



Medicinal plants used in Hmong women's healthcare in northern Thailand

Kamonnate Srithi^{a,*}, Chusie Trisonthi^a, Prasit Wangpakapattanawong^a, Henrik Balslev^b

^a Department of Biology, Faculty of Science, Chiang Mai University, 239 Huay Kaew Rd., Chiang Mai 50200, Thailand

^b Department of Biosciences, Aarhus University, Building 1540, Ny Munkegade 114–116, DK-8000 Aarhus C., Denmark

ARTICLE INFO

Article history:

Received 21 June 2011

Received in revised form 20 October 2011

Accepted 24 October 2011

Available online 28 October 2011

Keywords:

Cultural importance

Ethnobotany

Gynecology

Medicinal plants

Obstetrics

Traditional knowledge

ABSTRACT

Ethnopharmacological relevance: We studied traditional knowledge of medicinal plants used for women's healthcare in three Hmong villages in northern Thailand and determined how prevalent such knowledge is. We documented traditional medical practices and determined which of the species used are culturally important among the Hmong.

Materials and methods: We interviewed six key informants and 147 non-specialist informants about their traditional knowledge of medicinal plants used in Hmong women's healthcare. We selected nine species that were known in all three villages as the domain for questionnaire interviews with 181 additional and randomly selected non-specialist informants. We calculated the Cultural Importance index (CI) for each species and use category. We tested normality of the data, age correlations, and gender correlations with Kolmogorov–Smirnov tests, Spearman's rank correlation coefficient, Kruskal–Wallis test, and Mann–Whitney tests.

Results: We documented traditional knowledge of 79 medicinal plants used in women's healthcare. Of these, three species were culturally important to the Hmong. Our questionnaire interviews revealed significant difference in traditional medicinal plant knowledge between genders and age groups.

Conclusions: The Hmong people in northern Thailand possess large amounts of traditional knowledge related to women's healthcare and plants used for this purpose. However, this knowledge, even for the culturally important species, is not possessed by all Hmong and there were signs of knowledge erosion. Preservation of the Hmong intellectual heritage related to medicinal plants used in women's healthcare requires intensive traditional knowledge dissemination to the young Hmong generation.

© 2011 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Use of medicinal plants is important in Southeast Asia where the enormous biological and cultural diversity is reflected in a variety of traditional medical practice systems. As part of this, most cultures have special practices and activities related to women's healthcare, especially such ones that are used in the pregnant and postpartum period. In most cultures, pregnancy, childbirth and puerperium are critical periods of human life (Mathews and Manderson, 1981; Jambunathan and Stewart, 1995; Thi, 2004). Many practices, such as dietary restriction, herbal steam baths, mother roasting, are common during the postpartum period in many Southeast Asian cultures (Mathews and Manderson, 1981; Daviau, 2003; Kaewsarn et al., 2003a,b; Liulan et al., 2003; Thi, 2004; Lo, 2007; Lundh, 2007; Zumsteg and Weckerle, 2007; Barennes et al., 2009; de Boer and Lamxay, 2009; Villamin and Villamin, 2009; Lamxay et al., 2011; Panyaphu et al., 2011) and a number of medicinal plants are

incorporated into those practices. This is also true for the Hmong people who use medicinal plants to care for women's health conditions, including dysmenorrhea, menorrhagia, and female fertility.

The Hmong, an ethnic group originating in southern China, have a total population of 4–5 million (Lemoine, 2005) with the largest groups living in southern China and northern Southeast Asia, in northern Laos, Vietnam and Thailand. Like other cultures, they have developed a medical system that employs cultivated and wild plants and the related traditional knowledge has been orally passed down from generation to generation. Very little is known about the uses of plants in cultural practices and health beliefs related to pregnancy and postpartum of the Hmong in Southeast Asia. A few related studies that included cultural beliefs, taboos, practices, behaviors, and plants used in connection with birth of Southeast Asian Hmong were reported from Lao PDR (Daviau, 2003; Lundh, 2007). In addition, there are some in-depth studies carried out among immigrant Hmong in western countries for the purpose of implementing culturally appropriate healthcare (e.g. Lee, 1986; Morrow, 1986; Jambunathan, 1995; Jambunathan and Stewart, 1995; Rice, 1999, 2000; Johnson, 2002). Despite these studies of the Hmong women's healthcare system, only few ethnobotanical studies describe the medicinal plants incorporated in such

* Corresponding author. Tel.: +66 5394 3346x1234; fax: +66 5389 2259.

E-mail addresses: kamonnate.srithi@gmail.com, nookamon@gmail.com (K. Srithi).

practices (e.g. Pake, 1987; Spring, 1989; Anderson, 1993; Corlett et al., 2003; Lundh, 2007).

Traditional knowledge is, and has always been, dynamic in any culture. In our days with the introduction of modern healthcare systems in rural areas, cultural traditions of the past are often being ignored and they are gradually disappearing. Several studies show that access to modern medicine is accompanied with erosion of knowledge related to traditional medicinal plant in many cultures (Anderson, 1986a,b; Ohmagari and Berkes, 1997; Sam et al., 2008; Srithi et al., 2009). This has been reported in Minahasa (Indonesia) where reduction of the use of the *bakera*, a herbal steam bath for postpartum care, was attributed to a general trend to consume western medicine among the young mothers. They considered the preparation of the *bakera* too troublesome (Zumsteg and Weckerle, 2007). This may also be true for the Hmong. Documenting their use of medicinal plants is not only a way to perpetuate such orally transmitted traditional knowledge that is vulnerable to loss, but it also provides a deeper understanding of how Hmong traditional medical practices relate to women's healthcare.

In this paper we document traditional knowledge of medicinal plants and present new insights into traditional practices related to women's healthcare among the Hmong of northern Thailand. We also attempt to determine how that knowledge is shared and which are the culturally important plant species used for women's healthcare. Culturally important species are those that are used by a large number of people for the same category of medicinal use (Heinrich et al., 1998). In this context we aim at answering the following specific questions:

1. Which are the plant species used by Thai Hmong to treat women's health condition?
2. Which are the culturally important plant species used in woman's healthcare among the Thai Hmong?
3. How prevalent is knowledge and use of traditional medicinal plants for women's healthcare among the Thai Hmong?

2. Materials and methods

2.1. List of abbreviations

Cultural importance index (CI).

2.2. Cultural background

The Hmong form a sub-group of the Miao ethnic group and their name means 'free man' (Fass, 1991; Lundh, 2007). Originally from southern China in the regions that are now the Sichuan, Guizhou, Guangxi and Yunnan provinces (Siriphon, 2006), they were migratory and self-sufficient farmers in highland habitats (Lee, 1986). In the latter half of the nineteenth century, forced by population pressure and political control exerted by the Han Chinese over centuries, the Hmong migrated south to other parts of Asia (Michaud, 1997; Perve, 2006; Siriphon, 2006; Lee, 2007). Apart from political conflicts, search for fertile farmland may have contributed to the Hmong migration (Michaud, 1997; Siriphon, 2006). Subsequent migrations of the Hmong in southeastern Asia have been attributed to the spread of communist regimes in the Indochinese peninsula. At the end of the Vietnam War Laotian Hmong were persecuted and many fled to Thailand, the United States and other western countries such as France and Australia (Perve, 2006; Siriphon, 2006; Lee, 2007). Nowadays, the largest Hmong groups live in southern China, northern Laos, Vietnam, and Thailand. In Thailand, 150,000 Hmong live scattered in the provinces of Nan, Chiang Rai, Phayao, Chiang Mai, Phrae, Tak, Mae Hong Son, Lampang, Pitsanulok, Phetchabun and Loei (Perve, 2006).

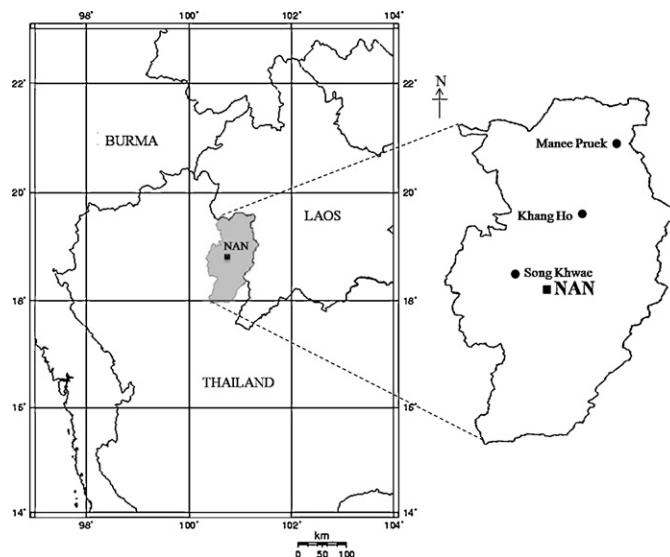


Fig. 1. Three Hmong villages in northern Thailand where medicinal plants used to treat women's health condition were studied.

Thai Hmong are divided in two groups; green Hmong (sometimes called blue Hmong) and white Hmong, who have different traditional costumes and dialects. They practice shifting slash and burn cultivation at 1000–1500 m elevation with upland rice, sweet corn, vegetables and many sorts of fruits (Anderson, 1993; Perve, 2006). They also raise black pigs and poultry for food and for ritual ceremonies. Their social structure is patrilineal and based on the family and the clan, and names are passed down from father to son. Each household includes an extended family of three or four generations, usually with two or more married couples. Polygamy is accepted and practiced and is seen as a sign of wealth and prestige. Hmong religion is a mixture of animist rites and shamanism. They worship ancestor's spirits and believe that spirits are present in all places such as the spirit of central house post, hearth, door, bedroom, etc. (Perve, 2006).

2.3. Study areas

Data were collected in three Hmong villages in Nan province, northern Thailand (Table 1, Fig. 1) from March 2010 to March 2011. The majority of the inhabitants in all three villages are green Hmong, and the few white Hmong who live there moved to the villages due to Hmong marriage traditions. Originally, all three villages studied were situated in the highlands, but Khang Ho and Song Khwac were moved to the lowlands after a conflict between the Thai military and the Communist Party of Thailand (CPT) in 1960–1982. After CPT 'took to the jungle' they offered ethnic minorities health, education and assistance to the poor (Rousset, 2009). As a response the Thai military ordered many highlanders to move to where they now reside. The remaining highland village, Manee Pruek is now the most traditional and isolated of the three, located at the end of a road, 42 km away from the nearest town. Despite the isolated location, Manee Pruek has a modern public healthcare system similar to those in the two lowland villages. The cash income of the Manee Pruek villagers is mainly derived from selling crops and orchard products.

2.4. Data collection

Six keys informants (5 females and 1 male, 2 from each village) were selected for their reputation as specialist with medicinal plant knowledge. A survey of the traditional knowledge of the key

Table 1

Basic information and number of informants in three Hmong villages in northern Thailand where medicinal plants used to treat women's health condition were studied.

Village name	Coordinates	Altitude (masl)	Inhabitants	Households	Distance to nearest town (km/town name)	Number of non-specialist informants (females/males)	Number of informants for the questionnaires for each age range (females/males)					
							15–19	20–29	30–39	40–49	50–59	>60
Khang Ho	19°07'59.44"N 100°56'00.38"E	220	1892	312	7/Pua	65 (47/18)	10 (6/4)	10 (5/5)	9 (4/5)	10 (5/5)	10 (5/5)	11 (6/5)
Manee Pruek	19°26'22.84"N 101°04'11.35"E	1252	1282	134	42/Chiang Klang	49 (39/10)	9 (4/5)	11 (6/5)	10 (5/5)	10 (6/4)	10 (5/5)	10 (5/5)
Song Khwae	18°51'49.22"N 100°38'08.69"E	200	2050	362	20/Nan	33 (29/4)	11 (5/6)	9 (5/4)	10 (5/5)	11 (6/5)	10 (5/5)	10 (5/5)

informants was made in homegardens, cultivated fields, and nearby forest. The key informants were interviewed concerning plants used to treat women's health conditions and herbarium specimens were collected (Appendix A). Plant names, recorded in Thai, were transliterated into Hmong spelling using Roman script (Bliatout et al., 1988). Common crops were identified on site, using local names and/or a checklist of Thai plant names (Smitinand, 2001). Other species were identified using taxonomic literature (Flora of Thailand, Flora of China, etc.).

Following the survey with key informants, group discussions with 5–8 different non-specialist informants were conducted 5, 7, and 10 times in Song Khwae, Manee Pruek and Khang Ho, respectively. The topic of discussion was announced beforehand and randomly selected informants were asked to participate in the group discussion. Women were more willing to participate and of 147 non-specialist informants, 115 were females and 32 were males (Table 1). Pictures and samples of plants, collected during the key-informant-survey were shown to the informants who were asked if they knew any use related to women's health conditions of those plants. Some informants added uses of medicinal plants that were not mentioned by the key informants. Species used for women's healthcare, mentioned by both key informants and non-specialist informants in all three villages, were classified as 'culturally important'.

To determine prevalence of knowledge and use of the 'culturally important' species, we carried out a third survey in the form of a questionnaire interview. This was done from January through March, 2011 with 181 additional informants concerning traditional knowledge and actual uses of medicinal plants. In total, 91 females and 89 males were randomly selected in six stratified age groups (Table 1). The interviews were conducted in Thai with the presence of a translator when the informants could not communicate in that language. During the interview, pictures of the 'culturally important' medicinal plants were shown to each individual and they were asked what uses they knew of those species for treating conditions related to women's health and whether they had actually used the particular plant themselves. All uses mentioned were classified into 21 use-categories (Table 2).

2.5. Data analysis

Based on the data from the questionnaire interviews, we calculated the Cultural Importance index (CI; Tardío and Pardo-de-Santayana, 2008) that reflects the prevalence of use (number of informants), and diversity of use of each species:

$$CI = \sum_{u=1}^{NC} \sum_{i=1}^N \frac{UR_{ui}}{N}$$

Table 2

Use-categories in which 79 plant species were employed to treat women's health related conditions in the Hmong villages in northern Thailand.

No.	Use-categories
1	Food taboo for pregnant women
2	Increasing female fertility
3	Inducing labor
4	Inducing placenta delivery
5	Postpartum recovery (inducing uterus shrinking)
6	Postpartum recovery (treating prolapsed uterus)
7	Postpartum recovery (promoting expulsion of 'dead blood' and lochia)
8	Promoting fetal stabilization
9	Treating amenorrhea
10	Treating dysmenorrhea
11	Treating endometritis
12	Treating leucorrhea
13	Treating menorrhagia
14	Treating morning sickness
15	Treating pelvic pain
16	Treating venereal disease
17	Using as contraceptive
18	Using as lactagogue (increasing lactation)
19	Using as postpartum diet
20	Using for abortion
21	Using for blood tonic/anemia

where UR_{ui} is the total number of use-report for each use category of a given species, N is the total number of the informants and NC refers to the total number of the use-categories. Hence, the CI index is the sum of the proportion of informants that mention each of the use-categories for a given species. The maximum value of the index equals the total number of different use-categories (NC), which would occur if all informants would mention the use of a species in all use-categories. In this case, the maximum CI value would be 2.00.

Some informants would know medicinal use of a species without knowing that it was also used for women's healthcare. To separate this we employed two use categories: 'used for women's healthcare' and 'not used for women's healthcare' and calculated the CI value separately for 'used for women's healthcare' (CI'). Plants with CI' making up >50% of total CI we classify as genuinely 'culturally important' for women's healthcare among the Hmong.

We used the Kolmogorov–Smirnov test for normality of the data (number of plants used for women's health related conditions known by each interviewed informant); the Spearman's rank correlation coefficient to determine correlations between informants' age and number of plants known by them, the Kruskal–Wallis one-way analysis of variance to test for significant differences between numbers of known plants among age groups, and the Mann–Whitney test to determine equality of the women's healthcare knowledge between genders and different age groups. All analyses were done with the SPSS 16.0 software package for Windows.



Fig. 2. *Apiaceae* sp.1, the most important species encountered in this study, used to treat morning sickness in pregnant woman and promoting fetal stabilization.

3. Results

3.1. Plant species used to treat Hmong women's health condition

We document 79 plant species that are used medicinally in 21 categories (Table 2) related to Hmong women's health conditions, e.g. increasing female fertility, treating dysmenorrhea, postpartum recovery, etc. (Appendix A). Of those, 71 were identified to species, six only to genus and two only to family. Despite doing one year of field research, the *Apiaceae* sp.1 has proven difficult to identify irrespective of inquiries to several taxonomic experts. Likewise, *Apiaceae* sp.2, present in homegardens in Manee Pruek never bloomed and its owner has never seen its flowers. Key informants and non-specialist informants from Khang Ho, Manee Pruek, and Song Khwae reported 32, 44, and 35 species, respectively, many of which are used to treat more than one health condition. The species and their medicinal uses are listed in Appendix A. Of the total of 144 different uses mentioned by the informants, 137 were reported by less than 10 informants and 66 of those were reported by a single informant. Plant uses mentioned were mainly related to female reproductive system and pregnancy. The most frequently mentioned uses were treatments of dysmenorrhea and amenorrhea for which 28 plant species were used. The most frequently mentioned species was *Apiaceae* sp.1 (Fig. 2) which has 36 uses related to relieving morning sickness in pregnant women and promoting fetal stabilization.

3.2. Culturally important plant species

We classify nine species as 'culturally important' because they were mentioned by both key informants and non-specialist informants in all three villages (Table 3). Of these nine 'botanical' species two – *Impatiens balsamina* (in Khang Ho and Song Khwae) and *Impatiens violiflora* (Manee Pruek) – belong to the same 'ethno-species' called 'paaj nti ntuav' and 'paj co nti' by the green and white Hmong, respectively. We treated these two botanical species as one in the questionnaire interview, following the criteria of Hanazaki et al. (2000).

The species that were known by most informants in the questionnaire interview were *Achyranthes longifolia*, *Apiaceae* sp.1,

Impatiens balsamina/violiflora, and *Iresine herbstii*, which is reflected in their high CI' values. *Achyranthes longifolia*, *Apiaceae* sp.1, *Impatiens balsamina/violiflora* had CI'/CI proportions greater than 50% and were therefore classified as genuinely 'culturally important' plant species used for women's healthcare. The most important uses of these species reported by the non-specialists informants were the same as those reported by the specialist informants and in the focus group discussion. Overall, of those 334 informants, 27% reported that *Achyranthes longifolia* is used for woman's health related conditions (Table 3) and 20% mentioned its use for treating dysmenorrhea and 7% for amenorrhea. For *Apiaceae* sp.1, 25% said that its most important use is for treating morning sickness and promoting fetal stabilization. Of the 63 informants (19%) who mentioned uses related to women's health condition of *Impatiens balsamina/violiflora*, 17 said it was used to treating dysmenorrhea and amenorrhea whereas 23 said it was used for inducing labor.

3.3. Prevalence of knowledge and use

In the questionnaire interviews 44% of the informants did not have any knowledge relating to the use of the nine plants and only 9% of the informants knew about the use of more than three species. Among those who possessed local knowledge about the use(s) of at least one species, 221 and 263 reports were given of uses for 'women's healthcare' and 'non-women's healthcare', respectively. The CI values (0.14–0.53) of the nine species used as the questionnaire domain were far from the possible maximum value (2.00).

The number of known medicinal plant was significantly correlated with informant age (Spearman's rank correlation test: $r=0.600$, $p<0.001$), more so among females ($r=0.798$, $p<0.001$) than among males ($r=0.459$, $p<0.001$). Female informants mentioned more medicinal plant used for women's healthcare than did the male informants (Mann–Whitney test, $p<0.001$). We also found significant differences of plant use knowledge between age groups (Kruskal–Wallis test, $p<0.001$). For both genders, informants >50 years and more so informants >60 years of age, knew more medicinal plants than younger informants (Mann–Whitney test, $p<0.05$).

Of the 58 use-reports from male informants related to women's healthcare, 48 were known from hearing about them and only 10 were known from personal experience such as gathering or preparing medicinal plants for women in their family. Of 175 use-reports mentioned by female informants, 21 were only known from hearing about them whereas 154 were known through personal experience. When asking about the actual use, 73% of the informants mentioned that their reports related to past uses dating more than five years back. During the questionnaire interviews, most female informants said that, when a herbal remedy was needed, the plants were not easy to find. Some, who mentioned uses of medicinal plants to treat disorders such as dysmenorrhea, could not recall which plants were used. Focusing on culturally important species, all use-reports related to the use of *Impatiens balsamina/violiflora* to induce childbirth were known only from the past uses and none of the informants had used them in practice. All female informants agreed that Hmong women no longer give birth at home. Of the 29 informants who had used *Apiaceae* sp.1 empirically, only three informants (young mothers) had used it recently (in the past 2–3 years) whereas the rest of informants mentioned it as a use from past times. In contrast, 24 of 45 female informants had used *Achyranthes longifolia* in the recent past to treat dysmenorrhea whereas the rest of them no longer used it.

4. Discussion

4.1. Plant species used to treat Hmong women's health condition

The use of 79 plant species for 144 different uses in 21 categories, by key and non-specialist informants in this study, reflects the large

Table 3
Nine plants species used as domain for questionnaire interview and number of informants who mentioned them as useful in treating women's health condition, most important use, CI values, and their degree of importance in three Hmong villages in northern Thailand.

Plant name	Survey and Focus group discussion (6 key informants and 147 non-specialist informants)		Questionnaire interview (181 non-specialist informants)								
	No. of informant who mentioned the use of the species	Most important use	Total use-report	No. of informant who mentioned use-report 'not related to women's healthcare'	Most important use	No. of informant who mentioned use-report 'related to women's healthcare'	Most important use	CI' value	Total CI	%CI' relative to total CI	Degree of importance
<i>Achyranthes longifolia</i>	30	Treating dysmenorrhea	75	13	(Salient use cannot be determined)	62	Treating dysmenorrhea	0.34	0.41	82.67	Culturally important
<i>Agrimonia nepalensis</i>	7	Treating amenorrhea	60	54	Treating food poisoning	6	Treating amenorrhea	0.03	0.33	10.00	–
<i>Apiaceae</i> sp.1	36	Treating morning sickness Promoting fetal stabilization	68	19	Tonic food 'seasoning chicken soup'	49	Treating morning sickness Promoting fetal stabilization	0.27	0.38	72.06	Culturally important
<i>Impatiens balsamina/violiflora</i>	22	Treating amenorrhea Treating dysmenorrhea	49	8	–	41	Treating amenorrhea Treating dysmenorrhea	0.23	0.27	83.67	Culturally important
<i>Iresine herbstii</i>	9	Inducing labor Blood tonic/anemia	96	55	Tonic food 'seasoning chicken soup'	41	Inducing labor Blood tonic/anemia Use as postpartum diet	0.23	0.53	42.71	–
<i>Mirabilis jalapa</i>	9	Treating amenorrhea Treating dysmenorrhea	26	15	–	11	Treating dysmenorrhea	0.06	0.14	42.31	–
<i>Sedum</i> cf. <i>sarmentosum</i>	12	Treating morning sickness Promoting fetal stabilization	36	23	Tonic food 'seasoning chicken soup'	13	Treating morning sickness Promoting fetal stabilization	0.07	0.20	36.11	–
<i>Teucrium viscidum</i>	11	Promoting fetal stabilization	83	76	Treating cough Treating fever Treating stomachache	7	Treating dysmenorrhea Treating morning sickness Promoting fetal stabilization	0.04	0.46	8.43	–

Table 4

A comparison of plants used to care for women's health conditions recorded in this study and their use(s) elsewhere.

Plant name	Health conditions for which the plant used by the Hmong (this study)	Health conditions for which the plant used elsewhere	Cultural group/culture (country)	References
<i>Agrimonia nepalensis</i>	- Amenorrhea - Dysmenorrhea - Postpartum recovery (inducing uterus shrinking)	- Metrorrhagia - Postpartum cramp - Postpartum recovery (prevention of cold after delivery)	Taiwanese (Taiwan) The Hakka (Guangdong, China)	Li (2006) Au et al. (2008)
<i>Artemisia lactiflora</i>	- Postpartum recovery (promoting expulsion of postpartum discharge)	- Regulates menstruation	Taiwanese (Taiwan)	Li (2006)
<i>Artemisia vulgaris</i>	- Amenorrhea	- Amenorrhea - Dysmenorrhea - Emmenagogue	Ayurveda (India)	Jadhav and Bhutani (2005)
<i>Boehmeria nivea</i>	- Amenorrhea - Dysmenorrhea - Postpartum recovery	- Preventing miscarriage - Preventing miscarriage	(Ben En National Park, Vietnam) (Ben En National Park, Vietnam)	Sam et al. (2008) Sam et al. (2008)
<i>Buddleja asiatica</i> <i>Carex baccans</i>	- Contraceptive - Amenorrhea - Postpartum recovery (inducing uterus shrinking)	- Abortifacient - Dysmenorrhea - Leucorrhea	Tribal women (Pakistan) Red-headed Yao (China)	Shah et al. (2009) Long and Li (2004)
<i>Dioscorea bulbifera</i>	- Promoting fetal stabilization	- Stopping menses bleeding - Uterine bleeding	Taiwanese (Taiwan) Taiwanese (Taiwan)	Li (2006) Li (2006)
<i>Impatiens balsamina</i>	- Abortion - Amenorrhea - Dysmenorrhea - Inducing labor	- Inducing labor	Hmong (U.S.A) Yunnanese (Thailand)	Corlett et al. (2003) Liulan et al. (2003)
<i>Leonurus artemisia</i>	- Pelvic pain	- Menstrual irregularities - Amenorrhea - Postpartum hematoma	Taiwanese (Taiwan)	Li (2006)
<i>Lysimachia christinae</i>	- Amenorrhea - Morning sickness/promoting fetal stabilization	- Womb bleeding	Red-headed Yao (China)	Long and Li (2004)
<i>Melastoma malabathricum</i> subsp. <i>normale</i>	- Dysmenorrhea - Leucorrhea	- Leucorrhea	Red-headed Yao (China)	Long and Li (2004)
<i>Mirabilis jalapa</i>	- Dysmenorrhea - Amenorrhea - Leucorrhea	- Promote delivery of blood clot after delivery	Hmong (refugee camp, Chonburi, Thailand)	Pake (1987)
<i>Phyllanthus niruri</i> <i>Plumbago zeylanica</i>	- Amenorrhea - Amenorrhea - Dysmenorrhea - Menorrhagia - Abortion	- Irregular menstruation - Abortifacient	Rural people in Haryana (India) (Chittoor district, India)	Yadav et al. (2006) Chetty et al. (2006)
			(India)	Edwin et al. (2009)
			(Balh valley, India)	Rawat and Kharwal (2011)
			Tribal women (Pakistan)	Shah et al. (2009)
		- Leucorrhea	Rural people in Haryana (India)	Yadav et al. (2006)
		- Amenorrhea	Tribal people (Bangladesh)	Yusuf et al. (2007)
<i>Ricinus communis</i>	- Inducing labor - Inducing placenta delivery	- Menstrual disorder	Ayurveda (India) Rural people in Haryana (India)	Jadhav and Bhutani (2005) Yadav et al. (2006)
<i>Teucrium viscidum</i>	- Dysmenorrhea - Promoting fetal stabilization	- Dysmenorrhea	Taiwanese (Taiwan)	Li (2006)

amount of traditional knowledge related to women's health conditions among the Hmong. Many of the species reported here were shown to have medicinal value for women's healthcare in previous studies. Among the traditional knowledge reported, we found both shared and idiosyncratic knowledge which may or may not be shared with the others (Vandebroek, 2010). Because empirical experiences are the basis for knowledge, and because effectiveness of medicinal plants depends on each individual's response to the pharmacological components, we did not ignore those single use-reports.

4.1.1. Plants used for uterine/vaginal related conditions

Fertility is a dominant theme in Hmong culture (Weeks et al., 1989; Lundh, 2007). In the past, the Hmong had the highest birth rates among Indochinese refugees (Weeks et al., 1989) including the highland minorities in Thailand (Kunstadter, 1985). It was supposedly because the Hmong live in large extended families, marry at very young age, and rarely use contraception (Kunstadter, 1985). Because infertility, low fertility, or inability to conceive is usually blamed on the woman, the Hmong often employ fertility-enhancing herbs (Lundh, 2007). This may be the reason that plant uses recorded here mainly related to the female reproductive system and pregnancy. Interestingly, most plants reported as important for treating dysmenorrhea or amenorrhea (e.g., *Achyranthes longifolia*, *Impatiens balsamina*/*violiflora*, *Piper* sp., *Plumbago zeylanica*, *Rosa* sp., etc.) are frequently mentioned 'multi-purpose' medicinal plants that are used for other uterine-related health treatments such as female infertility, abortion, postpartum recovery, e.g., promoting expulsion of postpartum discharge and inducing uterus shrinking.

To Hmong traditional attitude, the uterus is significant as the home for the unborn and the basis of 'true' women for fulfilling their responsibility to their husbands and family (Yang and Mielke, 2003). Hmong women fear the collapse of their uterus more than any other health condition because they believe that it is fatal and cannot be cured (Liamputtong, 2003). Women's ability to become pregnant and give birth to healthy children is the most important sign that the uterus is healthy. Absence of menstruation for long time is considered bad for uterine health. Normal and regular menstrual cycles are important to clean the uterus. Dysmenorrhea (menstrual cramp) is considered normal for young women and is seen as a sign of the need to have a child, but on the other hand, the same condition is considered abnormal and unhealthy for older women (Yang and Mielke, 2003). Our findings suggest that many Hmong woman still maintain these traditional attitudes. Informants usually mentioned that dysmenorrhea or amenorrhea is caused by accumulation of 'unhealthy' blood clot in the uterus. They believe that medicinal plants can promote the contraction of the uterus and expulsion of 'unhealthy' blood. After the expulsion of the 'unhealthy' blood, the uterus is clean and considered healthy and prepared for pregnancy (Liamputtong, 2003). Based on Hmong concepts of reproductive physiology, they believe that ovulation occurs during or immediately following menstruation (Spring and Lochungvu, 2003) and twenty days after a period is considered as the most fertile period for a woman (Liamputtong, 2003). As such, a married woman who wishes to bear a new child should have sexual intercourse with her partner after using those plants that help increasing fertility and, hence, enhance the possibility to succeed their goal. Pregnant women are not allowed to use these plants neither in form of food nor as medicine, unless an abortion is desired (Liamputtong, 2003).

Plants used to care for the female reproductive system by the Hmong are often used for similar purposes by other ethnic groups (Table 4). As documented here *Piper* sp. is used for multiple purposes such as treating dysmenorrhea, amenorrhea, endometritis, pelvic pain and increasing female fertility. We note that a related

species, *Piper hancei*, which can be considered the same ethno-species as it has the same Hmong name ('maab saw nyiaj (G)'/hmab saw nyiaj (W)'), is used to treat prolapsed uterus by the Hmong in a refugee camp in Chonburi (Pake, 1987). In Africa, the bark of *Piper capense* has been used to treat infertility and venereal disease (Arnold and Gulumian, 1984; Steenkamp, 2003). Among the Hmong studied here a root decoction of *Rosa* sp. is used in postpartum recovery (inducing uterus shrinking), treating amenorrhea, dysmenorrhea and leucorrhea. The Hakka in China use a root decoction of a related species, *Rosa chinensis* to treat irregular menstruation and amenorrhea (Au et al., 2008). *Rubia crassipes* is used for treating dysmenorrhea and amenorrhea by the Thai Hmong studied here, whereas a related species, *Rubia cordifolia*, is used for treating oligomenorrhea in India (Rawat and Kharwal, 2011), menorrhagia in Africa (Arnold and Gulumian, 1984), and dysmenorrhea, postpartum vaginal pain, amenorrhea, uterus and vagina diseases in Ayurvedic medicine (Jadhav and Bhutani, 2005).

4.1.2. Plants used for postpartum recovery

The postpartum period is seen as very important in many cultures. This also holds for the Hmong culture and a rest period of one month after childbirth is commonly recommended (Jambunathan, 1995; Daviau, 2003). Despite the fact that young Hmong mothers no longer give birth at home, postpartum practices are still important and adhered to. Prescriptive behaviors after childbirth are important for ensuring women's short-term survival, long-term health, maintenance of their fertility, and their ability to produce breast milk (Culhane-Pera, 2003; Culhane-Pera and Xiong, 2003). In this study informants rarely reported herbal bathing for postpartum treatments even if 'warm showers/baths' have been reported in other studies of the Hmong postpartum treatments (Jambunathan, 1995). Such herbal bathing is also common among other Thai and Southeast Asian cultures (Liulan et al., 2003; Lundh, 2007; Zumsteg and Weckerle, 2007; de Boer and Lamxay, 2009; Lamxay et al., 2011; Panyaphu et al., 2011). In this study, only *Boehmeria nivea* was said to be used in herbal bathing during the postpartum period. To the Hmong, postpartum bleeding is seen as necessary to rid the uterus of old 'dead blood', so that the woman's body is cleaned out. The Hmong believe that if the old blood remains in the uterus the woman may develop an infection, become infertile and be bothered by multiple ailments for the rest of her life (Culhane-Pera, 2003). Most plants related to postpartum recovery reported here are therefore used in form of potions to induce uterus shrinking (restore to pre-pregnancy condition), induce placenta delivery and promote expulsion of lochia and postpartum discharge. Many of the plants reported here as used for postpartum recovery are used for the same purpose elsewhere. For example, *Acorus gramineus* which the Thai Hmong use for promoting the expulsion of lochia and postpartum discharge is used for promoting the expulsion of 'dead blood' by the Hmong in the U.S. (Spring, 1989; Corlett et al., 2002, 2003), and *Curcuma aeruginosa* which the Thai Hmong use to induce uterus shrinking after delivery is also used in postpartum care by the Thai elsewhere in Thailand (Thaina et al., 2009).

4.1.3. Food taboos and plants used for postpartum diet

In the postpartum month, behavior in relation to diet and hygiene is regulated by Hmong traditional cultural norms. During that period Hmong women may only rest, eat and take care of their child and they have a variety of medicinal plants that they use for recovery and diet. The new mothers may only consume hot rice and chicken soup (Jambunathan, 1995) cooked with green herbs (Rice, 1999). It is believed that consumption of chicken and rice contributes to individual strength in old age and prevention of future sickness because chicken contains less fat than soup from other meat (Jambunathan, 1995). The tradition of consuming chicken as postpartum diet is also observed among the Chinese

(Pillsbury, 1978; Liulan et al., 2003; Raven et al., 2007; Tung, 2010), Thai (Kaewsarn et al., 2003b), Mien (Daviau, 2003; Panyaphu et al., 2011), and some ethnic groups in Lao (Daviau, 2003; de Boer and Lamxay, 2009; Lamxay et al., 2011). Consumption of food considered 'cold' both in terms of temperature and humoral quality is prohibited. This is also true for other food that can cause illness and death, such as fruits, fresh vegetables, red meat and cold drinks (Rice, 1999). The concept of hot and cold foods and body temperatures connected with a woman's postpartum vulnerability has been described among many Asian cultures (Mathews and Manderson, 1981; Daviau, 2003; Kaewsarn et al., 2003b; Liulan et al., 2003; Thi, 2004; Lo, 2007; Lundh, 2007; Raven et al., 2007; de Boer and Lamxay, 2009). The Hmong we interviewed mentioned these precautions but they also said that *Agrimonia nepalensis*, Apiaceae sp.1, *Boehmeria nivea*, and *Xiphidium caeruleum* are non-toxic and that these species constitute 'not harmful' food to the new mothers and that they can help in treating abnormalities caused by consumption of other species encompassed by food taboos. *Xiphidium caeruleum*, in contrast to its use in postpartum diet, is a food taboo for pregnant women. Such precaution may be attributed to its use for treating amenorrhea and promoting expulsion of 'dead blood' after delivery which is related to contraction of the uterus. *Iresine herb-stii*, in addition to its important use for blood tonic, is also used as a seasoning herb for postpartum chicken soup together with other kinds of vegetables such as *Gynura bicolor*. These two species are also used in postpartum diet by the Mien (Yao) elsewhere in Nan province (Srithi et al., 2009). Other plants that are reported as food taboo for pregnant women were *Kalanchoe laciniata*, *Mirabilis jalapa*, and *Phedimus* sp. Interestingly, it was reported in a study of the Hmong living in Australia that the ethno-species called paj kub tub sab which in this study refers to *Mirabilis jalapa* is used as a postpartum herb to clean out the blood, and that, if the herb is taken during pregnancy, it can cause abortion (Liamputtong, 2003).

4.1.4. Plants used for inducing lactation

Breastfeeding is common among Hmong women (Liamputtong, 2003). Plants used as lactagogues are served to new mothers in their postpartum diet. We found that Hmong concepts about lactation are similar to the ones found in Thai culture in which white-colored foods are thought to relate to good quality or correct milk concentration (Vong-ek, 1993). The belief in 'curing like with like' – referring to the physical characteristics of plants that supposedly reveals their therapeutic value – is found throughout the world and it is known as the doctrine of signatures (Bennett, 2007). Here we found that the Thai Hmong use plants with milky sap such as *Alstonia scholaris*, *Carica papaya*, *Euphorbia hirta*, *Euphorbia neriifolia*, and *Pedilanthus tithymaloides* to induce lactation. The latex of *Carica papaya* has been reported to have oxytocic activity (Adaikan and Adebisi, 2004; Bryant and Knights, 2010). *Anredera cordifolia*, used as lactagogue by the Hmong in this study, is used for the same purpose by the Mien (Yao) in Nan province (Panyaphu et al., 2011). Elsewhere other species with milky sap such as *Euphorbia lancifolia* (Rosengarten, 1982), *Euphorbia antiquorum* (Pake, 1987), *Lactuca biensis*, and *Taraxacum officinale* (Mills et al., 2006) are used for stimulating lactation. Though it is unlikely that signatures led to discovery of plants' medicinal value, many plants that bear signatures are efficacious (Bennett, 2007). This may also be true for the uses of the milky-sap plants shown to us by the Hmong; however, it still needs to be investigated more thoroughly.

4.1.5. Plants used for blood tonic and treating anemia

The use of plants for blood tonic and for treating anemia by the Thai Hmong reported here is also in accord with the doctrine of signatures with their reddish color indicating the plant's efficacy in treating blood ailments (Bennett, 2007). Mostly, they use plants such as *Amaranthus cruentus*, *Basella rubra*, cf. *Blutea superba*, *Iresine*

herbstii, *Stephania pierrei* that have pigments or red or purple sap but they also use some plants without those red/purple pigments for the same purpose. Similarly, leaf juice and seeds of *Basella rubra* is used for treating anemia among women in Bangladesh (Paul et al., 2011). And the Mien (Yao) in Nan province use *Iresine herb-stii* to increase blood corpuscles (Panyaphu et al., 2011). Amaranthaceae, such as *Amaranthus cruentus* and *Iresine herb-stii*, have betacyanin pigments (Cai et al., 2001) which have been reported to enhance the oxygen-carrying capacity of the blood. This also makes beetroot useful in the treatment of anemia and this could also be true for other Amaranthaceae species reported in this study.

Overall, this study suggested that Hmong practices for women's healthcare and medicinal plants used are, in some manner, similar to those practiced by other Southeast Asian cultures. Because many medicinal plants used for women's healthcare by the Hmong in this study have also been reported as medicinal and related to women's healthcare in other cultures, it is likely that the selection of medicinal plants used for women's healthcare by the Hmong is based on empirical observation of efficacy. Phytochemical studies, however, are needed to document the efficacy of the plants used.

4.2. Culturally important plants

We determined three culturally important medicinal plants used for Hmong woman's healthcare. All three species were known by most informants in the questionnaire interview and they were associated to childbirth and the female reproductive system.

Apiaceae sp.1 is used for treating morning sickness and promoting fetal stabilization and was mentioned by 25% informants as useful in women's healthcare. Its use to treat morning sickness was always reported along with its use for promoting fetal stabilization. For that purpose, its leaves are finely chopped and mixed with eggs and then steamed and served to the pregnant woman suffering morning sickness. The Hmong woman we interviewed believed that morning sickness is a sign of weakness of the fetus and may cause miscarriage. This plant helps regaining strength and stabilizes the life of the unborn. Apart from its name in Hmong language, they usually call this plant the 'herb that prolongs the unborn's life.' Childbearing is not only a biological event but also relates to the social and cultural environments where it occurs (Rice, 1999). To the Hmong, miscarriage is not only the physiological failure of a pregnant woman to bear a child, but also considered a failure to extend the clan and lineage and it has profound meaning related to the spirit and the soul of the unborn (Rice, 2000). Thus, every attempt must be made by a Hmong pregnant woman to avoid miscarriage. Even if there are many plants that are used to treat morning sickness and to promote fetal stabilization, most informants suggested that this Apiaceae sp.1 is the most effective of them all. It may be used together with other herbs such as *Lysimachia christinae*, *Kalanchoe pinnata*, and *Sedum* cf. *sarmentosum*. Still, complete identification of this Apiaceae species is pending.

The ethno-species *Impatiens balsamina*/violiflora is used for inducing labor. In past times when the Hmong resided in the highlands, they were isolated from hospitals and modern antenatal care. When it was time to give birth, the midwife was the only caregiver available in such isolated habitats. Most informants mentioned that hot infusion of *Impatiens* leaves and roots was served to pregnant women who had long labor pain to induce and ease delivery. Most of the informants who reported this use were older women who had experienced the traditional delivery. Traditional knowledge, similar to that of the Thai Hmong related to *Impatiens balsamina*, has also been reported for Laotian Hmong refugees who migrated to the U.S. (Corlett et al., 2003) and for Chinese minorities in northern Thailand (Liulan et al., 2003). Interestingly, other *Impatiens* species such as *Impatiens capensis* and *Impatiens pallida*

are used by native Americans to induce childbirth (Moerman, 2004).

Achyranthes longifolia is a culturally important species that is used for multiple purposes related to the female reproductive system and it is important for treating dysmenorrhea. Informants who had used this plant agreed about its efficacy in treatment of dysmenorrhea. The cultural importance of this plant may be attributed to its efficacy and popularity as it was mentioned by 20% of the informants for the use to treat dysmenorrhea. However, in spite of being an effective and well-known species, there are only few reports in the literature to confirm its effectiveness. A somewhat related use of this species is reported from Taiwan, where it is used to improve blood circulation (Li, 2006). Our report of its use to treat dysmenorrhea may therefore be the first one relating to its medicinal use in women's healthcare, indicating that this use may be unique to the Hmong and further research may be needed to warrant its efficacy.

4.3. Prevalence of knowledge and use

Overall, the CI values (0.14–0.53) of the species used as the domain of the questionnaire were far from the possible maximum value (2.00), showing that knowledge and use of these medicinal plant were not known by a large proportion of the 181 interviewed informants. Apparently, this interpretation is supported by the result that there were 44% of the 181 informants who did not have any knowledge relating to the use of the nine culturally important medicinal plants and only 9% knew about the use of more than three of the nine plant species. Moreover, of the 493 use-reports mentioned by all informants, more than half (53%, 263 use-reports) were for 'not used for women's healthcare' whereas only 47% (230 reports) were 'used for women's healthcare'.

Older informants knew more medicinal plants than younger ones and women knew more than men. Knowledge of medicinal plants used for women's healthcare is, therefore, more intensively possessed by female informants whose age was greater than 50 years. This is not surprising because certain skills such as knowledge of medicinal plants are developed over a lifetime. A large part of the traditional knowledge is embedded in practices that people engage in (Pfeiffer and Butz, 2005; Guimbo et al., 2011); for example, in rural Niger, women knew more edible plants than men because they have responsibility for daily food production whereas men have a greater knowledge of fodder and construction (Guimbo et al., 2011). Our findings on gender effect on knowledge of medicinal plants may reflect similar relationships—154 of 175 use-reports (88%) about plant used for women's healthcare possessed by female informants were gained empirically. In contrast, such knowledge possessed by male informants was mostly learned from hearing. In this case practical knowledge possessed by female informants may surpass the theoretical knowledge possessed by male informants and contribute to the significant difference in their knowledge about plants used for women's healthcare.

Knowledge of medicinal plants develops over a lifetime and also increases with frequent application of that knowledge (Phillips and Gentry, 1993). When factors that interrupt knowledge transmission are absent, knowledge of medicinal plants can develop over a lifetime as the young informants get older. We, however, find some factors that could interrupt transmission of knowledge and that may have lead to the erosion of knowledge. First, medicinal plant knowledge possessed by the informants was not a direct reflection of their actual use. Of 154 use-reports gained empirically 73% referred to past use obtained more than five years ago. Prolonged lapses between times when a plant is used may lead to disruption of knowledge transmission because medicinal knowledge is passed down orally and via lifestyle to the young generation (Albuquerque,

2006). We take the case of culturally important species, *Impatiens balsamina* and *Miralibis jalapa*, as an evidence. These two species are still grown in Hmong communities but their traditionally medicinal uses were seldom practiced; young informants, instead, merely see them as ornamental plants. Furthermore, with access to modern medical care, knowledge of using *Impatiens balsamina/violiflora* to induce childbirth is vulnerable to extinction. Secondly, young women who still use herbal remedies rely on knowledge held by the elders. They inform the elder in their family (mother, mother-in-law, grandmother) about their health problem and ask them to gather and prepare the medicinal plant used to treat such disorders, without paying attention to learning how to gather and prepare the herbal remedy. For this reason, they could not recall and determine which plants were used. Also, the accessibility of new or easier method of living is always accompanied with the changes in lifestyle which is related to the loss of once well-known traditions unless attempts are made to strengthen and apply them (Zumsteg and Weckerle, 2007). During the questionnaire interviews, most female informants mentioned that when a herbal remedy was needed, the plants were not easy to find and prepare. They therefore had to rely on the modern healthcare system. A similar situation also causes the reduction of traditional postpartum practice in other cultures in Southeast Asia (Zumsteg and Weckerle, 2007; Srithi et al., 2009; Panyaphu et al., 2011). As the environmental surroundings is considered central to the acquisition of traditional plant knowledge (Lozada et al., 2006), it is important to note that the disappearance of environments related to the traditional lifestyle may lead to the breakdown of knowledge transmission and threatens the existence of traditional medicinal knowledge (Huai and Pei, 2004).

5. Conclusion

This study presents insights into traditional practices related to women's healthcare among the Hmong in northern Thailand. They use 79 medicinal plant species and the uses are likely based on empirical observation of efficacy. Based on use patterns, we classify three medicinal plant species as 'culturally important': *Achyranthes longifolia*, Apiaceae sp.1 and *Impatiens balsamina/violiflora*. These plants are used to treat health conditions related to women's reproductive system. Medicinal plant knowledge related to women's healthcare is not uniformly distributed among the 181 informants interviewed by means of a questionnaire. We found effects of age and gender on medicinal plant knowledge and such knowledge is mostly possessed by older female informants. Overall, this study provides a deeper understanding of Hmong traditional attitude about women's healthcare. Preservation of Hmong intellectual heritage about medicinal plant used in women's healthcare requires intensive dissemination to the young Hmong generation.

Acknowledgments

We thank all informants at Khang Ho, Manee Pruek, and Song Khwae for sharing their knowledge of medicinal plants with us and permitting us to publish our findings. We thank Sunee Zae-her, Nudda Yangyuentawee, Bampen Kumthornsiripanich and Wa Yansakon for being translators, Arunee Yangyuentawee and Sureeporn Zae-Yang for the transliteration of plant names into Hmong spelling using Roman script. We would also like to thank The Royal Golden Jubilee Program of the Commission on Higher Education of Thailand for funding Kamonnate Srithi's PhD study.

Appendix A.

See Table A.1.

Table A.1

Plant species used medicinally in three Hmong villages in northern Thailand for women's healthcare. Herbarium vouchers were collected by Kamonnate Srithi and deposited at the Ethnobotany Research Unit, Department of Biology, Faculty of Science, Chiang Mai University, Thailand and Queen Sirikit Botanic Garden herbarium (QBG), Mae Rim, Chiang Mai, Thailand.

Scientific name [Plant family/Voucher No.]	Hmong name (G = green Hmong/W = white Hmong)	Part used	Preparation	Route of administration	Application/condition	Village	No. of informant who mentioned use of this species
<i>Achyranthes longifolia</i> Makino [Amaranthaceae/014]	Zaub ceg nyuj lab (G), Zaub ceg nyuj liab (W)	Leaves	Decoction	Potion	Increasing female fertility	Khang Ho	5
		Leaves	Decoction	Potion	Postpartum recovery (inducing uterus shrinking)	Khang Ho, Manee Pruek	2
		Leaves	Decoction	Potion	Treating amenorrhea	Khang Ho, Song Khwae	5
		Leaves	Decoction	Potion	Treating dysmenorrhea	Khang Ho, Manee Pruek, Song Khwae	27
<i>Acorus calamus</i> L. [Acoraceae/052]	Pawj a (G), Pawj ia (W)	Leaves/rhizome	Decoction	Potion	Treating amenorrhea	Manee Pruek, Song Khwae	2
<i>Acorus gramineus</i> [Soland.] [Acoraceae/086]	Pawj qab (G), Pawj qaib (W)	Leaves	Cooked with chicken	Eaten as food	Postpartum recovery (promoting expulsion of 'dead blood' and lochia (postpartum discharge))	Manee Pruek	1
<i>Agrimonia nepalensis</i> D.Don [Rosaceae/008]	Cos kev nyeg (G)	Root/whole plant	Decoction	Potion	Treating amenorrhea	Khang Ho, Manee Pruek, Song Khwae	4
		Root/whole plant	Decoction	Potion	Treating dysmenorrhea	Song Khwae	1
		Root/whole plant	Decoction	Potion	Using as postpartum diet	Manee Pruek	2
<i>Alocasia cucullata</i> (Loureiro) G.Don [Araceae]	Teeb nqug (G)	Corm	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	1
<i>Alstonia scholaris</i> (L.)R.Br. [Apocynaceae]	–	Milky sap	Cooked with chicken	Eaten as food	Using as lactagogue (increasing lactation)	Song Khwae	1
<i>Amaranthus cruentus</i> L. [Amaranthaceae/189]	Txhuv ntuj lab (G), Txhuv ntuj liab (W)	Leaves	Cooked with chicken/decoction	Eaten as food/potion	Using for blood tonic/anemia	Song Khwae	3
<i>Anredera cordifolia</i> (Ten.) Steenis [Basellaceae/020]	Saab txhim maab (G), Sab txhim hmab (W)	Leaves	Cooked with chicken	Eaten as food	Using as lactagogue (increasing lactation)	Khang Ho	5
Apiaceae sp.1 [101]	Taab kib ntsuab (G), Tab kib ntsuab (W)	Leaves	Hot infusion	Potion	Treating dysmenorrhea	Manee Pruek	1
		Leaves	Cooked with steamed eggs	Eaten as food	Treating morning sickness/promoting fetal stabilization	Khang Ho, Manee Pruek, Song Khwae	36
		Leaves	Cooked with chicken	Eaten as food	Using as postpartum diet	Song Khwae	1
Apiaceae sp.2 [006]	Txhab xyooob (G)	Leaves	Cooked with chicken	Eaten as food	Postpartum recovery (inducing uterus shrinking)	Manee Pruek	1
<i>Artemisia lactiflora</i> Wall. ex DC. [Asteraceae/007]	Taab kib lab luj (G), Tab kib liab luj (W)	Leaves	Cooked with chicken	Eaten as food	Postpartum recovery (promoting expulsion of 'dead blood' and lochia (postpartum discharge))	Manee Pruek	4
<i>Artemisia vulgaris</i> L. [Asteraceae/092]	Suv ntswm (G), Suv ntsim (W)	Leaves	Cooked with steamed eggs	Eaten as food	Treating amenorrhea	Song Khwae	1
<i>Basella rubra</i> L. [Basellaceae/446]	Maab ntshaa lab (G), Hmab ntshaa liab (W)	Leaves	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Song Khwae	1

Table A.1 (Continued)

Scientific name [Plant family/ Voucher No.]	Hmong name (G = green Hmong/ W = white Hmong)	Part used	Preparation	Route of administration	Application/ condition	Village	No. of informant who mentioned use of this species
<i>Blumea balsamifera</i> DC. [Asteraceae/015]	Xaab yeeb qus (G,W)	Leaves	Warmed	Abdominal wrapping	Using for abortion	Manee Pruek	1
<i>Blumea lanceolaria</i> Druce [Asteraceae/212]	Ntiv zoov (G)	Leaves	Decoction	Potion	Increasing female fertility	Khang Ho	1
		Leaves	Decoction	Potion	Treating endometritis	Khang Ho	1
<i>Boehmeria nivea</i> Gaudich. [Urticaceae/116]	Tsaaj (G), Tsaj (W)	Leaves	Decoction	Herb bathing	Postpartum recovery	Khang Ho	2
		Leaves	Cooked with chicken	Eaten as food	Treating amenorrhea	Khang Ho	1
		Leaves	Decoction	Potion	Treating dysmenorrhea	Khang Ho	1
		Leaves	Cooked with chicken	Eaten as food	Using as postpartum diet	Khang Ho, Manee Pruek	4
<i>Buddleja asiatica</i> Lour. [Buddlejaceae/484]	Paaj tshuas (G), Paj tshaus (W)	Root	Decoction	Potion	Treating venereal disease	Manee Pruek	1
		Root	Decoction	Potion	Using as contraceptive	Khang Ho	1
<i>Caesalpinia sappan</i> L. [Fabaceae/016]	Txhub (G,W)	Stem	Decoction	Potion	Treating dysmenorrhea	Khang Ho	1
<i>Callicarpa rubella</i> Lind. [Lamiaceae/206]	Xwv muaj nab	Root	Decoction	Potion	Treating venereal disease	Manee Pruek	3
<i>Carex baccans</i> Nees [Cyperaceae/208]	Rog luj	Root	Decoction	Potion	Postpartum recovery (inducing uterus shrinking)	Manee Pruek	3
		Root	Decoction	Potion	Treating amenorrhea	Manee Pruek	2
<i>Carica papaya</i> L. [Caricaceae]	Maum kuab (G), Taub ntoos (W)	Root/raw fruit	Cooked with chicken	Eaten as food	Using as lactagogue (increasing lactation)	Manee Pruek	3
<i>Celosia argentea</i> L. [Amaran- thaceae/133]	Paaj lauv qab (G), Paj lauv qaib (W)	Root	Decoction	Potion	Treating amenorrhea	Manee Pruek	2
cf. <i>Butea superba</i> Roxb. ex Willd. [Fabaceae/295]	Maab ntshaa (G), Hmab ntsha (W)	Stem	Decoction	Potion	Using for blood tonic/anemia	Manee Pruek	1
<i>Chloranthuserectus</i> (Buch.-Ham.) Verdc. [Chloran- thaceae/187]	Ntub yag	Root	Decoction	Potion	Increasing female fertility	Manee Pruek	2
		Root	Decoction	Potion	Postpartum recovery (inducing uterus shrinking)	Manee Pruek	2
		Root	Decoction	Potion	Treating amenorrhea	Manee Pruek	3
		Root	Decoction	Potion	Treating dysmenorrhea	Manee Pruek, Song Khwae	5
<i>Coix lachryma-jobi</i> L. [Poaceae/161]	Ntseb ntsaug (G,W)	Root	Decoction	Potion	Treating amenorrhea	Manee Pruek	2
<i>Conyza sumatrensis</i> (Retz.) E.Walker [Asteraceae/174]	–	Root	Decoction	Potion	Increasing female fertility	Song Khwae	1
<i>Costus speciosus</i> Sm. [Costaceae/170]	Nqug nqees	Root/stem	Decoction	Potion	Increasing female fertility	Khang Ho	1
		Root/stem	Decoction	Potion	Inducing placenta delivery	Khang Ho	1
		Root/stem	Decoction	Potion	Treating amenorrhea	Song Khwae	1
<i>Curcuma</i> <i>aeruginosa</i> Roxb. [Zingiberaceae]	Qoov (G,W)	Rhizome	Decoction	Potion	Postpartum recovery (inducing uterus shrinking)	Manee Pruek	1
<i>Cyathula officinalis</i> K.C.Kuan [Ama- ranthaceae/464]	Nrhaab cos (G), Nrhab cos (W)	Leaves	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	5
<i>Cynoglossum</i> sp. [Boragi- naceae/495]	Txhaab (G)	Root	Decoction	Potion	Treating morning sickness	Manee Pruek	3

Table A.1 (Continued)

Scientific name [Plant family/ Voucher No.]	Hmong name (G = green Hmong/ W = white Hmong)	Part used	Preparation	Route of administration	Application/ condition	Village	No. of informant who mentioned use of this species
<i>Dendranthema indicum</i> (L.) Des Moul. [Asteraceae/003]	Taab kib miv (G), Tab kib miv (W)	Leaves	Cooked with steamed eggs	Eaten as food	Treating morning sickness	Manee Pruek	2
<i>Dicliptera</i> sp. [Acan- thaceae/462]	Tshuaj hov txob (G), Tshuaj kua txob (W)	Leaves	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Khang Ho	1
<i>Dioscorea bulbifera</i> L. [Dioscore- aceae/241]	Qos npua nyeg (G)	Bulbils	Cooked with steamed eggs	Eaten as food	Promoting fetal stabilization	Khang Ho	4
<i>Elephantopus scaber</i> L. [Asteraceae/228]	Yig nqeeb (G,W)	Root	Decoction	Potion	Treating dysmenorrhea	Khang Ho	1
<i>Eleutherine americana</i> Merr. ex K.Heyne [Iridaceae/013]	Nplooj qhab xyab (G), Nplooj qhaib xyab (W)	Bulbs	Decoction	Potion	Treating amenorrhea	Song Khwae	1
<i>Entada pursaetha</i> DC. [Fabaceae/297]	–	Seeds	Hot infusion	Potion	Treating amenorrhea	Khang Ho	1
<i>Euphorbia hirta</i> L. [Euphor- biaceae/388]	–	Whole plant	Cooked with chicken	Eaten as food	Using as lactagogue (increasing lactation)	Khang Ho	1
<i>Euphorbia neriifolia</i> L. [Euphorbiaceae]	Xeeb leej tsaav (G)	Leaves with milky sap	Cooked with chicken	Eaten as food	Using as lactagogue (increasing lactation)	Khang Ho, Song Khwae	9
<i>Fallopia forbesii</i> (Hance) Yonek & H. Ohashi [Polygo- naceae/001]	Qaub pees (G)	Root/leaves	Decoction	Potion	Treating amenorrhea	Khang Ho, Song Khwae	3
		Root/leaves	Decoction	Potion	Treating pelvic pain	Khang Ho	2
<i>Gelsemium elegans</i> Benth. [Logani- aceae/104]	Tshuaj nas tuav	Root	Decoction	Vapour roasing	Treating venereal disease	Manee Pruek	1
<i>Gomphrena globosa</i> L. [Amaran- thaceae/489]	–	Root	Decoction	Potion	Treating amenorrhea	Khang Ho	3
		Root	Decoction	Potion	Treating dysmenorrhea	Khang Ho	3
<i>Gouania leptostachya</i> DC. var. <i>tonkinensis</i> Pitard [Rham- naceae/156]	–	Root	Decoction	Potion	Treating leucorrhea	Manee Pruek	3
<i>Gynura bicolor</i> DC. [Asteraceae/469]	Tshuaj rog	Leaves	Decoction	Potion	Postpartum recovery (promoting expulsion of 'dead blood' and lochia (postpartum discharge))	Song Khwae	1
<i>Homonoia riparia</i> Lour. [Euphor- biaceae/233]	–	Leaves	Cooked with chicken	Eaten as food	Using as postpartum diet	Khang Ho	1
		Stem	Decoction	Potion	Using for abortion	Song Khwae	1
<i>Houttuynia cordata</i> Thunb. [Sauru- raceae/024]	Zaub raus nees (G), Kab raus (W)	Whole plant	Decoction	Potion	Treating pelvic pain	Manee Pruek	3
<i>Impatiens balsamina</i> L./ <i>Impatiens violiflora</i> Hook. f.[Balsaminaceae/324,178]	Paa nti ntuav (G), Paj co nti (W)	Root/leaves	Hot infusion	Potion	Inducing labor	Khang Ho, Manee Pruek, Song Khwae	7
		Root/leaves	Hot infusion	Potion	Inducing placenta delivery	Khang Ho	1
		Root	Decoction	Potion	Postpartum recovery (promoting expulsion of 'dead blood' and lochia (postpartum discharge))	Manee Pruek	1

Table A.1 (Continued)

Scientific name [Plant family/ Voucher No.]	Hmong name (G = green Hmong/ W = white Hmong)	Part used	Preparation	Route of administration	Application/ condition	Village	No. of informant who mentioned use of this species
<i>Iresine herbstii</i> Hook.f. [Amaranthaceae/034]	Nkaaj lab (G), Nkaj liab (W)	Root	Decoction	Potion	Treating amenorrhea	Khang Ho, Manee Pruek, Song Khwae	10
		Root	Decoction	Potion	Treating dysmenorrhea	Khang Ho, Manee Pruek	7
		Root	Decoction	Potion	Using for abortion	Khang Ho, Manee Pruek	2
		Root	Decoction	Potions	Using for blood tonic/anemia	Song Khwae	1
		Leaves	Decoction	Potion	Treating dysmenorrhea	Khang Ho, Manee Pruek	2
		Leaves	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Khang Ho, Manee Pruek, Song Khwae	7
<i>Ixeris japonica</i> Nakai [Asteraceae/353]	–	Leaves	Hot infusion	Potion	Treating dysmenorrhea	Song Khwae	1
<i>Kaempferia galanga</i> L. [Zingiberaceae/306]	Pua toj (G,W)	Rhizome	Hot infusion	Potion	Treating dysmenorrhea	Khang Ho	2
		Rhizome	Hot infusion	Potion	Using for blood tonic/anemia	Khang Ho	1
<i>Kaempferia rotunda</i> L. [Zingiberaceae]	Xaab txhwm (G), Xab txhim (W)	Rhizome	Hot infusion	Potion	Using for blood tonic/anemia	Song Khwae	1
<i>Kalanchoe laciniata</i> (L.) DC. [Crassulaceae/025]	Tshuaj ntiv (W)	Leaves	Cooked with chicken	Do NOT eaten as food	Food taboo for pregnant women	Khang Ho, Song Khwae	2
		Leaves	Cooked with chicken	Eaten as food	Increasing female fertility	Song Khwae	1
		Leaves	Hot infusion	Potion	Treating amenorrhea	Khang Ho, Song Khwae	3
		Leaves	Hot infusion	Potion	Treating dysmenorrhea	Khang Ho, Song Khwae	3
		Leaves	Hot infusion	Potion	Using for blood tonic/anemia	Khang Ho	1
<i>Kalanchoe pinnata</i> (Lam.) Pers. [Crassulaceae/258]	Nploo tuaj kaus (G)	Leaves	Hot infusion	Potion	Treating amenorrhea	Khang Ho	2
		Leaves	Cooked with steamed eggs	Eaten as food	Treating morning sickness	Manee Pruek	1
<i>Kyllinganemoralis</i> (Forst.) Dandy ex Hutch. & Dalziel [Cyperaceae/088]	–	Whole plant	Decoction	Potion	Postpartum recovery (promoting expulsion of 'dead blood' and lochia (postpartum discharge))	Khang Ho, Manee Pruek	4
		Whole plant	Decoction	Potion	Treating amenorrhea	Khang Ho, Manee Pruek	2
		Whole plant	Decoction	Potion	Treating dysmenorrhea	Khang Ho, Manee Pruek	2
<i>Leea indica</i> (Burm.f.) Merr. [Leeaceae/066]	Qab ib	Root	Decoction	Potion	Treating dysmenorrhea	Song Khwae	1
<i>Leonurus artemisia</i> (Lour.) S.Y. Hu [Lamiaceae/051]	–	Root	Decoction	Potion	Treating pelvic pain	Song Khwae	2
<i>Limnophila rugosa</i> Merr. [Scrophulariaceae/102]	Siv fwj xyaab (G)	Root	Cooked with chicken	Eaten as food	Using as postpartum diet	Manee Pruek	1
<i>Lysimachia christinae</i> Hance [Primulaceae/019]	Qua luag lab (G), Gua luag liab (W)	Leaves	Decoction	Potion	Treating amenorrhea	Manee Pruek	1
		Leaves	Cooked with steamed eggs	Eaten as food	Treating morning sickness/promoting fetal stabilization	Khang Ho, Manee Pruek	15
<i>Melastoma malabathricum</i> L. subsp. <i>normale</i> (D.Don) [Melastomaceae/080]	–	Root	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	2
		Root	Decoction	Potion	Treating leucorrhea	Manee Pruek	2

Table A.1 (Continued)

Scientific name [Plant family/ Voucher No.]	Hmong name (G = green Hmong/ W = white Hmong)	Part used	Preparation	Route of administration	Application/ condition	Village	No. of informant who mentioned use of this species
<i>Mirabilis jalapa</i> L. [Nyctagi- naceae/113]	Paaj kuab tub sab (G), Paj kuab tub sab (W)	Leaves	Cooked with chicken	Do NOT eaten as food	Food taboo for pregnant women	Song Khwae	1
		Root	Decoction	Potion	Treating amenorrhea	Khang Ho, Manee Pruek,	4
		Root	Decoction	Potion	Treating dysmenorrhea	Song Khwae Khang Ho, Manee Pruek,	5
		Root	Decoction	Potion	Treating leucorrhea Using as lactagogue (increasing lactation)	Song Khwae Manee Pruek	2
<i>Pedilanthus tithymaloides</i> (L.) Poit. [Euphorbiaceae]	–	Leaves with milky sap	Cooked with chicken	Eaten as food		Khang Ho	2
<i>Phedimus</i> sp. [Cras- sulaceae/492]	Sam muaj kaab (G)	Leaves	Cooked with chicken	Do NOT eaten as food	Food taboo for pregnant women	Song Khwae	1
<i>Phyllanthus niruri</i> L. [Euphor- biaceae/387]	–	Whole plant	Decoction	Potion	Treating amenorrhea	Song Khwae	1
<i>Piper</i> sp. [Piperaceae/496]	Maab saw nyiaj (G) hmab saw nyiaj (W)	Root	Decoction	Potion	Increasing female fertility	Manee Pruek	11
		Root	Decoction	Potion	Treating amenorrhea	Manee Pruek	9
		Root	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	12
		Root	Decoction	Potion	Treating endometritis	Manee Pruek	1
		Root	Decoction	Potion	Treating pelvic pain	Manee Pruek	2
<i>Plantago major</i> L. [Plantagi- naceae/056]	Zaub ntswg npua (G)	Leaves/whole plant	Decoction	Potion	Treating dysmenorrhea	Khang Ho	3
<i>Plectranthus amboinicus</i> (Lour.) Spreng. [Lamiaceae]	–	Leaves	Cooked with chicken	Eaten as food	Treating pelvic pain	Song Khwae	1
<i>Plumbago zeylanica</i> L. [Plumbagi- naceae/059]	Kuab ib maab (G)	Root/whole plant	Decoction	Potion	Treating amenorrhea	Khang Ho	2
		Root/whole plant	Decoction	Potion	Treating dysmenorrhea	Khang Ho	2
		Root/whole plant	Decoction	Potion	Treating menorrhagia	Khang Ho	2
		Root/whole plant	Decoction	Potion	Using for abortion	Khang Ho, Song Khwae	4
<i>Polygonum multiflorum</i> Thunb. [Polygo- naceae/497]	Qos lab qus (G)	Root	Decoction	Potion	Treating leucorrhea	Manee Pruek	1
		Root	Decoction	Potion	Using for blood tonic/anemia	Manee Pruek	2
<i>Ricinus communis</i> L. [Euphor- biaceae/115]	Taw dlaav lab (G), Taw dav liab (W)	Leaves	Warmed	Wrapping the feet of delivering women	Inducing labor	Manee Pruek	1
		Leaves	Warmed	Wrapping the feet after delivery	inducing placenta delivery	Manee Pruek	3
		Leaves	Warmed	Wrapping the head together with laying down with the position of head is lower than the position of legs	Postpartum recovery (treating prolapsed uterus)	Manee Pruek	2
		Leaves	Warmed	Wrapping feet	Using for abortion	Manee Pruek	1
		Root	Decoction	Potion	Postpartum recovery (inducing uterus shrinking)	Manee Pruek	4
<i>Rosa</i> sp. [Rosaceae/103]	Ntshua nplai	Root	Decoction	Potion		Manee Pruek	4

Table A.1 (Continued)

Scientific name [Plant family/ Voucher No.]	Hmong name (G = green Hmong/ W = white Hmong)	Part used	Preparation	Route of administration	Application/ condition	Village	No. of informant who mentioned use of this species
<i>Rubia crassipes</i> Coll. & Hemsl. [Rubiaceae]	Maab tshws nees (G),	Root	Decoction	Potion	Treating amenorrhea	Manee Pruek	1
		Root	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	1
		Root	Decoction	Potion	Treating leucorrhea	Manee Pruek	1
		Root/stem	Decoction	Potion	Inducing labor	Manee Pruek	1
		Root/stem	Decoction	Potion	Postpartum recovery (inducing uterus shrinking)	Manee Pruek	1
		Root/stem	Decoction	Potion	Treating amenorrhea	Manee Pruek	4
<i>Sanchezia nobilis</i> Hook.f. [Acan- thaceae/172]	Paaj lav (G), Paj lav (W)	Root/stem	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	2
		Root/stem	Decoction	Potion	Promoting fetal stabilization	Manee Pruek	2
<i>Sedum</i> cf. <i>sarmentosum</i> Bunge [Crassulaceae/087]	Nplai zeb (G,W)	Leaves	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Song Khwae	1
		Leaves	Cooked with chicken	Eaten as food	Treating amenorrhea	Song Khwae	1
		Leaves	Cooked with steamed eggs	Eaten as food	Treating morning sick- ness/promoting fetal stabilization	Khang Ho, Manee Pruek, Song Khwae	11
<i>Sophora flavescens</i> Aiton [Fabaceae/100]	Vuam kheev (G)	Root	Dried, chopped	Eaten as drug powder	Treating dysmenorrhea	Manee Pruek	1
<i>Stahlianthus campanulatus</i> Kuntze [Zingib- eraceae/348]	Tsawb ntug ntsuab (G,W)	Rhizome	Hot infusion	Potion	Treating dysmenorrhea	Song Khwae	1
<i>Stephania pierrei</i> Diels [Menispermaceae/362]	Maab ntshaa (G), Hmab ntsha (W)	Root	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Song Khwae	2
<i>Teucrium viscidum</i> Blume [Lamiaceae/090]	Pawn tshis nyeg (G,W)	Leaves	Cooked with steamed eggs	Eaten as food	Promoting fetal stabilization	Khang Ho, Manee Pruek, Song Khwae	11
		Leaves	Decoction	Potion	Treating dysmenorrhea	Manee Pruek	2
<i>Verbena officinalis</i> L. [Verbenaceae/091]	Kaab laug rog (G), Kab laug rog (W)	Whole plant	Decoction	Potion	Treating amenorrhea	Manee Pruek	1
		Whole plant	Decoction	Potion	Treating dysmenorrhea	Khang Ho, Manee Pruek	2
<i>Xiphidium caeruleum</i> Aubl. [Haemodor- aceae/026]	Tw ntse luj (G)	Leaves	Cooked with chicken	Do NOT eaten as food	Food taboo for pregnant women	Manee Pruek	1
		Leaves	Decoction	Potion	Postpartum recovery (promoting expulsion of 'dead blood' and lochia (postpartum discharge))	Khang Ho	1
		Leaves	Decoction	Potion	Treating amenorrhea	Khang Ho, Song Khwae	3
		Leaves	Cooked with chicken	Eaten as food	Using as postpartum diet	Khang Ho	1
		Leaves	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Khang Ho	1
		Leaves	Cooked with chicken	Eaten as food	Using for blood tonic/anemia	Khang Ho	1

References

- Adaikan, P.G., Adebisi, A., 2004. Mechanisms of the oxytocic activity of papaya proteases. *Pharmaceutical Biology* 42, 646–655.
- Albuquerque, U.P., 2006. Re-examining hypotheses concerning the use and knowledge of medicinal plants: a study in the Caatinga vegetation of NE Brazil. *Journal of Ethnobiology and Ethnomedicine* 2.
- Anderson, E.F., 1986a. Ethnobotany of hill tribes of northern Thailand. I. Medicinal plants of Akha. *Economic Botany* 40, 38–53.
- Anderson, E.F., 1986b. Ethnobotany of hill tribes of northern Thailand. II. Lahu medicinal plants. *Economic Botany* 40, 442–450.
- Anderson, E.F., 1993. *Plants and People of the Golden Triangle: Ethnobotany of the Hill Tribes of Northern Thailand*. Dioscorides Press, Portland, OR.
- Arnold, H.-J., Gulumian, M., 1984. Pharmacopoeia of traditional medicine in Venda. *Journal of Ethnopharmacology* 12, 35–74.
- Au, D.T., Wu, J., Jiang, Z., Chen, H., Lu, G., Zhao, Z., 2008. Ethnobotanical study of medicinal plants used by Hakka in Guangdong, China. *Journal of Ethnopharmacology* 117, 41–50.

- Barennes, H., Simmala, C., Odermatt, P., Thaybouavone, T., Vallee, J., Martinez-Ussel, B., Newton, P.N., Strobel, M., 2009. Postpartum traditions and nutrition practices among urban Lao women and their infants in Vientiane, Lao PDR. *European Journal of Clinical Nutrition* 63, 323–331.
- Bennett, B.C., 2007. Doctrine of signatures: an explanation of medicinal plant discovery or dissemination of knowledge? *Economic Botany* 61, 246–255.
- Bliatout, B.T., Downing, B.T., Lewis, J., Yang, D., 1988. Handbook for Teaching Hmong-speaking Students. Folsom Cordova Unified School District and Southeast Asia Community Resource Center, Sacramento, CA.
- Bryant, B., Knights, K., 2010. *Pharmacology for Health Professionals*, third ed. Elsevier Australia, Chatswood, New South Wales.
- Cai, Y., Sun, M., Corke, H., 2001. Identification and distribution of simple and acylated betacyanins in the Amaranthaceae. *Journal of Agricultural and Food Chemistry* 49, 1971–1978.
- Chetty, K.M., Sivaji, K., Sudarsanam, G., Sekar, P.H., 2006. Pharmaceutical studies and therapeutic uses of *Plumbago zeylanica* L. roots (Chitraka, Chitramalamu). *Ethnobotanical Leaflets* 10, 294–304.
- Corlett, J.L., Clegg, M.S., Keen, C.L., Grivetti, L.E., 2002. Mineral content of culinary and medicinal plants cultivated by Hmong refugees living in Sacramento, California. *International Journal of Food Science and Nutrition* 53, 117–128.
- Corlett, J.L., Dean, E.A., Grivetti, L.E., 2003. Hmong gardens: botanical diversity in an urban setting. *Economic Botany* 57, 365–379.
- Culhane-Pera, K.A., 2003. Cultural complications in end-of-life care for a Hmong woman with gallbladder cancer. In: Culhane-Pera, K.A., Vawter, D.E., Xiong, P., Babbitt, B., Solberg, M.M. (Eds.), *Healing by Heart: Clinical and Ethical Case Stories of Hmong Families and Western Providers*. Vanderbilt University Press, Nashville, TN, pp. 258–264.
- Culhane-Pera, K.A., Xiong, P., 2003. Hmong cultures: tradition and change. In: Culhane-Pera, K.A., Vawter, D.E., Xiong, P., Babbitt, B., Solberg, M.M. (Eds.), *Healing by Heart: Clinical and Ethical Case Stories of Hmong Families and Western Providers*. Vanderbilt University Press, Nashville, TN, pp. 11–70.
- Daviau, S., 2003. Beliefs, Taboos, Practices and Behaviors Around Birth in Lao PDR. World Health Organization.
- de Boer, H., Lamxay, V., 2009. Plants used during pregnancy, childbirth and postpartum healthcare in Lao PDR: a comparative study of the Brou, Saek and Kry ethnic groups. *Journal of Ethnobiology and Ethnomedicine* 5.
- Edwin, S., Joshi, S.B., Jain, D.C., 2009. Antifertility activity of leaves of *Plumbago zeylanica* Linn. in female albino rats. *The European Journal of Contraception and Reproductive Health Care* 14, 233–239.
- Fass, S.M., 1991. The Hmong in Wisconsin: on the Road to Self-sufficiency. The Wisconsin Policy Research Institute, Wisconsin, p. 39.
- Guimbo, I.D., Muller, J., Larwanou, M., 2011. Ethnobotanical knowledge of men, women and children in rural Niger: a mixed methods approach. *Ethnobotany Research and Applications* 9, 235–242.
- Hanazaki, N., Tamashiro, J.Y., Leitão-Filho, H.F., Begossi, A., 2000. Diversity of plant uses in two Caiçara communities from the Atlantic Forest coast, Brazil. *Biodiversity and Conservation* 9, 597–615.
- Heinrich, M., Ankli, A., Frei, B., Weimann, C., Sticher, O., 1998. Medicinal plants in Mexico: healers' consensus and cultural importance. *Social Science and Medicine* 47, 1859–1871.
- Huai, H.Y., Pei, S.J., 2004. Plants used medicinally by folk healers of the Lahu people from the Autonomous County of Jinping Miao, Yao, and Dai in southwest China. *Economic Botany* 58, 265–273.
- Jadhav, A.N., Bhutani, K.K., 2005. Ayurveda and gynecological disorders. *Journal of Ethnopharmacology* 97, 151–159.
- Jambunathan, J., 1995. Hmong cultural practices and beliefs: the postpartum period. *Clinical Nursing Research* 4, 335–345.
- Jambunathan, J., Stewart, S., 1995. Hmong women in Wisconsin: what are their concerns in pregnancy and childbirth? *Birth* 22, 204–210.
- Johnson, S.K., 2002. Hmong health beliefs and experiences in the western health care system. *Journal of Transcultural Nursing* 13, 126–132.
- Kaewsarn, P., Moyle, W., Creedy, D., 2003a. Thai nurses' beliefs about breastfeeding and postpartum practices. *Journal of Clinical Nursing* 12, 467–475.
- Kaewsarn, P., Moyle, W., Creedy, D., 2003b. Traditional postpartum practices among Thai women. *Journal of Advanced Nursing* 41, 358–366.
- Kunstadter, P., 1985. Health of Hmong in Thailand: risk factors, morbidity and mortality in comparison with other ethnic groups. *Culture, Medicine and Psychiatry* 9, 329–351.
- Lamxay, V., Boer, H.J.d., Björk, L., 2011. Traditions and plant use during pregnancy, childbirth and postpartum recovery by the Kry ethnic group in Lao PDR. *Journal of Ethnobiology and Ethnomedicine* 7.
- Lee, G.Y., 2007. Diaspora and the predicament of origins: interrogating Hmong post-colonial history and identity. *Hmong Studies Journal* 8.
- Lee, P.A., 1986. Health beliefs of pregnant and postpartum Hmong women. *Western Journal of Nursing Research* 8, 83–93.
- Lemoine, J., 2005. What is the actual number of the (H)mong in the world? *Hmong Studies Journal* 6.
- Li, T.S.C., 2006. *Taiwanese Native Medicinal Plants: Phytopharmacology and Therapeutic Values*. Taylor & Francis, London.
- Liamputtong, P., 2003. Abortion—it is for some women only! Hmong women's perceptions of abortion. *Health Care for Women International* 24, 230–241.
- Liulan, W., Nanakorn, W., Fukui, K., 2003. Food and herbal medicine for childbirth care among the Chinese minority in northern Thailand. *Journal of Ethnobiology* 23, 209–226.
- Lo, K., 2007. Postpartum Practices Among Cambodian Mothers in Preah Vihear Province: A Qualitative Study of Beliefs and Practices. Faculty of Graduate Studies, Mahidol University, Bangkok, p. 134.
- Long, C.L., Li, R., 2004. Ethnobotanical studies on medicinal plants used by the red-headed Yao people in Jinping, Yunnan province, China. *Journal of Ethnopharmacology* 90, 389–395.
- Lozada, M., Ladio, A., Weigandt, M., 2006. Cultural transmission of ethnobotanical knowledge in a rural community of northwestern Patagonia, Argentina. *Economic Botany* 60, 374–385.
- Lundh, E.C.S., 2007. Plant Use in Ante- and Postpartum Health Care in Lao PDR. Department of Systematic Botany, Uppsala University, Uppsala, p. 91.
- Mathews, M., Manderson, L., 1981. Vietnamese behavioral and dietary precautions during confinement. *Ecology of Food and Nutrition* 11, 9–16.
- Michaud, J., 1997. From Southwest China into upper Indochina: an overview of Hmong (Miao) migrations. *Asia Pacific Viewpoint* 38, 119–130.
- Mills, E., Dugoua, J.J., Perri, D., Koren, G., 2006. *Herbal Medicines in Pregnancy and Lactation: An Evidence-based Approach*. Taylor & Francis, New York.
- Moerman, D.E., 2004. *Native American Ethnobotany*. Timber Press, Hong Kong.
- Morrow, K., 1986. Transcultural midwifery: adapting to Hmong birthing customs in California. *The Journal of Midwifery and Women's Health* 31, 285–288.
- Ohmagari, K., Berkes, F., 1997. Transmission of indigenous knowledge and bush skills among the western James Bay Cree women of subarctic Canada. *Human Ecology* 25, 197–221.
- Pake, C.V., 1987. Medicinal ethnobotany of Hmong refugees in Thailand. *Journal of Ethnobiology and Ethnomedicine* 7, 13–26.
- Panyaphu, K., On, T.V., Sirisa-ard, P., Srisa-nga, P., Chansakaow, S., Nathakarnkitkul, S., 2011. Medicinal plants of the Mien (Yao) in Northern Thailand and their potential value in the primary health care of postpartum women. *Journal of Ethnopharmacology* 135, 226–237.
- Paul, A.K., Arif, H.A., Seraj, S., Nahar, A., Nasrin, D., Chowdhury, M.H., Islam, F., Jahan, R., Bashir, A.B.M.A., Freedman, R., Rahmatullah, M., 2011. A survey of plant items eaten by the low income groups of the rural population of Talbunia village in Bagerhat district, Bangladesh with an account of their folk medicinal applications. *American-Eurasian Journal of Sustainable Agriculture* 5, 132–144.
- Perve, E., 2006. The Hilltribes Living in Thailand. Alligator Service, Chiang Mai, Thailand.
- Pfeiffer, J.M., Butz, R.J., 2005. Assessing cultural and ecological variation in ethnobiological research: the importance of gender. *Journal of Ethnobiology* 25, 240–278.
- Phillips, J.M., Gentry, A.H., 1993. The useful plants of Tambopata, Peru. II. Additional hypothesis testing in quantitative ethnobotany. *Economic Botany* 47, 33–43.
- Pillsbury, B.L.K., 1978. "Doing the month": confinement and convalescence of Chinese women after childbirth. *Social Science & Medicine* 12, 11–22.
- Raven, J.H., Chen, Q., Tolhurst, R.J., Garner, P., 2007. Traditional beliefs and practices in the postpartum period in Fujian Province, China: a qualitative study. *BMC Pregnancy Childbirth* 7, 8.
- Rawat, D.S., Kharwal, A.D., 2011. Traditional phyto-remedies for gynecological complaint in 'Balh valley', district Mandi (Himachal Pradesh), India. *Life Science Leaflets* 16, 546–550.
- Rice, P.L., 1999. What women say about their childbirth experiences: the case of Hmong women in Australia. *Journal of Reproductive and Infant Psychology* 17, 237–253.
- Rice, P.L., 2000. When the baby falls!: the cultural construction of miscarriage among Hmong women in Australia. *Women & Health* 30, 85–103.
- Rosengarten, F., 1982. A neglected Mayan galactagogue—Ixbut (*Euphorbia lancifolia*). *Journal of Ethnopharmacology* 5, 91–112.
- Rousset, P., 2009. Thai Communist Party. In: Ness, I. (Ed.), *The International Encyclopedia of Revolution and Protest: 1500 to the Present*. Blackwell, Oxford, pp. 3256–3265.
- Sam, H.V., Baas, P., Kefler, P.J.A., 2008. Traditional medicinal plants in Ben En national park, Vietnam. *Blumea* 53, 569–601.
- Shah, G.M., Khan, M.A., Ahmad, M., Zafar, M., Khan, A.A., 2009. Observations on antifertility and abortifacient herbal drugs. *African Journal of Biotechnology* 8, 1959–1964.
- Siriphon, A., 2006. Local knowledge, dynamism and the politics of struggle: a case study of the Hmong in northern Thailand. *Journal of Southeast Asian Studies* 37, 65–81.
- Smitinand, T., 2001. *Thai Plant Names*, rev. ed. Royal Forest Department, Bangkok.
- Spring, M.A., 1989. Ethnopharmacologic analysis of medicinal plants used by Laotian Hmong refugees in Minnesota. *Journal of Ethnopharmacology* 26, 65–91.
- Spring, M.A., Lochungvu, M.L., 2003. Hmong preferences for natural family planning. In: Culhane-Pera, K.A., Vawter, D.E., Xiong, P., Babbitt, B., Solberg, M.M. (Eds.), *Healing by Heart: Clinical and Ethical Case Stories of Hmong Families and Western Providers*. Vanderbilt University Press, Nashville, TN, pp. 73–79.
- Srithi, K., Balslev, H., PrasitWangpakapattana Wong, Srisanga, P., Trisonthia, C., 2009. Medicinal plant knowledge and its erosion among the Mien (Yao) in northern Thailand. *Journal of Ethnopharmacology* 123, 335–347.
- Steenkamp, V., 2003. Traditional herbal remedies used by South African women for gynaecological complaints. *Journal of Ethnopharmacology* 86, 97–108.
- Tardío, J., Pardo-de-Santayana, M., 2008. Cultural importance indices: a comparative analysis based on the useful wild plants of southern Cantabria (northern Spain). *Economic Botany* 62, 24–39.
- Thaina, P., Tungharoen, P., Wongnawa, M., Reanmongkol, W., Subhadhirasakul, S., 2009. Uterine relaxant effects of *Curcuma aeruginosa* Roxb. rhizome extracts. *Journal of Ethnopharmacology* 121, 433–443.

- Thi, L.M., 2004. Traditional Postpartum Practices Among Vietnamese Mothers: A Study in Anthi District, Hungyen Province. Faculty of Graduate Studies, Mahidol University, Bangkok, p. 132.
- Tung, W.C., 2010. Doing the month and Asian cultures: implications for health care. *Home Health Care Management and Practice* 20, 1–3.
- Vandebroek, I., 2010. The dual intracultural and intercultural relationship between medicinal plant knowledge and consensus. *Economic Botany* 66, 303–317.
- Villamin, C.R., Villamin, G.R.R., 2009. Obstetrics in colonial Philippines. In: *Positioning the Profession: The Tenth International Congress on Medical Librarianship*, Brisbane, Australia.
- Vong-ek, P., 1993. How popular beliefs influence breastfeeding practices in North-east and Central Thailand. *Journal of Primary Health Care and Development* 6, 61–76.
- Weeks, J.R., Rumbaut, R.G., Brindis, C., Korenbrot, C.C., Minkler, D., 1989. High fertility among Indochinese refugees. *Public Health Reports* 104, 143–150.
- Yadav, J.P., Kumar, S., Siwach, P., 2006. Folk medicine used in gynecological and other related problems by rural population of Haryana. *Indian Journal of Traditional Knowledge* 5, 323–326.
- Yang, D., Mielke, D., 2003. Cultural responsive care for a Hmong woman with vaginal bleeding. In: Culhane-Pera, K.A., Vawter, D.E., Xiong, P., Babbitt, B., Solberg, M.M. (Eds.), *Healing by Heart: Clinical and Ethical Case Stories of Hmong Families and Western Providers*. Vanderbilt University Press, Nashville, TN, pp. 106–110.
- Yusuf, M., Wahab, M.A., Yousuf, M., Chowdhury, J.U., Begum, J., 2007. Some tribal medicinal plants of Chittagong hill tracts, Bangladesh. *Bangladesh Journal of Plant Taxonomy* 14, 117–128.
- Zumsteg, I.S., Weckerle, C.S., 2007. Bakera, a herbal steam bath for postnatal care in Minahasa (Indonesia): documentation of the plants used and assessment of the method. *Journal of Ethnopharmacology* 111, 641–650.