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Documentation of 'Plant Drugs' dispensed via local weekly shanties of Madurai City, India

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ABSTRACT

Background: The Valaiyar (Moopanar) communities of Tamil Nadu are traditionally known for catching rats and snakes from the agricultural fields. Prior to independence, some of these families have faced socio-economic changes and chosen to become herbalists in Madurai city. They are mainly engaged in collecting and dispensing fresh and dried plant drugs in its ‘natural form’ at Tiḷḷagar tīḍal market of Madurai city. Their business is unique, because customers receive ‘prescriptions’ and ‘plant drugs’, unlike the conventional dispensaries. Their world view is: ‘to cure the ailing in natural way’.

Objectives: To document plant drugs collected and dispensed by some of the families belonging to Valaiyur (Moopanar) community in the Tiḷḷagar tīḍal market.

Materials and methods: Ethnobotanical tools were employed to document various aspects of the practices including resource and knowledge base, medicinal uses, dosage, collection of herbarium and raw drug specimens. Integrative approach was adapted to document the trade dynamics.

Results: During the study, 133 medicinal plant species belonging to 50 families were documented. 71% of species were sourced from wild and non-forest areas. 272 simple and compound remedies were recorded.

Conclusion: Local markets/shanties like these are ‘Traditional Medicine (TM) health care services at door step’. They cater to local health care needs along with conventional system in a synergistic manner and provide adaptable, local solutions using local resources.

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1. Introduction

Globally the demand for Traditional Medicine (TM) and its services is constantly increasing. It has been contributing to the goal of continuance and access to healthcare needs [1].

Traditionally shanties (weekly local markets) have been a time tested system of economic transaction of several goods and agricultural produce in local and regional context. These markets are occasionally known to play a vital role in providing TM healthcare services too, which however goes unnoticed by the mainstream medicine.

An attempt has been made to document such unorganized system of healthcare service offered in shanties, by keeping the focus on Tiḷḷagar tīḍal market, in Madurai city of Tamil Nadu, India,
which is popular for dispensing ‘Plant Drugs’ and ‘remedies’. During 2011–2013, recurrent visits were made to this market and all the five shop owners belonging to Valaiyar (Moopanar) community were interviewed to document the diverse herbal produce that is dispensed along with the prescriptions.

Most of the ethnobotanical research is on the enumeration of medicinal plants and traditional knowledge used by specific communities such as Irular, Valaiyar, Pakkiyar, Muthuvar, Kani, Kanikkars of Madurai and surroundings for their self-use or for the communities. However, so far, no specific study related to Tişgar tidal market, popular for ‘Plant Drugs’, dispensed by Valaiyar (Moopanar) community for diverse healthcare needs has been conducted.

2. Materials and methods

2.1. Study area and key respondents

The city of Madurai (9° 56’ 0” N/78° 7’ 0” E) lies on the flat and fertile plain of the river Vaigai, which flows in the northwest-southeast direction through the city, dividing it into two almost equal halves. The Sirumalai and Nagamalai hills lie to the north and west of Madurai. The land in and around Madurai is utilized largely for agricultural activity, which is nurtured by the Periyar Dam [2]. Tişgar tidal market or Sunday market is located in the central part of the Madurai city where ‘fresh green herbs’, dispensed by Valaiyar (Moopanar) community (Fig. 3).

The key respondents of the study are the experienced elders (senior and knowledgeable as recognized by the community members), who manage their shops in Tişgar tidal market. They belong to Valaiyar (Moopanar) community of Nagamalai hills, who are known traditionally as “snake catchers”, catering to local needs of farmers and farming activities. In Tamil, Valai has two meanings: one is “rat burrow” and the other is “net” [3,4]. These respondents are also “herbologists”, who have extensive knowledge about the medicinal plant sources, identification, knowledge related to diagnosis and management of disease, use of herbs and related aspects.

2.2. Literature studies

Review of literature reveals that most of the ethnobotanical studies pertain to Madurai and surrounding districts. Published information can be broadly categorized as enumerations of medicinal plants and traditional knowledge used by specific communities or regional practices/local trade such as follows: An ethnobotanical study on traditional medicinal plants used in Uthapuram, Madurai district, documented 52 valuable medicinal plant species belonging to 36 families with folk uses [5]. An ethno-veterinary survey of the villagers of Usilampatti taluka of Madurai district, recorded 73 medicinal plant species with uses in cattle health management [6]. Ethno-botanical survey in Theni district (Western Ghats) documented 86 plant species with medicinal uses as practiced by Paliyars and Muthuvars [7]. An ethnobotanical survey of Kani tribal communities in Tirunelveli hills of Western Ghats, India resulted in documentation of 90 medicinal plant species used commonly for treating 65 different types of ailments [8]. Another ethnobotanical study of traditional healers from Mayiladumparai block of Theni district, Tamil Nadu documented the ethno-medicinal usage of 142 medicinal plant species belonging to 62 families, with 504 formulations [9]. Madurai is one of the well-known ‘raw drug trading centre’ in the country as recorded in the ‘Demand and Supply of Medicinal Plants of India’ study [10]. An ethno-medicino-botanical documentation of Valiyān community from Alagarkoil hills, Madurai district resulted in listing of 111 medicinal plants and their uses [11]. An ethnobotanical investigation among Paliyar tribes in Madurai district of Tamil Nadu resulted in systematic documentation of 60 medicinal plant species along with traditional formulations for managing various disorders [12]. A quantitative assessment of medicinal plants traded from selected markets in the state of Tamil Nadu (Chennai (a major market) and Virudhunagar (an intermediate market)) and flow of raw materials to central (Madurai) and regional markets (Chennai) was observed [13]. A study on Valaiyans, an ethnic group in Piranmalai hills, Tamil Nadu, recorded 63 medicinal plant species [14]. A comprehensive profile of Valiyārs (Moopanars/Mooppar), an agriculture based community is documented in ‘People of India Project’ [4]. Review shows no focused study on Tişgar tidal market or Sunday market of Madurai, which is solely managed by Valaiyar (Moopanar) for eight generations (from 1940s).

2.3. Survey

During February 2011 to December 2013, the key respondents at five retail shops in the market were interviewed by employing...
ethnobotanical documentation methods (such as personal interviews, observational studies, focused group discussions) to elicit primary information related to the diversity of ‘plant drugs’ sold as bunches (known as ‘kattu’ in Tamil) or as powder or simple/compound formulations, their sources and traditional uses for specific health conditions [15].

Frequent visits to the market enabled the preparation of a comprehensive resource inventory including availability of season specific plant resources. Open-ended questions were posed to gather retrospective information. To ensure the data consistency and reliability, recall techniques, personal observations and repeated questioning were employed [16].

Samples of plant drugs sold in the market were procured and processed into herbarium and raw drugs voucher specimens as per the international protocols [17]. These specimens were identified and validation of scientific names was carried out by referring to international, regional and national floras [18,19], and further authenticated by taxonomists. The identified voucher specimens were deposited at FRLH-Herbarium, at FRLHT, Bangalore with specific accession numbers.

The data gathered was systematically compiled, summarized to a table comprising of Tamil names and its binominal nomenclature, sources, traditional knowledge such as medicinal uses and methods of compounding, selling prices of the materials in the market. Tamil names were further authenticated by consulting taxonomists with Tamil knowledge and regional floristic publications. Further, botanical correlation of Tamil names, was carried out using multi-dimensional databases on Indian medicinal plants. Additionally, the usage of these plants in other medical systems viz. Ayurveda(A), Siddha(S), Unani(U), Folk(F), Tibetan (T), Modern(M) and Traditional Chinese Medicine(C) was also tagged [20,31], (Table 1, column 9) (Supplementary file).

The documented medicinal uses were closely examined by the physicians of Indian Systems of Medicine (ISM), who are familiar with Local Health Traditions (LHT) adapting documentation and rapid assessment methodology [21,22]. They consulted various classical medical publications related to medicinal uses of the studied species for direct or indirect references [23–29]. Besides these, physicians also contributed their experience of using these species for a health condition as an input which is shown in Table 1, column 7 (Supplementary file). As a result of this exercise, recorded medicinal uses were further classified as three main categories viz., promotive, preventive and curative health care practices (Table 1).

3. Results

3.1. Enumeration of medicinal plant resources

Through this study, 133 medicinal plant species belonging to 50 families, which are used as fresh and dried plant drugs in Madurai city and surroundings were, recorded (Supplementary file-Table 1). The life form (habit) analysis of the plants species recorded were 75 herbs, 24 climbers, 17 trees and 17 shrubs (Fig. 2a).

3.2. Sources of plant drugs

Mostly commonly growing herbaceous, easily accessible plants were seen in the dispensaries. Nearly 71% of the plant resources were from different habitats in the wild such as the farm lands, fallow lands, foot hills, roadsides, home gardens etc (Fig. 2b, Table 1). However, certain rare resources were collected from foot hills/hilly terrains/neighbouring places. For example, mahāveru (Decalepis hamiltonii Wight & Arn.) was collected from Anamalai/Nagamalai hills; tarapasi (Portulaca quadrifida L.) is taken from water-logged areas, which is seasonal too. Muyal ceviyan [Kleinia grandi flora (Wall. ex D.C.) Rani] was obtained from the nearby hill ranges which required extra effort, and therefore are expensive than others (Rs. 50 to 75 per leafy branches).

![Fig. 2. (a) Habit wise analysis of ‘plant drugs’; (b) Sources of medicinal plants traded; (c) Plant parts traded.](image-url)
3.3. Plant parts traded

Among the 133 species recorded in the market, 67 are used as leafy materials/twigs/tender branches/stem; 33 species are whole plants; 16 species are fruits (both pre-mature and ripened), 11 species are underground parts including rhizome, roots, tubers, bulbs etc; 7 species are seeds and 2 species are floral parts (Fig. 2c, Table 1).

3.4. Range of health care solutions

272 herbal remedies for managing various health conditions were recorded in this study. These were broadly classified into curative (43%), preventive (17%), and promotive (19%) health care solutions (additionally 21% can be included across the categories). Range of health conditions addressed are from cuts, wounds, fever, cold, cough, reproductive health, antidotes, skin care, hair care, rejuvenants, cardiac care, diabetes management, etc. Analysis of data shows, more than one species being prescribed to manage a health condition (Table 1).

3.5. Prudent use of resources

A wide range of knowledge resides in the community related to specific habitats preferences, seasonal availability of resources, morphological variants and alternatives.

a) Morphological similarities: Similarities in the appearance of plant drugs guides their choice for treatment. Instead of *siru parppakam* (*Oldenlandia corymbosa* L.), which is a linear leaved erect herb, *perum parppakam* (*Mollugo oppositifolia* L.) an ovate leaved decumbent herb is preferred; similarly for *Nalla tuvsi* (*Ocimum tenuiflorum* L.), which is a mildly scented greenish herb, *näyi tuvsi*/*käthu tuvsi* (*Ocimum americanum* L.), a strong scented one is preferred.

b) Seasonal variants and health solutions: They also believe that seasonal health problems can be addressed using herbs available in specific seasons e.g., for skin care in rainy and winter seasons, *avrul-nil* (*Indigofera tinctoria* L.), kuppaimeni (*Acalypha indica* L.), *sima agarti* (*Senna alata* (L.) Roxb. are used.

c) Specific habitat preference: In traditional practices there is always preference for plant drugs procured from specific location. E.g., *amukkarän veru* (*Withania somnifera* (L.) Dunal) roots collected from *Pollachi* and *Masaniamma Koil*, Tamil Nadu are much preferred than the Rajasthan variety. Similarly, *Tulasi* (*O. tenuiflorum*) from Rajapalyam areas and *soru kätäkä* (*Aloe vera* (L.) Burm.f.) from Kolli hills, Serumalai and Alagarkoil are popular in trade.

d) Substitutes and adulterants: Respondents are also familiar with genuine, adulterants/substitutes available in the local markets. E.g., one of the informants Shri P. Mokan says: “… I stopped sending people to main market due to one incidence: One day, a stock of *bhümicakkäri käjängu* (based on description of the climber, flowers & tubers, species identified as *Ipomoea mauritiana* Jacq.) was exhausted in our shop. I told my patient to buy from regular retailer in the city. The patient got back to me with pieces of roots of *Maravidi käjängu* (as described, these are roots of *Agave mexicana* Lam.), which were sold in the name of *bhümicakkäri käjängu*. From thereafter, I decided not to send any of our customers to retail shops, but collect the material ourselves and provide them to the customers. In another instance, one has to know how to differentiate genuine, alternatives and adulterants. I identify resources through close observation of external morphological and organoleptic characters and thus confirm its genuinity due to familiarity. I can differentiate between similar looking plants like *Nalla vallarai elai* (*Centella asiatica* (L.) Urb.) and *ko dém vallarai* (*Merremia emarginata* (Burm. f.) Hallier f.), which seasonal plants used as memory enhancers and hair conditioners. Both have kidney shaped, semi-cordate leaves. *Nalla vallarai elai* has roots and leaves at every node and spreads on the ground. *ko dém vallarai* has no roots at each node. It has a strong tap root and branches arising from centre and spreads all over like a climber. *Nalla vallarai elai* is slightly bitter to taste and is much preferred than the latter”.

3.6. Medicinal plants across Indian systems of medicine

Out of 133 species recorded, 16 of them are being used across Ayurveda, Siddha, Unani, Folk, Homeopathy and modern medicine. For example, *amukkarän kizhángu* (*W. somnifera* (L.) Dunal) is used as a rejuvenant; *sirukurūnjan/sákcarakkoñi* (*Gymnema sylvestre* (Retz.) R.Br. ex Sm.) is used in diabetes management. The overlapping usage pattern indicates common origin of practices or knowledge sharing across various systems of medicine (Table 3).

3.7. Potential nutraceuticals

During the study, more than 20 species were recorded and are used in various food preparations such as tea, beverages and cuisine for specifically managing health issues. Mostly, whole herbaceous plants or fresh twigs/tender stems/wild edible fruits are used (Table 2). Such preparations warrant nutraceuticals and dietetics research.

3.8. Collection practices

A strict regime is followed by collector-cum-herbalist while harvesting. They pay due respect to plants by offering a coconut, betel leaves and incense stick prior to harvest. For example: collecting roots of *veḷḷa irukku* (*Calotropis gigantea* (L.) Dryand.), certain ritual is followed. A nude male member goes in the night and collects the roots after performing certain rituals and harvest eastward growing roots. Harvested roots are soaked in milk, dried and sold. A strong belief is that any changes in this ritualistic practice may cause harm to collector and is ineffective. Sustainable harvest protocols are followed in most of the cases for example: While collecting tuberous roots of *tanirvñam*...
| Broad categories of health conditions addressed | Number of remedies | Categories | Tamil name (Botanical names) of plant drugs used |
|-----------------------------------------------|-------------------|------------|------------------------------------------------|
| Gastrointestinal problems (ulcers, grippe, indigestion, constipation, flatulence, appetite, heat boils due to pitrum/usham, worms infestation, improves digestion, Piles and fistula) | 47 | Curative and promotive | Sirukkiri (Amaranthus graecizans L.), Edambur (Helicteres isora L.), Perum tumbari (Anisomeles indica (L.) Kuntze), Kadukai (Terminalia chebula Retz.), Katkaruni kitaliungu (Cyttophema setosum (Roxb.) Alston), Kavai tumbi (Trichodesma indicum R.Br.), Kovai elai (Coccinia grandis (L.) Voigt.), Mudakatan (Cardiospermum halicacabum L.), mumsukkai (Mukia maderaspatana (L.) M. Roem.), Naivyuravu/nayuravu (Achyranthes aspera L.), Neluvagai (Senna alexandrina Mill.), Onnavalli (Plectranthus amboinicus (Lour.) Spreng.), Tarapasi/darbhasali/darbhasali (Portulaca quadrifida L.), Bhumikanakarai kilangi (Ipomoea mauritiana Jacq.), Payyapadi/payyapodal (Ufia amara Roxb.), Pirankkai/pirantkai (Luffa acutangula (L.) Roxb.), Vipam/vimbu/vepilai (Azadirachta indica A. Juss.), Virali melgaju/virali metalu (Evolvulus alsinoides L.) |
| Skin and hair care (itching, scabies, local allergic reactions, lichenisa, cuts and wounds, hair care, lice, bad body odour and excessive sweating) | 36 | Curative and promotive | Avuri/nili (Indigofera tinctoria L.), Kuppaaimeni (Acacia indica L.), Sima agati (Senna alata (L.) Roxb.), Siriyangani (Andrographis paniculata (Burm. f.) Nees.), Sirapcalai (Acalypha fruticosus Forsk.), Edamburi (Helicteres isora L.), Karbogarasi (Prorea coriifolia L.), Mumsukkai (Mukia maderaspatana (L.) M. Roem.) |
| Respiratory problems (cough, cold, fever, dengue, breathing problem, chest pain, asthma, sinusitis) | 30 | Curative and preventive | Ahotada elai (Adhatoda vasica L.), Atinaduram (Glycyrrhiza glabra L.), Kandangatari elai/kandangatari elai (Solanum virginianum L.), Karpuravalli (Hyptis suaveoleus (L.) Poit.), Muńgai (Bambusa arundinacea Wild.), Muńtu murunagai (Erythrina suberosa Roxb.), Tulasai (Ocimum teliumflorum L.), Onnavalli (Plectranthus amboinicus (Lour.) Spreng.), Samagu elai (Azima tetracantha Lam.), Siriyangani (Andrographis paniculata (Burm. f.) Nees.), Siriv tamba tai (Leucas aspera (Willd.) Link.), Vatanaçaylan elai (Delonix elata (L.) Gamble), Paraspatkai (Molugo cerviana Ser.), Vsnukranți (Evolvulus alsinoides L.), Vilva (Aegle marmelos (L.) Corrêa.), Kumakitkai (Citrusello coloynthi (L.) Schrad.) |
| Orthopedic problems (strengthening of bones, joint pains) | 24 | Curative and preventive | Vilva Aegle marmelos (L.) Corrêa., Gala (Crotalaria serruca L.), Kanaivy/deverai pandu (Dipteracanthus patula (Jacq.) Nees.), Kovai addu (Trichodesma indicum R.Br.), Kovai elai (Coccinia grandis (L.) Voigt.), Mannanji (Morinda coreia Buch.-Ham.), Mudakatan (Cardiospermum halicacabum L.), Nayi tulasi (Ocimum americanum L.), nindalvadi (Biophytum sensitivum (L.) DC.), umatai kāy (Datura metel L.), pirađeai (Cissus quadrangularis L.), talaśut (Clerodendrum phlomoides L.), taśy velai (Gynandropsis gynandra), totalavadi/tottalavadi/totalsungu (Mimosa pudica L.) tūti elai (Abutilion indicum (L.) Sweet.), tatulatāi/Vatamadaki (Clerodendrum phlomoidis Lf.), Vatanaçaylan elai (Delonix elata (L.) Gamble), Velgaruttai (Pergularia daemia (Forsk.) Chiov.) |
| Poisonous bite (snake, insects and scorpions bites) | 19 | Curative | Akāsāgarudun ilana/kaḷorangavai kilangi (Corallocarpus epigaeus (Rottler) C.B.Clarke), Avaruri/nili (Indigofera tinctoria L.), kānjiriam (Strychnos nux-vomica L.), nirmel neruppulu (Ammannia baccifera L.), pāl kuriurai (Ichnocarpus frutescens (L.) WT.Aiton), perun kuriurai (Dregea volubilis), Sima agati (Senna alata (L.) Roxb.), Siriyangani (Andrographis paniculata (Burm. f.) Nees.), śivarakanti/sivarakandāi (Sphaeranthus amaranthoides Burm.), vipam/vimbu/vepilai (Azadirachta indica A. Juss.) |
| Rejuvenants | 16 | Preventive and promotive | Amukkalan kilangi (Withania somnifera), arakkari (Amaranthus tristis Wild.), aragum pal (Cynodon dactylon (L.) Pers.), Bhumianakkari kilangi (Ipomoea mauritiana), nili kāy (Phyllanthus emblica), nirmel neruppulu (Ammannia baccifera L.), nirmalūti viadi (Hygrophila schuill M.R.Almeida & S.M.Almeida), nilapani kilangi (Curculigo orchioides Gaertn.), oridhai tāmarai elai (Hybanthus enneanpermus (L.) F.Muell.), piranadi (Cissus quadrangularis L.), pūnūtu (veiṭai) (Allium sativum L.) tetān koṭi/terān koṭi (Strychnos potatorum Lf.), tanirīvaṭi kilangi/taṇerīvaṭov kilangi (Asparagus racemosus Willd.) |
| Life style related (Diabetes management) | 15 | Promotive | arakkari (Amaranthus tristis Wild.), aragum pal (Cynodon dactylon (L.) Pers.), āvarai (Senna auriculata), āvarai (Senna auriculata), kāsthi kari (Cichorium intybus), kovai elai (Coccinia grandis), nāvalpamalai koṭai (Syzgium cumini), pāl kuriurai (Ichnocarpus frutescens (L.) WT.Aiton), sīnti koṭi (Sintkai koṭi (Tinospora cordifolia (Willd) Miers.), sīryangani (Andrographis paniculata (Burm. f.) Nees.), śivarukuriṇju/sakkaraiṭi (Gynnema sylvestre (Retz.) R.Br. ex Sm.), tuvada elai/tutuva elai (Solanum trilobatum L.), vipam/vimbu/vepilai (Azadirachta indica A. Juss.), vendyai kari (Trigonella foenum-graciei L.), Vilva (Aegle marmelos (L.) Corrêa.) |
| Liver problems (jaundice and liver tonic) | 14 | Curative and promotive | Āvarai (Senna auriculata), aragum pal (Cynodon dactylon (L.) Pers.), kāṭta koṭi (Coccullus hirsutus (L.) W.Theob.), kīltuṇnu (Phyllanthus amarus Schumach & Thonn.), mahāj kulakalakāṇi (Sphenogastria calendulacea (L.) Pruski, Wedelia triloba (L.) Hitchc.) |
| Urinary disorder (coolant, burning micturition, infection, stones, diuretic, oedema) | 11 | Curative | Kārīkku/karippullai (Aerva lanata (L.) Juss.), nirmel neruppulu (Ammannia baccifera L.), nīrinnimū/nerinnimū (Trilibus laguniosus L.) pudānai (Mentha arvensis L.), mūyal kāṭu (Kleinia grandiflora (Wall. ex DC.) Rani) |
3.9. Promoting traditions

At any given time or season, on an average, they sell 40 to 70 different plant species as ‘plant drugs’ in the form of bunches (Katu). They also sell underground parts like rhizomes, cluster of roots, tubers, stem pieces, fruits, and flowers and occasionally stem and root barks. The cost of these bunches, vary somewhat between Rs. 10 to 150, and the families earn between Rs. 1000 to 3000 per day depending upon the desired botanicals, availability, accessibility and medicinal significance. In the study, it was observed that the market is often visited by Siddha, Ayurveda and Unani practitioners, who are trained formally in Medical Colleges for procurement of herbs for treatments. Some of the enthusiastic customers, who are keen to learn about Siddha and visit and learn about identification and sources of collection.

3.10. World views and reach

During the study, it was observed that the herbalists carefully diagnose and dispense mainly ‘plant drugs’ bunch (Katu) at nominal fee for the services rendered. They also sell dried form of the plant drugs. They sometimes do free services. They also request for follow-ups’ to ensure efficacy and safety.

4. Discussion

This study is a qualitative retrospective research and is the first time documentation of the market was done. There were only 5 shops in the market; the key respondents interviewed were identified by these shop owners. The most challenging part of the study was rapport building with key respondents; understand their beliefs, world views, attitudinal behaviors, world views, socio-economic dimension of the health care system and inevitable social conditions and started concentrating on gathering minor forest products or non-forest wild plant resources and providing TM services to other communities. This has earned them social respect and shown an alternative means for their livelihood. This is one of the local ecosystem services offered through shanties. The scope of the study remained only to the documentation of medicinal plant resources. However, it encourages researchers to take up studies related to medical anthropology, health seeking behaviors, world views, socio-economic dimension of the health care services and Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) [30] on the sustenance of traditional practices and livelihood opportunities, sustenance of tradition-cum-profession, under the rapid urbanization flux including continuity, attitudinal changes in younger generations towards their traditional practices.

The community members can be called as ‘para-taxonomists’, as they easily identify plant resources through close observation of external and organoleptic characters as confirmatory tests, without any higher education and formal training. This aspect of traditional know-how needs to be documented in future, as it would lead to...
practical key for identification of resources. Their ecological knowledge and sustainable collection practices can help in adaptive management of medicinal plants.

Through this study, it was recorded from the respondents that a range of 25–100 visitors come to these shops every day. Their daily income ranges between rupees 1000 to 3000 rupees. The shop owners generally distribute flyers with the information on herbs available for sale (Fig. 1). These 5 shops have gained popularity by merely providing unique TM services, where fresh herbs, prescriptions and caring touch are offered. Health seekers have recognized their value for managing health care at affordable price by utilizing their services. Over-the-Counter products like pain removal oils, hair oils, hair wash, conditioners, skin care products and mixtures of powders are sold. Certain plant parts are sold to ward off evil spirit. Example: stem and root pieces of 试卷 (Strychnos nux-vomica L.) and dried stem pieces of 木耳 (Phellodendron amurense Rupr. & Maxim). Among 1149 plant species recorded in Siddha system of medicine and promotive health care (Table 1), 120 species among 1549 species recorded in Ayurvedic medicine are being dispensed in the same market. 64 species among 493 species recorded in Unani medicine are also being sold here [31] (Table 1). It was observed that the physicians from these three systems of medicines, which are commonly practiced in and around Madurai district, were one of their customer groups. During various discussions with the physicians it was evident that Tilagar supplies their raw material needs on request.

The Tilagar market functions like a Primary Health Care Centre through traditional medicine. Our study revealed that the set up treats 56 numbers of primary health issues and chronic problems. Apart from treating ailments, it also functions like source of well-being medicine and promotive health care (Table 1). It was observed that the physicians from these three systems of medicines, which are commonly practiced in and around Madurai district, were one of their customer groups. During various discussions with the physicians it was evident that Tilagar supplies their raw material needs on request.

### Table 2

Some examples of ‘Plant Drugs’ used as greens with potential nutraceuticals properties.

| Scientific name (Tamil trade name as per the community) | Parts used | Health conditions |
|---------------------------------------------------------|------------|-------------------|
| Delonix elata (L.) Gamble (Vatanarayana) | Leaves | Vata disorders (leading to nerves weakness, muscular problems etc.) |
| TriantHEMA decandra L. Mant. (Chattisaranthi) | Leaves | Paralysis |
| Boerhavia diffusa L. (Mookarattai) | Leaves | Blood circulation |
| Cassia quadrangularis L. (Paranda) | Stem pieces | Bone strengthening |
| Erythrina suberosa Roxb. (Mulla murungai) | Leaves | Cold |
| Cardiospermum halicacabum L. (Mudakatana) | Leaves | Constipation, flatulence |
| Erythrina suberosa Roxb. (Mulla murungai) | Leaves | Control of blood pressure |
| Alternanthera sessilis (L.) R.Br. ex D. (Ponanganni) | Leaves | Reduces excessive body heat |
| Trigonella foenum – graecum L. (Vendaya keera) | Whole plant | Diabetes management |
| Dregea volubilis (L.f.) Benth. ex Hook.f. (Perun kurunjan) | Leaves | For improving vision |
| Ciclorium intybus L. (Kasainsi keerai) | Leaves | Cough |
| Trigonella foenum – graecum L. (Vendaya keera) | Leaves | Fever |
| Alternanthera sessilis (L.) R.Br. ex D. (Ponanganni) | Leaves | General weakness |
| Eclipta prostrata (L.) (Karappan) | Whole plant | Hair growth promoter |
| Erythrina suberosa Roxb. (Mulla murungai) | Leaves | Jaundice treatment |
| Centella asiatica (L.) Urb.(Vallari elai) | Whole plant | Memory power (Buddi Shakti) |
| Abutilon indicum (L.) Sweet. (Thuthi elai) | Leaves | Fever |
| Sphagneticola calendulae (L) Pruski (Manjal karalankanni) | Whole plant | Piles and fistula |
| Eclipta prostrata (L.) L. (Karappan) | Whole plant | Memory power (Buddi Shakti) |
| Abutilon indicum (L.) Sweet. (Thuthi elai) | Leaves | Jaundice treatment |
| Trigonella foenum – graecum L. (Vendaya keera) | Whole plant | Memory power (Buddi Shakti) |
| Eclipta prostrata (L.) L. (Karappan) | Whole plant | Memory power (Buddi Shakti) |
| Centella asiatica (L.) Urb.(Vallari elai) | Whole plant | Memory power (Buddi Shakti) |
| Abutilon indicum (L.) Sweet. (Thuthi elai) | Leaves | Jaundice treatment |
| Achyranthes aspera L. (Naiyurvar) | Whole plant | Memory power (Buddi Shakti) |
| Stachydradysia jamaiensis (L) Vahl. (Eluthani keerai) | Whole plant | Memory power (Buddi Shakti) |
| Trichodesma indicum R.Br. (Kovil tumbai) | Leaves | Memory power (Buddi Shakti) |
| Dregea volubilis (L.) Benth. ex Hook.f. (Perun kurunjan) | Leaves | Memory power (Buddi Shakti) |

### Table 3

Medicinal plants species across various medical systems.

| Plant Drugs | Ayurveda | Folk | Homeo | Sidda | Tibetan | Unani | Western |
|-------------|----------|------|-------|-------|---------|-------|---------|
| Ayurveda     | 117      | 96   | 41    | 108   | 47      | 66    | 12      |
| Folk         | 96       | 107  | 36    | 99    | 44      | 58    | 9       |
| Homeo       | 41       | 36   | 41    | 40    | 25      | 32    | 8       |
| Sidda        | 108      | 99   | 40    | 118   | 47      | 62    | 12      |
| Tibetan      | 47       | 44   | 25    | 47    | 47      | 39    | 6       |
| Unani        | 66       | 58   | 32    | 62    | 38      | 66    | 11      |
| Western      | 12       | 9    | 8     | 12    | 6       | 11    | 12      |

Note: Out of 133, One species have not been included in any of the system as it is new record in folk.
knows the medicine in their ‘natural form’, which again helps building faith. Entire system seems to be a faith-based set up rather commercial which is evident from the practice of dispensing medicine at the cost without expecting any consultation fees.

The market seems to be continuously supplying raw materials throughout the year. Seasonal plants like *P. quadrifida* are collected during abundance and stored for continuous supply. In order to meet the rare species demand, they go to an extent to collect them from faraway places. Example, hilly terrain species like *D. Hamiltonii*, roots are harvested from Alagarkoil or Nagamalai hills. These are processed and preserved.

The healers-cum-traders are ‘eco-conscious’ by nature and practice. They harvest plant parts after offering prayers and take just enough for their consumption. From among the 133 species recorded in the market, more than 50% (67 species) are harvested for leafy materials/twigs/tender branches/stem, which get replenished.

Like any other societal changes, this community of healers is also facing similar socio-economic changes. For instance, it was recorded that the younger generation members of this community are largely influenced by modernization, and getting deviated from the traditional occupation.

5. Conclusion

Even today, in many parts of the world, access to modern healthcare is difficult or not affordable. They continue to rely on TM which is based on locally available natural resources and traditional knowledge. Hence, such local markets/shanties can be considered as ‘TM health care services at door step’, which provides local solutions and resources in cost-effective manner. The good practices existing in *Tīk̄kāgar tiḍal* market have to be recognized and promoted for wider application, thus ensuring symbiotic relationship across health care service providers in the system. There is a need to assess the ecological services valuation to sustain such practices. This study warrants proper documentation of know-how of these healers-cum-traders with regard to their traditional ecological knowledge, affordability of the solutions, bio-prospecting potential of the remedies, empirical evidences, and anthropological studies to know the dynamism in these practices.

The markets like these treasure immense knowledge, experiences coupled with traditional wisdoms, which needs to be unraveled for “Health for All” in the community.

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Conflict of interest

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Appendix A. Supplementary data

Supplementary data related to this article can be found at doi:10.1016/j.jaim.2017.05.008.

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