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Original Article

The use of different indicators for interpreting the local knowledge loss on medical plants

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ABSTRACT

The increasing loss of local ecological knowledge may have negative impacts on the resilience of socio-ecological systems and may also negatively impact bioprospecting efforts, since local ecological knowledge is an important source of information for searching new drugs. Recent studies try to evaluate whether communities are experiencing loss of local ecological knowledge. However, some of them make conclusions which are erroneously based on specific analyses of a single indicator. We propose an integrative analysis of three indicators, namely: number of plants cited by young people and elders, therapeutic choices and people's connectance in terms of medicinal plant learning. The study was carried out in the community of Sucruiuzinho (Bahia, Brazil). We conducted semistructured interviews and a therapeutic recall with 24 local dwellers. We did not find evidence of local ecological knowledge loss in the studied community. Although younger people know fewer plants, they are well connected in terms of knowledge transmission. Moreover, in illness events, young people and adults have similar proportions of choice for plants when compared to allopathy. Concomitant use of the three indicators leads to a more realistic scenario of local ecological knowledge loss than the use of only one of them.

Introduction

It has been argued that local populations around the world are losing their local ecological knowledge (LEK), and this phenomenon primarily affects young people's generations (Benz et al., 2000; Voeks and Leony, 2004; Reyes-García et al., 2013). Several factors appear to account for this change, such as: decrease in biological and cultural diversity (Malthez-Stifel et al., 2012; Sujarwo et al., 2014), modernization (Quilan and Quilan, 2007), urbanization (Teklehaymanot et al., 2007), economic development (Reyes-García et al., 2005) and language barriers (Benz et al., 2000; Zent, 2001). However, the vast majority of works usually evaluates indirectly the processes of knowledge loss, regardless of the current standards of intracultural variability (Zent, 2001).

Several authors suggest that young people's generations are undergoing a process of knowledge loss, from a conclusion based on a single indicator: the number of plant species known by the young people compared to the number of species known by older people. However, an alternative interpretation of this finding is that young people know less plants because they are still in the learning process (Voeks and Leony, 2004; Albuquerque, 2006; Silva et al., 2011; Malthez-Stifel et al., 2012). Thus, an analysis guided only in the amount of known plant species does not allow robust inferences about the process of the knowledge loss.

Another indicator that has been employed to analyze the loss of LEK on medicinal plants is related to therapeutic choices centered on the dichotomy allopathic medicines × medicinal plants. Researchers suggest that access to modern medicines can lead to disinterest of people in learning about medicinal plants of their

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culture (Quilan and Quilan, 2007; Sujarwo et al., 2014). However, the prevalence of allopathy alone is not necessarily related to loss of LEK. Some medical systems, for example, are plural in terms of healthcare, so that traditional medical systems and Western medicine (biomedicine) coexist (Vandebroek et al., 2004; Soldati and Albuquerque, 2012).

Considering the scenario presented above, that reinforce that a simplistic assessment of the loss of local ecological knowledge can bring inadequate conclusions about a complex phenomenon, this study integrates a set of three indicators to assess the loss of LEK on medicinal plants: number of plants mentioned among young people and elders; therapeutic choices (allopathic or medicinal plants) and young people's connectance in terms of medicinal plant learning. Our third indicator (connectance) is important because it shows how individuals are exchanging medicinal plant knowledge. In this sense, the best of our knowledge, the use of this tool has not been popular among studies about loss of LEK, and has not been used together with the other indicators mentioned above. Connectance calculations are common, for example, in ecological studies about food web patterns (Kondoh, 2013). They are also present in studies that use the concept of social networks (Haselmair et al., 2014). Although the idea of social networks is being increasingly used in ethnobiological research, it is not our aim to deepen theoretical aspects on the subject, but, instead, to use a tool that is also employed in such studies. Such tool will reveal if people are exchanging knowledge or if there are barriers compromising such transmission.

This research proposal aims to fill theoretical and methodological gaps with regard to the proposal of three indicators that can be decisive for the detection of loss of LEK (number of known species, therapeutic choices and connectance in terms of medicinal plant learning). Therefore, it can be useful in future researches aimed at documenting this phenomenon more accurately.

Making an accurate evaluation of LEK loss is important since such knowledge commonly increases the resilience of socio-ecological systems (Ferreira Júnior et al., 2015). Furthermore, the increasing loss of local ecological knowledge may have negative impacts on bioprospecting efforts, since LEK is an important source of information for searching new drugs (Heinrich, 2008).

Materials and methods

Study area

We tested our proposal in the community of Sucruiuzinho, placed in the municipality of Barreiras, state of Bahia, Northeastern Brazil (Fig. 1). It is located 20 km from the center of Barreiras. Barreiras is 905 km far from Bahia's capital, Salvador (IBGE, 2010). The municipality has an extension of 7859.225 km^2 and altitude of 452 m, with an estimated population of 150,896 inhabitants, 13,686 of them in rural areas (IBGE, 2010). The city is characterized by its average annual temperature of 24.3 °C with average annual rainfalls varying from 1100 mm to 1200 mm (SEI, 2007).

Sucruiuzinho has twenty households and 37 residents (21 male and 16 female). The community is placed in a rural area and has no health centers, schools or basic sanitation. The nearest health center is located in the center of Barreiras. However, the community residents receive visits from a doctor each three months as well as monthly visits of the local health agents.

Data collection

The initial contact with community members was performed with the assistance of a member of the neighboring community (Sucruiu), which participated in previous studies developed by our team. We explained the study aims to the community members and those who accepted to participate were invited to sign the Free and Informed Consent Term, where the goals and methods of the research were exposed as well as the possibility of returning in the house of those who were interested in contributing to the research. This research proposal was submitted and accepted by the ethics committee in research with human beings through the Plataforma Brasil (CAAE 07488513.4.0000.5026).

During the following visits, we conducted 24 semi-structured interviews (Albuquerque et al., 2014). Our study design included people with permanent residence in the community and over 10 years. Therefore, 24 people from 14 to 83 years-old participated, considering that the interval between 10 and 13 years was not represented in the community. Not all residents participated in the survey, as two people refused; six were not old enough to participate, and five were not found even after several attempts. We chose a small community, since it facilitates connectance analysis of medicinal plant learning which will be described below. Therefore, we interviewed a total of 63% of the residents (77% of those old enough to participate) in order to identify which medicinal plants are known (indicator 1), besides collecting socioeconomic data. After this step, the therapeutic recall was performed. We named "therapeutic recall" the adjustment of the recall 24 h commonly used in ethnobiological studies (Albuquerque et al., 2014). This technique aimed at analyzing: (a) The self-reported illness events suffered by the interviewee in the last year; (b) and for each illness event, if the respondent made use of allopathy or medicinal plants. This methodological step generated data that has been analyzed as the indicator 2 of knowledge loss between generations, as it was related to therapeutic choices.

Afterwards, in order to analyze how connected are the youngers to the community in terms of medicinal plant learning (indicator 3), a list with the names of all people in the community was presented to the respondents. They were invited to indicate the individuals in the list from whom they have learnt about medicinal plants, as well as those individuals to whom they have actively taught. This methodological procedure carries a risk of bias, since the teaching and learning events were all based on the informant's memory. Thus, we tried to reduce this methodological bias as follows: when the respondent x claimed to have learned about plants from a respondent y and respondent y did not mention to have transmitted knowledge to the respondent x, the information about the transmission of knowledge from x to y was considered, thus increasing the reliability of the information.

Data analysis

To analyze the first indicator of knowledge loss between generations, we used a simple linear regression to assess the relationship between age and number of known plants. These data were subjected to a square root transformation to fit in a normal distribution. Then we performed a similar analysis considering the knowledge on plants of people up to 50 years old (12 people in total), since we observed a posteriori a stability in plant knowledge of people from that age group.

The citations for different therapeutic choices (allopathic, plants and both) when informants faced health problems, our second indicator, were compared between age classes through Fisher Extract. Three age groups were considered: class a (between 14 and 36 years) (six people), class b (between 37 and 59 years) (eight people) and class c (between 60 and 83 years) (ten people). More age classes were not adopted in this study because of the limited number of people in the community, what would lead to classes with small values and a possible statistical bias. We interpret that a higher proportion of citations for allopathic among younger people could be related to knowledge loss. The limits of age classes within the