

Use of medicinal plants and socioeconomic evaluation of urban and rural populations of Sobradinho (DF-Brazil)

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Abstract

It is known that the use of medicinal plants can improve health, and their study in Brazil is promising due to their floristic megadiversity, mainly in Cerrado, where several traditional populations live, and many endemic species can be found. From data obtained through interviews, this research recorded the medicinal plants used by 40 residents of urban and rural areas of Sobradinho (DF), situated in Cerrado, and evaluated their socioeconomic profiles. Rural women had a greater knowledge about medicinal plants. Most of the urban population had a full college education, while most of the rural population had not completed their basic education. Although the urban population also used literature, the main source of knowledge came from family members. The level of ethnobotanical knowledge was vast in Sobradinho and similar in urban and rural areas, where the interviewees cited 86 names of medicinal plants that corresponded to 126 species, of which 56.35% were native to Brazil and 43.65% exotic. All of the species were categorized into 48 botanical families, with Asteraceae, Lamiaceae and Fabaceae being the most cited, respectively. Although they knew many native species of medicinal plants, the population used more exotic ones, such as mint, lemongrass and boldo to treat conditions such as stress, flu and indigestion, respectively.

Keywords: Cerrado. Ethnobotany. Exotic medicinal plants.

Introduction

Medicinal plants have therapeutic properties that can be used in the manufacture of chemicals or drugs (VEIGA-JÚNIOR et al., 2005). Medicinal plants have been widely used in popular medicine because they are considered natural (SIMÕES et al., 1998) and cheaper than pharmaceutical drugs (FIGUEREDO, 2013). They have been used by the Unified Health System of Brazil (SUS, Sistema Único de Saúde in Portuguese) since 2007 (MINISTÉRIO DA SAÚDE, 2016), indicating greater social importance (FIGUEREDO, 2013).

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The study of medicinal plants in Brazil is promising due to their floristic megadiversity (GUERRA; NODARI, 2003), which includes numerous medicinal species (FIGUEREDO et al., 2014). The country is also different physiographically contrasting biomes with great biological wealth, high endemism and vast ecological complexity. For example, Brazil has the largest rainforest, the Amazon Rainforest, the largest floodplain, Pantanal, and the most diverse savanna, Cerrado, in the world (MINISTÉRIO DO MEIO AMBIENTE, 2010).

Cerrado has 10,000 species of plants (MEYERS et al., 2000), with 44.0% being endemic (SILVA-JÚNIOR; BATES, 2002). It is considered the second largest biome of South America, comprising 10 Brazilian states and the Federal District (Distrito Federal - DF) (SANTOS et al., 2010). According to Ribeiro and Walter (1998), Cerrado is a vegetation complex, consisting of grasslands to forest. Despite its biological and social importance, given that several traditional communities depend on its natural resources to survive, Cerrado is being destroyed by human activities (CAVALCANTI; JOLY, 2002). Therefore, it is vital to preserve it because its degradation is causing loss of biodiversity and of medicinal species (PAGOTTO; SOUZA, 2006). In order to decrease the destruction of Cerrado, it is necessary to economically appreciate its environmental worth (CAVALCANTI, 2005; DELGADO et al., 2019), such as in the bioprospection of native medicinal plants. Nevertheless, the collection of native medicinal plants is extensive and, at times, irresponsible (FRANCO; BARROS, 2006), since it may cause their extinction (BORGES-FILHO; FELFILI, 2003; BAVARESCO et al., 2016). Therefore, research of native medicinal plants should be based on agroecology principles, such as the rational use of biodiversity, the conservation of traditional knowledge (SILVA et al., 2007) and the socioeconomic development of the end users of medicinal plants (BORSATO et al., 2009). Thus, investigations like this study can and should be conducted in Distrito Federal.

Sobradinho is an administrative region of DF founded in 1960 (ANUÁRIO DO DISTRITO FEDERAL, 2014). Of its population, 52.81% were born in Distrito Federal, and 47.19% are immigrants from other Brazilian states, mainly Minas Gerais, Goiás, Bahia and Piauí. In total, 45.5% are men and 54.55% are women (PDADDF, 2015). Sobradinho has four green parks (Parque de Uso Múltiplo Centro de Lazer e Cultural Viva Sobradinho, Parque Ecológico dos Jequitibás, Parque Ecológico e Vivencial de Sobradinho and Parque Recreativo e Ecológico Canela de Ema), some of which have Cerrado vegetation (INSTITUTO BRASÍLIA AMBIENTAL, 2012). Because its population has heterogeneous origins (GOMES et al., 2015) with easy access to remnants of natural vegetation (MESSIAS et al., 2015), as Cerrado, the hypotheses of our study were the following: (1) the population of Sobradinho has a high level of ethnobotanical knowledge, (2) especially its rural population, who are likely to have more contact with the cultivation of medicinal plants and flora resources.

Therefore, our objectives were to perform an ethnobotanical study of medicinal plants used and known by the population of Sobradinho (DF - Brazil) and to compare socioeconomic characteristics and the ethnobotanical knowledge of rural and urban residents of Sobradinho, in different areas of that administrative region, in order to analyze whether the knowledge was more rural, urban or equally widespread.

Material and methods

Ethnobotanical research

This research proposal was submitted to Plataforma Brasil (Process number: 56011516.6.0000.5650) and evaluated by the Comitê de Ética do Centro Universitário do Distrito Federal (CEP-UDF).

Potential respondents were determined by the “snowball” technique, that is, connoisseurs of medicinal plants indicated other connoisseurs (ALBUQUERQUE et al., 2010). Only those who signed the informed consent form (ICF) were interviewed. In these cases, a copy of ICF was given to the interviewee and the researcher kept the original. In total, 40 people were interviewed, all of them adults, 20 of whom were urban and 20 rural residents. The interviews were conducted from August 2016 to February 2017. The number of 40 interviewees is considered high for ethnobotany research, since many other important studies have smaller sample size than it (OLIVEIRA et al. 2010; COSTA; MARINHO, 2016; PRADEICZUK et al., 2017).

The interviews were semi-structured with written questions (ALEXIADES; SHELDON, 1996), but also interactive since the interviewees could provide more detailed answers or relate some experiences if they desired (ALBUQUERQUE et al., 2010). The interviews dealt with social questions (place of birth, educational level, place of origin, etc.) and ethnobotanical knowledge (origin of knowledge, popular names of medicinal plants which have already been used by the interviewees, way of use, etc.).

Data analysis

The data from the interviews conducted in urban and rural areas were analyzed separately. After that, two lists of the medicinal plants used by the interviewees along their indications were done for each area. From the two lists, species and family of each medicinal plants were identified, using the popular names cited by the interviewees, photographs and literature (mainly, LORENZI; MATOS, 2008). The origin and spelling of species names, authors of species and family identification were confirmed using the Internet website “Flora do Brasil 2020 - em construção”, from Jardim Botânico do Rio de Janeiro (2017).

Quantitative analyses with percentages were calculated using socioeconomic and ethnobotanical data in order to evaluate differences between interviewees of urban and rural areas in relation to: (1) the number of men and women; (2) birthplace; (3) age group, such as young (18 to 19 years), young adult (20 to 39 years), adult (40 to 59) and elderly (over 60 years) (adaptation of Villaneuva (1987)); (4) education level, such as non-reader, incomplete primary education, primary education, incomplete secondary education, secondary education, incomplete college education and college education; (5) occupation, such as public worker, CLT worker, self-employed professional, student, retired, household worker; (6) origin of ethnobotanical knowledge, such as family, books and magazines, self-experience, other people, other sources; (7) the main collection site of the medicinal plants, such as nature, yard, gardens or market places; (8) the level of ethnobotanical knowledge; (9) the quantity of native or exotic species cited; (10) organ or part of the plant used to obtain the therapeutic effect, such as root, stem, bark, leaf, flower, seed, fruit or the entire plant) and (11) access to the public health service.

Statistical analyses were performed on the data: (1), (2), (3), (4), (5), (6), (7), (8), (9) and (10). The Chi square test was used to evaluate (1), (2), (3), (4), (5), (6), (7), (9) and (10) and Kruskal-Wallis (H) to test (8). All the analyses were performed using PAST 3.18 software (HAMMER et al., 2001), being α equal 5%.

Results and discussion

The total number of men and women who have knowledge about medicinal plants differed between rural and urban areas (Chi square test = 3.75; $p < 0.05$). In the urban area, the ethnobotanical knowledge was well distributed between males and females (TABLE 1). However, in rural areas women had the most knowledge (TABLE 1), which is understandable since woman have traditionally been responsible for matters of the family, such as food and health, since the dawn of civilization (BUDÓ et al., 2008).

Table 1 – Social data of interviewees from the ethnobotanical research carried out in the urban and rural areas in Sobradinho – DF (Brazil).

Social data		Urban area	Rural area	Sobradinho
	Men	11	5	16
	Women	9	15	24
Birthplace	DF	13	6	19
	Other states	7	14	21
Age group	Young (18 to 30 years)	5	4	9
	Adult (31 to 60 years)	14	12	26
	Elderly (over 60 years)	1	4	5
School level	Non-reader	0	1	1
	Incomplete primary education	0	6	6
	Primary education	0	5	5
	Incomplete secondary education	0	0	0
	Secondary education	1	4	5
	Incomplete college education	8	2	10
	College education	11	2	13
Occupation	Public worker	9	0	9
	CLT worker	3	5	8
	Self-employed professional	2	5	7
	Student	4	0	4
	Retired	1	2	3
	Household worker	1	8	9
Origin of ethnobotanical knowledge	Family	20	16	36
	Books and magazines	8	2	10
	Self-experience	1	2	3
	Other people	4	6	10
	Other sources	1	4	5
Teaches the knowledge	Yes	13	19	32
	No	7	1	8
Main place to collect the medicinal plant	Nature	8	6	14
	Yard or garden	12	17	29
	Market place	9	7	16
	Other sources	3	6	9

Social data		Urban area	Rural area	Sobradinho
Access to public health service	Yes	20	20	40
	No	0	0	0

N = 40 people, 20 from urban areas and 20 from rural areas.

Source: Elaborated by the authors (2020).

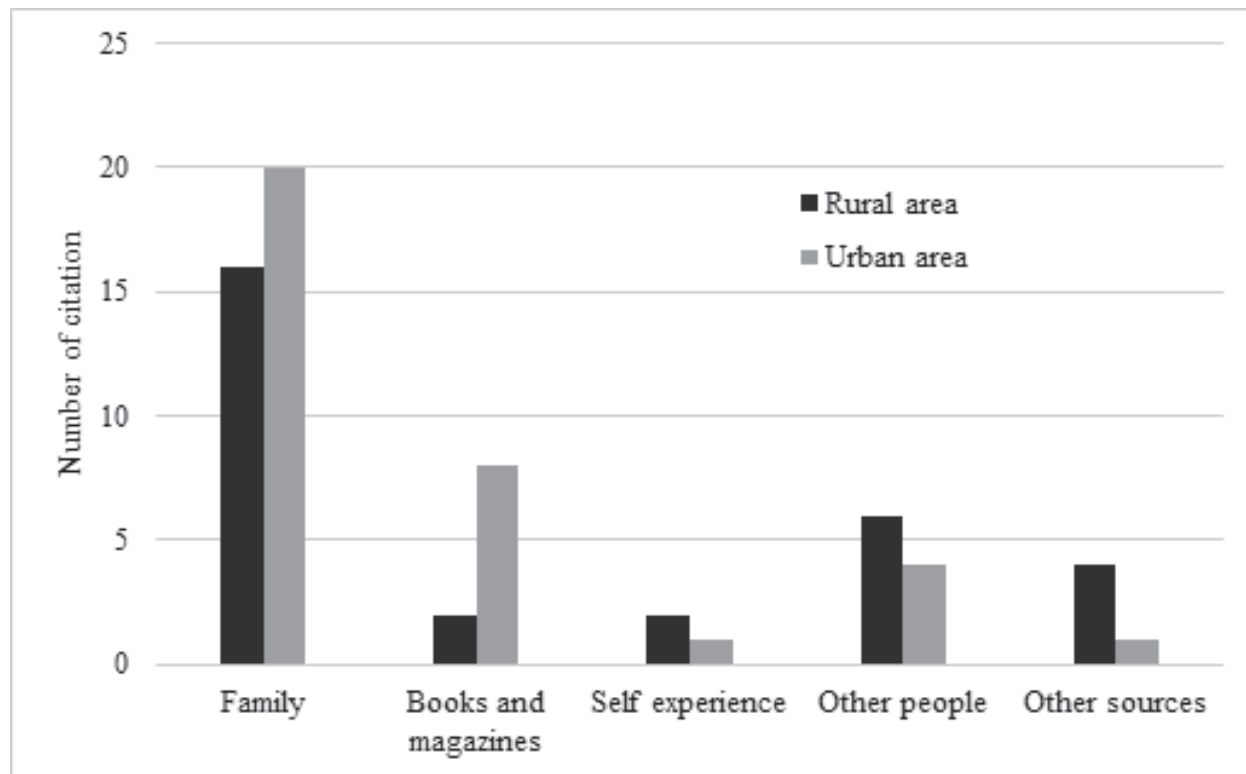
Interviewees differed in relation to birthplace when we observed urban and rural areas, because we observed that more interviewees from urban areas were born in DF; on the other hand, the majority of interviewees from rural areas were born in other states (TABLE 1) (Chi square test = 4.91; $p < 0.05$). These results show that the knowledge about medicinal plants in Sobradinho was amassed by the local community and people from other regions of Brazil. The incorporation of traditional knowledge from other states was expected because Brasília (DF) has received a great number of migrants since its establishment (PESQUISA DISTRITAL POR AMOSTRA DE DOMICÍLIO DO DISTRITO FEDERAL, 2015).

There was no difference in the age groups between urban and rural interviewees (TABLE 1) (Chi square test = 5.82; $p > 0.05$). For that reason, our result suggested that there was transmission of ethnobotanical knowledge among people of different ages, favoring its maintenance.

The level of education was different between people who lived in urban and rural areas (Chi square test = 30.93; $p < 0.01$), with a large proportion of urban population achieving a university education (TABLE 1), while most rural people had not completed basic education (TABLE 1). It suggested that both people who were less formal educated and more formal educated valued the knowledge about medicinal plants.

The interviewees also had several types of occupation (TABLE 1). Forty-five percent were public workers in urban areas, while 40% were household workers in rural areas. A correlation was observed between the ethnobotanical knowledge and the type of job. The public workers work in a farm-school that valued knowledge about medicinal plants, since they are professors of agrarian and biological areas. The household workers in rural areas, composed of only women, have an important role in family health care (2008), therefore, it was expected that they would be knowledgeable about medicinal plants.

There was no statistical difference regarding the origin of ethnobotanical knowledge between urban and rural areas (Chi square test = 6.35; $p > 0.05$). However, we could suppose that the main origin of the ethnobotanical knowledge was familial (FIGURE 1). According to Guerra and Nodari (2003), this method of information transmission has occurred for millennia. The interviewees also reported increasing their knowledge about medicinal plants through books and magazines, their own experiences and information shared with other people (MESSIAS et al., 2015). However, interviewees from urban areas were more interested in the literature than the residents of the rural areas (FIGURE 1). This finding had been expected because interviewees from urban areas had a greater engagement with formal studies than interviewees from rural areas.

Figure 1 – Origin of the ethnobotanical knowledge.

Source: Elaborated by the authors (2020).

Eighty percent, i.e. 32 interviewees (TABLE 1), taught their knowledge orally. This fact shows that people have pride in their knowledge of medicinal plants because people teach what they believe. Moreover, this fact also corroborates the maintenance of ethnobotanical knowledge (GOMES et al., 2015).

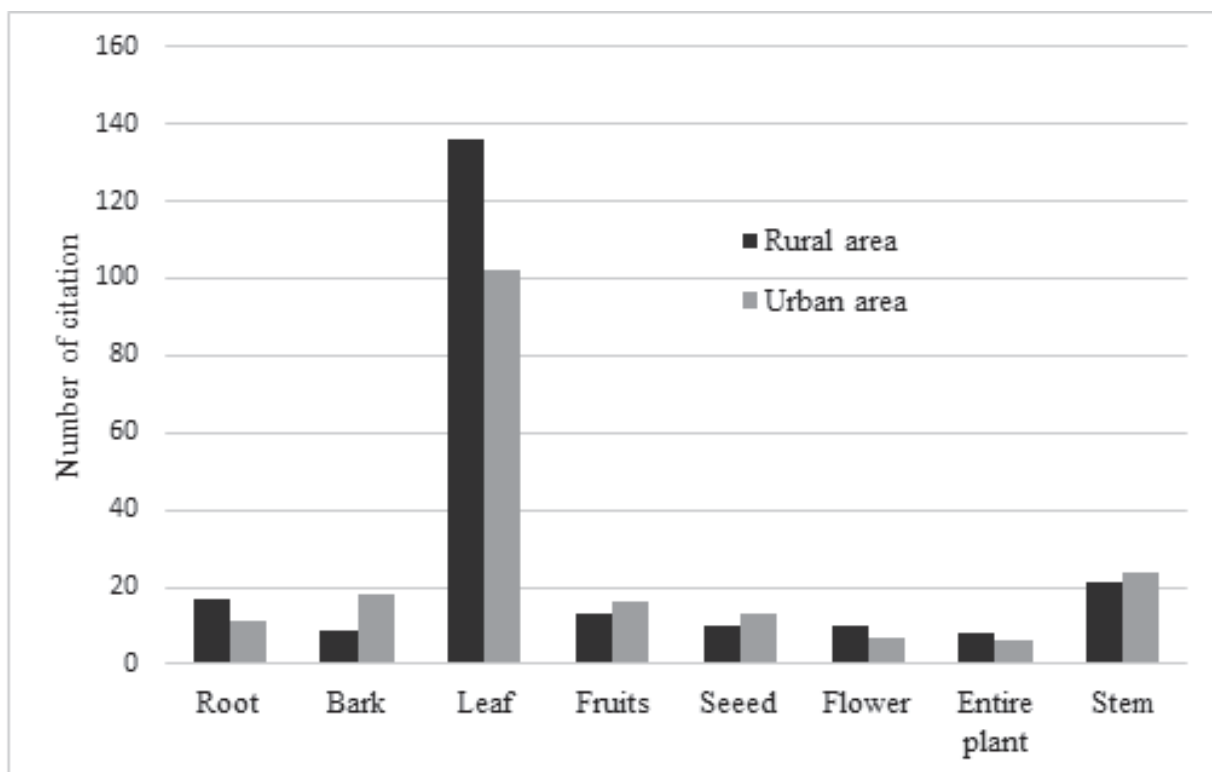
Most of the medicinal plants were cultivated in domestic yards (TABLE 1), being it more common in rural areas (Chi square test = 14.05; $p < 0.01$). This result is consistent with the type of houses found in Sobradinho, since its urban area is usually formed by houses with backyards and the rural areas are composed of many small farms. WinklerPrins (2002) states that urban backyards can be interpreted as a transition from rural to urban housing as they favor the practice of gardening and cultivation of medicinal and food plants and are important areas for maintaining agrobiodiversity.

The same people who cultivated medicinal plants in their gardens or yards also collected plants from nature or bought them in the market places. As we did not trace the origin of medicinal plants that were commercialized, it is possible that the sellers of medicinal plants also cultivate them in house gardens and/or collect them from nature, especially those native to Cerrado.

The collection of plants in the field had been expected, since Sobradinho has many green parks with wild vegetation (INSTITUTO BRASÍLIA AMBIENTAL, 2012). However, the vegetable extractivism needs to take place responsibly because it may cause a decrease in the native plant population, as it has already happened to barbatimão (*Stryhnodendron adstrigens*) (BORGES-FILHO; FELFILI, 2003) and sucupira-branca (*Pterodon* sp.) (BAVARESCO et al., 2016). Hence, it is necessary to teach correct and sustainable ways of vegetable extractivism in human settlements near areas of Cerrado in order to conserve native species.

The urban and rural areas did not differ in relation to the type of collected organ from medicinal plants (Chi square test = 9.17; $p > 0.05$). However, leaves were the most collected plant organs both in urban and rural areas (FIGURE 2), which has already been observed in other studies (GOMES et al., 2015; COSTA; MARINHO, 2016). Fortunately, leaf extractivism is considered the least damaging to the plant because it does not directly decrease the reproduction nor does it cause the plant to die, unlike the collection of roots, seeds, stems and bark.

Figure 2 – Collected organs from the medicinal plants.



Source: Elaborated by the authors (2020).

All interviewees had access to public health services (TABLE 1). The perpetuation of ethnobotanical knowledge, despite having access to SUS, must be due to the fact that many patients still want to be able to choose alternative forms of treatment (FIGUEREDO, 2013). Another reason could be limited access to drugs prescribed by doctors after the ambulatory service (FIGUEREDO et al., 2014), because the use of medicinal plants is cheaper than the use of pharmaceutical drugs (FIGUEREDO, 2013). The SUS incentive for the use of medicinal plants as an alternative to the primary health service (MINISTÉRIO DA SAÚDE, 2012) may be another reason to perpetuate this knowledge. Finally, there are many people who also use medicinal plants combined to other types of medication (FIGUEREDO et al., 2014).

Our study partially corroborated the tested hypothesis. The population of Sobradinho presented wealth knowledge about the use of medicinal plants, citing 86 popular names of medicinal plants from 126 species. However, the interviewees from rural and urban areas showed an equivalent level of knowledge ($Z = -1.504$, $p > 0.05$), which was contrary to our

expectations. Of the popular names mentioned by all the interviewees, 30 were exclusive to rural areas and 21 to urban areas. On the other hand, 33 popular names were cited in both areas. Therefore, 54 medicinal plants (64.29% of those mentioned) were reported in urban areas and 63 (75% of the plants cited) in rural areas.

Traditionally, the rural population depends more directly on nature to survive than the urban population (MARQUES, 2002). Therefore, it has long been thought that they may be more knowledgeable about medicinal plants than urban people. Likely, this hypothesis was not confirmed because the interviewees of the urban areas were mainly public worker specialists in environmental and agrarian fields. In addition, the urban area of Sobradinho has few buildings and many houses with small gardens or backyards, where the majority of medicinal plants are cultivated. Gardens and backyards favor the maintenance of ethnobotanical knowledge in urban populations (PRADEICZUK et al. 2017). Therefore, the knowledge about medicinal plants is widely diffused in Sobradinho, an extremely positive fact regarding its perpetuation.

The 86 popular names of medicinal plants corresponded to 126 species because there was more than one species for each popular name cited in most cases, which corroborates findings by Gomes et al. (2015). Of the 126 species, 71 were native to Brazil and 55 were exotic, that was considered equal in statistical terms (Chi square test = 0.002; $p > 0.05$). Around 10% of 71 native medicinal species were endemic to Brazil, with 78.87% restricted to Cerrado. These results demonstrate the richness of Cerrado flora for medicinal plants, reinforcing the importance of the valorization of the native vegetation since several species have pharmaceutical potential. For this reason, our research has a strong conservationist appeal since the interviews were conducted in the Cerrado, one of the most threatened biomes in the world (MEYERS et al., 2000), especially in the DF, where several land invasions by the human population are destroying the native flora of the region (SECRETARIA DE ESTADO DO MEIO AMBIENTE DO DISTRITO FEDERAL, 2017).

Our research identified 48 families of plants, with Asteraceae, Lamiaceae and Fabaceae being the most representative families with 22, 15 and 11 species, respectively. These families have been commonly cited in other studies (NETO; MORAIS, 2003; OLIVEIRA; LUCENA, 2015; GOMES et al., 2015), because they form considerably diverse taxonomic groups with high colonization ability, favoring their use by the human population (SOUZA et al., 2016).

The most commonly genera cited were *Mentha* (Lamiaceae), *Passiflora* (Passifloraceae) and *Qualea* (Vochysiaceae), with four species each, followed by *Baccharis* and *Mikania* (Asteraceae), *Bauhinia* (Fabaceae), *Pteridium* (Dennstaedtiaceae) and *Ocimum* (Lamiaceae), with three species each. From the analysis of these genera, the dominance of Asteraceae, Fabaceae and Lamiaceae was once again observed.

However, despite an expertise regarding native medicinal species, the population of Sobradinho made more frequent use of exotic species, such as mint, lemongrass, boldo, melissa and aloe (TABLE 2). Messias et al. (2015) also observed that 40% of the medicinal plants cited by residents of Ouro Preto (MG) were exotic. In urban areas, lemongrass, melissa, boldo, aloe and mint were the most cited, respectively, differing statistically from the others. In rural areas, mint, boldo, aloe, lemongrass, melissa, mastruz, rosemary, ginger and mentha were the most cited. These results demonstrated that the most used medicinal plants were practically the same in both areas.

Table 2 – Decreasing order of the 10 most medicinal plants, which have been already used by interviewees from the ethnobotanical research carried out in the urban and rural areas in Sobradinho – DF (Brazil).

Classification	Popular names of medicinal plants	Citation			Indication uses according to the interviewees
		Urban areas	Rural areas	Both areas	
1 st	Mint	9	17	26	Gas, indigestion, abdominal cramps, malaise, flu, cough, cold, bronchitis, general pains, fever, high blood pressure and worms. It is carminative, digestive, antispasmodic, physically stimulating, analgesic, vermifuge and soothing.
2 nd	Lemongrass	13	9	22	Flu, cold, tiredness, malaise, high blood pressure, indigestion, low immunity and headache. It is soothing, physically stimulating, a decongestant and diuretic.
3 rd	Boldo	10	10	20	Digestive problems (stomach pain, heartburn, indigestion, intestinal cramps and nausea), inflammation in the uterus, hangover and headache. It is laxative, digestive, detoxifying and abortifacient.
4 th	Melissa	11	8	19	Gas, reflux, abdominal cramps, headache, tiredness, malaise, cold and flu. Controls blood pressure. It is carminative, analgesic, antispasmodic, physically stimulating and soothing.
5 th	Aloe	9	9	18	Hemorrhoid, burn, acne, capillary and stomach problems. It is healing, anti-tumor, anti-inflammatory, skin moisturizing, laxative and preventative of prostate cancer.
6 th	Mastruz	5	8	13	Infection, worms, stomach pain and bruising. It is anti-inflammatory, analgesic, healing and appetite stimulating.
7 th	Rosemary	5	7	12	Sinusitis, flu, cough, asthma and headache. Controls blood pressure. It is soothing and astringent.
8 th	Ginger	5	6	11	Flu, low immunity, sore throat and hoarseness. Aids in cleaning teeth. It is anti-inflammatory, depurative of the stomach and slimming.
9 th	Mentha ("Poejo")	3	6	9	Abdominal cramps, flu, cold, cough and runny nose. It is soothing, antispasmodic and analgesic.
10 th	Mikania ("Guaco")	4	4	8	Flu and cough. It is anti-inflammatory, analgesic and expectorant.
10 th	Phyllanthus ("Quebra pedra")	6	2	8	Kidney stones and urinary tract infection.

Source: Elaborated by the authors (2020).

In a practical sense, the medicinal plants were used to treat the same symptoms and diseases. For example, stress, influenza and bad digestion were the most cited health problems in urban areas, while influenza and stress were the most cited health problems in rural areas. From these data, we concluded that medicinal plants were more commonly used in the treatment of common diseases (TABLE 2). According to Figueredo et al. (2014), medicinal flora should treat less severe and fast-course diseases. In addition, the same plant was given to treat different types of symptoms (TABLE 2), which has already been demonstrated in the studies of Oliveira et al. (2010) and Costa and Marinho (2016).

Conclusion

Our results show that the millennial ethnobotanical tradition is still present in Sobradinho, despite the rural and urban population having access to formal health services. Likely, this tradition is maintained due to family teaching and the lifestyle observed in the population of Sobradinho, where there are many farms and houses with backyards and gardens. Finally, the present study demonstrates the importance of the native flora as a therapeutic resource, since most of the species mentioned are native to Brazil, many from the Cerrado region, although we found that exotic plants are more used than native ones. In addition, the present study also shows the need to disseminate correct and sustainable forms of plant extractives in order to try to conserve native medicinal species that grow in wild areas near urban centers and rural areas.

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Uso de plantas medicinais e avaliação socioeconômica de populações urbana e rural de Sobradinho (DF-Brasil)

Resumo

É sabido que o uso de plantas medicinais pode melhorar a saúde e seu estudo no Brasil é promissor, devido a sua megadiversidade florística, principalmente no Cerrado, onde várias populações tradicionais vivem e muitas espécies endêmicas podem ser encontradas. Por meio de dados obtidos de entrevistas, esta pesquisa registrou as plantas medicinais utilizadas por 40 moradores de áreas urbanas e rurais de Sobradinho (DF), situadas no Cerrado, e avaliou seus perfis socioeconômicos. Mulheres rurais apresentaram um maior conhecimento sobre plantas medicinais. A maioria da população urbana tinha uma educação universitária completa, enquanto a maioria da população rural não tinha completado sua educação básica no momento da entrevista. Embora a população urbana também relatou utilizar literatura, a principal fonte de conhecimento apresentada foi a familiar. O nível de conhecimento etnobotânico encontrado foi vasto em Sobradinho e semelhante em áreas urbanas e rurais, onde os entrevistados citaram 86 nomes de plantas medicinais, correspondentes a

126 espécies, das quais 56,35% são nativas do Brasil e 43,65% exóticas. Todas as espécies foram categorizadas em 48 famílias botânicas, sendo Asteraceae, Lamiaceae e Fabaceae as mais citadas, respectivamente. Apesar de conhecerem muitas espécies nativas de plantas medicinais, a população relatou utilizar mais plantas exóticas, como hortelã, capim-limão e boldo, para tratar condições como estresse, gripe e indigestão, respectivamente.

Palavras-chave: Cerrado. Etnobotânica. Plantas medicinais exóticas.

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