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Front cover: *Leucopsar rothschildi* Stresemann, 1912
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Saharjo BH, Nurhayati AD. 2006. Domination and composition structure change at hemic peat natural regeneration following burning; a case study in Pelalawan, Riau Province. *Biodiversitas* 7: 154-158.

Book:

Rai MK, Carpinella C. 2006. Naturally Occurring Bioactive Compounds. Elsevier, Amsterdam.

Chapter in book:

Webb CO, Cannon CH, Davies SJ. 2008. Ecological organization, biogeography, and the phylogenetic structure of rainforest tree communities. In: Carson W, Schnitzer S (eds) *Tropical Forest Community Ecology*. Wiley-Blackwell, New York.

Abstract:

Assaed AM. 2007. Seed production and dispersal of *Rhazya stricta*. 50th annual symposium of the International Association for Vegetation Science, Swansea, UK, 23-27 July 2007.

Proceeding:

Alikodra HS. 2000. Biodiversity for development of local autonomous government. In: Setyawan AD, Sutarno (eds.) *Toward Mount Lawu National Park; Proceeding of National Seminary and Workshop on Biodiversity Conservation to Protect and Save Germplasm in Java Island*. Universitas Sebelas Maret, Surakarta, 17-20 July 2000. [Indonesian]

Thesis, Dissertation:

Sugiyarto. 2004. Soil Macro-invertebrates Diversity and Inter-Cropping Plants Productivity in Agroforestry System based on Sengon. [Dissertation]. Universitas Brawijaya, Malang. [Indonesian]

Information from internet:

Balagadde FK, Song H, Ozaki J, Collins CH, Barnet M, Arnold FH, Quake SR, You L. 2008. A synthetic *Escherichia coli* predator-prey ecosystem. *Mol Syst Biol* 4: 187. www.molecularsystemsbiology.com

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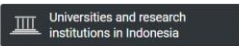
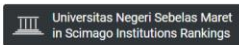
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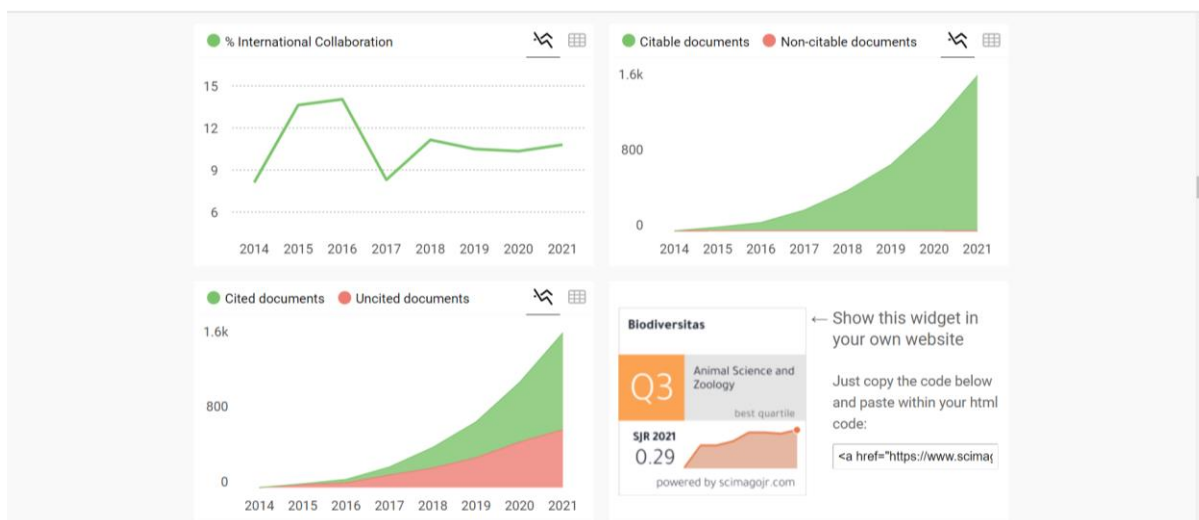
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Ethnomedicinal plants and practices related to pregnancy, childbirth, and postpartum healthcare of Minangkabau ethnic group, West Sumatra, Indonesia

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Abstract. Silalahi M, Khairiah A, Nisyawati. 2020. *Ethnomedicinal plants and practices related to pregnancy, childbirth, and postpartum healthcare of Minangkabau ethnic group, West Sumatra, Indonesia. Biodiversitas 21: 4597-4605.* In the Minangkabau ethnic cultures, medicinal plants have been used to treat health problems associated with pregnancy, childbirth, and postpartum period (PCP). The objectives of this study were to (i) document the medicinal plants used during pregnancy, childbirth, and postpartum recovery by Minangkabau ethnics and the associated ethnomedicinal practices, and (ii) identify plants that have the potential to be developed as ingredients to increase the production of breast milk. Data were collected in three villages, namely Guguak Sarai, Taruang Taruang, and Sungai Durian in West Sumatra, Indonesia, by interviewing a total of 141 informants, involving 9 key informants and 132 general respondents. A total of 42 species of medicinal plants were found to be used for PCP healthcare by Minangkabau people. These medicinal plants are used to facilitate childbirth, alleviate menstruation problems, assist recovery after miscarriage, mitigate postpartum hemorrhage, aid in postpartum recovery, and for infant care. A total of 26 species were represented by 9 families i.e. Poaceae (7 species), Arecaceae, Fabaceae, Zingiberaceae (3 species respectively), Euphorbiaceae, Lamiaceae, Meliaceae, Musaceae, and Asteraceae (2 species each). Majority of the used medicinal preparations are administered by drinking (35 species), bathing (4 species), and as a paste (3 species). Use of *Musa balbisiana*, *Carallia brachiata*, *Lansium domesticum*, and *Toona sureni* for treating problems related to pregnancy, childbirth, and postpartum period need to be further investigated for their phytochemistry and pharmacological properties. *Plectranthus ambonicus* and *Sauropus androgynus* are used to increase breast milk production, and further research is needed for standardizing processing and commercialization of these species.

Keywords: Minangkabau ethnic, PCP, *Plectranthus ambonicus*, *Sauropus androgynus*

INTRODUCTION

Pregnancy, childbirth, and postpartum (PCP) are resulting in considerable deaths, especially in developing countries. The factors that contributed to the death are postnatal bleeding (Tsu et al. 2004), postpartum hemorrhage, and postpartum depression (Abdillahi and Van Staden 2013). The local communities in Asia such as Laos (de Boer and Lamxay 2009; de Boer et al. 2011), Indonesia (Silalahi and Nisyawati 2019), Malaysia (Teoh et al. 2013), Thailand (Panyaphu et al. 2011), India (Jain et al. 2011) use medicinal plants to reduce the death risk of the PCP mothers. About 52.9% of studied mothers ingested herbs during the post-partum period in Malaysia (Theo et al. 2013).

Various ethnic groups in Indonesia use plants for PCP management, based on local knowledge and make them integral part of the PCP process such as oukup (Silalahi and Nisyawati 2019). The purposes of the use of medicinal plants during PCP are: to restore stamina and to increase breast milk (Silalahi and Nisyawati 2019); to heal the

wounds, reduce postpartum hemorrhage, reduce pain during childbirth, and to protect baby from infection (Silalahi and Nisyawati 2019); to improve the health of babies, to facilitate labor and delivery (Theo et al. 2013), and to alleviate menstruation problems (De Boer and Lamxay 2009). The process of acculturation, use of synthetic drugs, and weakening of oral knowledge inheritance systems resulted in the degradation of local knowledge, even though it is an important source of information on biodiversity and cultural conservation (Suryadarma 2010; Emmanuel and Didier 2012; Sujarwo and Cuneva 2016). Knowledge of the use of medicinal plants is derived from experience or inheritance from close family for generations (Emmanuel and Didier 2012).

The problems that postpartum mothers face are maternity blues, depression (Takashi et al. 2014), and stress. Stress has directly or indirectly affected production of breast milk so that some mothers fail to provide good nutrition to the baby. The traditional health system develops various therapies to improve PCP of the mother's health through diet and herbs (Jain et al. 2011; Theo et al.

2013) and steam bathing (Silalahi and Nisyawati 2019). Silalahi and Nisyawati (2019) stated that various plants used in saunas by postpartum mothers have a relaxing effect so that they can reduce postpartum stress.

The plants used to maintain health varies between one ethnic group and another, which is influenced by various factors such as the biodiversity of the surrounding environment, topography, and culture (Silalahi et al. 2015; Sujarwo and Cuneva 2016). This resulted in the species and number of medicinal plants being recognized differences among ethnic groups. Fifty-four medicinal plant species were used to overcome 15 types of maternal postpartum disorders in the Laos local community (Lundh 2007), while the Batak ethnic group used 63 species as adequate ingredients (Silalahi and Nisyawati 2019) and 88 species for *oke show* ceremony by Halmahera communities (Wahkidah et al. 2017).

Research on medicinal plants conducted so far in Sumatra mostly focused on documenting their uses in general. Studies on plants curing PCP are severely limited (Silalahi and Nisyawati 2019), especially in the Minangkabau ethnic group. This study aims (i) to reveal local knowledge of Minangkabau ethnicity in utilizing medicinal plants to improve health during pregnancy, childbirth, and postpartum, and (ii) to compare the cultural values or CSI values of the plants used.

MATERIALS AND METHODS

The study was conducted in three villages (*nagari*), namely the Guguak Sarai, Taruang Taruang, and Sungai Durian of IX Koto Sungai Lasi Sub-district, Solok District, West Sumatra, Indonesia (Figure 1). These nagari's represent the locations of Minangkabau ethnic groups in the West Sumatra. The study was conducted from February to June 2016. The Minangkabau ethnic connecting the area is called "Minangkabau land" which means unity between territory, social system, and culture contained within them and has a system of matrilineal kinship. Empirically, the Minangkabau ethnic groups are known to be rich in local knowledge of using herbs and spices, and research has proved that they are rich in traditional medicine (Kairiah 2017). The Minangkabau is an ethnic group that adheres to the matrilineal kinship. The child in the matrilineal system has a bond with the mother's brother called *mamak* (uncle).

Data collection

Data were collected from a total of 141 informants, consisting of 9 key informants and 132 general respondents, ranging in age from 30 to 80 years (Table 1). More than 95% of the people living are Minangkabau and the rest are Javanese. More than 90% of them are farmers, the rests are traders and government employees. Respondents were selected with purposive snowball sampling methods. Information on diversity of medicinal plants used as medicinal plants was obtained from the respondents with semi-structured, in-depth interviews, and

participative observation methods. Interviews were conducted according to the existing methods (Martin, 1995), with some modifications.

Medicinal plants are collected as voucher specimens and their local names, parts used, life forms, uses, and process of preparation are recorded. The identification of voucher specimens was carried out at Laing's Spice and Drug Plant Research Institute, Solok, specifically in Plant Taxonomy Laboratory, Faculty of Mathematics and Natural Sciences, Universitas Indonesia, Depok, and Herbarium Bogoriense, Institute of Sciences (LIPI), Cibinong, Indonesia. The voucher specimens were stored at Laing's Spice and Drug Plant Research Institute, Solok, West Sumatra, Indonesia. The scientific names are verified with the Plantlist Database (www.theplantlist.org.)

Table 1. The demographic information of respondents of the Minangkabau ethnic group, West Sumatra, Indonesia

Characteristics	Guguak Sarai village	Sungai Durian village	Taruang-taruang village
Key informants	3 people	3 people	3 people
General respondents	46 people	18 people	68 people

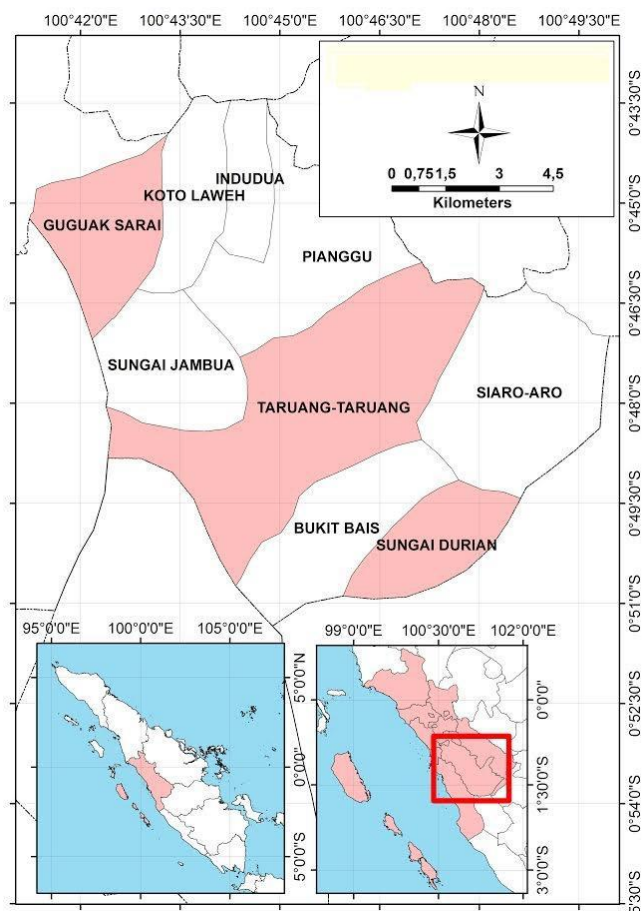


Figure 1. Map of the study area Guguak Sarai, Taruang Taruang and Sungai Durian villages, IX Koto Sungai Lasi Sub-district, Solok District, West Sumatra, Indonesia

Data analysis

Data were analyzed using qualitative and quantitative methods. Qualitative analysis used descriptive statistics by grouping plants based on usage category. The cultural significance index (CSI) was calculated using the technique developed by Turner (1988). Assessment of this cultural importance index uses three components namely the quality of use, intensity of use, and the exclusivity of use with the following formula:

$$CSI = \sum_{k=1}^n (q \times i \times e) n_i$$

CSI is equal to the sum of individual and use values from 1 to n, with n representing the last use described and the subscript k representing the value 1 through n, consecutively. For each use given, q = quality value, i = intensity value, and e = exclusivity value.

RESULTS AND DISCUSSION

Diversity of the medicinal plants for pregnancy, childbirth, and postpartum

The Minangkabau ethnic group recognizes pregnancy, childbirth, and postpartum (PCP) as vulnerable stages which may cause maternal death, and they have special treatments and diets to manage the health adversities of these stages. This research found that a total of 42 species, belonging to 39 genera and 25 families, of medicinal plants have been used by the Minangkabau ethnic group to treat PCP related health problems (Table 2). Out of these 43 species, 27 species are represented by 9 families, namely Poaceae (7 species), Arecaceae, Fabaceae, Zingiberaceae (3 species each), Euphorbiaceae, Lamiaceae, Meliaceae, Musaceae, and Asteraceae (2 species each) (Figure 2). The remaining 16 families in this study were represented by single species each.

The number of medicinal plants used by the Minangkabau is less than the number reported for Batak Karo (Silalahi and Nisyawati 2019). Differences in medicinal plants use by local people are influenced by local factors like the environment, topography, ethnicity, and culture (Sujarwo and Cuneva 2015; Silalahi et al. 2015). On the other hand, the popularity of modern medicine, directly or indirectly, influences the degradation of local knowledge pertaining to use of plants as food and medicine (Sujarwo and Cuneva 2015; 2016).

Medicinal plants have been used during PCP to reduce the discomforts associated with pregnancy and to “restore” the body condition after delivery (Theo et al. 2013). Both Batak Karo and Minangkabau ethnics use the same species to treat PCP, such as *Cymbopogon citratus*, *Sauropus androgynus*, *Cymbopogon nardus*, *Curcuma longa*, *Zingiber officinale*, and *Acorus calamus* (Silalahi and Nisyawati 2019).

The results of this study show the decreasing use of medicinal plants by Minangkabau ethnic to treat PCP. The reasons for the local community, especially the younger generation, do not use medicinal plants anymore are: (i) the traditional medicinal practice is associated with mysticism and thus is contrary to religion, (ii) the process of using medicinal plants is more difficult than that of modern medicine, (iii) some medicinal plants are difficult to obtain, and (iv) the easy availability of modern medicinal facilities (midwife).

Pregnancy care by ethnic Minangkabau is intended to strengthen the fetus, reduce nausea, increase appetite, increase fetal weight, prevent bleeding, and facilitate delivery. The roasted extract of the *Musa balbisiana* roots with *Saccharum officinarum* L. stem has been used to facilitate delivery, whereas the extract of the *Coleus atropurpureus* Benth. (leaves) and *Cocos nucifera* L. (fruits) have been used to prevent bleeding. The extract of *Coleus atropurpureus* leaves is red, so it is believed to have function similar to blood.

The PCP mothers in the Minangkabau ethnic group believe that they are susceptible to interference by evil spirits, but they are protected by the rhizome *Acorus calamus*. The volatile oil acorenone concentration in *A. calamus* rhizome which is up to 20.86% (Venskutonis and Dagilyte 2003) produces a distinctive aroma that provides a relaxing effect. Some ethnic groups in Indonesia utilize plants that contain essential oils, such as *Cymbopogon nardus*, *Cymbopogon citratus*, *Curcuma longa*, and *Zingiber officinale*, as traditional medicines. Silalahi and Nisyawati (2019) stated that Batak steam-bathing tradition in North Sumatra uses those plants as the main component which provide a relaxing effect. The essential oils in those plants are terpene: β -pinene, camphor, bornyl acetate, borneol, linalool, D-limonene, fenchone, terpinen-4-ol, and α -terpinene (de Boer et al. 2011). The terpenes also function as antimicrobial and analgesic agents (de Boer et al. 2011).

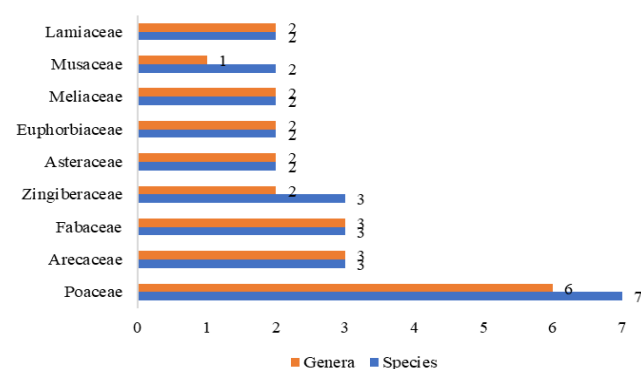


Figure 2. Families with the highest species number of medicinal plants to treat pregnancy, childbirth, and post-partum in the Minangkabau ethnic, West Sumatra, Indonesia

Table 2. The medicinal plants used to treat pregnancy, childbirth, and postpartum in the Minangkabau Ethnic, West Sumatra, Indonesia

Family	Scientific name	Local name	Cultivated/ wild	Life form	Part of uses	CSI value	Single or concoction	How to use	Uses
Acanthaceae	<i>Graptophyllum pictum</i> Griff.	<i>Pudiang hitam</i>	Cultivated	Shrub	Bark	9	Single	Fresh, pilis	Headache
Amaranthaceae	<i>Amaranthus hybridus</i> L.	<i>Bayam</i>	Cultivated	Herb	Leaves	25	Concoctions	Fresh, drink	Restoring the stamina, increasing breast milk production
Araceae	<i>Acorus calamus</i> L.	<i>Jariangau</i>	Wild	Herb	Rhizomes, leaves	9	Concoctions	Boil, drink	Antipyretic
Arecaeae	<i>Areca cathecu</i> Burm.f.	<i>Pinang</i>	Cultivated	Tree	Fruits, roots	9	Concoctions	Boil, drink	Antipyretic, healing of woman reproductive
	<i>Cocos nucifera</i> L.	<i>Karambia</i>	Cultivated	Tree	Exocarp	12	Concoctions	Boil, drink	Cleansing woman reproductive
	<i>Arenga pinnata</i> Merr.	<i>Anau</i>	Wild	Tree	Roots	9	Concoctions	Boil, drink	Antipyretic, healing of woman reproductive
Asteraceae	<i>Blumea balsamifera</i> DC.	<i>Capo</i>	Wild	Shrub	Leaves	6	Single	Boil, drink	Antipyretic
	<i>Pluchea indica</i> (L.) Less.	<i>Lontas</i>	Wild	Herb	Leaves	3	Concoctions	Fresh, drink	Antipyretic
Basellaceae	<i>Anredera cordifolia</i> (Ten.) Steenis	<i>Binahong</i>	Cultivated	Herb	Leaves	6	Concoctions	Boil, drink	Antipyretic
Caricaceae	<i>Carica papaya</i> L.	<i>Sampelo</i>	Cultivated	Herb	Flowers	18	Concoctions	Boil, drink	Antipyretic, cleansing woman reproductive, healing of woman reproductive
Cecropiaceae	<i>Poikilospermum suaveolens</i> (Blume) Merr.	<i>Lundang</i>	Wild	Tree	Roots	9	Concoctions	Fresh, drink	Refreshment of body, Restoring the stamina
Convolvulaceae	<i>Ipomea batatas</i> Poir.	<i>Ubi jala</i>	Cultivated	Herb	Leaves	9	Concoctions	Boil, drink	Healing of woman reproductive
Clusiaceae	<i>Garcinia mangostana</i> L.	<i>Manggis</i>	Cultivated	Tree	Stems	6	Concoctions	Boil, drink	Cleansing woman reproductive
Euphorbiaceae	<i>Phyllanthus niruri</i> L.	<i>Dukuang anak</i>	Wild	Herb	Aerial part	6	Concoctions	Boil, drink	Antipyretic
	<i>Sauropus androgynus</i> Merr.	<i>Katu</i>	Cultivated	Shrub	Leaves	6	Single	Boil, drink	Cleansing woman reproductive
Fabaceae	<i>Erythrina fusca</i> Lour.	<i>Cangkiang</i>	Wild	Tree	Roots	6	Concoctions	Boil, drink	Antipyretic
	<i>Parkia speciosa</i> Hassk.	<i>Patai</i>	Cultivated	Tree	Seeds	9	Concoctions	Roasted, drink	Restoring the stamina
	<i>Tamarindus indica</i> L.	<i>Asam jao</i>	Cultivated	Tree	Fruits	9	Concoctions	Boil, drink	Restoring the stamina
Gleicheniaceae	<i>Gleichenia linearis</i> (Burm.) Clarke.	<i>Pakih ransam, rasam</i>	Wild	Herb	Leaves	6	Concoctions	Boil, drink	Cleansing woman reproductive
Lamiaceae	<i>Plectranthus amboinicus</i> Lour.	<i>Bangun bangun</i>	Cultivated	Herb	Leaves	6	Concoctions	Boil, drink	Antipyretic
	<i>Coleus atropurpureus</i> Benth.	<i>Pudiang merah</i>	Wild	Herb	Leaves	3	Concoctions	Fresh	Stop of bleeding
Malvaceae	<i>Hibiscus surattensis</i> L.	<i>Asam ruso-ruso</i>	Wild	Shrub	Leaves	6	Concoctions	Boil, bathing	Refreshment of body
Meliaceae	<i>Lansium domesticum</i> Jack.	<i>Duku</i>	Cultivated	Tree	Bark	9	Concoctions	Boil, drink	Cleansing woman reproductive
	<i>Toona sureni</i> Merr.	<i>Kayu surian</i>	Wild	Tree	Bark	6	Concoctions	Boil, pilis	Antipyretic and headache
Menispermaceae	<i>Cyclea barbata</i> Miers	<i>Kalimpanang</i>	Wild	Herb	Roots	9	Concoctions	Boil, drink	Antipyretic and headache
Musaceae	<i>Musa balbisiana</i> Colla.	<i>Pisang batu</i>	Wild	Herb	Roots, stem	9	Concoctions	Boil, drink	Cleansing woman reproductive
	<i>Musa paradisiaca</i> L.	<i>Pisang buai</i>	Cultivated	Herb	Roots	9	Concoctions	Boil, drink	Cleansing woman reproductive
Myrtaceae	<i>Eugenia malaccensis</i> Reinw. ex Blume	<i>Jambak</i>	Cultivated	Tree	Bark	9	Concoctions	Boil, bathing	Refreshment of body
Piperaceae	<i>Piper betle</i> L.	<i>Siriah</i>	Cultivated	Herb	Leaves	9	Concoctions	Boil, drink	Antipyretic

Poaceae	<i>Coix lacryma-jobi</i> L.	<i>Anjalai, Batiah-batiah</i>	Wild	Herb	Seeds	9	Concoctions	Boil, drink	Cleansing woman reproductive
	<i>Cymbopogon nardus</i> (L.) Rendle.	<i>Sarai harum</i>	Cultivated	Herb	Pseudostem	9	Concoctions	Boil, bathing	Refreshment of body
	<i>Cymbopogon citratus</i> Stapf	<i>Sarai</i>	Cultivated	Herb	Stem	9	Concoctions	Roasted, drink	Restoring the stamina
	<i>Imperata cylindrica</i> (L.) P. Beauv	<i>Lalang</i>	Wild	Herb	Rhizomes	9	Concoctions	Boil, drink	Cleansing woman reproductive
	<i>Oryza sativa</i> L.	<i>Padi</i>	Cultivated	Herb	Seeds	9	Concoctions	Fresh, pilis	Refreshment of body
	<i>Oryza sativa</i> var. <i>glutinosa</i>	<i>Sipuluik</i>	Cultivated	Herb	Seeds	9	Concoctions	Roasted, drink	Restoring the stamina Increasing breast milk production
	<i>Zea mays</i> L.	<i>Jaguang</i>	Cultivated	Herb	Seeds	9	Concoctions	Roasted, drink	Restoring the stamina, Increasing breast milk production
	<i>Saccharum officinarum</i> L.	<i>Tabu udang</i>	Cultivated	Herb	Stems	9	Concoctions	Boil, drink	Antipyretic
Rhizophoraceae	<i>Carallia brachiata</i> (Lour.) Merr.	<i>Maransi</i>	Wild	Tree	Stems	6	Concoctions	Boil, drink	Restoring the stamina
Rubiaceae	<i>Uncaria gambir</i> (W. Hunter) Roxb.	<i>Gambia</i>	Cultivated	Shrub	Sap	9	Concoctions	Boil, drink	Antipyretic
Sapindaceae	<i>Schleichera oleosa</i> (Lour.) Oken.	<i>Kasambi</i>	Wild	Tree	Leaves	9	Concoctions	Boil, bath	Refreshment of body
Zingiberaceae	<i>Curcuma longa</i> L.	<i>Kunyik bona</i>	Cultivated	Herb	Rhizomes	9	Concoctions	Boil, drink	Antipyretic
	<i>Zingiber officinale</i> Rosc.	<i>Sipadeh</i>	Cultivated	Herb	Rhizomes	6	Concoctions	Boil, drink	Antipyretic, restoring the stamina
	<i>Zingiber purpureum</i> Rosc.	<i>Kunyik bolai</i>	Cultivated	Herb	Rhizomes	9	Concoctions	Fresh, drink	Antipyretic

The medicinal plants recorded in this study were also reported to be used by other ethnic groups. Such plants include *Cymbopogon citratus* Stapt, *Curcuma longa* L., *Zingiber officinale* Rosc, and *Sauropus androgynus* Merr. New medicinal plants that are used by mothers of Minangkabau ethnic for PCP include *Musa balbisiana* Colla and *Musa paradisiaca* L. (Musaceae), *Carallia brachiata* (Lour) Merr (Rhizophoraceae), and *Lansium domesticum* Jack., and *Toona sureni* Merr. (Meliaceae). The roots and pseudostem of *Musa balbisiana* and *Musa paradisiaca* have been used to restore stamina of maternal postpartum, while *Lansium domesticum* and *Toona sureni* have been used to cleanse blood during the puerperium. Further research needs to be done to find out bioactive compounds from these plants. *Oryza sativa* L., *Zea mays* L. and *Ipomea batatas* Poir are plants used as sources of carbohydrates, but when they are used in the treatment of PCP, the processing method is different. For example, *Zea mays* roasted with pseudostems of *Cymbopogon citratus* and seeds of *Parkia speciosa* Hassk, brewed with hot water, and used to maintain stamina of pregnant women.

The predominant mode of administration of herbal preparations was drinking (35 species), which was followed by bathing (4 species), and applying as a mask paste (3 species). The thirty-five species were used as concoctions, while 7 species were used as single herbs. Fresh extracts are collected from fleshy plant parts, such as *Curcuma longa* and *Zingiber officinale* rhizomes and *Saccharum officinarum* stem. The medicinal plants such as the leaves of *Blumea balsamifera*, *Anredera cordifolia*, and *Cocos nucifera* were prepared by boiling and then the boiled water was used as herbal drink. The respondents are of the opinion that medicinal plants should be processed before consumption for imparting taste, better benefits, easier consumption, and also for ensuring hygiene. Medicinal plants are also boiled and brewed with other additives such as palm sugar (*Arenga pinnata*), honey, and chicken eggs also to improve flavor and efficacy.

The use of medicinal herbs in the treatment of PCP is believed to be beneficial for antipyretics, cleansing the female reproductive organ, restoring stamina, refreshing the body, healing headaches, increasing breast milk production, and stopping bleeding. The number of species used for each of these purposes is shown in Figure 3. Medicinal plants used for antipyretics are *Zingiber purpureum*, *Curcuma longa*, *Uncaria gambir*, *Piper betle*, *Cyclea barbata*, and *Toona sureni*. The utilization of *T. sureni* as an antipyretic is hitherto not reported and therefore needs further research.

The post-partum maternal bathing method in the Minangkabau ethnic group differs from other ethnic groups such as the Batak ethnicity (Silalahi and Nisyawati 2019). Postpartum mothers in the Minangkabau ethnic group take water that has been mixed with freshly sliced medicinal plants for bathing while the Batak ethnic group take a steam bath. The Batak Karo sub-ethnic used 62 species of medicinal plants, most of which belong to Rutaceae and Zingiberaceae (Silalahi and Nisyawati 2019). The steam-bathing aims to restore stamina, cleanse the uterus, relaxing, eliminate headaches, reduce cholesterol and

hypertension (Silalahi and Nisyawati 2019), while the Minangkabau ethnic bath is to make the body refreshed.

One of the goals of using plants during PCP is to increase breast milk production. The plants used are *Sauropus androgynus* and *Plectranthus amboinicus*. *Garcinia mangostana*, *Arenga pinnata*, and *Gleichenia linearis* have been used to clean the female reproductive organs while *Hibiscus surattensis*, *Gleichenia linearis*, *Eugenia malaccensis*, *Schleichera oleosa*, *Cymbopogon nardus*, and *Curcuma longa* have been used for bathing. The initial period of one month is considered unhealthy for postpartum mothers. They are advised to use *Phyllanthus niruri*, *Gleichenia linearis*, and *Garcinia mangostana* to cleanse their reproductive system and uterus.

Ogbe et al. (2009) stated that the purpose of using medicinal plants after childbirth is to treat bleeding, contraception, increasing milk, and treat skin diseases, and that *Euphorbia hirta* and *Ocimum gratissimum* were used to increase breast milk by local Africans. Panyaphu et al. (2011) opined that plants used in post-partum also function as antioxidants and antimicrobials. Figure 4 shows the extent of plant parts used as medicinal by Minangkabau ethnic group. Leaves are the predominantly used part (12 species), followed by stems (10 species), roots (6 species), rhizome (5 species), and seeds (5 species).

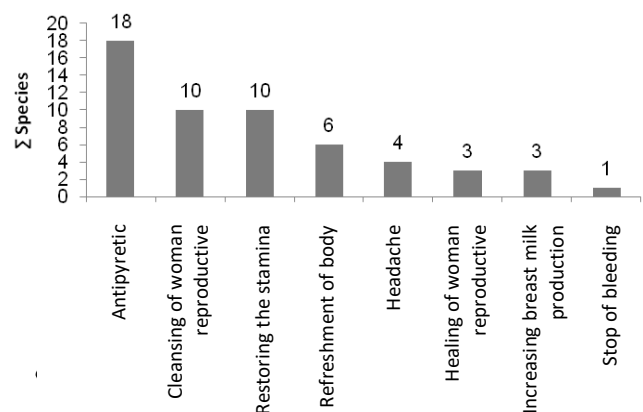


Figure 3. Various benefits of medicinal plants in treatment of PCP and species used by Minangkabau ethnic, in West Sumatra, Indonesia

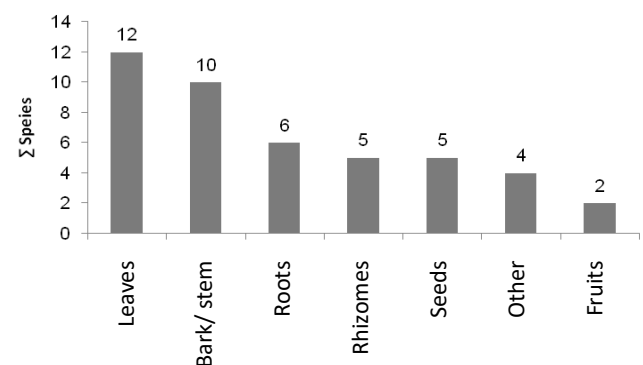


Figure 4. Medicinal plant parts used to treat pregnancy, childbirth and postpartum period by Minangkabau ethnic, in the West Sumatra, Indonesia

Cultural Significance Index (CSI) of the medicinal plants

The values of cultural significance index (CSI) of medicinal plants to treat pregnancy, childbirth, and postpartum are classified as very low (<5), low (6-10), moderate (11-15), and high (> 15). Two species, namely *Pluchea indica* and *Coleus atropurpureus* have very low CSI values. More than 88% or 38 species of medicinal plants in this study have low CSI values. *Graptophyllum pictum*, *Areca catechu*, *Blumea balsamifera*, and *Anredera cordifolia* are some species with low CSI values. Medicinal plants which have low CSI values are rarely used or have few resources, so that people do not recognize and are also underutilized. *Areca catechu* is a plant that is more widely known as an ingredient for betel nut than PCP medicine. The medicinal plants that have a high CSI value are those that are frequently used and easily found in the surrounding environment. They are cultivated, and, therefore, easily recognized and used intensively by the local community. The non-cultivated medicinal plants are rarely used by local people and tend to be forgotten which has implications for the degradation of local knowledge.

Medicinal plant for increased breast milk production

The problems that are often encountered by postpartum mothers are low milk production, anemia, and being overweight. Adequate milk production is crucial for the growth and development of the baby, therefore post-partum mothers commonly consume vegetables such as *bangun-bangun* (*Plectranthus amboinicus*) and *katuk* leaves (*Sauropus androgynus*). Both of these plants are believed to increase breast milk production.

P. amboinicus leaves are cooked much like a vegetable curry by adding spices, such as lemongrass (*Cymbopogon citratus*), ginger (*Zingiber officinale*), coriander (*Coriandrum sativum*), onion (*Allium cepa*), garlic (*Allium sativum*), and coconut milk (*Cocos nucifera*). These vegetables are consumed by breastfeeding mothers, as often as possible. The use of *P. amboinicus* to increase milk production by the s caused by cultural influence of the Batak ethnic group from North Sumatra. The Batak ethnic is an indigenous ethnic group in North Sumatra that is geographically bordered directly with West Sumatra, resulting in cultural exchange between ethnic cultures. Batak people, especially the Simalungun Batak, use *P. amboinicus* as the main menu for breastfeeding mothers. To improve the taste, additives like chicken meat and spices are employed. Besides, increasing breast milk, consumption of *P. amboinicus* also increases stamina (Hasibuan 2014). *Plectranthus amboinicus* is generally cultivated in home gardens, so that it is easily accessible to the local community. It is harvested by cutting branches and young shoots, after that new shoots will appear from branches that have been cut.

Arumugam et al. (2016) stated that the nutrients in the *P. amboinicus* are protein (0.6%), Calcium (0.158%), Potassium (0.138%) and Ferrum (0.262%). The Ferrum in *P. amboinicus* increases blood and prevents anemia in postpartum mothers. It also contains various secondary metabolites such as tannins, saponins, flavonoids, steroid glycosides and polyuronides (Asiimwe et al. 2014;

Sathasivam and Elangovan 2011); alkaloids, cardiac glycosides, terpenoids, and flavonoids (Sathasivam and Elangovan 2011). The major phenolic compounds in *P. amboinicus* are rosmarinic acid (6.160 mg/g), followed by caffeic acid (0.770 mg/g), rutin (0.324 mg/g), gallic acid (0.260 mg/g), quercetin (0.15 mg/g), and p-coumaric acid (0.104 mg/g) (Bhatt et al. 2013). The terpenoid essential oils contained in leaves and stems of *P. amboinicus* results in providing a distinctive aroma. The main essential oil found in *P. amboinicus* leaves were linalool (50,3%), neryl acetate (11,6%), geranyl acetate (11,7%), and carvacrol (14,3%) (Asiimwe et al. 2014). The other compositions of *P. Amboinicus* were β -Myrcene, 4-Carene, γ -terpinene, β -ocimene, β -cymene, linalool, α -caryophyllene, neryl acetate, geranyl acetate, and nerol carvacrol (Asiimwe et al. 2014). *P. amboinicus*, owing to its rich nutrients and phytochemicals, can be potentially developed as food and nutraceutical source (Bhatt et al. 2013).

Plectranthus amboinicus has been reported as anti-bacterial (Wadikar and Patki 2016; El-hawary et al. 2013) and also has antifungal activities (Wadikar and Patki 2016; Manjamalai et al. 2012). The essential oil of *P. amboinicus* leaves inhibited growth of *Klebsiella pneumoniae* (Goncalves et al. 2012), *Staphylococcus aureus* (Manjamalai et al. 2012; Bhatt et al. 2013; Astuti et al. 2012), *Bacillus cereus*, *Escherichia coli*, *Yersinia enterocolitica* (Bhatt et al. 2013), *Bacillus subtilis* (Astuti et al. 2012; Bhatt and Negi 2012), *Klebsiella planticola* (Vanaja and Annadurai 2013), *Pseudomonas aeruginosa* (Astuti et al. 2012; Manjamalai et al. 2012), and *Salmonella thypi* (Astuti et al. 2012).

Sauropus androgynus has been long used as a vegetable to increase breast milk production by Minangkabau ethnic and is more familiar than *P. amboinicus*. *S. androgynus* is cultivated in home garden and easily found in the surrounding environment. The Minangkabau people have been long consuming *S. androgynus*, and they have not reported any poisoning due to its consumption. In Taiwan and Japan, it is used as a slimming and anti-obesity agent (Bunawan et al. 2011). In Taiwan (1995) and China (2005), the consumption of *S. androgynus* has been reported to cause lung dysfunction called bronchiolitis obliterans (Bunawan et al. 2011; Lai et al. 1996; Yu et al. 2006). Bronchiolitis obliterans is characterized by inflammation of the airways, broccoli fibrotic lesions, and narrowing of the lumen (Cottin and Cordier 2013). Xin et al. (2006) reported that giving juice of *S. androgynus* leaves to cells at certain doses resulted in obliteration of the lysosome and Golgi apparatus but did not result in chromosomal changes. The method of *S. androgynus* processing in Minangkabau ethnic is different from Taiwan and China. In Taiwan, *S. androgynus* leaves and young shoots are used as fresh material (Lai et al. 1996; Yu et al. 2006; Bunawan et al. 2011), while the Minangkabau people use after boiling them. Papaverine is an alkaloid which results in bronchiolitis obliterans (Bunawan et al. 2011), and this compound is degraded in the presence of heating (Lai et al. 1996). Thus, boiling of *S. androgynus* by Minangkabau ethnic makes it a relatively safe diet.

The use of *S. androgynus* in postpartum mothers, in addition to increasing breast milk production, is thought to reduce weight and also increase the number of red blood cells. Yu et al. (2006) stated that *S. androgynus* leaves contain a chemical compound called is 3-O- β -D-glucosyl-(1 \rightarrow 6)- β -D-glucosyl-kaempferol that has anti-obesity properties. Hasimun et al. (2018) reported that *S. androgynous* leaf extract at doses of 50, 100, and 200 mg/kg could increase the number of red blood cells and reduce the rate of stretching. *S. androgynus* leaf extract at a dosage of 200 mg/kg has anti-anemic and analgesic effects, simultaneously.

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