

# Diversity and use of medicinal plants for traditional women's health care in Northern Banyumas, Indonesia

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**Abstract.** *Utaminigrum W, Nofrianti, Hartanti D. 2022. Diversity and use of medicinal plants for traditional women's health care in Northern Banyumas. Biodiversitas 23: 1970-1976.* This study aimed to record the diversity and utilization of medicinal plants for maintaining women's health in Northern Banyumas (Central Java, Indonesia) using qualitative and quantitative approaches. Semi-structured interviews with 97 informants were conducted to collect data on local plant names, plant parts, herbal preparation, and application of plants used for traditional women's health care. The value and importance of the plants to the people in the surveyed areas were quantitatively determined by the species use-value (SUV), the relative frequency of citation (RFC), and fidelity level (FL). The local community cited 21 plant species belonging to 10 families. The most frequently used plant part, preparation, and application were fruits and rhizomes (32.6% each), infusion (83.7%), and oral (88.4%), respectively. There were four use-category of the plants, i.e., post-partum, pre-menstrual syndrome, lactation stimulant, and leukorrhoea. The most valuable plants were *Curcuma longa* L., *Piper betle* L., and *Kaempferia galanga* L. with SUV of 0.41, 0.34, and 0.21, respectively. The *C. longa* and *P. betle* were also recorded as the most important plants with RFC values of 0.63 and 0.40. These findings confirm the status of Zingiberaceae as the main component of *jamu* (traditional medicine) to maintain women's health.

**Keywords:** Baturraden, ethnomedicine, medicinal plants, Sumbang, traditional medicines, women's health care

**Abbreviations:** FL: fidelity level, RFC: relative frequency of citation, SUV: species use-value,

## INTRODUCTION

People in Indonesia, particularly those living in the rural area and from the lower-middle class, commonly consumed *jamu*, the Indonesian traditional medicine, to maintain health and cure ailments. Their *jamu* intake was in the form of self-made herbal preparations from plants around their living place (Elfahmi et al. 2014; Isnawati et al. 2019). The particular use of *jamu* for maintaining the overall health and beauty caring of women is an interesting benefit of *jamu*. Numerous *jamu* formulations are specially dedicated to every step of the womanhood life cycle (Jun et al. 2021; Siahaan et al. 2021).

There are numerous ethnobotanical studies covering this topic worldwide. Some recent examples include the utilization of plants by Brazilian women, Arabic women in Mecca (Saudi Arabia), Menoua women in Cameroon, and Chinese women in Chaoshan (China) for treating pregnancy, menstruation, and the related conditions (Yemele et al. 2015; Yazbek et al. 2016; Alqethami et al. 2017; Li et al. 2017). In Indonesia, such studies are also conducted in Bangkalan (East Java) on Madurese people, Seluma (Bengkulu) on Serawai people, Solok (West Sumatra) on Minangkabau people, and Upper Left Kampar (Riau) (Rahayu et al. 2020; Silalahi et al. 2020; Muslichah et al. 2021; Susandarini et al. 2021).

Compared to other regions in Java, the biodiversity in the slope of Mt. Slamet, the area where the sub-districts of Baturraden and Sumbang are located, is considered high. The area's biological richness in terms of hornworts, pteridophytes, Javanese endemic palms, begonias, and Saurauia have been reported (see Praptosuwiryo 2013; Efendi 2019; Zulkarnaen et al. 2019; Helmanto et al. 2020; Siagian et al. 2021). Further, several ethnomedicinal studies have described the use of plants for treating diabetes and diarrhea in the area of Northern Banyumas (Permatasari et al. 2011; Utaminigrum et al. 2020). To the best of our knowledge, there is an absence of ethnobotanical studies related to women's health care conducted in Northern Banyumas, Central Java, Indonesia so this study is designed to document the diversity of medicinal plants used for women's health care in the sub-districts of Baturraden and Sumbang.

## MATERIALS AND METHODS

### Study area

The study was conducted in all villages in the sub-districts of Baturraden (Karangmangu, Karangsalam, Karangtengah, Kebumen, Ketenger, Kutasari, North Kemutug, Pamijen, Pandak, Purwosari, Rempoah, and

South Kemutug), and Sumbang (Banteran, Ciberem, Datar, East Banjarsari, Gandatapa, Karangcegak, Karanggintung, Karangturi, Kawungcarang, Kebanggan, Kedungmalang, Kotayasa, Limpakuwus, Sikapat, Silado, Sumbang, Susukan, Tambaksogra, and West Banjarsari), Banyumas, Central Java, Indonesia. The study area is located between 7°14'-7°40' N latitude and 109°12'-109°30' E longitude, which cover the total area of 98.95 km<sup>2</sup>, bordered by Tegal and Pemalang Regencies in the north, Purbalingga Regency in the east, North Purwokerto and Kembaran sub-districts in the south, and Kedungbanteng subdistrict in the west. The northern parts of the study area are covered by the Gunung Slamet protected forest, while the southern parts are productive farmland with corn and rice as the main crop (Figure 1).

### Procedures

The ethical approval of the protocol of this study was issued by the Ethical Commission of Faculty of Medicine and Health Sciences, Universitas Jendral Soedirman (Ref: 187/KEPK/XI/2016). There were 97 people interviewed in this study during Januari-March 2017. The inclusion criteria for participant selection were familiar with the utilization of plants for medicinal purposes, literate, aged 17 years old or older, and residing in the studied areas. The number of informants of each village was proportional to their respective population. The demographic characteristics of the informants have been described in our previous publication (see Utaminingrum et al. 2020).

The semi-structured interview was conducted to collect the ethnomedicinal data from the informants after written informed consent was obtained. The questionnaire followed the model used in the Research on Medicinal Plants and Traditional Indonesian Medicines (RISTOJA, *Riset Tumbuhan Obat dan Jamu*) 2015 as the guide for the interview. It addressed the traditional use of the plants, including local name, disorder treated, plant part used,

mode of preparation, and application route. The informants were requested to mention all the medicinal uses of plants they knew. However, only the plant species used for maintaining women's health care were reported in this study. The plants mentioned in the survey were collected and further identified in the Laboratory of Pharmaceutical Biology, Faculty of Pharmacy, Universitas Muhammadiyah Purwokerto, Central Java, Indonesia (see Utaminingrum et al. 2020).

### Data analysis

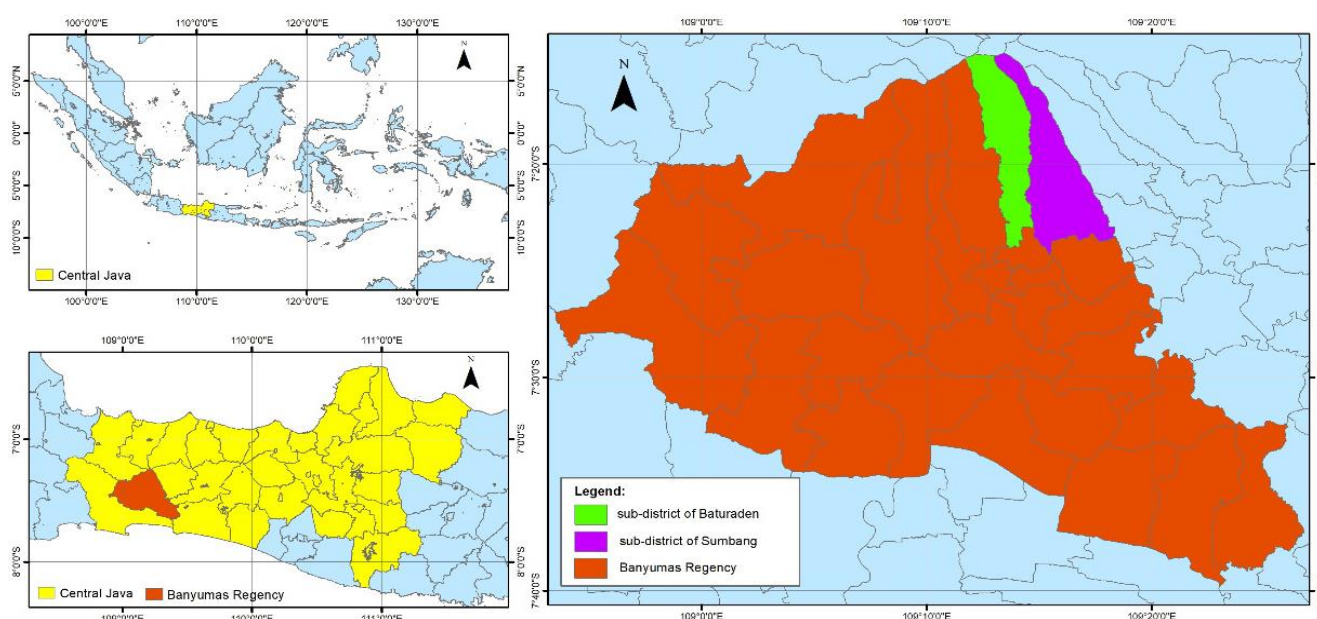
The data of medicinal plants were alphabetically listed according to their accepted name in The World Flora Online (<http://www.worldfloraonline.org/>) and compared to those in the POWO (Plants of the World Online, <https://powo.science.kew.org/>). The disorder was grouped according to the Economic Botany Data Collection Standard nomenclature. Each ethnomedicinal data were statistically described using Microsoft Excel 2010 functions. The quantitative indices used in this study were SUV, RFC, and FL, which were calculated following (Zenderland et al. 2019) and (Mechchate et al. 2020).

$$SUV = \sum \frac{U_i}{N}$$

$$RFC = \frac{FC}{N}$$

$$FL = \frac{I_p}{F_c} \times 100$$

Where  $U_i$  is the number of total uses of a given plant species,  $N$  is the number of real informants,  $FC$  is the number of informants mentioning any uses of a given species, and  $I_p$  is the number of informants citing the particular use a given species.



**Figure 1.** Map of the study area in sub-districts of Baturraden and Sumbang sub-districts, Banyumas District, Central Java, Indonesia

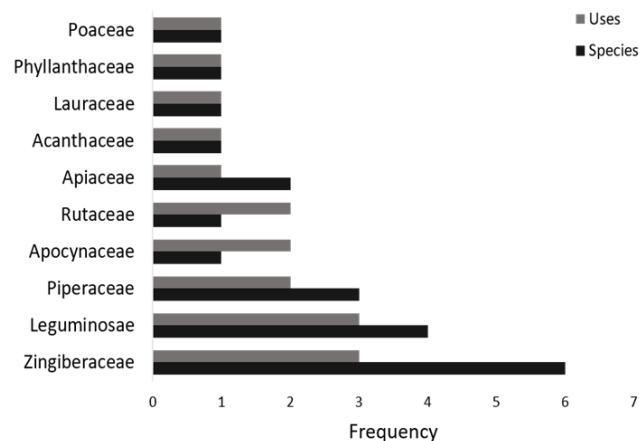
## RESULTS AND DISCUSSION

There were ten families with 21 plant species used for women's health care by the Northern Banyumas. Families with multiple plant species were Zingiberaceae, Leguminosae, Piperaceae, and Apiaceae, while families with multiple uses were Zingiberaceae, Leguminosae, Piperaceae, Apocynaceae, and Rutaceae (Table 1, Figure 2).

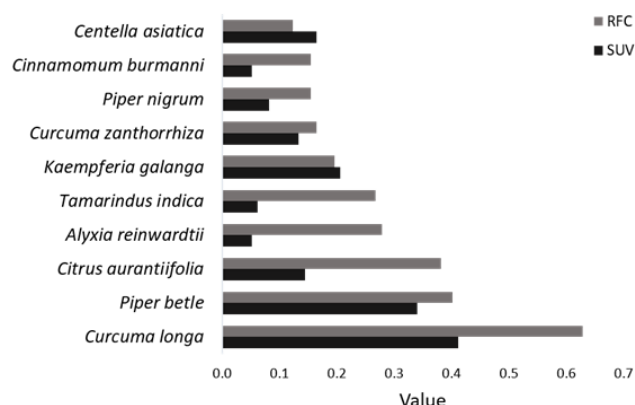
SUV represents the relative importance of plants in a given community. This study suggested that *Curcuma longa* L., *Piper betle* L., *Kaempferia galanga* L., *Centella asiatica* (L.) Urb., *Citrus aurantiifolia* (Christm.) Swingle, and *Curcuma zanthorrhiza* Roxb. were considered as the most important plants for woman's health care. On the other hand, the higher RFC of a given plant value indicates that the community is perceived as more valuable. The *C. longa*, *P. betle*, *C. aurantiifolia*, *Alyxia reinwardtii* Blume, *Tamarindus indica* L., and *K. galanga* were recorded as the most valuable plants in sub-districts of Baturraden and Sumbang (Figure 3).

While SUV represents the overall importance of a given species, FL indicates its importance for a particular use. The high FL means that the majority of the informants use a plant in the same way for treating a specific disorder (Khan et al. 2014). Four conditions related to women's health care were treated with medicinal plants in the studied areas. The FL values of 100% for some plants were recorded in the use category of lactation stimulation and post-partum (Figure 4).

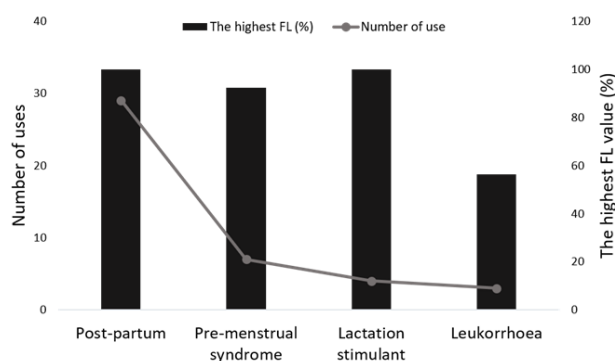
The fruits and rhizomes were the most commonly used plant parts in the studied area. Most plant materials were used as the polyherbal formulation. The people of Baturraden and Sumbang mainly prepared the plant materials into an infusion, which is made by slowly boiling them in water for a short time. Tea, prepared by pouring boiling water onto the plant materials, was also consumed. Most herbal preparations were taken by oral route, and a small number of topical preparations were in the forms of poultice and tea (Figure 5).



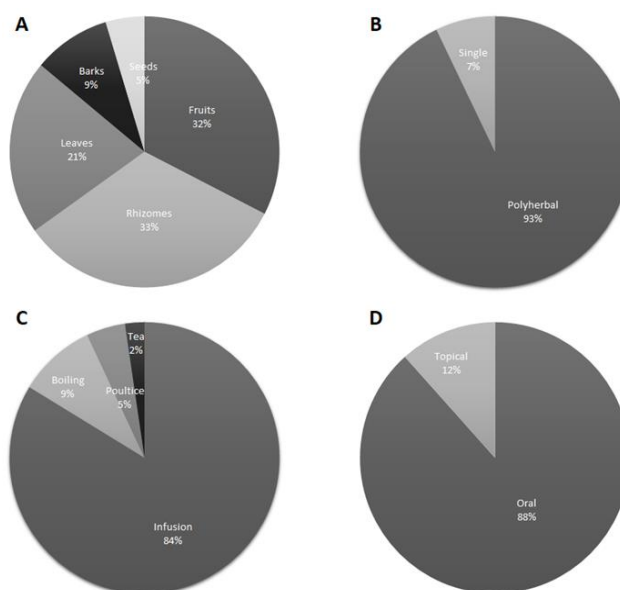
**Figure 2.** The profile of family of plants used for woman's health care



**Figure 3.** The plants with the highest relative frequency of citation and species use-value used for the woman's health care



**Figure 4.** Profile of FL and number of plants used for each disorder related to women's health care



**Figure 5.** The profile of (A) plant part, (B) herbal preparation, (C) preparation, and (D) route of administration of plants used for women's health care

**Table 1.** The medicinal plants used for woman's health care

Family	Plant species name	Local name	SUV	RFC	Life form	Use category (FL)	Plant part	Herbal preparation	Preparation	Application
Acanthaceae	<i>Clinacanthus nutans</i> (Burm.f.) Lindau	<i>Ketumpang</i>	0.05	0.06	Shrub	Post-partum (33%)	Leaves	Polyherbal	Infusion	Oral
Apiaceae	<i>Centella asiatica</i> (L.) Urb.	<i>Panegoang</i>	0.16	0.12	Herb	Post-partum (17%)	Leaves	Polyherbal	Infusion	Oral
Apiaceae	<i>Foeniculum vulgare</i> Mill.	<i>Adas</i>	0.03	0.04	Herb	Post-partum (50%)	Fruits	Polyherbal	Infusion	Oral
Apocynaceae	<i>Alyxia reinwardtii</i> Blume	<i>Pulosari</i>	0.05	0.28	Tree	Post-partum (56%), pre-menstrual syndrome (41%)	Barks	Polyherbal	Infusion	Oral
Lauraceae	<i>Cinnamomum burmanni</i> (Nees & T.Nees) Blume	<i>Kayu manis jangan</i>	0.05	0.15	Tree	Post-partum (13%)	Barks	Polyherbal	Infusion	Oral
Leguminosae	<i>Desmodium triflorum</i> (L.) DC.	<i>Jarem</i>	0.07	0.08	Shrub	Post-partum (25%)	Leaves	Polyherbal	Infusion	Oral
Leguminosae	<i>Parkia timoriana</i> (DC.) Merr.	<i>Dawung</i>	0.01	0.02	Tree	Post-partum (100%)	Seeds	Polyherbal	Infusion	Oral
Leguminosae	<i>Senna occidentalis</i> (L.) Link	<i>Senting</i>	0.03	0.01	Tree	Lactation stimulant (100%)	Leaves	Monoherbal	Boiling	Oral
Leguminosae	<i>Tamarindus indica</i> L.	<i>Asem</i>	0.06	0.27	Tree	Post-partum (96%), pre-menstrual syndrome (92%)	Fruits	Polyherbal	Infusion	Oral
Phyllanthaceae	<i>Sauropus androgynus</i> (L.) Merr.	<i>Katuk</i>	0.02	0.06	Shrub	Lactation stimulant (100%)	Leaves	Monoherbal	Boiling	Oral
Piperaceae	<i>Piper betle</i> L.	<i>Sirih</i>	0.34	0.40	Herb	Leucorrhoea (56%)	Leaves	Monoherbal	Infusion, tea	Topical
Piperaceae	<i>Piper cubeba</i> Vahl.	<i>Kemukus</i>	0.03	0.04	Herb	Post-partum (50%)	Fruits	Polyherbal	Infusion, tea	Oral
Piperaceae	<i>Piper nigrum</i> L.	<i>Merica</i>	0.08	0.15	Herb	Post-partum (30%)	Fruits	Polyherbal	Infusion	Oral
Poaceae	<i>Oryza sativa</i> L.	<i>Beras</i>	0.06	0.05	Herb	Post-partum (20%)	Seeds	Polyherbal	Poultice	Topical
Rutaceae	<i>Citrus aurantiifolia</i> (Christm.) Swingle	<i>Jeruk nipis</i>	0.14	0.38	Tree	Post-partum (70%), pre-menstrual syndrome (65%)	Fruits	Polyherbal	Infusion	Oral
Zingiberaceae	<i>Amomum compactum</i> Sol. ex Maton	<i>Kapulaga</i>	0.06	0.09	Herb	Post-partum (22%)	Rhizomes	Polyherbal	Infusion	Oral
Zingiberaceae	<i>Boesenbergia rotunda</i> (L.) Mansf.	<i>Temukunci</i>	0.01	0.01	Herb	Lactation stimulant (100%)	Rhizomes	Monoherbal	Boiling	Oral
Zingiberaceae	<i>Curcuma longa</i> L.	<i>Kunir</i>	0.41	0.63	Herb	Post-partum (46%), pre-menstrual syndrome (39%)	Rhizomes	Polyherbal	Infusion	Oral
Zingiberaceae	<i>Curcuma zanthorrhiza</i> Roxb.	<i>Temulawak</i>	0.13	0.16	Herb	Post-partum (13%)	Rhizomes	Polyherbal	Infusion	Oral
Zingiberaceae	<i>Kaempferia galanga</i> L.	<i>Kencur</i>	0.21	0.20	Herb	Post-partum (37%)	Rhizomes	Polyherbal	Infusion, poultice	Oral, topical
Zingiberaceae	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	<i>Lempuyang</i>	0.05	0.05	Herb	Post-partum (40%)	Rhizomes	Polyherbal	Infusion	Oral

**Table 2.** The polyherbal formulations used for women's health care

Plant species	Use category	Preparation	Application
<i>Alyxia reinwardtii</i> , <i>Amomum compactum</i> , <i>Centella asiatica</i> , <i>Cinnamomum burmannii</i> , <i>Clinacanthus nutans</i> , <i>Curcuma longa</i> , <i>Desmodium triflorum</i> , <i>Foeniculum vulgare</i> , <i>Kaempferia galanga</i> , <i>Parkia timoriana</i> , <i>Piper cubeba</i> , <i>Piper nigrum</i> , <i>Zingiber zerumbet</i>	Post-partum	Infusion	Oral
<i>Alyxia reinwardtii</i> , <i>Amomum compactum</i> , <i>Cinnamomum burmannii</i> , <i>Curcuma longa</i> , <i>Foeniculum vulgare</i> , <i>Kaempferia galanga</i> , <i>Parkia timoriana</i> , <i>Piper cubeba</i> , <i>Piper nigrum</i> , <i>Zingiber zerumbet</i>	Post-partum	Infusion	Oral
<i>Curcuma longa</i> , <i>Curcuma zanthorrhiza</i> , <i>Kaempferia galanga</i> , <i>Tamarindus indica</i> , <i>Zingiber zerumbet</i>	Post-partum	Infusion	Oral
<i>Alyxia reinwardtii</i> , <i>Citrus aurantiifolia</i> , <i>Curcuma longa</i> , <i>Tamarindus indica</i>	Post-partum, pre-menstrual syndrome	Infusion	Oral
<i>Kaempferia galanga</i> , <i>Oryza sativa</i>	Post-partum	Poultice	Topical

## Discussion

The superior use of Leguminosae for woman's health care has been reported worldwide. It was the most frequently cited family for maintaining conditions related to women's health in Brazil (Yazbek et al. 2016). Most galactogenic plants used by Berhoum (Algeria) people were from Leguminosae, with *Trigonella foenum-graecum* L. as the most valuable plant for the community (Madani et al. 2017). German and Italian mainly consumed *Galega officinalis* L. based products to stimulate breastmilk production in mothers (Salatino et al. 2017). In Ipoh (Malaysia), *Glycine max* (L.) Merr. derived products were popular as alternative medications for menopause-related symptoms (Mar et al. 2015). On the other hand, Zingiberaceae seems popular as midwifery plants in Southeast Asia. The versatility of Zingiberaceae in traditional medicine has been long recognized particularly in Indonesia and Malaysia (Razak et al. 2017; Silalahi et al. 2020). There were 16 Zingiberaceae species used for 14 medicinal use categories, while two species were used for treating diarrhea in Baturraden (Permatasari et al. 2011; Suparman et al. 2012). However, the diversity of women's healthcare-related plants in this study is lower than in other places. For example, people in Himalayan Poonch (Pakistan) used 39 plants of 20 families for cosmetic purposes only (Shaheen et al. 2014), 111 plants of 101 genera belonging to 50 families were used for traditional maternal healthcare in Katsina, Nigeria (Kankara et al. 2015).

The high SUV and RFC showed by *C. longa*, *P. betle*, *K. galanga*, and *C. aurantiifolia* demonstrate that those plants are employed for many uses and known by many people. *Curcuma longa* and *K. galanga* are members of Zingiberaceae, which has been noted as the essential ingredient of traditional herbal medicines (*jamu*) in Indonesia (Widyowati and Agil 2018). Furthermore, the anti-inflammatory, analgesic, and antioxidant activities of *C. longa* and its bioactive compounds, curcuminoid, have been well-proven, which might explain its versatile traditional uses (Hewlings and Kalman 2017; Rauf et al. 2018). *Piper betle* is commonly associated with its essential oil, which has shown benefits in treating microbial-related conditions (Madhumita et al. 2019). The anti-inflammatory activity of *K. galanga* extracts,

particularly the isopimarane diterpenes, might underline its importance in traditional medications (Jagadish et al. 2016; Tungcharoen et al. 2020). The essential oils and flavonoids in *C. aurantiifolia* are considered the main active constituents. The fruit juice's acidity also plays a vital role in improving the herbal preparations' taste and stability. The better solubility in water, and a lower pH are particularly beneficial for non-polar bioactive compounds (Spadaro et al. 2012; Xu et al. 2016; Kharat et al. 2017).

The plant used for post-partum treatment with FL of 100% was *Parkia timoriana* (DC.) Merr., subsequently followed by *T. indica* and *C. aurantiifolia* with FL values of 96% and 70%, respectively. The exclusive use of *P. timoriana* in post-partum conditions might be related to its phytosterols content, which has shown pre-clinical benefits to both mother and offspring when supplemented during pregnancy and lactation (Rideout et al. 2015; Sale et al. 2021). *Tamarindus indica* might be similar to that of *C. aurantiifolia*. Their uses are particularly for the supporting ingredients in the polyherbal formulations by facilitating a better solubility of the active ingredients and a more appreciable taste. Both plant materials were also found with the highest FL values of 92% and 65% in the use category of pre-menstrual syndrome.

In the lactation stimulation category, *Boesenbergia rotunda* (L.) Mansf., *Senna occidentalis* (L.) Link, and *Sauropus androgynus* (L.) Merr. had FL values of 100%. *Sauropus androgynus* is a well-known plant for traditional stimulation of breast milk production, in which its efficacy has been clinically proven. The increased breastmilk production was likely related to prolactin stimulation (Hayati et al. 2016; Primadhani, 2021). *Piper betle* is the only plant used for leucorrhea topical treatment with an FL of 39%. The plant species can inhibit the growth of patient-isolated *Candida albicans* (C.P.Robin) Berkhout, in which hydroxychavicol is considered the compound responsible for the activity (Ali et al. 2010; Septiyana 2018).

As in this study, the widespread use of fruits was also reported elsewhere. For example, fruits of four species of Citrus were used by people in Nuevo Leon (Mexico) as food flavoring, while West Bank (Palestine) people used juice of *Citrus limon* L. to treat psoriasis (Estrada-Castillón et al. 2014; Shawahna and Jaradat 2017). All the rhizomes used by the locals in this study were from the

Zingiberaceae family, which has also been reported in northern Angola (Pompermaier et al. 2018). Only *S. occidentalis*, *P. betle*, and *B. rotunda* were used for oral monoherbal preparation. The polyherbal formulations used in the Sumbang sub-district consisted of two to 13 plant species, mainly containing *C. longa* and used for post-partum treatments (Table 2). Utaminingrum et al. (2021) cited only a polyherbal formulation to treat pre-menstrual syndrome in the Baturraden sub-district. The polyherbal formulation is commonly associated with better efficacy, fewer side effects, and better preparation taste (Parasuraman et al. 2014; Dragos and Gilca 2018; Karole et al. 2019). Some plants in Northern Banyumas, i.e., *Amomum compactum* Sol. ex Maton, *Cinnamomum burmannii* (Nees & T.Nees) Blume, *Piper nigrum* L., *C. aurantiifolia*, and *T. indica*, might be used for improving the taste or the aroma of the oral preparation of the polyherbal formulations. Palm sugar and rock candy as a sweetener is commonly practiced in Sumbang sub-district.

The dominant use of water-extract-based herbal preparations was also practiced in East Sikkim (India) and Southern Tanzania for the topical fungal infection medication (Mbunde et al. 2016; Tamang et al. 2022). This study also revealed that *S. occidentalis* and *S. androgynus* leaves and *B. rotunda* rhizomes were cooked and served as a soup (*sayur bening*). A similar method of use and indication of *S. androgynus* as the soup is also reported in Bantul (Yogyakarta) (Budiarti and Kintoko 2021). People in North Banyumas likely used herbal preparations specific to the purpose. While they mainly used infusion to maintain women's health, they primarily utilized decoction to treat diabetes and directly ate them directly to stop diarrhea (Permatasari et al. 2011; Utaminingrum et al. 2020).

Our study concludes that the people of Northern Banyumas utilize 21 plant species belonging to 10 families to maintain the woman's health. *Curcuma longa* and *P. betle* are the most valuable and important species. The *K. galanga* and *C. zanthorrhiza* are also popularly used. Most of the plants are prepared as the polyherbal formulation and consumed orally in the form of infusion. Hence, our study confirms the importance of Zingiberaceae in *jamu*, particularly for women's health care.

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