What Is the Most Efficient Methodology for Gathering Ethnobotanical Data and for Participant Selection? Medicinal Plants as a Case Study in the Peruvian Andes

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What Is the Most Efficient Methodology for Gathering Ethnobotanical Data and for Participant Selection? Medicinal Plants as a Case Study in the Peruvian Andes. The loss of traditional knowledge (TK) invariably continues worldwide and there is an urgent need to document and safeguard it before it vanishes. Researchers need efficient methods to document TK, taking fieldwork time and costs into account. In this study, we focused on medicinal plants to compare (1) the information provided by 600 expert and general participants from 12 localities in northern Peruvian Andes; and (2) the information gathered in semi–structured and structured interviews with 81 informants at two localities in the same area. We found that expert informants reported 91% of medicinal species and 67% of medicinal indications in less than half the time than was required to gather information from general informants. Using structured interviews yielded an increase of 18% of medicinal species and 21% of medicinal indications, but the time spent interviewing was 100% higher than in the semi–structured interviews. Overall, since time and costs are key factors often limiting ethnobotanical research, we suggest focusing on interviews with expert informants to gain efficiency. Regarding the interview method, the most efficient use of structured interviews would be in the cases or areas where (some) ethnobotanical data have been reported previously. If a researcher starts a new project and little or no previous TK data exist for a given area, we would recommend the use of semi–structured interviews. However, the available time and budget will always be key factors to be taken into account in order to select the best methodology of any TK study. **¿Cuál es la metodología más eficiente para recopilar datos etnobotánicos y para la selección de participantes? Las plantas medicinales como un estudio de caso en los Andes peruanos.** La pérdida del conocimiento tradicional (CT) continúa invariablemente en todo el mundo, por lo que hay una necesidad urgente de documentarlo y rescatarlo antes de que desaparezca. Los investigadores necesitan métodos eficientes para documentar el CT, teniendo en cuenta el tiempo y el coste del trabajo de campo. En este estudio, nos enfocamos en plantas medicinales para comparar (1) la información obtenida de 600 participantes expertos y generales en 12 localidades del norte de los Andes peruanos; y (2) la información recopilada de entrevistas semiestructuradas y estructuradas con 81 informantes de dos localidades en la misma área. Documentamos que los informantes expertos conocían el 91% de las especies medicinales y el 67% de las indicaciones medicinales, dedicando menos de la mitad del tiempo que se requirió para documentar la misma información con los informantes generales. Al utilizar entrevistas estructuradas, obtuvimos un aumento

[1] Received 24 April 2020; accepted 1 January 2021;
published online 23 February 2021

Submitted 19 June 2020

Economic Botany, 75(1), 2021, pp. 63–75

del 18% de las especies medicinales y del 21% de las indicaciones medicinales, pero el tiempo dedicado fue 100% mayor que con respecto a las entrevistas semiestructuradas. En conjunto, dado que el tiempo y el coste son factores clave que a menudo limitan la investigación etnobotánica, sugerimos enfocar las entrevistas con los informantes expertos para ganar eficiencia. Respecto al método de entrevista, el uso más eficiente de entrevistas estructuradas se daría en los casos o áreas donde se han registrado (algunos) datos etnobotánicos previamente. Si un investigador inicia un nuevo proyecto y existen pocos o ningún dato previo de CT para un área determinada, recomendaríamos el uso de entrevistas semiestructuradas. Sin embargo, el tiempo disponible y el presupuesto siempre serán factores clave a tener en cuenta para seleccionar la mejor metodología de cualquier estudio sobre CT.

Key Words: Biocultural conservation, Cultural ecosystem services, Expert informants, Livelihood, Quantitative ethnobotany, Semi–structured vs. structured interviews, Sustainability, Traditional knowledge.

Introduction

After the incorporation of traditional knowledge (TK) into the Convention on Biological Diversity (CBD (Convention on Biological Diversity) 1992) and highlighting its value as a resource that can help to preserve, maintain, and even increase biological diversity (Becker and Ghimire 2003; Reyes-García 2014), other international organizations have followed this example. The Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services recognizes TK as a complement to scientific knowledge for the conservation and use of biodiversity (IPBES 2018), and the World Health Organization has over the past two decades been developing strategies for the promotion of TK in complementary medicine in rural areas (WHO (World Health Organization) 2000, 2013). Under the Nagoya Protocol on Access and Benefit Sharing, local human groups are valued as owners and promoters of these cultural ecosystem services and practices, and the transmission of such knowledge about the use of their resources (UNESCO 2017).

However, at the same time, the loss of TK continues or even accelerates, because the interest in traditions and TK of different populations is globally declining, fueled by multiple changes, including (i) the loss of cultural identity (Houde 2007; Reyes-García et al. 2013a; Vandebroek and Balick 2012); (ii) the expansion of the agricultural and livestock frontier (Assefa and Hans-Rudolf 2015; Gómez-Baggethun and Reyes-García 2013; Sujarwo et al. 2014); (iii) the improvement of regional socioeconomic factors—e.g., access to medical infrastructure, roads, and markets (Almeida–Campos et al. 2019; Bellia and Pieroni 2015; Williams et al. 2012); and (iv) the loss of interest of (some) younger generations in TK (Quinlan and Quinlan 2007; Reyes–García et al. 2013b; Srithi et al. 2009). This progressive loss of TK is occurring on a global scale, both in the most developed countries (Gómez-Baggethun et al. 2010) as well as in developing countries (Baldauf and dos Santos 2012; Voeks and Leony 2004). Overall, there is an urgent need to document and safeguard TK before it vanishes (e.g., Cámara-Leret et al. 2014; FAO 2009).

The study of medicinal plants represents the documentation of one of the most significant components of TK, particularly in rural areas of developing countries (Saslislagoudakis et al. 2014). Plants are an integral component of the healthcare for up to 80% of the world's population (Chen et al. 2010). Interviewing a representative part of different human communities is regarded as the most effective way to gather TK (e.g., Paniagua-Zambrana et al. 2018; Souto and Ticktin 2012; Van Andel and Carvalheiro 2013; Voeks 2007). However, there are two relevant factors to take into account: the type of informants and the type of interviews conducted (Davis and Wagner 2003; Martin 1995). Many ethnobotanical studies only conduct interviews of the general population, while some combine interviews with both expert and general informants (Cámara-Leret et al. 2014; Júnior et al. 2016; Thomas et al. 2009). Expert informants are participants recognized by the rest of the community members for their high TK, and often are regarded as the traditional healers of the community (Mugisha et al. 2014; Tongco 2007). In addition, most ethnobotanical studies focusing on medicinal plants use semi–structured interviews or structured interviews, but rarely combine both methods (Odonne et al. 2013; Pasquini et al. 2018; Zank et al. 2019). In semi–structured interviews, informants are given freedom of response with a flexible but controlled outline, whereas in the case of structured interviews the questions follow a more precise scheme (Alexiades 1996).

In this study, we compared different methods to obtain TK about medicinal plants, focusing on the type of informants and distinct forms of interview, in order to evaluate which methods would be the most efficient for data gathering. First, the medicinal plant knowledge of both expert informants and general informants was compared within the same localities. We hypothesized that most of the TK that general informants hold would also be held by the expert informants, as shown in other studies (Ajibesin et al. 2008; Tsioutsiou et al. 2019). Our hypothesis was that even working with expert informants only, we would obtain the most TK about medicinal plants in the localities, and that interviewing a small number of expert informants would require less time overall than with general informants to document most of the ethnomedicinal information of the community or locality. In other words, interviewing expert informants would take more time than interviewing other members of the community, but this would be compensated by the larger number of species and medicinal uses reported.

Second, we compared two different methods to gather TK of medicinal plants, using both semi–structured and structured interviews with the same participants, during two different time periods. Our hypothesis was that using structured interviews would guide the informants more precisely, and would allow us to document larger numbers of medicinal plant species and uses than using semi–structured interviews (Albuquerque et al. 2014; Vogl et al. 2004). At the same time, we hypothesized that structured interviews would be more time–consuming than semi–structured interviews since we need to ask for all documented species and possible categories of medicinal uses in the first method.

Methods

Study Area

The study was carried out in 12 localities (villages) in the northern Peruvian Andes, between 1500 and 3500 m elevation (Table 1). To evaluate the difference in medicinal plant knowledge between expert informants and general informants, we gathered information from all 12 localities with the following criteria: (1) local population does not exceed 1000 inhabitants in any of the localities; (2) they were inhabited by culturally similar mestizo populations dedicated mainly to agriculture and livestock. Both activities have modeled large areas of the landscape. Detailed geographical, climatological, demographic, and ecological information of this ecoregion and localities can be found in Corroto et al. (2019).

To assess the efficacy of structured and semi–structured interviews, we specifically focused on two localities: Granada and Olleros. These localities were chosen based on three criteria: (1) geographical isolation from large cities; (2) limited regional socioeconomic development (no hospitals, large markets, tourist attractions, or paved roads); and (3) small populations with less than 300 inhabitants per locality (INEI 2015).

Data Collection

To test the first hypothesis, we interviewed two types of informants: expert informants and general informants. Experts were selected by the authorities of each locality, representing participants recognized by the community as the custodians of TK on medicinal plants. We could not select gender or age because they were few expert informants in all different localities. We interviewed all experts selected by the authorities, which resulted in having between three and seven expert participants per locality, totaling 77 expert informants (Table 1).

In a first phase, we used the "walk–in–the–woods" methodology for gathering ethnobotanical information of medicinal plants with expert participants. This method was carried out directly in the field, working with each participant for between one and 3 days, respectively. During these semi–structured interviews, the expert participants were asked about the vernacular names and medicinal indications of each plant. We collected the plant material with the expert participants for correct botanical identification. A full list of medicinal plant species and their associated uses was prepared to be used in a second phase. In the second part, we also conducted semi–structured interviews with 523 general informants at their homes trying to balance both gender and age distribution in each locality (Table 1). All documented medicinal plants with their medicinal indications are available as supplementary material in Corroto et al. (2019).

To test the second hypothesis, we only focused on 2 out of 12 localities: Granada and Olleros. One year later, we returned to these two localities and again gathered ethnobotanical data of medicinal plants from 81 of our 100 informants interviewed the previous year. We were unable to locate 19 out

TABLE 1. GENERAL CHARACTERISTICS AND NUMBERS OF THE PARTICIPANTS INTERVIEWED IN THE 12 LOCALITIES STUDIED IN THE NORTHERN PERUVIAN ANDES

Localities	Elevation (m)	Geographical coordinates	# Inhabitants	Principal source of income	Experts participants		General participants	
					# Male (age range)	# Female (age range)	# Male (age range)	# Female (age range)
Cuispes	1891	5°55′41.10″S; 77°56′38.49″W	895	Subsistence agriculture and extensive subsistence cattle	2 (30–72)	1 (49)	23 (20–89)	24 (21–86)
Granada	3454	6°6′11.11″S; 77°37′42.15″W	385	Productive agriculture and extensive subsistence cattle	1 (46)	4 (42–57)	24 (18–59)	21 (20–77)
Huambo	1683	6°25′44.45″S; 77°32′16.50″W	920	Productive coffee and intensive bovine cattle and swine	2 (29–53)	2 (41–51)	23 (24–72)	23 (19–80)
Longuita	2758	6°24′50.14″S; 77°58′6.53″W	548	Productive agriculture and extensive subsistence cattle	4 (43–56)	3 (46–71)	20 (18–69)	23 (20–76)
María	2743	6°25′46.83″S; 77°57′39.03″W	645	Productive agriculture and extensive subsistence cattle	3 (37–55)	4 (34–75)	23 (19–70)	20 (19–81)
Olleros	3442	6°3′13.25″S; 77°38′52.43″W	362	Productive agriculture and extensive subsistence cattle	1 (52)	6 (44–79)	27 (21–79)	16 (18–78)
Quinjalca	3198	6°5′29.76″S; 77°40′43.00″W	843	Productive agriculture and extensive subsistence cattle	2 (55–59)	5 (41–74)	23 (19–66)	20 (18–72)
San Carlos	2013	5°57′57.74″S; 77°56′43.31″W	517	Subsistence agriculture and extensive subsistence cattle	0	4 (36–68)	25 (24–81)	21 (23–69)
Sta. Rosa	1759	6°27′10.54″S; 77°27′22.13″W	912	Productive coffee and intensive bovine cattle and swine	1 (38)	5 (34–82)	25 (18–71)	19 (19–74)
Totora	1655	6°29′5.92″S; 77°27′58.90″W	855	Productive coffee and intensive bovine cattle and swine	0	7 (33–84)	23 (21–65)	20 (19–68)
Valera	1908	6°2′33.49″S; 77°55′9.33″W	981	Subsistence agriculture and extensive subsistence cattle	0	3 (55–59)	25 (18–69)	22 (20–75)
Yomblón	2920	6°26′54.33″S; 78°5′33.55″W	766	Productive agriculture and extensive subsistence cattle	3 (39–58)	4 (26–59)	24 (18–74)	19 (18–70)

of 100 participants for different reasons. We then conducted structured interviews to be compared with the semi–structured interviews that had already been done. Of the 81 informants interviewed twice, 7 were experts and 74 were general participants. We again asked the participants about all the medicinal plants reported during our first study period, using our existing list with the registered common names, and using a laptop to show the participants photographs of the species, in case of any doubt. We assumed that with a one–year period between the two interviews, the TK reported during the first interview (semi–structured) would also be maintained in the second interview (structured) and that, at the same time, the informants would not feel uncomfortable answering our questions. We registered the time it took to conduct the different types of interviews with each of the informants, to later compare the time needed for the different interview methods.

All the collected species were identified and deposited in the Herbarium Truxillense (HUT). The scientific names follow The Plant List (The Plant List: A working list of all known plant species 2018) and the family taxonomic classification proposed by the Angiosperm Phylogeny Group (Chase et al. 2016).

DATA ANALYSIS

We classified all the reported medicinal uses in 18 categories following international standards (ICPC–2 (International Classification of Primary Care), revised 2nd edition 2005) and including modifications for cultural, ritual, or magical diseases as proposed by Macía et al. (2011) and Gruca et al. (2014). Three ethnobotanical indicators were analyzed for each informant: 1) the number of medicinal plant species (NSP) reported in the respective interviews; 2) the number of medicinal plant uses (NMU), corresponding to the use of a plant part of a given species that is associated with a medicinal category and a specific medical indication; and 3) the number of medicinal plants use–reports (NUR), corresponding to the sum of all different medicinal uses reported for the total number of known species.

To analyze the information gathered from expert informants and general informants, we first compared the mean (±SD) of the three ethnobotanical indicators obtained per type of informant and later averaged for all 12 localities. Second, we used two ethnobotanical indicators (NSP and NUR) because the global patterns of NMU and NUR yielded similar patterns. We compared total percentages that expert and general participants contributed to the NSP and NUR per locality, respectively. And finally, using these two ethnobotanical indicators, we averaged and compared them among the 12 most cited medicinal categories.

To evaluate possible differences between both interview methodologies (semi–structured and structured), we calculated a Mann–Whitney U test to seek statistically significant differences between the two interview methods for each ethnobotanical indicator. Finally, we used a general mixed linear model and its corresponding post hoc LSD Fisher test of multiple comparisons ($p < 0.05$) using only NUR with the 12 medicinal categories that yielded the highest number of records. All the analyses were performed in R 3.4.0. (R Development Core Team 2020).

Ethics Statement

The objectives of this study were first explained to the authorities of the 12 localities and after their approval, a written consent permit was obtained. Afterwards, we also obtained oral informed consent from all 600 participants before any interview. The informants agreed to participate voluntarily, knowing they could stop the interview whenever they decided, and that the data gathered would be treated anonymously. In this way, we followed the stipulations of the Convention on Biological Diversity, taking into account the Bonn guidelines, and the Nagoya Protocol (SCBD (Secretariat of the Convention on Biological Diversity) 2002, 2011). The ethics committee of the Universidad Autónoma de Madrid approved the research project and research protocol (CEI 73–1327 to M.J. Macía).

Results

Expert Informants Vs. General Informants

A total of 416 species of medicinal plants belonging to 107 families were registered from the 600 interviews conducted in 12 localities of northern Peruvian Andes. The expert informants represented 12.8% of the total participants interviewed. Overall, the mean of the three ethnobotanical indicators (NSP, NMU, and NUR) at the individual level was almost twice as high for the expert informants than for general informants, whereas the total number of both species and botanical families recorded from each participant group were similar (Table 2). The average time spent per interview was 13 times higher with the experts than with the general informants, but overall, 17 days less were spent with the expert informants.

When the NSP and NUR for the two types of informants were compared per locality using the number of records gathered for each case, we found higher values for the general informants for both ethnobotanical indicators in most of the localities (Fig. 1). However, in four of them, the number of records of NSP and the NUR showed higher values (Fig. 1b, c, and i) or equal values (Fig. 1d) for the expert informants. On average, the expert informants contributed 46.1% of the number of records of NSP and 48.4% of the NUR, whereas the contribution of the general informants was 53.9% of the NSP and 51.6% of the NUR (Fig. 1).

The expert informants clearly showed higher TK of medicinal plants than the general informants in all the medicinal categories, based on the two ethnobotanical indicators tested (Fig. 2). Overall expert

Table 2. Comparison of three ethnobotanical indicators (NSP—number of medicinal plant species, NMU—number of medicinal plant–uses, and NUR—number of medicinal plant use–reports), together with plant species richness, and time spent on interviews for expert informants and general informants in 12 localities of the northern Peruvian Andes

Informant type	Ethnobotanical indicators	Mean ± SD	Plant families	Medicinal plant species	Exclusive medicinal plant species	Average ± SD interview time (min)	Total interview time (days)
Expert informants	NSP	33.2 ± 19.6	105	379	36	625 ± 238	104
	NMU	38.1 ± 16.2					
	NUR	40.6 ± 22.8					
General informants	NSP	17.8 ± 20.9	101	376	39	47 ± 55	121
	NMU	18.2 ± 22.4					
	NUR	20.8 ± 27.6					

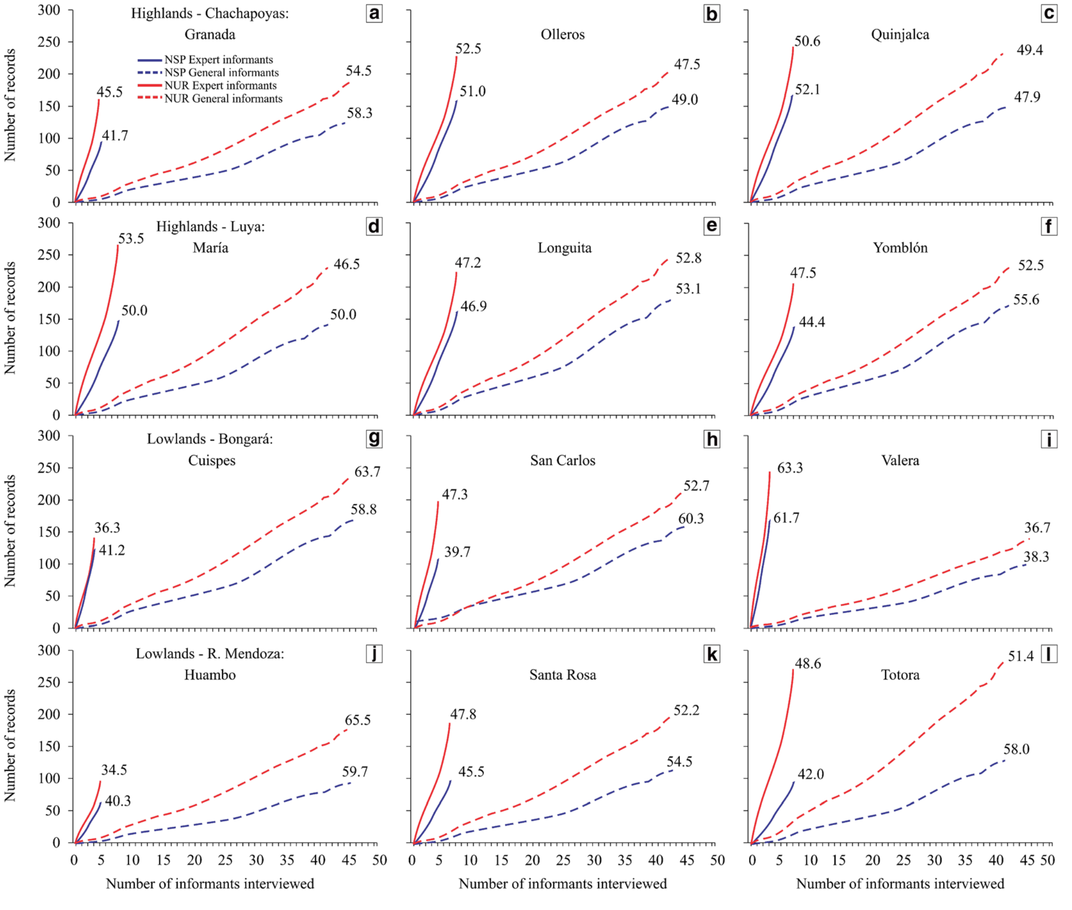

Fig. 1. Comparison of the number of records of medicinal plant species (NSP) and number of medicinal plant use–reports (NUR) gathered from expert informants and general informants in 12 localities of the northern Peruvian Andes. The numbers to the right of the lines indicate the percentages of NSP and NUR obtained within the localities, respectively

informants reported more than twice the NSP than general informants in 6 out of 12 medicinal categories (Fig. 2a, e, f, j, k, and l). Similarly, experts reported more than twice the NUR than general participants in 5 out of 12 medicinal categories (Fig. 2a, e, f, g, and l).

Semi–Structured Interviews Vs. Structured Interviews

In the two localities studied twice, we recorded 249 medicinal plant species belonging to 89 plant families from 81 interviews. The information obtained with structured interviews yielded the highest numbers for all three ethnobotanical indicators (NSP, NMU, and NUR). However, the average time spent in the structured interviews was more than double that spent in the semi–structured interviews (Table 3). Differences between both interview methodologies were statistically significant.

The structured interviews reported a higher NUR than semi–structured interviews for all medicinal categories, although statistically significant differences were found in 7 out the 12 most cited categories: *Digestive system*; *General ailments*; *Skin and subcutaneous tissue*; *Cultural diseases and disorders*; *Muscular–skeletal system*; *Pregnancy, birth, and puerperium*; and *Infections and infestations* (Fig. 3a, d, e, f, h, j, and k, respectively).

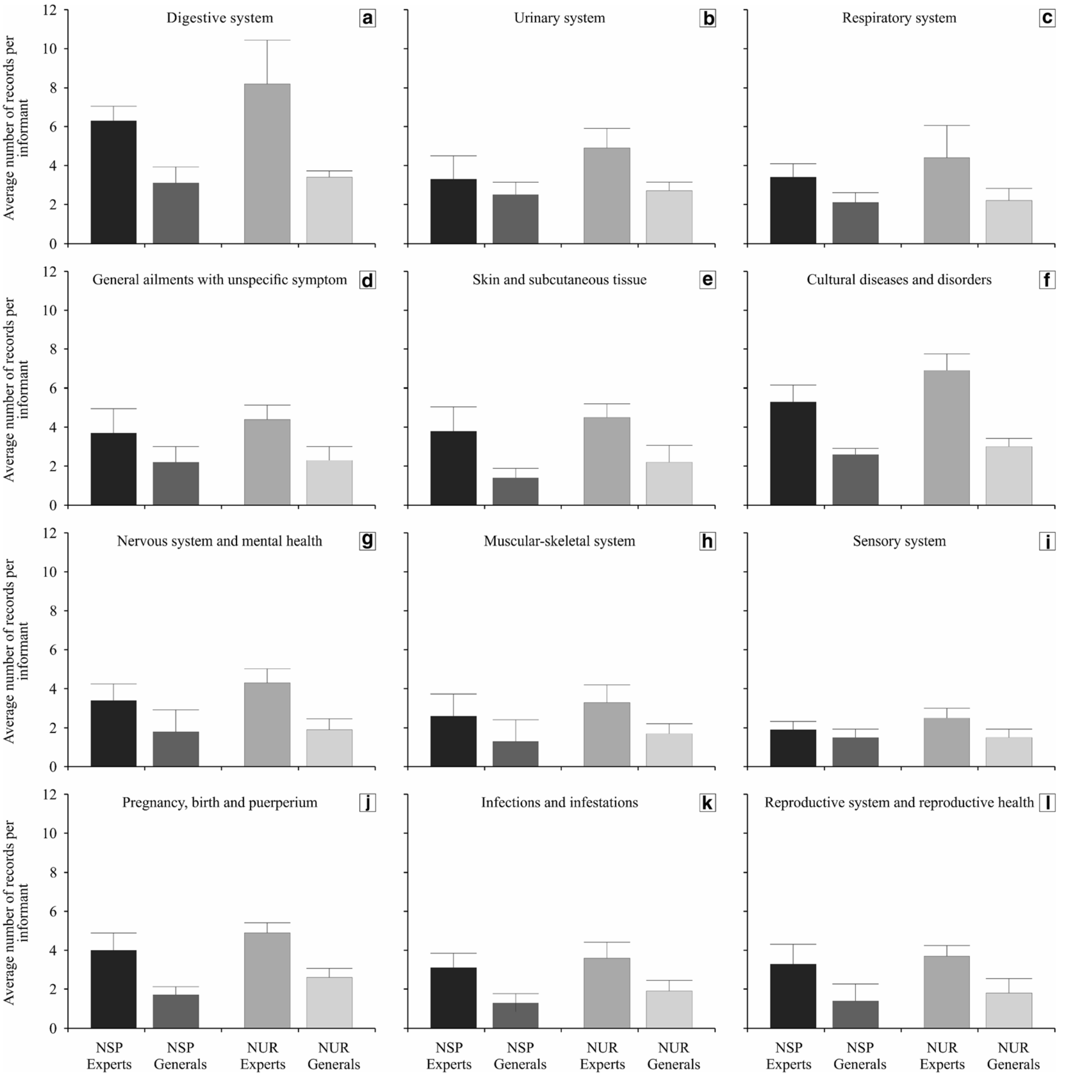

Fig. 2. Comparison of the averages of the number of medicinal plant species (NSP) and number of medicinal plants use–reports (NUR) gathered from expert and general informants in the 12 most cited medicinal categories in the 12 localities studied in the northern Peruvian Andes

Discussion

Expert Informants Vs. General Informants

Our first hypothesis was accepted because most TK of medicinal plants could indeed be registered by only gathering data with expert informants. This means that working only with 12.8% of the total population interviewed, and spending less than half the overall time, we yielded 91% of the NSP information and 67% of the NMU. This is a very acceptable level of confidence, as also documented in earlier studies (Almeida et al. 2012; Voeks 1996). In this sense, it appears that the general informants in the study area have only a basic TK of medicinal plants, leaving the responsibility of maintaining and using more complex medicinal practices to the expert informants of each locality (Singh et al. 2012; Tongco 2007). Our study is in line with previous studies that documented higher TK of expert informants compared to other participants (Belayneh et al. 2012; Cartaxo et al. 2010; Demie et al. 2018).

TABLE 3. THE AVERAGE NUMBER OF MEDICINAL PLANT SPECIES (NSP), AVERAGE NUMBER OF MEDICINAL USES (NMU), AND AVERAGE NUMBER OF MEDICINAL PLANT USE–REPORTS (NUR) OF THE TWO INTERVIEW METHODS USED WITH 81 INFORMANTS IN TWO LOCALITIES OF THE NORTHERN PERUVIAN ANDES

Ethnobotanical indicators	Semi–structured interviews (Mean ± SD)	Structured interviews (Mean ± SD)	Mann–Whitney test between the two methods (p value)
NSP	25.6 ± 9.3	31.8 ± 16.2	0.01**
NMU	30.4 ± 12.4	36.7 ± 18.3	0.02*
NUR	32.4 ± 12.6	38.6 ± 19.0	0.02*
Average interview time (min)	70 ± 26	150 ± 29	–

* indicate significant differences ($p < 0.05$), and ** indicate highly significant differences ($p < 0.01$)

However, in most localities we gathered a higher total number of records with the general informants than with the expert informants, which easily can be explained because the number of general informants interviewed was clearly higher than the number of expert informants interviewed in all 12 localities. Thus, using the walk–in–the–woods method to gather first ethnobotanical information only with the expert participants was relevant to have a whole picture of the majority of the medicinal species used and their associated uses in the study area.

However, the differences between the two types of informants depended on the medicinal category. The TK in the categories *Pregnancy, birth and puerperium*, and *Reproductive system and reproductive health* has been documented as specialized and unique knowledge of expert women in northern Peru (Bussmann and Glenn 2010; Monigatti et al. 2013). But in case of the categories, *General*

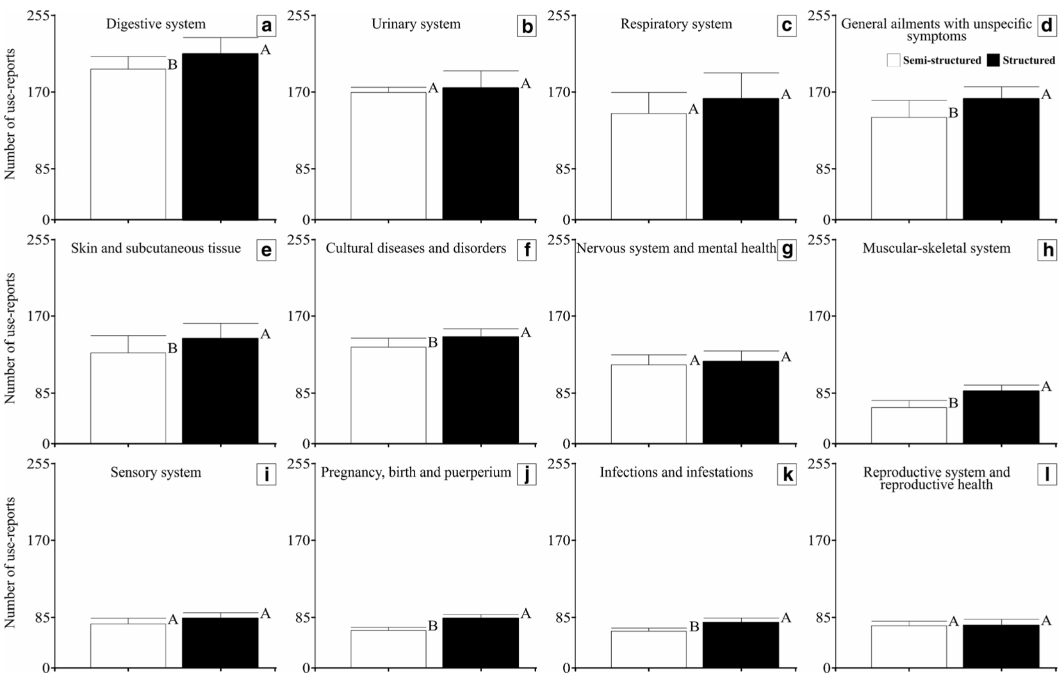

Fig. 3. Comparison of the average percentage of medicinal plant use–reports recorded in semi–structured interviews and structured interviews of 81 participants of Granada and Olleros localities in northern Peruvian Andes. Letters (A, B) indicate significant differences based on general mixed lineal models and the corresponding post hoc LSD Fisher test ($p < 0.05$)

ailments with unspecific symptoms and *Skin and subcutaneous tissue*, most informants in the Andean society know plant resources to alleviate and heal such ailments (Bussmann and Sharon 2014; Ceuterick et al. 2011; De Feo 2003).

However, it is also true that TK information of medicinal plants would be incomplete if focusing only on expert informants, without having any clear idea about how such TK is distributed in a locality or region. Depending on the objectives of the studies, researchers may thus need to focus on different types of participants, taking into account, e.g., gender, age, experts, or general informants to gather the TK as complete as possible, and interviews may need to be extended to the general population to obtain more complete and representative information from the whole community (Espinosa et al. 2012; Mugisha et al. 2014).

Time and costs are two key factors that can greatly limit research efforts, and thus need to be considered carefully before conducting any work. Unfortunately, most grants in our discipline provide a limited budget, and to be executed over short periods of time. Both are fundamental variables to be taken into account in two dimensions. Thus, first, in order to collect as much information about TK in a community in the shortest time possible and thus to gain efficiency, we propose focusing interviews on the so–called expert informants (Almeida et al. 2012; Vandebroek et al. 2004). Second, there is evidence that TK transmission is decreasing worldwide and thus, we need to obtain as much information as possible of cultural ecosystem services before they are lost forever (Cámara-Leret et al. 2014; McMillen 2012; Salpeteur et al. 2016), although we also know that TK is dynamic and local populations adapt to learn new knowledge (e.g., Gómez-Baggethun et al. 2010; Reyes-García et al. 2013a), which is fundamental to the understanding of traditional medical systems nowadays.

Finally, gender and age are relevant factors in TK studies, so when possible, it should be incorporated in data collection and analyses (e.g., Corroto et al. 2019; Srithi et al. 2009). In this study, it was not possible since expert informants were very few in number in all localities and selected by local authorities, exclusively.

Semi–Structured Interviews Vs. Structured Interviews

Our second hypothesis was also verified, because the use of structured interviews resulted in the most effective method to obtain TK information on medicinal plants. Conducting structured interviews, we obtained an increase of 18% of NSP, 21% of NMU, and 19% of NUR. Using this method, we made sure the informants had the opportunity to give information on all potential medicinal plant species used in the area (Bernard 2006), and follow past results that documented interviews elicited more TK than freelists (Paniagua-Zambrana et al. 2018). It is very important to gain the confidence of the informants to obtain good results, which depends on an open and collaborative role of the interviewer to succeed (Albuquerque and Hanazaki 2009). Furthermore, through the use of structured interviews, the interviewer has the opportunity to use previous knowledge about medicinal plants, making it easier for the informants to be involved in the interview (Alexiades 1996). However, at the same time, structured interviews need to be prepared more carefully, requiring previous research on the species, and might even include, as in our case, the previous photographic documentation of the species, reducing the time of the interview and minimizing the risk of misidentification (Martins et al. 2012; Nguyen 2003; Thomas et al. 2007).

The time spent in the interviews is a very important factor when conducting a large number of field interviews at different levels. Structured interviews usually take almost twice as long as semi–structured interviews, which could be a limiting factor when deciding on the method to be used in the field (Quinlan 2005). Thus, the implications of doing a pre–study to get names and plant images for the structured interviews is time demanding. This needs to be taken into account when a researcher starts a new project and little or no previous data exist for a given area. In this particular case, structured interviews may not be the most efficient method and therefore we do not recommend it.

Our results identify differences in the two interview methods; that is, semi–structured and structured interviews. However, it needs to be further tested since unidentified bias could be found. Other authors could use our study as a model to investigate potential biases from using semi–structured and/or structured interviews with different human populations elsewhere.

Finally, our results only have quantitatively analyzed TK of medicinal plants, and probably other use categories will follow this same pattern for both the type of informants and interviews, but still we need more studies to confirm that our results can be applied widely to different cultural domains.

Conclusions

The importance of TK in the conservation of biocultural diversity is widely recognized by international organizations that protect health and the environment. These entities have highlighted the dire consequences of the unquestionable loss of TK (of medicinal plants) throughout the world. Ethnobotanists and ethnobiologists must find the most efficient techniques and methods for documenting TK rapidly, before it is lost forever. Our study shows that, at least in the case of medicinal plant knowledge, working only with expert informants allows us to obtain a large part of the TK while spending less time in the field. The use of structured interviews was a more appropriate method to obtain most of the TK in a community when previous ethnobotanical data have been already reported; but, in turn, required much more time. Researches may take these recommendations into account before starting a new study, and depending on the available budget and time.

Acknowledgments

We are grateful to the 600 participants from the 12 Peruvian localities who shared their knowledge and time with us, and doubly grateful to the 81 informants who were interviewed twice or more times. We are also grateful to the political authorities of all the localities that allowed us to conduct the study. We thank Rainer Bussmann and three anonymous reviewers for their helpful comments on the manuscript. This work was supported by Universidad Nacional Toribio Rodríguez de Mendoza and Universidad Autónoma de Madrid. M. J. Macía received support from the Spanish Ministry of Economy and Competitiveness, grant number CGL2016–75414–P.

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