Assessment of Possible Intellectual Property Protection Options of Traditional Knowledge System in Ethiopia: Special Reference in Herbal Medicine for Livestock

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Assessment of Possible Intellectual Property Protection Options of Traditional Knowledge System in Ethiopia: Special Reference in Herbal Medicine for Livestock

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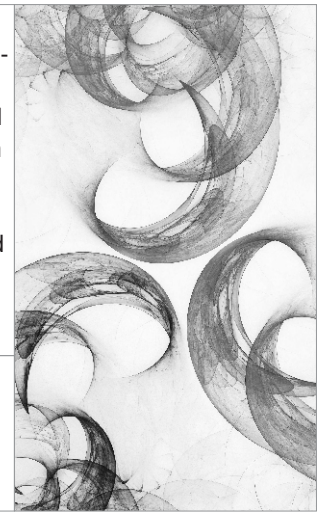
The African Technology Policy Studies Network (ATPS) is a multi-disciplinary network of researchers, private sector actors and policy makers promoting the generation, dissemination, use and mastery of science, technology and innovation (ST&I) for African development, environmental sustainability and global inclusion. ATPS intends to achieve its mandate through research, capacity building and training, science communication/dissemination and sensitization, participatory multi-stakeholder dialogue, knowledge brokerage, and policy advocacy.



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List of Acronyms

ARIPO	African Regional Intellectual Property Organization
ATPS	African Technology Policy Studies Network
ATVET	Agricultural Technical and Vocational Education Training
BYDV	Barley Yellow Dwarf Virus
EIPO	Ethiopian Intellectual Propriety Office
FDG	Focus Group Discussion
IP	Intellectual Property
IPR	Intellectual Property Rights
IBC	Institute of Biodiversity Conservation
ARI	Agricultural Research Institutes
IKS	Indigenous Knowledge System
MoST	Ministry of Science and Technology
NHNRI	National Health and Nutrition Research Institute
PS	Pilot Survey
PGRs	Plant Genetic Resources
QSAE	Quality Standard Authority of Ethiopia
TK	Traditional Knowledge
THRGE	Traditional Healers Research Group of Ethiopia
WIPO	World Intellectual Property Office
WGARC	Wondo Genet Agricultural Research Center

Abstract

This report was prepared as per the Grant obtained from the African Technology Policy Studies Network (ATPS CP 0209/04) whose primary objective is to support the implementation of the ATPS/BTA Intellectual Property program on Traditional Knowledge Systems & Increasing Access and Benefit Sharing of Intellectual property in Africa.

The study was carried out in Afar, Keryu, Shinile (Issa somila), Borana (Moyale), Dollo Ado, Bekoji, and Wollo. Primary data were collected from purposively selected elders' pastoralists in Ethiopia, whose livelihoods depend predominantly on livestock and their products. The data was collected using semi structured interviews, focus group discussions & field observation with traditional healers, users, policy makers and foreign scholars.

Most of the treatments in the study areas are plant based. 78.2% of the healers depend on plant extracts. 75.6% of the healers prepared two or more plants with water for single treatment of an animal disease. The majority of the local healers used to collect medicinal plants alone with great secrecy and no one was allowed to see this activity except some family members. The study confirmed that 79.5% acquired the knowledge from their father or uncle; and in line with this, 84.6 % of the respondent didn't improve the acquired knowledge. The survey result revealed that 92.3% of the respondent confirmed that their knowledge was well known to some individuals in their community.

This study concludes that the traditional healer's knowledge, protected through appropriate sui generis intellectual property right protection scheme with highly consideration of customary law and international agreements has to be in place.

1. Introduction

In Knowledge based on the natural environment includes any knowledge existing in association with the biological environment (fauna, flora, micro and macro organisms); the physical environment (existing in any form and within any space); and the natural laws associated with the biological and physical environment. Any knowledge within communities existing in association with the human environment pertains to identities of specific communities resulting from a long history of co-existence of people and all levels of interactions; individual, family, clan, village, etc. All the interactions that include human to human and humans with the natural environment, gradually developing and evolving to include a certain social environment of the same identity which we refer to as 'community' and those expressions and creativities whether for practical or artistic reasons as 'knowledge'.

Traditional knowledge is a part of the cultural identities of indigenous and local communities. Concepts of knowledge systems of communities could be said to be existing in association with two pillars, the natural environment and human environment - the root basis of any knowledge, hence community knowledge.

More specific categories of traditional knowledge could include agricultural, ecological, medicinal, biodiversity-related knowledge, etc whose base is the natural environment; artistic literary, administrative, legal knowledge's belonging to the human environment, existing either independent of each other or in most cases interdependently. These knowledge categories could be expressed as creative, innovative, technical or technological, etc or the combination of these.

The role of Intellectual Property (IP) systems in relation to Traditional Knowledge

(TK), and how to preserve, protect and equitably make use of TK, has recently received increasing attention in a range of international policy discussions. This addresses matters as diverse as food and agriculture, the environment, notably the conservation of biological diversity, health, including traditional medicines, human rights and Indigenous issues and aspects of trade and economic development.

When we look into international agreements and conventions, there is an existing gap to be covered on traditional knowledge. Trade-Related Aspects of Intellectual Property Rights (TRIPs) makes no reference to the protection of traditional knowledge; does not acknowledge or distinguish between indigenous, community-based knowledge and industrial. Recently, discussions on traditional knowledge have come up mostly at the TRIPs Council. However, plant varieties have to be eligible for protection either through patent protection or a system created specifically for the purpose ("sui generis"), or a combination of the two. (WTO, 2002). The Convention on Biological Diversity (CBD) is the only major international convention that assigns ownership of items on biodiversity to indigenous communities and asserts their right to protect this knowledge.

The protection of TK has also been raised in relation to the definition and implementation of the concept of Farmers` Rights introduced during the revision of the International Undertaking on Plant Genetic Resources for Food and Agriculture, which began in 1994. Article 9.2(a) of the final text, which was adopted as a new treaty by the FAO conference in Rome in November 2001 requires measures for the protection of "Traditional Knowledge" but, in view of the scope and purpose of the Treaty, it only refers to "knowledge relevant to plant genetic resources for food and agriculture". Article 9.2 is, thus, narrower in scope than Article 8(j) of the CBD, and would not apply, for instance, to knowledge relating to medicinal or industrial uses of plant genetic resources. Under this approach, the issue of protection of TK may be circumscribed to knowledge incorporated in farmers` varieties and certain associated knowledge.

The African Model Legislation (2001) provides several provisions that put due emphasis on the role of customary law and practices in the protection of traditional knowledge. The State recognizes and protects community rights 'as they are enshrined and protected under the norms, practices and customary laws found in, and recognized by, the concerned local and indigenous

communities, whether such law is written or not' (Art.18). An item of TK shall be identified, interpreted and ascertained by the local communities concerned themselves under their customary practice and law, whether such law is written or not (Art.24.2). Local communities shall exercise their inalienable right to access, use, exchange or share their biological resources as regulated by their customary practices and laws (Art.22.1).

The African Regional Intellectual Property Organization (ARIPO) Diplomatic Conference for the adoption of the Protocol on Traditional Knowledge and Expressions of Folklore held in Swakopmund noted that no international normative framework has been concluded for the protection of traditional knowledge. ARIPO and its member states have played an active role in finding a harmonized approach to protect traditional knowledge and expressions of folklore at the international level. The instrument sufficiently articulates the parameters and the scope of the subject matters referred to, in that, a balance of appropriation has been put and set in between the bonafide right holders and would be users. This is an important and valuable element to observe before taking any decision. Ethiopia is an observer in ARIPO. The Protocol will furthermore provide a framework for national legislative developments on the protection of the resources.

The reorganization of community knowledge basis, the protection and exploitation of all knowledge categories, and their expressions are issues of national and global importance. The protection and exploitation of community knowledge in a country with rich biodiversity and cultural expressions such as Ethiopia is not only of great importance to the knowledge owner-communities and the country, but also a global concern where knowledge transfer for the good human race has been a contemporary agenda.

Knowledge categories discussed above, which Ethiopia is believed to host, exist in most instances interdependently. This fact may implicate a common scenario and would exist to drafting a basic law for all traditional knowledge systems. However, a holistic study on all knowledge systems is improbable. It may be impossible to get the maximum results out of a survey on all knowledge categories in one package. Even if there may be a possible option to study all the knowledge categories in one package, the study would be too broad to discover specific realities.

Ethiopia has glorious tradition of a health care system based on plants, which dates back to several millennia. In the early 16th century, a European traveler called Francisco reported the use of herbs as purgatives in Ethiopia. Another British traveler, James Bruce, who stayed in Ethiopia from 1769 to 1771, also reported the wide use of a plant locally known as 'wagnos' that was later named Brucea antidysenterica as a remedy against dysentery. Medical text books written in Geez and even in Arabic in Ethiopia between mid of the 17th and beginning of the 18th century prove that plants have been used as a source of traditional medicine in Ethiopia from time immemorial to combat different ailments and human sufferings.

The long history of the use of medicinal plants is reflected in various medico-religious manuscripts produced on parchments and believed to have originated centuries ago. For example, the ancient and very antique manuscripts remnant of Axumite kingdom (7th to 11th century), manuscripts collected from the ruins of Zagwe kingdom (11th - 13th century) and documents of Gonder kingdom, collected from church covenants and individuals at the time of Minilik the 2nd written in Geez, indicate that the use of traditional medicine in Ethiopia is significant and deep-rooted [2]. The use of plants as a source of medicine is very diverse in Ethiopia due to the extremely diverse socio-economic and cultural diversity of the country, which in turn is due to the existence of more than 80 ethnic groups with distinct languages and dialects. The majority of Ethiopian population (over 85 percent in rural areas and a very significant number in urban areas) and 90 percent of livestock have been dependant on traditional medicine (WHO, 1998). This study is on selected categories of knowledge and associated knowledge systems with the reference to herbal medicine for livestock. A study on selected type of knowledge, besides being manageable, would be useful in identifying possible common issues in future studies of other knowledge systems.

The report contained in this document is compiled to create possible intellectual property protection options on traditional knowledge systems in Ethiopia with emphasis on traditional medicinal knowledge especially that related to herbal medicines for livestock.

This study concludes that the traditional healer's knowledge protected through appropriate sui generis intellectual property right protection scheme with high consideration of customary law has to be in place.

2. Background

Ethiopia has a large natural and cultural diversity with a big range of climatic conditions which results from its topography and latitudinal position. The great plains of Ethiopia occur atop two massive highland plateaus, cloven into unequal halves by the Great Rift Valley. From the sweltering arid and semi-arid lands of the Ogaden in the Somali Region in the east, the lowlands bordering the Sudan in the west and Dalol in the Afar Region in the north, where Africa crashes into Arabia, the land sweeps up, rising through semi-arid lowlands and pockets of tropical jungle, montane forests, and reaching afro-alpine pastures on the slopes of the Simen, Bale, Ghugi and other mountain ranges. Many of these mountain ranges reach over 4000masl, and are home to numerous endemic species of flora and fauna. There is a great variation in altitude ranging from 116 m below sea level in Dalol to 4620 m above sea level in Semien. The differences in altitude and latitude have resulted in a wide variation in climatic conditions; that is: rainfall, humidity, temperature and exposure to wind.

Ethiopia's land area is 1.12 million square kilometers with a wide variety in topography, geography, climate and culture. There are eight terrestrial ecosystems within Ethiopia. These range from afroalpine and sub-afroalpine grasslands, through to moist evergreen and montane forest to desert and semi-desert scrubland ecosystems. In addition, there are wetlands and aquatic ecosystems. Because of the diversity of ecosystems within the country and its long history, Ethiopia is endowed with a wide diversity of fauna and flora. The country is also a center of origin and diversity for a number of crop and animal genetic resources, reflecting its long history of agriculture [2].

There are between 6500 and 7000 higher plant species of which about 12 per

cent are endemic [2]. With regard to animals, there are known to be 284 wild mammal, 861 bird, 201 reptile, 63 amphibian, 188 fish and 1225 arthropod species with about 10, 2, 5, 54, 0.6 and 21 per cent of endemism respectively. There is an immense variation in the farmer's varieties of different crops and breeds of livestock. More than 100 crop plant species are cultivated with a sizeable proportion of them having their center of origin or diversity in Ethiopia. There are also 30 cattle, 14 sheep, 14 goats, 4 camels, 4 donkeys, 2 horses, 2 mules, 5 chicken and 5 honey bee breeds/ecotypes/populations recorded which are indigenous to the country. This biodiversity is of crucial importance in the socio-economic, cultural and life of the people.

Ethiopia is one of the major Vavilov centers of origin/diversity for many crops and their wild and weedy relatives. It is an important primary and secondary gene pool for many field crop species that are useful sources of germplasm for economic traits in general and sources of genes resistant to diseases and pests in particular. Ethiopia is a primary gene center for eleven field crops including noug (Guizotia abyssinica), teff (Eragrostis tef), the Ethiopian mustard (Brassica carinata) and enset (Ensete ventricosa). Field crops such as barley, sorghum, durum wheat, finger millet, faba bean, linseed, sesame, safflower, chickpea, lentil, cowpea, fenugreek and grass pea have a large genetic diversity in Ethiopia.

There has been an immense contribution of Ethiopian's Plant Genetic Resources (PGRs) to the world; and useful genetic variations of global significance have emanated from these genetic resources. Among numerous examples are the Barley Yellow Dwarf Virus (BYDV) resistance gene found in Ethiopia's barley, on which California depends on its USD 160 million per annum worth of barley production [2]. Sorghum is one of the most diverse crops distributed over a wide range of agro-ecological regions in the country (400 to 3000masl) having intermediates as well as wild and weedy forms. The high lysine gene has also an Ethiopian origin traced to the local varieties called 'Wotet Begunche' (milk in the mouth) worth $12 million annually in Canada. Teff collected from the Dessie area and hence called 'Dessie Teff' has been given Plant Breeders' Rights protection by the US Plant Variety Protection Act until 2016 in the USA.

At least 80 per cent of the Ethiopian people depend on traditional medicine for their health care (Dawit and Ahadu, 1993), and more than 95 per cent of traditional medicinal preparations in Ethiopia are made from plant origin (Dawit,

1986). There are about 887 plant species recorded as having medicinal use for people. The majority of the medicinal plants are herbs, followed by shrubs and trees (see Table 1). Twenty four (2.7 per cent) of the medicinal plant species are endemic to Ethiopia, and most are found in the wild (Table 2).

Table 1: Distribution of the medicinal plants by their growth forms

Growth habit	No. of species	Percent
Herbs	271	30.5
Shrubs	168	19.0
Trees	110	12.4
Climbers	74	8.3
Reed	2	0.2
Unidentified	262	29.6

Source: Ethiopia's 4th Country Report to the CBD

Table 2: Distribution of medicinal plants by their state of existence

State of existence	No. of species	Percent
Wild	357	40.2
Cultivated	89	10
Weed	52	5.9
Undetermined	389	43.9

Source: Ethiopia's 4th Country Report to the CBD

The proclamation issued related intellectual property to Ethiopia:

This proclamation may be cited as Copyright and Neighboring Rights Protection Proclamation No.410/2004. The provisions of this Proclamation concerning the protection of works shall apply to:

Works of authors who are nationals of, or have their principal residence in Ethiopia;

> Works first published in Ethiopia and, works first published abroad and also published in Ethiopia within 30 days, irrespective of the nationality or residence of their authors;

> Audiovisual works, the producer of which has his headquarters or principal residence in Ethiopia; and
> Works of architecture erected in Ethiopia and other artistic works incorporated in a building or other structure located in Ethiopia.

This Proclamation may be cited as Trade Mark Registration and Protection Proclamation No.501/2006.

> Subject to the principles of reciprocity or in accordance with any treaty that Ethiopia is a party to, foreigners shall have the same rights and obligations as Ethiopians under this Proclamation.
> It is necessary to protect the reputation and goodwill of business persons engaged in manufacturing and distribution of goods as well as rendering services by protecting trademarks to avoid confusion between similar goods and services;

This Proclamation may be cited as the Inventions, Minor Inventions and Industrial Designs, proclamation, No. 123/1995.

> It is necessary to create favorable conditions in order to encourage local inventive and related activities thereby building up national technological capability.
> It has been found essential to encourage the transfer and adoption of foreign technology by creating conducive environment to assist the national development efforts of the country.
> The task of fulfilling the nation's multidimensional demand for a harmonious scientific and technological progress, to be used for the public's benefit, shall be most effectively served when there exists an appropriate legal framework.

The proclamation to provide for plant breeders right. This refers to proclamation no.481/2006. Till now the regulation is not issued. The regulation is explained in detail on how to register and the steps of the process. This issue is directly under the Ministry of Agriculture and Rural Development

The proclamation of Access to genetic resources and community knowledge, and community rights proclamation. This refers to proclamation no.482/2006. Both the preceding proclamation and this one were issued on the same date. This proclamation articulated the issue of Access to genetic

resources but did not address the issue of protection of community knowledge. This forms a big gap from the proclamation. This proclamation was issued by the Institute of Biodiversity.

With the exception of the above two, all the rest are administered under the office of Ethiopian Intellectual Property office.

3. Research Justification

Healing in Ethiopian traditional medicine is not only concerned with curing of diseases but also with the protection and promotion of the human physical, spiritual, social, mental and material wellbeing.

Medicinal plants; and knowledge of their use, provide a vital contribution to human and livestock health care needs throughout the country. The plants are readily available in general, have minimal side-effects and are free and/or affordable [1]. They are an important component of the agricultural and environmental sectors and have the potential to make major contributions to both macro and economic growth and rural poverty reduction in the country. There are a number of traditional medicinal practices that reflect the diversity of Ethiopian cultures [1]. Their study indicated a declining trend in the number of traditional resources of medicinal plants. They call for an urgent action to document and preserve the traditional medical knowledge before it disappears from the country [1].

Moreover; according to Dr. Fekadu, Ethiopians have used traditional medicines at least as early as the 17th century; however, very little is documented. The oral transmission of knowledge from generation to generation gives rise to the possibility of incompleteness, omission, misrepresentation or distortion of the original medicinal plant cure as time goes by [7]. The other problem of attempting to preserve traditional knowledge through the oral tradition is that, it leaves no written record for posterity. Thus, the oral tradition does not only risk misinterpretation, it also risks losing crucial information.

The health and drug policies of the Ethiopian Ministry of Health recognized the

important role traditional health systems play in health care. However, currently there is no systematic way of keeping records of traditional practitioner with the Federal Ministry of Health though herbal medicines are sold on the streets with medical claims [3]. In spite of the promulgation of the necessary policies, little has been done in recent decades to enhance and develop the beneficial aspects of traditional medicine including related research and its gradual integration into modern medicine. There are many gaps between policy and actual practices. There are clear deficits in the organized approach towards ensuring an optimal contribution on traditional medicine to the national health system. For example, there were no regulations to the safety and efficacy, licensing, as well as the registration and guidelines for clinical trials involving traditional medicines.

The knowledge and uses of specific plants for medicinal purposes (often referred to as traditional medicine) is an important component of TK. But Western IP regimes have focused on protecting and promoting the economic exploitation of inventions with the rationale that doing so promotes innovation and research. For any invention to be patentable it has to satisfy three criteria, i.e., novelty, inventiveness and industrial applicability (utility). Traditional Medicine does not satisfy any of these criteria thus making it unique and a special case of study required.

Moreover, Habtewold [5] strongly argued in their paper; taking into account the importance of traditional knowledge and the role of intellectual property in the world trade, that there is an urgent need to design IP protection for traditional knowledge system in Ethiopia both at national and international level. They stated clearly that the existing IPR system cannot accommodate all traditional knowledge system. Even though many studies have been conducted, their research output does not provide possible option for the protection of traditional knowledge.

This study is therefore designed to fill that vacuum in the overall framework that can provide comprehensive protection to traditional medical knowledge identified by the previous studies. Such types of systems shall extend to control access to the genetic resources and the local knowledge related to these resources. The primary objective of a system for the protection of traditional medicine shall be: giving recognition to the rights of the knowledge holders while at the same time recognizing the potential for exploiting these resources.

4. Objectives

The general objective of the study is to analyze the Possible Intellectual Property Protection Options of the Ethiopian Traditional Knowledge in herbal medicine for livestock.

Specific objectives

> To locate and identify existing traditional knowledge that may be subject for protection under IP rights regimes (identify traditional knowledge claim)
> To identify who holds the knowledge and stakeholders with direct interest
> To identify relevant intellectual property option for the knowledge claim

5. Literature Review

The literature reviewed in this section has been widely cited in traditional medicine resources, as well as by our key informants.

The Ethiopian government with the assistance of the World Bank implemented the first conservation and sustainable medicine plants project in sub-Sahara Africa. The overall objective of the project was to initiate support for conservation management and sustainable use of medicinal plants for human and livestock cases. The following results were obtained through implementation of the project.

1. Research or preparation and cultivation methods of very few selected indigenous medicinal plants for human and livestock.
2. Establishment of a database for medicinal plants.
3. Extraction standardization, safety, efficiency and dosage formulation of two species.
4. Site conservation and sustainable use of medicinal plants, in Bale Mountains.
5. Establishment of medicinal plant field gene bank at Wondo Genet.

The other objective that was not achieved was to serve as a basis for the development of policy and guidelines for the protection of traditional medicinal knowledge in Ethiopia. The report stated '…… that has been made at the national level is to conduct a survey of selected traditional medicinal practitioners in two areas of Ethiopia, namely in the capital Addis Ababa and Bale in the Oromia Region. A questionnaire was prepared to this effect with the objective of eliciting the views of the traditional medicinal practitioners on their expectations regarding the protection of their knowledge. The outcome of the survey does not help much in revealing the expectations and needs of the traditional medicinal practitioners

regarding the protection of their knowledge.' In this study covering seven areas in Ethiopia comes out to protect traditional healers through appropriate sui generis intellectual property right with consideration of customary law.

According to Dr. Fekadu, one reason for the lack of documentation might be that traditional practitioners are reluctant to divulge their trade secrets. Most folkloric Ethiopian medicinal plants and their method of preparation are often closely guarded secrets, usually passed from the father to the eldest son, as the death of the former approaches. This study also confirmed that, although Ethiopia has had its own written language for more than 2,000 years, this hereditary profession is based on knowledge of medicine acquired from centuries of experience passed down privately from generation to generation through the oral tradition. The problem with this kind of knowledge transmission is the contamination of information. As a result of this tradition, the oral transmission of knowledge from generation to generation gives rise to the possibility of incompleteness, omission, misrepresentation or distortion of the original medicinal plant cure as time goes by [3]. This study got the same result in Shinile zone. The other problem with attempting to preserve traditional knowledge through the oral tradition is that it leaves no written record for posterity. Thus, the oral tradition does not only risk misinterpretation, it also risks losing crucial information. Documenting Ethiopian traditional medicine not only makes an invaluable contribution to the Ethiopian heritage and our understanding of traditional Ethiopian medicine but also facilitates the preservation of the knowledge and its transfer to the next generation.

The research on Ethiopian medicinal plants has mostly been more of producing inventories and checklists; and hence application of full-blown ethno-botanical research methodology is just taking shape with more biasness to the qualitative approach. While the studies so far show that the role of medicinal plants in different parts of Ethiopia is significant and that the traditional healthcare is deep-rooted with oral and written pharmacopoeias, there has been a total lack of quantified information on the amount of plant matter collected and marketed or the income generated from it; both at the local and country levels. To date, the bulk of the plant matter used for medicinal purposes is collected from natural vegetation stocks while the amount extracted from the natural vegetation as well as the annual economic value derived has never been assessed. On the other hand, the natural vegetation is shrinking, the environment is degrading and

individual medicinal plants are being selectively removed for various purposes to such an extent that the amount available has started dwindling.

The knowledge and uses of specific plants for medicinal purposes are important components of TK but Western IP regimes have focused on protecting and promoting the economic exploitation of inventions with the rationale that doing so promotes innovation and research. Currently, some 95% of patents in the world are held in developed countries [11]. At present, international patent law and most national conventional patent law protection requirements of novelty and inventive steps do not seem to be applicable to traditional knowledge and biodiversity.

There is no act under patent law which could be used to protect the non-medical traditional therapies, such as manual therapies and spiritual therapies Because of lack of a database and the same medicinal plants growing and being used in various countries and continents, it is very difficult to identify the founder.

Pharmaceutical products can be protected by the existing conventional patent law, however, herbal medicines and herbal products are quite different from chemical drugs; they are very difficult to be protected by the existing patent law. There are only three key protectable subject matters in order to get patent for pharmaceutical products in the conventional patent law; Patent for discovering new chemical components; Patent for know-how in producing the products; & Patent for the trademark

In addition to patent law, knowledge on herbal medicines could also be protected by keeping it secret. Firstly, the above–mentioned means are without little or no compensation to the custodians of this traditional knowledge and are without their prior informed consent. Secondly, herbal medicines have been defined by several WHO guidelines; they include crude plant materials, such as leaves, flowers, fruits, seeds, stems, wood, bark, roots, rhizomes or other plant parts, which may be whole, fragmented or powdered. The products, which chemically defined active substances have been added, including synthetic compounds and/or isolated constituents from herbal materials, are not considered to be herbal medicines. Therefore, it is impossible to get existing patent law protection for herbal medicines through the discovery of new chemical components.

Thirdly, the major dosage forms of traditional herbal medicines are directly derived from their herbal preparations, which include powdered herbal materials, or extracts, tinctures and fatty oils of herbal materials. They also include preparations made by steeping or heating herbal materials in alcoholic beverages and/or honey, or in other materials. The production process and major dosage forms of traditional herbal medicines is normally very simple. There is almost no know how available to protect this by patenting.

Fourthly, except for pharmaceutical companies and industries, other holders of traditional knowledge find it impossible to get protection for their product through trademark. Fifthly, it is impossible to keep knowledge a secret, because registration of the herbal medicines has to be done if the products are to be sold in the market. Therefore, all of the components in the products have to give account to their national drug authorities. Some countries, however, have been aware of the important role of intellectual property rights for traditional medicine. India, Kenya and Madagascar, for example, have updated their legal system and national patent law in order to protect the knowledge of traditional medicine [11].

The intellectual property rights are important in protecting the benefits of traditional knowledge; they need to be further developed and expanded. Patent law, however, is not the only means in protecting the benefits of traditional knowledge. Each government should develop its own means to protect the benefits of the knowledge of traditional medicine.

Knowledge about traditional medicinal plants and their application in Ethiopia resides in the non-professional public and the professional or healer domains. A study focused at the former domain revealed that a lot of medicinal plants are well known by ordinary rural people since they used them for various health problems (Hareya Fassil, 2005). This study revealed that 92.3% of the respondent confirmed that their knowledge was well known by individuals in their community but not the whole community. Such common medicinal plant knowledge is at a lower risk of erosion because many members of the community will have this knowledge at a given time as long as the plants exist and their use continues. Serious concerns are being raised in recent years because of the elderly healers passing away without transferring their knowledge. The young generation tends to ignore this knowledge as a result of influence by modern education, which either despises the indigenous knowledge or never considers it as something

with a good future (Kebu Balemie et al., 2004; Debela Hunde et al., 2005). This study also recommended that an urgent need to formulate an array of incentive measures to ensure that members of the younger generation would desire to learn, value, adapt and apply the traditional knowledge.

A sustainable supply of medicinal herbs can be achieved when a good balance exists in benefit sharing and all actors become concerned about the plants. Medicinal plants, having market demands, have to be produced in adequate quantity to respond to the demands. This could be made possible by establishing small-scale special medicinal plant gardens, large-scale medicinal plant farms and arboreta as well as enhancing and intensifying home gardens so that households can produce more medicinal plants and be able to generate income. There has to be an appropriate property rights scheme to protect the plants and the indigenous knowledge from piracy. Schemes that would enable sustainable use of medicinal plants and the associated indigenous knowledge should be developed. The country also has to exercise its sovereign right over its resources. Use of this resource by external parties must help the country in capacity building.

The traditional medicine practitioners protect their trade by a system of trade secrets that included magical practices, attached beliefs and various tricks including mixing of safe non-medicinal herbs with the medicinal ones. This secret never became accessible to others except to a member of the family. When we want to import this to the modern system an appropriate sui-generis intellectual property right protection scheme has to be in place. It also needs a national legislation regulating medicinal plant collecting and marketing to provide a more formal mechanism for controlling illegal harvests. Similarly, rules could be developed at local levels to regulate the amount, the time and type of medicinal plant harvest. We believe that more formal marketing systems will enhance proper management of the plants for sustainable use including the general biodiversity and the environment if appropriate tenure and property ownership system is put in place. Different authorities including Berthaud (1997) strongly support the idea of conservation with use, while others maintain that ownership rights as well as fair and equitable sharing of benefits will give positive returns in conservation. However, the best practice in benefit sharing outside patenting must be legislated and implemented.

6. Materials & Methods

Description of the Study Areas

The **Afar** people live primarily in Ethiopia and the areas of Eritrea, Djibouti, and Somalia in the Horn of Africa. The Afar region extends from central to northeastern Ethiopia, following the East African Rift Valley. The study districts - namely Amibara, Awash-Fentale and Dulecha are found in the southern part of the Afar region. Amibara and Awash-Fentale are located in the middle Awash valley, within the Rift Valley, whereas Dulecha is found across the lowland-highland interface, towards the western border of the Rift Valley. All study areas are characterized by a semi-arid climate, with average annual temperatures ranging from 21 to 38°C, the lowest temperatures being between December and February and the highest between April and June.

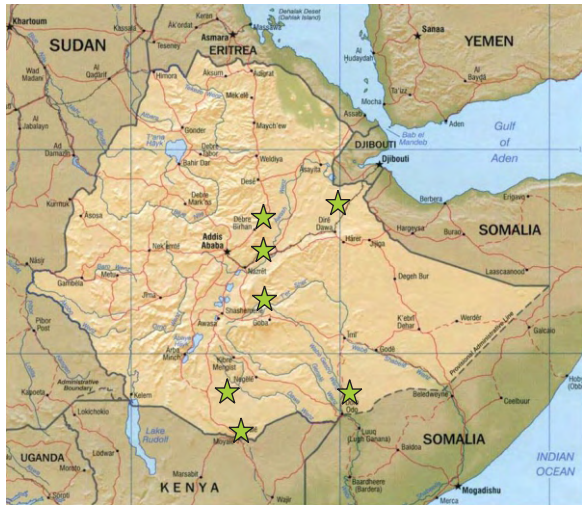

Figure 1: Study Area

The **Kereyu** in Fentale woreda is located at East Shewa zone, Oromiya Region. The Kereyu, who have been the indigenous inhabitants of the Metehara Plain and Mount Fentale area are Oromo-speaking transhuman pastoralists. Their main faiths are Islam and other traditional beliefs. Their major economic activities are animal husbandry likes cattle, goats, sheep and camels and agriculture to some level of extent. Their livelihood is more of the nomadic type. The climatic condition of the region is arid mostly with hot temperature.

Borana pastoralists' depend predominantly on livestock and their products. Borana breed, one of the multipurpose cattle breeds in Africa, was evolved, and is still widely reared by Borana pastoralists of southern Ethiopia. Borana pastoral area of Oromia Regional State located between 03037' 23.8" to 050 02' 52.4" North and 370 56' 49.4" to 390 01' 101" East, in the Southern part of Ethiopia. The altitude ranges from 970masl in the south bordering Kenya to 1693masl in the Northeast. The Borana pastoral system represents a vast lowland area, covering about 95,000 km2 (Coppok, 1994). It borders the republic of Kenya to the south, Somali Regional State to the east and, Southern Nation and Nationalities Regional State to the west and Gujji Zone to the North.

The **Somali** regional state of Ethiopia is located between 4-11°N and 40-48°E, within the eastern and southeastern lowlands of Ethiopia. It borders the Republic of Djibouti in the north, the Somali republic in the east, the Oromiya region from south to northwest, and the Afar region in the north and northeast of the country. The total land area is about 327 000 km2, equivalent to 30% of the national land area. The study area in Shinile zone of the Somali region of eastern Ethiopia is a pastoral area, located in the northeast of the region, with a total area of about 85 000 km2. The sites are located at distances of 25 km from Dire Dawa town, which is about 520 km east of Addis Ababa the capital city of Ethiopia.

Methods

The questionnaire was designed to obtain information on the knowledge possessed by the healers, types of illnesses treated by the healers, sources of the knowledge, sources of the natural materials used for the preparation of the herbal medicine, Access & benefit sharing issues, and relevant points for the protection and exploitation of traditional medicine. The data collection was done in two phases:

I. Conducted pilot studies

The Pilot study was designed to provide descriptive information. Hence, the researchers were able to describe the traditional medicine knowledge situation in the pilot study area of Ethiopia at Afar, Keriyu, Desse and Kombolicha as indicated in the study area and as observed and reported by the Healers, the users and key informants. The study included men and women who were using TK in their daily activities & with other members of the community. The areas were selected and stratified by the Agro ecological zones of Ethiopia.

The data collection included three steps. During the first step, Secondary data was gathered through; an informal interview with Traditional Medicine Head in Biodiversity institute (Ato Belachew), and a correspondence with Dr. George Owusu Essegbey, Director, Science and Technology Policy Research Institute Council for Scientific and Industrial Research from Ghana through the help from Professor Lynn K. Mytelka. The correspondence with Dr. George from the study that he did on Ghana notably had:

> the decision to bring allopathic & traditional practitioners together into a council and thus strengthen their interaction
> encouraged the traditional practitioners to have their medicines tested and registered, etc.
> moved towards the local production of traditional medicines with proper dosages, etc.

Following the desk literature search, a survey instrument was designed. This survey instrument was reviewed by ATPS researcher's coordination Group, colleagues at the Ethiopian Intellectual Propriety Office and ILRI to establish its validity.

The second step involved primary data which was collected using Participatory Rural Appraisal techniques especially Focus Group Discussion (FGD) and Key Informant Interview. Four FGD; one for each study city carried out by a multidisciplinary 'team' consisting of a healer, user, community elder, leader and professionals (Few core members, who act as 'facilitators' to assist local people to elicit and record their own knowledge using techniques which involved a minimum interference).

Realize that, TK was not evenly or homogeneously distributed among the various members of a local community. There were differentiations of knowledge among

individuals, based on a number of factors to be taken into consideration, when possible sources of relevant TK were being identified. Gender accounts for a large part of the differences in knowledge among individuals. Out of 30 in the FGD 23 are male and 7 female. This pilot survey considered other factors such as age, education, occupation, environment, socio-economic status, experience, religion; that may influence knowledge differentiation in a community.

In order to identify representative sites and TK holders, purposive sampling techniques were used and the country classified the major TK type as Ethno-veterinary & traditional medicine. From each stratum, TK holders (individual, group and community) were identified using key informants. For Afar and Keryu (Ethno-veterinary), the FGD conducted was based on the community choice with the combination of a Community Elder, a user, Healers and a government administrator. But for Wollo (traditional human medicine), the FGD was conducted with a user and pharmacists and also 27 individual structured questions for the healers as checklists used to guide the FGD.

Figure 2: FGD at Afar and Keryu

During the third step, which was not planned, the researcher was informed that Dr. Motlalepula Gilbert was in Addis Ababa with WIPO officials. Dr. Motlalepula is a Director of health indigenous knowledge system of South Africa (pictured below). The researcher arranged for an interview at Intercontinental Hotel in Addis Ababa and he was willing to give his experience on Traditional Medicine intellectual protection system in South Africa.

Figure 3: Dr. Motlalepula with researcher at Addis Ababa

II. Conducted Full Scale Survey

The full Scale study was designed to provide descriptive information. Hence, the researchers were able to describe the traditional medicine knowledge situation in the study area of Ethiopia as indicated in figure 1 and as observed and reported by the Healers, the users and key informants. The study included men and women who were using it in their daily activities & members of the community.

Table 3: Number of Healers interview per site

Study Areas	Sex		Total
	Female	Male	
Somali-Shinila	1	12	13
Keryu	0	16	16
Bekoji	1	3	4
Borna	2	14	16
Moyale	1	13	14
Afar	0	15	15
Total	**5**	**73**	**78**

Primary data were collected from purposively selected pastoralists' livelihoods who depend predominantly on livestock and their products in Ethiopia. The six sampling sites were distributed widely to cover different cultural settings and geographical conditions to be able to capture the ethno-veterinary use patterns by different ethnical groups (figure 1). The individual interview revealed that 78 healers both male and female traditional healers were interviewed individually as shown in Table 3.

Figure 4: Individual healers' interview at Keryu and Bekoji

This research interviewed six government officials from Ethiopian Intellectual property office, National Health and Nutrition Research Institute (NHNRI), Wondo Genet Agricultural Research Center (WGARC) traditional medicine, Ministry of Science and Technology and Environmental Protection Authority.

One key informant for the big city was herbalist Abebech Shiferaw who is owner and manager of Deshet Traditional Herbal Medicine Treatment Centre. The Centre conserves medicinal plants and gives treatments to patients using traditional practices.

This research at full scale conducted a series of five focus group sessions for the total participant who were 46 (7 Female and 39 male), two for Shinile and one each in Keryu, Moyale and Dollo Ado. Each session was held in a professional focus group facility. As well as 47 users who were interviewed individually. This study used three enumerators and three research assistance in the field.

Table 4: Number of Participant in FGD per site

Study Areas	Sex		Total
	Female	Male	
Somali-Shinila	2	18	20
Keryu	0	8	8
Borna	5	5	10
Dollo Ado	0	8	8
Total	**7**	**39**	**46**

The data generated was coded and entered into SPSS version 15.0 software for statistical analysis. Descriptive statistics like mean, standard deviation, frequency distribution, percentage, were used to examine and understand the situations of the purposive sample respondents.

Figure 5: FGD at Moyale and Shinile respectively

7. Results & Discussion

This part of the report presents the major findings of the study area indicated in figure 5. The first subsection presents the traditional healers' indigenous knowledge and practices including the common human and animal diseases and their traditional treatment practices. The knowledge ownership and transfer mechanism is analyzed in the second subsection. The third subsection discusses the available options to help protect the intellectual property rights of the traditional knowledge system.

7.1 Traditional knowledge and practices

The traditional healers' interview and the Focus Group Discussion (FGD) in the PS revealed that traditional healers have the ethomedicinal and ethnoveterinary knowledge to treat humans and animals diseases, respectively. The full scale survey results showed that knowledge percentage for animals was 85.9% and 14.1% for humans. The survey results also confirmed the purposive sampling of the study to represent the pastoralist areas with a very high diversity of medicinal plant species and indigenous knowledge. The individual interview showed that both male and female traditional healers are involved in the traditional knowledge and practices where the females were represented with only 6.4% dominated by the male practitioners (93.6%). A similar study in the central Ethiopia (Debre Markos area) reported the gender imbalance in the traditional treatment and stated that the males appeared to be more knowledgeable than the females. This is in contrary to the findings in Tanzania who reported that all the traditional medicine practitioners in the surveyed villages were female [8].

7.2 Major diseases treated by traditional healers

The full scale study areas, known for its ethnoveterinary knowledge showed that

85.9% of the individual healers were involved in the treatment of animals, while 14.1% treat both animals as well as humans. Among the healers, 53.8% of the respondents treat internal diseases, mainly internal bone fractures and external diseases were claimed to be at 11.5%.

The Afar and Kereyu areas are known as livestock dependent societies hence they have demand for the involvement of tradition healers on the problem of animal diseases in this livestock sector. Accordingly, the healers have a vast amount of ethnoveterinary knowledge. The analysis of the FGD in the PS undertaken in the study areas showed that up to 23 livestock diseases were treatable by herbal medicines. And also this study reported that there were 34 types of diseases which can be treated. In a similar study, livestock keepers of the Turkana and the Samburu communities in Kenya identified about 50 livestock diseases and grouped them as treatable using local remedies. Treatable diseases included retained placenta, eye disease, bloat and skin conditions such as wounds, streptothricisis, mange, lice, fleas and leeches. Anthrax and Black leg were responsible for the death of most of the livestock in the study areas. A similar study conducted in Afar by Oxfam international indicated that the livestock productivity is constrained by wide spread diseases; bacterial, viral, protozoal diseases; and internal and external parasites commonly exist in all species of livestock; Anthrax and Black leg occur sporadically in cattle; LSD and Pasteurellosis also appear following changes in climate. The National Trypanosomosis Centre confirms the occurrence of camel trypanosomes caused by T. evansi in the region [10]; and also Dvm. Zeriun Y/Hailu (lecturer in Afar ATVET) converted the local names to scientific ones from the Afar FGD and verified the disease prevalence in the area. Livestock keepers in the study areas use the public animal health services and NGOs working in the area during disease outbreaks and vaccination campaigns especially when there is a seasonal change.

7.3 Major disease treatment methods and herbal preparation

Traditional healers in the PS study areas reported to use medicinal plants materials, mineral, soil, blood, immunization by tissue from affected cases (common for animal disease and called auto vaccination) and animal products for the treatment of human and animal diseases. Most of the treatments in the study areas are plant based. Different parts of the medicinal plants such as the

leaves, roots, seeds, small branches and internal bark are processed into fresh or dried forms. The same result was obtained in this study; 78.2% depend on plant extracts. From the plant parts 33.3% use roots and 50% use root & herbs for medicinal preparation. 75.6% of the healers prepared two or more plants with water for a single treatment for an animal disease as shown in fig.6. Table 3 presents the major diseases treated by types of traditional treatment, preparation and administration methods in Afar. A similar study in the southeastern of Ethiopia reported that most of the medicinal plants parts such as leaves (39.2%) and roots (31.65%) were processed in fresh (46.58%), and fresh or dried forms (32.19%) while some (21.23%) in solely dried forms [2]. Single or compound plants are used to prepare the remedial similar to the ethnopharmaceutical knowledge worldwide. Most plant-based preparations involve crushing the principal ingredients (pulverization) and they are mixed with substances like cold water, honey, coffee, butter, oil, salt, sugar, kerosene, ash and milk. The processed remedies are mostly administered through the mouth (oral), nose (nasal), or on the skin (dermal), auricular and optical depending on the type of disease and the treatment.

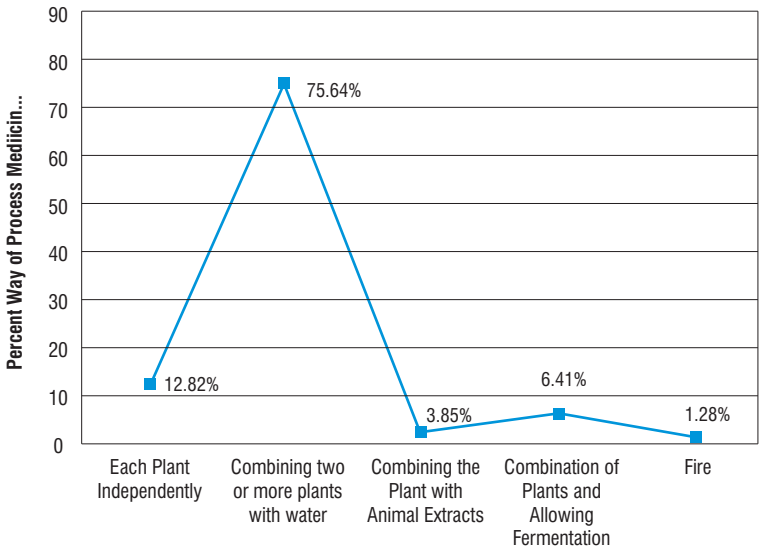

Figure 6: Way of preparation

Table 5: Afar major disease traditional treatment, preparation and administration methods

Disease Local Name	Scientific Name*	Description	Treatment	Preparation	Method of administration
Gublo	CBPP	Transmitted by Air, kills the animal	Auto vaccine method	Taking meat from one of the dead animals	Inserted on the nasal part of the live animals
Feriera	Anthrax	Sudden death; the animal suddenly dies by just jumping and falling on the ground, kills animals every day and the pastoralists become poor due to high devastation	Drenching	The leaves are ground and water is added	Through nasal and mouth
Endigulu	Render pest	Attacks only the calf but not the cow. Wound on eyes, fever, wound also on mouth. Killed the affected calf only	Auto vaccine method	Tie the calf with a rope and collect urine only in a cup. Leaves are ground and the calf's urine is added	Nasal drop let
Abebi	Foot and mouth	Salivating highly, wound on the animal's leg and the nail come off	Drenching	The leaves are ground and water is added	Through nasal and mouth
Noka	Lameness	Just like Malaria symptom	Expose to sun	Nothing given	They don't give water and grass to the animal for two days. The animal is tied and exposed to sunlight
Rori	Demodex	Wound from a Tick and also transmitted to a calf and also a human child through drinking of milk from affected cow	Inserted in wound	Butter dressed with leaves	Inserted in wound
Snake Bite		Swelling on the bitten part	Drenching with praying	Starts the day early in the morning with fasting he then takes leaves mixed with water after praying. At night he vomits blood and Diarrheas	Mouth
Cattle hit with another's horn		Bleeding	Ointment	Powdered leaves on the wound	On the wound
Bit by a hyena		Bleeding but no broken bone	Ointment	Powdered leaves on the wound	On the wound
Poor mothering		The calf does not get enough milk from the cow	Insertion	Pick the leaves in the name of the cow	Inserted in the cow's uterus early in the morning

Disease Local Name	Scientific Name*	Description	Treatment	Preparation	Method of administration
Andro	Anaplasmosis	Blood parasite			
Kerbi	fascioliasis				
Dahani	babesiosis				
Sole	Baslerhi homblobe uria				
Harmodi	Black leg				
Pida	Pastrolosti				

* *This Name is verified by Veterinary Doctor in the area*

7.4 Knowledge ownership, access & benefit and transfer mechanism

Knowledge ownership

According to the World Intellectual Property Organization (WIPO), traditional knowledge holders are all persons who create, originate, develop and practice traditional knowledge in a traditional setting and context. Indigenous communities, peoples and nations are traditional knowledge holders, but not all traditional knowledge holders are indigenous" [11]. The knowledge ownership system in both study locations goes in line with this definition where the traditional healer is the owner of the traditional knowledge.

The majority of the local healers used to collect medicinal plants alone with great secrecy and no one was allowed to see this activity except some family members. The study confirmed that 79.5% acquired the knowledge from their father or uncle whereas 3.8% of the respondent confirmed that their knowledge was acquired from well-known traditional healers from another town. 87.2% reported that they acquired the whole knowledge from their mentors and in line with this, 84.6% of the respondent didn't improve the acquired knowledge.

The survey results revealed that 92.3% of the respondent confirmed that their knowledge was well-known to individuals in their community but not the whole community (fig.7). This indicated that such traditional knowledge is held by a limited class or members within the community who pass such skills and knowledge mainly to their kin.

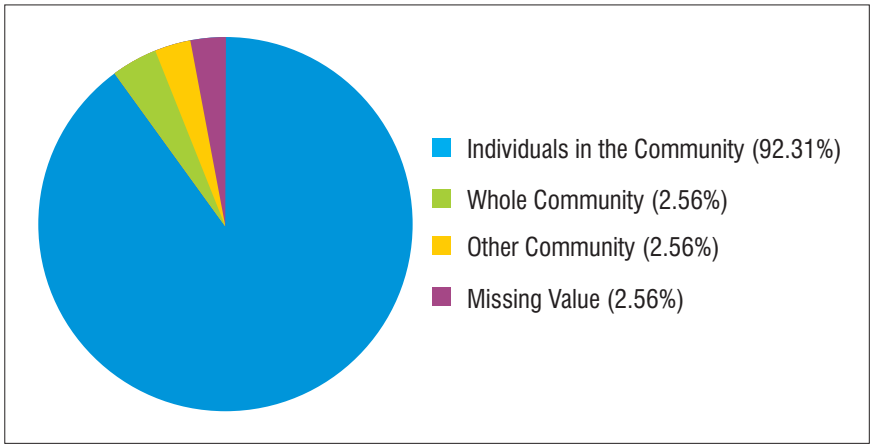

Figure 7: Those who hold traditional medicine knowledge

Knowledge transfer

As discussed in the knowledge ownership part, the majority of the traditional healers have acquired their knowledge from their parents or relatives. The study showed that the current knowledge transfer system followed the inheritance based transfer system where most healers pass their knowledge to an elder/ the eldest son/daughter. The selection of the elect was based upon his/her good conduct and ability to keep the secrecy with regards to the medicinal plant use knowledge.

100% of the respondent agreed that the knowledge transfer system used was the oral mechanism transfer of this wisdom resulting in the fragmentation or loss of the ethnomedical/ethnoveterinary lore and medicinal plants. The oral transmission of knowledge from generation to generation gives rise to the possibility of incompleteness, omission, misrepresentation or distortion of the original medicinal plant cure as time goes by [7]. Shinile (Isaa Somali) study area revealed that the two brothers received the same training from their father but have different skills in the society (see the fig below).

The other problem with attempting to preserve traditional knowledge through the oral tradition is that it leaves no written record for posterity. Thus, the oral tradition does not only risk misinterpretation, it also risks losing crucial information.

Figure 8: The two brothers who are healers in Shinile

Another issue is the low educational level of the healers coupled with the unwillingness to transfer the wisdom during their relatively young ages; the study revealed that 67.9% of the respondents are illiterate. The knowledge transfer system is bound by traditional laws and can only happen through a cultural ceremony. 89.7% of the healers confirmed that during the transfer of the knowledge, they are also bestowed with obligation.

In all areas, where there is a strong cultural relation, other people of the community who might know the medicinal plants application are not allowed to use the medicine without the healer's permission since it is believed to bring bad luck to all those concerned. Therefore, no one will practice the knowledge which was not passed to him/her through the proper transfer mechanism in practice, from father to son. The graph below (fig 9) analyses the respondents' response to the question - “Did you undertake any obligation?”

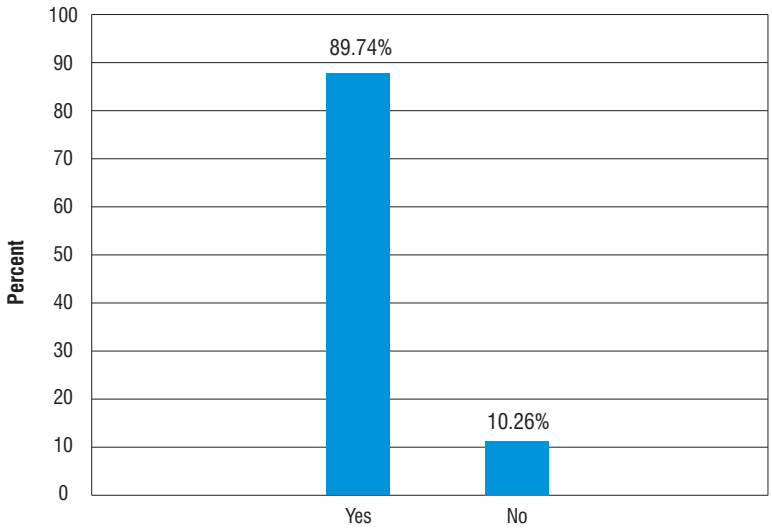

Figure 9: Obligation transfer

The time to transfer the knowledge to his/her elder son/daughter dependent on the willingness of the healers where in some cases the healer may pass without transferring the knowledge especially during accidental death. The transfer time depends on the perception that the healer has about his/her successor. The successor will not practice the knowledge unless the healer allowed him to do so, though the successor knows how to prepare the treatment. In Afar, the successor is told when the time is right to practice it otherwise he/she would wait for healer's blessings to start the medication. However, there are cases where the knowledge is transferred out of the norm: where the healer dies before passing the knowledge in the presence of the elders and the person who is exposed to it and knows its application; people start going to ask for the medicines in that house and the knowledgeable persons start to practice traditional medicine. Though this is not common, there are cases where the healers had the experience of teaching family members or other community members; if someone else outside the family members has the interest to learn the knowledge, interested persons would contact traditional medicine knowledge holder and request to learn the knowledge. This may require two or three trials to convince the healer and in addition, payment is made in cash or in kind (cattle). This type of transfer depends mainly on the interest of the learner and willingness of the healer (traditional knowledge holder).

Access-benefit issues

Ethiopia has had a good experience on Access Benefit issues for the Teff genetic resource case between Ethiopia and Netherland. Ethiopia is the center of origin and diversity for teff [Eragrostis tef (Zucc.) Trotter] that is one of the most important food crops in the country. It accounts for about 22 per cent (more than 2 million ha) of the total cultivated acreage among the major cereals. It is grown as a cereal crop only in Ethiopia where it is ground into flour, fermented and then made into injera (a type of pancake and the staple food for many Ethiopians). It originated in Ethiopia between 400 and 1000 BC. Genetic evidence points to E. pilosa as the most likely wild ancestor (Ingram and Doyle, 2003).

It has adapted to environments ranging from drought to waterlogged soil conditions. Maximum teff production occurs at altitudes of 1800 to 2100masl, growing season rainfall of 450 to 550mm, and a temperature range of 10 to 27°C.

Teff has an attractive nutrition profile; being high in dietary fiber, iron and calcium (National Research Council, 1996) as well as being high in protein (Seyfu, 1993). It is gluten free, so it is appropriate for people with celiac disease (Chanyalew, 2007).

Demand for teff is increasing in some European countries mainly due to the health reasons associated with gluten allergy. In April 2005, a Dutch company called Health and Performance Food International (HPFI) entered into an agreement with the Institute of Biodiversity Conservation (IBC) and the Ethiopian Agricultural Research Organization (EARO) to develop non-traditional teff-based food and beverage products, which are listed in the agreement. This agreement is a benefit-sharing arrangement but this study is focused on individual healers.

Long established medicinal knowledge practices & knowledge transfer norms and non-commercial provision of service have brought amongst community members trust and confidence on knowledge systems within their communities. Service is given in their locality and also to anyone from outside the community. The medication is given by the healer himself and according to what has been cured, his payment will be made and also the same payment is received as his mentor; if he cured cows, a cow will be his payment, if they were goats, a goat will be his price. But prior to treatment, when he is requested to come and treat the animals, he first needs a piece of clothing called “abujede” and two sheep (male

and female) to be delivered to his house; only then would he start to collect the plants needed and prepare the medicine and cure the animal.

According to Mugabe, one important feature of the Tigray form of institutional organization is that it facilitates easy sharing or exchange of seeds among the farmers and even outside communities. One channel of seed exchange is the practice of offering a portion of the best-selected seeds as gifts to the poor in connection with the St. Mary's celebration in the Orthodox Church. Similarly, this study revealed that in Afar and Somali, they have traditions for exchanging new disease treatment methods through their clan leaders.

7.5 Key Informant Interview at Big City

The key informant at the city was the herbalist Abebech Shiferaw, owner and manager of Deshet Traditional Herbal Medicine Treatment Centre. The Centre conducts conservation of medicinal plants and gives treatments to patients using traditional practices. The centre is conserving the medicinal plants in a field gene bank (a 4 ha garden) and traditional seed store. In the field gene bank, some 600 species of herbs, shrubs, grasses and trees having medicinal value and a total of 1,400 samples collected from all over the country are conserved. In addition, edible horticultural crops such as potato and cabbage are also planted to be mixed with the medicinal plants; they are served to patients demanding nutritional supplements. About 50 seed samples of tree species, some of which are highly threatened, and 112 samples of teff, sorghum, barley and wheat are kept in the seed store.

The seeds are monitored for viability every 3 to 5 years. Thirteen seed samples, which the centre calls 'vitamin Etse-tehadso', are also kept underground. According to the Herbalist, restoration of medicinal plants has been undertaken in some areas of the country where these genetic resources have been lost from the localities. In addition to the conservation activities, the Centre provides traditional medicines and health care at the Centre and its branch in Addis Ababa.

Figure 10: Traditional seed store of Deshet Traditional Herbal Medicine Centre (Photo: Adugna Abdi)

Figure 11: Partial view of the medicinal plants garden

The Herbalist stated that about 23 medicinal plant species have become extinct from the country because of the absence of proper conservation and sustainable utilization. The Centre identified the following major problems and constraints of medicinal plants:

- Severe erosion and extinction of indigenous knowledge;
- Lack of capacity for the responsible government institutions to look after the resources;
- Lack of due consideration of the resources and traditional medicines;
- Absence of an organization to integrate and coordinate the efforts of traditional healers and their healing practices;
- Absence of due respect for indigenous traditional healers (or herbalists);
- Lack of inclusion of traditional medication in government institutional structures.

Besides the conservation and traditional healing endeavours, the Centre organizes workshops and trainings in relation to traditional medication not only for Ethiopia but also for Africa. They gave training in Ghana and Kenya. The centre recommends the following sites/regions as priority areas for the conservation of medicinal plants; with need for urgent action:

- Abay river catchment
- The Kesem-lowland-woodland areas including Afar and Somali regions;
- South Omo – the Omo river catchment, and around Jinka
- Gonder and Eastern Gojam (Zege) areas
- Benishangul-Gumuz and Gambella areas

The Herbalist believes that restoration of the medicinal plants to their natural habitat is important since the curing ability is more effective when they are collected from their natural habitats rather than plants collected from areas where they have been taken to. These results, also supported by findings, indicated that 88.46% of the respondents prepared fresh herbs and gave them immediately.

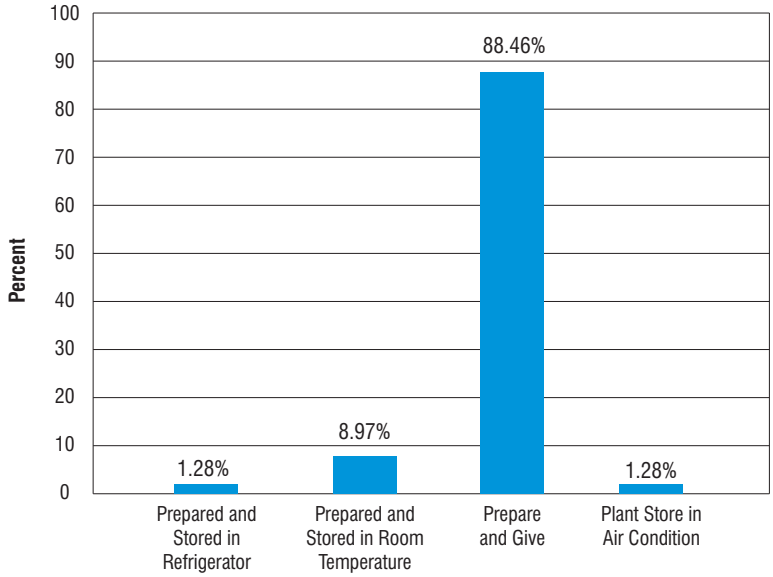

Figure 12: Traditional medicine storage

The Herbalist stated that the training is mainly given for common disease treatments. All healers have their own specialization, which are a big secret to the family. The herbalist confirmed that she is from the 52nd generation of the Deshet; this generation is specialized on gene and mental development; so this knowledge is never ever disclosed to anybody, even when the generation is at big risk. This also revealed that 64.10% of the respondents were not willing to share their knowledge with the researcher.

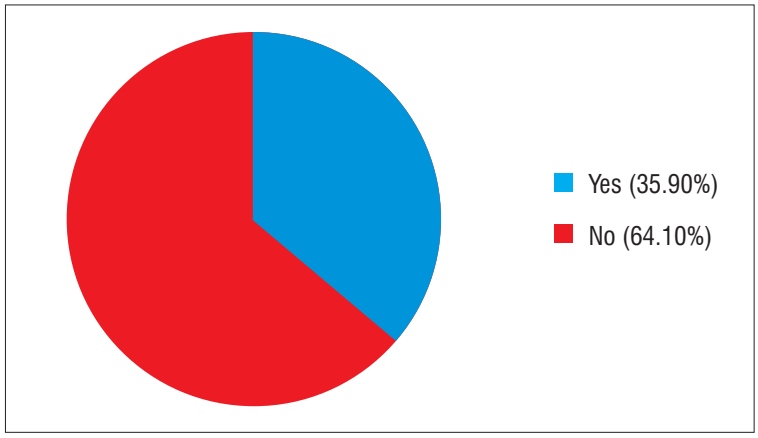

Figure 13: Knowledge sharing with the researcher

She finally confirmed that this knowledge belongs to the community. But unlike to all healers, this family has written documents that are transferred from one generation to another. These documents were asked by the Ethiopian science & Technology for records but she refused to provide even to the government.

7.6 Interview with the Government officials

This research interviewed six government officials from the Ethiopian Intellectual property office, the National Health and Nutrition Research Institute (NHNRI), the Wondo Genet Agricultural Research Center (WGARC) traditional medicine, and the Ministry of Science and Technology and Environmental Protection Authority.

All the respondents agreed on the issue of the criteria to be applied to determine whether certain knowledge should be characterized as traditional as follows: associated mainly with the other traditional culture or beliefs of the society concerned, mostly communicated orally; no systematic documentation, area specific i.e.; not widely spread, Dose, type and source of herbal medicine is dependent on the practitioner.

The majority view on the recognition of the rights of traditional communities on their traditional medicine knowledge is that it should be officially recognized for it helps majority in the public, and most rural communities are benefiting from traditional medicine in many ways. So recognizing this means developing a system by which all can benefit from; thereby, reducing the improper usage of the knowledge as well as conserving the environment.

All agreed on the issue of recognizing the community (customary) laws on traditional medicine. And they proposed the way as follows: In the first place there has to be a means to protect the knowledge of healers; and hence proper registration system of such knowledge has to be in place; Devising a system to appreciate these communities with some royalty is important and to do so discussions may be important and should involve all relevant stakeholders including traditional healers, representative of the aged people, medical doctors, pharmacists, pharmacologist, pharmacognocist, organic chemists, lawyers, etc. There has to be in place an organic link between the traditional medicine and modern technological laboratories with proper exchange of knowledge and with adequate secrecy. Categorizing valuable and senseless community laws has to be done in discussions with the healers, users and professionals.

Proper working procedures shall then be devised to make use of the agreed community laws. For this, recognition of various community leaders at each identified locality is to be made.

On the issue on knowledge of any Ethiopian law which addresses the protection of traditional medicinal knowledge, the majority agreed that there is no clear policy but that the law issued by biodiversity institute indirectly addresses the issue of Access & Benefit Sharing on protection of unfair exploitation by the third party.

All respondents agreed on recognition and certification of traditional healers with proper care and follow up And they suggested the responsible organization should depend on the type of traditional medicine being certified (the certifying body may be one, two or three institutions/organizations): if for example the product to be certified is simply herb, certification should depend on the type and the varieties that that specific herb belongs to. In this case, the Ministry of Agriculture together with Agricultural Research Institutes (ARI) may be relevant.

In other cases where the traditional medicine is made from minerals, may be the Quality Standard Authority of Ethiopia (QSAE) would be relevant but in consultation with National Health and Nutrition Research Institute (NHNRI).

But most traditional medicines are made from a combination of different ingredients; multi-institutional certification systems may also be devised.

All agreed on the traditional medicinal practitioners disclosing their formulations to a pertinent government body which the public will benefit more in getting standardized service and the healers will also get the royalty for the knowledge and the necessary technical support.

All suggested that on the area of government intervention to ensure the potential of traditional medicinal knowledge is realized in the national health care system; it should be done by:

> Organizing different traditional healers located at various parts of the country,
> Capacitating these healers with some very crucial health care systems through series of trainings and experience sharing; in this case some NGOs can be involved

- Devising a system by which these practitioners share their knowledge to the relevant institution(s)
- Organizing Traditional Healers Research Group of Ethiopia (THRGE) at different levels, may be under NHNRI where they can share their knowledge and conduct preclinical and clinical researches together with the research body,
- Establishing firm linkages between the Ministry of Science and Technology (MoST), the National Health and Nutrition Research Institute (NHNRI), the Wondo Genet Agricultural Research Center (WGARC), the Institute of Biodiversity Conservation (IBC), the Quality Standard Authority of Ethiopia (QSAE), Addis Ababa University School of Pharmacy, the Herbarium of Addis Ababa University.
- Studying the value chain of traditional medicinal plants and thereby supporting each step with proper research.
- Devising a system of certification ,
- Creating awareness in the communities with respect to where, how and which type of herbal medicine is relevant for their health care.

Finally all agreed that the conventional intellectual property system which evolved over the past few centuries in the west has no relevance to the protection of the knowledge on traditional medicine but with the exception of some modification, according to our public culture and understanding, it may be used.

7.7 Options to protect the intellectual property rights of the traditional medicinal knowledge system

I. Defensive protection is basically intended to prevent third parties from acquiring or asserting IP rights over traditional knowledge including traditional medicinal knowledge other than the customary custodians of the knowledge or resources. To prevent patent claims on traditional medicinal knowledge, it would require making available the knowledge that is already in a certain group of the community in some kind of documented form by publishing the data in order to bring it to the attention of patent examiners. The measure that may be considered in this respect and that has been suggested by several authors would be; to collect information on traditional medicinal knowledge and hold it in a database to make it available at the national and international level in order to prove prior art.

The major concern with respect to publishing and establishing databases on traditional medicinal knowledge is that it may further pave way for increased misappropriation of such knowledge because of its public availability. Thus, giving unrestricted access to genetic resources and associated traditional knowledge may lead to further bio-piracy. And also the study revealed that 100% of healers received their knowledge orally and 89.7% of healers received their knowledge together with the obligation.

II. Positive protection of traditional knowledge including traditional medicinal knowledge is intended for the holders of traditional medicinal knowledge to acquire IPR by themselves. The protection may be through existing IPR systems. In this context, we shall initially examine briefly whether existing IPR systems may be applicable to traditional medicinal knowledge.

Patent - in order for an invention to be patentable, it generally has to meet three criteria, namely: novelty, non-obviousness and industrial applicability and one procedural criterion; that of sufficient disclosure. These requirements under conventional IP law are cumulative and, if one of the substantive criteria is absent, then the patent cannot be approved. The study revealed that 84.6% of the healers didn`t improve the acquired knowledge. The results of the study indicated that certain groups of communities which hold such knowledge did not wish to divulge their knowledge to the public and prefer to hold such knowledge continuously within the community. The traditional medicinal knowledge is already in the public domain as such, the conventional IP system will not be applicable to such types of traditional medicinal knowledge.

There are mainly three requirements that need to be satisfied in order to protect certain knowledge as trade secrets: the information must be kept as secret and therefore must not be in the public domain; the information that is kept as a secret must have a commercial value and the holder of the knowledge must make reasonable efforts to maintain secrecy of the knowledge. With respect to this study of traditional medicinal knowledge, there are 92.3% of the healers who confirmed that their knowledge was well known to individuals in their community but not the whole community. In such situations, such traditional medicinal knowledge cannot be protected under trade secrets.

III. In view of the special and often varied characteristics of traditional knowledge and the difficulties of applying conventional intellectual property rights protection to such knowledge, there are several efforts made at the international, regional and national levels to develop a sui generis regime for the protection of traditional knowledge including traditional medicinal knowledge. As pointed out previously in the literature paper, the African Model Legislation seems to incorporate the most comprehensive and novel set of objectives for protection of traditional knowledge and the biological resources on which they are based. It contains important elements as objectives. For instance, it refers to 'knowledge and technologies of communities' as the objective of protection which is closer to the provision of the CBD which recognizes the existence of local technologies used by local communities in the creation and exercising of their knowledge system. It also incorporates the notion that the rights of the local communities over their knowledge and technologies are 'inalienable'. This is intended to suggest that no one can appropriate the long-standing and inter-generational rights of local communities over their knowledge and technologies and associated biological resources and to exercise such right includes exchange of such knowledge within such communities permanently. It also implies that access to biological resources and related knowledge and technologies may only be availed to third parties only if they are given consent by the concerned communities themselves. The African model legislation is also intended to ensure the effective participation of the communities in access and benefit sharing.

The African Model legislation refers to the 'community rights' or 'community intellectual rights'. It gives emphasis to the collective nature of the rights and the right of the communities to collectively benefit from their knowledge. In other words, it does not seem to provide any possibility that the knowledge within the community can be privately held by individuals or a group of persons within the community. This gives rise to the issue of whether or not it is always the case; that the community holds traditional knowledge collectively or whether or not it is the wish of the individuals who hold such traditional knowledge in the community or even if held by the community as a whole, it is recognized that it is held and shared collectively. The use of the term ' community intellectual rights' has also been coined to avoid the term 'property' since it is believed that conventional forms of IPR are inappropriate to community traditional knowledge which are always presumed to be freely shared within the community even if it has no commercial value.

The African model legislation strongly emphasizes the role of customary law of the concerned communities in determining their rights; in the identification of their knowledge and also in its access, use of their biological resources and related knowledge. This is a very important provision in the sense that it gives the decision-making power in all matters to the holders of the TK themselves. This creates the necessary incentives for the communities to actively participate in the protection of their knowledge.

The above discussions on the instruments intended to protect traditional knowledge have relevant provisions that must be used for the development of a sui generis regime for the protection of traditional knowledge in the Ethiopian context. There are variations and similarities in some of the provisions contained in the laws. What one can see is that there are certain major policy differences in the laws. For instance, in the African model legislation, there is no mention of 'property' rights on the traditional knowledge that communities hold.

This is a major policy decision since the underlying presumption behind avoiding the term 'property rights' is the firm belief that traditional knowledge should not be protected by any form of IPR that entitle exclusive rights to the community or any member of the community because it is believed that the communities freely exchange their knowledge, innovations and practices associated with biological resources. Imposing western forms of IPR would, therefore, destabilize such communities and create culturally inappropriate forms of protection of TK which has been held collectively and passed freely from generation to generation. One thing that the study revealed is that communities have their own customary practices of protecting their knowledge and recognizing individual creativity within their customary systems which may at times be similar or close to the IPR form of protection. According to Dutfield, customary laws and practices contain the rules for the holders of traditional knowledge, and in the local context they usually provide effective protection [20]. Kuruk also mentioned the mechanisms may cease to be effective [21]. Similarly Timmernans stated that it is difficult to use existing laws and mechanisms for the protection of traditional medicine, it is necessary to look beyond and devise new mechanisms.

The study concludes that the traditional healer's knowledge in livestock protected through appropriate sui generis intellectual property right protection scheme, with highly consideration of customary law, has to be in place.

8. Conclusions & Recommendations

Traditional healers of the study areas of Ethiopia were found to be rich in their indigenous knowledge on the use of medicinal plants to manage various human and animal diseases. Traditional knowledge has originated, developed and is being practiced by traditional knowledge holders. This knowledge is transferred with their own mechanism which is restrictive and family based. The finding revealed the following points:

- Customary systems have their own rule-based systems governing access to and use of knowledge.
- Special traditional knowledge was held by a certain group within the community.
- Traditional Medicinal knowledge has been passed from generation to generation without improvement on the original knowledge. Moreover, some specific knowledge is lost in-between generations.
- Documentation of medicinal uses of plants is becoming urgent.
- Traditional healers protect their knowledge by attached believes.
- Ethiopian Orthodox church has great resources in Traditional Medicine pharmacopeias based on the photo copy of the old book written in 1896 that we got.
- The study area results revealed that customary law is still beyond the government legal law now.
- The spiritual aspect of traditional medicine cannot be separated from the physiological uses of plants.
- The pilot survey revealed that the same plants were being used for the same purpose across the same boarder of Afar and Keryu. Similarly the full scale results revealed that the same names of diseases and treatment are used in Afar and Isaa Somali.

- Traditional knowledge is held by specific community members and not by the whole community
- There is knowledge specialization between healers. Most healers are known to be best at some specific areas of medication.
- Plants used in preparation of the medicines are not well known. This hindered the protection of biodiversity in regard to these plants.
- One`s whole knowledge is disclosed to his/her family members but the rest of the community would know the most common knowledge.
- No one, even within the owner's family, can practice the knowledge without the owner`s permission.
- Knowledge is transferred orally. This led to knowledge being lost in the process from generation to generation.
- Traditional medicine was prepared by harvesting the roots.
- Restoration of the medicinal plants to their natural habitat is important in curing ability when collected from their natural habitats.
- Traditional healers' knowledge in livestock could be protected through appropriate sui generis intellectual property rights with highly consideration of customary law.

Recommendation

- Systematic cultivation of medicinal plants be introduced in order to conserve biodiversity and protect threatened species.
- An urgent need to formulate an array of incentive measures to ensure that members of the younger generations would desire to learn, value, adapt and apply the traditional knowledge.
- The government should create an environment where the traditional healers can communicate with researchers and reveal secret medicinal cures and their beliefs of the treatment.
- Traditional medical policy, regulations and working guidelines must be approved.
- The government must be resolving the differences and disagreements between the traditional herbalists and modern medical practitioners.
- Transfer of knowledge should be appreciated by the knowledge owners and their advantage in doing so should be made clear.
- Knowledge owners must be motivated and given incentives to work in collaboration with modern medicine experts.
- IP protection should be familiarized with the knowledge to know its benefit

> Government policy must be directed to benefit the knowledge owners while using the results at the national as well as international level.

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2	Mr. Wondosen Belete	Director of Environmental System Project of Ethiopian Environmental Authority
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6	Mr. Feleke Kibrate	Secretary for Ethiopian Health Research Ethics

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