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Distribution of Herbal Remedy Knowledge in Tabi, Yucatan, Mexico

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Abstract

The distribution of herbal remedy knowledge among a group of people is studied for two main reasons: (1) to identify plants that are promising for pharmacological analysis, and (2) to examine the factors that lead to herbal remedy knowledge erosion as opposed to dynamism in the acquisition of knowledge. The goal of this particular study, which is aligned with the second reason, is to establish the variation in herbal remedy knowledge among the Yucatec Maya in Tabi, Yucatan, Mexico. Free listing and cultural consensus analysis revealed that knowledge about a few medicinal plants and herbal remedies was distributed widely among the Yucatec Maya in Tabi, whereas the majority of knowledge was idiosyncratic. This finding was consistent with other studies of herbal remedy knowledge distribution among indigenous groups in Latin America and Africa. Assessing patterns in the distribution of herbal remedy knowledge is an important next step in determining the degree of dynamism or erosion in knowledge acquisition and transmission in Tabi.

Keywords

Yucatan; Mexico; Yucatec Maya; traditional medicine; medicinal plants; herbal remedies; knowledge distribution; socially acquired knowledge; cultural consensus analysis

Introduction

There are two common reasons for studying the distribution of herbal remedy knowledge in a community: (1) to identify plants that are considered efficacious and thus promising for pharmacological analysis, and (2) to elucidate the factors that lead to herbal remedy knowledge loss, transformation, and/or persistence. In the first group of studies the usual approach is to identify the plants with more consensus regarding their application (Friedman et al. 1986; Johns et al. 1990b; Trotter II and Logan 1986). In the second group of studies the goal is to understand consensus, variation, and patterns of knowledge across the population (Alexiades 1999; Barrett 1995; Casagrande 2002). Dynamism and erosion in ethnobotanical knowledge can then be assessed, ideally through replicated studies over time. The goal of this particular study, which is aligned with the second group, is to establish the variation in herbal remedy knowledge among the Yucatec Maya in Tabi, Mexico. By focusing on a systematic assessment of variation in knowledge among non-healers, this study provides an important addition to the medical ethnobotanical research, especially from

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the Yucatan Peninsula (cf. Anderson 2003, 2005; Ankli et al. 1999a, 1999b, 2002; Arellano Rodríguez et al. 2003; Garcia et al. 1999).

Previous studies of the distribution of medicinal plant knowledge from a small number of locations in other areas of Latin America and Africa have largely found that medicinal plant knowledge varies in distribution from a large number of idiosyncratic responses to a more limited number of responses that are shared among a group. For example, Barrett (1995) determined that the medicinal uses of some plants are widely distributed among the six ethnic groups living in the Atlantic Coastal Region of Nicaragua, and the majority are reported by only a few individuals. This demonstrates what he coined as a pattern of "consensus within diversity." Among the Tzeltal Maya in Chiapas, Mexico, Casagrande (2002) also found that a core number of herbal remedies were shared widely, while a larger set of herbal remedy knowledge was idiosyncratic. Friedman et al. (1986) noted a similar distribution pattern among the Bedouins in the Negev Desert, and Johns et al. (1990b) found that most herbal remedy knowledge among the Luo of the Siaya District of Kenya was idiosyncratic. Data from an ethnomedical survey of the Ese Eja of the Bolivian and Peruvian Amazon also showed a wide distribution of responses with a large amount of idiosyncrasy (Alexiades 1999). The consistency in this pattern of "consensus within diversity" led to development of the following research questions in this study: What is the distribution of herbal remedy knowledge among the Yucatec Maya in Tabi? How does this distribution compare to other places?

Study Location

This study was carried out from April 2007 through April 2008 in Tabi, a Yucatec Maya rural community located in the central part of the state of Yucatan, Mexico. The community consists of 698 people residing in 122 households. Practically all men and women in Tabi continue to participate in traditional subsistence livelihood activities and spend the majority of their time outdoors. Most adults attended school, although only 26 % completed sixth grade and almost a third are illiterate. A few adults are monolingual Yucatec Maya (9.5 %) or Spanish (1.5 %) speakers, while the vast majority are bilingual (89 %). Although Catholicism is still the most common religion (46 %), increasing numbers of people are joining the many Protestant-based religions now available in Tabi (34 %) or choosing to have no religious affiliation. Herbal remedies continue to be the most commonly used treatment for frequently occurring illnesses; however, families are increasingly choosing to utilize pharmaceuticals prescribed by medical interns at the state-run health care clinical in Tabi. The presence of conditions that typically impact the distribution of socially-acquired knowledge, such as access and use of modern services (e.g., the school and health care clinic) and embracing new forms of knowing (e.g., bilingualism and religious conversion), suggest that Tabi is an appropriate location to study variation in herbal remedy knowledge.

Methods

Free listing was used to capture the variation in herbal remedy knowledge in a manner that was comparable with previous studies and to inform the selection of items used in a cultural consensus analysis (CCA) questionnaire (cf. Weller and Romney 1988). As reported in more detail in Hopkins (2011), the free list method consisted of asking 30 women and 10 men of varying ages from different households to list all the herbal remedies they knew. We asked about herbal remedies, instead of the more commonly used medicinal plants, because participants preferred to report the plants and the illnesses they were used to treat as one entity. We used ANTHROPAC to analyze the data and produce the frequency with which each herbal remedy was reported. We also parsed each remedy into the illness and plant(s)

that composed it and calculated the frequency of each, which allowed us to make comparisons with other studies.

We gathered voucher specimens of the plants reported by at least three participants in the free listing interviews after receiving permission to collect under the plant collection permit (FLOR0025) from the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). The plant specimens were dried and identified at the Centro de Investigación Científica de Yucatán (CICY). A duplicate of each voucher was deposited in the herbaria at CICY, Florida Museum of Natural History (FLAS), University of Georgia (GA), Missouri Botanical Garden (MO), and also in the Ethnobiology Laboratory at the University of Florida.

Since the large number of idiosyncratic responses reported in previous studies may be a product of free or prompted recall inherent in free listing, we also administered a dichotomous response questionnaire that relies on participant recognition of herbal remedies as opposed to recall. The data from the questionnaire were analyzed using cultural consensus analysis (CCA) to determine if there was one shared domain of herbal remedy knowledge and to measure individual agreement in herbal remedies (Borgatti 1996; Weller and Romney 1988). The details of this procedure can be found in Hopkins (2011), but briefly, we created a questionnaire that consisted of 43 questions in the form “Can *plant x* cure *illness y*?” in which we substituted various plant names for *plant x* and their corresponding illnesses for *illness y*. Half of the questions consisted of plausible remedies that were not reported in the free listing exercise nor are known in the literature to avoid response bias (Weller 2007). The questionnaire was administered to 116 people in different households that were considered the most knowledgeable about medicinal plants. The data were analyzed in UCINET by calculating the proportion of matches between pairs with a statistical adjustment for guessing, and then a minimum residual factor analysis was run on the corrected matches (Borgatti 1996; Borgatti et al. 2002; Romney et al. 1986).

Results and Discussion

A total of 650 different remedies were free listed (Table 1 and @Appendix 1 at http://www.clas.ufl.edu/users/stepp/yucatan.pdf). The frequency of people who reported each remedy ranged from 1 to 20 out of the 40 interviewed, and 84 % of the remedies were reported by only one individual (Fig. 1). The most commonly reported remedies were reported by 50 %, 37.5 %, 27.5 %, and 25 % of the people. The average number of remedies free listed per person was 23, with a range from 2 to 88.

The remedies were comprised of 107 distinct illnesses and 276 different names of plants. The proportion of people who reported each of the plant names as being used in a remedy ranged from 2.5 % to 82.5 % (Fig. 2). In general, the pattern shows that a few plant names are reported by many people and numerous plant names reported by a few people. This pattern fits with other studies on the distribution of medicinal plant knowledge in Latin America and Africa (Barrett 1995; Casagrande 2002; Friedman et al. 1986). The number of plant names reported by only one individual was 47 %. This finding is similar to other studies that found between 40 % and 50 % of the medicinal plant knowledge was idiosyncratic (Barrett 1995; Johns et al. 1990a, 1990b). In Tabi, 39 % of plant names were reported by more than three people. In other studies the range of plants recognized by more than three people was from 15 % to 50 % (Barrett 1995; Johns et al. 1990a). Generally not more than three plants were reported by the vast majority of the participants (Barrett 1995; Casagrande 2002; Friedman et al. 1986). The three most commonly reported plant names in Tabi were provided by 82.5 %, 65 %, and 55 % of the people interviewed. The similarities

between our findings and those of previous studies suggest that the distribution herbal remedy knowledge from Tabi is not atypical.

The results from the CCA were used to further assess the variation in medicinal plant remedy knowledge in Tabi. All of the assumption of CCA were met with the Tabi data (Hopkins 2011). Thus, there is one common cultural herbal remedy knowledge in Tabi, and the first factor values represent individual competence scores in that knowledge. The individual competence scores ranged from 0.08 to 0.95, where 0 is no competence and 1 is full competence (Fig. 3). The mean competence score is 0.64, with a standard deviation of 0.20. The findings from the CCA confirm the result from the free list activity that there is quite a bit of variation in reported knowledge about medicinal plant remedies within Tabi. In addition, the CCA reveals that community members vary in their proficiency of the common culture of herbal remedy knowledge in Tabi (Boster 1985).

The findings in this study were consistent with other studies of herbal remedy knowledge distribution among indigenous groups in Latin America and Africa. Identifying existing patterns in knowledge distribution is the first step to understanding processes of cultural knowledge sharing and the factors that influence these processes. A next step is to determine patterns in the distribution of herbal remedy knowledge based on characteristics of the community members. Once these patterns are identified they can provide a greater understanding of changes in knowledge exchange over time. It is important to note that although these findings are consistent with previous studies, the described pattern of knowledge distribution may not be the same in all rural indigenous communities nor when using different methods. Varying access to modern services and new forms of knowing are likely to influence the distribution of knowledge throughout a community. Comparative studies designed to test differences in the distribution of knowledge across communities with different levels of access to modern services and contact with diverse groups of people are needed to fully understand how these factors influence the distribution in knowledge.

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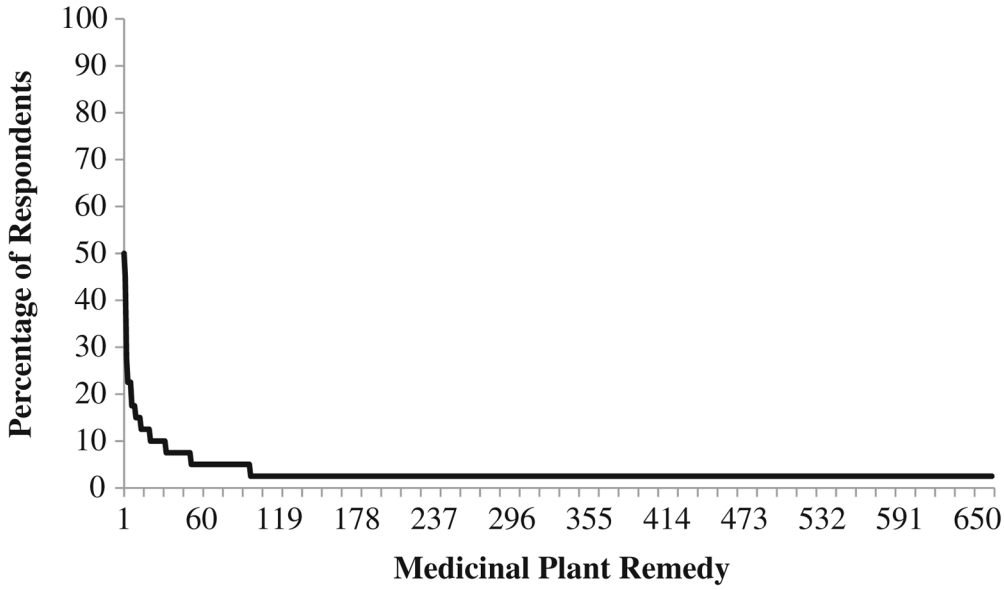

Fig. 1.
Distribution of herbal remedy knowledge based on data free listing exercise (n=40).

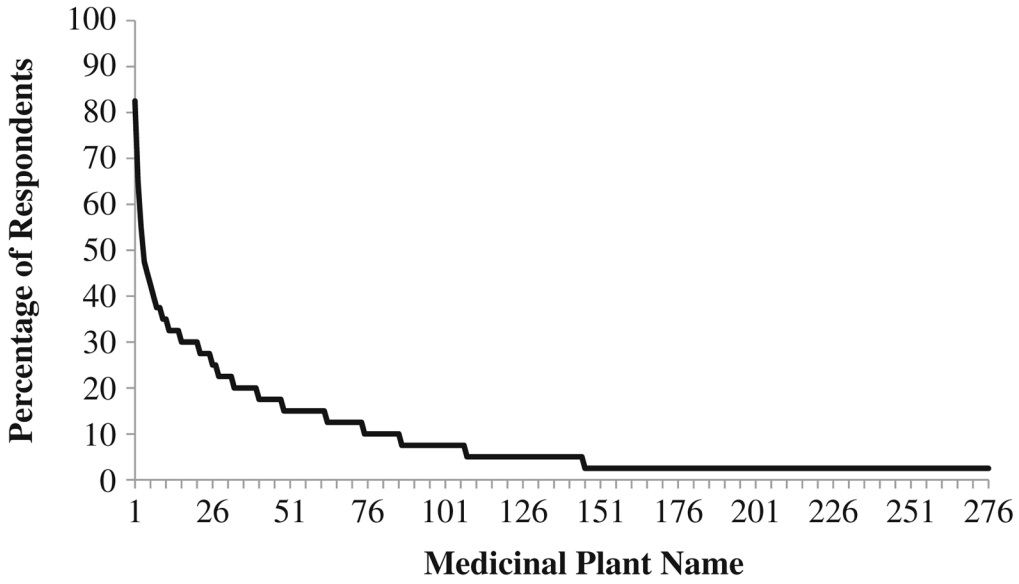

Fig. 2.
Distribution of medicinal plant names based on the data from the free listing exercise (n=40).

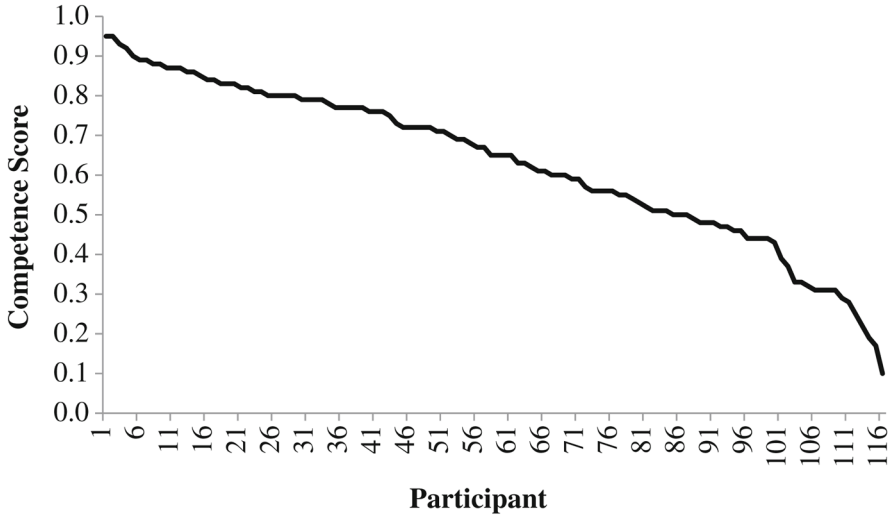

Fig. 3.
Distribution of competence scores based on cultural consensus analysis (n=116).

Table 1

Species composing remedies free listed by three or more participants.

Family	Species	Collection #	Common Name	Medicinal Use
Agavaceae	*Manfreda petskinil* R. Orellana, L. Hern. & G. Carnevali	07-53	Petzkinil	Headache
Amaryllidaceae	*Allium schoenoprasum* L.	07-46	Cebollina	Stomach gas
Anacardiaceae	*Spondias purpurea* L.	07-21, 07-22	Ciruela	Diarrhea
Annonaceae	*Malmea depressa* (Baill) R.E. Fries	07-2	Elemuy	Kidney stones
Apocynaceae	*Tabernaemontana amygdalifolia* Jacq.	07-12	Utzupek'	Splinter
Apocynaceae	*Thevetia gaumeri* Hemsley	07-9	Akitz	Toothache
Asteraceae	*Artemisia vulgaris* L.	07-49	Sisin	Vomit
Asteraceae	*Pluchea carolinensis* (Jacq.) G. Don	07-42	Chalche'	Infertility
Bignoniaceae	*Crescentia cujete* L.	07-19	Jícara	Headache
Bignoniaceae	*Tecoma stans* (L.) Juss. ex Kunth	07-10, 07-63	K'an lool	Diabetes
Boraginaceae	*Heliotropium angiospermum* Murray	07-8	Nema'ax	Diarrhea
Cactaceae	*Hylocereus undatus* (Haw.) Britton & Rose	07-20	Pitajaya	Dysentery
Caricaceae	*Carica papaya* L.	07-1	Ch'iich' puut	Snakebite
Chenopodiaceae	*Dysphania ambrosioides* L.	07-36	Epazote	Parasites, Vomit
Cucurbitaceae	*Momordica charantia* L.	07-43	Chiquita	Acne
Euphorbiaceae	*Cnidoscolus aconitifolius* (Mill.) I.M. Johnston	07-35	Chaya	Kidney stones, No lactation
Euphorbiaceae	*Croton humilis* L.	07-24	Ik'aban	Warts
Euphorbiaceae	*Euphorbia gaumeri* Millsp.	07-33	Weech xiiw	Diarrhea
Euphorbiaceae	*Jatropha curcas* L.	07-57	Sikilte'	Canker sores
Euphorbiaceae	*Jatropha gaumeri* Greenm.	07-13	Polmolche'	Canker sores
Euphorbiaceae	*Ricinus communis* L.	07-26	X-K'o'och	Fever
Lamiaceae	*Mentha x piperita* L.	07-55, 07-62	Hierba buena	Parasites
Lamiaceae	*Ocimum basilicum* L.	07-51	Albahaca	Eye pain
Lamiaceae	*Ocimum campechianum* Mill.	07-14	Kakaltun	Diarrhea, Dysentery
Lamiaceae	*Origanum vulgare* L.	07-30	Orégano de Castilla	Earache
Liliaceae	*Aloe vera* (L.) Burm. f.	07-48	Sábila	Dandruff
Liliaceae	*Aloe vera* (L.) Burm. f.	07-48	Sábila	Hair loss
Malvaceae	*Abelmoschus moschatus* Medik.	07-34, 07-64	Viperol	Snakebite
Malvaceae	*Gossypium hirsutum* L.	07-65	Tz'intaman	Asthma
Meliaceae	*Trichilia hirta* L.	07-37	K'ulinsiis	Itchy skin
Menispermaceae	*Cissampelos pareira* L.	07-5	Pepektun	Dysentery
Moraceae	*Maclura tinctoria* (L.) D. Don ex Steud.	07-18	Moraz	Toothache
Musaceae	*Musa x paradisiaca* L.	07-31, 07-32	Plátano	Canker sores
Olacaceae	*Schoepfia schreberi* J.F. Gmelin	07-38, 07-66	Sak beek	Cough
Olacaceae	*Ximenia americana* L.	07-27	Napche'	Diarrhea
Papaveraceae	*Argemone mexicana* L.	07-56	Kardo santo	Toothache
Plantaginaceae	*Plantago major* L.	07-54	Llantén	Diarrhea, Stomach fever
Poaceae	*Cymbopogon citratus* (DC. ex Nees) Stapf.	07-58	Zacate de limón	Cough
Poaceae	*Zea mays* L.	07-41	Maíz	Diarrhea, Kidney stones

Family	Species	Collection #	Common Name	Medicinal Use
Polygonaceae	*Antigonon leptopus* Hook. & Arn.	07-52	Flor de Santiago	Diarrhea
Rubiaceae	*Coffea arabica* L.	07-50	Café	Fever
Rutaceae	*Citrus aurantium* L.	07-3	Naranja agria	Chill in the stomach, Colic, Diabetes, Stomach gas
Rutaceae	*Citrus limonia* Osbeck	07-23	Limón país	Cough, Dysentery
Rutaceae	*Ruta graveolens* L.	07-29	Ruda	Evil eye
Sapotaceae	*Manilkara zapota* (L.) van Royen	07-16, 07-67	Zapote	Diarrhea
Solanaceae	*Solanum lycopersicum* L.	07-45	Tomate	Burns
Urticaceae	*Urera baccifera* (L.) Gaudich. ex Wedd.	07-17	Ortiga	Colic, Headache
Verbenaceae	*Lippia graveolens* Kunth	07-47, 07-61	Orégano país	Earache