ACADEMIC INN INTERNATIONAL

ISSN: 2706-8471 (Online) ISSN: 2706-8463 (Print)

SOUTH ASIAN JOURNAL OF DEVELOPMENT RESEARCH

open access

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To cite the article: SEWALE WONDIMNEH (2019). Review on contribution of medicinal plants for livelihood and food security, *South Asian Journal of Development Research*, 2(1): 16-24.

Link to this article: http://aiipub.com/journals/sajdr-191130-021030/

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REVIEW ON CONTRIBUTION OF MEDICINAL PLANTS FOR LIVELIHOOD AND FOOD SECURITY

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ARTICLE INFO
Article Type: Review
Received: 15, Nov. 2019.
Accepted: 31, Dec. 2019.
Published: 10, Jan. 2020.

Keywords:
Ethnobotany, Food security
Medicinal value, Shrubs and Trees

ABSTRACT
Ethiopia has a wide range of topographical diversity which have a tropical, sub-tropical and temperate climatic condition. Due to this, the country has many diverse plant species. The resident of the country is highly dependent on trees and shrubs for their livelihood. Many studies showed that traditional ecological knowledge (TEK) has enormous advantageous to conserve plant species. By using this knowledge local inhabitants use forests for different purposes such as; food, medicinal, construction, ornamental and spiritual purposes. However, knowledge transfer on the use of trees and shrubs was depending on age and gender. The younger and women have little knowledge due to the mysterious use of knowledge of elder people. It is recommended to investigate further achievements on knowledge transfer of the traditional use of plants among traditional healers. Special training should be given for those who have indigenous knowledge how to transfer knowledge, how to manage and use plants in a sustainable way.

1. INTRODUCTION

Ethiopia is a land of great topographical diversity of high mountains, incited river valleys and rolling plains, which are responsible for tropical, sub-tropical and temperate climatic conditions (Kassa, 2009). Man utilizes plants for several purposes such as medicine, fruit, vegetable, fodder, and fuel. Plant-based medicines are essential for a healthier life that as they are effective and inexpensive without any side effects (Zereen *et al*., 2013). Ethiopia has the highest number of plants as compared to other countries (43.5%) followed by Philippines (40%), Guatemala (34.7%), Uganda (18.6%), Mexico (17.3%), Nepal (16.1%) and Bulgaria (11.9%) (Moe, 2007).

In Ethiopia, forest and woody vegetation resources comprise natural high forests characterized by woodlands, bushlands, plantations and on-farm trees. The forestry sector plays several important economic roles by earning foreign currency mainly from export of non-wood forest products, via providing energy and wood products (FAO, 2016).

Introduction of modern medicine to Ethiopia dates back to the 16th century during the regime of Emperor Libne-Dingel (1508-1540) (Wolde-Mariam *et al*., 2015; Uddin et al. 2018). However, due to incomplete coverage of the modern medical system, shortage of pharmaceuticals and unaffordable price of modern drugs, the majority of Ethiopian people still depend on traditional medicine (Zerabruk and Yirga, 2012). Thus, ancient times, plants have been indispensable sources for both preventive and curative traditional medicine preparation of human beings and livestock (Lulekal *et al*., 2008).

According to Haile (2012), desertification and poverty had a strong direct correlation to each other. While desertification can lead to famine, malnutrition, under-nourishment, epidemics, economic and social instability and migrations, which in turn, enhance desertification. Besides, poverty contributes to land degradation in drylands by inducing poor women and men to exploit the natural resource base in an unsustainable manner.

Environmental degradation, agricultural expansion, loss of forests and woodlands, over-harvesting, fire, cultivation of marginal lands, overgrazing and urbanization are causing the reduction of medicinal plants in Ethiopia (Bekele, 2007). The failure of conservation through protected area systems due to conflicts with local people has increased interest in ethnobotany conservation (Awas *et al*., 2010). However; there exists accelerated devastation of plant resources with the loss of indigenous knowledge. Although these measures could be taken, the extent of the knowledge of traditional medicine practice based on medicinal plants should be documented through botanical surveys (Yirga, 2010). In general, biological diversity and sustainable resource use are crucial for ecosystem stability and human survival (Abdullahi *et al*., 2013). Therefore, the objective of this paper was to review numerous recent achievements on the contribution of medicinal plants and to be made easy for researchers and interested bodies for further studies and investigations.

2. USE OF TREES AND SHRUBS

2.1 Medicinal Value

Medicinal plants used to treat the most prevalent disease in Kara and Kwego (southern Ethiopia) were similar. The first three medicinal plants with the highest rank that were indicated as the preferred choice of remedy to gastrointestinal illness and intestinal parasites were Solanumhastifolium Hochst. ex Dunal, Cissampelospareira L. and Hypoestesforskaolii (Vahl) R. Br., for respiratory infection and tuberculosis, were Salvadorapersica L., Grewiakakothamnos K. Schum., and UvarialeptocladonOliv., and for boils, abscess, swelling, external injury, and wounds were MaeurasessilifloraGilg, Salvadorapersica L. and CadabarotundifoliaForssk (Teklehaymanot and Giday, 2010).

A study carried out in central Punjab, Pakistan, indicated that ethnobotanical uses of 35 species of shrubs belonging to 22 angiosperm families documented from indigenous people showed that shrubs were in use from generation to generation for medicinal, fruit, forage/fodder, fuel, fence, ornamental purposes. It was observed that most of the shrubs were medicinally important for the treatment of human ailments of the digestive tract, skin, rheumatic pains, cardiac and pulmonary problems (Zereen *et al.*, 2013).

According to Walikhan and Surayya (2008), 98 species were identified of which most are native and having some uses by the resident of Haramosh and Bugrote valleys in Northern Pakistan. These plants frequently used for fever, cough, asthma, respiratory problems, stomach, and abdominal disorders, rheumatism and joints pain. In Nigeria, Oladele and Alade (2011) indicated that it is necessary to cultivate medicinal plants wisely to conserve biodiversity and protect threatened species. Similarly, in Algeria, Maundu *et al*. (2001) investigated nearly 90 species used for medicinal purposes in humans. This probably represents only half of the species used for medicine in Loita. The vast number is an indication of the important role played by plants in the health of the Loita Maasai.

2.2 Forage value

According to Dalle *et al*. (2005) a study carried out in southeastern Ethiopia, seventy-six percent of the useful plants were identified as forage species, being distributed among 45 families and 119 genera. However, more than half (51%) of them belong to Poaceae, Fabaceae, Lamiaceae, and Asteraceae. Of the 188 forage species encountered, 41% were trees and shrubs, 25% kinds of grass,

19% forbs, 12% climbers, including both woody and herbaceous climbers, and 3% sedges.

2.3 Food value

In southeastern Ethiopia, findings of Dale *et al*. (2005) indicated that forty-one plant species, distributed among 23 families and 31 genera, were identified as sources of food, accounting for 17% of the useful plants (or 12% of the total plants) identified by the pastoralists. Most of them (66% of the 41 species) were trees and shrubs. Forbs constituted 20% and climbers 15% of these wild edible plants. Wondimu *et al*. (2006) also found that in Arsi, Ethiopia, thirty species were documented as cultivated food plants. Among these, 8 species are fruit crops, 7 species are vegetables, cereals and pulses comprise 5 species, each, 3 species are oil crops and 2 species are cash crops. The largest number for the cultivated plants goes to herbs (63%) and the seeds are the most usable parts (19.72%) (Figure1).

Some plants, particularly *Acacia* spp. are chewed for their sweet taste, their water content, as an exercise for the jaws and to pass time. The bark is removed and the inner light-colored thin layer is chewed (Maundu *et al*., 2001). Depending on their tradition, the people of the world feed upon various types of food. However, 90% of the food derived from plant materials and most of these are of high nutritional value (Wondimu *et al*., 2006).

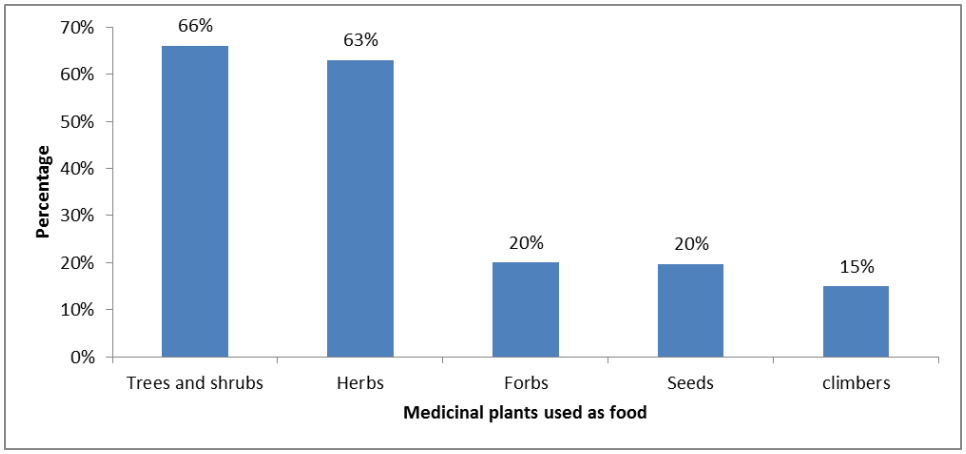

Figure1. Medicinal plants used as food and their proportion

2.4 Other Uses

Harvests of non-wood forest products (NWFP) have three major functions: provision of part of the daily necessities of forest-dependent people, off-farm income and a safety net in times of adverse conditions for agricultural production (FAO, 2012).

In the Pacific Northwest, *Thujaplicata* is without a doubt the most culturally important plant to most native groups. The bark is used to make baskets, clothing, rope and decorations, the wood into boxes, masks, totem poles, longhouses and canoes, the withes into rope and baskets, and the roots into baskets and hats. The lists could go on and on. From a mature stand, which is unlikely to be found anytime soon on a restoration site, all materials including planks of wood (but not including the trunk itself), can be harvested without killing the trees, using traditional harvest methods (Curtis, 2008).

The use categories recorded included: arrow, bow, broom, construction, cultural, farm implement, fence, food, forage, fuelwood, furniture, greasing baking plate, gum, honey production, incense, insect repellent, insecticide, medicinal, musical instrument, poison, rope, shade, soap, tanning, timber, tool handle, toothbrush and utensils. Awas *et al*. (2010) indicated that the highest proportions of wild plants were used for food, fuelwood, construction, and medicine.

2.5 *Parts of Trees and Shrubs Used*

According to Mesfin *et al*. (2013), the study was done in Gemad district, Ethiopia, showed that 42% part of the medicinal plant species used to treat human ailments was a leaf. However, only 6% of stem parts were used as a traditional medicinal value in the study area. The study of Sarri *et al*.(2014) in M'sila, Algeria, showed tisane or decoction are the most used (44.7%) followed infusion (27.1%) and powder (12.2%) of which, traditional medicines are extracted maximum from plant leaves followed by roots, fruits, seeds, and barks, while the least used part were the flowers. About 106 plant species were recorded to use their leaves for the preparation of traditional medicine. Similarly, roots with 58 gain the second highest importance in the traditional system of medicine used by Naga tribes. The third-place occupies by fruits 45 plant species, fourth by bark with 30 plant species. Moreover, plant parts such as seeds (27 plant species), stems (18 plant species), flowers and pods (19 plant species), Rhizomes (12 plant species), tuber (7 plant species), Woods (3 plant species), bulb (3 plant species) and corm (4 plant species) were traditionally used as medicine. Very interestingly, 36 plant species were recorded to use the whole plant as a medicinal purpose (Zehasa *et al*., 2015) (figure 2a). Awas *et al*. (2010), investigated that leaves contributed about 50% followed by seeds (15%) and roots (10%) in Gumuz and Berta people (Figure2 b).

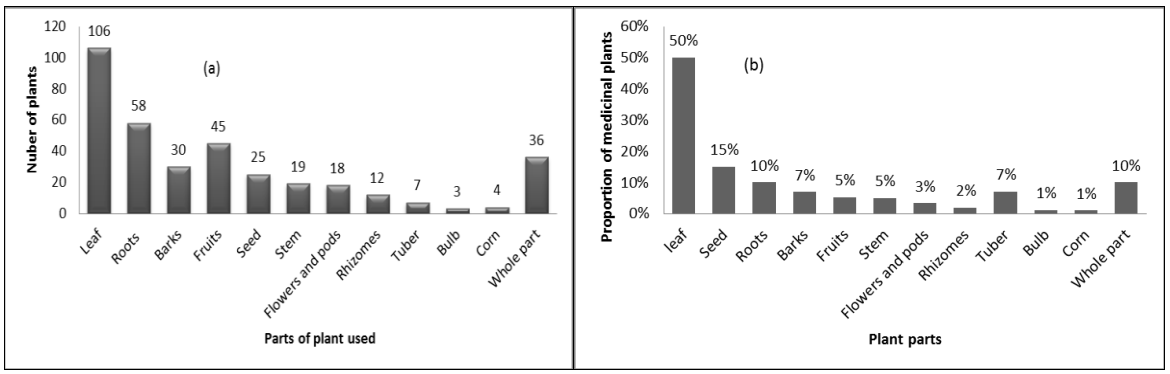

Figure 2. (a) Number of medicinal plants versus their use, (b) Proportion of medicinal plants versus their use.

2.3. Route of Administration

According to Sarri *et al*. (2014), in M'sila, Algeria, medicines are administered orally. Indeed, several preparation methods used to facilitate the administration of plants to patients. In Amaro Woreda, Ethiopia, Mesfin *et al.* (2014) also investigated the treatment of snakebite, 51% of remedies were applied orally in the form of an infusion or decoction, 34% was applied topically on the snake bite area, and the rest applied in both forms. In Ethiopia, ManaAngetu district most of the treatments were reported to be completed within two or three days. A majority of drugs were recommended for thrice-daily consumption or application. Internal ailments mostly treated by making the patient drink herbal preparations; skin infections such as ringworm were treated by rubbing and painting herbal preparations on an infected skin; sores by chewing and spitting remedial plant part on the sore; headaches and fever by a steam bath and vapor inhalation (Lulekal *et al*., 2008).

The administration route, oral (61%) was the leading in both Kara and Kwego people. The measurements of doses were dependent on the parts used and edibility. The number of leaves, young twigs, and fruits used in the preparation of remedies were more than that of the root (Teklehaymanot and Giday, 2010). Yirga (2010) around Alamat, southern Tigray, Ethiopia also investigated that the administration routes, as described were oral (20%), dermal (48%), nasal (16%), oral or dermal (8%), chewing (4%) and through the ear (4%). Some (44%) of the remedies are mixed with water, butter,

honey, Citrus limonum, and Allium sativum while the remaining do not have any ingredients added.

In Gindebret, district, Ethiopia medicinal plant preparations were administered through oral, dermal and nasal routes. However, oral application (33 preparations, 67.3%) was the highest and most commonly used route of application followed by dermal application (15 preparations, 30.6% (Zerabruk and Yirga, 2012).

In Western Shoa zone, Ethiopia, the route of administration is either external or internal (oral, ear, nasal). According to this study, about 133 (80.61%) of the medicinal plants are administered internally (112 (67.88%) oral, 15(9.10%) nasal and 6(3.64%) ear). About 111(67.27%) of the medicinal plants are applied externally on the skin (Kassa, 2009).

2.4. Gender Distribution

Wolde-Mariam et al. (2015), studies on traditional medicinal plants in Degadamot woreda, Ethiopia, showed that a total of 50 heterogeneous groups of study participants were included. Among them, 35 (70%) of the respondents were males and 15 (30%) females. 62% of the group study participants were illiterate and 12%, 10% and 8% of them attended literacy campaign, church education, and grades one to six respectively. The age range of the study participants was approximately between 18 and 102. Similarly, Zerabruk and Yirga (2012), a study was done in Gindebret, district, Ethiopia, indicated that the gender distribution of traditional healers was 84 (70%) and 36 (30%) for males and females, respectively and 50% were illiterate. Most of the traditional healers were married (50.8%) and 71.7% were older than 46 years.

2.6 Market Conditions

Recent data on the forest resources of Ethiopia, documented in FAO's Forest Resources Assessment (FRA), puts Ethiopia among countries that have forest cover ranging between 10 to 30 percent of their total land area. According to FRA (FAO, 2012), Ethiopia's forest cover is 12.4 million hectares (11.5 percent). Factors that contributed to accelerating the decline of vegetation cover in the country between 1990 and 2010 include the high level of poverty, coupled with the increase in the human population, the consequent demand for forest products such as firewood and the subsequent conversion of forests and woodlands into farmlands and settlements (FAO, 2016). In Ethiopian traditional market, medicinal plants are usually associated with spices and herbs. They have seen in the areas of the market, where spices and herbs are displayed on roadsides during religious ceremonies around churches and mosques. In Ethiopia, the informal trade takes the major share in rural areas except at the level of healers who commercialize just the crude materials or charge together with (Bekele, 2007).

Concerns for sustainable development, for the deterioration of the environment and social relations, as well as for the negative effects of climate change at different scales are influencing market decisions. This can be above all noticed in agricultural product markets, where buyers are looking for products that meet specific environmental and/or social standards. Some banana plantation owners that export to the European market, for example, have started to invest in forest land for conservation and carbon emissions compensation (FAO, 2012).

2.7 Way of Management

Medicinal plants in the wild have been nurtured and preserved by herb gatherers and traditional healers for many generations under an informal set of rules. However, as the demand for

Of the 230 medicinal plants studied, 208 species (90.43 %) were collected from the wild while 13 species (5.65 %) were found in cultivation and 9 species (3.91 %) were obtained both from cultivation and the wild. This indicates that the practitioners depend on the wild source or the natural

environment rather than home gardens to obtain the medicinal plants, and the activity of cultivating medicinal plants is very poor in the study area. It also indicates that the natural forest of Mana Angetu is being overexploited by traditional practitioners for its medicinal plants' composition (Lulekal *et al*., 2008).

3. CONCLUSION

Many studies showed that traditional ecological knowledge (TEK) has enormous advantageous to conserve plant species. By using this knowledge local inhabitants use forests for different purposes such as; food, medicinal, construction, ornamental and spiritual purposes. As indicated in most of the studies, leaves of plants are most frequently used for medicinal purposes. However, the way of knowledge transfer is very poor due to the secreting use of plants among traditional healers which may result in the disappearance of this precious knowledge. Some people cultivated plants around homes while many people used it from the wild by uncontrolled cultivation. This is the cause of deforestation, biodiversity loss, and global warming.

Further studies should be done on the knowledge transfer of traditional use of plants among traditional healers. Special training should be given for those knowledgeable people how to transfer knowledge, how to manage and use plants in a sustainable way. Manuals, leaflets, should be prepared based on research findings, and distributed for concerned bodies. A workshop should be prepared on issues on how to conserve plants, how to use how to manage and how to transfer knowledge among people for stakeholders, administrators, policymakers and influential peoples.

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