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Popular knowledge as a factor of female empowerment in Northeast Brazil

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Abstract. Women all over the World are the main victims of bad social and environmental conditions. Registering these conditions along with their knowledge before such conditions can be a way to acknowledge women in rural areas. In this context, the objective of this study was to portray the socioeconomic, environmental, cultural, and religious characteristics of the context in which women are inserted and register their popular knowledge about wild plants, analyzing how these characteristics and knowledge are related to the process of female empowerment. Forty interviews were carried out with residents of three communities around the Sete Cidades National Park using semi-structured forms covering socioeconomic, cultural, environmental, and ethnobiological information. The Free List method was used for the survey of species, with record of 70 species belonging to 24 families. Knowledge was analyzed according to schooling, length of residence in the communities, and age group, and the similarity between these criteria and knowledge about wild plants was analyzed using the Single clustering method and the Dice-Sorensen coefficient. The analysis was performed using the NTSYSpc v.2.10t software for comparison, using cluster analysis. Data referring to cultural practices were cataloged through observation, notes, and a photographic record. The knowledge was centered on women who lived for longer time in the communities and on older women, confirmed by their distance in the similarity analysis. The practices and strategies that women developed point to a solidary and collective empowerment, albeit unconscious.

Keywords: Rural knowledge; Local characterization; Gender.

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Resumo. ***Conhecimento popular como fator de empoderamento feminino no Nordeste do Brasil***. As mulheres em todo o Mundo são as principais vítimas das más condições sociais e ambientais. Registar estas condições juntamente com o seu conhecimento diante de tais condições pode ser uma forma de reconhecer as mulheres nas áreas rurais. Nesse contexto, objetivou-se com esse estudo retratar as características socioeconômicas, ambientais, culturais e religiosas do contexto em que as mulheres estão inseridas e registrar seus conhecimentos populares sobre plantas silvestres, analisando como essas características e conhecimentos estão relacionados ao processo de empoderamento feminino. Foram realizadas quarenta entrevistas com moradores de três comunidades localizadas em torno do Parque Nacional das Sete Cidades por meio de formulários semiestruturados abrangendo informações socioeconômicas, culturais, ambientais e etnobiológicas. Para o levantamento das espécies foi utilizado o método Lista Livre, com registro de 70 espécies pertencentes a 24 famílias. O conhecimento foi analisado segundo escolaridade, tempo de residência nas comunidades e faixa etária, e a similaridade entre esses critérios e o conhecimento sobre plantas silvestres foi analisada pelo método de agrupamento único e pelo coeficiente de Dice-Sorensen. A análise foi realizada utilizando o software NTSYSpc, v.2.10t, para comparação, utilizando análise de *cluster*. Os dados referentes às práticas culturais foram catalogados por meio de observação, anotações e registro fotográfico. O conhecimento centrou-se nas mulheres que viviam mais tempo nas comunidades e nas mulheres mais velhas, confirmado pela distância na análise de similaridade. As práticas e estratégias que as mulheres desenvolveram apontam para um empoderamento solidário e coletivo, ainda que inconsciente.

Palavras-chave: Conhecimento rural; Caracterização local; Gênero.

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Introduction

Popular knowledge refers to the multiple sets of knowledge produced by men and women obtained from observations, formulation of hypotheses and generalization, and produced in solidarity (Chassot, 2000; 2003). It involves knowledge that people from certain communities or places acquire from lived experiences and "pass on" to future generations, that is, from parents to children (Mahfoud, 1996), which can also circulate among people of the same community.

The knowledge acquired through life experiences is important for maintaining the culture of traditional populations; however, this accumulated knowledge is not transmitted to children through genes, as stated by Dawkins (1976) in his studies. An important point to be highlighted is that the literature has been discussing and underscoring that the knowledge built, improved and transmitted in human populations can be tied to several factors, such as sexual division of labor, economy, and psychological factors (Voeks, 2007; Reyes-Garcia et al., 2009; Medina et al., 2011), culture and life experience (Ross et al., 2003; Ladio and Lozada, 2004; Voeks, 2007), and ecological

conditions of the environment (Ladio and Lozada, 2004). In addition to these, some authors also indicate other factors that can interfere in the dynamics of the construction of local knowledge, such as gender, age (Garro, 1986; Begossi, 2002), kinship (Ohmagari and Berkes, 1997), and bilingualism (Villagran, 1998). This information is important when considering the assessment of the empowerment of peasant women and the importance of their daily experiences in this cultural, social, and even economic context.

In this context, ethnobiological and ethnoecological studies can contribute to the recording and maintenance of traditional knowledge, preventing the loss of the interaction between people, plants, and empirical knowledge (Batista et al., 2022). This interaction is important because, through it, part of a community's cultural heritage is rescued, considering that knowledge is built in the relationships with the nature that surrounds the community (Meyer et al., 2012).

Within the cultural heritage of rural communities, there is a vast amount of knowledge built by women that has played an essential role throughout history in the productive stages, harvesting, cultural treatment, and care with planting. However, they remain on the sidelines of decisions and their work is not formally recognized in its real potential. In this context, there is an urgent need for women's participation and empowerment. Women have developed important skills and knowledge (Cembranos et al., 2011) that can favor such a mechanism and the possibility of autonomy, since empowerment is what may be closer to the notion of autonomy, as it refers to the ability of individuals and/or groups to decide on issues that affect them (Batliwala, 1997).

According to Moreira et al. (2012), the objective of female empowerment is the achievement of new mechanisms of conviviality that disarticulate patriarchal relations and the dominant power of men, guaranteeing women control over their lives. However, most scientific research is still limited to indigenous, caiçara, and quilombola populations and rural communities, addressing the knowledge of peoples in general but without specifically valuing the female vision.

In this sense, analyzing the knowledge of women in different contexts, in addition to favoring their empowerment, can be an alternative for understanding the relationships of the various existing communities, such as those surrounding Conservation Units (CUs). For Drummond et al. (2009), the involvement of women in the shared management of CUs has proved to be of great importance for the long-term success and permanence of this type of initiative.

Worldwide, ethnobotanical studies emphasizing the gender perspective are incipient, although they have been conducted on four continents. The study by Srithi et al. (2012) in Asia and Reyes-García et al. (2010) in Europe are noteworthy. However, Brazil (Voeks, 2007; Merétika et al., 2010; Albuquerque, 2011) and Mexico (Camou-Guerrero et al., 2008; Estrada-Castillón et al., 2012; Beltrán-Rodríguez et al., 2014) stand out on the American continent, and Ethiopia (Ayantunde et al., 2008, Dovie et al., 2008; Müller et al., 2014) in Africa, providing most of the works found, all of them related to medicinal plants. The present study analyzes the popular knowledge about all categories of plants in the surroundings of a CU from the female perspective.

In this context, Ethnobotany can contribute to women's empowerment in rural communities based on the recording and valuing of traditional knowledge and practices developed by women who live in these spaces. In light of the above, the following questions were raised: Do socio-environmental conditions and traditional knowledge influence women's empowerment? What factors influence the knowledge and use of plants by women in rural communities? The hypothesis was raised that female empowerment is present in rural communities despite the various factors that pose a barrier to it.

Considering the above observations, this work aimed to register and analyze the popular knowledge of women about wild plants, as well as portray the socioeconomic, cultural, and religious context in which they are inserted, analyzing how this knowledge and characteristics are related to the process of female empowerment.

Methodological procedures

Study area

The study was carried out in the buffer zone (BZ) of the Sete Cidades National Park (PNSC) in Piauí. This CU was created by Federal Decree 50,744 of 1961 (Brasil, 1961) in the Northeast of the State of Piauí, into the Municipalities of Piracurura and Brasileira (Figure 1) whose seat is located at coordinates 04° 02' 08" S and 41° 40' 45" W. Inserted in the Sedimentary Basin of Parnaíba, in the Mid-North of Piauí/Maranhão. Soil and climate variations in the area allow the occurrence of different vegetation types, with distinct physiognomies and flora, causing the territory to be an ecological transition zone between Cerrado and Caatinga, with a predominance of physiognomic types belonging to the Cerrado biome, distributed in forest, savanna, and grassy field types (Oliveira et al., 2007). The PNSC has an area of 6,221.48 ha and an irregular water regime (Castro et al., 2002). The climate of the area where the CU is located, according to Köppen's classification, is characterized as hot sub-humid (Aw'). The mean annual temperature is 26.5 °C, with mean maximum of 28.1 °C in October, and minimum of 25.5 °C in June, and the mean annual rainfall is 1,558 mm, more concentrated in February, March, and April (Oliveira, 2004).

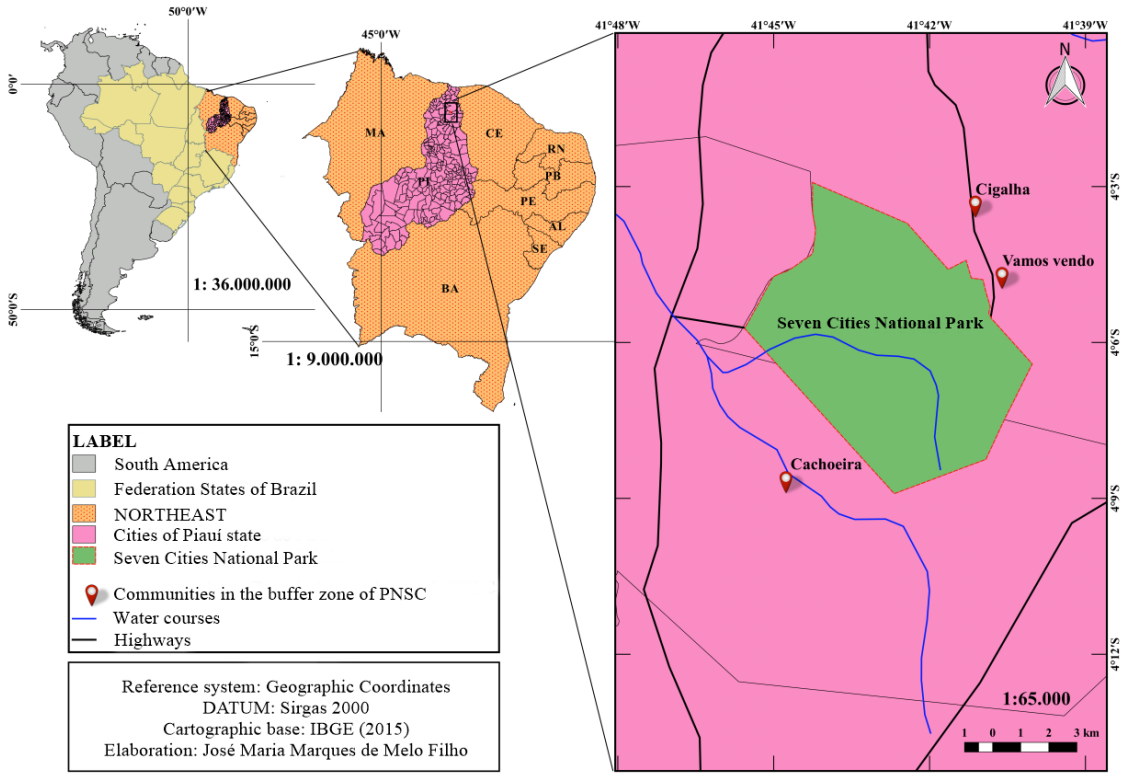

Figure 1. Location of the Sete Cidades National Park, Piauí/Brazil, and the Vamos Vendo and Cigalha (Piracuruca) and Cachoeira (Brasileira) communities. Organization: IBGE (2010), modified by José Maria Marques de Melo Filho, in 2019.

Data collection

Data collection took place in the Rural Communities Vamos Vendo, Cigalha, and Cachoeira, which were selected to represent the two municipalities in which the park is located and because they have the largest number of residents. The Cachoeira Community has 23 residences, (04° 08' 31.06'' S and 41° 44' 45.09'' W) and is approximately 6 km from the seat of the Municipality Brasileira. The Vamos Vendo Community (4° 04' 35.81" S and 41° 40' 36.38" W) and the Cigalha Community (4° 03' 13.39" S and 41º41'07.20" W) have 12 residences each. Both belong to the Municipality of Piracurura and are 20 and 17 km away, respectively, from the municipal seat. The residents of the two communities have a close relationship because they share practically the same living space, as they are geographically very close.

Methods and techniques

The research was submitted to the Research Ethics Committee (REC) of the Federal University of Piauí (UFPI), approved and embodied under number 2,689,570, with SISGEN registration number AB6672E, and had collection authorization in SISBIO number 7154425. The residents of the communities who accepted the invitation to participate in the research, after explicit explanation, signed the Informed Consent Term (ICT).

The first meetings with the communities were carried out using the Rapport method (Bernard, 1989) with the help of the community health agent of the communities and one of the touristic guides of the PNSC. The sample universe of the research consisted of 40 female residents corresponding to 100% of the residents of the chosen communities, following the recommendations of Begossi et al. (2004). Of these, 22 were from the Cachoeira, 11 from the Vamos Vendo, and seven from Cigalha.

Data collection was carried out monthly with the aid of a form with open and closed questions and semi-structured interviews (Bernard, 1988), covering socioeconomic, cultural, environmental, and ethnobiological information. The socioeconomic and cultural form presented the following structure: identification, location, and socioeconomic data (family composition, age, sex, marital status, education, income, housing, sanitation, mystic-religious information).

As for age, there were three groups based on the definition of the IBGE (2010): young people (between 18 and 24 years old), adults (between 25 and 59 years old), and elderly people (60 years old and over). This form model, according to Ditt (2002), gives the interviewees the opportunity to make statements and at the same time allows the researcher to attribute scores to the answers. Data referring to cultural practices were cataloged through observation, notes, and a photographic record made by the researchers. The Free List method (Albuquerque and Lucena, 2004) was used for the ethnobotanical surveys.

To diagnose the sharing of knowledge about wild plants, a cluster analysis was used based on education, time of residence, and age group (Q mode) with binary data (1 and 0) of the species mentioned in each criterion. This analysis was performed using the NTSYSpc v.2.10t software (Rohlf, 2000). The clustering method used was Single (simple clusters) and the Dice-Sorensen coefficient ofsimilarity.

Results and discussion

Socio-environmental context

The women from the communities studied around the PNSC are part of families mostly composed of father, mother, children and, in some cases, relatives (son and daughter-in-law and grandchildren) aged between 18 and 71 years. As for marital status, most (80%) of the respondents were married or common-law married and had children. As for the age group, it was found that the majority (45%) were adults, followed by young

(37.5%) and elderly (17.5%) people. The higher percentage of adults was likely related to the fact that young women are migrating from rural areas in search of better education and employment.

The women face problems similar to those seen in the reality of rural communities in Northeast Brazil, which hinder the process of empowerment of these residents. For Noce and Ferreira Neto (2016), rural poverty is striking in underdeveloped and developing countries and is a reality in much of the world. However, all over the World, unlike men, women play a key role in these communities because they are the first to notice problems (Shonsey et al., 2012), as they face the difficulties more directly.

The problems faced by these women are common to all in rural communities in Northeast Brazil. As Noce and Ferreira Neto (2016) explain, rural poverty is striking in underdeveloped and developing countries, representing a reality that occurs in much of the world. Although this hinders the process of empowering of these women, for Shonsey et al. (2012), all over the world, women and not men are the ones who play a key role in these communities because they are the first to perceive problems.

Women experience a peculiar situation: their homes are located in the BZ of a protected area where human activities are subject to specific rules and restrictions in order to minimize negative impacts on the CU, according to the National System of Conservation Units (Brasil, 2000). Despite this, all of them own their houses, which have structures that follow a pattern common to the rest of the country, namely, houses covered with tiles, mostly (67%) with brick walls and cemented floors.

These residents live in situations of social vulnerability similar to those seen in the rest of rural communities in the Northeast of Brazil. They have electricity and cell phone network, but face problems such as lack of leisure spaces, lack of basic sanitation, insufficient public transport, poor public health assistance, low education, low income, among others. Grisa et al. (2017) state that the Brazilian rural environment is still characterized by limited conditions of basic infrastructure.

Plenty of literatures have shown that the conditions above described are not different in communities established around protected areas, with small differences from region to region. However, this fact is not associated with the protected area, but with the regional context itself. For example, results showed less favored situations in the study carried out by Arshad et al. (2017) in four rural communities around the Khirthraz National Park in Pakistan and in the work carried out by Coetzee and Nell (2019) in two rural communities around the Mokala National Park in South Africa. The infrastructure conditions in those places are below those found in the present study, such as the largest number of people without assistance, especially in relation to water supply, electricity, education, and health.

However, the reality is quite diverse in other studies carried out in communities living around protected areas in Brazil. This is because regional differences reflect a variety of socio-environmental conditions; yet, deficiencies in the health and education sectors are present throughout the countryside of Brazil. These differences can be observed in studies carried out in communities around the Southern and Southeastern CUs, as in the work carried out in Santa Catarina by De Luca (2014) around the Serra Furada State Park and by Pradeiczuk et al. (2015) in five communities around the Araucárias State Park; and in the state of Rio de Janeiro by Hamilton Filho et al. (2016) in a community around the Serra dos Órgãos National Park, whose infrastructure is better than that found in rural communities from Northeast Brazil.

Contextualizing the quest for empowerment

The absence of basic infrastructure affects all residents, but especially women, as many of the socio-environmental conditions to which they are subject (Table 1) hinder the process of empowerment. However, women are the ones who play a key role in these

communities all over the world because they are the first to perceive problems (Shonsey et al., 2012). Their knowledge to face these problems is also fundamental, as in most cases they solve the problems, find alternatives to develop their activities and face the most different adversities, as they have their homes as the most important space to work, and they are the ones who carry out daily maintenance and organization activities.

Table 1. Socioeconomic profile of the studied residents in the rural communities of Cachoeira (Brasileira), Vamos Vendo, and Cigalha (Piracuruca), Piauí.

Criteria analyzed	Parameter	Percentage
Age	Young	37.5%
	Adult	45%
	Elderly	17.5%
Family income (minimum wage)	0-1/2	35%
	1/2-1	27.5%
	1-2	12.5%
	2 or more	10%
Time of residence in the community (years)	0-10	22.5%
	11-20	37.5%
	21-30	17.5%
	31-40	5%
	41 or more	17%
Religion	Catholic	80%
	Evangelical	20%
Schooling	Illiterate	25%
	Complete elementary school	37.5%
	Complete high school	35%
	Incomplete university education	2.5%
	Complete university education	2.5%
Professional activity	Housewife	20%
	Housekeeper	10%
	Housekeeper/student	2.5%
	Farmer/housewife	55%
	Student	7.5%
	Receptionist	2.5%
	Health agent	2.5%
Number of children	0	32.5%
	1-3	35%
	4-6	22.5%
	7-10	10%

Women perform various tasks such as cleaning, including weeding in the surroundings of their homes, since roads are not tarred or paved in any way. Garbage disposal is another activity carried out by women in Cachoeira, where there is no garbage collection service; so, they are responsible for the destination of household waste. The lack of these services is a negative factor for women, making them perform exhausting functions on a daily basis to cover this need (Stevenson et al., 2012; Caruso et al., 2015; Hulland et al., 2015).

The communities do not receive treated water. Water supply is carried out through hydraulic pipes with direct intake from tubular wells managed by the city halls, reaching the residences without prior treatment. The purification of this water is done, for the most part (54%), through the filtering process that is often carried out using clay filters improvised by the women. Generally, in case of absence of water, they are the ones who

move to supply their homes. Several studies show that, in places where water is a scarce resource, women and adolescents play the main role in domestic supply, management, and protection (Campos, 2010; Lisboa et al., 2010; Reddy et al., 2011; Shonsey et al., 2012; Kevany et al., 2013). All over the world, women are the first to notice when the water they cook or bathe their children starts to become scarce and/or undergoes other changes (Seager, 1993). Chifamba (2014) and Brewster et al. (2006) consider that women have accumulated significant knowledge about water, including several aspects about sources, quality assessment, and storage. This is due to the fact that they have a closer relationship with these resources.

They also face the difficulties generated by the absence ofa sanitary sewage system, with disposal of wastewater directly into the soil, which in many cases is reused by them in horticultural beds. As for the destination of human excreta, only 24% use the septic tank systems in bathrooms indoors. The absence of bathrooms in most of the residences of the women is a problem; they have to go to the more closed portions of the forests to meet their physiological needs, causing, in many cases, embarrassment due to the lack of privacy. They also need to redouble the care to avoidthe risk of contamination of their children. The inexistence of this service directly affects women, as they are responsible for the care and treatment of family members when they are affected by contaminations related to the environment (Mellor, 2000; Brewster et al., 2006).

According to Sahoo et al. (2015), in rural areas, women, and especially children and adolescent girls, live under high levels of social stress due to lack of privacy. Some studies carried out in rural areas of developing countries show the lack of privacy as a determinant of psychosocial stress in women (Wutich, 2009; Stevenson et al., 2012; Hirve et al., 2015; Hulland et al., 2015).

Regarding health-related aspects, these residents have their needsunmet because only one of the communities (Cachoeira) have a Health Post. Medical care is offered on a monthly basis, restricted to basic services provided by the Family Health Program (FHP) and regular monitoring of health agents in their homes. The latter carry out disease prevention and health promotion activities through educational activities and guidance to families. In cases of more serious situations, the residents need to go to the seat of their respective municipalities or to the capital of the state. However, these protagonists generally solve the simplest health problems using folk medicine, since they use natural recipes for themselves and for other family members. This is probably due to the fact that plants are the main source of raw material for the production of homemade medicines, and because, according to Viu et al. (2010), women are responsible for the health and food security of the family, especially in rural areas where conservatism is still deeply rooted in the culture and family institution.

As for the level of schooling, it was found that these women had no permanent access to education, had very low levels of education, as 31.7% had no schooling, 37.5% had primary education, 35% had complete high school, 2.5% had incomplete university education, and only 2.5% had complete university education. This is probably due to the lack of schools in the communities. However, they had interest in keeping their children inserted in the educational process with public transport to take the children tothe school in the municipal seat. This is a reality changed by the implementation of government programs aimed at guaranteeing access to basic education.

Low salary levels were found. Only 35.0% of the women gain only half a salary. The vast majority (89.0%) complements their livelihood with income from benefits provided by the Federal Government; 30.7% of them receive a family allowance, which facilitates the survival of these women and their children. For Altieri (2012), support policies must be designed aiming at the empowerment of rural communities, based on the real use of local resources and traditional knowledge, for effective food security and autonomy of these peoples in an environmentally sustainable way.

The fact that they are beneficiaries of the Family Grant (Bolsa Família) program has also contributed to women's empowerment in the communities, as they perceive themselves as capable of solving different daily demands of their homes, such as the purchase of products from urban centers and access to industrialized food and medicine. This source of income is essential and sometimes the only one these women can safely rely on. According to Moreira et al. (2012), holding the Family Grant card provides autonomy and self-esteem to women, as most of them have never had access to banking procedures, like opening an account or visiting a bank branch. According to this author, this factor values and legitimizes women as citizens. According to the Ministry of Social Development (Brasil, 2015) the program aims to overcome poverty and ensure commitments to education and health.

However, these women perform - alone or with the men of the family - activities that provide them with other sources of income or provide them with possibilities of survival. The majority (55%) develop subsistence agriculture, cultivating small plantations on land close to their homes and in their backyards. They plant mainly the following cultivars: beans (*Phaseolus vulgaris* L.), rice (*Oryza sativa* L.), corn (*Zea mays* L.), cassava (*Manihot esculenta* Crantz), pumpkin (*Cucurbita pepo* L.), okra (*Abelmoschus esculentus* Moench), and watermelon (*Solanum palinacanthum* Dunal). For Valadão et al. (2006) agricultural activities practiced in rural areas are essential for the survival of local communities. This is corroborated by Oler and Amorozo (2017), when they state that the cultivation of plants for self-consumption has an important economic function as it ensures greater autonomy and the surplus can generate extra income.

In addition to the activities described above, income comes from public jobs in the case of some women, as they are public servants. Others carry out other basic activities of relevance to the economy such as fishing, extensive raising of small animals (chickens, pigs, goats, and sheep) and extraction of carnauba straw (*Copernicia prunifera* (Mill) HE Moore), which in the Cachoeira community is used to extract powder for sale to companies based in neighboring municipalities. In the Vamos Vendo and Cigalha communities, this extraction is also used for the production of handicrafts (hats). They also develop the collection of cashew (*Anacardium occidentale* L.) nuts and the extraction of babassu coconuts (*Attalea speciosa* Mart. *ex* Spreng) to remove the almond from which oil is produced and extract the straw for production of broomson a small scale, and use of the fruit's pericarp for the production of charcoal.

All the mentioned activities are economic factors that maintain part of the livelihood of the families of the interviewees, representing a phenomenon of pluriactivity. This is understood by Gaspari et al. (2018) as the combination of agricultural and non-agricultural activities. Staduto et al. (2013) comment that through pluriactivities, women can become important social actors active in the development of their community, as they can reduce the current trend of migration to cities and the worrying gender imbalance in the population of rural areas.

Regarding this aspect, it was verified that some of the women live a situation in which their husbands move to big cities as a result of changes in climatic seasonality, usually in periods of intense drought. According to El Hinnawi (1985), this characterizes them as environmental refugees, the name given to people who are forced to leave their places, either permanently or temporarily, due to the impoverishment of the environment. In this context, women assume full responsibility for the home and the family. Although the husbands send part of their wages, regardless of whether the amount received is sufficient or not, women are the ones who manage the expenses as well as the resolution of any financial or psychosocial situation.

In this context, according to Fonseca (2010), while husbands are away, often for an indefinite period, women assume the roles of providers (administering the whole family structure), heads of the family, and rural workers at the same time.

With regard to cultural aspects, women actively participate in commemorative events such as parties, sporting championships, fisheries, festivals, and especially in events promoted by the management of the PNSC, among others. The religious aspects are important in the lives of these residents. They actively participate in the activities carried out during the year and all those who declare to be Catholics cited prayers (Our Father and Hail Mary) as a form of protection. For Tuan (1980), religion is present in human life in various degrees and in all cultures. Religion is considered by the author as a universal trait.

Local knowledge about wild vegetation

As for the knowledge and use of wild vegetation by the residents, it was found an expressive number of citations during the application of the free listing method. They represented 70 wild tree/shrub species with their respective categories of use. The relationship between the knowledge of these women about wild plants and the level of education, length of residence in the communities, and age group was analyzed (Table 2).

Table 2. Relation between knowledge about wild plants and level of education, length of residence in the communities, and the age group of the residents studied in the Rural Communities Cachoeira (Brasileira), Vamos Vendo, and Cigalha (Piracuruca), Piauí.

Analyzed criteria		Parameter			
		Interviewees	Citations (%)	Mean of citations	Species cited
Schooling	Unschooled	10	209 (39.88%)	20.9	55
	Schooled	30	315 (60.12%)	10.5	58
Age	Elderly	7	134 (25.57%)	19.14	45
	Adult	21	307 (58.58%)	14.62	63
	Young	12	83 (15.83%)	6.91	24
Residence in the community	0-10	9	73	8.1	30
	40-or more	7	147	21.0	45

It was found that the level of schooling was not associated with traditional knowledge, as women without schooling cited triple the number of species of that cited by all women with other levels of education. As for age groups, it was observed that elderly women had greater knowledge than adult and young women: more than half of the plants mentioned by the informants in the three communities were indicated by elderly women and only 10% by young women. Age group has been discussed in relation to traditional knowledge, and several studies affirm that knowledge about plants is mostly concentrated in older people (Hanazaki et al., 2000; Fonseca-Kruel and Peixoto, 2004; Arias Toledo et al., 2007; González et al., 2011; Campos et al., 2015; Messias et al., 2015).

However, not only the concentration of knowledge in certain older age groups should be discussed, but also the factors that favor this trend. Different arguments have been used, such as lack of interest on the part of young people in this knowledge, rural exodus, and economic and cultural pressures outside the community (Merhy and Santos, 2017). However, another factor that may have an influence, in the case of young people in these communities, is the limitations these residents are subjected to due to the fact that they live in the BZ of a CU.

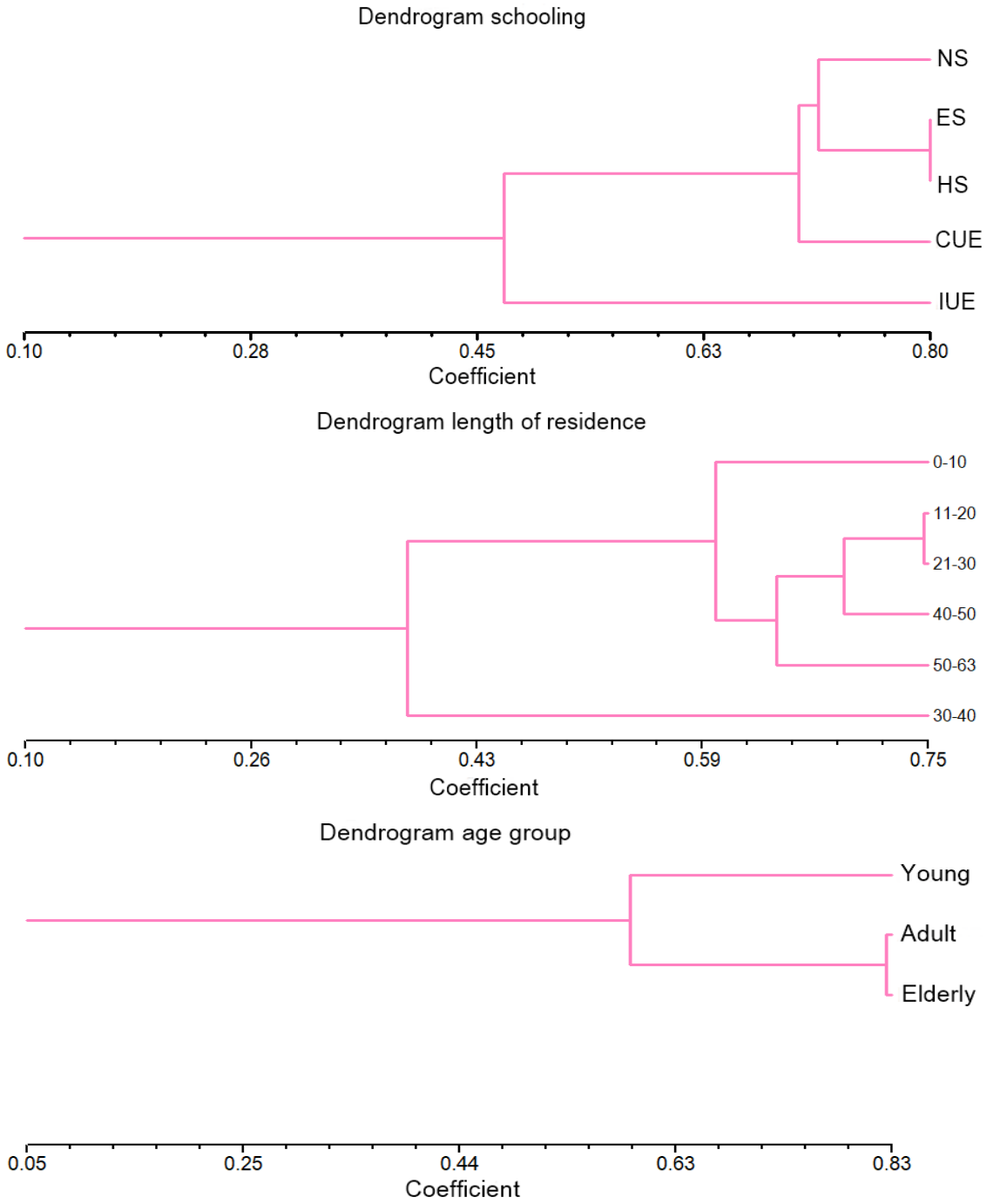

Figure 2. Dendrogram (grouping analysis, cluster), with binary data of plant species cited according to schooling, length of residence, and age of respondents in rural communities of Cachoeira (Brasileira), Vamos Vendo, and Cigalha (Piracuruca), State of Piauí. Legend: NE = non-schooled; ES = Elementary school; HS = high school; CUE = completed university education; IUE = incomplete university education.

As for the relationship between knowledge and length of residence, there was a confirmation of the age factor. When analyzing staggered time intervals of 10 years, an increase in the mean number of cited species was observed: women who lived for more than 40 years in the communities cited more than twice the number of those whohad lived

for 0-10 years. These data must be associated with decreasing use and lack of interest in traditions related to plantson the part of young women which shows, according to Zuchiwschi et al. (2010), the correlation between use of species and knowledge and the differences between generations.

However, these data are worrisome with regard to the decrease in the transmission of knowledge. For Pereira and Diegues (2010), in the absence of effective alternatives for the protection of nature, the appreciation of traditional knowledge emerges as an alternative capable of assisting in preserving the remaining natural areas, as it is the case of the studied communities.

In this context, it must be highlighted that holders of traditional knowledge make available their counseling skills and their knowledge, which are undervalued and forgotten in our society (Fonseca, 2011) and this implies the risk of behavioral changes in future populations. For this author, we can associate empowerment with wisdom in old age since wisdom involves the ability to recognize and use resources, being characterized not only by reflective or analytical skills but also by an accurate pragmatic knowledge about day to day life, which also allows for the proper management of the available resources.

In this sense, despite their low educational level, elderly women in these communities can be great allies of scientific knowledge, and the transmission of knowledge between generations is very important. According to Liporacci and Simão (2013), knowledge is transmitted mainly by mothers and grandmothers, allowing it to be passed on and learned over time.

A dendrogram was created (Figure 2) of the similarity between knowledge sets based on data of the species mentioned, schooling, length of residence, and age group.

There was a similarity related to knowledge and schooling among women who attended elementary and high school and among women who lived in the communities for 11-20 and 21-30 years. These similarities were centered on the knowledge of younger women who lived in the communities for at most 30 years, corresponding to those who attended elementary and high school, which made their knowledge more similar regarding the criteria studied. As for age group, it was observed that there was a similarity between the knowledge of adult and elderly women, who cited a higher number of species, lived longer in the communities, and many had no schooling.

Final considerations

The women investigated in the communities surrounding the PNSC are inserted in highly vulnerable socio-environmental conditions, as it is common in rural communities in Northeastern Brazil.

The analysis of knowledge associated with the established criteria related to the use of wild plants showed that knowledge is not centered on the level of schooling, but rather on the longer time spent living in the communities and on older women, confirmed by their distance in the analysis of similarity of knowledge.

As for female empowerment in these spaces, it is possible that there is a difficulty in assimilating it from the perspective of the traditional academy. The image evoked when talking about female empowerment is still mostly white and urban, based on the possibility of access to higher education and rise to a position of power that has traditionally been occupied by men. However, associating empowerment with this single version and then taking it as a universal measure is not only fallacious but also dangerous.

In this sense, despite the numerous factors that hinder the perception of the empowerment of women, the significant number of practices and strategies developed based on knowledge about the use of plants among many other types of knowledge

historically constructed in the daily lives of these women indicates that there is a factual empowerment, even though the women are not aware of it.

They are also empowered when placed in the position of heads and providers for their families and whenever they participate in productive and organizational activities, which contribute to the discussions, and make use of the knowledge, technologies, and processes existing in the community.

Therefore, it is also suggested that they are empowered in different degrees and in different aspects as their knowledge is used to solve problems and situations of the most diverse natures.

Empowerment should not be seen only as an intrapersonal but rather as a collective action, so that its effects can reach the entire community, especially in spaces related to environmental protection. This is because it is necessary that in these spaces the populations involved are aware of their rights and responsibilities so that protection mechanisms are strengthened and the communities can be empowered, engaging in conservation objectives in a conscious and sustainable manner.

Conflicts of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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