

Network Perspective: Knowledge and Use of Natural Medical Resources and Urbanization

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Abstract

In view of the society development and the populational growth, significant transformations in local regional customs are occurring, so that, the use, management and preparation of medicinal natural resources are being significantly altered. Thus, it is essential the development of methods to recognise how and for what reasons the habit of using these resources is being left behind. The present study aims to analyse the existence of an exclusion relationship between traditional knowledge and urbanization in the different sample strata. The research was developed in Crato, Ceará. For data collection, the stratification method and the snow ball technique were used, having as instruments, sociodemographic forms and semi-structured interviews. The results were analysed in a qualitative and quantitative way, using descriptive-associative statistics. The study sample consisted of 125 people of both sexes, living in the strata drawn, aged between 18 and 80. As for the socioeconomic profile, most of the interviewees are female, married and low educational attainment. Evaluating the correlations between the variables that involve the central objective of this work (location and knowledge), it was possible to notice a weak and negative correlation, so that the higher the urbanization level, the lower the knowledge. Therefore, the place has the role of defining popular knowledge about natural resources used as therapeutic products. In short, it is concluded that ethnobiological knowledge is present, however, it has been modified with the acquisition of new knowledge, due to the cultural dynamics of metamorphic societies.

Introduction

Ethnobiology studies the relationship of human beings with natural resources, this science ranges from cultural to biological processes (Begossi 1993). At the end of the 19th century, ethnobiological studies were started with the objective of understanding the knowledge of different peoples and cultures about plants and animals (Sobral and Albuquerque 2014).

Thus, it can be understood as a complex system, which is a dynamic, non-linear system that contains a large number of interactions between the parts. These systems have a tendency to change, evolve and adapt. A complex system gives rise to general patterns of behavior, difficult to predict, control and manage (Mitchell 2011; Furtado and Sakowski 2014) and its applicability in ethnobiology is imminent.

Among the facets of ethnobiology, there are the medical practices, which are characterized by the use of knowledge based on traditions, linking aspects of spirituality and daily findings. This context is comprehensive and involves mystical rituals, spiritual therapies, zotherapy and phytotherapy (Costa Neto 2011). In the last decades, many studies of this nature have been carried out in Brazil, especially involving ethnobotany (Sales et al. 2009) and etnozoology (Bernarde and Santos 2009).

The city of Crato is located in the region of Cariri in the state of Ceará, Brazil, studies carried out in this region demonstrate the expressiveness of the animals and plants usage to treat different illnesses (Oliveira et al. 2007; Rodrigues and Teles 2015). In addition, Cariri has a vast diversity of natural

resources, thus being a promising place for the development of ethnobiological studies (Brito and Perinotto 2012).

In an analysis of the urban geography characteristics, Carter (1972) describes urbanization as a process of multivariate cause, whose components unfold in: emergence and development of an urban network; physical-structural growth of cities with varying degrees of dynamism or development of the process; social and economic transformations or changes. According to Arraes (2012), the urbanization process of Crato is a recent advent that has been increasing mainly due to the commerce growth.

Some speculations regarding traditional knowledge and the growing urbanization process, affirm that there is an exclusionary relationship between these two factors (Vandebroek et al. 2004). In view of the society development and the populational growth, significant transformations in local regional customs are occurring, so that, the use, management and preparation of Medicinal Natural Resources (MNR) are being significantly altered. Thus, it is essential the development of methods to recognise how and for what reasons the habit of using these resources is being left behind.

Therefore, it is notorious the scientific value researches developed seeking to preserve these intangible heritages of a culture. In order to accomplish this result, it is necessary to capture, register and disseminate the traditional knowledge of a culture. Furthermore, these studies are considered to be very important to the understanding of the process and the impacts caused by local urbanization, taking into account the urbane analyse along with the economic and social transformations. In this context, it was evaluated whether there is and how the excluding relationship between traditional knowledge and the urbanization process in different sample strata.

Materials And Methods

Study area

This research was developed in the city of Crato (07° 14 '03 "S, 39° 24' 34" W), located in the South Region of the Ceará state, with an estimated population of 131. 372 (IBGE 2020). This city is located in a territory with significant and wide biodiversity. In addition, a prominent aspect of this city is to have communities, originating in the Chapada do Araripe, that preserve through orality, practices related to the use of NMR (Silva Neto 2013).

The current city of Crato started its formation in the mid 19th century. For a long period, this region had been characterized as a place of precious metals extraction, agriculture and livestock. After the advent of commerce and the tourism growth, there was a great increase in population, which was accentuated in the 1980. These factors had brought a new look to the city, changing not only the landscape, but the way of life of the old traditional communities (Oliveira and Abreu 2010).

Sample delimitation and data collection

The process of selecting the study area was carried out in four stages: Initially, a survey of all districts, farms, towns and districts of Crato was performed; In the second stage, the sectors were ordered based on the concept of urbanization, thus, the population was accumulated forming strata. After delimiting the strata, areas in each segregated stratum were drawn by a systematic procedure; In the third stage, digitalized maps of each strata drawn were obtained; and lastly, a simple casual drawing was conducted, in which the “starting point” area for data collection was established. The interviews were conducted in the following neighbourhoods: Alto da Penha, Vila lobo and at the Jatobá farm (Santa Fé), corresponding to the urbanized (stratum 3), little urbanized (stratum 2) and rural (stratum 1) strata, respectively.

The research sample consisted of people of both sexes, living in the strata drawn, aged between 18 and 80 years. Subjects affected by alopsychic, autopsychic disorientation and psychiatric disorders were excluded from the sample due their incomprehension of reality. The interviewees contribution in this research was conditioned to their acceptance, after presentation the project and its objectives.

In order to ensure clarification about free and voluntary participation, it was required from the participants to sign in the Free Consent Form (FCF).

The collection was conducted between June 2019 and February 2020, under recording and subsequent literal transcription of the information.

Using the snow ball technique, individuals were identified to compose the sample and had sequentially indicated other possible participant capable of contributing to the research, until reaching the “saturation point”, a situation characterized by the repetition of the indicated names (Albuquerque et al. 2010). Primarily, a form for sociodemographic characterization was applied, after filling in these data, semi-structured interviews were conducted with questions related to the use of MNR as a way of treating diseases.

Simultaneously with the interviews, guided tours were held with the participants. The "walk-in-the-woods", consists of a field interview technique, in which the interviewee points out the species to the researcher, enabling their correct identification and complementing the data obtained (Alexiades 1996; Albuquerque et al. 2008). The choice of places for guided tours in this study came from the interviewees themselves.

Data analysis

The data were interpreted in a qualitative way, with descriptive-associative statistics. In order to observe the correlation between the variables, network analysis was used. This methodology depicts the association patterns of variables in a two-dimensional graphic object. The representation is formed by spheres (variables) and lines (relations between variables), allowing the statistical visualization of the interactions. The variables disposition is defined through three horizons: 1 - related variables attract and unrelated ones expel each other; 2 - the more central a variable is, the more related to the others; 3 - lines represent the weighted association between the spheres, being positive or negative (Borsboom and Cramer 2013).

To evaluate the network, it was observed the following parameters: 1) centrality, which point out the most important nodes within the network depending on the different types of couplings; 2) the proximity measure (closeness centrality), which is defined by the inverse of the distances from a node to all other nodes of the systems, in a way that one node with a high level of proximity is a node with high level of other nodes prediction and; 3) the measure of strength (centrality of strength), that refers to the magnitude of the associations between nodes (Machado et al. 2015; Fonseca-Pedrero 2018). The statistics were made using the statistical program JASP 0.11.1 version 2019.

Regarding the construction of the correlation network, an electronic spreadsheet in Microsoft Office Excel® version 2016 was built with the variables organized and scored using two guiding axes: urbanization and knowledge. The established variables were: location, sex, age, marital status, education, knowledge about MNR, indications of use, way of preparing the resources, transmission of knowledge, replacement of a medication prescribed by a health professional with natural resources and usage frequency over time.

Ethical and legal aspects

In line with the ethical aspects, the research was submitted to the Plataforma Brasil, and was therefore sent to the Research Ethics Committee (REC) of the Regional University of Cariri (URCA). It was then approved for completion, through the process 3,626,796. Additionally, due to legal requirements in Brazil, the project was submitted and approved by the National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen), under the authorization number A1439DC.

Results

Sociodemographic profile

The total research sample was composed by 125 participants, 45 from the rural stratum (73.2% female and 26.8% male participants), 41 from the little urbanized stratum (87.8% female and 12.2% male participants), and 39 from the urban stratum (74.4% female and 25.6% male participants).

The majority of the female and male interviewed participants from the rural stratum were concentrated in the age group of 40 to 50 years old (19.9%) and 29 to 39 years old (8.9%) respectively. Regarding marital status, the most reported was married (66.7%). Considering the level of education, 33.3% of the interviewed reported not having completed elementary school and 13.3% declared to be unschooled. These data demonstrate a scenario of low education in the community. Regarding the time of residence in the area, 55.5% of the interviewed population reported living in the area for a period ≥ 30 years (Table I).

Table I

Simple frequencies, percentage distribution and sociodemographic variables of the interviewed participants in rural stratum.

RURAL STRATUM														
VARIABLES	Age range													
	18–28		29–39		40–50		51–61		62–72		73–80		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Biological Sex														
Female	5	11,1	6	13,3	9	19,9	6	13,3	5	11,1	2	4,5	33	73,2
Male	1	2,2	4	8,9	3	6,7	1	2,2	2	4,5	1	2,2	12	26,8
<i>Total</i>	6	13,3	10	22,3	12	25,6	7	15,5	7	15,5	3	6,7	45	100
Marital Status														
Single	4	8,9	4	8,9	2	4,5	1	2,2	-	-	-	-	11	24,4
Married	2	4,4	6	13,3	8	18,9	5	11,1	6	13,3	3	6,7	30	66,7
Divorced	-	-	-	-	-	-	-	-	1	2,2	-	-	2	4,4
Widow (er)	-	-	-	-	1	2,2	1	2,2	-	-	-	-	2	4,4
<i>Total</i>	6	13,3	10	22,3	12	25,6	7	15,5	7	15,5	3	6,7	45	100
Educational Level														
None	-	-	-	-	-	-	1	2,2	3	6,7	2	4,4	6	13,3
Incomplete elementary school	-	-	2	4,4	3	6,7	5	11,1	4	8,9	1	2,2	15	33,3
Complete elementary school	1	2,2	3	6,7	1	2,2	1	2,2	-	-	-	-	5	11,1
Incomplete high school	-	-	1	2,2	1	2,2	-	-	-	-	-	-	2	4,5
Complete high school	4	8,9	4	8,9	6	13,3	-	-	-	-	-	-	15	33,3
Incomplete higher education	1	2,2	-	-	-	-	-	-	-	-	-	-	1	2,2
Complete higher education	-	-	-	-	1	2,2	-	-	-	-	-	-	1	2,2
<i>Total</i>	6	13,3	10	22,3	12	25,6	7	15,5	7	15,5	3	6,7	45	100

RURAL STRATUM															
Residence time in the area in years															
< 10	4	8,9	1	2,2	-	-	-	-	-	-	-	-	-	5	11,1
10–19	2	4,4	-	-	1	2,2	-	-	1	2,2	-	-	4	8,9	
20–29	-	-	5	11,1	5	11,1	1	2,2	-	-	-	-	11	24,5	
30 or more	-	-	4	8,9	6	13,3	6	13,3	6	13,3	3	6,7	25	55,5	
<i>Total</i>	6	13,3	10	22,3	12	25,6	7	15,5	7	15,5	3	6,7	45	100	

Among the female interviewed participants from little urbanized stratum, the highest age group concentration was 29–50 years old (43.8%), while for male participants it was 18 to 39 years old (9.8%). Regarding marital status, 65.5% of the total sample were mostly married. Considering the educational level, 14.6% of the participants did not have schooling, while 34.2% did not finish elementary school, 7.1% have completed high school and only 4.8% have completed higher education. The data also shows that 39.1% of the population have lived at the region for a period between 20 and 29 years and 21.9% for a period of 30 years or more (Table II).

Table II

Simple frequencies, percentage distribution and sociodemographic variables of the interviewed participants in little urbanized stratum.

LITTLE URBANIZED STRATUM														
VARIABLES	Age range													
	18–28		29–39		40–50		51–61		62–72		73–80		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Biological Sex														
Female	5	12,2	9	21,8	9	21,8	4	9,9	5	12,2	4	9,9	36	87,8
Male	2	4,9	2	4,9	-	-	-	-	-	-	1	2,4	5	12,2
<i>Total</i>	7	17,2	11	26,6	9	21,8	4	9,9	5	12,2	5	12,3	41	100
Marital Status														
Single	4	9,9	5	12,2	1	2,5	1	2,5	-	-	-	-	11	27,2
Married	3	7,2	6	14,2	4	9,7	2	4,9	5	12,2	5	12,2	25	60,5
Divorced	-	-	-	-	-	-	1	2,5	-	-	-	-	1	2,5
Widow (er)	-	-	-	-	4	9,7	-	-	-	-	-	-	4	9,8
<i>Total</i>	7	17,2	11	26,6	9	21,8	4	9,9	5	12,2	5	12,3	41	100
Educational Level														
None	-	-	-	-	-	-	3	7,5	2	4,8	1	2,4	6	14,6
Incomplete elementary school	-	-	5	12,1	4	9,5	1	2,4	1	2,4	3	7,5	14	34,2
Complete elementary school	-	-	2	4,8	1	2,4	-	-	-	-	1	2,4	4	9,7
Incomplete high school	1	2,4	2	4,8	-	-	-	-	-	-	-	-	3	7,3
Complete high school	6	14,7	1	2,4	3	7,5	-	-	2	4,8	-	-	12	29,4
Incomplete higher education	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Complete higher education	-	-	1	2,4	1	2,4	-	-	-	-	-	-	2	4,8
<i>Total</i>	7	17,2	11	26,6	9	21,8	4	9,9	5	12,2	5	12,3	41	100

LITTLE URBANIZED STRATUM														
Residence time in the area in years														
< 10	4	9,7	3	7,3	-	-	-	-	-	-	2	4,8	9	21,8
10–19	3	7,3	2	4,8	1	2,4	1	2,4	-	-	-	-	7	17,2
20–29	-	-	4	9,7	5	12,2	2	4,8	3	7,3	2	4,8	16	39,1
30 or more	-	-	2	4,8	3	7,3	1	2,4	2	4,8	1	2,4	9	21,9
<i>Total</i>	7	17,2	11	26,6	9	21,8	4	9,9	5	12,2	5	12,3	41	100

Regarding the urban stratum, the most frequent age group observed among female participants was 51–61 years old (20.5%) and 40–50 years (10.3%) among men. The prevalent marital status was married, which includes 56.4% of the participants. Considering the level of education, 7.7% completed higher education, the highest percentage when compared to the other strata, additionally, the urban area showed the lowest rate of people with no education (5.1%). When asked about the time of residence at the place of study, it was found that about 66.6% live at the place for a period of 30 years or more (Table III).

Table III

Simple frequencies, percentage distribution and sociodemographic variables of the interviewed participants in urbanized stratum.

URBANIZED STRATUM														
VARIABLES	Age range													
	18–28		29–39		40–50		51–61		62–72		73–80		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Biological Sex														
Female	3	7,7	3	7,7	5	12,8	8	20,5	7	17,9	3	7,7	29	74,4
Male	1	2,6	1	2,6	4	10,3	2	5,1	0	0,0	2	5,1	10	25,6
<i>Total</i>	4	10,3	4	10,3	9	23,1	10	25,6	7	17,9	5	12,8	39	100
Marital Status														
Single	4	10,3	2	5,1	2	5,1	3	7,7	-	-	-	-	11	28,2
Married	-	-	2	5,1	5	12,8	7	17,9	7	17,9	1	2,6	22	56,4
Divorced	-	-	-	-	2	5,1	-	-	-	-	-	-	2	5,1
Widow (er)	-	-	-	-	-	-	-	-	-	-	4	10,3	4	10,3
<i>Total</i>	4	10,3	4	10,3	9	23,1	10	25,6	7	17,9	5	12,8	39	100
Educational Level														
None	-	-	-	-	-	-	-	-	-	-	2	5,1	2	5,1
Incomplete elementary school	-	-	2	5,1	3	7,7	2	5,1	3	7,7	1	2,6	11	28,2
Complete elementary school	-	-	-	-	2	5,1	2	5,1	1	2,6	1	2,6	6	15,4
Incomplete high school	-	-	-	-	-	-	-	-	2	5,1	-	-	2	5,1
Complete high school	3	7,7	-	-	4	10,3	6	15,4	1	2,6	1	2,6	15	38,5
Incomplete higher education	-	-	-	-	-	-	-	-	-	-	-	-	0	0
Complete higher education	1	2,6	2	5,1	-	-	-	-	-	-	-	-	3	7,7
<i>Total</i>	4	10,3	4	10,3	9	23,1	10	25,6	7	17,9	5	12,8	39	100

URBANIZED STRATUM															
Residence time in the area in years															
< 10	2	5,1	2	5,1	-	-	-	-	-	-	-	-	-	4	10,3
10-19	2	5,1	-	-	-	-	-	-	-	-	-	1	2,5	3	7,7
20-29	-	-	-	-	3	7,7	2	5,1	1	2,5	-	-	-	6	15,4
30 or more	-	-	2	5,1	6	15,4	8	20,5	6	15,4	4	10,3	-	26	66,6
<i>Total</i>	4	10,3	4	10,3	9	23,1	10	25,6	7	17,9	5	12,8	-	39	100

Network analysis: associations and centrality measures

Considering the associations between the different variables, it was possible to notice that there were no strong positive correlations (Fig. I). On the other hand, a strong negative correlation between sex and the use of MNR was demonstrated ($\beta = -0.560$). Thus, it is possible to infer that women understand and make greater use of this type of resource when compared to men.

Fig. I Graphical representation of the network analysis showing the correlation between the variables of the strata surveyed (Source: JASP 0.11.1 version 2019). Each node represents a variable prospected by the research, blue lines indicate positive associations and red lines indicate negative associations. 1 = Education; 2 = Marital status; 3 = Age; 4 = Location; 5 = Do you know any natural resources that are used to treat any illness? (Question 1); 6 = What resources are these? (Question 2); 7 = What symptoms do they treat? (Question 3); 8 = How is the preparation done? (Question 4); 9 = Do you teach your children how to use natural resources to treat diseases? (Question 5); 10 = Have you ever replaced (exchanged) the medication prescribed by the doctor (or another health professional) for the treatment of any disease? (Question 6); 11 = Do you think that the use of natural resources is done at the same frequency as in the past? (Question 7); 12 = Sex; 13 = Residence time in the area

There was a moderate negative correlation between the time of residence and the use of MNR ($\beta = -0.320$), thus, popular knowledge is greater in people who live in a certain place for a longer amount of time. Such a circumstance is evident in the rural stratum.

Regarding education, it was found a weak negative relationship when correlating the participants educational level ($\beta = -0.068$), number of MNR known ($\beta = -0.099$), number of diseases that can be treated with the MNR ($\beta = -0.061$) and ways of preparing homemade remedies ($\beta = -0.179$). Thus, it is possible to state that the higher the level of education, the less knowledge about previous topics. However, as the level of education increases, it is possible to notice a greater claim of knowledge propagation ($\beta = 0.259$) and an increase in the exchange from industrialized drugs to the use of traditional homemade remedies ($\beta = 0.005$). Furthermore, it was also observed that people with higher

educational level were able to affirm that “traditional” knowledge has been disappearing over time, ($\beta = -0.009$), which represents a weak and negative correlation.

Weak positive relationships were also identified when the correlations between knowledge and age variables were analysed. It was possible to verify that age interferes positively in the amount of resources known ($\beta = 0.252$), in the amount of diseases that can be treated with this resource ($\beta = 0.258$) and also in the methods of remedies preparation to cure or prevent diseases ($\beta = 0.270$), so that these knowledges tend to increase along with the participants age.

Considering the associations between place and the knowledge, it was noticed that the traditional knowledge inherent to the MNR ($\beta = -0.069$), the amount of these resources ($\beta = -0.193$) and the signs and symptoms that can be treated by them ($\beta = -0.026$), they have a weak and negative correlation with the interviews location, so that the higher the level of urbanization, the lower the traditional knowledge. However, it is possible to observe moderate positive relationships regarding the transmission of knowledge to new generations ($\beta = 0.343$).

Figure II shows the centrality measure of the relationship between variables. In relation to the strength value, the variable location showed the highest value, in addition, it also demonstrated a high proximity value, as it has strong connections with the nearby nodes. Thus, this variable plays a very important role in the network due to its action in all other nodes. Thus, the location has the role of defining the popular knowledge about MNR.

Fig II Graphical representation that shows the measure of centrality of the relationship between the variables of the strata surveyed (Source: JASP 0.11.1 version 2019)

Discussion

Considering sex as a determinant of knowledge, it was observed that women are the greatest holders of knowledge, including, in the sparsely urbanized strata, women demonstrated greater instruction on MNR, on the other hand, no ethnological knowledge was referred to man in the analyse.

Dias (1999) connected the differentiation of knowledge and medicinal plant use between both sexes, with the daily activities performed by the residents of the region. In his study, in most of the interviewed families, the woman was responsible for the cultivation and preparation of medicinal plants, as well as for feeding and caring for children and other family members when sick. Studies such as those by Borges and Peixoto (2009) and Giraldi and Hanazaki (2010) have shown similar results, where they report that the historical context of the female role allows greater knowledge about medicinal, food, herbaceous and exotic plants.

The fact that female ethno-zoological knowledge stands out from the male in stratum 2 is due to the fact that women are responsible for feeding and preparing most of the homemade remedies produced. These

results do not follow the trend that is indicated in the literature, as observed in the work of Alves et al. (2012), who showed that most knowledge about animals is more tied to man.

In all strata, the process of knowledge transmission occurs mainly by female, predominantly the maternal figure. Scientific investigations show this tendency, for example, in the work of Moreira et al. (2002) and Viu et al. (2010).

While visiting the communities object of this study, it was observed that there was a consolidated division of labour activities according to biological gender. Thus, men and women have different experiences, values and knowledge, in which the knowledge related to MNR, due to the social structure is dominated predominantly by women and passed on by them, as they have the responsibility for the execution of health care in the family.

Historically, the woman-mother has assumed the responsibility of primary caregiver, which have been culturally inherited from their ancestors, thus becoming the main responsible for this function among family members. The Caring demands dedication, experimentation and wisdom inserted in the world conception of common sense (Gramsci 1981; Cabral and Tyrrell 1995).

Due to the aforementioned facts, women tend to exchange more allopathic drugs for homemade remedies when compared to men. This valorisation of knowledge induces a preference for these resources in comparison to those conventional allopathic drugs. It was demonstrated in the research carried out by Brasil et al. (2017), conducted at Arruda Farm, in which a large part of the interviewees reported to prefer using teas to the treatment of pain, in detriment of allopathic medications.

Several factors contribute for choosing complementary therapies in detriment of allopathic drugs, for instance: dissatisfaction with allopathic medicine (efficacy and safety), satisfaction with alternative medicine and concepts of full safety of vegetables, as well as cultural and personal aspects (Barnes 2003).

Moreover, part of the interviewees has replaced conventional drugs for homemade remedies due to the belief that they are free of side effects, similar results were observed in the study carried out by Kakooza-Mwesige (2015). From a scientific point of view, studies have shown that many of the medicinal plants have potentially aggressive substances and, for this reason, they must be used carefully, respecting their toxicological risks (Veiga Junior et al. 2005).

In addition, a large portion of the interviewees, distrusting the efficiency of plants, seek a cure for diseases using pharmaceutical drugs, which points to the tendency of people to associate medicinal plants with pharmacotherapy (Pinto et al. 2006).

Furthermore, there was a consensus on the importance of empirical knowledge for the treatment, cure and prevention of diseases. In fact, knowledge and appreciation of the cultural aspects of the population can be considered as effective strategies for adherence to the therapeutic plan. It may enable a more horizontal relationship in health education actions, and also discouraging behaviours that entails health

risks and/or reinforce stigmas, or even to plan therapeutic approaches and behaviours that allow an open dialogue with local beliefs (Mello 2012).

There was a confluence regarding the decrease in homemade medicinal practices, the justification most cited by the interviewees is that its easier to buy allopathic drugs. Vandrebroek et al. (2004) argues that the loss of knowledge about traditional therapeutic practices is associated with greater access to public health services. In addition, factor such as the rural exodus, increasing urbanization, new social and economic conditions and disinterest of young people in traditional knowledge as well as environmental degradation are responsible for the genetic erosion of the knowledge associated with plants and animals (Reyes-García et al. 2014).

Considering that knowledge is related to the time of residence, it was seen that people residing in the same place for a longer time have a greater information baggage. This is because knowledge is built according to the relationships between people and available resources, thus, the longer the dwelling time, the greater the contact and the level of information. This was also verified by Gandolfo and Hanazaki (2014), corroborating the results obtained.

When knowledge is related to the educational level, an inverse association is observed between these two variables. Illiterate and the less educated people present more knowledge about treatments with popular medicinal resources, than those who finished high school or even tertiary education. Similar findings are described in the study of Viu et al. (2010). The greatest knowledge about zootherapies and use of animals as medicinal resources are displayed by people with low income associated with rural labour function, which can be explained by the need to supplement the family food resources through hunting (Souza et al. 2015).

However, as the level of education increases, it is possible to notice a greater claim of transmission of the popular knowledge, this is because people with higher academic education have greater discernment to show their children the importance of human interactions with the local biodiversity. In this sense, children progressively learn about the importance of using medicinal resources from nature. For example, Aunger (2000) reported in one of his works that the name of species is learned in childhood, however, the ways of using and collection are acquired gradually with their experiences and intrapersonal interactions.

Age is a variable that interfere positively in the number of MNR, the number of diseases that can be treated using this resource and also in the preparation methods to treat, cure or prevent diseases, So that these ethnological knowledge are directly proportional to the age. Additionally, some young people claimed to prefer conventional drugs and were incredulous about the use of products originated from natural resources to treat diseases, data such as these were found in the study by Hanazaki et al. (2000).

According to Palmer (2004) the reduced ethno-knowledge of younger people is due to the lack, destruction of traditional knowledge or acculturation. However, Sousa et al. (2012) argues that this interpretation should be viewed with caution since the accumulation of popular knowledge occurs throughout life through experiences.

However, it cannot be ignored the presence of younger individuals who know about the uses of MNR in the locus of this research. It demonstrates the existence of a legacy culture, which transmits the information using oral tradition as a means of communicating biological, ethnobotanical and ethno-zoological information, allowing the perpetuation of homemade medicine among the new generations.

Evaluating the variables that involve the central objective of this work, location and knowledge, it was possible to notice a weak and negative correlation, so that the higher the level of urbanization, the lower the knowledge, this result was reinforced when observed the force value, which showed that the local has strong connections with the nearby nodes. Thus, the place has the role of defining popular knowledge about MNR.

Conclusion

The use of MNR is a common practice in areas of the city of Crato, with a vast knowledge associated with this type of flora and fauna. An expressive ethnological knowledge was seen in the rural stratum communities, including the different forms of medicinal plants and animals use, the parts and forms of use, as well as the therapeutic applications resulting from the interactions of human populations and the environment.

The transmission of the ethno-knowledge of medicinal plants and animals is practiced by different ways and by different subjects. However, it is evident the young people's lack of interest in such knowledge. People use natural resources, to treat a wide range of diseases and symptoms, as a complementary and/or alternative medicine, to help others take care of their families, improve comfort and the overall feeling, this practice was well evidenced in all strata.

It is noticed that ethnobiological knowledge is present, and that some categories of use continue to be developed, for instance the medicinal plants. The reminiscence of the plant species use in the past with the acquisition of new knowledge, demonstrates the insertion of ethnobotanical knowledge as part of the cultural dynamics of a metamorphic society, in which new habits, beliefs and values specific to urban life are inserted, but they do not fatally extinguish the previous reality, which still alive in their memories, although the process of acculturation is being responsible for severe cuts in traditional knowledge.

Declarations

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Declaration of Competing Interest

The authors declare that there is no conflict of interest.

Availability of data and material

Not applicable.

Code availability

Not applicable.

Author's contributions

Sara T.S. Machado, Paulo R. Batista, Cícero D.C. Alencar and Heitor T.S. Machado: Conceptualization, Methodology, Writing - Review & Editing. Sara T.S. Machado, Cícera N.F. Lima and Paulo F.R. Bandeira: Software. Daniel S. Bezerra: Writing - Original Draft. Sara T.S. Machado, Paulo R. Batista, Gyllyanderson A. Delmondes, Luiz M. Barros and Marta R. Kerntopf: Supervision.

Ethics approval

In line with the ethical aspects, the research was submitted to the Plataforma Brasil, and was therefore sent to the Research Ethics Committee (REC) of the *Regional University of Cariri (URCA)*. It was then approved for completion, through the process 3,626,796. Additionally, due to legal requirements in Brazil, the project was submitted and approved by the National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SisGen), under the authorization number A1439DC.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

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Figures

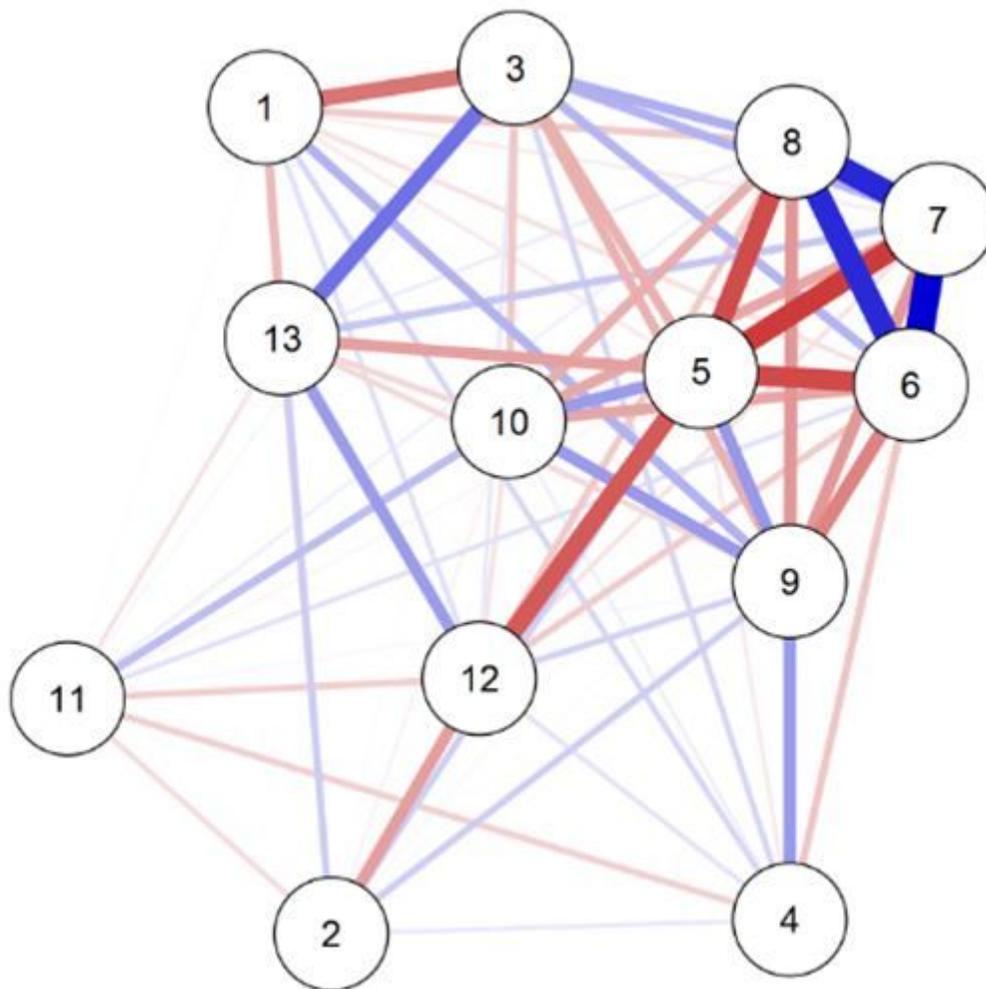


Figure 1

Graphical representation of the network analysis showing the correlation between the variables of the strata surveyed (Source: JASP 0.11.1 version 2019). Each node represents a variable prospected by the research, blue lines indicate positive associations and red lines indicate negative associations. 1 = Education; 2 = Marital status; 3 = Age; 4 = Location; 5 = Do you know any natural resources that are used to treat any illness? (Question 1); 6 = What resources are these? (Question 2); 7 = What symptoms do they treat? (Question 3); 8 = How is the preparation done? (Question 4); 9 = Do you teach your children how to use natural resources to treat diseases? (Question 5); 10 = Have you ever replaced (exchanged) the medication prescribed by the doctor (or another health professional) for the treatment of any disease? (Question 6); 11 = Do you think that the use of natural resources is done at the same frequency as in the past? (Question 7); 12 = Sex; 13 = Residence time in the area

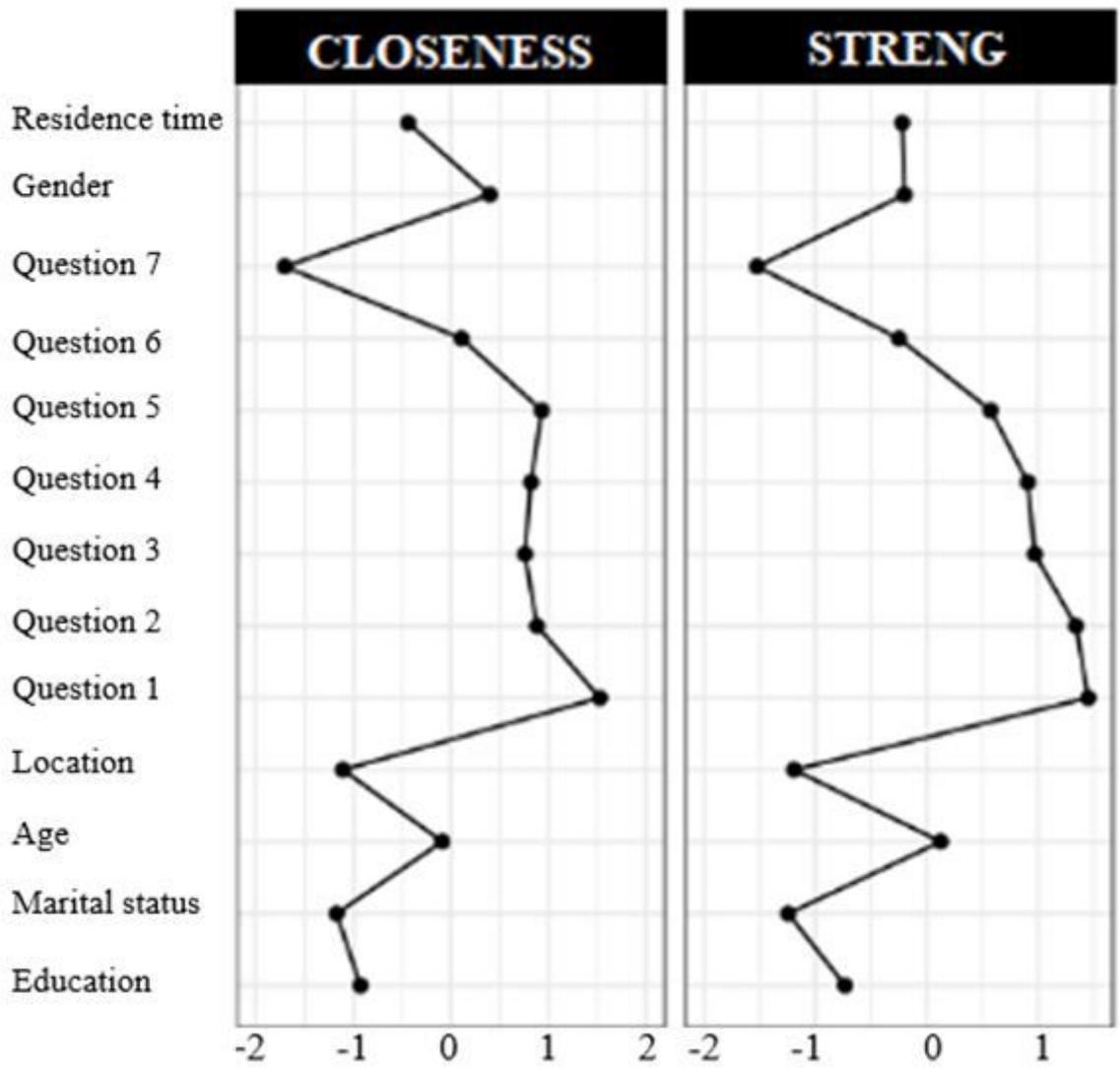


Figure 2

Graphical representation that shows the measure of centrality of the relationship between the variables of the strata surveyed (Source: JASP 0.11.1 version 2019)