area. About 25% of the females with one child belonged to the age group of 16 to 18 years. Over 50% of the females with three children were in the age range of 21 to 25 years, and over 40% of the females with four and more children were in the age range of 26 to 30 years. These findings indicate a very high fertility among these females. Child mortality also seems to be rather high. Almost 30% of the females claimed to have lost at least one child already. Also, abortion is not uncommon. Thirteen percent of the women claimed to have experienced abortion at least once. An overwhelming majority of the women delivered at home with 50% of the deliveries attended only by relatives. Five percent of the females even delivered alone without anyone at-

tending them.

The gold standard used to estimate maternal mortality is a reproductive age mortality survey (Campbell, 1993). These are costly and complex to conduct, even in areas with a high ratio of maternal mortality, since at the local level, such events are rather rare. Maternal mortality tended to be underreported even in countries with a rather satisfactory death statistic. The so-called sisterhood method is recommended as an appropriate method to estimate maternal mortality rates (WHO and UNICEF, 1997; Font *et al*, 2000; Orach, 2000). However, this was beyond the scope of this investigation because of limited resources. In a study undertaken in Lao PDR, the main causes for maternal death were reported to be postpartum hemorrhage, complications of abortion, infectious diseases (malaria), postpartum sepsis and cardiopathies (Senhsathit *et al*, 1994). Similar patterns for maternal death were found in other countries (MacLeod and Rhode, 1998; Font *et al*, 2000; Walraven *et al*, 2000), but sometimes with different magnitudes or additional risk factors such as abortion (Szmoisz *et al*, 1995), pre-eclampsia (Mungra *et al*, 1999) or hypertensive disorders (Etard *et al*, 1999). Maternal mortality is often closely related to avoidable factors, such as delay in seeking treatment, lack of transportation, sub-optimal clinic and hospital management and lack of appropriately trained personnel (Fawcus *et al*, 1996, Urassa *et al*, 1997). The five main causes worldwide, accounting for 50% to 75% of all maternal deaths, are now recognized to be hemorrhage, sepsis, eclampsia, obstructed labor and complications of abortion (Walraven and Weeks, 1999). Many of the females questioned for this study also reported heavy hemorrhage during and after delivery, high fever during pregnancy, edema as well as convulsion and headache. These symptoms are indicative of the above mentioned risk factors in relation to maternal death during pregnancy and delivery.

In Xieng Ngeun, one of the districts under investigation, TBA of 126 villages were trained for two weeks in 1996/1997 using funds from the UNICEF Save Motherhood Project. However, there was no follow up to this. No refresher training and also no supervision was provided after the training courses came to an end. The fact that nearly 70% of the females in this district considered the TBA services available to be generally

satisfactory, should be interpreted with caution, since the interviewers were government officials. This fact might have influenced the response of the women to the question about TBA services. Quite a number of the TBA who received training left the villages afterwards. This was given as one of the main reasons, why the women did not make use of the service. The villagers were also not very convinced that TBA could really help them. Thirty percent of those females questioned in the Xieng Ngeun district preferred to go to hospitals for delivery and 46% thought that they could do well without help from the TBA, since their delivery was easy anyway. Only about 50% of the females residing in the Xieng Ngeun district who were interviewed said that they made use of the TBA service. Among those females who did, 45% consulted the TBA and received health education.

It is claimed that a mother's health practices might be independent of the advice given by the TBA (Rashid *et al*, 1999). The results of this investigation seem to indicate the opposite. Even in a situation where a short training course was held only once and no refresher training was conducted. There are indications that the females who made use of the TBA service in the Xieng Ngeun district are more likely to participate in ANC, more likely to be vaccinated against tetanus neonatorum, and give colostrum to their new-borns. These findings are independent of the variables: distance from the women's homes to the nearest community hospital, belonging to a certain ethnic group and educational level. In the Pakou district, without trained TBA, participation at ANC seems to depend more on whether the women reside close to a health facility or not. If giving colostrum to new-borns is taken as an indicator of appropriate child care, in the absence of a trained TBA, health education seems to depend on the nearness of a health facility. Besides belonging to a particular ethnic group, health behavior, such as not observing a food taboo, also relates to the nearness of the community hospital. In the Pakou district, the females living closer to the community hospital were less prone to observe food taboos. Independent of the distance from the female's home to the community hospital, belonging to a particular ethnic group also seems to be an important factor in health behavior. However, this was not found to be consistent

for a particular group. In the Xieng Ngeun district the Lao Lum were more likely to observe food taboos than in the Pakou district. Opponents of TBA training programs argue that antenatal screening in developing countries is not really effective in detecting women at risk (Maine *et al*, 1991; de Brouwere and Tonglet R/Lerberghe, 1998; MacLeod and Rhode, 1998). They admit, however, that antenatal services could concentrate on education, information, treatment and prevention of existing problems, such as urinary infection, malaria and anemia. The service should be closely linked to a referral system in case of emergency (de Brouwere *et al*, 1998). Piper (1997) hinted about a problem, which cannot be overcome in countries like Lao PDR in the foreseeable future. The problem is recruitment of nurses/midwives and doctors to work in remote areas at the village level. The results of this investigation support the view that TBA in Lao PDR and in neighboring countries can contribute to reproductive health if training and supervision can be improved. It should be noted that in some instances the services of TBA could help to reduce maternal mortality rates, if training and supervision were adequate (Schneider *et al*, 1999).

Another important finding is the importance of educational level among females, independent of TBA service, distance from community hospital or belonging to a particular ethnic group. Literate women in the Xieng Ngeun district are more likely to practise birth spacing and in both districts these women are more likely to have been vaccinated. In the Pakou district literate women are less likely to lose a child than illiterate women. Similar findings were reported from other countries and different continents. Maternal health is dependent on the educational level of women (Elo, 1992; Raghupathy, 1996; Sarin, 1997; Addai, 1998).

The results of this survey conclude that adequate training of TBA and their continued support through supervision can improve ANC and health education. In addition to improvement of the referral system for emergency cases and manpower development within the obstetric curative service, TBA will have a positive impact on reproductive health in the country. It should be kept in mind that not only maternal health but the overall health status of the population depend greatly on the overall educational level of the population.

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