Becoming a Traditional Medicinal Plant Healer: Divergent Views of Practicing and Young Healers on Traditional Medicinal Plant Knowledge Skills in India

Research

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Abstract

Traditional medicinal plant knowledge (TMK) helps meet the health needs of a large section of the world's population, especially socially and economically disadvantaged and aboriginal communities of developing countries like India. However, there is little known about TMK skills and their intergenerational transfer and growing concerns over the erosion of TMK within these communities. Through in-depth interviews with 33 practicing village healers from two remote and economically poor villages of Western India, we identified a set of ten crucial TMK skills and their relative importance. We then interviewed 27 young budding healers from the same villages to establish their views on crucial TMK skills. The Mann-Whitney U test was used to compare the differences in importance that old and young healers attach to TMK skills. We found that old and young healers significantly differ on ascribing importance to five crucial TMK skills, including: interest, identification, rare plants, consultation and harvesting. It was discovered that such differences in perception of old and young healers about critical TMK skills can be attributed to lack of interest by young healers in learning some TMK skills, complexity of the skills, incomplete transmission (due to stricter adherence to transmission rules by old healers) and the impact of formal schooling and modern medicines in generating negative values among young healers towards learning new TMK skills.

Traditional Medicinal Plant Knowledge

World Bank estimates indicate that more than eighty percent of the population of South Asia uses plant-based medicines for maintaining and improving their health (Nickel & Sennhauser 2004). These community-based, or local uses of medicine, can be classified broadly into the following three categories according to the knowledge base that underpins them (Hamilton 2005): (i) Traditional systems of medicine, with a systematic codified body of knowledge either in the form of pharmacopoeias or ancient scriptures [ayurvedic, Chinese and Tibetan medicine, siddha, unani (Arabic), etc.]. The WHO (2002) defines traditional systems of medicine (TSM) as 'the diverse health practices, approaches, knowledge and beliefs incorporating mainly plants and plant products with or without spiritual therapies transmitted through generations by oral means to maintain well-being, as well as to treat, diagnose or prevent illness; (ii) Traditional medicinal knowledge or folk medicine (TMK), which is transmitted by oral means and is mostly acquired through learning-by-doing approaches, and (iii) Shamanistic or spiritual medicine, which has a strong religious/spiritual element and can be practiced only by highly specialized local experts called shamans.

Our concern here is with TMK practices and beliefs as they relate to plant-based medicines and that are transmitted by oral means. TMK associated with plant use is most widely practiced in South Asia (Shankar 1999, Shukla & Gardner 2006) and is being increasingly recognized by government agencies such as the National Medicinal Plant Board of India and international agencies such as

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the United Nations Educational, Scientific and Cultural Organization (UNESCO), Oxford Committee for Famine Relief (OXFAM), and the Ford Foundation. Despite the growing recognition of TMK, scholars are expressing serious concerns about its erosion including loss of TMK skills due to lack of interest by younger generations, lack of intergenerational transmission, inadequate support structures for recognition and legitimization of TMK and its holders (Gupta 2003, Kala 2005). Some of these factors such as loss of TMK skills are directly contributing to the erosion of TMK and are more serious than others. However, scholarly understanding of TMK skills is lacking (Shankar 2001, Shukla & Gardner 2006). The importance of understanding TMK skills is also emphasized in various studies on transmission (Hewlett & Cavalli-Sforza 1986, Ohmagari & Berkes 1997, Ruddle 1993, Ruddle & Chesterfield 1977, Tsuji 1996). Generally, these studies considered 'skills' as the practice-oriented aspect of local knowledge. In other words, assessing critical TMK skills as they have been learned and practiced by its practitioners is one of the most direct and useful ways to understand the process of TMK erosion.

While local knowledge such as TEK is dynamic and cumulative (Berkes 1999), we also endorse the view that distribution and accessibility of TEK can be unequal at the community level (Gupta & Sinha 2002, Vanderbroek *et al*. 2004). This is particularly true in the case of TMK, since medicinal and edible plants may not be known by many members of the village community, rather its processing, application and treatment is known and practiced only by local healers having specialized skills (Shankar 1999). The critical TMK skills are therefore, mostly inherited from previous generations without much modification (Haarumaya 2003a,b) as opposed to the local knowledge being 'derived' or adapted from inherited knowledge. We therefore concentrate only on critical TMK skills, which are generic, known and practiced by local healers and are not subject to change with intergenerational transmission, at least from the view of established healers.

The analysis of TMK skills within local knowledge systems has been restricted to traditional knowledge with regards to survival or livelihood. For instance, a pioneering work by Ruddle and Chesterfield (1977) summarized various studies on transmission of traditional knowledge in the context of subsistence-societies. In this study, the various tasks to accomplish livelihood activities including fishing, hunting, farming and collection of wild plants were described as important traditional knowledge skills. Ohmagari and Berkes (1997) also enlisted 93 'bush skills'- which were identified as traditional competencies to become self-reliant in making livelihood off the land (forests or wetlands) - mainly for hunting, fishing and food processing by women members of two sub arctic Cree Indian communities in Canada. Even though the list of these skills was not exhaustive, it did include use of traditional medicine as one of the important bush skills.

Other studies have also made passing reference to important TMK skills. For instance, in a study by Zarger (2000) on Q'eqchi' Maya in Belize, identification and harvesting of wild and medicinal plants were considered critical subsistence skills. The Kadazan and Dusun healers of East Malaysia also indicated the importance of specialized TMK skills such as application of medicinal-plant based formulation, diagnosis of patient (consultation) and use of rituals during administration of treatment (Haarumaya 2003a). Lozada *et al*. (2006) in their study on TMK use and transmission among local communities in Cuyin Manzano near Andean forest of Argentina concluded that physical, geographical and ecological features of medicinal plants were important content for learning TMK. The specific TMK skills such as color and smell (identification) of plants, its use, location of plants including landmarks and best time to collect plants (harvesting) were emphasized during TMK transmission.

In the Indian context, studies specifically looking at TMK have focused largely on documenting ethno-medicinal knowledge of local communities (Patil & Patil 2005, Sharma & Majumdar 2003) rather than skills. Research studies on TMK skills and their transmission are rare. One such example is a study by Chand and Shukla (2003), who identified some critical TMK skills such as: i) identification of plants with detailed attention to their morphological features; ii) medicinal uses of plants; iii) administering the treatment to patients; and iv) development of 'utility perspective', i.e. practical understanding of the use of plant materials. This study also suggests that learning about TMK could start as early as 5-7 years of age and by the age of 9 most of the learners were well placed in the learning cycle, which might continue for several years.

TMK transmission refers to as a transfer of skills from old healers to young healers (Ohmagari & Berkes 1997). In other words, it is a process of acquisition of skills and values by younger healers in order to become mature healers who can independently practice TMK. Weaker transmission of TMK skills means fewer younger community members will become mature practicing healers in future. The decline in the number of TMK practitioners or mature local healers thus contributes to erosion of TMK.

Given these issues and concerns about the TMK skills, its erosion, and the importance of intergenerational loss, our research focuses on documenting the crucial TMK skills necessary to become a successful healer and assesses the relative importance of identified skills through the perspectives of old and young local healers. We considered the perspectives of old and young healers on the importance of critical TMK skills since differing perspectives may underpin the loss of TMK particularly during its intergenerational transmission at the local level.

Selection of Research Sites, Participants and Methods

The field research was conducted in two villages of Maharashtra State, selected in consultation with two Non-Governmental Organizations (NGOs); Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) and Rural Commune's Medicinal Plant Conservation Center (RCMPCC). Both SRISTI and RCMPCC were internationally recognized for promoting community-based conservation in India, through the use of TMK and hence they were approached to help identify study villages. Table 1 describes the salient characteristics of two field work villages.

Table 1. General description of villages selected for field research in Maharashtra State, India.

Characteristics	Villages	
	Amboli	**Baripada**
Population	3647	986
Social groups	Marathas and gurav are predominant higher caste groups. About ten percent of lower caste groups include dhangar, chamar, jadhav.	Two main tribal groups are pawar and chaure with a small proportion of bhils.
Altitude	690 m	350 m
Community conserved area	267.63 hectares	445.28 hectares
Landscape vegetation	Dry deciduous forest with patches of evergreen forest	Semi evergreen forest

Source: self-compiled based on village records and information provided by local NGOs

In the first phase of the research 33 healers (N=16 from Amboli, N=17 from Baripada) were selected of which less than half were women. All healers from the Baripada were from scheduled tribes, while the majority (three-fourths) from Amboli were from Maratha or the higher caste category. In this study, the traditional healers or **vaidus**[i] were identified mainly on the basis of following criteria: i) a person who is a resident of a village; ii) a person who has demonstrated ability/skills to practice as a healer in and around the village; and iii) a person, who has been recognized by local residents and/or neighboring villages as being a general or specialized **vaidus**.

After selecting the healers, data on skills were obtained through informal interviews (Cohen *et al*. 2000), based on healers' availability and willingness to participate in the study. Interviews were conducted during forest walks with the healers, who were mainly asked to provide responses to the open-ended questions like: What skills are crucial to become a successful healer? The informal conversation with healers during these forest walks, and participant observation of healers, yielded statements describing various skills (see Table 2, column 2). This list was then shared with healers in focus group discussions which allowed categorizing and consolidation of these statements into a final set of the ten most important skills for being a successful healer.

During the focus groups, the healers were asked to assign scores to these skills in order of importance. Such an exercise was conducted to assess the difference between young and old healers in terms of relative importance they attached to crucial skills, as an indirect measure of which skills are vulnerable to being lost. These skills were scored on the basis of a three-point rating scale: a) most important (scored as 3), important (scored as 2) and least important (scored as 1). The average scores for each of ten crucial skills were analyzed using SPSS (V 13.1) and discussed with the healers in small groups where they verified and finally categorized the skills by order of importance (Table 2).

In the second phase of research, 27 young individuals were identified for participation in the research who had been selected as disciples by 33 elder healers. These young healers were asked to rank the skills in the same manner their teachers or elder healers did in the first round. The differential preferences between young and old healers were analyzed through the Mann-Whitney test using SPSS (V. 13.1).

Results: Crucial TMK Skills

The ten critical skills as identified by local healers are presented in Table 2. Each skill consists of a set of sub skills that were derived from the healers' comments on each and are described in turn.

Identification of plants

According to healers, identification of plants is one of the most important skills since it deals with recognizing plants in the forest. The correct identification is thus considered by the healers as key to learning how to avoid the harmful effects of poisonous plants when used in a treatment. Identification of rare plants is also considered an important sub-skill in order not to remove plants inadvertently while picking other medicinal plants from the wild. Most

i. **Vaidus** is a generic term commonly used to describe TSM and TMK practitioners throughout Maharashtra and many parts of India.

healers, however, strongly believe that identification of poisonous plants must be taught. “Plants, for example like **bhuykuli**, have potential to kill even human beings if eaten in a small quantity. Therefore, young healers must know to recognize such plants in wild” (MC, personal interview, Baripada).

Identification of plants is mostly taught in the wild or forest areas or in some cases, in specially created areas such as home herbal gardens (Baripada) or village demonstration gardens (Amboli). In some cases, identification is also taught at the homes where the plants are cut and stored. In a few cases these skills are learned during visits to the forest as part of daily routines, including cattle grazing. There are variations in the methods of teaching identification. For example, “My father used to keep four to five branches in front of me, and then asked me to pick the right one by calling out their names” (JY, personal interview, Amboli). This kind of guided and practical teaching helped in not just learning how to identify plants, but also in differentiating the medicinal uses of plants.

Some healers have also suggested methods for identifying seemingly alike plants based on a step-wise test. One should begin to look at the color of the leaves. If the colors of two leaves are the same, then look for the shapes of leaves. If the shapes are the same, then crush the leaves and stem bark and smell. Most plants have a distinct smell, but, even if one is confused with similar smells, then the final criterion should be to check for the type, shape, size and smell of flowers and fruits.

Even though the mean age of acquiring the identification skills is close to 17 years, it is being learned and taught throughout healers’ lives.

Knowledge of rare and locally unavailable plants

The knowledge of the rare and locally unavailable plants was established as another important skill mainly because such skill helps to ensure protection of local medicinal plants from overuse.

> “We are almost on the verge of extinction of **amruta** plant because its anti-cancer properties were discovered by a few pharmaceutical companies, and some of the plant collectors from outside villages have been indiscriminately chopping this valuable species from our

Table 2. Critical TMK skills identified to become a successful healer in Amboli and Baripada villages in Maharashtra State, India.

Name of Skills	Description of skill / sub-set of skills	Mean age at which skill was acquired (N=33)	Mean scores reflecting importance attached to the skills (N=33)
Identification	Identification of rare plants Identification of poisonous plants Distinguishing phenotypically similar plants	16.74	Most important
Knowledge of plant becoming rare	Name and location of rare plant species Marking location of rare plant species for other healers Spreading awareness for regeneration/sustainable use/ safer harvesting of rare plants	20.57	Most important
Interest in plants	Developing sensitivity towards local biodiversity Showing a desire to learn about plants Curiosity to learn about plants	15.09	Most important
Harvesting of plants	Part and quantity to be removed Method of harvesting Time of removal (specific day and time, e.g., planetary movements) Special care/rules for harvesting to be taken Religious rituals to be performed during harvesting	18.57	Most important
Processing of plants	Part / parts and quantity to be used Method of preparation (mixture, decoction, etc) Storage of raw material and/or final product	19.13	Important
Consultation with the patient	Personal rapport with patients Instructions for repeat treatment Special care while dealing with serious illnesses, children and women Getting feedback through dialogue with patients	19.09	Important

Name of Skills	Description of skill / sub-set of skills	Mean age at which skill was acquired (N=33)	Mean scores reflecting importance attached to the skills (N=33)
Habitat of plant	Knowledge of places/locations in and around villages Knowledge of geographical features as indicators of particular habitat Knowledge of use of landmarks/special symbols/signals to relocate/indicate use/overuse of the plant	16.52	Important
Application of medicines	Number, length and interval of dosages Quantities to be used in each dosage Religious ceremonies to be performed during application Knowledge of side effects/counter indications	19.04	Important
Evaluation of treatment	Checking the efficacy of treatment through written record or dialogue with patients Network with other healers to assess relative importance of various treatments Checking effect of treatment through physical examination	19.61	Least-important
Follow-up with patients	Continuous contacts with patients through personal contacts/consultations/informal meetings Referral to other healers	19.87	Least-important

forest. As elders, we must teach younger healers to protect such destructive actions through village-based monitoring and local regeneration" (LGG, personal interview, Amboli).

More than one-third of the healers from Baripada have set-up home herbal gardens in/around their home/field for teaching. Such efforts also demonstrate how individual healers can contribute to conservation and regeneration of rare local plants. Learning about the name and location of rare medicinal plants occurs partially during acquisition of identification skills. During interviews, the healers indicated a variety of medicinal plants which they thought were becoming rare. Special efforts were made by healers to teach young learners about rare plants once the learners were well-acquainted with common plants. Some local healers have to travel long distances in search of certain plants. In Baripada for example, more than half the healers walk more than 20 km on an average to locate a locally rare but very useful plant called **ragatrohida**.

Marking of rare plants and their locations through landmarks or specific identifiable symbols is practised by one-third of the healers from both sites. While the remaining two-thirds have not used such marking, they do acknowledge that marking the location of rare plants is an important skill. "I put a one rupee coin, **kanku** (red colored powder) and a few grains of rice near a rare plant so that other healers might notice it as an already used plant. Such marking also protects rare plants from over-extraction" (RB, personal interview, Baripada).

Even though the sensitivity and basic learning about rare plants might have started along with identification for the healers interviewed, the detailed and systematic knowledge of rare plants generally was not acquired by them until an average age of 20.

Interest in plants

Interest in plants was considered one of the most important foundation skills by healers. Most healers mentioned that being interested in local plants lays a strong foundation for learning other critical skills, enhances the process of transmission and develops positive attitudes towards conservation. An interest in plants developed at a young age in many healers, such as, during performing family support chores like cattle grazing or assistance in farming. Since most of the healers had opportunities to see and/or assist their parents or relatives in treating patients, the desire to learn followed.

"When a farmer from a neighboring village had snakebite and visited my father, my father asked me to accompany him in the forest. I went with him to the forest to help him in removing the bark of two different plants. My father gave an oral dose of a medicinal pellet made from these two different barks and the patient was cured. This incident not only reinforced my faith in plant-based medicine, but inspired me to learn it" (DD, personal interview, Amboli).

In general, interest in plants started building at the age of 14 years among the healers interviewed and, if this interest in plants was encouraged by external events (through incidences like this), or by guru, healers indicated that there was more motivation to learn other skills.

Harvesting of plants

The harvesting of plants, meaning removal of plants or their parts for medicinal purposes, was considered as most important by healers to ensure long-term availability of the plants. Learning of correct methods of harvesting was considered an essential part of local conservation efforts by healers. Most healers indicated that no plant part should be removed until the plant is strong enough to withstand the loss. In general, it was felt that a mature plant of more than 15 years old should be chosen for removal of the required parts. The right method of harvesting varies according to the growth of the plant and nature of the cure. However, as a general rule, the length of the removed bark should not be more than one foot, and the cut should not penetrate more than six inches deep.

The time at which plant parts are harvested is also important. Many healers, from Baripada, for instance, believe that Saturday night is an auspicious time for harvesting. Saturday night harvesting and Sunday treatments are the most common practice among the local healers of Baripada. In addition, knowledge of special care or practices related to safer harvesting is also considered important. Most of the healers have revealed that their shadow should not fall on the plants while harvesting. Similarly, many healers would never remove the bark in a circular fashion, avoiding a ring shape or complete removal from the stem. They believe that such a removal will permanently damage the xylem cells, which might lead to drying and death of the plants.

In addition to these special practices, religious or holy ceremonies are also performed while removing the useful parts of the plants by healers. Many healers from Amboli and Baripada offered a handful of rice and prayer to plants before they remove them. During such prayers, they appreciate the effectiveness of the medicinal plants and express their gratitude. Knowledge of planetary movement is also a part of their learning of ceremonial rituals by healers of Baripada. “Certain plant parts should only be harvested on a full moon night so that I can get the full vigor of the plant quality in the drug. During full moon nights, other planets in the universe remain calm so that the goddess of plants moves around in forest and showers her blessings” (SB, personal interview, Baripada).

Learning harvesting of medicinal plants consists of five sub-skills (Table 2) and therefore required a longer time period to learn (more than three years) after the skills of identification and location of medicinal plants were acquired.

Processing of plants

The useful plant parts are either given as medicine in raw form or are processed in a variety of forms. The most common processed forms reported by the healers were: crushed drugs, pastes, fresh juice, (dried) powders, decoctions, ash, **lehya** (semi-solid form derived by mixing powdered drug in a liquid base for ingestion), porridges, **lepa** (powder or paste in oil base for external application) and **dhoopa** (smoke for inhalation). Local healers have indicated that processing is an important skill which indirectly helps in conservation because proper processing of plant parts consumed less quantity of the plants and helped to ensure the whole plant was not uprooted. Processing also becomes critical when preparing the herbal formulations from toxic plants. For instance, poisonous plant like **bhuykuli** if taken orally, even for a taste, can be extremely dangerous for humans and animals. However, if diluted in great quantity of water and then sieved through cotton cloth four to five times it can cure rabies.

Some healers use combinations of various plants in a variety of forms to make complex products. For example, a healer from Amboli mixes and crushes the dried bark of **palas**, **biba surangi** and **tamalpatra** in equal proportions. A small quantity of water is then added to make a round ball, which is heated through the smoke of **gugle** tree bark. While smoking, the flour of **raagi** plant is added and the final product is used to treat a variety of wounds and bone injuries in cattle. Some concoctions are given fresh while others are kept overnight for better results. The skill of storage is, therefore, also considered important. Most healers use earthen pots and avoid metal containers to store a concoction of liquid products overnight. Few healers like LP from Amboli, with the support from his educated sons, have also printed handouts in the local language for his products. LP has created a small processing unit in his home which has a small grinder and a power operated packing and sealing machine. Guided observation and assistance to teachers in actual practice of treatment were two methods used by interviewed healers.

Consultation with the patients

Consultation or establishing personal rapport with patients was considered one of the foundational skills by healers. Most healers, either through planned or informal meetings or during conversations at village gatherings or on the farms or in the forest, developed personal relationships with patients. “Some of my patients from the village and outside have also become good friends and we can mobilize such informal networks in generating awareness about the importance of medicinal plants” (JG, personal interview, Amboli). Thus consultation within healer’s own networks could become a significant platform for social learning for sustainable use and conservation of medicinal plants.

The consultations also involve a set of repeat instructions, which are often prescribed during the second visit by the patients for change of dose, change of treatments, referral to another healer, or dispensary. Patients suffering from serious illnesses such as cancer or infectious diseases

are separately handled and given priority. Children, women and older people are either given priority or treated at their places of preference by half of the healers interviewed.

The local healers ask symptom-specific questions and check how the behavior and well-being of patients are affected by existing ailments. These disease-specific questions are sometimes supplemented by additional physical examination such as **nadi parikshan** (pulse rate) for diagnosis. In cases of external injuries (wounds or snake bites), physical examination is often conducted. “I start a funny discussion about joyful events, and then suddenly twist the sprained bone when patients have sprains or dislocation of bones and muscles” (SA, personal interview, Amboli). Practical demonstration with dialogue and guided observations are the two most commonly used for learning consultation skills.

Habitat of the plants

Learning about the locations of plants, the surrounding geographical features, and interrelationships between the two, constitutes the habitat of plants skill. Knowledge of plant locations was also gained during learning of identification of plants and therefore habitat and identification are considered as overlapping skills by the healers. The first subset of the skill is related to learning about the location of medicinal plants. “Sometimes we have patients with a poisonous snake bite and immediate care and treatment is required. We must know, therefore, the exact locations of the plants, since fresh parts are required to prepare the concoction” (RB, personal interview, Baripada).

Knowledge of plant, animal, or geographical features that are closely linked to the preferred habitat of certain plants is also believed to be a useful skill. For example, the many healers from Amboli mentioned that presence of a black spider in certain patches of Amboli forest indicates a good habitat for medicinal plants. Such interrelationships between medicinal plants and wild animals also provide clues to better understanding of the preferred habitats of medicinal plants. The use of landmarks or other symbols that represent either location or status of that particular plant species is the third important skill that forms the habitat skill complex. In addition to rare plants, certain plant species that are used to cure serious health problems such as snakebites or scorpion bites have also been given special symbols (such as the presence of a large neighboring tree, or tying a string on a branch of the plant or neighboring tree, in a way that can be recognized from a distance).

Figure 1. A village healer showing processing of bark of medicinal plants to other healers in Maharashtra State, India.

More interactive and hands-on approaches were cited as main methods to learn about habitat by the healers. “When I shared my dream about the location of some medicinal plants with my father, he showed many medicinal plants in that location of village forest and described their uses. He also explained the significance of such dreams and their possible interpretations” (CS, personal interview, Baripada).

Application of medicines

The application of medicine is the next step in learning after one has acquired good knowledge of plants, their habitat and processes of preparing herbal medicines. Around the average age of 19, the skills related to the application of medicinal plants are learned. The treatment is often prescribed by the healers in the form of dosages and frequencies at which herbal formulations need to be taken. Some healers prefer to administer medicine at their homes.

The knowledge of combined or compound action (both synergistic and antidotal) of various herbs and other ingredients is also important. For example, to cure skin infections and blisters in humans, dried roots of **bharangi** are crushed and mixed with water to make turbid lotion. The same lotion can also be used to treat eczema, blisters, and for first-aid treatment after adding a small amount of a child’s urine.

The timing of taking herbal medicines varies according to the nature of diseases. “As a general rule, herbs taken along with meals are the ones prescribed for stomach and digestive ailments, while herbs that are administered to cure kidney and reproductive problems are generally advised to be taken before meals” (RB, personal interview, Baripada).

Learning about both processing and application skills requires active involvement and initial guidance by mature practitioners, and some use of the interactive and hands-on methods. “I was asked to assist in making concoctions and **lapas** (paste) by my husband and to help in applying the **lapas** to patients, so that he could see other patients while I rubbed pastes on the patients’ body parts” (JS, personal interview, Baripada).

Many of the healers also used chanting of mantras– the divine and sacred verses, often sung in local dialects. The knowledge of **pathya**, or allowable dietary and lifestyle related restrictions is also important. While different healers prescribe different advice on **pathya**, the most common include: not to eat meat, not to eat black gram, and not to eat chilli or spicy foods. Sometime the **pathya** is advised to be self-observed by patients.

Evaluation of treatment

The effect of a treatment is often assessed by local healers, mostly through verbal feedback from patients. Such activity was viewed as representing evaluation skills by healers. Evaluation skills are useful to determine time required to recovery which depends on the factors like length and interval of doses of the treatments. “My treatment for jaundice in humans should show its results in seven days. If a patient does not start improving after a week, I change my dose or the treatment. If that does not work, I refer my patients to go to the hospital in Ajra town” (LP, personal interview, Amboli). Most of the healers are well aware of the recovery period of their treatments. However, most of them would still like automatic repeat visits by their patients for judging the effectiveness of the prior treatment. Four healers have used **nadi parikshan** to check the effectiveness of previous treatments. Physical examinations of affected parts were carried out by most of the healers, in the case of external diseases. For internal diseases, however, almost one-third relied on directly asking patients about the symptoms of the disease.

More than one-third of the local healers have established contacts with at least five healers, while another one-third are closely connected with more than five healers in and around the villages. These healers maintain regular contact through either informal or planned visits. During such visits, almost one-third of the healers have either sought verification of their treatment or discussed the effectiveness of the same or related treatment for the same ailments.

Most of the healers interviewed learned the evaluation skills in the later teen years, just after the time at which skills of processing and application had been learned. Interactive methods of learning such as demonstration by, and dialogue with, teachers were used mainly to learn these skills.

Follow-up with patients

As indicated by some healers, follow-up is closely related to evaluation. Other healers, however, suggested that developing closer interactions and relationship with the patients is a specialty knowledge and could only be acquired through follow-up skills. Following-up with patients is considered very demanding in terms of time. This constraint becomes more severe if patients are from outside the village. Sometimes healers create situations to compel patients to see local healers. “I ask my patients to accompany me to the temple to offer small religious rituals to express thanks to the god once they are cured” (JS, personal interview, Amboli).

Referral to other healers or modern hospitals is considered as useful after ineffective earlier treatments by a particular healer, or for the convenience of location. During follow-up, the advice on **pathya** or diet restrictions is

the most commonly discussed topic by the local healers (slightly less than one-third), followed by general talk or examination for improvement (almost one-fifth). Interestingly, close to one-fifth of the healers have never made any attempt for follow-up with their patients and consider follow-up as part of the consultation skill complex. Consequently, follow-up is the lowest scored skill in terms of importance by healers among the ten crucial skills. It is learned between the age of 19 and 20, either by discussing with, or assisting teachers during actual practice.

Results: Young Healers Perceptions of the Crucial TMK Skills

As outlined above, we also wanted to get a sense of the perceptions of young healers about their perception of the necessary skills to be a successful healer. In this part of the study, we implemented the cohort-based approach by targeting the two generations (old and young) of local healers. The age group of old healers (N=33) was 30-86 years and young healers (N=27) was 9-24 years. Since we had already identified critical skills from the perspective of old practicing healers, we sought the relative preferences of young healers on the importance of these critical skills as a next step. The differential preferences between young and old healers were analyzed through the Mann-Whitney test. Members of both groups were asked to rank their preferences (1= less important, 2= important and 3= most important) on ten skills identified by practicing (old) healers as being critical.

The Mann-Whitney scores or U values for the skills sets of identification and knowledge of rare plants are 236.50 and 225.50 (see Table 3), which indicate a high level of significance ($p<0.001$). The higher mean scoring on identification of plants (mean=2.76) and rare plants (mean= 2.52) by the older healers compared to their disciples (mean for identification= 2.15, mean for knowledge of rare plants=1.81) indicate that older healers consider those skills more valuable than young healers. The U value for the skill of interest is also significantly larger (237.00, $p=0.001$) indicating that the old (mean = 2.47) and young healers (mean = 1.89) differ significantly in terms of valuing interest as a skill to learn. The same trend is observed for the skills sets of consultation and harvesting, with U values of 274.50 ($p=0.007$) and 318.50 ($p=0.033$).

Discussion

The focus group discussions held with old and young healers partly explain such differences in the ascribed importance by these two groups. Old healers in Baripada used an admission test for young aspiring healers required them to identify and collect the twigs of 20 medicinal plants from the village forest overnight. The local names of the plants were given as a test and a time of overnight was given as test duration. “Until morning we could locate and identify only five plants. The passing performance requires at least 15 plants to be correctly identified and brought. RB rejected all of us just because he felt we were not yet mature enough to learn completely about the plants” (JP, personal interview, Baripada). Such a strict and difficult test for checking interest and identification (including rare plants) was perceived as a roadblock by many young healers who considered the skills of interest in, and identification of, local plants as less important than the rest of the crucial skills. Young healers also felt that critical TMK skills of identification, harvesting, knowledge of rare plants and consultation are also relatively difficult and time-consuming to learn.

Figure 2. A healer’s dispensary in Amboli, Maharashtra State, India: Spiritual learning or mantras are well-woven within crucial skills required to become a successful healer.

Many young healers, particularly from Baripada strongly felt that older healers are not transmitting all the skills. The partial sharing of information was deliberately practised by a few healers as a strategy to establish themselves as gurus who know all about plants and, therefore, should be respected and consulted in the future. For example, in Amboli, **vaidus** would only show treatment or actual uses of plants without disclosing their names or locations. In Baripada young healers complained that old healers would only show some common plants and reveal their names, but they would not give

any clues about the actual location and uses of the plants. On the other hand, the older healers blamed young healers for not showing interest, persistence and preparedness for hard work. The skill of habitat and location of rare plants was therefore considered as less important by young healers than their teachers.

Spiritual learning is considered an integrated component of the crucial skills. The skills of plant habitat (including rare plants), harvesting and consultations used mantras or spiritual chanting as part of their overall skill complex. Budding healers from both villagers are better educated and have less faith in spiritual aspects of TMK than their teachers. “Spiritual learning of TMK demands secrecy and is not to be revealed to persons who do not possess the right values, even if they are better educated and interested to learn (RB, personal interview, Baripada). The differences in value attached to spiritual aspects of TMK between young and old healers could create a communication gap which can be a barrier to the transfer of skills that required spiritual learning.

Learning of habitat, harvesting and consultation skills entails spiritual learning and were therefore perceived as less important by young healers, who had some formal schooling. “While we value the importance of our plants, we do not see any rational reasons for chanting mantras

Table 3. Mann-Whitney (U) analysis of the ranks between young (disciple) and old (trained) healers interviewed in Amboli and Baripada villages in Maharashtra State, India.

Skills	Healers	N	Mean skill value	Standard deviation	Mann-Whitney U	P (2- tailed assym)
Interest	young	27	1.89	0.641	237.00	0.001
	old	32	2.47	0.621		
	total	59	2.20	0.690		
Identification	young	27	2.15	0.718	236.500	0.000
	old	33	2.76	0.435		
	total	60	2.48	0.650		
Habitat	young	27	2.22	0.751	435.500	0.873
	old	33	2.24	0.792		
	total	60	2.23	0.767		
Processing	young	27	2.26	0.656	394.500	0.533
	old	32	2.34	0.745		
	total	59	2.30	0.701		
Harvesting	young	27	2.04	0.649	318.500	0.033
	old	33	2.39	0.556		
	total	60	2.23	0.620		
Application	young	27	2.00	0.734	375.500	0.267
	old	33	2.21	0.820		
	total	60	2.11	0.783		
Evaluation	young	27	2.48	0.580	361.00	0.170
	old	33	2.18	0.797		
	total	60	2.32	0.725		
Consultation	young	27	1.74	0.656	274.50	0.007
	old	33	2.27	0.761		
	total	60	2.03	0.758		
Follow up	young	27	2.26	0.656	359.500	0.143
	old	33	2.03	0.585		
	total	60	2.13	0.623		
Knowledge of Rare plants	young	27	1.81	0.681	225.500	0.000
	old	33	2.52	0.755		
	total	60	2.20	0.798		

while removing plants for medicinal purposes" (JP, personal interview, Baripada).

In addition, the recent introduction of allopathic medicine in the village has attracted many young and literate healers. "Modern medicines gives faster results and is easily available as pills and in liquid forms through our village **sevak** (health worker)" (CP, personal interview, Baripada). The local availability of allopathic medicine as an easy alternative is therefore also likely contributing to the decline of interest in young healers towards learning of TMK skills.

As established by this research, the transmission of traditional medicinal plant knowledge (TMK) is age specific and includes the acquisition of a set of ten crucial skill complexes in the case of the healers with whom we worked. Some of these skills are highly valued by older healers and embody spiritual learning (such as chanting mantras). Five of these (interest towards plants, identification of plants, harvesting of plants, processing for making final herbal products, and knowledge of rare plants), are foundational skills and were given more importance by established healers than other skills. This research supports findings of earlier studies and reiterates the importance of foundational skills of identification and harvesting of medicinal plants (Chand & Shukla 2003, Lozada *et al*. 2006, Zarger 2000). The skills of application and consultation were considered as important TMK skills in an earlier study by Haarumaya (2003a). They were not, however, rendered as critical as other foundational skills in this study. Many old healers indicated that application and consultation skills required human interactions and were less complicated to learn. "These skills could be acquired and mastered through repeated practice and as 'one grows in healing profession" (focus group discussion with healers, Baripada, October 24 & 27, 2004).

Knowledge of rare medicinal plants which was identified as a most important TMK skill is a new addition to the critical TMK skill set established in past research. The skill of knowledge of rare plants was considered as essential and a highly-ranked foundational skill, and also corresponded to the dimension of sustainable use of plants. The sustainability of local medicinal plants was thus viewed as an integral part of one's professional learning to become a practicing healer.

Most of these skills were gradually learned between 15 to 20 years of age which roughly, corresponds to the age at which systematic learning of language takes place in the schools. While interest towards plants might have developed in earlier years (e.g., at the age between 5-7 years (Chand & Shukla 2003), this research established that the young prospective healers were chosen as learners by older healers only after the age of 14, when their formal school-based training of language began. As well, in the rural tribal Indian context, where access to, and opportunities for, secondary school education are limited to residential schools, the education from vertical learning sources (community elders, family members or relatives) becomes more difficult since students have to leave home to go to school. Schools in such cases can provide access to horizontal sources by linking TMK with existing curricular or co-curricular activities and thus ensures the continuity of transmission of critical TMK skills.

The 14-20 age group presents challenges for the transmission of TMK. By the age of 14 many young people in many small rural villages have been directed into life choices. Some are compelled to stay in the village in order to support the basic needs of their families and others take up work. For such young people, sustaining interest in, and motivation for, learning about medicinal plants while working becomes an inevitable challenge. One of the ways to address this challenge is as one healer from Amboli put it, 'to catch them young', preferably before the age of 14 through conscious and deliberate efforts to generate interest in local plants. Such early exposure might motivate young people to explore being a traditional medicinal plant knowledge healer as a profession. Certain closely-related skills were learned simultaneously (such as identification and harvesting) and skills with rare plants were acquired life long.

Learning methods are an important dimension of local knowledge transmission which were only cursorily examined in this paper. In general, to learn the foundational skills more indirect methods such as observation or demonstration were used. To learn the human skills (at a later stage) such as evaluation and follow-up, more direct methods such as guided and repeated observation and assistance in actual practice were used. These methods correspond generally with the eight-stage learning sequence model presented by Ruddle and Chesterfield (1977), where the learner moves from familiarization (developing interest about plants) to equal partner with instructors (assistance in actual practice and self-practicing). An earlier study by Chand and Shukla (2003) also confirmed that the choice of methods by elder Indian healers depended on the nature of skill to be taught and gender of learners. This gendered nature of TMK transmission highlights a direction for further research, namely, to examine the relationships between the choice of learning methods and the gender of learners in other forms of TEK knowledge, such as subsistence skills.

Many young healers, particularly from Baripada strongly felt that older healers are not transmitting all the skills. The partial sharing of information was deliberately practiced by a few healers as a strategy to establish themselves as gurus who know all about plants and, therefore, should be respected and consulted in the future. For example, in Amboli, **vaidus** would only show treatment or actual uses of plants without disclosing their names or locations. In Baripada young healers complained that old healers

would only show some common plants and reveal their names, but they would not give any clues about the actual location and uses of the plants. On the other hand, the older healers blamed young healers for not showing interest, persistence and preparedness for hard work to learn about local rare plants. In addition, skills of rare plants are usually acquired at the later age of 20, and many young healers (age group 9-24) included in the analysis, had just began to realize the importance of knowledge of rare plants. The skill of habitat and location of rare plants was therefore considered as less important by young healers than their teachers (old healers).

Conclusions

The methods used in this research to understand crucial TMK skills and their loss during intergenerational transfer help in overcoming some limitations of earlier studies. Firstly, the empirical research on TMK skills is limited to a few studies which focus on subsistence skills, largely theoretical in orientation and target a single generation. The current study emphasizes and examines critical TMK skills as part of TMK, which is a specialized knowledge and practiced by local healers. Secondly, this study empirically explained TMK skills through the perspectives of TMK practitioners and thus responded to the need for examining skills as a practice-oriented aspect of local knowledge system as raised in earlier studies on local knowledge transmission (Ruddle & Chesterfield 1977, Hewlett & Cavalli-Sforza 1986). Finally, this research assesses the loss of TMK through the lenses of two consecutive generations and thus establishes a new way of measuring transmission loss than past practice of using mere quantitative approaches or/and targeting only on one generation.

As described, the reasons for difference in perception of critical TMK skills between old and young healers, such as lack of interest by young learners in learning, complexity of skills, incomplete transmission (due to stricter adherence to transmission rule by old healers) and the impact of formal schooling and modern medicines in changing values of young healers. Select of these were also highlighted in earlier studies examining loss in TMK transmission (Balasubramaniam 2000, Ohmagari & Berkes 1997).

Our analysis of differences in perception of ten critical TMK skills by young and old healers may have useful implications for enhancing TMK transmission and for local conservation of medicinal plants. For example, the older healers should be encouraged to share their knowledge of plant identification and rare plants to the young learners. Similarly, younger healers need to demonstrate strong interest, enthusiasm and sincere efforts to learn about plant identification and knowledge of rare plants. Innovative community-based educational approaches that reinforce learning of critical TMK skills among young aspiring healers and recognize the contribution of mature healers may improve TMK transmission and thereby prevent the loss of local medicinal plants and associated TMK skills at the community level.

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