



# Ethnobotanical Studies on Traditional Medicinal Plants Used in the Treatment of Humans' Skin Diseases in Ethiopia: A Review

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## Abstract

The ethnobotanical literature review explores the use of medicinal plants in treating skin diseases in Ethiopia, assessing gaps in accessible research papers. 18 scientific papers, including M.Sc. theses, journals, electrons, and proceeding, highlight the safety and cost-effectiveness of these plants. In this ethnomedicinal literature review, a total of "233" species belonging to 71 families under 170 genera were selected from different regions of the country. Taxa commonly used for the treatment of skin disease belong to six families such as Asteraceae (19), Fabaceae (17), Solanaceae (15), Euphorbiaceae (14), Lamiaceae (11) and Malvaceae (10, each) in number of species. Herbs formed a major component (43%), while shrubs, trees, and climbers constitute 32%, 16%, and 9%, respectively. Plant species cure various skin diseases such as dandruff, eczema, skin rash, scabies, inflammation, cuts, wounds, boils, itching, sores, and swellings. The most frequently used plant parts for the preparation of remedies were leaves, followed by roots and/or leaves. Traditional folk medicines hold the heritage of community acceptance because they are derived from indigenous knowledge and skills that also involve theories, beliefs, and experiences. In this review, the current literature on ethnomedicinal plants is summarized, along with a listing of the medicinal plants used for common skin ailments. Based on the reviewed papers, the main threats to medicinal plants in the country were overgrazing, agricultural expansion, firewood, drought, and construction. Thus, the review paper concludes by providing recommendations regarding the scenarios of research in the country.

**Keywords:** Ethiopia; Ethnobotany; Plant Parts; Medicinal Plants; Skin Diseases

**Abbreviations:** ICF: Informant Consensus Factor; IK: Indigenous Knowledge.

## Introduction

Ethiopia's topographical diversity, including high mountains, plateaus, gorges, river valleys, and plains, contributes to tropical, subtropical, and temperate climates.

The country's diverse environment highlights plant and animal life, and it is home to numerous ethnic groups and cultural diversity [1].

It is important to note that out of the total 422,000 flowering plants reported from around the world [2], more than 50,000 are used for medicinal purposes [3]. Ethiopia has diverse medicinal flora that is distributed in different

vegetation types. The current literature shows that about 1,000 medicinal plants have been identified and documented in the country [4]. However, investigations have indicated the presence of erosion of genetic and indigenous knowledge, which in turn calls for the collection, investigation, and conservation of these resources [5].

Physical inspection of the skin and the mucous membranes forms the foundation for an exact analysis of skin membrane conditions [6]. These conditions mostly present with skin exterior changes (wounds), which have additional or fewer discrete features [7]. Skin conditions are among the commonest causes of morbidity in rural and urban areas of developing countries, accounting for a high proportion of visits to primary healthcare centers, which are often undeserved and underfunded [8]. Although a well-designed epidemiological survey has never been conducted in Ethiopia, available information, though scanty, indicates that dermatological diseases rank fifth among the top twelve morbidity causes that were recorded between 1981 and 1991 [9].

Dermatological disorders were reported as the second and fourth most frequent complaints at Shebe and Agaro health centers in the tropical foothill region of Illbabor province, southern Ethiopia. Among children, skin disease is usually the second most common reason for consultation in rural clinics [10]. Another study carried out in 1996 to determine the prevalence of skin diseases among schoolchildren in rural Ethiopia showed that 80.4% of schoolchildren assessed were found to have one or more skin diseases [11].

The objective of the present work is to review the accessible literature on ethno-botanical knowledge for the treatment of skin diseases as well as assess the literature's content and indicate its gaps for future studies that will be undertaken elsewhere in Ethiopia. This review was conducted using secondary information found in published, open-access journals, proceeding papers, and unpublished thesis documents. The data were compiled and analyzed using descriptive statistics (graphs, tables, percentages, and charts).

## Ethnomedicinal and Skin Diseases Review

### Ethnomedicinal Research in Ethiopia

Before three and a half decades in Ethiopia, it was stated that detailed descriptions of plants used medicinally were scanty (FAO, 1986); however, few ethnobotanical investigations were conducted in the recent past in different parts of the country [4,12-16]. These researchers have clearly indicated the presence of a wealth of indigenous

knowledge of the use and management of plant resources among the local people of various parts of the country and ethnic groups. Nevertheless, considering the country's varied flora and socio-cultural diversity, these studies are few as ethno-medical healing systems vary across cultures. In addition, researchers have also indicated the reliance of nearly 80% of the population in the country on utilizing plant-based traditional medicines as a major health-care system [17].

### Common Dermatological Disorders

It was reported that skin is primarily an organ of protection. As the body's first line of defense, the skin is continuously subjected to potentially harmful environmental agents, including solid matter, liquids, gases, sunlight, and microorganisms [18]. Although it has remarkable properties that allow for a continuous cycle of healing, shedding, and cell regeneration, the skin is subjected to a very wide range of disorders [19].

### Infectious Skin Disorders

Mitscher LA, et al. [18] indicated that the skin is subjected to attack by a number of microorganisms. Normally, the skin flora, sebum, immune responses and other protective mechanisms guard the skin against infection. Depending on the virulence of the infecting agent and the competence of the host's resistance, infections may result [18].

### Bacterial Infections

Bacteria are considered normal flora of the skin. Most bacteria are not pathogenic; however, when pathogenic bacteria invade the skin, superficial or systematic infections may develop. Bacterial infections are classified as primary, or superficial (e.g., impetigo), and secondary, or deep (e.g., infected ulcers) [18]. The most common bacterial infections include impetigo, folliculitis, furuncles, and carbuncles [18,20].

### Fungal Infections

Microbial information revealed that fungal infections of the skin can be superficial, intermediate, or deep. Some are opportunistic and affect a susceptible host, while others are truly pathogenic and can infect a healthy person [18,20]. The superficial infections are called dermatophytosis, and they are commonly known as tinea or ringworm. Different forms of tinea affect different body areas. Tinea can affect the body (*Tinea corporis*), scalp (*Tinea capitis*), beard (*Tinea barbae*), hands (*Tinea manus*), feet (*Tinea pedis*), nail (*Tinea unguium*), or groin and upper parts of the thigh (*Tinea cruris*). Individual species of three genera have been identified as

the invading fungi in most forms of tinea: *Microsporum*, *Epidermophyton*, and *Trichophyton*. Intermediate fungal diseases invade both the superficial and deeper tissues; moniliasis caused by *Candida albicans* is an example. Deep fungal infections involve the epidermis, dermis, and subcutis. Infections that are typically superficial may exhibit deep involvement in immunosuppressed individuals [18,20].

### Viral Infections

It is reported that viruses invade the keratinocyte, begin to reproduce, and cause cellular proliferation or cellular death. The use of corticosteroid medications, which have immunosuppressive qualities, and birth control pills, which change the bacterial flora of the skin, has been linked to the sharp rise in viral skin illnesses [18]. Herpes simplex, Varicella (also known as chickenpox), Herpes zoster, Warts (*Verrucae*), Rubeola (Measles), and Rubella (also known as German measles) are some of the most common infectious skin disorders of viral origin [20].

### Inflammatory and Allergic Skin Disorders

Inflammatory skin diseases are usually localized to the skin and are rarely associated with a specific internal disease. They produce marked variations in normal skin, usually papulosquamous in nature. Inflammation and erythema are common. Acne, lichen planus, psoriasis, and pityriasis resea are among the most common skin disorders of this type. Allergic skin responses involve the body's immune system and are caused by hypersensitivity reactions. They include contact dermatitis, atopic and cummular eczema, and drug reactions [18,20].

### Use of Medicinal Plants on the Skin

Plants have been used for skin treatment since prehistoric times, with Egyptians recording skin care on temple wall paintings Grierson, et al. [21,22]. About 33% of phototherapy in non-Western communities is used for skin disorders, wounds, and infections [23]. Topical application of medicinal plants has proven effective due to their biological activities, such as anti-microbial, anti-inflammatory, and anti-erythema properties [24].

It was confirmed that ethnobotanical surveys have been found to be one of the most reliable approaches to the bio-prospecting of medicinal plants and their uses. Many plant medicines have been incorporated into the mainstream of the healthcare system. The pharmaceutical industry has considered plant medicine as a source of bioactive agents that can be used in the preparation of medicine [25]. Effective and inexpensive botanical remedies are gaining popularity

equally among both rural and urban areas [26].

### Skin Diseases in Ethiopia

Although limited studies have been made on the prevalence of skin diseases in Ethiopia, the available records are indicative of the high prevalence of this problem in the country. A study made at Black Lion Hospital indicated that skin diseases are among the leading causes of hospital visits. The most common skin diseases were allergic skin diseases (25.5%), infections (25.4%), and photodermatoses (22.9%), followed by papulosquamous diseases (11.4%) and pruritus of unknown origin (3.3%). The pattern of skin diseases observed in this analysis shows that allergic and infectious causes account for three-quarters of skin problems [27]. It was also reported that of all the skin diseases that were diagnosed in 4,700 patients in one of the dermatological hospitals in the capital, dermatomycosis, vitiligo (including a group of genetically determined disorders characterised by an inability to produce melanin in the skin, hair, and eyes), and psoriasis accounted for 7.8%, 4.6%, and about 2%, respectively (Schaller, 1963, cited in Dawit, et al.). Another study conducted in 1980 involving 1,000 patients showed skin disorders due to bacteria and fungi to be 12.7% and 9.7%, respectively, while psoriasis and vitiligo were 2.6% each [1].

A study made in northwest Ethiopia showed a prevalence rate of 49.2%. *Tinea capitis*, impetigo, infected wounds, and verrucae were the most common skin infections [28]. A related study made at Kazanchis Health Centre in Addis Ababa also reported that 15 bacterial, fungal, and viral infections were dominating, comprising 19.4%, 18.5%, and 6.5% of the Ncases [28].

In this review, a total of 233 plant species belonging to 170 genera and 71 families were found to be useful in the treatment of more than 24 different skin diseases like wounds, hemorrhoids, body swelling, ringworm, skin rash, itching, burns, aches, eczema, dandruff, boils, scabies, rashes, tinea versicoloris, tinea nigri, and the like. Out of 233 plant species, 95 were invariably used for the treatment of wound diseases. Swelling, hemorrhoids, general skin diseases, skin rash, and dandruffs were treated consistently by 45, 35, 25, 24, and 22 species, respectively. The fewest (one or two) plant species treat diseases like leprosy, colic, mumps, meningitis, and so on. The review revealed that skin diseases, wounds, scabies, eczema, itching, ringworm, skin cancer (tumor), sores, skin eruptions, and swellings are very common among the different tribal communities of Ethiopia. The infection of the skin could be superficial, intermediate, or deep (Table 1; S1)

Infection of the Skin	Skin Diseases/Disorders	No. of MPs	Percentage (%)
Superficial/deep	Wounds	95	20.26
Superficial/deep	Swelling	45	9.59
Deep/superficial	Hemorrhoids	35	7.46
Superficial/deep	General skin diseases	24	5.12
Deep/superficial	Skin rash, herpes	25	5.33
Superficial	Scabies	21	4.48
Superficial	Dandruff	22	4.69
Superficial/intermediate	Other fungi (tinea nigri, athlete's foot etc.)	21	4.48
Superficial	Ringworm	20	4.26
Superficial	Itching	19	4.05
Deep	Eczema	16	3.41
Deep	Warts	16	3.41
Deep	Rheumatism	15	3.19
Deep	Skin cancer/tumor	13	2.77
Intermediate/deep	Sores	9	1.92
Deep	Tetanus	8	1.71
Superficial	Blood clot	8	1.71
Superficial	Skin poison	8	1.71
Deep	Leschmaniasis	7	1.49
Superficial/intermediate	Allergy	6	1.28
Deep/superficial	Burns	6	1.28
Deep/superficial	Boils	6	1.28
Superficial	Aches	5	1.07
Deep	Ulcer	5	1.07
Superficial/deep	Skin infection	4	0.85
Could be superficial, intermediate or deep	Others (mumps, colic, bite, sun strike, meningitis, goiter, leprosy)	10	2.13
	Total	469	100

**Table 1:** Skin diseases caused by microorganisms.

S/N	Scientific name	Families	Common name		Pp	Ethnobotanical uses	References
1	<i>Acacia abyssinica</i> <i>Hochst. ex Benth</i>	Fabaceae	Lafto	T	L	Skin rash, goiter, wound	1, 2, 3, 7
2	<i>Acalypha volkensii</i> Pax	Euphorbiaceae	Kirija	Cl	L	Wound	14
3	<i>Acanthus eminens</i> C.B. <i>Clarke,</i>	Acanthaceae	'Phecho',	S	St	Wound	18
4	<i>Acanthus polystachius</i> <i>Delile</i>	Acanthaceae	Kosorruu	S	L	Wound	15, 6
5	<i>Acanthus pubescens</i> <i>(Oliv.) Engl.</i>	Acanthaceae	Kosorru	S	Sap	Tinea corporis	4

6	<i>Achyranthes aspera</i> Lam.	Amaranthaceae	Telenj	H	L, R	Wound, hemorrhage, swell, cut	3, 6,7,8,16
7	<i>Aeollanthus densiflorus</i> Ryding,	Lamiaceae	'Dicho'	H	L	Skin disease	18
8	<i>Acmella caulirhiza</i> Del.	Asteraceae	Kutcha-melk	H	L	Swelling	7
9	<i>Acokanthera schimperi</i> (A.DC.) Schweinf.	Apocynaceae	Qaraaru	S	L	Leprosy, itching	5, 12
10	<i>Ageratum conyzoides</i> L.	Asteraceae	Tuffoo (Or.)	H	L	Blood clot, wound	1, 18
11	<i>Albizia sp.</i>	Fabaceae	Ambaltaa	T	Bar	Wound	15
12	<i>Allium sativum</i> L.	Alliaceae	Shinkurt	H	Bar, sap	Tinea nigra; itching, wound, skin disease, rheumatic	4, 9, 11, 16
13	<i>Aloe debrana</i>	Aloaceae	Eret	H	Sap	Hemorrhoids, ringworm	8
14	<i>Aloe macrocarpa</i> Tod.	Aloaceae	Ret/erete	H	Lat	Fire burn, wound	4, 7
15	<i>Aloe kefaensis</i> Gilbert & Sebsebe	Aloaceae	'Ginwaro	H	Sap	Wound	18
16	<i>Aloe otallensis</i> Baker	Aloaceae	Godare utsa	H	L, sap	Wound	11
17	<i>Aloe pirottae</i> A. Berger	Aloaceae		S	L	Hemorrhoid	5
18	<i>Arundinaria alpine</i> K. Schum.	Poaceae	Kerkeha	H	R	Eczema	5
19	<i>Arundo donax</i> L.	Poaceae	Lemicho (Wol)	S	L	Wound	17
20	<i>Artemisi annua</i> L.	Asteraceae	Faranjiya agupiya	H	L	Ringworm; skin disease	11
21	<i>Asparagus africanus</i> Lam.	Asparagaceae	Yeset-qest	H	Wp	Tetanus, bone fracture, wound, itching	7,8,12, 15,16
22	<i>Astragalus atropilosus</i> (Hochst.) Bunge	Asparagaceae		H	Wp	Itching	7
23	<i>Asparagus racemosus</i> Willd	Asparagaceae	'Ufikaro'	H	R & St	Wound	18
24	<i>Bersama abyssinica</i> Fresen.	Melanthaceae	Azamir	S	L, St	Skin infection, rheumatic	4,17, 18
25	<i>Brachiaria brizantha</i> (Hochst. ex A. Rich.) Stapf)	Poaceae	Shalishshattuwa	H	R	Scabies	11
26	<i>Brassica carinata</i> A. Br.	Brassicaceae	Gomen	H	Se	Skin rush	8
27	<i>Brucea antidysenterica</i> Swiss Chard.	Simarobaceae	Waginos/Avalo	S	Fl	Eczema, Rheumatic, Tinea nigri, snake bite, ulcer, wound, itching	3,4,6, 7, 9, 11,12,16
28	<i>Buddleja polystachya</i> Fresen.	Loganiaceae	Anfar	S	L	Scabies, itching, wound	3, 7,8
29	<i>Cadaba farinosa</i> Forssk	Capparidaceae	Qalqalch	S	L	Ringworm, wound, eczema	12

30	<i>Calotropis procera</i> (Ait.) Ait.f.	Asclepiadaceae	Qimbo (Am)	S	Lat	Hemorrhoids, swell, wound	3,7,8, 15
31	<i>Calpurnia aurea</i> (Ait.) Benth.	Fabaceae	Digita	S	Fl, L	Eczema, scabies, wound	6, 16, 17
32	<i>Canarina eminii</i> Aschers ex Schweinf.	Campanulaceae	Maaracaa	Cl	Wp	Scabies	15
33	<i>Capparis tomentosa</i> Lam.	Capparidaceae	Gumeero	S	R	Skin rush	8
34	<i>Capsicum annum</i> L.	Solanaceae	Qaria	H	Se	Skin rush	3
35	<i>Capsicum frutescens</i> L.	Solanaceae	Mis'imis'uwa	H	Fr, Fl	Swelling, fungal, rheumatism	11
36	<i>Carduus leptacanthus</i> Fresen	Asteracea	'Guchino'	H	R	Skin disease	18
37	<i>Carduus shimperi</i> Sch. Hip.	Asteraceae	Qoriharree	H	R/ Bar	Hemorrhages	12
38	<i>Carica papaya</i> L.	Caricaceae	Paappaayyaa	T	Se	Wound	15
39	<i>Catha edulis</i> (Vahl) Forssk. ex Endl.	Celasteraceae	Chat	S	Se	Skin disease	6
40	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Baala buqqee	H	L	Tinea corporis	15
41	<i>Caylusea abyssinica</i> (Fresen.) Fisch. & Mey.	Resedaceae	'Yamo'	H	L	Skin disease, scabies	4, 18
42	<i>Chenopodium ambrosioides</i> L.	Chenopodiaceae	-----	H	L	Wound	12
43	<i>Chenopodium murale</i> L.	Chenopodiaceae	Amedmado	H	L	Wound, dandruff, swellings	3,7,8
44	<i>Cissus quadrangularis</i> L.	Vitaceae	Yezehon anjet	Cl	Wp	Hemorrhage	8
45	<i>Citrus aurantifolia</i> Burn. f.	Rutaceae	Loomiya	S	L, Fr	Germ killing, wound (qunchir)	7, 11
46	<i>Citrus limon</i> (L.) Burm.f.	Rutaceae	Lomi	S	Fr	Athletes foot, skin rush, scabies	3, 8,12
47	<i>Clausena anisata</i> Willd. Hook.f. ex Benth.	Rutaceae	Limich	S	R, L	Skin rash (shiffe), skin disease	2,18
48	<i>Clematis hirsuta</i> Guill. & Perr.	Ranunculaceae	Azo-hareg	Cl	Fr	Hemorrhoids, skin wound, swell	8,11
49	<i>Clematis simensis</i> Fresen.	Ranunculaceae	Azo-areg	Cl	L, R	Sore, leishmaniasis, Tinea nigri, sore, cancer	2, 3,7, 6, 12,16
50	<i>Clerodendrum cephalanthum</i> Oliv.	Lamiaceae	Boye maataa	Cl	Wp	Swelling, wound	11
51	<i>Clerodendrum myricoides</i> (Hochst.) Vatke	Lamiaceae	Misirch	S	R, lat, L & sap	skin disease, wound, eczema, burn mumps, swell, tetanus	2, 8,11,18
52	<i>Clutia lanceolata</i> Jaub. & Spach. var. <i>abyssinica</i>	Euphorbiaceae	Feyele-fej	S	L, Fr	Itching, hemorrhages	6



53	<i>Clutia abyssinica</i> subsp. <i>lanceolata</i> Forssk.	Euphorbiaceae	Feyel fej	H	L	Dandruff	3
54	<i>Coffea arabica</i> L.	Rubiaceae	Bunna	S	Se	Sore, cuts, wound	8,12,16
55	<i>Combretum molle</i> R. Br. ex G. Don.	Combretaceae	Avalo	T	Se	Skin rash, tumors	3
56	<i>Combretum paniculatum</i> Vent.	Combretaceae	Baggi	S	Lat	Ring worm	2
57	<i>Commelina benghalensis</i> L.	Commelinaceae	Lalunxe (Wol)	H	Lat	Skin infection	17
58	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	'Naletto'	H	Sap	Skin disease	18
59	<i>Commelina</i> sp.	Commelinaceae	Wuha-anqur	H	R, L	Athlete foot, wound Skin, wound	13
60	<i>Commelinia latifolia</i> Hochst. ex A Rich.	Commelinaceae	Dali'sha (Gassa)	H	Sap	Wound (gormit)	7,11
61	<i>Commiphora africana</i> (A. Rich.) Endl.	Burseraceae	-----	S	L	Eczema, scabies	5
62	<i>Convolvulus steudneri</i> Engl.	Convolvulaceae	Flasot	H	L	Swelling	6
63	<i>Cordia africana</i> Lam.	Boraginaceae	Warka	T	L, bar, L	Poison, wound, dandruff	2, 3, 11,12, 14 15,18
64	<i>Crotalaria karagulensis</i> Taub.	Fabaceae	Yeahiya ater	H	L	Itching (likft)	7
65	<i>Crotalaria incana</i> L.	Fabaceae	Atarii kuruphee	H	L	Swelling, wound	2,18
66	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	Bisana	T	L, lat	Ringworm, boil, wound, cut, eczema, skin disease	2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 15, 16
67	<i>Cucumis ficifolius</i> A. Rich.	Cucurbitaceae	Hiddi hoolo (Or)	Cl	R, L	Tetanus, swelling, wound	2, 7, 8
68	<i>Cynoglossum coeruleum</i> (Hochst. A. Rich.) DC.	Boraginaceae	Chegogit	H	L	Itching, sun strike, swelling, skin, wound, poison	13, 7,16, 17
69	<i>Cynoglossum amplifolium</i> Hochst. ex A.DC.	Boraginaceae	Girshu	H	L	Wound	14
70	<i>Cynoglossum densoliatum</i> Chiov.	Boraginaceae	Chigogote	H	L	Skin infection	8
71	<i>Cyphostema adenanthum</i> (Fresen.) Desce.	Vitaceae	Aserkuch-tebeteb	Cl	L, R	skin wound	13
72	<i>Cyphostemma</i> spp.	Vitaceae	Gaalee	Cl	Fl	Hemorrhages	12
73	<i>Datura metel</i> L.	Solanaceae	Qoricha bofaa (Or.)	H	L	Snake bite	1

74	<i>Datura stramonium L.</i>	Solanaceae	Astenagir	H	L, Fr	Ring worm, dandruff, scabies head infection, hemorrhoids, head, wound	2, 3,4, 5, 6, 8,10,11, 16,17,13, 18,
75	<i>Dichrostachys cinerea (L.) Wight &amp; Arn.</i>	Fabaceae	Gariggaruwa	T	L	Wound	11
76	<i>Delonix regia (Boj.ex Hook.) Raf.</i>	Fabaceae	Mimi (Wol)	T	L	Wound	17
77	<i>Drymaria cordata (L.) Schultes</i>	Caryophyllaceae	Sayidasajal	H	L	Swelling, allergy, wound	1, 18
78	<i>Discopodium penninervum Hochst.</i>	Solanaceae	Almit	S	L	Wound, dandruff	16
79	<i>Dissotis senegambiensis (Guill. &amp; Perr.) Triana</i>	Melastomataceae	Kossosiya	H	R, L	Fungal infection	11
80	<i>Dodonaea angustifolia L.f.</i>	Sapindaceae	Kitkita	S	L	Wounds, skin rash, eczema, Tinea versicolor, bone fracture, burn, skin rash	3, 5, 6, 8, 12, 16
81	<i>Ehretia cymosa Thonn.</i>	Boraginaceae	Ulaagaa	T	L	Rheumatism	1
82	<i>Embelia schimperi Vatke</i>	Myrsinaceae	Enqoqo	S	Fl, L, sap	Hemorrhoids, wound, itching, snake bite,	16,14
83	<i>Erica arborea L.</i>	Ericaceae	Asta	S	L	Wound,	16
84	<i>Eucalyptus globules Labill.</i>	Myrtaceae	Bahir zaf	T	L	Foot smell, skin diseases	1,3,9
85	<i>Euphorbia abyssinica Gmel</i>	Euphorbiaceae	Qulquql	S	St, lat	Itching/scabies, wound, hemorrhoids	5, 7,16
86	<i>Euphorbia ampliphylla Pax</i>	Euphorbiacea	'Gineato'	S	Sap	Wound, hemorrhage, cancer	3, 18
87	<i>Euphorbia colubrina Bally &amp; Carter</i>	Euphorbiaceae	Anterfa	S	Sap	Ringworm	8
88	<i>Euphorbia depauperata A. Rich.</i>	Euphorbiaceae	Anxarfaa	H	Lat	Eczema	12
89	<i>Euphorbia lathryis L.</i>	Euphorbiaceae	Hadaamii	T	St	Hemorrhoids	2
90	<i>Euphorbia platyphylos L.</i>	Euphorbiaceae	Antir (Am)	H	Lat	Tumor, wound, dandruff	3,6
91	<i>Euphorbia schimperiana Scheele</i>	Euphorbiaceae	Antirfa	H	Wp, sap	Wound, skin disease	16,18
92	<i>Euphorbia tirucalli L.</i>	Euphorbiaceae	Shuramo (Wol)	S	Lat	Skin cancer, hemorrhage, ringworm, wart	4 ,8, 10, 15, 17,18
93	<i>Falkia canescens C.H. Wright</i>	Convolvulaceae	Gura hantutaa	H	L	Spider poison, allergy	1
94	<i>Ficus carica L.</i>	Moraceae	Beles	S	Lat	Wound	6,7
95	<i>Ficus exasperata Vahl</i>	Moraceae	Balansofi (Or)	T	Sap	Warts, Eczema	4



96	<i>Ficus palmata</i> Forssk.	Moraceae	Beles	T	R/L	Cancer	8
97	<i>Ficus sur</i> Forssk.	Moraceae	Shola	T	Fl, Fr, sap, L	Itching, wound, acute bleeding, ring worm, wart (cancer)	2, 6,12, 16, 17
98	<i>Ficus sycomorus</i> L.	Moraceae	Odaa (Or)	T	Sap	Hemorrhoid	2
99	<i>Ficus vasta</i> Forssk.	Moraceae	Warka	T	St	Eczema, wound	7,16
100	<i>Galium aparinoides</i> Forssk.	Rubiaceae	Kanggad'a	H	L	Fungal infection, ulcer	11
101	<i>Gnidia glauca</i> Fersen	Thymelaeaceae	Matta	H	R	Burns	16
102	<i>Gnidia involucrata</i> Steud ex A. Rich.	Thymelaeaceae	Geni'e-	S	R, St	Glandular swelling	11
103	<i>Grewia ferruginea</i> Hochst. ex A. Rich.	Tiliaceae	Dhoqonuu	T	L, bar	Dandruff, red hair	4,7,15
104	<i>Guizotia abyssinica</i> (L.f.) Cass.	Asteraceae	Nug	H	Se	Sore, swelling	15,16
105	<i>Guizotia scabra</i> (Vis.) Chiov	Asteraceae	Tuffoo (Or)	H	L, Wp	Wound	1,12, 18
106	<i>Hibiscus micranthus</i> L.f.	Malvaceae	Yebeklo	H	L	Wound	3,7
107	<i>Hordeum vulgare</i> L.	Poaceae	Gebis	H	Se	Dandruff	3
108	<i>Impatiens hochstetteri</i> Warb	Balsaminaceae	Ensosila	H	R	Scabies	16
109	<i>Impatiens tinctoria</i> A. Rich.	Balsaminaceae	Gurshet	H	Rhizome	Rheumatism	3
110	<i>Indigofera spicata</i> ; Forssk.	Fabaceae	Qoricha hadha	Cl	L	Allergy, scabies, eczema	1, 5
111	<i>Indigofera hochstetteri</i> Bak.	Fabaceae	Qoricha	H	R	Tetanus	2
112	<i>Ipomoea cairica</i> (L.)	Convolvulaceae	Kalaalaa (Or.)	Cl	L	Wart	1
113	<i>Ipomoea tenuirostris</i> Choisy	Convolvulaceae	Nisbaa	Cl	L	Allergy	1
114	<i>Jasminum grandiflorum</i> L.	Oleaceae	Tenbelel	Cl	R	Boils	6
115	<i>Juniperus procera</i> Hochst ex. Engl.	Cupressaceae	Tid	T	Resin	Ringworm, swelling, wound (gormit)	7, 16
116	<i>Justicia schimperiana</i> (Hochst. ex Nees) T. Anders	Acanthaceae	Sensel, Smiza,	S	L	Hemorrhoids, open sore, Rheumatism, swelling, skin lesion, dandruff	1,3, 13, 16, 17
117	<i>Kalanchoe densiflora</i> Rolfe	Crassulaceae	'Kachamiitobo'	H	L	Wound, swelling	3, 18
118	<i>Kalanchoe petitiana</i> A. Rich.	Crassulaceae	Endahula	H	R/L	boil, sore, colic, wound, allergy, swelling	1,6,8 ,16, 17
119	<i>Kanahia laniflora</i> (Frossk.) R. Br.	Asclepiadaceae	Arust (Am)	H	L, Wp, lat	Tumor, wart	6,8

120	<i>Lagenaria siceraria (Mollina) Standl.</i>	Cucurbitaceae	Qil	Cl	R	Wound, scabies, Tinea versicolor, swell, dandruff	2, 3, 15,16
121	<i>Laggera tomentosa (Sch. Bip. ex A. Rich.) Oliv. &amp; Hiern</i>	Asteraceae	Keskeso	H	L	Swelling	8
122	<i>Lannea fruticosa (A. Rich.) Engl.</i>	Anacardiaceae	Dechimarac'c'iyā	T	R	Swelling, meningitis	11
123	<i>Lepidium sativum L.</i>	Brassicaceae	Feto	H	Se	Wound, hemorrhage, ringworm, swelling	3, 8, 11, 13
124	<i>Leuca martinicensis (Jacq.) R.Br.</i>	Lamiaceae	Bokkoluu	H	L	Ringworm	12
125	<i>Linum usitatissimum L.</i>	Lineaceae	Talbaa	H	Se	Dandruff, breast ulcer, wound	7, 9, 15
126	<i>Lippia adoensis Hochst ex. Walp.</i>	Lamiaceae	Kessie	H	L	Ring Worm	2
127	<i>Lobelia rhynchopetalum (Hochst) Hemsl.</i>	Campanulaceae	Jibra	H	R	Scabies/itching	16
128	<i>Maesa lanceolata Forssk.</i>	Myrsinaceae	'Chego'	S	L, sap	Skin disease, swelling, hemorrhoids	11,12,18
129	<i>Maerua oblongifolia (Forssl.) A. Rich.</i>	Capparidaceae	Sanggaana	S	Bar R, L, Wp	Swelling, tetanus	11
130	<i>Malva verticillata L.</i>	Malvaceae	Lut	H	R	Wound, dandruff, poison, scabies	3, 7,8
131	<i>Maytenus senegalensis (Lam.) Exell</i>	Celasteraceae	Kombolcha	S	L	Hemorrhoids	12
132	<i>Melia azedarach Forssk.</i>	Meliaceae	Nim	S	L	Wound, acute bleeding tetanus, dandruff, lashing (fungus),	3, 8, 16, 17
133	<i>Microglossa pyrifolia (Lam.) O. Kuntze</i>	Asteraceae	Orgulach	S	L	Swell	14
134	<i>Mirabilis jalapa L.</i>	Nyctagnaceae	Ababa diimaa	S	Fr	Hemorrhoids	15
135	<i>Milletia ferruginea (Hochst.) Bak.</i>	Fabaceae	Sotallo	T	L	Tetanus, skin disease, wound, ringworm	3,8,11,12,18
136	<i>Momordica foetida Schumach &amp; Thonn.</i>	Cucurbitaceae	Qura-hreg	Cl	L	Swelling, wound, swelling, scabies	1,6,11,16,17
137	<i>Myrtus communis L.</i>	Myrtaceae	A des	S	L	Scabies, leishmaniasis, dandruff	3, 6,16
138	<i>Nephrolepis undulata (Aftel. exSw.) J.Sm.</i>	Oleandraceae	Bisaa	H	L	Swelling of gland	11
139	<i>Nicandria physaloides (L.) Gaertn.</i>	Solanaceae	Yewushe Ageda	H	Se	Wound	3

140	<i>Nicotiana tabacum L.</i>	Solanaceae	Timbaho	H	L	'Neqersa' (cancer) wound	1,7
141	<i>Nigella sativa L.</i>	Ranunculaceae	Tiqur-azm	H	Se	Skin fungus	13
142	<i>Ocimum gratissimum L.</i>	Lamiaceae	Dama kessie	H	L	Wart, febrile-illness, Rheumatism.	1,4,11
143	<i>Olea europaea L. subsp. cuspidata (Wall. ex G. Don) Cif.</i>	Oleaceae	Woirra	T	St	Sore, 'Naqersa' (cancer), wound, itching, hemorrhoids, scabies	1,5, 12, 16
144	<i>Oliverella hildebrandtii (Engl.) Tieghem</i>	Loranthaceae	Dheertuu Dhumugaa	H	L	Dandruff	15
145	<i>Osyris quadripartite Decn.</i>	Santalaceae	Qerets	S	L	Leishmaniasis, skin, wound	3, 13
146	<i>Otostegia tomentosa A. Rich.</i>	Lamiaceae	Tunjuti (or)	S	L/R	Febrile illness	4
147	<i>Pavonia sp.</i>	Malvaceae	'Sheto'	H	L	Wound	18
148	<i>Periploca linearifolia Quant. Dill. &amp; Rich.</i>	Asclepiadaceae	Moider hareg	Cl	L/R	Wound, hemorrhage	7,16
149	<i>Pavonia urens Cav.</i>	Malvaceae	Hincinnii	H	L	Wound	15
150	<i>Phytolacca dodecandra L'Herit.</i>	Phytolacaceae	Andode (Or.)	Cl	L, R	Scabies, herpes, zoster, itching, skin, swelling, rheumatism	1,3,9, 11
151	<i>Piper nigrum L.</i>	Piperaceae	K'unddobam bbariyaa	T	Se, L	Rheumatism, swelling	11
152	<i>Plantago lanceolata L.</i>	Plantaginaceae	Wonberet/Esat adrik	H	L	Ulcer, burn, wound, hemorrhoid, skin cut, open wound, wart	1,2,3, 6, 7,9,15, 16
153	<i>Plectocephalus variance (A. Rich) C. Jeffrey. ex Cufod.</i>	Asteraceae	Ets-yohannes	H	Wp	Tumor	6
154	<i>Protea gaguedi J. F. Gmel.</i>	Proteaceae	Laaluwa	T	L, R	Body swell	11
155	<i>Premna schimperi Engl.</i>	Lamiaceae	Urgessa	S	L	Eczema	12
156	<i>Plumbago zeylanica L.</i>	Plumbaceae	Ameeraa;	H	R	Hemorrhoids, wound	1,7
157	<i>Podocarpus falcatus (Thunb.) Mirb. T</i>	Podocarpaceae	Dagucho	T	St, Bar	Wound	17
158	<i>Premna schimperi Engl.</i>	Lamiaceae	Chocho	S	Bark	Hemorrhoids, wound, skin, inflammation Eczema	7, 13
159	<i>Prunus africanus (Hook. f.) Kalkam</i>	Rosaceae	Hoomii (Or)	T	L, bar	Wound	15,18

160	<i>Prunus persica</i> (L. Batsch)	Rosaceae	Kookii	T	L	Hemorrhages	15
161	<i>Psidium guajava</i> L	Myrtaceae	Zeytun	T	L	Skin rash, wound	8,12
162	<i>Pycnostachys abyssinica</i> Fresen.	Lamiaceae	Olomuwa	S	L	Swell	11
163	<i>Ranunculus multifidus</i> Forssk.	Ranunculaceae	'Hogiyo'	H	Fr, R, L, sap	Skin disease	18
164	<i>Ranunculus oligocarpus</i> Hochst. ex A. Rich.	Ranunculaceae	Tinkushi	H	L	Sore, eczema, leishmaniasis	16
165	<i>Ranunculus sinesiss</i> Frescene	Ranunculaceae	-----	H	R, L	Sore of scrofula, boil swelling, leishmaniasis	
166	<i>Rhamnus prinordes</i> L'Herit	Rhamnaceae	Xaddo (Wol)	S	L, Se	Skin infection, Tinea versicolor, scabies, dandruff, herpes, eczema	4, 5, 6, 7,8,10,17, 18
167	<i>Rhus glutinosa</i> A. Rich. subsp. <i>glutinosa</i>	Anacardiaceae	Embes	T	Bar	Wound	3
168	<i>Rubia cordifolia</i> L.	Rubiaceae	Dumo	Cl	R	Swelling	17
169	<i>Rhus ruspolii</i> Engl.	Anacardiaceae	-----	S	L	Wound	14
170	<i>Rhus vulgaris</i> Meikle	Anacardiaceae	Kammo (Am)	S	L	Wound	6
171	<i>Rhus natalesis</i> Meikle	Anacardiaceae	-----	H	R	Wound	8
172	<i>Ricinus communis</i> L.	Euphorbiaceae	Qobo (Or.)	S	Se	Wound, ulcer, skin disease	1,18
173	<i>Ritchiea albersii</i> Gilg	Capparidaceae	Dalsach	T	L	Wound	14
174	<i>Rubus apetalus</i> Poir.	Rosaceae	Gora (Wol)	S	L	Swelling	17
175	<i>Rumex abyssinicus</i> Jacq.	Polygonaceae	Meqmeqo	H	L, R	Scabies, Tinea vesicular, ringworm, wound	3,6,12,15
176	<i>Rumex nepalensis</i> Spreng.	Polygonaceae	Baaruda (Or.)	H	L	Blood clot, body swelling, poison, wart, wound, hemorrhoid	1,2,5, 6,8,12,15
177	<i>Rumex nervosus</i> Vahl	Polygonaceae	Enbuacho	S	R	Itching, skin rash, wart	7,16
178	<i>Salvia nilotica</i> Juss. ex Jacq	Lamiaceae	Shokoksa (O)	H	R	Herpes, hemorrhoid	5,11
179	<i>Salix subserrata</i> Willd.	Salicaceae	Haya	T	L	Boil	3
180	<i>Schefflera abyssinica</i> (Hochst. ex A. Rich.) Harms	Araliaceae	Getem	T	R	Swelling, wart, itching	9,16
181	<i>Senna occidentalis</i> (L.) Link	Fabaceae	Hamash (Wol)	S	L	Poisoning	17
182	<i>Sesbania sesban</i> (L.) Merr.	Fabaceae	Arbeti (Wol)	S	L	Swelling, wound	1, 17

183	<i>Sida ovata</i> Forssk.	Malvaceae	Chifrig	S	R/L	Foot wound, skin, skin infection, burn	7, 13, 17
184	<i>Sida collina</i> Schlechtend.	Malvaceae	Sese	H	L	Wound	14
185	<i>Sida schimperiana</i> Hochst. ex A. Rich.	Malvaceae	Chifrig	S	Wp /Fl, St, L,R	Leishmaniasis, sore, tumor, wound, skin rash	3,8,16
186	<i>Sida rhombifolia</i> L.	Malvaceae	Gorgegit	S	L	Wound	7
187	<i>Sida tenuicarpa</i> Vollesen	Malvaceae		S	L	Wound	7
188	<i>Sida urens</i> L.	Malvaceae	Sese	H	L	Wound	14
189	<i>Solanecio gigas</i> Vatke.	Asteraceae	Leaf	S	L	Skin rash	2
190	<i>Solanum adoense</i> (Hochst) ex A. Rich.	Solanaceae	Zerchi ebuay	S	Fr	Itching	7,16
191	<i>Solanum dasyphyllum</i> Schumach.	Solanaceae	Embay	S	R	Skin cancer, wound (lifie)	3
192	<i>Solanum capsicoides</i> Allioni	Solanaceae	Buluwa	H	L, Se	Rheumatism	11
193	<i>Solanum esculentum</i> L.	Solanaceae	Timatim	H	L	Poison	1
194	<i>Solanum incanum</i> L.	Solanaceae	Buluwa	H	L, R, Fr	Mump, tetanus, hemorrhoid	5,11
195	<i>Solanum marginatum</i> L.f.	Solanaceae	Hiddii	S	St	Wound	12
196	<i>Solanum nigrum</i> L.	Solanaceae		H	Wp, L	Wound, Hemorrhoid, poison	7
197	<i>Sonchus asper</i> (L.) Hill	Asteraceae	Attuchi (Or)	H	L	Tinea versicolor	1
198	<i>Sauromatum venosum</i> (Ait.) Kunth.	Araceae	Mun	H	Tuber	Hemorrhoids	13
199	<i>Snowdenia polystachya</i> (Fresen.) Pilg.	Poaceae	Muuja	H	Wp, L.	Tenia pedis or Tinea nigri	2
200	<i>Trigonella foenum-graecum</i> L.	Fabaceae	---	H	Fr	Skin disease	9
201	<i>Stephania abyssinica</i> (Dill and Rich). Walp.	Menispermaceae	Yeayit hareg	Cl	R, L	Wart, skin cancer, wound skin, herpes, swelling	2, 3,13, 16,17
202	<i>Steganotaenia araliaceae</i> Hochst. ex A. Rich.	Apiaceae	Yefiyel chew	T	St	Hemorrhoids	7
203	<i>Stereospermum kunthianum</i> Cham.	Bignoniaceae	Zana	H	R/bar	Wound, skin rash	13
204	<i>Tapinanthus globiferus</i> (A. Rich.) Tiegh.	Loranthaceae	Hafa- teketsila	H	Wp	Skin rash	13
205	<i>Terminalia brownie</i> Fresen.	Combretaceae	Olpata	T	L	Skin wound	5
206	<i>Tamarindu indica</i> L.	Fabaceae	Mserech	T	L	Wound	3
207	<i>Thalictrum rhyhocarpum</i> Dill. & A. Rich.	Ranunculaceae	Inchiilaa	H	L	Swelling	1,7

208	<i>Toddolia asiatica (L.) Lam.</i>	Rutaceae	Harangam a	S	L	Glandular swelling	15
209	<i>Tragia brevipes Pax.</i>	Euphorbiaceae	Abelbelit	H	R	Swelling	7
210	<i>Tragia mixata M. Gilbert</i>	Euphorbiaceae	Gugubdu	Cl	L	Poison	1
211	<i>Trichilia dregeana Sond.</i>	Meliaceae	Anunu	T	St	Wart	1
212	<i>Urtica simensis Steudel</i>	Urticaceae	Sama	H	L	Burns, hemorrhage, fibril illness	3,7,16
213	<i>Vevascum sinaiticum Benth.</i>	Scrophulariaceae	Kutina	H	R	Wound	3
214	<i>Vepris glomerata Engl.</i>	Rutaceae	----	S	L & R	Skin wound	5
215	<i>Verbena officinalis L.</i>	Scrophularaceae	Ketentina	H	R	Sore	16
216	<i>Vernonia adoensis Sch. Bip ex Walp.</i>	Asteraceae	Etse-musay	S	R	Itching	7
217	<i>Vernonia amygdalina Del.</i>	Asteraceae	Ebicha	S	Lat, L	Dandruff, wound, scabies, athlete foot, herpes, skin infection, Rheumatism	1,3,6,7,8,11, 14
218	<i>Vernonia auriculifera Hiern</i>	Asteraceae	Reejje (wol)	S	R	Wound	17
219	<i>Vernonia ituriensis Musch.</i>	Asteraceae	Giginaa	T	L	Rheumatism	11
220	<i>Vernonia myriantha Hook.f.</i>	Asteraceae	-----	S	L	Ulcer, sore	16
221	<i>Vicia fava L.</i>	Fabaceae	Baqiela	H	Se	Boil, leishmaniasis, skin disease, swell	3, 8, 9, 16
223	<i>Vinca major L.</i>	Apocynaceae	Wuluwusha	H	Wp	Wound	11
224	<i>Vernonia theophrastifolia Schweinf ex. Oliv. &amp; Hiern.</i>	Asteraceae	Buuzuwa	S	L	Wound healing	11
225	<i>Vigna unguiculata (L.) Walp.</i>	Fabaceae	Hiphoo	Cl	L, St, Se	Tinea corporis, head fungus, rheumatism,	4,15
226	<i>Zanthium spinosum L.</i>	Asteraceae	Dehanekay	S	Wp	Swell	8
227	<i>Zehneria scabra (Linn. f.) Sondll.</i>	Cucurbitaceae	Haregresa	Cl	St, L	Hemorrhage, fibril illness, swelling	3,7
228	<i>Zizlphus spinachristi (L.) Desf.</i>	Rhamnaceae	Gaba	S	L	Dandruff	3,7
229	<i>Zornia pratensis Milne-Redh.</i>	Fabaceae	-----	H	L, R	Rheumatism	11
230	<i>Withania somnifera (L.) Dunal in DC.</i>	Solanaceae	Gizaawaa	S	L	Allergy, swelling	1,11
231	<i>Xamimonia caffra Sond.</i>	Olacaceae	Enqoy	S	Bar	Herpes zoster	6
232	<i>Ximonia americana L.</i>	Olacaeae	Enqoy	H	Bar	Wound	7
233	<i>Xanthium strumarium L.</i>	Asteraceae	Gid-zemedede	S	L	Tinea vesicular, dandruff	6,7

**Table S1:** List of Reviewed Medicinal Plants for Treating Skin Diseases.

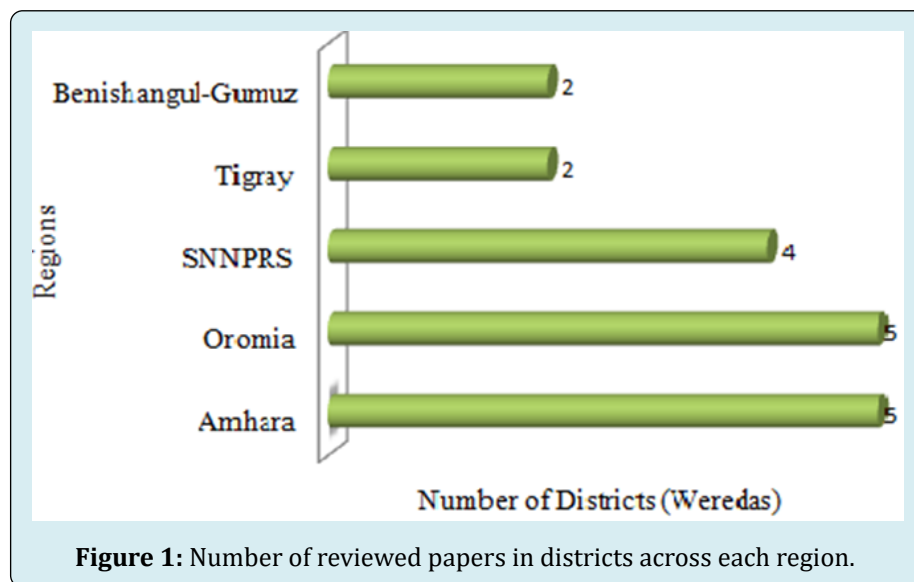


Reviewed traditional medicinal plants in Ethiopia for the treatment of various skin diseases: *Etana, 2010=1; Amenu, 2007=2 Abebe, 2011=3; Tolasa, 2007=4; Mesfin et al., 2014=5; Gebeyehu et al., 2014=6; Chekole, 2011= 7; Alemayehu, 2010=8; Yirga and Zeraburk, 2011=9 ; Mesfin et al., 2013=10; Agize, et al.,2013=11; Gebrehiwot, 2010= 12; Giday et al., 2007=13; Gidey et al., 2009=14; Megersa et al., 2013=15; Amsalu, 2010=16; Tamene, 2011)=17; Awas and Demissew, 2009=18.*

**Key to Abbreviations:** T-tree, S-shrub, H-herb, Cl-climber, L-leaf, R-root, Fl-flower, Wp-whole plant, Plant parts used- Pp, St-stem, Fr-fruit, Bar-bark, Lat-latex, Se-seed, R-root, Habit-Hb

### Number of Reviewed Studies in Terms of Regions

In this review, a total of 18 districts (weredas) were taken from five regions (Amhara, Oromia, Benishangul-Gumuz, SNNPR, and Tigray). Amhara and Oromia account for five districts each, whereas SNNPRS, Tigray, and Benishangul-Gumuz, 4, 2, and 2 districts were selected, respectively (Figure 1; S2). However, the papers were taken randomly, and therefore the review does not indicate whether the given regions were extensively studied or not. In any case, the different research papers revealed that, compared to the huge number of districts in the country, the ethnomedicinal studies that have been undertaken are almost scanty. On the other hand, of the eighteen scientific papers taken into account from the five regions, nine of them are M.Sc. theses.



Research Title	Author and Year	Study Region	Type of paper
Ethnobotanical study of traditional medicinal plants of Goma Wereda, Jima Zone	Etana, 2010	Oromia	M.Sc. Thesis
Use and Management of Medicinal Plants by Indigenous People of Ejaji Area (Chelya Wereda) West Shewa,	Amenu, 2007	Oromia	M.Sc. Thesis
Ethnobotanical study of medicinal plants used by local communities in Debark Wereda, North Gondar	Abebe, 2011	Amhara	M.Sc. Thesis
Use and Conservation of Traditional Medicinal Plants by Indigenous People in Gimbi Wereda, Western Wellega	Tolosa, 2007	Oromia	M.Sc. Thesis
An Ethnobotanical Study of Medicinal Plants in Amaro Woreda, Ethiopia.	Mesfin et al., 2014	SNNPRS	Journal
An Ethnobotanical Study of Traditional use of medicinal plants and their conservation status in Mecha Wereda, West Gojjam zone	Gebeyehu et al., 2014	Amhara	Journal
An Ethnobotanical Study of Plants Used in Traditional Medicine and as Wild Foods in and around Tara Gedam and Amba Remnant Forests in Libo Kemkem Wereda, South Gondar Zone	Chekole, 2011	Amhara	M.Sc. Thesis

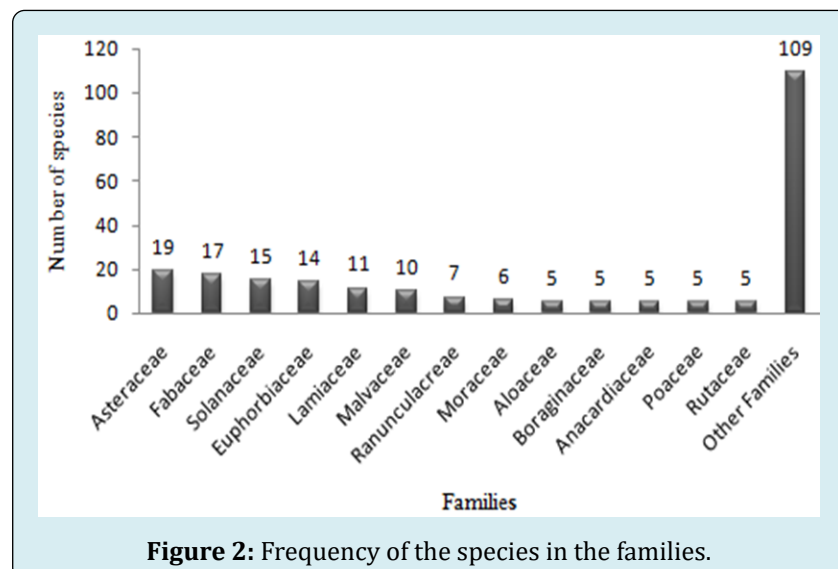
Ethnobotanical study on medicinal plants used by indigenous local communities in Minjar-Shenkora Wereda, north Shewa zone	Alemayehu, 2010	Amhara	M.Sc. Thesis
Ethnobotanical study of traditional medicinal plants in Gindeberet District	Yirga and Zeraburk, 2011	Tigray	Journal
Ethnobotanical study of traditional medicinal plants used by indigenous people of Gemad District	Mesfin et al., 2013	Tigray	Journal
Ethnobotany of Medicinal Plants in Loma and Gena Bosa Districts (Woredas) of Dawro Zone	Agize et al., 2013	SNNPRS	Journal
An Ethnobotanical Study of Medicinal Plants in Seru Wereda, Arsi Zone	Gebrehiwot, 2010	Oromia	M. Sc. Thesis
Medicinal plants of the Shinasha, Agew-awi and Amhara peoples in northwest	Giday et al., 2007	Benishangul-Gumuz	Journal
Medicinal plants of the Meinit ethnic group of Ethiopia: An ethnobotany study.	Giday et al., 2009	Benishangul-Gumuz	Journal
An ethnobotanical study of medicinal plants in Wayu Tuka District, East Welega Zone	Megersa et al., 2013	Oromia	Journal
An Ethnobotanical Study of Medicinal Plants in Farta Wereda, South Gondar Zone	Amsalu, 2010	Amhara	M. Sc. Thesis
An Ethnobotanical Study of Medicinal Plants in Wondo Genet Natural Forest and Adjacent Kebeles, Sidama Zone	Tamene, 2011	SNNPRS	M. Sc. Thesis
Ethnobotanical study of medicinal plants in Kafficho people, southwestern Ethiopia	Awass and Sebsebe, 2009	SNNPRS	Proceeding

**Table S2:** List of reviewed papers on ethnobotany.

### Diversity of Medicinal Plants in Terms of Families

Asteraceae is the most dominant family, holding 19 plant species, followed by Fabaceae, which has 17 species. Other taxa commonly used are Solanaceae (15 spp.), Euphorbiaceae (14 spp.), Lamiaceae (11 spp.), Malvaceae (10

spp.), Ranunculaceae (7 spp.), Moraceae (6 spp.), Aloaceae, Anacardiaceae, Boraginaceae, Poaceae, and Rutaceae (5 each). The other fifty-eight families hold 109 species. Of which Acanthaceae, Capardiaceae, Commelinaceae, Convolvaceae, and Cucurbitaceae each account for 4 species. The rest of the families signify one, two, or three species (Figure 2; S1).

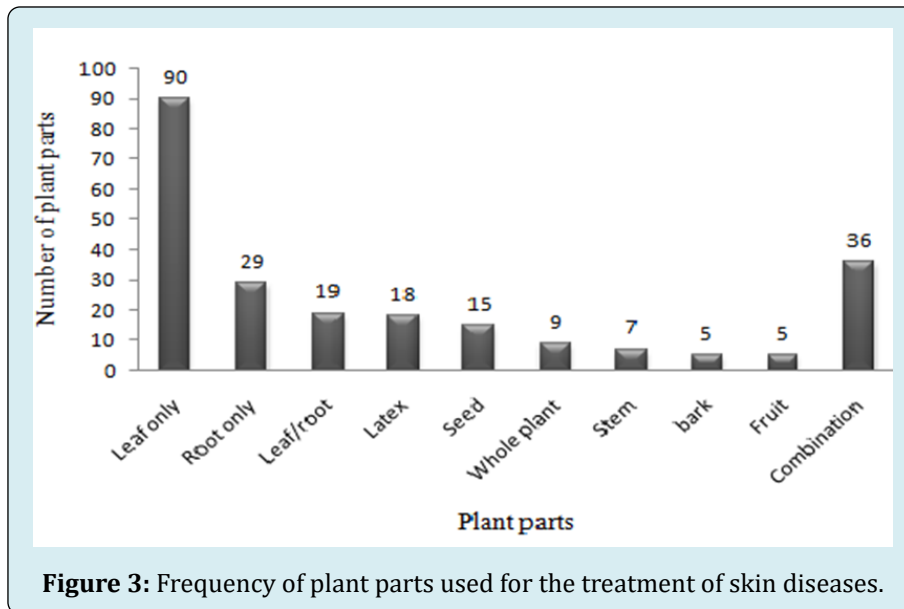


**Figure 2:** Frequency of the species in the families.

### Different Parts of Plants Used to Cure Skin Diseases

The plant parts used ranged from leaves (90), root (29), root and leaf (19), latex/sap (18), seed (15), whole plant (9), stem (7), to barks and fruits (5 each). In addition, two or more combinations of parts (which account for 36), such as flowers, seeds, leaves, bark, latex, fruit, resin, rhizomes,

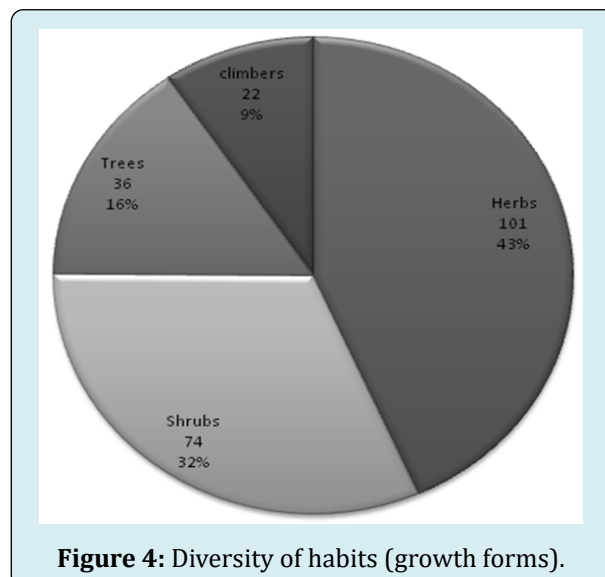
and the like, were used. The survey data revealed that leaves were by far the most widely used plant parts, followed by roots, leaves, or roots in the preparation of remedies (see Fig. 3 and S1). The different reports in Ethiopia have also shown that leaves were the most commonly used, followed by roots, to treat various health problems [29-31].



### Habits of Medicinal Plants that Treat Skin Diseases

The review shows that the most widely used medicinal plants habit in the different study areas were herbs 101 (43%) followed by shrubs 74 (32%). Trees and climbers account 36 (16%) and 22 (9%) respectively (Figure 4; S1). Herbs are

largest in number this may be due to the plant species exhibit high level of abundance and easy to access them. The results of this reviews agreed with the findings of other indigenous researchers including Berhanu, et al. [29,32-37]. On the contrary, the findings of Tamene B, et al. [13,15,30,32,36,37] revealed that shrubs are the most commonly used habits in their respective different study sites of Ethiopia.



### Ten top Medicinal Plants used in the Prevention and Treatment of Skin Diseases

Based on the reviewed data from various sources, *Croton macrostachyus* and *Dataura stramonium* were cited by 12 authors as treating 6 and 7 skin diseases, respectively. *Brucea antidysenterica*, *Plantago lanceolata*, and *Rhamnus prinoides* were cited by 24 (each 8) authors and each of them treats 7, 7, and 6 dermatological diseases, respectively. *Justicia schimperiana* and *Euphorbia tirucalli* were the least

both in terms of the number of diseases treated and the number of authors cited (Table 2). The diseases treated by the ten top medicinal plants were: skin lesion, dandruff, burn, open wound, skin infection boil, *Tinea nigri*, snake bite, ulcer, wound, itching, cut, eczema, skin disease, skin cancer, haemorrhage, ringworm, wart, open sore, rheumatism, scabies, herpes, blood clot, body swelling, poison, scabies, and athlete's foot (Table 2; S1).

Botanical Names	No. of Diseases Treated	No. of Authors Cited
<i>Brucea antidysenterica</i>	7	8
<i>Croton macrostachyus</i>	6	12
<i>Dataura stramonium-</i>	7	12
<i>Dodonaea angustifolia</i>	7	6
<i>Euphorbia tirucalli</i>	5	6
<i>Justicia schimperiana</i>	6	5
<i>Plantago lanceolata</i>	7	8
<i>Rhamnus prinoides</i>	6	8
<i>Rumex nepalensis</i>	6	7
<i>Vernonia amygdalina</i>	7	7

**Table 2:** Top ten Plant species cited by many authors which treat many skins diseases.

### Preparations and Mode of Applications of Herbal Medicines

The majority of traditional medicinal plants were prepared using water as a medium. The mode of application was topical, confined to the affected portion of the skin [37-55]. In some cases, additives were added during applications. The above authors reported that the methods of preparation used by traditional healers were crushing, squeezing, and powdering. Most of the medicinal plants encountered in the study areas were prepared from a single plant or plant part. The use of multiple plants or plant parts for a single skin disease problem was rare. It was also reported that the condition of the plant materials used was fresh, dry, or fresh or dry.

### Informant Consensus Factor (ICF) Related to Skin Disease Categories

The highest ICF (0.88) value is indicated in Tamen B, et al. [54] and the least one (0.67) is associated with Megersa M, et al. [52] (Table 3). However, the average ICF value is 0.78. The ethnobotanical reviews of "7" Weredas from different regions showed that the ICF values were obtained for diseases related to dermatological or skin problems (Table 2). This indicates that medicinal plants, which have higher ICF values, are assumed to be effective in treating a certain ailment. Some of the reported dermatological diseases with the highest value were wounds, skin swellings, haemorrhages, dandruff, and eczema (Table 2). Other authors, like Awas T, et al. [45,55,56], identified skin disease as the most commonly reported health problem in Kafficho people, Minjar-Shinkora, and Ofla districts, respectively.

Authors and sample Weredas (Districts) of different Regions	Ns	Nuc	ICF
Etana T, [57] Goma Wereda, Jima Zone of Oromia Region	47	266	0.83
Abebe E, [40] Debark Wereda, North Gondar Zone (Amhara)	67	345	0.81
Gebeyehu G, et al. [43], Mecha Wereda, West Gojjam (Amhara)	29	183	0.85

Gebrehiwot G, [49] Seru Wereda, Arsi Zone of Oromia Region	12	38	0.7
Megersa M, et al. [52] Wayu Tuka Wereda, East Wollega Zone	25	41	0.67
Amsalu N, [53] Farta Wereda, South Gondar Zone (Amhara)	44	162	0.73
Tamene S, [54] Wondogenet Wereda, Sidama Zone (SNNP)	29	230	0.88

**Table 3:** ICF related to skin disease categories.

Paired comparison, Preference ranking and direct matrix ranking of Medicinal

### Plants used to Treat Skin Diseases

The paired comparison of five selected medicinal plants out of 15 species used to treat a disease called wound based on informant consensus showed that *Euphorbia abyssinica*, *Ranunculus oligocarpus*, *Clematis simensis*, *Justicia schimperiana*, and *Dodonaea angustifolia* stood 1st, 2nd, 3rd, 4th, and 5th, respectively [53]. For a similar disease, the same number of medicinal plants were identified and compared using ten informants to know their rank; thus, *Plantago lanceolata* stood first, followed by *Rumex nepalensis* Tolasa E, [41]. On the other hand, using seven informants Etana T, [57] found that *Indigofera spicata* species stood first for the treatment of skin allergies, and *Drymaria cordata*, *Ipomoea tenuirostris*, and *Withania somnifera* were ranked 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup>, respectively. *Kalanchoe petitiiana* was the least preferred species to treat the disease in the area. He indicated that rank is because of the efficacy of the plant, at least in the context of local people.

The most preferred medicinal plants among the five species that were used to treat fibril illness in the study area, based on the responses of ten key informants, showed that *Zehneria scabra* ranked first, followed by *Ocimum lamifolium*, and the least favoured one was *Cyathula polycephala* Gebrehiwot, [49]. Similarly, Abebe E, et al. [40], indicated that *Zehneria scabra* is the most preferred, while *Cyathula polycephala* is the least preferred of the other plant species cited in treating fibril illness.

Researchers also figured out the preference ranking of six medicinal plants that were reported for treating wounds after selecting ten key informants. *Plantago lanceolata* ranked first, indicating that it is the most effective in treating wounds, followed by *Rumex nervosus*, and the least effective was *Euphorbia platyphyllos* [40]. *Nicotiana tabacum* stood first among the six plant species, followed by *Senna didymobotrya*, in treating snakebite [41]. By following the same method, it was also reported that *Dodonaea angustifolia* was rated as the most effective in treating wounds, followed by *Solanum marginatum*. This is based on the perceptions of ten traditional healers in the

study area [49].

A direct matrix of randomly selected medicinal plants with different uses, including medicinal value, based on a given use criteria revealed that medicinal plants were broadly collected for different purposes such as charcoal, construction, fencing, firewood, forage, furniture, and the like Amsalu, et al. [49,52-54,57].

### Indigenous Knowledge (IK)

There is a traditional distinction between attitudes towards knowledge in academia and industry. Educators have typically considered knowledge a public good, and the acquisition and dissemination of knowledge have therefore been encouraged with the same open-mindedness [58]. By definition, IK is context-specific. What works successfully in one location or for one community may not work for another. The defeat is to extract from the knowledge that applies in a particular context the more general aspects that can be applied elsewhere. Experience and case studies show that this is possible, but at the same time, it necessitates a careful approach [59].

The IK of medicinal plants in Ethiopia is unevenly distributed among community members [60]. However, all share IK, and only a few hold specialised knowledge. Knowledge and social structure are thus intertwined Kibebew and Asfaw Z, [60]. The distribution of this knowledge and service is hierarchically placed. Services are obtained from the family, the neighbourhood, the village or beyond Fasil H, [61].

### Threats to Medicinal Plants and Indigenous Knowledge in Ethiopia

In Ethiopia, traditional medicine, as elsewhere in other developing countries, is faced with a problem of sustainability and continuity, mainly due to the loss of taxa of medicinal plants and habitats of medicinal and other categories of plants and cultures [60]. The diversity of plants in Ethiopia is in the process of erosion due to anthropogenic pressures [62]. The same document states that habitat destruction and deforestation by commercial timber interests and encroachment by agriculture and other land



uses have resulted in the loss of some thousand hectares of forest, which harbors useful medicinal plants, annually over the past several decades.

Different researchers' findings also indicated that agricultural expansion, fuel, grazing, drought, and construction, as well as other destructive factors in the study areas [15,38,39,43-45,48,49,53,56,63,72], resulted in the disappearance of medicinal plants.

In Ethiopia, the loss of indigenous knowledge is not too far from developed countries. The vast knowledge of traditional uses of plants is not fully documented, and most of the knowledge is conveyed from generation to generation by word of mouth Kibebew and Weldegerima. The review could trigger the undertaking of ethnopharmacological surveys and conservation activities of these highly threatened plants by governmental or non-governmental bodies based on their potential sources for seeking new medicinal active compounds.

### Conservation of Traditional Medicinal Plants

Plant genetic resources can be conserved in situ or ex situ; the two systems are complementary and are being adopted as part of the conservation strategy in Ethiopia [62]. Asfaw Z, et al. [60] also clearly indicated that some traditional medicinal plants have to be conserved in situ due to difficulties in domestication and management [60]. Moreover, some plants fail to produce the desired amount and quantity of the active principles under cultivation outside of their natural habitats. Medicinal plants can also be conserved by ensuring and encouraging their growth in special places, as they have been traditionally. This can be possible in places of worship (churches, mosques, grave yards, etc.), sacred grooves, farm margins, river banks, road sides, live fences of gardens, and fields [60]. However, another researcher stated that conservation of diversity in plants can in principle be done in three different ways: ex-situ conservation in gene banks, ex-situ conservation in botanic gardens, or "field gene banks," and in-situ conservation in national parks and resources. Each of the three methods has its advantages and disadvantages [64].

In this review, Amsalu N and Chekole G [44,53] found conservation and management areas in remnant woody plant patches in Orthodox Tewahdo church forests in Farta and Libo Kemkem Weredas, Sounth Gondar Zone. The ritual and spiritual protected areas for celebration of "Gada" and "Jaarii," "Errecha," and "Qe'ee Ayyantuu" preferably contain more plant diversity because the cultural rule of harvest forbids the harvest of plant resources from these areas, possibly preserving indigenous ethnobotanical information

and cultural components [39]. Similarly, Tolosa E and Megersa M, et al. [41,52] reported that medicinal plants were collected during 'Chegino', which means Monday, Wednesday, and Friday, and the limitation of days for collecting medicinal plants reduced the effect. This shows that culture, belief, and religion contribute a lot to the conservation of medicinal plants. On the other hand, some traditional practitioners have started to conserve medicinal plants by cultivating them at homegarden [44,45,53,57].

### Critics of the Review

Many of the earliest ethnobotanical studies showed that there had mostly been more producing inventories and checklists, and so the application of full-blown ethnobotanical research methodology is just taking shape, with more bias to the qualitative approach. However, the studies so far have shown that the role of medicinal plants in different parts of Ethiopia is significant, and traditional healthcare is deeply rooted in oral and written pharmacopoeias. There has been qualified and quantified information on the amount of plant matter. Thus, in most M.Sc. theses, unlike a few scientific journals, data analysis techniques like informant consensus, preference ranking, direct matrix ranking, paired comparison, use values, ICF, and fidelity level were used.

It is known that a number of studies have been conducted elsewhere in the country, even though the distribution is unfair among regions. Most of the research papers are unpublished. On the other hand, in the review paper, some of the published journals missed relevant ethnobotanical information like family names, unitalicized scientific names, diseases treated, therapeutic effects, parts of plants used, methods of preparation, methods of administration, and doses. In a few cases, incorrect phonetic transcription of the local names of plant species and a lack of collection numbers were observed. Writing unspecified diseases' names is also another problem. The review showed that most of the studies conducted in Ethiopia focused on the medicinal use of plants and associated traditional healing practices. However, ethnobotanical studies on specific health problems, like dermatological or skin-related diseases, are generally very limited in the country.

### Conclusions

The current literature study is carried out to gain knowledge about the medicinal plants that are used to treat skin diseases in the context of Ethiopia. Though about 233 plant species were investigated from 18 research papers during this work, this number could have increased considerably if all ethnobotanical research papers had been taken into account. There are a huge number of plants that are used as herbal medicines, and people prefer them



because of their lesser side effects and because they have more benefits as a result of the combinations of medicinal constituents joined with natural components. Traditional medicinal plants have great importance because they include the experiences of native people and also provide information about ethnobotanical plants. Through ethnobotanical surveys, indigenous knowledge from native people and practitioners is collected and recognized in order to identify plants that can be a source of drugs against skin infections.

For a long time, medicinal plants have been known to cure and treat various human diseases. There are lots of medicinal plants available in nature that has anti-skin properties, and the majority of them are still to be explored for their anti-skin properties. Ethiopia is endowed with diverse flora owing to the existence of great physiographic, edaphic, and climatic variations. However, the country is faced with a number of threats to medicinal plants; hence, in-situ and ex-situ measures are vital to conserve the maximum diversity of plants.

### Recommendations

Based on the review given above and my own view, the following recommendations are forwarded:

- Ethnobotanical research should synchronise both qualitative and quantitative data.
- Sampling techniques must be representative of the given populations while carrying out research;
- More efforts should be made to isolate active ingredients from these medicinal plants so that more effective and safer drugs could be developed for the treatment of skin diseases;
- Ethnobotanical research related to dermatological and skin diseases has to be conducted in different areas of Ethiopia;
- There should be mass responsibility for the issues of medicinal plants and indigenous knowledge to conserve and build up their values.

### Ethics Approval and Consent to Participate

- Not applicable.
- Availability of data and materials
- All relevant data are within the manuscript.

### Competing Interests

I have no competing interests.

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