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Management of epilepsy in Laos: perceptions of healthcare professionals from Vientiane Capital Province and traditional healers in Southern Laos

Authors: Mayoura BOUNLU^{a,b}, Emilie AUDITEAU^{a*}, Somchit VORACHIT^b, Phetvongsinh CHIVORAKOUN^{a,b}, Vimalay SOUVONG^b, Thidachanh SOUKHASEM^b, Sonesimmaly SANNIKONE^b, Pierre-Marie PREUX^a, Farid BOUMEDIENE^a

^aINSERM, Univ. Limoges, CHU Limoges, UMR 1094, Tropical Neuroepidemiology, Institute of Neuroepidemiology and Tropical Neurology, Limoges, France

^bAssociation for Patient with Epilepsy in Laos (Lao APE), Vientiane, Lao People's Democratic Republic

Corresponding author

*Dr Emilie Auditeau, *E-mail address:* emilie.auditeau@unilim.fr, *Tel:* +33 5 55 43 59 75

Conflict of interest statement

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List of Abbreviations

AEDs: antiepileptic drugs

CAM: complementary and alternative medicine

DHeVeLoP: Domestic Health Visitors for improving access to care for people with epilepsy in Lao PDR

Lao APE: Lao Association for Patients living with Epilepsy

Lao PDR: Lao People's Democratic Republic

PWEs: people living with epilepsy

Keywords

Neurological disease, traditional medicine, conventional medicine, treatment gap, Southeast Asia

Highlights of the findings and novelties

- Understanding the perceptions and reciprocal views of care providers,
- Study the combination of traditional and conventional medicine for epilepsy,
- Public health policies: integration of traditional medicine in the care of patients.

Type of Article

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Section

4. History, Philosophy and Social-Cultural aspects of Traditional Medicine.

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International Issues in Epidemiology

Traditional Herbal Medicine

Clinical Neurology

1 **Management of epilepsy in Laos: perceptions of healthcare professionals from Vientiane Capital**
2 **Province and traditional healers in Southern Laos**

3

4 **Abstract**

5 *Background and Aim:* Traditional practices are deeply rooted in Lao people's perceptions and beliefs
6 about health and illness.

7 The objective of the study was to understand the perceptions of healthcare professionals and
8 traditional healers regarding the management of epilepsy in Laos, and their reciprocal views.

9 *Experimental procedure:* An observational study was carried out in two areas of Laos from February
10 to May 2017. Semi directive questionnaires were used to collect quantitative and qualitative data.
11 Semiotic square was carried out to highlight relationships between attitudes of traditional healers
12 and healthcare professionals. For quantitative approach, the proportions were reported, and the test
13 used was Fisher's test for nominal variables. The mean and standard deviation expressed the
14 continuous variables and the Student's t-test was used.

15 *Results and Conclusion:* Epilepsy was cited by 90.9% of traditional healers as a convulsive disease
16 with saliva or urine, and herbal medicines were predominantly used (86.4%) to treat it. Few
17 healthcare professionals (26.5%) pointed out that they knew remedies to treat epilepsy other than
18 antiepileptic drugs (AEDs), and 76.5% of healthcare professionals mentioned that epilepsy was a
19 disease which only AEDs could treat. On the other hand, 54.5% of traditional healers confirmed a
20 traditional remedy could cure completely epilepsy through long-term use. Ninety percent of
21 traditional healers said the collaboration with healthcare professionals was a good idea and 44.1% of
22 the healthcare professionals group said was complicated.

23 The combination of these medicines for the management of epilepsy needs to be adapted to Lao's
24 medical context.

25 *Keywords:* epilepsy, traditional medicine, conventional medicine, traditional healer, treatment gap

26

27 1. Introduction

28 Epilepsy is a chronic brain disorder that affects about 70 million people worldwide ¹. Epilepsy affects
29 about 1% of the population in Southeast Asia region; thus, there are approximately 15 million people
30 with epilepsy in the region. Only 10-20% of all people living with epilepsy (PWEs) receive appropriate
31 treatment; communities in Southeast Asia continue to believe in many myths and misconceptions
32 about epilepsy ². In Eastern and South Eastern Asian languages, such as Chinese, Japanese, Korean,
33 Malay, Lao, Thai, Burmese, and Khmer (Cambodia) epilepsy is associated with madness ³. In many
34 cultures, including in Africa and Asia, people with epilepsy (PWEs) are viewed with hostility and
35 denied access to medical and social care. PWEs are excluded from society: exposed to social and
36 religious taboos, isolated, sometimes with no right to have children or marry ⁴, are excluded from
37 jobs, and are not allowed to have contact or to share meals with other people ⁵.

38 Epilepsy is a controllable disease in the majority of PWEs. The goal of treatment is to maintain a
39 healthy lifestyle, ideally by complete seizure control with no or minimal side effects. Antiepileptic
40 drugs (AEDs) are the main treatment ⁶, and are the usual first line step in the management of
41 epilepsy for the majority of PWEs ⁷. In Asian countries, the treatment gap is 64.0% ⁸, and higher in
42 rural areas than in urban areas, particularly because of a lack of knowledge on epilepsy and the low
43 availability of AEDs ⁹.

44 In developing countries, traditional healthcare systems compete or complement conventional
45 medicine ¹⁰. Faith healers have strong social and religious connections; they also play an essential
46 role in the management of epilepsy in some countries. Especially in communities in Southeast Asia,
47 where PWEs are sometimes more likely to consult traditional healers than conventional doctors ².

48 Despite a lack of national policy program on epilepsy in Laos, recent research studies in collaboration
49 with several centers provided an overview of the state of knowledge ¹¹. The overall prevalence of
50 epilepsy was 7.7 cases per thousand inhabitants in 2006 ¹². The treatment gap was 90% or more, the
51 low level of knowledge of epilepsy on the part of health workers may be contributing to the wide

52 treatment gap in Laos ¹². A low availability of AEDs throughout the country was reported with an
53 annual importation of phenobarbital allowing to treat around 2% of PWEs and a price of annual
54 treatment 4- to 10-fold higher than the international price ¹³. Only a mean of one PWE per month per
55 hospital is being cared in Lao hospitals ¹¹. PWEs face many challenges to get access to appropriate
56 healthcare: a study in 2013 showed that PWEs combined conventional and traditional medicines
57 treatments ¹⁴. Traditional practices are deeply rooted in Lao people's perceptions and beliefs about
58 health and illness. The use of traditional medicine has recently become more popular and accessible,
59 and in response, the Ministry of Health has launched a policy in support of integrating traditional
60 medicine with Western medicine. The Centre for Research on Medicinal Plants and Traditional
61 Medicine was upgraded to a national institute in 2009. In 2014, the Food and Drug Department
62 provided a census of traditional medicines but guidelines for the safe use have not yet been
63 formulated. The first national traditional medicine policy and strategy are under discussion ¹⁵.

64 Our study aimed to understand the perceptions of healthcare professionals and traditional healers
65 regarding the management of epilepsy in Laos, and their reciprocal views on traditional and
66 conventional medicines, in order to improve the management of epilepsy.

67 2. Method

68 2.1 Study Area

69 An observational descriptive study was carried out from February to May 2017 by using semi
70 directive questionnaires. The selection procedure of participants was concentrated in 2 areas of Laos.
71 First, in Vientiane Capital (Figure 1), a well-known area included in the Domestic Health Visitors for
72 improving access to care for people with epilepsy in Laos (DHeVeLoP project 2014-2016) ¹⁶. Most of
73 participants were the members of the Lao Association for Patients with Epilepsy (APE), and lived in
74 the capital. The APE was established in 2011 with four main activities: organizing scientific
75 conferences on epilepsy, providing three days training on epilepsy to health personal at both
76 provincial and district levels, supporting the provision of antiepileptic drugs through a revolving drug
77 fund at provincial and district hospitals, and promoting the dissemination of information on epilepsy

78 to the public ¹⁵. There are also market trade centers for traditional medicine (sellers of medicinal
79 plants). The second area was Champasak Province, which located in the South of Laos, it is about
80 700 kms away from Vientiane Capital (Figure 1). This province has a strong cultural and religious
81 environment, the largest number of traditional healers, and there is a Traditional Medicine Centre
82 site in the Provincial Hospital.

83 2.2 Participants

84 2.2.1 Healthcare professionals

85 The participants in the conventional group were selected from the list of healthcare professionals
86 from the Lao Association for Patient with Epilepsy ¹⁷.

87 We performed an exhaustive sampling: all healthcare professionals (nurses and general
88 practitioners) of the list from the association for people living with epilepsy that have been found in
89 both study areas (Vientiane Capital and Champasak Province) were included. Then, we also
90 automatically included health personnel in the neurology and mental health services who provided
91 epilepsy treatment although they were not a member of the association.

92 2.2.2 Traditional Healers

93 With the assistance of the Provincial and District Health Units, and especially the Provincial Hospital
94 Traditional Medicine Centre, as well as through the herbal market, we were able to identify
95 traditional healers. In addition, a snowball sampling technique was used, allowing recruiting
96 traditional healers who were familiar and lived in the same villages as PWEs.

97 All participants had to know at least one traditional remedy for treating epilepsy. We included all
98 types of traditional medicine players (traditional healers and sellers of medicinal plants). They had to
99 be present at the time of our survey and willing to participate.

100 2.3 Semi-structured interviews

101 We organized individual interviews using two semi-structured questionnaires and interview guides,
102 one for healthcare professionals and one for traditional healers. The questionnaire for healthcare
103 professionals consisted of four sections: sociodemographics, knowledge (epilepsy training), attitudes
104 and practices regarding epilepsy and its treatments. It included seven questions in total, two closed
105 questions, and five open-ended questions. The questionnaire for traditional healers consisted of five
106 sections: sociodemographic data, experience with conventional medicine, knowledge, attitudes, and
107 practices regarding epilepsy and its treatments. There were in total eight open-ended questions to
108 allow a good free expression on these topics.

109 Questionnaires were initially developed in English with the agreement of the research team, and
110 then they were translated in Lao language. The Lao questionnaires were field tested in Vientiane
111 capital with 10 participants prior to conducting field work.

112 Before starting the interview, the researcher explained in detail the topic and the objective of the
113 discussion. All individual interviews were conducted by the first author (bilingual, native of Laos) at
114 the residence of participant from the traditional healers' group. For the conventional group, they
115 could choose the place where it was most convenient for them. The researcher allowed participants
116 to share their opinions without influencing the answers. If necessary, more specific questions were
117 then asked. We worked closely with local healthcare professionals (who acted as mediators) for
118 better communicating and comprehensive of a local term, so the participants would be able to
119 provide rich information. Each individual interview would take a minimum of 50 minutes; interviews
120 were recorded after seeking authorization from the participants. Interviews recorded in Lao were
121 then translated in English.

122 2.4 Ethical considerations

123 Written consent was systematically obtained before the interviews. Our study was authorized by the
124 Lao National County of Ethics for Health Research (No 032/NIOPH/NECHE and No044/NECHR) and
125 the Ministry of Health, Laos (Agreement No 0397 dated 04/03/2016).

126 2.5 Data analysis

127 Our main objective was focused on understanding the perceptions of traditional healers and
128 healthcare professionals on epilepsy management by using two different analytical approaches.

129 2.5.1 Qualitative analyses

130 Thirteen open-ended questions, reverse translations, and transcriptions were carried out by the
131 bilingual interviewer, a native of Laos (1st author). We used the thematic analysis methodology, first
132 identifying key themes within data, and encoding before interpretation. The lexical analysis was
133 based on semantic occurrences, which allowed coding (in qualitative value) according to the most
134 frequently cited modalities and was presented by a proportion. The validity of the coding was based
135 on the consensual coding of two researchers (1st and 2nd author). When differences emerged, a
136 consensus was sought with a third researcher. These questions were then analyzed as closed
137 multiple-choice questions by proportion analysis.

138 We used semiotic square in order to highlight relationships between attitudes of traditional healers
139 and healthcare professionals through the negative and positive answers.

140 2.5.2 Quantitative analyses

141 Transcriptions and coding of the lexical segments of interest were carried out using the
142 functionalities of the Word software; then the coded data were stored in Microsoft Excel. The
143 statistical analyses were performed using STATA 13 software. For dichotomous and closed-ended
144 questions, the proportions were reported, and the tests used were Chi2 or Fisher's test. Their mean

145 and standard deviation expressed the quantitative variables, and the Student's t-test was used. The
146 significance threshold for all analyses was set at 0.05.

147 3. Results

148 3.1 Sociodemographic data

149 Fifty-six participants were interviewed: 34 healthcare professionals and 22 traditional healers (Figure
150 1). Women represented 61.8% in the group of healthcare professionals in contrast with the
151 traditional healers' group, where the male population was predominant (95.5%); the difference
152 between two groups was significant ($p < 0.0001$). The participants were mostly Buddhists (98.2%) and
153 in the traditional healers' group, they were significantly older than in the conventional group
154 ($p < 0.0001$). Only one traditional healer (4.6%) had completed a university degree compared to 100%
155 of subject in the healthcare professionals' group ($p < 0.0001$) (Table 1).

156 3.2 Knowledge and practice of traditional healers on epilepsy

157 Epilepsy was cited by 91% of traditional healers as a convulsive disease with saliva or urine, followed
158 by a neurological disease (41%). The perception of a supernatural disease was not found in the
159 participants of the survey. Fifty-four percent had learned about traditional medicine from their family
160 and they stated this practice was a Lao folk custom. When we questioned if the participant knew
161 another remedy to treat epilepsy beside a traditional remedy, about 41% mentioned biomedical
162 medicine as a treatment for epilepsy. Forty-one percent had no restriction if patient would like to
163 combine antiepileptic drugs with traditional remedy.

164 3.3 Epilepsy remedy of traditional healers

165 Herbal medicines were predominantly used by traditional healers (86.4%) and 31.8% of them used
166 bone or teeth from animals. The participant explained the reason of using traditional remedies by a
167 familiarity and a tradition behavior (54.5%). Food restrictions were mentioned for PWEs being
168 treated with traditional medicine (68.2%). For some traditional healers, the only advice given to
169 PWEs was to be careful about epileptic seizures (31.2%). Regarding the combination of traditional

170 and biomedical treatments, 45.5% of traditional healers said it was the patient's decision. Forty-one
171 percent stated that patients could combine a traditional remedy with AEDs with no restriction (Table
172 2).

173 3.4 Attitudes of healthcare professionals on epilepsy care pathway

174 Thirty-four healthcare professionals were interviewed about their opinion on epilepsy management
175 in Laos (Table 3). Only 21% reported that they received initial training in epilepsy as part of their
176 medical curriculum. Sixty one percent mentioned that continuous training had improved their
177 knowledge on epilepsy and 50% stated they had the capacity to diagnose and prescribe antiepileptic
178 drugs (AEDs).

179 Very few participants pointed out that they knew treatments other than AEDs (26.5%): among those
180 who knew, 20.6% mentioned traditional ceremonies and 11.5% herbal medicines, only one
181 healthcare professional mentioned surgery. Otherwise, 41.2% of participants stated that only AEDs
182 could treat epilepsy, and that traditional remedies or herbal medicine were ineffective. Anyhow, if
183 PWEs would like to combine, they could (38.2%).

184 3.5 Conventional doctor and traditional healers' attitudes on epilepsy treatment

185 We synthesized participants' attitudes according to semiotic squares in Figure 2 (A&B). Regarding the
186 opinions on AEDs, the figures were categorized in more positive and more negative attitudes for
187 better understanding. In the conventional group, 61.8% mentioned that AEDs were available and
188 affordable, but some of them (44.1%) stated AEDs geographical availability could be limited,
189 potentially leading to low adherence to treatment for PWEs (32.4%). For the traditional healers'
190 group, AEDs were considered by 68.2% of participants to increase the pharmacological effect of
191 traditional remedies. Although, 13.6% of participants thought AEDs were used to control the
192 epileptic seizures, not to treat epilepsy cause.

193 The second question was focused on the perception regarding traditional remedies. Participants in
194 the conventional group had more negative attitudes on traditional medicine: 76.5% mentioned that
195 epilepsy was a neurological disease which only AEDs could treat. Only 14.7% said it could be
196 combined with AEDs as traditional medicine was about providing psychosocial support to PWEs. In
197 the traditional healers' group, traditional medicine was considered as more natural (organic means)
198 and moreover, it could cure completely epilepsy when used over the long-term (54.5%). Thirty-six
199 percent of traditional healers stated that the effectiveness of traditional remedies was unpredictable.
200 For the collaboration between conventional and traditional medicine, 90.9% of traditional healers
201 said it was a good idea. In contrast, with the conventional group in which 44.1% stating, it was
202 complicated.

203 4. Discussion

204 4.1 Conventional and traditional medicine for epilepsy management

205 Traditional medicine remains an important part of the health care system, particularly in Asian and
206 African countries ¹⁸⁻²⁰. Traditional healers showed a positive attitude regarding the collaboration with
207 healthcare professionals for epilepsy treatment. Most of them said the cooperation was an excellent
208 approach but only 13.0% of traditional healers recommend PWEs taking a traditional remedy and an
209 AED at the same time. A study in Burkina Faso demonstrated that most healers (more than 90.0%)
210 wished to be integrated into the modern healthcare system and considered that both kinds of
211 treatments were complementary ²¹. A study conducted in Cape Town in 2015 showed that traditional
212 healers were supportive of collaboration with western-trained practitioners ²². Conversely, the study
213 in Ivory Coast highlighted that traditional healers would recommend the sudden discontinuation of
214 modern medicines in preference to traditional treatment, this attitude reflecting their relative
215 ignorance about modern treatments ²³. In our study, almost half healthcare professionals thought
216 that collaboration with traditional healers was complicated and only thirty-eight percent stated it
217 was good. We noticed that they were likely to not recommend complementary treatment, unlike

218 patients in Peru, in which it was showed the traditional medicine has been chosen by PWEs instead
219 of conventional treatment ($p=0.024$)²⁴.

220 It is interesting to discuss why they had a different perspective, especially because our study shows a
221 contradictory perception between the two groups. First, if we consider sex and age, we observed
222 that the participants' traditional groups were significantly older than those of the conventional
223 group. Older adults perceive pictures differently than younger adults; older adults focus more on
224 positive affect²⁵. There was also a greater proportion of males in the group of traditional healers
225 similar to the study in Burkina Faso by Abdullahi et al. (2011), regarding traditional healers'
226 knowledge and attitudes towards epilepsy, all traditional practitioners were male and most of them
227 were above 50 years of age²¹. In Lao context, men are considered culturally superior because of their
228 ability to become monks. Men are generally recognized as the household head for religious and
229 political purposes²⁶. Being a traditional healer in Laos means they have to respect many cultural
230 rules, so it is not too different from being a religious leader.

231 4.2 Knowledge, Attitudes and Practices regarding on epilepsy care

232 Epilepsy was seen largely as a convulsive disease with saliva or urine flowing out by traditional
233 healers. The perception that epilepsy has a supernatural origin was not found for traditional healers
234 and healthcare professionals but was previously reached by PWE, their families and villagers⁵. A
235 study in Ivory Coast demonstrated that for more than 80.0% of traditional practitioners, epilepsy was
236 a supernatural disease²³. Our results, and those of the study in Ivory Coast²³, suggest that herbal
237 treatments are the main remedy used by traditional practitioners, 86.4% and 97.0% respectively. In
238 Latin America, a study conducted in Peru showed the traditional healers were more frequently
239 consulted than healthcare professionals for first-line antiepileptic treatment. More than 60.0% of
240 PWEs and 80.0% of traditional healers, used herbal remedies in this survey, and supernatural
241 etiologies were mentioned by 23.4% of PWEs²⁴. By contrast, in Malaysia in 2008, Razali et al. showed
242 that 75.0% of epileptic patients used Holy water and only 12.5% herbal medicine²⁷.

243 Awareness campaigns provided by healthcare system mentioned 38.2% of PWEs and their families
244 had limited understanding about epilepsy and medicals staff in rural areas had poor knowledge on
245 epilepsy (23.5%)²⁸. More than half of healthcare professionals mentioned that continuous
246 professional training could be applied to increase knowledge on epilepsy treatment and allowed
247 them to have the ability to diagnose and prescribe antiepileptic drugs (AEDs). The professional
248 training that they referred to was the activities of the program DHeVeLoP (2014-2016) and of the Lao
249 Association for patients living with epilepsy (Lao APE)¹⁷. This suggested a positive outcome of the
250 intervention activities compared to the previous study conducted in 2013 which indicated a low
251 knowledge of epilepsy for healthcare workers in Laos¹⁴. Two important changes in the management
252 of epilepsy were made between the studies: the APE provided AEDs and the domestic health visitors
253 were trained about the disease in the second study. A randomly selected health workers study
254 conducted in 2009 reported only 2.5% of them recalled ever having received training on epilepsy and
255 our study highlighted a poor knowledge of the medical staff for less than 25% of the healthcare
256 professionals surveyed. The majority of the health workers (59.9%) were unaware of any available
257 AEDs at the health facilities¹² and 55.9% perceived difficulties of AEDs management and accessibility
258 in the present study.

259 The availability of antiepileptic drugs (AEDs) seems to be a serious barrier to the management of
260 epilepsy: participants in the conventional group mentioned that AEDs were available and affordable
261 with some of them stating that their geographical availability across the country could be limited.
262 Many studies in Laos already highlighted that AEDs had very low availability especially in rural areas
263^{28,29}. Traditional or herbal medicines were considered as ineffective (41.2%) but the study conducted
264 in 2018 in Laos suggested that more than 50% of PWEs had already consulted a traditional
265 practitioner to treat their epilepsy³⁰. Only thirty-eight percent agreed about the combination of
266 conventional and traditional medicines based on patient's needs.

267

268 4.3 Strengths and limitations

269 Our study was the first study in Laos conducted to understand the perceptions of healthcare
270 professionals and traditional healers regarding epilepsy treatment. Exploratory research is effective
271 in laying the foundation for future studies. All information collected was original data; individual
272 interviews helped participants to discuss contentious issues in more depth, allowing flexibility, and
273 adaptability to the local context.

274 A rather modest number of subjects in the samples, which may not adequately represent the target
275 population, was surveyed. The identification of participants, especially traditional healers was not
276 easy because not every Traditional Medicine Centre has a list of registered traditional healers
277 resulting in a lower number of traditional healers answered in comparison with healthcare
278 professionals. Thus our sample has a limited representativeness, which makes extrapolation of the
279 results in the national context difficult. Additionally, it could have been interesting to interview
280 traditional healers from the North of Laos who have different cultural background and medicine
281 healthcare, influenced by Chinese traditional medicine.

282 Exploratory studies generate qualitative information and interpretation of such type of information is
283 subject to biases. That is the reason why we combined qualitative and quantitative approaches:
284 some qualitative answers were then categorized into quantitative variables (after consultation with
285 several authors). Although it can lead to a loss of information from interviews, it has the benefit of
286 allowing quantitative analyses.

287 The healthcare seeking behavior of mixing remedies has long been observed. It is time for healthcare
288 professionals to be more willing to accept complementary and alternative remedies.

289 5. Implications for practice and conclusion

290 Most traditional healers said the collaboration with healthcare professionals was a good idea and
291 nearly half of the healthcare professionals believed it would be complicated. Healthcare
292 professionals reported that AEDs have a low compliance, mainly due to occasional availability. For

293 them, traditional medicine could be used in association with AEDs as non-medical remedies and
294 could play a psychotherapeutic role. Traditional healers mentioned that traditional medicine
295 provides unpredictable effectiveness. Most of them indicated that AEDs will be interesting in order to
296 increase the efficacy of the traditional remedy. For both groups of caregivers, it would be relevant to
297 use the effects of traditional medicine coupled with those of AEDs.

298 Understanding the attitudes of the conventional doctor towards traditional medicine will be useful in
299 implementing future integration of complementary and alternative medicine (CAM). The institutional
300 recognition of traditional medicine, recommended by the WHO in its strategy 2014-2023, promote
301 the safe and effective use of CAM through the regulation of products, practices, and practitioners.
302 Healthcare professionals need to be aware of their presence and their role as a potential referral to
303 healthcare, considering the holistic, humanitarian and individualized views of the traditional healer,
304 and the interesting therapeutic and palliative effect of CAM in chronic diseases.

305 This study showed steps forward in epilepsy management in the Lao medical context. Further
306 research on the combination of traditional and conventional medicine for epilepsy is required and
307 will bring us closer to the patient. A better understanding of the care pathway will help reduce the
308 treatment gap.

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311

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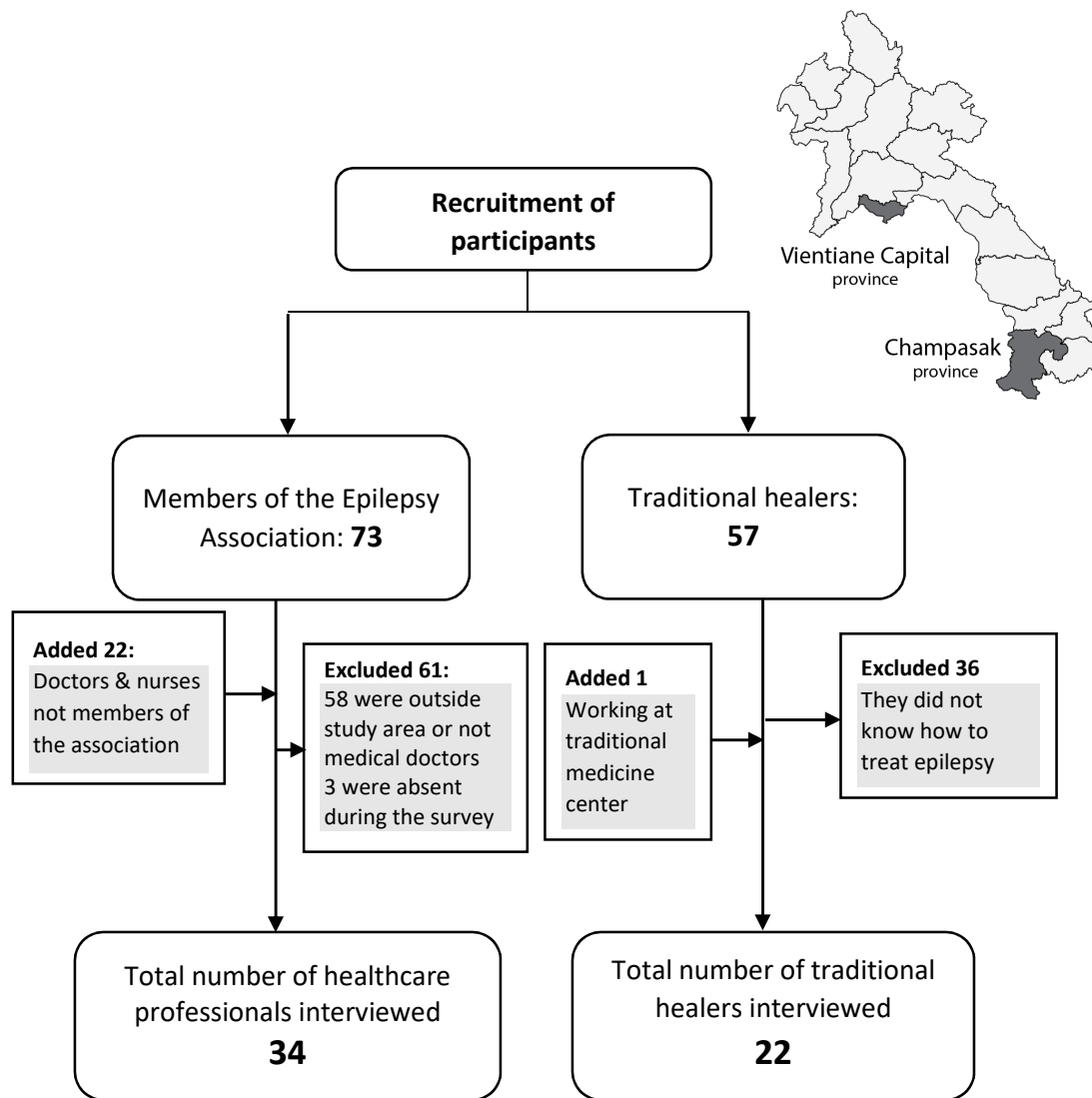


Figure 1: Flow chart of healthcare professionals & traditional healers interviewed and localization of study areas in Lao PDR

	Healthcare professional	Traditional healers
+	61.8% : Availability and affordability	68.2% : Increase the efficacy of the traditional remedy
-	44.1% : Low geographic availability 32.4% : Occasional availability → Low patient compliance	13,6% : Can control the seizure but not treat the real cause 9.1% : Had more side-effects

Figure 2.A: Opinion on antiepileptic drugs (AEDs) for epilepsy treatment

	Healthcare professional	Traditional healers
+	14.7% : In association “non-medical remedy = psychotherapy”	54.5% : Can heal completely epilepsy 54.5% : Less chemicals supplements, more natural ingredients
-	76.5% : Only AEDs can treat epilepsy	36.4% : Unpredictable effectiveness

Figure 2.B: Opinion on traditional method for epilepsy treatment

Table 1: Sociodemographic characteristics of participants interviewed

	Overall N=56	Healthcare professionals N= 34	Traditional healers N= 22	P value
Sex				
Male	34 (60.7%)	13 (38.2%)	21 (95.5%)	<0.0001 ^a
Female	22 (39.3%)	21 (61.8%)	1 (4.6%)	
Mean age ± SD (Min-Max)	50.4±13.9 (24-80)	43.1±9.1 (24-61)	61.8±12.3 (34-80)	<0.0001 ^b
Religion				
Buddhism	55 (98.2%)	34 (100.0%)	21 (95.5%)	0.393 ^a
Animism	1 (1.8%)	0	1 (4.6%)	
Education level				
Special education system	2 (3.6%)	0	2 (9.1%)	<0.0001 ^a
Primary school	10 (17.9%)	0	10 (45.5%)	
Secondary and higher	9 (16.1%)	0	9 (40.9%)	
University degree	35 (62.5%)	34 (100.0%)	1 (4.6%)	
Family status				
Single	5 (8.9%)	5 (14.7%)	0	0.145 ^a
Married	51 (91.1%)	29 (85.3%)	22 (100.0%)	

a=fisher's exact test, b=student's T-Test

Table 2: Knowledge and practices towards epilepsy of traditional healers

	Traditional healers N=22
Knowledge on epilepsy and epilepsy remedy	
What is epilepsy, also called mad pig disease? (multiple answers)	
Convulsive disease with saliva/urine	20 (90.9%)
Neurological disease	9 (40.9%)
Disease of the blood system	7 (31.8%)
Disease of nerve fibers /tendons	6 (27.3%)
Hereditary disease	6 (27.3%)
Do you know epilepsy remedies other than your epilepsy treatment methods?	
Yes	11 (50.0%)
Biomedical medicine	9 (40.9%)
Acupuncture	2 (9.1%)
No	11 (50.0%)
How did you learn about traditional medicine? (multiple answers)	
Family knowledge	12 (54.5%)
Learned at the temple (learned with a monk)	4 (18.2%)
Learned by ancient traditional healer	3 (13.6%)
The only one remedy access to care in rural area	3 (13.7%)
Have been chosen by a spirit to become a healer	3 (13.7%)
Practices on epilepsy	
Which methods do you use to treat epilepsy? (multiple answers)	
Herbal medicines	19 (86.4%)
Animals (bone, teeth)	7 (31.8%)
Other	4 (18.2%)
Why do you use traditional remedy? (multiple answers)	
This is a tradition/ these traditions exist in Lao folk custom	12 (54.5%)
Generation-to-generation knowledge	8 (36.4%)
Fewest side effects	7 (31.8%)
Restrictions? Yes	
Food diet	15 (68.2%)
No restrictions, just advise him to be careful about the seizures	7 (31.2%)
Drinking alcohol	4 (18.2%)
Advice for PWEs who want to use antiepileptic drugs	
Patient's preference	10 (45.5%)
In association with no restriction	9 (40.9%)
One after the other	3 (13.6%)

Table 3: Opinion of healthcare professionals on epilepsy care

		Healthcare professionals (N=34)
Opinion on the epilepsy care system in Laos		
Positive attitude	Continuous training enabling to increase knowledge	21 (61.8%)
	Capacity of diagnosis & prescription of AEDs	17 (50.0%)
	Improvement of the patient's quality of life	8 (23.5%)
Negative attitude	Difficulty of AEDs management and accessibility	19 (55.9%)
	Misunderstanding of patients and their families about epilepsy	13 (38.2%)
	Poor knowledge of the medical staff	8 (23.5%)
	Complexity of doctor-patient coordination	5 (14.7%)
Do you know any other remedy to treat epilepsy?		
<i>Yes (multiple answer)</i>		9 (26.5%)
	Traditional ceremony	7 (20.6%)
	Herbal medicines	4 (11.8%)
	Surgery	1 (2.9%)
<i>No</i>		25 (67.6%)
Advice for PWEs who want to use herbal medicine		
	Only AEDs, other remedies are not effective	14 (41.2%)
	In association	13 (38.2%)
	Patient's preference	7 (20.6%)

Knowledge (epilepsy training), Attitudes & Practices regarding epilepsy and its treatments

Semi-structured interviews

Traditional healers



86.0% used medical plants

91.0% : willing to collaborate

Healthcare professionals



76.5% mentioned only antiepileptic drugs

44.1%: collaboration was complicated

Qualitative analyses
Quantitative analyses

Healthcare system

Conventional medicine

Traditional medicine

Healthcare pathway