TRADITIONAL MEDICINE IN ETHIOPIA

Proceedings of a national workshop held in Addis Ababa, Ethiopia, 30 June-2 July 2003

Ethiopian Health and Nutrition Research Institute
Addis Ababa, Ethiopia
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Edited by
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Ethiopian Health and Nutrition Research Institute, Addis Ababa, Ethiopia

2004

Proceeding of the First National workshop on traditional medicine June 30 – July 2, 2003
Every human community responds to the challenge of maintaining health and treating diseases by developing a medical system based on indigenous theories, beliefs and experience that are handed down from generation to generation. In Ethiopia, traditional medicine has always existed and was practiced more than we might think. It has been practiced in Ethiopia since time immemorial. Even with the introduction of modern medicine in Ethiopia, traditional medicine however, continues to maintain its popularity for historical and cultural reasons, as about 90% of the people of Ethiopia and the livestock depend on it for their health care needs. Traditional medicine has also been recognized by the Ministry of Health as an important alternative health resource, readily available to both urban and rural communities.

Despite the fact that the role of traditional medicine in health care delivery is well recognized, some major challenges persist. These include lack of collaboration between traditional health practitioners and modern health practitioners to promote the use of traditional medicines, lack of code of ethics for traditional health practitioners, lack of sufficient data on safety, efficacy and quality of traditional therapies, lack of proper documentation of the system and lack of awareness on the medicinal plant resources of the country. These challenges hamper institutionalization and integration of traditional medicine into mainstream health system and services. The Ethiopian Health and Nutrition Research Institute (EHNRI) has been proactive in responding to these challenges by:

1. creating an enabling environment for practice of traditional medicine through development of code of ethics and regulatory frameworks for the practice.
2. conducting research with the involvement of traditional health practitioners to validate claims on safety, efficacy and quality of traditional medicine
3. undertaking research on conservation of medicinal plants with involvement of traditional health practitioners and local communities.
4. partnership building between traditional health practitioners and modern health practitioners.

This workshop has been successful in bringing biomedical researchers, traditional healers and regulators of traditional medicine to overcome the above-mentioned issues. The workshop outcomes and recommendations are believed to promote the development of traditional medicine in the country and bridge the gap that existed between modern and traditional systems of medicine. It is also felt that an atmosphere of understanding, trust and respect has been created between modern health practitioners, traditional health practitioners and the community they serve.

These proceedings are the outcome of the deliberations at the workshop. The information presented in this volume of proceedings is significant and highly valuable. It is hoped that the proceedings will provide guidance for strengthening and expansion of future actions for development and promotion of traditional medicine in Ethiopia. Through the preparation and publication of the proceedings on traditional medicine, EHNRI remains committed to increasing its support to development, promotion and proper use of traditional medicine and its integration with the national health service system.

Abera Geyid
Director, EHNRI

Tilahun Woldemichael
Deputy Director, EHNRI

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Preface

Traditional medicine may be defined as diverse health practices, approaches, knowledge and beliefs incorporating plants, animals-and/or mineral-based medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination to maintain well-being as well as to treat, diagnose or prevent illness. It is a product of social institutions and cultural traditions that have evolved over many centuries to enhance health.

Since time immemorial, traditional medicine has played crucial role in combating multiple and complex health conditions affecting the Ethiopian people. It was the only system available for health care prior to the introduction of modern medicine for the prevention, diagnosis and treatment of social, mental and physical illness.

The use of traditional medicine is still widespread in Ethiopia, and its acceptability, availability and popularity is no doubt as about 90% of the populations use it for their health care needs. The question therefore arises: why do not we promote what is accessible and acceptable to us, and institute measures to promote and manage it? However, there are issues that need to be resolved for institutionalization and integration of traditional medicine into mainstream health system and services of the country.

The issues include safety, efficacy, quality, regulation and intellectual property rights (IPRs) related to traditional medicine. Another major challenge is disrespect for, and denial of, the role of traditional medicine and traditional health practitioners by modern health practitioners. To bridge this gap, the National Workshop on Ethiopian traditional medicine was organized.

The major aims of workshop held in Addis Ababa, from June 30-July 2, 2003 were to review past research on traditional medicine, to develop ethical guidelines on traditional medicine and practices, to assess how traditional medicine can be regulated, and ultimately, to forward how traditional medicine can be organized to harmonize it with modern medicine.

The workshop was attended by more than 100 participants drawn from Universities, Colleges, research institutes, regulatory bodies, the WHO, traditional healers, professional associations and regional health bureaus. The conference was opened and addressed by Dr. Angela Benson, WHO Representative and Dr.Abera Geyid, Director of the Ethiopian Health and Nutrition Research Institute.

Participants presented policy papers, review papers and current research findings on traditional medicine. Participants were divided into sub-groups to discuss on code of ethics for traditional health practitioners, regulation of traditional medicine and draft traditional medicine bill. The main conclusions and recommendations of the workshop can be summarized as follows:

1. Create an enabling environment for the practice of traditional medicine through approval by the government of the developed regulatory framework at this workshop for the practice and registration of qualified traditional health practitioners.
2. Provide training to traditional health practitioners for their future accreditation.
3. Conduct research with the involvement of traditional health practitioners, to validate claims on safety, efficacy and quality of traditional medicines as well as develop national formularies on traditional medicines

4. Conduct research on conservation of medicinal plants with involvement of traditional health practitioners and local communities

5. Build partnership between biomedical researchers and traditional health practitioners to complement each other and thereby promote and enhance management of disease and disorders.

The proceedings are divided into the following sections:

1. Inauguration
2. Traditional medicine policy and regulation
3. Research on traditional medicine
4. Ethics on traditional medicine
5. Abstract presentations
6. The traditional Medicine Bill or Act

The workshop and publication of these proceedings was supported by the WHO and the Ethiopian Health and Nutrition Research Institute. The staff of the Department of Drug Research must be thanked for their contribution to the success of the workshop. Particular mention should be made of Mr. Hunegnaw M and Mr. Berhanu T. The editors also thank Mrs. Mengistu A and Miss Wolde W for their neat typing of the text matter. Finally, we must express our gratitude to all the delegates for giving the workshop the benefit of their time and expertise, without them, this proceedings volume would not have been possible.

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PART I. INAUGURATION
Welcoming Address

Dr. Abera Geyid
Director, Ethiopian Health and Nutrition Research Institute

Dr. Angela Benson, WHO Representative, Distinguished Research Scientists, Workshop Participants, Invited Guests, Ladies and Gentlemen:

On behalf of the entire staff of the Ethiopian Health and Nutrition Research Institute, the Organizing Committee and myself, it is indeed my pleasure to welcome you all to the 1st National Workshop on Traditional Medicine in Ethiopia.

Traditional medicine is an ancient medical practice, which exists, in human societies before the application of modern science of health. It is the sum total of knowledge, skills and practices on holistic healthcare, which is recognized and accepted by the community for its role in the maintenance of health and the treatment of diseases. Traditional medicine is based on indigenous theories, beliefs and experiences that are handed down from generation to generation.

Traditional medicine remains paramount to the Ethiopian people. According to a recent WHO estimate 90% of the Ethiopian population use traditional medicine as its first choice for day-to-day health care needs. It was therefore; not surprising that the Government of Ethiopia in 1993 issued a series of polices promoting the development of traditional medicine in the country.

Despite these policy orientations, the country has not developed legal frameworks and code of ethics including code of conduct for the practice of traditional medicine for traditional health practitioners in the country.

With traditional medicine still remaining omnipresent in the life of almost the entire population in Ethiopia, the practice of traditional medicine is not regulated. This may be considered as one of the most serious challenges for integration of traditional medicine with modern health care system. Considering code of ethics as one of the most important components of regulation and control of traditional medicine in Ethiopia, the Ethiopian Health and Nutrition Research Institute in collaboration with the World Health Organization has organized this workshop. The workshop is a participatory workshop towards a formulation of code of ethics including code of practice of traditional health practitioners in Ethiopia.

The workshop is designed to bring researchers from universities, colleges, research institutions, regulatory authorities, professional associations and regional health bureaus together and to provide a forum through which intensive exchange of relevant information, diversified views of conceptual matters, and to consider contemporary issues on traditional medicine related to primary health care.

The overall objective of the workshop is to review recent advances in research on traditional medicine of Ethiopia and to develop code of ethics including code of practice of traditional
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health practitioners. It will also address relevant issues that are related to traditional medicine policy and primary health care in the country.

We fully understand that it is important for a country like ours to have the institutions work together and exchange information in order to provide new insight and deepen mutual understanding of the subject of traditional medicine.

We hope that this workshop will achieve this through the papers that will be presented and active discussions by the participants, and that further cooperation between institutions will be developed in the field of traditional medicine.

I must stress that the breadth of the subject matter and complexities of the associated factors are far from simple. I hope, through the discussion points to be covered, and the interactions that will follow, we shall be in a position to work out appropriate code of ethics including code of practice that will assist our traditional health practitioners in the exercise of the system.

I would also like to thank the paper presenters, workshop participants and to those who have shown keen interest in participating and sharing their experiences with us in developing code of ethics including code of practice of traditional health practitioners.

May I finally take this opportunity to express my gratitude to the funding agency, the World Health Organization for its financial support in organizing this workshop.

Thank You
Keynote Address

Benson A

WHO Country Representative, Addis Ababa, Ethiopia

Workshop Participants, Distinguished Guests, Ladies and Gentlemen

The delimitation of traditional and modern medicine was difficult for a very long time in the past since the latter gradually evolved from the former. The separation of the two systems crystallized over the last one hundred years when many of the astounding discoveries of modern medicine were made and specific qualifications were required for practice in medicine, nursing, midwifery and other branches of modern medicine.

Modern medicine commands high social priority in both developed and developing countries because of its success in preventing and controlling new and age old diseases by means of increasingly new therapeutic and diagnostic discoveries. However, the modern health care system has not reached all segments of the population in developing countries. Cognizant of this fact, many Asian countries have been able to integrate the alternative health care system, the oriental or traditional medicine, with modern health care.

For centuries Ethiopians relied heavily on traditional medicine for treatment of human and animal diseases. There seems to be no village, town or city where traditional health practitioners are not involved in the provision of health care that is culturally acceptable and which more or less deals satisfactorily with certain kinds of local health problems.

In spite of the Ethiopian Government efforts to introduce modern health care delivery system to the rural population, recourse is made by most of the rural people and even the urban dwellers to the traditional medicine. Recent estimates indicate that over 90% of the Ethiopian population relies on traditional medicine for the fight against various diseases. Therefore, the health care of the large population may be improved by officially bringing the positive elements of traditional medicine into modern health process.

The Government of Ethiopia accords health a prominent place in its order of priorities and has committed itself to the attainment of this goal however, there is an enormous volume of unmet health needs and the cost of these health needs is staggering. The improvements in the health status of the Ethiopian population will inevitably require among other things, linking traditional medicine with official care. The development and mobilization of natural resources and remedies has been employed by the majority of the population in the traditional health care delivery system.

Traditional medicine is practiced by traditional health practitioners. However, apart from the need to possess of indigenous and traditional knowledge, experience, and reputation in the communities where they live, traditional health practitioners should also fulfill other basic requirements as provided for in the rules and regulations of the country. In return, Government should expect traditional health practitioners to act according to the norms of professional practice and to fulfill their professional obligations, faithfully and honorably, giving due
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consideration to the well being of society. The practice of traditional medicine should therefore, be governed and regulated by the appropriate laws of the country.

In order to effectively integrate traditional health practitioners (THPs) into primary health care (PHC), there is a need to institutionalize traditional medicine. The institutionalization of traditional medicine calls for a number of actions including:
1. The setting up of professional traditional medicine bodies
2. The development of national polices and establishment of legislation
3. The drawing up of code of ethics
4. Increasing close collaboration between the practitioners of traditional and those of conventional medicine
5. The development of norms and standards
6. The establishment of mechanisms for the official recognition and support of traditional medicine; and
7. The identification, registration and accreditation of qualified practitioners of Ethiopia.

Although Ethiopia has formulated national polices on traditional medicine, the relevant legislation and code of ethics, which are key for institutionalization of the practice of traditional medicine have not been currently put in place.

Ethics is the philosophical study of the moral value of human conduct and the rules that govern it. The purpose of the code of ethics is to serve as a guide to conduct for members. It contains standards for ethical behaviors for traditional health practitioners in their professional relationships.

It is timely and important that this workshop has taken upon himself to draft the best alternative guidelines towards the establishment of code ethics and code of practice of traditional health practitioners in Ethiopia by taking into account the scientific and technological level this nation has been able to attain.

This workshop is probably the first of its kind in the country in bringing together, health authorities, directors of health services, drug regulatory authorities, researchers, academicians, professional health associations including association of traditional health practitioners to make a new approach in the realization of the potentials of traditional medicine in the country.

It is encouraging to see that people of diverse profession have recognized that traditional medicine is vital for human and livestock health in Ethiopia. This workshop is part of the constructive effort to promote self-reliance and to support the Government's endeavor to put traditional medicine on scientifically sound footing.

In the field of health care, which is an area relevant to the workshop, our objectives are not only improving and expanding health care services, but also at making them efficient and available to all people. We know that as a result of the efforts of the Government, health care institutions have increased significantly over the years. It is against this background that I feel confident the network of the rural health centers which is being promoted may prove extremely useful in future application of traditional medicine at community level.
It may be noted that various professional associations of health in the country have developed code of ethics for their members. This forum, I believe, creates an opportunity for representatives from professional association of health to contribute to the development of yet a new code of ethics including code of practice, the disciplinary procedures and minimum standards for the practices of traditional medicine in Ethiopia.

I sincerely hope that three days of serious thought and evaluations of the potentials of traditional medicine in national health system many prove feasible for further promotion of traditional medicine in the country. We believe that it could be of immense benefit to the large percentage of Ethiopians who depend on traditional medicine.

Wishing you a successful conference, I now have the pleasure in declaring this National Workshop on Traditional Medicine officially open.

I thank you for your attention.
PART II. TRADITIONAL MEDICINE POLICY AND REGULATION
The Role of WHO in Bringing Traditional Medicine in to the Mainstream Health Service System

Benson A

WHO Country Representative, Addis Ababa, Ethiopia

Nearly one-third of the population in developing countries lack access to essential medicines. Consequently, a significant proportion of the people in developing countries still depend on Traditional Medicine (TM) to meet their primary health care needs. In developed countries, TM is also gaining popularity as Alternative and Complementary Medicine (CAM).

The actual global situation indicates that the provision of safe and effective TM/CAM therapies are important tools to increase access to health care, particularly in poor and marginalized populations. Moreover, herbal medicines serve as a basis for modern drug development in a number of ways. It is therefore, necessary to gradually incorporate proven TM/CAM into the National Health Care system.

WHO has been involved in the development of Traditional Medicine for five decades. In 1978, the declaration of Alma-Ata recommended, among other things, the inclusion of proven traditional remedies into national drug polices, and regulatory measures. Following this, the World Health Assembly (WHA) has adapted a number of resolutions on TM.

The main objectives of WHO's TM program are to provide normative and country program support so that member states can:
1. Develop their own TM/CAM and integrate it into their national health care systems as appropriate
2. Ensure appropriate, safe and effective use of TM/CAM

WHO also seeks to increase access, among member states, to accurate information on TM/CAM issues. Towards these ends, WHO has been helping member states to develop national policy and regulations. It also provides technical guidelines and financial support for research into the safety and efficacy of TM/CAM. For example, currently, WHO is supporting a total of 21 countries in Africa in their research into TM therapies.

WHO also develops Monographs on selected medicinal plants to provide scientific information on the safety, efficacy and quality control of widely used medicinal plants. Besides, nineteen WHO collaborating centers for Traditional Medicine are established to promote Traditional Medicine through research, training, and information exchange. Moreover, WHO works with several UN agencies, other international organizations, NGOs, international and national professional associations to maximize the potential that TM/CAM offers for improving health status worldwide.

Recently, WHO has further defined its role in TM/CAM by developing a four-year strategy (2002-2005) for TM in order to better address issues of policy, safety, efficacy, quality, access

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and rational use of TM/CAM. The strategy provides a framework for action for WHO and its
partners. Member countries are therefore, encouraged to adopt the strategy and prepare plan of
action for its implementation.

WHO has been collaborating with Ethiopia in the area of TM since the late seventies. It has
been supporting the research work in TM by providing funds for procurement of laboratory
equipment and supplies; by covering costs associated with trainings, workshops and study
tours. It will continue to support TM development in Ethiopia within the meaning of WHO’s

Acknowledgement
I would like to thank the Ethiopian Health and Nutrition Research Institute (EHNRI) and the
organizers for inviting WHO in this National workshop and express my hope that the
recommendations of the workshop will serve as an important input for future development
work on TM in Ethiopia.
WHO's Traditional Medicine Strategy

Tefera B

Essential Drugs and Medicines Policy (EDM), WHO Country Office, Addis Ababa, Ethiopia

Abstract
Traditional Medicine (TM) is widely used in developing countries (by 80% of the population in Africa) to meet their primary health care needs. The use of Complementary and Alternative Medicine (CAM) is also increasing rapidly in developed countries. Many factors contribute to the widespread use of TM/CAM, some of which are: accessibility, affordability, faith in the system, desire to have alternative system of medicine with a safer natural base, and growing economic importance. On the other hand, there is increasing demand for evidence of safety, efficacy and quality of TM/CAM products and practices. Unfortunately, evidences, which support the claims of TM/CAM, are limited. In addition to efficacy and safety issues, the growing herbal market and its great commercial benefit has posed a threat to biodiversity. Moreover, there is a need for protecting and preserving the indigenous and traditional knowledge of TM/CAM. The above shortcomings and concerns have given rise to issues related to policy; safety, efficacy and quality; access and rational use. In order to address these issues and maximize the potential of TM/CAM as a source of health care, WHO has developed a four-year strategy (2002-2005) and released it during its Fifty-fifth World Health Assembly (May 2002). The strategy provides a framework for action for WHO and its partners. The specific objectives of the strategy are to support member countries to: 1.Integrate TM/CAM with national health care systems, as appropriate, by developing and implementing national TM/CAM policies and programs; 2.Promote the safety, efficacy and quality of TM/CAM by expanding the knowledge base on TM/CAM, and by providing guidance on regulatory and quality assurance standards; 3.Increase the availability and affordability of TM/CAM, as appropriate, with an emphasis on access for poor populations; 4.Promote therapeutically sound use of appropriate TM/CAM by providers and consumers. The strategy is a working document and is meant for adoption and implementation at regional and country level. Therefore, member states are urged to adopt and implement, where appropriate, the strategy as a basis for national traditional medicine program or work plans.

Introduction
Health is a fundamental human right. Access to health care, which includes access to essential drugs, is a prerequisite for realizing that right. Essential drugs play a crucial role in many aspects of health care. However, many people throughout the world cannot obtain the drugs they need, either because they are not available or too expensive, or because there are no adequate facilities or trained professionals to prescribe them. WHO has estimated that at least one-third of the world’s population lack access to essential drugs; in poorer areas of Asia and Africa, this figure may be as high as one-half. Traditional Medicine has been used to fill this gap, particularly in developing countries.
What is traditional medicine?

WHO has defined TM as a discipline which includes diverse health practices, approaches, knowledge and beliefs incorporating plant, animal and/or mineral based Medicines, spiritual therapies, manual techniques and exercises applied singularly or in combination to maintain well being, as well as treat, diagnose or prevent illness (1).

The use of Traditional Medicine in developed countries is termed as complementary/Alternative Medicine (CAM). The term CAM (sometime referred to as “Non-conventional” or “parallel” medicine) refers to a broad set of health care practices that are not part of a country’s own tradition or not integrated into its dominant health care system (2) On the other hand, African Traditional Medicine is defined as the total combination of knowledge and practices, whether explicable or not, used in the diagnosis, prevention or treatment of physical, mental or social diseases and which may rely exclusively on past experience and observation handed down from generation to generation, verbally or in writing (3).

Systems of Traditional Medicine

There are many systems of TM in the world and they include:
1. Traditional Chinese Medicine
2. Indian ayurveda
3. Arabic Unani Medicine; and a variety of other indigenous TM system developed throughout history by Asian, African, Arabic, Native Americans, Oceanic, Central and South American and other cultures.

Global situation

Widespread and growing use

The majority of the populations in developing countries (80% in Africa) use TM to meet their primary health care needs as shown in Figure 1(4).

Figure 1. Population in developing countries using traditional medicine for primary health care

![Pie chart showing percentage of populations in various countries using traditional medicine for primary health care.]

1. Ethiopia, 90%
2. Uganda, 60%
3. Tanzania, 60%
4. India, 70%
5. Rwanda, 70%
6. Benin, 70%
In many developed countries, certain CAM therapies are also becoming popular as shown in Figure 2 below (5,6,7).

**Figure 2 Populations in developed countries who have used CAM at least once**

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Canada</td>
<td>70%</td>
</tr>
<tr>
<td>France</td>
<td>49%</td>
</tr>
<tr>
<td>Belgium</td>
<td>31%</td>
</tr>
<tr>
<td>USA</td>
<td>42%</td>
</tr>
<tr>
<td>Australia</td>
<td>48%</td>
</tr>
</tbody>
</table>

**Why widespread use?**
Many factors contribute to the widespread use of TM/CAM, some of which are discussed below (8,9).

**Accessibility**
In some developing countries, TM is much more widely available than allopathic medicine. For example, in Tanzania, Uganda and Zambia, researchers have found that the ratio of TM practitioners to population was 1:200-1:400 while that of allopathic practitioners to population ratio was 1: 20,000 or less. Moreover, the distribution of Allopathic practitioners is uneven and they are located primarily in cities, or other urban areas. Hence, for much of the rural population TM is the only available service of Health Care. For example, a survey conducted by the WHO’s Role Back Malaria program reported in 1998 that 60% of children with high fever due to malaria were treated by herbal medicine in Ghana, Mali, Nigeria and Zambia (10).

**Affordability**
TM is sometimes the only affordable service of health care especially for the poorest patients. Herbal medicines may be not only relatively cheaper than modern medicines, but are payable in kind and/or according to the “wealth” of the client (11).

**Faith in the system**
TM is often embedded in the wider belief system and continues to be an integral and important part of many peoples lives.

**A need for alternative or complementary approach to health care**
In many developed countries, increased use of CAM indicates that factors other than tradition and cost are at work. Some of these factors are concern about the adverse effects of chemical drugs, questions on the approach and assumptions of allopathic medicine, changing values and reduced tolerance to paternalism, development of chronic diseases along with longer

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life expectancy for which allopathic treatments could not provide satisfactory solutions. These factors have created a desire for having alternative system of medicine with a safer natural base (12).

Growing economic importance
In many parts of the world expenditure on TM/CAM is not only significant, but growing rapidly. The annual world market for herbal medicines based on traditional knowledge is now estimated at US$ 60 billion (13).

Challenges to the expectation of the potential of TM/CAM
TM/CAM has many positive features, and that traditional medicine and its practitioners play an important role in treating chronic illness, and improving the quality of life of those suffering from minor illnesses or from certain incurable diseases. Moreover, traditional medicine is the property of communities and nations where that knowledge originated and should be fully respected. However, there are a number of major challenges to the use of traditional medicine (14). These challenges fall into four categories and are summarized below.

National policy and regulatory frameworks
1. Lack of official recognition of TM/CAM and TM/CAM providers
2. TM/CAM not integrated into national health care systems
3. Lack of regulatory and legal mechanisms
4. Equitable distribution of benefits of indigenous TM knowledge and products
5. Inadequate allocation of resources for TM/CAM development and capacity building

Safety, efficacy and quality
1. Lack of research methodology
2. Inadequate evidence-base for TM/CAM therapies and products
3. Lack of international and national standards for ensuring safety, efficacy and quality control of TM/CAM therapies and products
4. Lack of adequate regulation and registration of herbal medicines
5. Lack of registration of TM/CAM providers
6. Inadequate support for research

Access
1. Lack of data measuring access levels and affordability
2. Need to identify safe and effective therapies and products
3. Lack of official recognition of role of TM/CAM providers
4. Lack of cooperation between TM/CAM providers and allopathic practitioners
5. Unsustainable use of medicinal plant resources

Rational use
1. Lack of training for TM/CAM providers and on TM/CAM for allopathic practitioners
2. Lack of communication between TM/CAM and allopathic practitioners, and between allopathic practitioners and consumers
3. Lack of information for public on rational use of TM/CAM
Responses to challenges: WHO's Traditional Medicine Strategy

Governments have responded to the popularity of TM/CAM and the challenges faced in different ways. In order to maximize the potential of TM/CAM as a source of health care by tackling the above challenges, WHO has formulated a comprehensive working TM strategy for 2002-2005 (15). The strategy was released during the Fifty-fifth World Health Assembly (May 2002) and it incorporates four objectives relating to: policy, safety, efficacy and quality; access and rational use. Each of these objectives incorporates two or three components, with expected outcomes. A critical indicator has also been included for each objective and will be used to help evaluate WHO's work in the area (Table 1).

In conclusion, it is believed that this strategy provides a framework for action. It is also a working document which is meant for adoption and implementation at regional and country level. Member states are, therefore, urged to adopt and implement, where appropriate, the strategy as a basis for national traditional medicine program or work plans.

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Table 1.1  WHO traditional medicine strategy 2002-2005: Objectives, Components, and expected outcome

<table>
<thead>
<tr>
<th>Objective</th>
<th>Components</th>
<th>Expected outcomes</th>
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| **Policy:** Integrate TM, CAM, with national health care systems as appropriate, by developing and implementing national TM/CAM policies and programs. | **1. Recognition of TM, CAM:** Help countries national polices and programs on TM/CAM | **1.1.** Increased government support and recognition of TM/CAM  
**1.2.** Relevant TM/CAM integrated into national health care system service |
| **Safety, efficacy and quality:** Promote the safety, efficacy and quality of TM/CAM by expanding the knowledge base on TM/CAM, and by providing guidance on regulatory and quality assurance standards | **2. Protection and preservation of indigenous TM knowledge relating to health:** Help countries to develop strategies to protect their indigenous TM knowledge | **2.1** Increased recording and prevention of indigenous knowledge of TM, including development of digital TM libraries  
**3. Evidence base for TM/CAM:** Increase access to and extent of knowledge of the safety, efficacy and quality of TM/CAM, with an emphasis on priority health problems such as malaria and HIV/AIDS | **3.1** Increased access to and extent of knowledge of TM/CAM through networking and exchange of information  
**3.2** Technical reviews of research on use of TM/CAM for prevention, treatment and management of common diseases and conditions,  
**3.3** Selective support for clinical research into use of TM/CAM for priority health problems such as malarial and HIV/AIDS, and common diseases  
**4. Regulation of herbal medicines:** Support countries to establish effective regulatory system for registration and quality assurance of herbal medicines | **4.1** National regulation of herbal medicines, including registration, established and implemented  
**4.2** Safety monitoring of herbal medicines and other TM/CAM therapies  
**5. Guidelines on safety, efficacy and quality:** Develop and support implementation of technical guideline for ensuring the safety, efficacy and quality control of herbal medicines and other TM/CAM products and therapies | **5.1** Technical guidelines and methodology for evaluating safety, efficacy and quality of TM/CAM therapies  
**5.2** Criteria for evidence-based on safety, efficacy and quality of TM/CAM therapies  
**6. Recognition of role of TM/CAM provider in health care:** Advocate recognition of TM/CAM providers in health care by encouraging interaction and dialogue between TM/CAM providers and allopathic practitioners | **6.1** Criteria and indicators, where possible to measure cost-effectiveness and equitable access to TM/CAM  
**6.2** Increased provision of TM/CAM through national health service  
**6.3** Increased number of national organizations of TM/CAM providers  
**7. Protection of medicinal plants:** Promote sustainable use and cultivation of medicinal plants | **7.1** Guideline for good agriculture practice in relation to medicinal plants  
**7.2** Sustainable use of medicinal plants resource |

Proceeding of the First National workshop on traditional medicine June 30 – July 2, 2003
Traditional Knowledge and Intellectual Property Rights

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Abstract

The importance of traditional medicine in health care is becoming increasingly evident. However, as a subset of traditional knowledge its protection and the sharing of benefits have been under debate at both the international and domestic level for a long time. Failure of existing IPR system to accommodate traditional knowledge has led to a search for alternative protection mechanisms. It is suggested that a *suigeneris* system separate from the existing IPR system should be designed to protect traditional knowledge, innovations, and practices. Existing IPR system cannot accommodate all TK system. There is an urgent need to design IP protection for TK both nationally and internationally. Careful choice of framework (rights based or remunerative) are required collectively held TK. Against this background this paper discusses the various instruments of intellectual property protection and identifies the different models, which are proposed for the protection of traditional knowledge.

Introduction

Intellectual property rights (IPRs)

Intellectual property rights are rights awarded by society to individuals or organizations principally over creative works such as inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. They give the creator the right to prevent others from making unauthorized use of property for a limited period. Intellectual property is categorized as industrial property (functional commercial innovations) and artistic and literary property (cultural creations). Current technological developments are blurring, to some extent, this distinction, and some hybrid *suigeneris* systems are emerging (1).

Rationale for IP protection

The four best-known position on which advocates of patent protection for inventors have rested their case may be characterized as the “natural-law” thesis, the reward-by-monopoly” thesis, the “monopoly-profit-incentive” thesis, and the “exchange-for secrets” thesis. The “natural law” thesis assumes that man has a natural property right in his own ideas. Appropriation of his ideas by others, that is, their unauthorized use, must be condemned as stealing. Society is morally obligated to recognize property right. Property is in essence, exclusive. Hence, enforcement of exclusivity in the use of a patented invention is the only appropriate way for society to recognize this property right. The “reward-by-monopoly” thesis assumes that justice requires that a man receive reward for his service in proportion to their usefulness to society, and that, where needed, society must intervene to secure him such reward. Inventors render useful services, and the most appropriate way to secure them commensurate rewards is by means of temporary monopolies in the form of exclusive patent right in their environments.

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The “monopoly-profit-incentive” thesis assumes that industrial progress is desirable, that inventions and their industrial exploitation are necessary for such progress, but that inventions and/or their exploitation will not be obtained is sufficient measure if inventors and capitalists can hope only for such profits as the competitive exploitation of all technical knowledge will permit. To make it worthwhile for inventors and their capitalist backers to make their efforts and risk their money, society must intervene to increase their profit expectations. The simplest, cheapest, and most effective way for society to hold out these incentives is to grant temporary monopolies in the form of exclusive patent rights in inventions (2).

The “exchange-for secrets” thesis presumes a bargain between inventor and society, the former surrendering the possession of secret knowledge in exchange for the protection of a temporary exclusivity in its industrial use. The presupposition again is that industrial progress at a sustained rate is desirable but can not be obtained if inventors and innovating entrepreneurs keep inventions secret, in this case, the new technology may only much later become available for general use.

Technological secrets may die with their inventors and forever be lost to society. Hence, it is in the interest of society to bargain with the inventor and make him disclose his secret for the use of future generations. This can best be done by offering him exclusive patent rights in return for public disclosure of the invention.

Instruments of IP Protection

Patents

Patents are legal titles granting the owner the exclusive right to make commercial use of inventions. In return society requires that the applicant disclose the invention in a manner that enables others to put in to practice. This increases the body of knowledge available for further research. An invention must meet several criteria if it is to be eligible for patent protection (3). The criteria discussed include, most significantly, that the invention must consist of patentable subject matter, the invention must be industrially applicable (useful), it must exhibit sufficient “inventive step” (be non-obvious), and the disclosure of the invention in the patent application must meet certain standards.

Patentable subject matter

In order to qualify for patent protection, an invention must be one, which falls within the scope of patentable subject matter. The inventions which are excluded from patent protection are defined in patent laws, the general rule being that patent protection shall be available for inventions in all fields of technology.

The following are examples of field of technology which may be excluded from patentability:
1. Discoveries of materials or substance already existing in nature;
2. Scientific theories of mathematical methods;
3. Plant or animal varieties, or essentially biological processes for the production of such plant or animal varieties, other than microbiological process;
4. Schemes, rules or methods, such as those for doing business, performing purely mental acts or playing games;
5. Methods of treatment of humans or animals, or diagnostic methods practiced on humans or animals (but not products for use in such methods).

**Industrial Application (Utility)**

An invention, in order to be patentable, must be of a kind which can be applied in manufacturing, commerce, agriculture, handicraft, fishery, services, etc. If the invention is intended to be a product or part of product, it should be possible to make that product. And if the invention is intended to be a process or part of a process, it should be possible to carry that process out or “use” it (the general term) in practice.

**Novelty**

An invention is new if it is not anticipated by the prior art. Prior art is in general all the knowledge that existed prior to the relevant filing or priority date of a patent application, whether it existed by way of written or oral disclosure.

**Inventive step (Non-obviousness)**

Inventive step means that having regard to the prior art the invention must not be obvious to a person having ordinary skill in the art. In other words it must not be possible for an average expert in the field to make the evaluation by mere routine.

**Industrial designs**

An industrial design is the ornamental or aesthetic aspects of a useful article. This ornamental aspect may be constituted by elements which, are three dimensional (the shape of the article) or two dimensional (lines, colors) but must be dictated solely or essentially by technical or functional considerations. Industrial designs are applied to a wide variety of products of industry and handicrafts from technical and medical instruments to watches, jewelry and other luxury items.

**Geographical indications**

A geographical indication is a sign used on goods that have a specific geographical origin and possess qualities or reputation that are due to that place of origins. Most commonly, a geographic indication consists of the name of the place of origin of the goods. Agricultural products typically have qualities that derive from their place of production and are influenced by specific local factors, such as climate and soil.

**Plant variety protection**

A plant variety protection (PVP) system is an administrative procedure which, an applicant complies with to secure a form of intellectual property right called plant breeders’ right. This right is awarded in recognition of the intellectual creation of the innovative citizens, as applied on plant varieties, particularly the transformation of plants, through breeding, whether done the classical way or through modern technologies such as genetic engineering (4).

A plant breeder’s right is an exclusive right that enables the holder of the right to prohibit others from exploiting or using the protected plant variety without any permission or license from the right holder. This right, however, is limited to a particular time period, usually 25
years for tree and vines, and 20 years for other plant types (5). The certificate of plant variety protection shall be granted for varieties that are:

1. New
2. Distinct
3. Uniform and
4. Stable

Trade Marks
A trade mark or mark is any word, phrase, symbol, design, sound, smell, color, product configuration, group of letters or numbers, or combination of these, adopted and used by a company to identify its products or services and distinguish them from products or services made, sold or provided by others. The primary purpose of marks is to prevent consumers from becoming confused about the source or origin of a product or service.

Copyright
Copyright gives the creators of a wide range of material, such as literature, art, music sound recordings, films and broadcasts, economic right enabling them to control use of their material in a number of ways, such as by making copies, issuing copies to the public, performing in public, broadcasting and use online. It also gives moral rights to be identified as the creator of certain kinds of material, and to object to distortion or mutilation of it. Material protected by copyright is termed a “work”. However, copyright does not protect ideas, or such things as names or titles.

The purpose of copyright is to allow creators to gain economic reward for their efforts and so encourage future creativity and the development of new material which, benefits us all. Copyright material is usually the result of creative skill and/or significant labor and/or investment, and without protection, it would often be very easy for others to exploit materials without paying the creator. Most users of copyright material, therefore, require permission from the copyright owner. However, there are exceptions to copyright so that some minor uses may not infringe copyright.

Copyright protection is automatic as soon as there is a record in any form of the material that has been created, and there is no official registration on form of fee. But creators can take certain steps to help prove that material is theirs.

IP protection in health sector
Traditional pharmaceuticals most of which synthetic chemicals were easy to define for patent purposes in terms of structure and function. Theses drugs were discrete chemical entities, easily distinguished by their atomic structures. Patents were awarded to companies that discovered unique chemical structures. This has not proved to be the case with drugs produced by means of biotechnology. Patent litigation has been extensive, leading to uncertainty as to who has the rights to sell the products. Unlike traditional pharmaceuticals, products of biotechnology are complex proteins that must maintain a three-dimensional structure, and in many cases acquire certain chemical modifications in order to function to their full potential (6).
According to the laws applied in most countries, the four principal requirements for patentability are novelty, non-obviousness or inventive steps, practical utility or industrial applicability, and requirements concerning the specification of the patent. It must be disclosed to the public in sufficient detail to enable those of ordinary skill in the field to follow the directions and obtained the promised result. The invention is defined in the claims which form part of the specification.

The non-obviousness requirement that inventions must meet to qualify for patent pertains to the degree of difference between the invention and the prior art. An invention that would have been obvious at the time it was made to a person with ordinary skill in the relevant field of technology is not patentable.

The rapid development and the complexity of the field of biotechnology makes it difficult to determine, at a given point in time, what is ordinary skill of what is obvious (6). One of the fundamental questions the non-obviousness criterion raises is the following: once a protein is discovered is it obvious to produce it subsequently using recombinant DNA (r-DNA) technology? (7).

Traditional knowledge: Definition and characteristics

Despite various efforts to define the concepts of traditional knowledge and indigenous knowledge, still now there are no universally adopted definitions. In the literature, mostly the two concepts are used interchangeably. According to the International Labor Organization (ILO) Convention, indigenous peoples are defined as peoples in independent countries who are regarded as indigenous on account of their decent from population which is habited in the country or geographical region to which the country belongs at the time of conquest or colonization of the establishment of present state boundaries and who irrespective of their legal status, retain some or all of their own social, economic, cultural and political institutions. In the above definition factors like time, geographical space, resilience and territorial occupation by outside population is to be considered in any discussion of indigenous knowledge.

Traditional people's knowledge may also be defined "as those who hold an unwritten corpus of long standing customs, beliefs, rituals and practices that have been handed down from previous generation". In the Ethiopian case, we may use the two definitions such that traditional peoples are not necessarily indigenous but indigenous peoples are traditional.

Characteristics of traditional knowledge

It can be said that traditional knowledge is the totality of all knowledge and practice, whether explicit or implicit, used in the management of socio-economic and ecology facets of life. It is established on past experience and observation and usually a collective property of a society. Many members of the particular society contribute to it over time, and it is modified and enlarged as it is used over time. It is transmitted from generation to generation. According to the United Nations Environment Program (UNEP) this knowledge “can be contrasted with cosmopolitan knowledge”, which is drawn from global experience and combines: Western scientific discoveries, economic preferences and philosophies with those of other widespread cultures. It is generally an attribute of a particular people, who are intimately linked to a particular socio-ecological context through various economic, cultural and religious activities.
Traditional knowledge is dynamic in nature and changes its character as the needs of the peoples' changes. It also gains vitality from being deeply entrenched in people's lives. Traditional knowledge is not limited to any specific field of technology or arts. Traditional knowledge systems in the fields of medicine and healing, biodiversity conservation, the environmental and food and agriculture are well known. Other key compounds of traditional knowledge are the music dance and art sonant (i.e. design, textile, crafts. etc) (8).

While modern arts and sciences often place individual accomplishment over community development, the traditional knowledge system, celebrate the community cooperative effort. Most traditional knowledge remain largely undocumented, intertwined within practical solutions, traditional knowledge often transmit the history, beliefs, aesthetics, ethics and traditions of a particular people. For example, many sculptures, paintings and crafts are created according to strict rituals and traditions because of their profound symbolic and /or religious meaning.

A fundamentally important aspect of traditional knowledge is that it is traditional only to the extent that its creation and use are part of cultural traditions of communities. Traditional therefore does not necessarily mean that the knowledge is ancient and static. Traditional knowledge is being created every day. It is evolving as a response of individuals and communities to the challenge posed by their social environment (9).

**Traditional knowledge and IP protection**

Some oppose the protection of traditional knowledge in any type of IPR protection system (Conventional IP or *suigeneris*). They argue that traditional knowledge (TK) is by all natural in the public domain. So it should be the subject of exclusive rights or commodified because such attempt to regulate its use and transmission would have far reaching philosophical and practical implication for the public domain, e.g. creates problem of free flow of information. Those in favor of TK protection argue that TK systems are increasingly accepted as an important source of useful information in the achievement of sustainable development. They say studies of local communities provide evidence that the protection of TK provide significant environmental benefits as well as possible commercial applications. They also point out that in developing and least developed countries protections of TK is important for social and cultural reasons. TK can play a role in the economic and social organizations of countries and recognizing the value of such knowledge may be viable means of promoting a sense of national cohesion and identity. TK holders stress the importance of TK protection of individual and community respected and dignified.

While accepting the need for TK protection some oppose the protection of TK in the conventional IP system arguing that in TK, knowledge is generally communally held and although some specialized knowledge may be held by certain individuals (Shamans). This does not give that specialist the right to privatize common heritage. Secondly, even if legal IPR regimes were to be implemented, TK holders would not have the finance means to implement, enforce or litigate. Thirdly it is difficult to apply IPR law criteria for granting patent novelty, inventive step, and industrial applicants to TK which continue to pass from generation to generation. Fourthly, notion of property rights and ownership are foreign for many indigenous people and local communities. Generally, the IPR system is essentially established to protect...
individual, technology and industrial inventions. It seems that it is very unlikely tool to protect the collective trans historical and intangible qualities of indigenous people and local communities' knowledge. They conclude that existing IP system is inherently inappropriate and dysfunctional in relation to TK. They propose a non-IP “suigeneris” system or systems of “community” collective “or “indigenous” rights. Some argue that there are ways in the conventional IPR that could accommodate TK. These include using geographical indications, trade secrets and modifying the patent law, e.g. patent applications which claim TK and biological resource utilization should include evidence that TK and/or biological material has been obtained with the prior informed consent (pic) of the country of origin. It should include benefits sharing provisions (10,11).

Review of models for protecting indigenous and traditional knowledge

The difficulty to cover traditional knowledge by the conventional intellectual property protection system together with the increasing recognition of the importance of traditional knowledge has led to the search for a better compatible system of protection. Review of the literature shows that there are a number of proposed models to address the problem. Although each proposed model has its own unique character, almost all can be put in to two broad categories. The rights based approach and remunerative approach. The rights based approach challenges the current legal framework and demands inherent rights approach to indigenous peoples and their knowledge. On other hand the remunerative approach seeks to achieve rewards based incentives mostly for conservation of biodiversity.

The basic difference between the two approaches lies on the control of resources. In rights based approach models propose intellectual property right, which provides exclusivity of control and use. While in the remunerative approach the models propose a right to remuneration every time a resource is used, but no control over the use or user of the resource. In the following a brief description of a few of the proposed models in each category is made.

1. Remunerative approach

Various types of remunerative approaches are suggested, from pay per use to broader profit sharing. In some cases, the system is tied to controlling access to the resource and/or traditional knowledge. Cooperation between the holders of these two different elements is required when they differ. The linking of the remuneration right to the conservation goal creates a new conception of the purpose of IP system. Suigeneris is a term that often used to describe the resulting suggestion. A remuneration right system based loosely on the compensation for farmers' rights is envisaged by the International Undertaking in Plant Genetic Resources (12). It is a remuneration right which provides only rewards for other decision on use. Categories of knowledge or materials that may constitute the subject matter of some form of rights can be identified as follows:

1. The use of plants
2. The preparation, processing and storage of useful species
3. Formulations involving plants
4. Individual species planting method, caring for, selection criteria etc.
5. Ecosystem conservation

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Correa (1994) however, rejects outright the extension of patent rights to knowledge that does not meet the novelty criteria arguing a weakening of these requirements would be to the benefit of those who have the greatest capacity to undertake innovatory activities as well as the legal means to pursue new protections. He also argues against the monopolization of further types of knowledge, suggesting the advantages of this are less than evident and certainly less evident than a system that promotes the diffusion of indigenous knowledge. Starting from what he calls a pragmatic perspective treated on a regional basis to prevent a shopper from accessing to the least expensive entry points (13).

Lessen (1994) argues however, that in some cases where a resource is available worldwide, as the rosy periwinkle was when its leukemia fighting properties were commercialized, then there is no real possibility of payment. In brief, lessen adapts the remunerative approach based on conservation rather than rights as its underlying philosophy (14).

Rights based approach
Rights based approaches focus on the moral and ethical reasons for ensuring that indigenous knowledge is controlled by the holders of the knowledge and used as they determine. Western conceptions define knowledge or innovation so as to exclude indigenous knowledge are seen as depriving indigenous people of this right. It is the ensuring of control, and the benefits it should bring that motivates this approach. Rights based approaches, lead inevitably to the notion of international agreement to ensure their universal acceptance and enforceability. Compensation may also be done through bilateral agreements and natural laws.

Aekerman et al, (1993) identify two arguments for recognizing the intellectual property of indigenous peoples. First is the assertion that the developed world has a moral obligation to ensure that indigenous peoples receive a fair share of the profits and benefits derived from the use of their traditional knowledge about plants. Both the economic and social validation of their contributions is included here. The second reason is the interest in the use of intellectual property laws in promoting the development and dissemination of scientific knowledge. Both these reasons, they suggest, lead to the ability of intellectual property rights in traditional knowledge to serve the goal of conserving biodiversity and useful medicinal and agricultural knowledge by giving indigenous people an incentive to maintain and disseminate traditional knowledge and practice in the face of attractive modern alternative (15).

Conclusion
As outlined in the discussion taking into account the importance of traditional knowledge and the role of intellectual property in the world trade, we strongly believe that there is an urgent need to design IP protection for traditional knowledge both at national and international level. It is clear that the existing IPR system cannot accommodate all traditional knowledge system. Designing an alternative protection system is a complex task. Besides choosing either the rights based or remunerative approach to serve as framework that fits the country, it should involve a careful selection of elements like collectively held TK rights, clear system of access to such right and benefit sharing, wide participation and consultation, etc. that must be included.
References


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The Characteristics of Traditional Ethiopian Medicine
And Its Traditional Pharmacopoeia

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Our knowledge of traditional Ethiopian medicine owes much to the existence of a local medico-religious or medico-magical literature which was brought to the notice of scholarship prior to World II by the Ethiopicists Marcel Graule, Sylvian Grebaut and Deborah Lifchitz (1-3). To obtain even a rough picture of traditional Ethiopian treatments as it existed in practice it is therefore necessary to examine the evidence afforded by the relatively large travel literature. The information obtained from this material though in a way less authentic than that contained in the native texts, has the advantage that it affords us an impression of the cures actually employed rather than those recommended. The object of this presentation is to preliminarily shade light on the traditional practices of Ethiopia.

In the first place it should be clearly stated that traditional medicine lacked the scientific character of modern medicine. It was not clearly differentiated from either religion or magic and even when devoid of superstition was not based on any scientific or theoretical knowledge of disease.

Considerable emphasis was placed on the utilization of supernatural forces. The chronicle of Zara Yaqob (1434-1468) tells for example, of the outbreak of an unidentified epidemic which was so serious at the capital Debra Berhan, that "no one was left to bury the dead". The king who was a resolute protagonist of the Orthodox faith, seems to have trusted to the Bible, where, it will be recalled David once declared that a plague would be kept away if an altar were erected. the Ethiopian Chronicler states that his master built a church, as it was said that "there would be no plague, drought or death near a shrine" (4).

Great reliance was traditionally placed on the value of application to God, prayers being composed against either illness in general or specified complaints, among them small box, epilepsy, dysentery, jaundice, rheumatism, malaria, colic, ulcer, pimples and the infection of wounds (2). Often, however, the various diseases were not considered as entities in themselves, focus being placed instead on the parts of the body affected; one prayer edited by Deborah Lifchitz for example implores Christ in blanket terms to save the person who uttered it from "the illness of man and woman, the illness the liver and the loins, the illness of the hand and the foot, of the kidney, the bones and the fingers, the illness of the head, teeth and ears the illness of the mouth, the nose the throat the teeth and the tongue, the illness of the body and the bones and intestines", etc(3).

Ethiopian medico-magical or medico-religious literature often made no distinction between its medical and non-medicinal aspects. Disease would not indeed be treated as something essentially different from any of the other difficulties with which a man or a women was confronted. Thus, the early twentieth century text published by Griaule under the title Le livre

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de recettes d'un dabtara abyssin contains not only prescriptions for the treatment of epilepsy, fever, syphilis, rabies, skin diseases, kidney trouble, hemorrhoids, constipation, diarrhea, dysuria, itching, coughing, snoring and sterility, but also magic formula to assist in dealing with such varied questions as averting the evil eye, overcoming demons and other evil spirits, defeating the machinations of human enemies, escaping arrest or prison, preventing the escape of slaves, acquiring money or royal honors, learning to play the harp, obtaining a long life, clear sight, good memory, large family or a faithful wife.

The travelers of former time confirm that great reliance was placed on supernatural action in dealing with disease. Thus Dr. Blanc, an observer of the 1860's, says that cholera victims would be exposed to eat seven grapes blessed by a priest who would also pray very earnestly for the patient. Other writers confirm the picture. Thus in the 1840's Kirk, himself a medical man, stated that in the province of Shoa "more reliance is placed on the efficacy of charms, spells and amulets than on medical treatment". Such amulets, he says, were carried by persons of all classes and were sometimes sold by debteras, or lay priests. Charles Johnston a contemporary of Kirk's took a similar view declaring that the Ethiopians had great faith in "mysterious ceremonies" and "absurd formulae" inscribed on little bits of parchment enclosed in red leather amulets worn round the left arm of the men or the neck of the women. Leiris, observed that the common people attribute the majority of illnesses to supernatural causes (evil eyes, spells, action of this or that spirit, etc) and magical remedies are the most frequently used of all cures. Religious cures were also believed to be effected by visits to or immersion in holy water.

Magic also played a considerable role in traditional thinking on disease. Some treatments seem to have been based very largely on magic. For example, that a person suffering from venereal disease might be expected to eat the twelve parts of a black he goat, i.e. the head, stomach, intestines, liver, kidney, spleen, lungs, heart etc, the object being it was supposed that the diseases should depart from him completely and not remain in any of the above organs.

Prescription of a more or less medical character were moreover often compounded with a greater or lesser amount of superstition. Thus the debtara's book edited by Griaule, for example, contains a medicinal prescription for syphilis, smallpox and certain other disease in which the reader after being told which roots and plants to mix together is exhorted to declare: Glory to the heavens.

Traditional medicine in Ethiopia, as in other countries, was in many cases concerned both with the prevention and cure or disease. Well aware of the infectious character of many diseases the Ethiopians took steps to control the spread of epidemic, above all smallpox, cholera and rinderpest. At such times people were prevented from traveling from areas of infection to other parts of the country.

The Ethiopian Traditional Pharmacopoeia

Ethiopia has a rich traditional pharmacopoeia, for several reasons:

1. The varied geographical terrain led to the growth, at different altitudes, of an extensive variety of vegetation, and hence of a wide variety of medicinal plants.
Health policy of the county has been issued by the Government in September of 1993 almost a decade ago. Following this the health sector strategy has come out. The Health Policy of the Government is the result of a critical examination of the nature, magnitude and root causes of the health problems of the country and awareness of newly emerging health problems. It is founded on commitment to democracy and the rights and powers of the people that derive from it and to decentralization as the most appropriate system of Government for the full exercise of these rights and powers in our pluralistic society. It accords appropriate emphasis to the needs of the less privileged rural population which, constitute the overwhelming majority of the population and the major productive force of the nation.

Some of the general healthy policy issues include:
1. Democratization and decentralization of the health services system.
2. Development of the preventive and promotive components of health care.
3. Development of standards and
4. Promoting and strengthening of intersectoral activities

Priorities of the health policy can be summarized as follows:
1. Information Education and Communication (IEC)
2. Give emphasis to control of communicable diseases and nutrition
3. Occupational health and safety
4. Development of environmental health
5. Rehabilitation of the health infrastructure
6. Development of an appropriate health service management system
7. Mental health
8. Give due emphasis to the development of the beneficial aspects of traditional medicine including related research and its gradual integration into modern medicine
9. Give special attention to mothers and children, pastoralist population, the poor, people in the forefront of productivity and victims of disaster.

General health strategies
There are about seventeen general strategies in the health policy document. The most prominent ones are:-
1. Democratization
2. Decentralization
3. Intersectoral collaboration
4. Human resource development
5. Family resource development
6. Family health services

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7. Availing drugs and medical equipment
8. Referral system and
9. Health systems research
The health system research will be implemented through identification of priority areas and strengthening national research institutions.

Traditional medicine

Development of traditional medicine in the country will be realized through identification and encouraging utilization of its beneficial aspects. In health and national drug policies, it is stated that research activities have to be initiated and it has to be linked with modern medicine. It is also stated that appropriate regulation and registration for its practice have to be developed.

Has the health sector done as what has been stipulated in the policy document? The answer is no! The health sector has been preoccupied with other most pressing issues and has been challenged as to how to approach traditional medicine in Ethiopia because of its complexity. But the Ministry of Health thinks from now on that it is going to fully duel on it. Some lessons have been learned from countries like China, Hong Kong, Korea, Vietnam, India and Sri Lanka on the role traditional medicine plays in the health care delivery system of these countries.

Traditional medicine will be fully supported and its promotion encouraged by the Ministry of Health, Drug Administration and Control Authority and the Ethiopian Health and Nutrition Research Institute jointly and other concerned bodies and stakeholders. To follow day-to-day activities on traditional medicine, a joint steering committee comprising of the Ministry of Health, Drug Administration and Control Authority and the Ethiopian Health and Nutrition Research Institute has been established recently. A technical committee drawn from the same institutions has also been established and commenced its activities as per the given terms of reference. A larger committee comprising of relevant stakeholders will be formed at a latter date. We know that there are lots of activities that have been carried out by the Ethiopian Health and Nutrition Research Institute so far and the Ministry of Health is confident that these will be streamlined to this technical committee first and get clear policy direction. Beyond that, activities relevant to each body will be followed by the respective institutions. In the end, the Ministry of Health like to admit that much has not been done to develop and promote traditional medicine but now we have to double and triple our concerted efforts and reach what should have been reached.

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Integration of Traditional Medicine with Modern medicine

Kanno B

Abstract

Traditional and modern systems of medicine were developed by different philosophies in different cultural backgrounds. They look at health, disease and causes of disease in different ways. These differences bring, different approaches to health and diseases. However, both systems deal with the same subject-human being. The old and modern arts of healing should therefore, exist together. Although integration of traditional medicine may mean incorporation of traditional medicine into the general health service system, it has not been an integral part of the formal health service system in Ethiopia. Both systems of medicine in Ethiopia in most cases conflict openly or covertly. Biomedical professionals are prejudiced against traditional healers and their medicine. On the other hand, there is unwillingness on the part of the traditional healers to part with their knowledge. Lack of recognition of traditional healers by modern health care system has also created resentment and insecurity of the healers leading to alienation and isolation. The major problem is therefore, how to reconcile the different values of medicine. In this paper, strategies have been indicated for the respectful coexistence of traditional and modern medicines.

Introduction

Humans and animals have tested and used botanicals to relieve their suffering since ancient times. The appropriate use of herbs requires proper diagnosis of the patient, correct selection of the corresponding therapeutic strategies and principles that guide the choice of herbal formulas. When appropriately prepared and used, herbs can be safe and effective. However, when used without proper guidance, a wide array of complications may result.

Traditional medicine is the ancient and culture-bound medical practice which existed in human societies before the application of modern science to health. The practice of traditional medicine is mainly based on conventional use and personal experience and is developed and handed down from generation to generation. Traditional medicine is recognized and accepted by the community for its role in the maintenance of health and the treatment of disease.

A traditional medicine practitioner is a person who is recognized by the community were he or she lives as someone competent to provide health care by using plant, animal and mineral substance and other methods based on social, cultural and religious practices.

More than 80% of the world’s population use traditional medicine. In Africa, up to 80% of the people use traditional medicine to meet their primary health care needs. Considerable amounts of money are spent on herbal products far exceeding that for modern drugs. The extent of use of traditional medicine in Ethiopia is estimated at 90%. With the introduction of modern medicine in to the country, traditional medicine was usually overlooked by the formal medical health service system. However, the majority of the Ethiopian population relies basically on traditional medicine for its primary healthcare needs. In Ethiopia like other parts of the world broad use of traditional medicine is attributed to its accessibility and affordability.

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Traditional and modern system of medicine were developed by different philosophies in different cultural backgrounds. They look at health, diseases, and causes of diseases in different ways. These differences bring different approaches to health and diseases. These in turn have resulted in attitudes ranging from complete rejection of traditional medicine by modern medical practitioners and of modern medicine by traditional medicine practitioners to a parallel existence with little communication over patient care.

In Ethiopia, knowledge on traditional medicine is rejected by some medical doctors trained in Western medicine as it not considered to have a scientific basis. However, both systems of medicine deal with the same subject human being. The old and modern arts of healing should exist together and may be integrated.

Integration of traditional medicine with modern medicine may mean incorporation of traditional medicine into the general health service system. Integration is defined as an increase of health coverage through collaboration, communication, harmonization and partnership building between modern and traditional systems of medicine, while ensuring intellectual property right (IPRs) and protection of traditional medicine knowledge (TMK). The availability of evidence on safety, efficacy and quality will promote the integration into health systems of traditional medicine practices and products. Indeed, partnership building between traditional health practitioners and modern health practitioners will increase health care coverage. Bringing together the two systems of medicine will enable traditional health practitioners and modern health practitioners to complement each other, and thereby promote and enhance management of diseases and disorders. Moreover, traditional health practitioners will be more knowledgeable about modern medicine while modern health practitioners will be more knowledgeable about traditional medicine. This acquired knowledge by the two systems of medicine will enhance mutual respect, mutual understanding and productive collaboration.

Harmonization of traditional and modern medicine emphasizes the importance of respectful co-existence. Within the model of harmonization, there is the requirement to develop and hold a good understanding between traditional and modern medicine.

An approach to harmonizing activities between modern and traditional medicine will promote a clearer understanding of the strengths and weakness of each, and encourage the provision of the best therapeutic option for patients. Harmonization of traditional and modern medicine will therefore, ensure that the two approaches work effectively side by side properly. From the above discussions, the importance of collaboration between modern and traditional medicine practitioners is apparent.

Inherent challenges
Integration of traditional medicine into modern health care system is faced with many challenges. These include lack of political recognition of traditional medicine, lack of regulatory and legal framework for practice of traditional medicine; inadequate protection of IPRs and biodiversity; lack of means of registration of traditional medicine; inadequate scientific research for validation of traditional medicine products, and marketing traditional medicines. From the above-mentioned challenges it seems appropriate to discuss the

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importance of some challenges to development and promotion of traditional medicine in Ethiopia.

Research traditional medicine

Scientific research will serve as the basis of our endorsement of the use of traditional therapies and techniques. The basic science areas of herbal medicine provide a means of assuring the quality and safety of herbal remedies. It may also lead to the discovery of clinically important drugs. Research on traditional medicine is also one of the essential steps involved in harmonization.

Modern scientific investigations on plant-based medicines have been carried out in many parts of the world. However, few studies have been carried out on medicinal plants and traditional therapies of Ethiopia irrespective of the presence of rich flora of the country.

Although extensive accounts of use and experiences from generation to generation provide some evidence of the effectiveness of traditional medicine, scientific research is however, needed to provide additional evidence of its safety and effectiveness.

Most traditional medicines and therapies have not been scientifically tested in Ethiopia. With increased interests on traditional medicine, consumers, the government, and modern medical professionals will ask for scientific based evidence. This calls for more research works need to be conducted. It is also necessary for Ethiopia to set up the priorities and an agenda for research on traditional medicine. The research works must be directed towards quality control of traditional medicine products which will have a significant impact on the overall effectiveness of herbal medicines.

Research activities are also required in the evaluation of active herbal constituents for efficacy, and toxicity. Phytochemical and clinical researches are other areas of research in which the active components of herbal medicine are isolated, their structure isolated and biological activities analyzed for mechanisms of action, toxicity, etc.

As mentioned earlier, most herbal claims have not been substantiated by scientific studies. Some herbs contain intrinsically toxic constituents and their safety is ensured by knowledgeable traditional health practitioners by limiting to a level so as not to present a health hazard. It was most unfortunate to note that some traditional health practitioners adulterate their traditional medicines with modern medicines and administer to their patients. Severe adverse effects have been reported for a number of herbal products from indiscriminate adulteration by modern drugs. One may also cite that many medical doctors in Japan, China, Korea and India apply both traditional and modern medicine. In fact safety and efficacy of such combination therapies have been validated and the doctors are educated in both systems of medicine.

During the process of evaluating traditional herbal remedies, the responsibility of traditional medicine practitioners will be to facilitate the appropriate evaluation of effectiveness, while other medical research techniques provide the capacity and approaches to determine how the therapeutic agents work.
Researchers and traditional health practitioners who are involved in the development of herbal remedies must recognize the importance of the conservation of diverse plant species of the country.

Last but not least, a more conducive environment for research on traditional medicine needs to be set up. This includes looking into the legal status and training practitioners, education of researchers and utilization of research findings.

Education
Lack of adequate education by modern medical practitioners in the traditional medicine approaches to diagnosis and treatment represent barriers to the harmonization of traditional and modern medicine. Improved relevant education is required in both sides.

It is essential that researchers and traditional medicine practitioners be educated in both traditional and Western medicines in order to perform research appropriately and treat patients effectively.

Modern medicine practitioners and researchers are required to achieve adequate education and awareness of the practice, principles and context of traditional medicine. Similarly, traditional medicine practitioners need to be significantly more aware of the nature of practice and strengths of modern medical approaches. The purpose of education base is not simply to yield a better understanding of differing practices, but primarily to promote the best care for patients by intelligently selecting the most facilitating route to health and wellness.

Awareness creation on traditional medicine and therapies
There is poor dissemination of research results related to the practice of traditional medicine in the country. Dissemination of information to the general public will also benefit from information on the safety and effectiveness of traditional medicine and the outcome of scientific research explained in simple language and easily understood.

An awareness of the principles of traditional medicine practice is equally important in basic science research. Researchers engaged in research on traditional medicine must be encouraged to disseminate their findings as widely as possible in journals. The initiation of publication of traditional medicine journal in the country is required. Furthermore, traditional health practitioners, monasteries, churches and mosques should endeavor to make available the manuscripts for research in order to disseminate to the public.

Conclusions
There are clear challenges to the harmonization or integration of traditional and modern medicine. Better access to information, facilitating research on traditional medicine therapies and practices, improving education and collaboration of practitioners and researchers, and respecting traditional practices in research are all important steps towards achieving this goals.
to improve the health status of the Korean population (Table 2) (13).

The Korean traditional Medical College started a 4-year course in 1945, which became a 6-year course in 1964 which is the same as the modern medical college. Traditional Korean medicine has a specialist system, traditional medical hospitals, a medical insurance system, a surgeon-general system, a regulation of traditional medicine and herbal medicine pharmacist system (Table 3). Traditional Korean medicine is recognized as an independent medical system both socially and legally. Therefore we can say that Korea has legally recognized a two-tiered medical system (13).

### Table 1. Number of Oriental Medical Institutions and Oriental Medical Doctors in Korea

<table>
<thead>
<tr>
<th>Year</th>
<th>Hospitals</th>
<th>Clinics</th>
<th>Doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>33</td>
<td>4,261</td>
<td>5,792</td>
</tr>
<tr>
<td>1995</td>
<td>69</td>
<td>5,928</td>
<td>8,714</td>
</tr>
<tr>
<td>1996</td>
<td>81</td>
<td>6,172</td>
<td>9,299</td>
</tr>
<tr>
<td>1997</td>
<td>98</td>
<td>6,348</td>
<td>9,289</td>
</tr>
<tr>
<td>1998</td>
<td>107</td>
<td>6,590</td>
<td>9,914</td>
</tr>
</tbody>
</table>

### Table 2. Health status of the Korean population

<table>
<thead>
<tr>
<th>Life expectancy 1960</th>
<th>Life expectancy 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>51.1 years for males</td>
<td>71.0 years for males</td>
</tr>
<tr>
<td>53.7 years for females</td>
<td>78.6 years for females</td>
</tr>
<tr>
<td>The infant mortality rate in 1962</td>
<td>The infant mortality rate in 1996</td>
</tr>
<tr>
<td>89.2 per 1,000 live births</td>
<td>7.7 per 1,000 live births</td>
</tr>
</tbody>
</table>

### Table 3. Development of Traditional Korean Oriental Medicine

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>The Korean Traditional Medical College became a 6-year course.</td>
</tr>
<tr>
<td>1987</td>
<td>A Traditional Medical insurance system started.</td>
</tr>
<tr>
<td>1988</td>
<td>The Association of Korean Oriental Medical Hospital was established.</td>
</tr>
<tr>
<td>1989</td>
<td>Korean Traditional medicine doctors started to work for the surgeon-general in the army and health centers of provincial governments.</td>
</tr>
<tr>
<td>1994</td>
<td>Herbal medicine pharmacist system started.</td>
</tr>
</tbody>
</table>

Korean medical policy separates traditional medicine from modern medicine, because Korean government recognized that hasty integration of different kinds of medical system might spoil both of medical concepts. However, in China, because of powerful government
support and great demand for traditional medicine, the government administers integrated traditional and modern medical systems. In Japan, where modern medicine is very strong, they do not recognize traditional medicine as a separate system. However, there are some doctors who, after completing their training in modern medicine, specialize in traditional medicine and treat their patients using traditional medicine.

Status of Oriental Medicine

Oriental medicine which is traditional Korean medicine basically differs from western medicine in principles and characteristics. Oriental medicine has contributed to improve the health of Koreans for a long period of time with excellent clinical treatment effect.

In oriental medicine, a disease is fundamentally attributed to a decrease of physical resistance to disease accompanying diminished bodily spirits. And oriental medicine interprets a disease as a manifestation of physiological disharmony of the whole body, not as an isolated, local abnormality of the body. Therefore, treatment in oriental medicine does forms not on the eradication of pathological germs, but on strengthening the resistance of the whole body system. And treatment policies are chosen after taking these interrelated factors into consideration.

From the early history, oriental medicine of Korea has been firmly established as a national medicine developed through the wisdom of Korean people. In the early days of the inception, Oriental Medicine of Korea was much influenced by Chinese Medicine. But since then, it was developed rather independently by Korean doctors, who fully established Korean traditional Oriental Medicine as a unique medicine.

They established the whole system of traditional medicine of Korea by taking unique customs and institutions of Korean people into consideration. Some examples are four-type constitutional medicine, Sa-am’s acupuncture, and an encyclopedia of oriental medicine, Dnugibogam (Hur Joon, A. D. 1713)

Principles of Oriental Medicine

The Yin and Yang and Five Elements Theory: This ancient oriental philosophy says that every thing in nature falls into the category of Yin and Yang and that all things are created by changes arising from the physical movement of five basic elements, namely: wood, fire, earth, metal and water. This theory has been applied to oriental medicine and became an important theoretical basis for diagnosis and treatment of oriental medicine. This theory can explain not only the physiology of human body but also the interaction among outside environment, human body and pathology.

Constitutional Medicine: In oriental medicine, each person is thought to have a peculiar physiological characteristics which is called a constitution. The constitution may account for different characters of a person, such as taste for food, physical build, and even the diseases which one is predisposed to. Constitutional Medicine, also known as Sasanguihak (four type of medicine), was originated by Lee Jae-ma (1837)-1900) and deals with a kind of preventive medicine, regimen and treatment considering constitutional characteristics of individuals.
Legal Status of Oriental Medicine

Oriental Medicine has been developed over a long period of time. When Medical Service Act was legislated in 1951 for the first time, oriental medicine began to have the support of the law system. Presently, oriental medicine has the same legal status as the Western medicine in Korea. Oriental Medical doctors at present, are entitled to practice all the medical actions of oriental medicine, including acupuncture and traditional medicine prescriptions.

Traditional drug materials

A total of over 2000 kinds of traditional drug materials are used in oriental medicine, among which 514 items are formally registered in the Official Oriental Medicine List (130 Korean Medicine Code and 384 in Oriental Medicine Standard Directory). Among them, about 300 items are often used in oriental medicine practice. In Korea, traditional drug markets were established for a long time across the country, among which Kyungdong drug market in Seoul, Daegu drug market and Keumsan Ginseng market are famous for their large scales.

Regulation of Traditional Drug Materials

In Korea, there is no independent law and regulation that governs matters related to the oriental medicines. Instead, they are governed by the Pharmaceutical Act which mainly administers Occidental Medicines. Oriental medicine products are not made of a single component, they are complex products made of various components by mixing and regenerating them. In their approval process, the oriental medicine products are tested for their safety and efficacy in accordance with the regulations stipulated in the Pharmaceutical Act. Therefore, it is difficult to get the official approval for a new oriental medicine product according to the standards set for the western medicines.

The safety and efficacy of the oriental medicines have already been verified through clinical experiences that date back to several thousand years. In this context, it is necessary to come up with measures that can foster and protect the oriental medicines, taking into account their characteristics.

A new oriental medicine product is usually developed based on the existing prescriptions described in the old literature of oriental medicine. Consequently, the development of new oriental medicine products are restricted to very limited cases. Eight relevant data to be submitted for verifications of safety and efficacy are as follows:

1. Data on the origin, discovery or development process
2. Data on structure determination and physical and physicochemical safety
3. Safety
4. Toxicity
5. Pharmacological actions
6. Clinical trial performance
7. Usage in foreign countries
8. Comparative reviews with similar domestic products and data related to other characteristics.

Standardization of Oriental Medicines

Oriental Medicine products are made up of raw materials produced in nature. Therefore, the distribution and contents of various efficacious components differ from each other depending
upon the year of production and the climate and the nature of the soil in which they are produced. For these reasons, 36 most frequently used items have been chosen among the oriental medicines and formally registered in the official Oriental Medicine List of Korea. In an effort to standardize them, manufacturing and qualifying criteria and packing and marking methods have been established. Under the standardization system, oriental medicines that meet such requirements can only be distributed in Korea. And from 1996, such standardization requirements have been expanded to all of the 514 items registered in Official Oriental Medicines List.

As it can be well observed, each country uniquely administers Traditional medical practices according to their social and medical situation. In the same way, we need to devise an adequate system for the development of Ethiopian traditional medicine to promote health in Ethiopia.

First of all, Ethiopian traditional health practitioners should prove their clinical result statistically and reveal their traditional medical theories, documents and experiences to be recognized. In eastern Asian traditional medicine, many wise doctors printed many traditional medical books because they realized that writing and distributing their clinical experiences and theories were essential for people's health and the development of traditional medicine. So, they separated a quack (a person who provides medical treatment with no proven clinical results and without a license) from a doctor in the following way:
1. A quack thinks only of private financial benefits and depends on secret treatments, usually treating a specific symptom without thinking of the person's complete situation.
2. A traditional health practitioner or an oriental medical doctor thinks of many people's health holistically and uses proven theories to treat his patients. So, it is said that a great doctor treats the world. Indeed, in eastern Asian countries, there are many examples of great doctors who became prime minister to take care of many people.

Ethiopia should create an environment where the traditional health practitioners can communicate with the government and reveal secret medical cures, their theories of treatment, and collect clinical data on the results of treatment. On the other hand, the Ethiopian Government should not judge traditional medical theories and clinical results using only modern medical understanding but consider Ethiopian traditional medicine as a specialty. The Government should also begin a dialogue with Ethiopian traditional health practitioners and establish an Ethiopian traditional medical policy, regulations and working guidelines as well as assist them to reorganize themselves in a manner amenable to the Government.

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Importance of traditional medicine drugs

Traditional medicine is the ancient and culture-bound medical practice which existed in human societies before the application of modern science to health. The practice of traditional medicine varies widely in keeping with the societal and cultural heritage of different countries. Every human community responds to the challenge of maintaining health and treating diseases by developing a medical system. Thus, traditional medicine has been practiced to some degree in all of the cultures.

Modern medicine developed very quickly and made major contributions to disease control in the past century. Interestingly, despite a rapid growth in knowledge and techniques in modern medicine, a dramatic increase in interest in traditional medicine is currently observed worldwide. The increasing public demand for its use had led to considerable interest among policy-makers, health administrators and medicinal doctors on the possibility of bringing traditional medicine and modern medicine together.

Although extensive accounts of use and experience from generation to generation provide some degree of evidence of effectiveness of traditional medicine, scientific research is needed to provide additional evidence of its safety and effectiveness. The public and the user of traditional medicine request safe, quality controlled and effective remedies. Modern health professionals require more scientifically based evidence if they are to trust its safety and effectiveness. Governments need to establish and update mechanisms for the regulation of traditional medicine and its practitioners and, in doing so, require more scientifically-based evidence to support decision-making.

Traditional medicine practitioners have developed unique methods of diagnosis and treatment that are specific to their particular cultures. However, given today’s interest in traditional medicine and complementary medicine worldwide, information in safety, efficacy and cost is being requested by patients, government, traditional medicine practitioners and practitioners of modern medicine.

Despite these interests, traditional medicine is always characterized by a restricted distribution and depends on the traditional healer who often shrouds his recipe and preparation in some secrecy. The lack of the systematic documentation of recipes does not favor the standardization of production and the primary condition for the emergence of an effective pharmaceutical industry. In view of this, a distribution through legal channels of drugs and specialized products of traditional medicine is only tolerated by the regulatory authorities. However, many drugs derived from traditional medicine have been tested in research laboratories and are currently being produced on an industrial or semi-industrial scale.
It is high time that traditional remedy becomes a medicine in its own right and in the legal sense of the word. This requires the formulation of a usable regulatory framework for evaluating drugs derived from traditional medicine. Guidelines have to be issued in this regard for a better evaluation of drugs derived from traditional medicine. Such guidelines should assist national regulatory authorities to put in place regulatory frameworks for granting marketing authorization.

It is worth noting that currently, no drugs derived from traditional medicine are in our market. Similarly, the herbal drugs in our markets are poorly handled, labeled and even their contents and for which diseases they are indicated are unknown. In addition, vendors of the herbal drugs are not knowledgeable in traditional medicine, there are numerous counterfeit herbal drugs sold to consumers. As a result, these realities pose a serious challenge to the health of the population and development of traditional medicine in Ethiopia. This calls for a new strategy of approach at the national level to encourage the marketing of herbal drugs, while at same time observing the criteria relating to pharmaceutical quality, innocuousness and therapeutic efficacy. The contributions of such medicines in the management of major diseases in Ethiopia will be key factors in the coverage of the country’s health needs and the emergence of an effective pharmaceutical industry based on local medicinal plant resources.

It is with a view to initiating this new approach that the Drug Administration and Control Authority (DACA) is proposing to define a regulatory framework at national level for the marketing authorization of drugs derived from traditional medicine and facilitate their distribution in the country. The regulatory framework proposed by DACA takes into account an aspect of its cultural heritage represented by traditional medicine.

National policy on traditional medicine
The Government of Ethiopia has issued three policies pertaining to traditional medicine in 1993.
These policies are the National Drug Policy, Health Policy and the National Science and Technology Policy. The policies on traditional medicine are needed for the following reasons.
1. The use of traditional medicine is a widespread form of health care system.
2. Policies will define the role of traditional medicine in health care delivery system
3. To indicate the commitment of the Government to ensure the direction, action and provision of financial and other resources.
4. Traditional medicine needs to be regulated in order to ensure its safety, efficacy and quality
5. Traditional medicine could be an affordable and cost effective form of health care.

The National Drug Policy of Ethiopia addresses Traditional Drugs as follows:
1. Attention shall be given to strengthen the sector through research and development. Research priorities shall be given to those Traditional Drugs which are in wider use
2. Favorable conditions shall be created for application of traditional drugs ascertained to be safe and effective for treatment. Private participation in the field shall be encouraged.
Research On Traditional Medicine

Traditional drugs are also properly addressed in DACA’s mandate. To ensure the safety, efficacy and quality of a drug and to maintain the proper production, distribution and use as well as to deter the illicit production, traffic and use of narcotic drugs and psychotropic substances, the Government has established the Drug Administration and Control Authority (DACA) under Proclamation No.176/1999. In accordance with the Proclamation, the Drug Administration and Control Authority (DACA) is the National Drug Regulatory Authority responsible to ensure the safety, efficacy, quality and proper used of both modern and traditional medicine drugs.

The Drug Administration and Control Authority (DACA) is responsible for:
1. Setting standards of safety, efficacy and quality of drugs, including traditional drugs
2. Setting standards of premises for manufacturing, distribution and use of drugs
3. Issuing, suspension and revocation of certificate of competence for establishment of drug trade
4. Manufacturing, importation, export, distribution and dispensing
5. Evaluation of laboratory and authorization of clinical trial on traditional drugs and authorization of use of Traditional Drugs, of proven safety, efficacy and quality, in the health service.
6. Registration or marketing /use, authorization of drugs, after assuring their safety, efficacy and quality
7. Undertaking and coordinating of post marketing surveillance
8. Provision and control of drug information
9. Control of promotion and advertisement of drugs including traditional drugs.
10. Setting standards for safety, efficacy, quality of traditional medicines and premises of manufacturing and dispensing outlets
11. Registration /authorization of marketing /utilization of drugs including traditional drugs, of proven safety, efficacy and quality
12. Issuing, suspension and revocation of certificate of competence for manufacturing, import, export, wholesale, distribution and dispensing.

Besides these general requirements, issues of registration and licensing of traditional medicine drugs are also included in the draft Drug Administration and Control Regulation.

Requirement for registration and licensing of herbal drugs

Traditional medicines are of plant, animal, and mineral origin. Generally, the use of herbal medicine in Africa including in Ethiopia is based on oral tradition with the family community. Most traditional medicines which are claimed to provide “Effective cures” for various diseases lack scientific evidence for safety, efficacy or quality. These herbal products are sold in the open market, stores and healer’s home to the public with possible adverse consequences.

Despite the use of traditional medicines for many centuries, challenges regarding the safety, efficacy and quality of traditional medicines exist. Promotion of the use of traditional medicines in the health care system requires the supply, to the population, of medicines that have valid data of safety, efficacy and quality.

The requirement for registration and licensing of traditional medicines are:

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Drug registration is therefore the process of evaluation of the safety, efficacy and quality of drugs through, document or data review, pharmacological, pharmaceutical, toxicological, clinical and laboratory investigation, laboratory or clinical testing and authorization of use or marketing of drugs.

The minimum regulatory requirement for registration depends on the classification of traditional medicine. It is impossible to register any traditional medicine without appropriate classification of the product. The classification will be based on the mode of preparation, the indication of preparation, the extent of development of traditional medicine compared to the traditional remedies used. According to WHO there are four categories of traditional medicines.

**Category 1 Traditional Medicines**

Medicines in this category are prepared by the traditional healers for specific patient and has the following characteristics:

1. It is prepared in an extemporaneous manner
2. It is prepared according to traditional methods of production and standardization
3. The safety and efficacy are guaranteed by the long period of use (more than 20 years)
4. The raw materials are well known by the healer and may be fresh or dried
5. Its shelf life is generally short (a few days)
6. It should be indicated for common diseases endemic to particular community
7. The formula of the herbal recipe is usually a family secret

**Category 2 Traditional medicines**

Medicine in this category is derived from community (popular use) with commercial application and possesses the following characteristics:

1. It is traditionally used in a given locality and even well known by the population, in terms of composition and directions for use
2. Its method of formulation ensures it stability and standardization
3. Its formula may be known or unknown by the community or unknown by the public
4. It is used in the treatments that require no prescription
5. Its safety and efficacy are guaranteed by ethnomedical evidence of a long experience of use and open to clinical test by the competent authority
6. The compounds responsible for the biological activity are not isolated and are generally unknown
7. It is freely sold in the market

**Category 3 Traditional medicine**

This medicine is developed by research institutes and has the following characteristics:

1. It is derived from scientific research
2. It takes into consideration, the biological properties of medicinal plants, the new therapeutic indications, a galenic formulation and knowledge of the biological active compounds

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3. It is standardized and produced in accordance with good manufacturing practice (GMP) principles
4. Its efficacy is based on evidence derived from pre-clinical and clinical investigation
5. Its indications are specific and may require prescription

Category 4 Traditional medicine
It is an imported traditional medicine with the following characteristics

The minimum requirements for registration/marketing/use authorization of traditional medicines varies with type of category. More stringent requirements are needed with traditional medicines classified as category 3 and 4. The minimum requirement could be categorized into:

1. Minimum quality requirements
2. Minimum safety requirements
3. Minimum requirements for efficacy
4. Labeling and advertisement requirement

Giving due consideration to these facts, the Authority is on the process of preparing Comprehensive Guidelines for Registration of Traditional Drugs. This draft registration will be distributed for comment and workshops and consultative meetings will be organized to enrich the guidelines.

Post marketing/use surveillance of traditional medicine
Registration of traditional drugs shall be backed by an appropriate system of post-marketing surveillance.

2. Minimum Licensing Requirements
The minimum requirements for getting licensing/use authorization of production, import, export, distribution and dispensing depends on categorizations of the traditional medicines. These categorizations are:
Category 1. Traditional Medicines
Category 2. Traditional Medicines
Category 3. Traditional Medicines
Category 4. Traditional Medicines

By giving due consideration to these facts, draft guidelines for licensing of premises and institutions are under preparation by the Drug Administration and Control Authority. The draft documents will be distributed widely for comment before they are finalized and put into action.
Vision and Mission of Traditional Health Practitioners in Ethiopia

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Abstract
Ethiopia is a nation full of eligible traditional healers of human and animal diseases using herbal medicine, animal products, and minerals. The Ethiopian National Traditional Medicine Preparation and Study Association has the following vision and mission:-

1. Organizing its members in various parts of the country into national, regional, zonal, and kebele levels under the Association
2. Provide additional training to its members on traditional medicine to enable the healers to render better services in treating human and animals diseases
3. Upgrade the level of traditional medicine of the country through scientific research in collaboration with the concerned governmental and non-government organizations
4. Upgrade awareness of the public on traditional medicine
5. Improve the preparation and dispensing of traditional medicines, used to combat various health problems, to meet the necessary standards
6. Collaborate with research institutions to determine safety, efficacy and quality of dispensed herbal drugs

To enable the Association work with governmental and legal bodies, and have proper relationship with the public, it requests the government to:

1. Give due attention to traditional medicine and its practitioners as being done in other countries
2. Issue clear traditional medicine policy including intellectual property rights of the healers
3. Assist in establishing and organizing of an institution which deals solely with traditional medicine research and its practitioners
4. Assist in facilitating marketing of herbal drugs and its ingredients including export to other countries
5. Recognize the contribution of traditional healers and allow them to participate in the preparation of health policies and guidelines
6. Make a concerted effort to change the attitude of modern medical personnel and the Ministry of Health towards traditional medicine and traditional health practitioners

Introduction
Ethiopia is a nation full of eligible traditional healers of human and animal diseases using herbal medicine, animal products, minerals and other therapies. Various ancient manuscripts
relate that the Ethiopian traditional health practitioners used to prevent and cure any disease and heal a patient by using traditional medicines. The forefathers left their valuable knowledge of healing a disease through traditional herbal medicines for the posterity. Cognizant of the fact that the present generation is residing in the very land that is the cradle of ancient medicines, every educated citizen is bound to contribute his/her share in improving and expanding the wisdom of the earlier traditional health practitioners by combining them with modern technologies for the benefit of the general public. History has it that before the coming of modern medicine from abroad, the ancient scholars of Ethiopia used traditional medicines to prevent and cure any disease.

Ethiopia is blessed with various natural resources that could be used for making traditional medicines. It also has able professionals, who could use herbs and minerals as well as animal and bird products to make traditional medicines that has high remedial value. These medicines can cure various kinds of human and animal ailments. They can kill or destroy pests, worms or bacteria. However, the books in different churches, monasteries and mosques, which contain such a priceless wisdom, are denied of the necessary attention and protection.

Health is a condition in which the physiology and anatomy of a human body functions well and smoothly. Unpolluted water and air, balanced sunrays and natural forests are decisive for human’s health. However, humans’ health could be affected by malnutrition and uncomfortable living conditions. To protect themselves from diseases, ancient people began to observe their environment and realized that they could use herbs, weeds, shrubs, trees, etc. for medicinal purposes. People learned to use traditional medicine, a type of medicine prepared by processing the roots, leaves or stems of plants. Step by step, these types of medicines began to be widely used and consumed by a large section of the society. Traditional medicine treatment therefore, is a kind of treatment, which the previous societies used to maintain their physical and mental health.

There are various kinds of herbs that grow in different climatic conditions and be used to prepare traditional medicines. The books that tell how to prepare traditional medicines out of herbs and grains are compiled by ancient herbalists both from Orthodox Christian and Muslim religions in various languages (Amharic, Gee’ze and Arabic). Thanks to the fact that these books are kept safely in churches and mosques, they are not at our disposal. Currently, traditional medicine treatment is striving not to lag behind the modern way of medicine treatment. Although it has not grown at the desired level, traditional medical treatment plays a significant part in the lives of the Ethiopian population. About 80% to 85% of the populations residing in the rural parts of the country use traditional medicine treatment more than the modern one. Traditional medicine became popular due to its reasonable price that took into account the economic status of the public at large. In addition, the herbalists are easily accessible, as they are part and parcel of the ordinary people.

Even now in the 21st century, the era of advanced technology and civilization, 90 percent of the Ethiopian population is beneficiary of traditional medicine. In contrast, forty, fifty and eighty-five percent, respectively, of the total population of America, Australia, Africa and Asia use traditional medicipes. The statistics clearly shows that the users of traditional medicines in the five continents are increasing from time to time instead of declining. In addition, the
The interrelationship between science and the traditional medicine treatment is becoming stronger and stronger. Then what are the factors that inhibited the scientific evaluation of the traditional medicine treatment in Ethiopia given the vast availability of herbs, minerals, animal products and birds as well as a great number of traditional health practitioners? Traditional health practitioners who are practicing the profession and who are greatly affected by this situation, have an outright response for this question. Forgetting the fact that most of the modern medicines were extracted from herbs, some modern medicine professionals hold a misconception towards traditional medicine treatment hindering its growth and expansion. It is a naked truth that traditional medicine treatment is the father of the modern medicine.

The Ethiopian National Traditional Medicines Preparation and Medical Treatment Study Association has managed to get a legal recognition after a long struggle. However, apart from recognizing the Association, no effort has been made to promote and expand the practice across the nation and closely follow its implementation. Although the Association has been legally established to operate within the law of the land, the traditional medicine treatment could not be harmonized with the modern medicine due to lack of support and collaboration from the government, health and educational institutions, modern medical professionals and judicial bodies. This in turn, deters the provision of better health services to the public at large.

The Association has identified strategies to develop and promote traditional medicine in the country. These strategic areas are as follows:

1. Organize traditional herbalists to create a uniform collection and preparation of traditional medicines based on existing and collective knowledge. There is also a pressing need on the part of government health institutions to offer skill-upgrading training to traditional herbalists.
2. Conduct joint studies and researches with governmental and public organizations to improve the quality and effectiveness of traditional medicines.
3. Seek viable methods whereby the traditional medical treatment system could be transformed into the modern one for the benefit of the society.
4. The Association should provide samples of the traditional medicines to health research institution in a bid to verify their remedial value and find out their harmful side effects.
5. Address the differences and disagreements between the traditional herbalists and modern medical professionals and work hand-in-hand to enhance the country's health coverage.
6. Traditional herbalists should be acquainted with and abide by the ethics and fundamental principles of medicine.

It is clear that the government has adopted various regulations and polices taking in to account the role played by the traditional medicine practitioners in increasing the health coverage of the country. However, the role of traditional medicine in the health care system has not been clearly specified. To bridge the existing gap the following steps are expected to be taken by the Government:

1. The government need to give due attention to traditional medicine so that the Association would strengthen its relations with governmental institutions and judicial bodies. Moreover, the government ought to establish an institute charged with the task of following up the activities of the Association and the overall conditions of the profession and the sector.
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2. Efforts should be made to facilitate conditions whereby traditional medicines could be supplied to the market maintaining their traditional value.

3. The misconception of some modern health professionals should be corrected so that we could actively participate in the implementation of the health policy formulated by the government

Acknowledgement

The Ethiopian National Traditional Medicines Preparation and Studies Association would like to express its gratitude to officials of the Ethiopian Health and Nutrition Research Institute for organizing such an august forum.
PART III. RESEARCH ON TRADITIONAL MEDICINE
The Role of Traditional Medicine in Animal Health Care in Ethiopia

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Abstract
Over 80% of the livestock population in Ethiopia relies on the traditional animal healthcare system. Studies conducted in different parts of the country indicated that livestock raising communities and traditional healers have their own ethnoveterinary medical knowledge on the causes, symptoms, ways of transmission, zoonotic importance, season of occurrence, treatment and methods of preventing different animal diseases. Ethnoveterinary medicine (EVM) in Ethiopia is composed of different technical, socio-cultural and spiritual dimensions. EVM practices mainly include ethnopharmacology where different botanicals are extracted and formulated. Local herbalists prepare infusions, decoction, powders, drops, pastes, ointments and fumes using plants, minerals and animal products in their copious veterinary pharmacopoeias. Studies on crude extracts of 25 selected plants used by herbalists showed that 23 of them were nearly or just as effective as, and cheaper than their conventional equivalents. It was also observed that this practice has not been without implication on plant biodiversity. EVM also provides several surgical remedies using a variety of procedures that involve obstetrical operations, wound management, bone setting, cauterization, trocarization, bloodletting, castration, wound management, etc. Besides, it plays a significant role in preventive medicine and herd health management via traditional vaccination, movement control, breeding and reproductive management, herding strategies, pasture management and nutritional supplementations. From inadequate veterinary services in the urban and peri-urban areas, and poor peripheral livestock health infrastructure it appears that EVM remains the only option in most areas for sometime in the future. Assessment of traditional expertise and documentation of all aspects of EVM knowledge can be used for the development of economically feasible and ecologically sound animal healthcare system and discovery of new alternative phytomedicines for both human and animal diseases.

Introduction
Livestock constitute a driving force for food security and sustainable agriculture in the developing countries. However, it is difficult to realize any gain on livestock production and productivity without ensuring improvements in animal healthcare. About 80-90% of the livestock population in Ethiopia relies on the traditional animal healthcare system (1). Nowadays there is a growing interest in EVM mainly due to its practical importance in rural animal healthcare and in implementation of workable and sustainable agriculture (2). Besides, scientists are probing into this knowledge system in search of new phytomedicines (3). In general, the latter derives from a great concern over the side effects and residues of many conventional drugs, and the presence many multiple-drug-resistant (MDR) bacteria in the environment that could not be treated by any available antimicrobials. Although conventional veterinary medicine has played an important role in the control and prevention of animal diseases in the last three decades, a great proportion of the livestock rearing community could
not fully rely on these conventional services. Inadequate skilled manpower, costs, logistics, scarce and erratic supply of drugs, biological and equipment are among the main constraints (4,5). Livestock owners those who occupy the remote and inaccessible areas, particularly the pastoralists, are more vulnerable to these problems (1). However, across the nation indigenous veterinary professionals equipped with a wide range of traditional techniques have bridged the huge gap left by modern services to this date (4,6,7,8). In addition to the technical aspects, EVM has got various socio-cultural and spiritual dimensions. As with most of the local knowledge system, information on the EVM has rarely been systematically documented and codified and it has been transmitted from generation to generation orally. Since traditional healers have provided human and livestock health services over centuries many of their healing and disease preventive procedures should have logic utility and acceptance. The objective of this paper was to overview the contribution of EVM to animal healthcare systems in pastoral and non-pastoral livestock rearing communities in Ethiopia and its future usefulness in the national veterinary services.

Ethnoveterinary disease knowledge and classification

Traditional healers and stockowners have their own local disease concepts and practices. These indigenous professionals who have over the year learned a repertoire of folk treatments are instrumental in the continued existence of traditional healing arts to which most rural people still owe their physical and mental well being. This valuable knowledge of indigenous science has been vital to the survival of local communities for generations. The age of the healers fall in the range of 40-95 years and it was indicated that they picked this art of local medicine from their parents or grand parents. Unlike conventional veterinary medicine, African folk disease distinction typically relies on clinical signs, epidemiological and supernatural explanation (9,3). Similarly, local people in Ethiopia, for example, the Boran pastoralist and elsewhere employ many methods such as palpation, smelling, observation of clinical signs and review of the patient's recent travel (10,7). In this sort of applied epidemiology they relate sick animal's history to areas infested by parasites, disease vectors, poisonous plants and any other information. Studies have also showed that, in most cases, pastoral and non-pastoral stockowners demonstrated ability in naming diseases and associated symptoms consistent with those provided by veterinary personnel (11,3,8). McCorkle and Mathias-Mundy, (1992) stated that regarding causation of illnesses the concept of disturbed physical/physiological equilibrium and supernatural agents prevail among African healers (3). According to studies conducted in different zones and regions of Ethiopia human and animal ethnomedical systems appear basically similar (10,7). Somewhat contrary to the observation of Ibrahim (1996) in Nigeria, this could be the reason why known traditional healers provide healthcare services for both humans and animals (11). The majority of the local healers also deal with both medical and surgical practices while the some were practitioners of only herbal medicine. Both sex groups of healers are found with 20% female herbalists. In addition to the healers, many stockowners, particularly pastoralists, have a thorough understanding of certain diseases including their cause, symptoms, transmission, treatment and prevention strategies. They are also aware of the zoonotic nature and the role insect vectors play in the transmission of certain animal diseases (6). Thus adept livestock raisers generally seek healers help only for certain complicated conditions with which they are not familiar (8).

EVM system classifies livestock diseases based on their salient symptoms, in some cases epidemiological and supernatural factors being considered. The concept of causal/etiological
identification of diseases is poor among traditional healers and stockowners in the country. This has led to a situation where the same disease may have different names and attributes among the same people in different species and there are situations where scientifically different diseases may be grouped together in the EVM classification system (7, 8). It also was observed that different diseases though to be the same or a symptom common to various diseases was considered as a disease by itself. EVM practitioners in the Boran pastoral system classify livestock diseases into at least five categories as follows.

1. Environmental diseases: diseases caused by parasite infected pasture, poisonous plants, insect and tick vectors, seasonal changes.
2. Contagious diseases: Diseases that are transmitted from animal to animal including zoonotic ones (anthrax).
3. Diseases that affect a particular species: Disease that are categorized according to the main host. Poultry disease (NCD), rabies, etc.
4. Nutritional diseases: Disease mainly caused by mineral deficiencies. These diseases are characterized by unthrift ness, poor fertility, and reduced growth rate.
5. Supernatural diseases: Disease characterized by emaciation and nervous signs like paralysis. Livestock owners mainly mention “Evil eye” as a cause.

In the above classification, a single conventionally defined disease may fall into different categories. This type of indigenous classification is widely used in the other African countries (3). However, this apparently creates some complexity of matching diseases with their conventional scientific counterparts.

Ethnopharmacology

In indigenous health system, plants and plant materials constitute the main healers’ treatment arsenal. More than 90% of the materials used in EVM are derived from plants (12). A significant percentage of ethno pharmaceuticals developed by different African healers have proven biomedically active and effective (3). Similarly, studies conducted at Debre-Zeit (13,14) and Bahr Dar (14) showed that 23 of them are effective against different bacteria. These results indicate that the use of these plants by local healers as a cure was in fact due to such biological activities. Local drugs are prepared from the whole or plant parts, alone or in various combinations, in the form of decoction, powder, hot or cold infusions, drops, pastes, ointments and fumes. Indigenous healers formulate local drugs using combinations of plant materials, animal products, minerals and other substances in their copious veterinary ethnopharmacopoeia (13, 8,14). The resulting medicaments are given in various ways whether external or internal. For internal administration, the oral route is the most frequent and applied by drenching or force-feeding liquid drugs. The above studies showed that some of the plants were used for the treatment of the same disease by different healers and there were many healers who treated the same disease using different plants. Different healers also reported the use of different plant parts for treating similar conditions. In different regions herbalists collect barks and roots from plants for preparation of local drugs in 70% of the cases. Unless this is accompanied by conservation its implication on plant biodiversity can be important. Education and awareness for traditional healers, conservationists, academic and research institutes on diminished ecological exploitation should be implemented.
Traditional manipulative and surgical practices

Wound and abscess management: Stockowners in all regions have developed useful methods of wound care. Wound treatment depends on the age, type and site of the wound. In general, the healers carefully wash wounds with cow urine and dress them with ashes and cow-dung. This dressing expedites healing, protects the wound from flies and finally loosens and falls off as a scab in the process of healing. The Boran pastoralists rub an abscess with *Solanum* species fruit juice to ripen it. Then the whole length of the abscessed skin is cut and necrotic materials are carefully removed. This is followed by application of a powder prepared from the leaves of *Balanites aegyptiaca*. Fresh cut wounds are carefully washed with water and urine from other animals and stitched with thorns and tendons. Several dramatic surgical skills of suturing open muscle wounds with animal tendons, giraffe or horse tail and skin wounds with cotton or plant fibers using urine as a disinfectant, cauterizing chronic wounds, removing injured eyes, etc, have been demonstrated by Ethiopian local healers (6,7,8) and other East Africans such as Kenyan Dagota, Turkana and Massai, Somali and Nigerian Fulani people (3).

Venusection and cauterization: Healers in different zones reported many conditions that can be treated by bloodletting. Bloodletting requires great care and only experienced indigenous professionals perform it. The Boran healers employ femoral venusection for treating hind limb paralysis caused by "Tabari" plant poisoning and jugular venesection for bovine ephemeral fever (8). Healers in the central highlands cut the ventral vein in the tongue to treat bloat and lactic acidosis in cattle (10). A therapeutic bleeding of animal was practiced in Egypt at least as early as 1786 BC (3). Cauterization is also an ancient multipurpose technique among stockowners and well entrenched in the pastoral systems. It is indicated for a number of diseases and conditions and carried out by pressing glow-hot iron on the skin. A site at which cautery is aimed varies depending on the type of illness and usually corresponds to the organ involved. It is used to treat wounds, abscesses, muscle pain, mastitis, digestive and hoof diseases, hernia, and many other conditions. However, this method decreases the quality of the skin in ruminants.

Obstetrical and gynecological practices: Alemsetegn (2002) studied obstetrical procedures practiced by healers in north Gondar, Abubeker (2003) in Borana and Tekele (2003) in the Adiaya zone (8,13). They found impressive techniques that include manual correction of fetal positions for relieving dystocia as much as possible, episiotomy and fetotomy in case of dead fetus. The Boran healers also treat retained fetal membranes by careful manual traction or using different herbs such as *Commiphora paoli*, *Dicrostachys cinerea*, *Grewia bicolar*, *Ricinus communis* and *Ximenia* species. Healers at Buta Jira treat retained fatal membranes and postpartum endometritis with a cold infusion prepared from *Persicaria senegalensis* (15). Closed (bloodless) and open surgery castration, for fattening or controlling breeding, are performed in different species of animals when insect population is low to reduce chances of infection and mortality. Pastoralists perform 'temporary' castration technique characterized by lodging the testicles under the abdominal skin to control out of season breeding. The testes can be let down during the breeding season and animals regain their fertility.

Bone setting: Healers can effectively diagnose and treat ruptured ligaments and tendons, dislocated joints and fractured bones
Preventive medicine and herd health management

Vaccination: Local healers and livestock owners in different rural areas have indigenous vaccination for a number of infectious diseases. The Boran pastorals developed an effective vaccine against contagious bovine pleuropneumonia (CBPP). The infected lung tissue is taken from animals died of CBPP and thoroughly minced, washed in small amount of salt solutions and sieved. Then small incision in the nostrils is made and small amount of the lung placed until the wound festers. After sometime the lung tissue is removed and the wound debrided and cauterized. Similarly, in different zones rinder pest is vaccinated using urine, feces and milk from infected animals. Similarly, foot and mouth disease is vaccinated using saliva of infected cattle.

Breeding and herd reproductive management: Stockowners have established their own indigenous genetics through countless observations and crossbreeding. Selection criteria (milk production, posture, color character, fertility, etc) vary across cultures and animal species. Adept herdsmen can identify which animal is in heat or pregnant. Also, they are cognizant of the hybrid vigor and ill effects of inbreeding. Pastoral societies synchronize small ruminant breeding by sheathing off the penis or reverse castration so that lambs are born in the season when feed is abundant and are not lost due to nutritional shortage.

Pasture management: Pastoral and agropastoral herdsmen know that ticks and smudges transmit diseases and seasonally burn rangelands to control pests. Also, they avoid grazing infected land at particular season so that the pests die out and the pasture becomes free of pests. Many livestock raisers know a good quality pasture including its nutritional impact on their herds, its palatability, identify poisonous plants in their pasture, and season of growth.

Nutritional supplementation: Pastoral people are aware of the fact that weight loss, abortion and reduced milk production are reflections of mineral deficiency. Therefore, they supplement their stock with salts and mineral soils.

Conclusion

Indigenous animal health practitioners have elaborate and impressive knowledge on disease diagnosis, treatment and prevention. Livestock owners ascribe many advantages to traditional medicine including availability, fewer cost and efficacy. However, there are many points that could be criticized in this indigenous knowledge system. On the other hand, the EVM knowledge could make valuable additions to the contemporary medicine for both human and animals. Therefore, this knowledge system should not be romanticized and at the same time it should not be rejected and ignored. Initiatives on traditional knowledge focus on the technical part of it while the socio-cultural and spiritual aspects of this knowledge system often receive little attention. Thus, there is a need of multidisciplinary approach for understanding and working with EVM system. Rapid socio-economic ecological and technological changes have led to loss of this piece of knowledge, which would eventually result in irretrievable loss, or distortion of the original type. Systematic assessment, documentation and understanding of this knowledge system, should help in the incorporation of the best part into the conventional animal healthcare system and in conservation and propagation of valuable medicinal herbs.
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Assessment of the Afar's Ethnoveterinary Knowledge

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Abstract
Ethiopian Afar pastoralists have a vast treasure of knowledge and experience over animal diseases; they know when their animals are sick; describe the disease signs, tell in which seasons specific diseases are prevalent and manage their animal diseases in their own traditional way. Livestock has been a key component of the pastoralists' livelihood and the economy of the area. A pilot survey was done on ethnoveterinary knowledge of Afar pastoralists residing in Gewane and Telalak areas; community animal health workers were used as an intermediate for the study. The Afar traditional healers are involved in treating both animals and humans. They treat using medicinal plant materials, soil, blood, immunization by tissues from affected cases (auto vaccination), surgical and manipulative handling of disorders, husbandry techniques etc. All are enthusiastically respected by their community. But the depletion of several important plant species and poverty was affecting their profession seriously. Evaluation of the efficacy and the safety of the traditional treatments would be of considerable importance for the community as it increase their knowledge base and renew respect among local/indigenous people for their own culture and technological expertise thus, knowledge of their preparation and effective administration will be maintained in younger generations.

Introduction
Within the African continent, Ethiopia alone was estimated to possess 31 million cattle, 42 million goats and sheep, 1 million camels, 56 million poultry and 7 million equines (1). The Afar Region located in the eastern part of Ethiopia is one of the regions rich in livestock. The Region has a population of 1.3 million people. The area is primarily low altitude, with sparse savannah type vegetation dominated by acacia trees. The low lands have low agricultural potential. The Afar Region is well known by its high temperature (42°C average), and severe drought condition. The rain falls usually once in a year between July and September.

The Afar people are one of the largest ethnic groups in the Horn of Africa occupying parts of Eritrea, Djibouti and Ethiopia. Nearly 85% of the Afar people are purely pastoralists with the economy and culture very closely related to livestock production and hence rely heavily on livestock for survival. They keep cattle, camels, sheep, goats and donkeys. The pastoralists throughout Afar rely on riverine habitats for dry-seaon grazing. Their strategies rely on the ability to move their herds sometimes over large distances to take advantage of pasture and water resources. Frequently these sites play critical roles ensuring herd survival during times of drought.

In all pastoralist areas of Afar like any other pastoralists of Sub-Saharan Africa, drought and animal diseases are incriminated as one of the most important constraints and these factors play

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major roles in pastoral production strategies (2). Access to modern veterinary services is poor due to the unavailability of the service to the community. As a result, the Afar pastoralists are relying exclusively on their ethno-veterinary knowledge (EVK) to keep their livestock healthy.

Ethnoveterinary knowledge is defined as beliefs, knowledge, and practices pertaining to animal health. The study of such beliefs and practices with an eye to practical development of their potential is termed as ethno-veterinary research and development (3). EVM practices are cheap, locally available, and culturally acceptable alternatives. But lack of scientific information on their efficacy and safety makes development officials skeptical about integrating these practices into modern animal health programs. However, only few studies exist on the different methods of traditional animal healthcare in Ethiopia and the extent to which they are practiced (4-8). The present study was therefore designed to document the EVK of Afar pastoralists and identify those traditional treatments used in the control of animal diseases in the area.

Methodology
Survey of EVK practices among the Afar pastoralists was carried out in Gawane and Telalak areas of Afar. Community animal health workers and community leaders were used to identify those traditional health practitioners involved in animal treatment. The traditional health practitioners in each of the two study communities were brought together and asked to name all livestock diseases that occur in their areas regardless of the species affected using a semi-structured questionnaire. They did so in their local language. Key informants who the community thought had good knowledge of traditional treatments and would be willing to share their knowledge with the researchers were also selected. The key informants selected were interviewed on the animal diseases of the area. The interviews were conducted in the local language by local enumerators using semi-structured questionnaire. The disease list was compiled based on the clinical signs described by the traditional health practitioners. Details of remedy composition, methods of preparation and administration, precautions and toxicity were also collected. Where possible, informants were asked to show the researchers the medicinal plants mentioned during the interviews. The plant samples were taken to the National Herbarium, Addis Ababa University for botanical identification.

Results and discussion
WHO estimates that 80 to 90% of the world population still rely mainly on local practitioners and folk medicine for their human healthcare needs (9). These figures are likely about the same for livestock. The WHO/AFRO Expert Committee has repeatedly recommended that formal human and veterinary health services be integrated as fully as possible, especially for hard-to-reach rural populations and their livestock (10). Furthermore, in all medical traditions, western- or non-western, much the same treatments and techniques are applied to all species and where appropriate, demonstrably valuable traditional treatments for animals could readily be encouraged and extended to humans and vice versa (11). For instance, a traditional and highly effective remedy for scabies in cattle was successfully and cost-effectively reformulated for local production and use in human scabies (12). Conversely in highland Peru, veterinarians compounded effective endoparasiticide for sheep from a proven traditional recipe for intestinal parasites in humans (13).

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Afar's knowledge of treatment and prophylaxis of diseases

The Afar traditional healers are involved in treating both animals and humans. They treat using medicinal plant materials, soil, blood, immunization by tissues from affected cases (auto vaccination), surgical and manipulative handling of disorders and animal husbandry techniques. The Afar healers use various techniques to treat animal diseases such as surgical intervention, dystocia, musculoskeletal intervention, cauterization, and phytotherapy.

Manipulation and management practices

The traditional healers and key informants in the present study keep animals themselves and belong to the pastoral community. Their degree of specialization varies. Some of the Afar healers are specialized in certain types of afflictions (such as fracture, birthing problems), types of treatment (e.g., firing or massage), or certain species usually cattle and camel. In case of manipulative procedures such as bone-setting and relieving of dystocia, a few individuals among the community have become specialists and are often consulted by the rest of the pastoralist community.

Prolapse: Replacing the prolapsed organ by inserting small-sharpened wood as a suture and leave in place for three days. The inserted small-sharpened wood is removed after 2-3 days when recovery is suspected. Capsicum frutescens leaves will be chopped and water is added to form detergent like solution. Some healers drench the herb and other spices after mixing with water.

Dystocia (mutation and traction, foetotomy): The fetus will be tried if it will easily be pulled by hand if not tied by rope and pulled back, if this don't work correction of the position and another trial will be done to remove it out. If it is difficult and if the fetus is already dead, forced traction after foetotomy or modified foetotomy will be applied and the accessible organs will be pulled out accordingly.

Musculoskeletal intervention: Lameness and fractures will be treated by a plaster made by sticks (bamboo) and are flattened on one side. This is then attached to the fracture site with strings made from skin strips. This treatment is usually done together with cauterization.

Cauterization: Branding is a well entrenched practice in Afar. They use it for diarrhea, mastitis and metritis, chronic cough and other emaciating conditions. The points upon which branding is applied usually correspond to the organs involved in the pathological process.

Tick infestation: The techniques to treat tick infestations include hand picking from the young camels and cattle and brushing with herbal acaricides. In some areas the animals are washed with hot salty water.

Wound: To treat wounds, the soils under Solanum tuberosum and termite nest will be taken and formed to mud after adding water. The wound will then be opened manually and the mud will be dressed and washed after a while. This process will be repeated every two days until recovery. Burning the stem part of Cordia africana and Ficus hochstetteri (also the root) to form ash powder and apply topically on the wound after opening are also used as wound treatment procedures.

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Phytotherapy of animal diseases

The Afar people have a vast amount of EVK. They named and described up to 23 livestock diseases and conditions for the different livestock species (Table 1). In a similar study, herders of Turkana and Samburu communities in Kenya identified about 50 diseases of their livestock and grouped these as treatable using local remedies. Treatable diseases included retained placenta, eye diseases, bloat and skin conditions such as wounds, streptothricosis, mange, lice, fleas and leeches (14). Their disease nomenclature is mainly based on clinical signs and symptoms. For instance, the Afar of Ethiopia, call rinderpest *degahabe* which to them means empty kraal. It comes from the expression *geso foya habe*, which mean the kraal of cattle is empty. Trypanosomiasis is a disease common in many pastoralist areas. The main vector being the tsetse fly through biting flies contribute by mechanical transmission. This protozoan disease affects all domestic animals. Trypanosomiasis is called, geramolae by the Afar of Ethiopia whereas, the Turkana of Kenya and the Nuer of southern Sudan call trypanosomiasis in cattle as *lokipi* and Gulew, respectively.

<table>
<thead>
<tr>
<th>Description of the diseases by Afar healers</th>
<th>Local name</th>
<th>Affected species</th>
<th>Suspected diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic coughing with associated weight loss</td>
<td>Kahu</td>
<td>All species</td>
<td>Coughing</td>
</tr>
<tr>
<td>Diarrhea, hair loss around tail, emaciation and death</td>
<td>Geramolae</td>
<td>Camels</td>
<td>Trypanosomiasis</td>
</tr>
<tr>
<td>Scratching, hair loss, skin thickness, wound formation, high incidence during rainy seasons, fatal</td>
<td>Agara</td>
<td>All</td>
<td>Mange mites</td>
</tr>
<tr>
<td>Nodular lesions all over the body, calves mostly affected</td>
<td>Asdelae</td>
<td>Camels</td>
<td>Camel pox</td>
</tr>
<tr>
<td>Inflammation of udder teat, blood and pus in milk, teat damage</td>
<td>Angubike</td>
<td>All</td>
<td>Mastitis</td>
</tr>
<tr>
<td>Bloody urine, diarrhoea</td>
<td>Undahi</td>
<td>Small ruminants</td>
<td>Anaplasmosis</td>
</tr>
<tr>
<td>Affect animals grazing Awash, diarrhoea, bottle jaw, weight loss</td>
<td>Kirbi</td>
<td>Ruminants</td>
<td>Fascioliasis</td>
</tr>
<tr>
<td>Circular lesions, skin sloughs off at the back</td>
<td>Korboda</td>
<td>Ruminants</td>
<td>Dermatophilosis</td>
</tr>
<tr>
<td>Lameness, salivation, pain, contagious</td>
<td>Abeb</td>
<td>Cattle</td>
<td>Foot &amp;mouth disease</td>
</tr>
<tr>
<td>Arthritis, neck and back paralysis</td>
<td>Silatiu</td>
<td>All</td>
<td>poisoning</td>
</tr>
<tr>
<td>Coughing, other respiratory syndromes, death within 3 days of first sign of illness</td>
<td>Mesengelae</td>
<td>All</td>
<td>Pneumonia syndrome</td>
</tr>
<tr>
<td>Acute fatal severe depression, fever, death within 24hrs, bloating, blood from natural body openings</td>
<td>Lodorae</td>
<td>All</td>
<td>Anthrax</td>
</tr>
<tr>
<td>Affects youngs, sore lesions around mouth</td>
<td>Ameror</td>
<td>Camels small ruminants</td>
<td>Contagious ecthyma</td>
</tr>
<tr>
<td>Sneezing, circling head, shaking larvae in nasal discharge</td>
<td>Suratu/undufay</td>
<td>Camels, ruminants</td>
<td>Nasal boat fly</td>
</tr>
</tbody>
</table>
The Afar of Ethiopia name blackquarter *harrymude* where harra means forequarter and mude means to pearce or to spear. This is a livestock disease that is recognized and accurately described by most pastoralists. The Turkana pastoralists call it *lokichuma* which literally means piercing pain. The Fulani of Cameroon call this disease labba meaning the Devil's spear (15). The above few examples of livestock disease perceptions by the pastoralists show that pastoralists are very good in diagnosing livestock disease entities in their traditional way. In fact, Itaru Ohta (1984) while discussing the Turkana classification of livestock diseases stated that they classify the conspicuous uncommonness visible on the animal. It is after diagnosing that they indicate traditional remedies for these disease entities (16).

Most of the treatments of animal diseases in Afar are plant-based. A total of 17 medicinal plant and two-none plant-based remedies were described as most commonly used. Most plant-based preparations involve crushing the principal ingredients (pulverization) and giving the product by mouth or through the nose when dry or after soaking it in water, urine or milk. Dosage rates vary and are usually estimated using units such as human length or palm sizes.

Similar to other pastoralist communities, the Afar use single and compound plants preparations (Table 2). This is similar to the ethno-pharmaceutical knowledge worldwide. It may mean that these pastoralists have been able to link specific therapeutic actions to specific disease problems as practiced among other pastoralists (8, 17). For any particular disease, more than one remedy is known to treat it confidently. Except for dosage rates, there was great consistency in the preparation and administration procedures. However, some remedies are used more commonly than others. There are differences, however, in EVK and its practices between different ethnic groups. Comparison between the Afar and other pastoralists of Ethiopia, for example, has shown that there are some practices, which are known only by the Afar (8).

The present study results indicated that traditional health practitioners in Afar have a vast treasure of knowledge on herbalism, which should be validated scientifically. In general this knowledge is shared and used freely and widely amongst different groups of the Afar pastoralists. Although women use this knowledge, especially when men are not at home and their small stock is sick; their role is seldom recognized by their male counterparts. The major causes cited for using the ethnoveterinary treatment system by the study pastoralists were, the people of Afar believe in the system and have been using it for generations, easily available and affordable, very effective and works quickly consistent with results of other studies (18).

Drought and animal diseases are cited (data not shown) in nearly all pastoralist areas of Afar as the most important constraints and these factors play major roles in pastoral production strategies similar to the findings of Stem and Sollod (19). In common with other pastoralist and agro-pastoralist areas of the world, generally simple disease prevention and control measures like deworming, vaccination, first aid, wound dressing, and use of herbal and indigenous medicines are practiced in Afar to circumvent livestock mortality and increase its production (20).

**Future perspectives**

No medical system alone can fully address all challenges and complexities of health problems of the modern period. Practitioners of different medical systems should therefore...
collaborate and pool their knowledge to their mutual advantage and apply whatever is the best
from the various health care systems. It is therefore, essential to document and validate relevant
indigenous knowledge and those EVMs that the Afar pastoralists perceive as most successful. It
is also important to note that old people, both men and women, are custodians of EVK and pass
it onto the younger generation by word of mouth. Being away from pastoral life such as due to
natural calamities like droughts and insecurity alienates one from practicing EVK. For effective
promotion of EV practices, it is important that the treatments and practices are scientifically
validated and improved in one way or another. Efforts to document this knowledge need to be
enhanced but this will only be possible if ethnopharmacologists and traditional practitioners
establish a close rapport.

Table 2: Phytotherapy of animal diseases in Afar Region

<table>
<thead>
<tr>
<th>Disease treated</th>
<th>Plants used</th>
<th>Parts used</th>
<th>Preparation</th>
<th>Method of administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camel tryps</td>
<td>Eleusine jaegeri,</td>
<td>Leaves, seeds and small</td>
<td>Powdered &amp; formed in to paste, hot female goat blood &amp; water added, kept</td>
<td>Orally and intranasally, single dose</td>
</tr>
<tr>
<td></td>
<td>Combretum molle,</td>
<td>branches</td>
<td>overnight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lipidium sativum,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trigonella foenumgraecum,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBPP (contagious bovine</td>
<td>Cassia angustifolia, Euphrbia</td>
<td>All parts</td>
<td>Mix the 2 plants, keep overnight</td>
<td>Drink from the hole if many cases. Drench</td>
</tr>
<tr>
<td>pneumoniasia)</td>
<td>abyssinica</td>
<td></td>
<td></td>
<td>if single case. Drench in to nose also</td>
</tr>
<tr>
<td>Rinderpest</td>
<td>Delonix elata</td>
<td>Roots</td>
<td>Mix in water to extract juice</td>
<td>applicable</td>
</tr>
<tr>
<td>Bloody urine (Fern poisoning)</td>
<td>Arundo donax</td>
<td>All parts</td>
<td>Chop the plant</td>
<td>Drench Nasally</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>Cadiba rotundifolia,</td>
<td>Leaves</td>
<td>Chop, and add cold water Mix the three</td>
<td>Oral drench</td>
</tr>
<tr>
<td></td>
<td>Camel milk &amp; Cattle urine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia in Camels</td>
<td>Commiphora africana, Cadiba</td>
<td>Leaves</td>
<td>Chop &amp; mix in cold water</td>
<td>Drench the juice extract</td>
</tr>
<tr>
<td></td>
<td>rotundifolia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goat pox</td>
<td>Trigonella foenumgraecum,</td>
<td>All parts</td>
<td>Put in big dish and add milk of first time kidded doe</td>
<td>Spray herd by menopausal age women</td>
</tr>
<tr>
<td></td>
<td>Allium cepa, Cordia ovalis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthrax</td>
<td>Allium cepa, Ficus sycomorus,</td>
<td>Deferent parts</td>
<td>Mix in water</td>
<td>Oral and nasal drench</td>
</tr>
<tr>
<td></td>
<td>Cadiba rotundifolia, Capsicum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>microcarpa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bloat due to obstruction</td>
<td>Phytolacca dodecandra</td>
<td>Internal bark</td>
<td>Keep in cold water to extract juice</td>
<td>Drench the juice</td>
</tr>
<tr>
<td>Arthritis and abortion</td>
<td>Phonex reclinata</td>
<td>bark</td>
<td>The internal part is soaked in water</td>
<td>Drench the extracted juice</td>
</tr>
<tr>
<td>(Brucellosis)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Scientific validation should investigate how to maximize and standardize the efficacy of traditional remedies. We should also attempt to understand the active principles, look for evidence of synergism and find out whether a defined mixture of plant-derived compounds can replace the use of the crude herbal preparations. Finally we should promote conservation of medicinal plants in order to provide cost effective ecofriendly drugs against tropical diseases such as trypanosomiasis in farm animals. This could help to save many medicinal plant species from becoming extinct.

References
11. McCorkle CM and Martin M. Parallels and potentials in animal and human ethnomedical technique. Agriculture and Human Values 1998; 15: 139-144

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Review of Traditional Medicine Research in Ethiopia

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Abstract
The various steps involved in traditional medicine research are enumerated. The types of research activities that have been attempted in Ethiopia are mentioned. The various government policies in support of such research are cited. Prospects for development and utilization of traditional medicine within the concept of what is now known as "integrative medicine" are indicated.

Introduction
According to the WHO sponsored (1976) African Expert Group on Traditional Medicine, it may be defined as the sum-total of knowledge and practices, whether applicable or not, used in diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing (1).

Traditional medicine in Ethiopia comprises:
1. Herbal medications
2. Medication of origin
3. Medication for psycho-social conditions such as:
   3.1. Exorcisms for Zar, Aganint, Buda, Ayene Tilla etc.
   3.2. Fumigation (inhalation)
   3.3. Holy water and blessed water
4. Medical practices consisting of:
   4.1. Bone setting
   4.2. Surgery
   4.3. Cauterisation
   4.4. Counter-irritation
   4.5. Bleeding
   4.6. Cupping
   4.7. Steam Bath
   4.8. Vapor Bath (woushba) and
   4.9. Moxibustion

The Ethiopian traditional medicine practitioners include:
1. Orthodox Christian literate healer (debetera)
2. Orthodox Christian astrologer (Metsehaf Gelach)
3. Mystique spiritual healer (Bale Zar)
4. Divine healer (Psychi, Tenquay)
5. Bone-setter (Woggesha)
6. Kitab ketabi (Amult maker)
7. Islamic Literature healer (Kabir)
Research endeavors on Ethiopian traditional medicine have almost exclusively been directed to herbal medications. Herbal medications are therapeutical preparation formulated from the parts of one or more plant(s) or the extracts therefore. These are, in most instance polypharmaceuticals and the concentration of their active ingredients are relatively low. At optimized dosages their toxicity is believed to be minimal.

The research and development activities in Ethiopian traditional medicine may be classified as follows:

A) Observation, verification and customization. This has, by and large, been done by our ancestors since time immemorial. The medicinal effect of a part of a certain plant is observed, tried again and confirmed as to its therapeutic activity. This knowledge is henceforth passed on from generation to generation, orally or in writing.

B) Collection of ethno-botanical information. From the traditional knowledge of the community, the plant of medicinal interest is identified by its local names and in terms of its scientific (botanical) nomenclature. The parts of the plant associated with its medicinal value as well as its locality are noted. Voucher specimens of the plants are collected and systematically placed in a herbarium. Representative plants may also be raised in herbal gardens of the appropriate ecology.

C) Documentation of phytopharmaceutical information. The method of processing of the plant part and subsequent formulation of the herbal medication is carefully established. The season in which the plant part is to be collected has to be noted.

D) Documentation of ethnomedical (ethnopharmacological) information. Ethnomedical information pertaining to indications, dosage forms, dosages, contraindications and antidotes is obtained. The method of processing that results in the final dosage form has to be carefully noted.

E) Experimental approaches
   a) Phytochemical screening. Phytochemical screening for the possible presence of major groups of natural products can be carried out. Confirmation for the presence of specific groups of natural products can be followed by its isolation using the appropriate chemical and instrumental techniques. Subsequent to validation of pharmacological activity, the isolation of the individual compounds can be accomplished for purification and characterization purposes.

   b) Validation of claims of pharmacological activity. Pursuant to the leads obtained from traditional knowledge, an extract of the plant can be subjected to a battery of pharmacological in vitro or in vivo tests. Positive result at this stage will warrant further studies. Bioassay guided fractionation can also enable faster screening of a large number of samples.

   c) Toxicity studies. Acute toxicity studies on experimental animals based on average dosage levels of traditional practice can give an estimate of the appropriate level of dosage for the
herbal medications. Chronic toxicity studies may be required in order to assess long-term toxicity effects.

d) Development of appropriate dosage forms. Approximate dosage forms (capsules, tablets, elixir etc.) can be formulated with reproducible dosage levels for application in clinical studies as well as for marketing purpose.

F) Clinical approaches. Validation of therapeutic activity, and optimization of dosage and dosage regimens can be done using informed volunteers. Documentation of untoward effects can also be carried out. Randomized, placebo controlled double blind clinical trials can subsequently be undertaken as has been done, in the USA, for the clinical trial study of St. John’s wort (*Hypericum perforatum*) for depression (2).

G) Development of analytical methods. Quality control of raw materials and formulated herbal products can be undertaken, through analytical profiling, using characteristic marker constituents (3). Generally, macroscopic, microscopic, titrimetric, spectrophotometric, TLC, HPLC and HPLC-MS techniques can be employed with reasonably good results.

H) Products and marketing. The formulation of crude drugs, powdered parts, extracts, isolated compounds and their derivatives of analogues can be undertaken for purposes of marketing. Protocols that comply with WHO good manufacturing practice (GMP) requirements can be developed. Phytotaxonomic work on Ethiopian medicinal plants has been pioneered by Mooney (4), Strelcyn (5), etc. Research activities pertaining to sections B, C, D and E have been carried out by the School of Pharmacy, Department of Biology, Department of Chemistry, Institute of Pathology (A.A.U), Alemaya University, and Department of Drug Research (Ethiopian Health and Nutrition Research Institute), etc

With regard to clinical approaches, it appears that very little has been done so far. It is interesting to note, however, that a Government sponsored preliminary clinical trial of an anti-HIV AIDS herbal medication has been attempted in collaboration with Ato Woubu Negash (a well known Medhanit Awaki) sometimes in the 1980’s. Regarding traditional approaches to psycho-social ailments, it is worthwhile to recall the contributions of Aba Wolde-Tensay Gizaw, an Orthodox Church monk, who had been reported to have cured more than a million people in his therapy center in Wolfitso over a period of 14 years (6)

Standardization of herbal medications along with their production and marketing should be the final target of the multi-disciplinary approaches of research into traditional medicine. This will, naturally be encouraged by the trend toward combined use of orthodox and alternative (herbal) medicine characterized by the newly evolved term, “integrative medicine (7). The introduction of courses on traditional medicine in the curriculum of the Faculties of Pharmacy and Medicine can further enhance the extent of research in this field.

Organization and administration

It is evident that the research endeavors will depend on Governmental policy and such policy has been favorable all long. The practice of traditional medicine was legalized by a Proclamation in 1942, authorizing traditional healers to practice non-dangerous indigenous
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traditional system (1). The 1948 Proclamation encouraged the voluntary registration of traditional healers, at the Ministry of Health.

Proclamation No. 127/1977 Sub-article 2 created a favorable condition for research by encouraging the use of traditional medicine along with modern drugs, and in 1979, the Co-coordinating Office for Traditional Medicine was established at the Ministry of Health. By 1986 about 600 traditional healers were registered (8).

In 1993, a Health Policy and National Drug Policy were introduced with provision for the research and utilization of traditional medicine. The Science and Technology Policy was also supportive and encouraging towards traditional medicine research.

The latest retranslation has culminated in the establishment of the Drug Research Department (DRD) of the Ethiopian Health and Nutritional Institute (EHNRI). By 1996, the DRD had identified over 600 medicinal plants and chemical and biological profiles have been compiled from the scientific literature for about a third of them (9). Finally, this workshop on Traditional Medicine in Ethiopia is another indication of the central role that the DRD and EHNRI are playing in this field.

References


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Survey of Poisonous Plants in Southern Ethiopia

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Abstract: Though written account is wanting, many plants exist in Ethiopia that are poisonous to both humans and livestock. Some verbal reports also indicate the presence of plant species which, are employed in criminal poisoning. This study was therefore, conducted to document such empirical or local knowledge on poisonous plants. It was carried out in Southern Nations, Nationalities, and Peoples State of Ethiopia. A two stage stratified random sampling procedure was used in the selection of major ethnic groups (zones) and weredas (sub-district). Using open-ended questionnaires, a focus group discussion involving community leaders was performed in each of the 12 selected weredas. Using structured questionnaires, individual interviews were also held in up to three peasant associations of each wereda. 111 plants that are locally recognized as harmful to people and/or livestock because of their use as herbal remedies, food or fodder, and other reasons were documented. The inherent traits of the plants and the environmental factors contributing to the toxicity of the species and the conditions that favor exposure of people and livestock are discussed. A few selected species that are believed to pose the greatest hazard to people were addressed in detail. A review of the active principles that are responsible for the toxicity of these plants is also presented. In view of the ever expanding and unregulated trade in herbal products, the need for further intensified study in the area is stressed.

Introduction

Since antiquity, man has been exploring the plant kingdom for food, medicine, and clothing and for the best part of his effort he seems to have attained several of his objectives. In the process of learning which was by and large based on trial and error, man has undoubtedly experienced much poisoning by ingesting certain mushrooms, fruits, berries, etc. that produced various magnitudes of malaise or even death, whereas others could be taken safely (Abebe et al., 2001a). In spite of the awareness and better knowledge we have than our forefathers regarding the toxic substances in our immediate surrounding, the incidence of poisoning rather seems to be on the rise for a number of reasons and the culprit for most of this incidence are represented by diverse species of plants.

Factors that possibly lead to exposure of toxic plants

Mistaken identity that may arise from morphological similarity of the plants and/or vernacular names and mere curiosity on the part of the individuals may well be some of the important factors leading to the exposure of people to poisonous plants. Uncontrolled introduction of exotic species along with food aid and for other reasons has further aggravated the potential and actual exposure of people to harmful plants. Furthermore, the frequent episode of drought and famine seem to push the people to the edge of consuming unfamiliar or wild plants that they would have avoided under normal circumstances posing serious consequences to their health and/or life. However, in the Ethiopian context, the danger of exposure to
poisonous plants appears to stem mostly from the deliberate use of several species as therapeutic agents.

For example, a survey conducted by Abebe et al. (2001a and 2001b) demonstrated that several groups of plants that are with well known toxic effects to be the most prescribed among the 800 or so species that are employed as remedies in the indigenous health care system (1,2). Thus, of the 340 health problems addressed by the traditional health care delivery system, about 45% are catered for by plants considered as poisonous. The most prominent of these are the group of plants belonging to the family Euphorbiaceae commonly known as 'QULQWAL'. They are often characterized by their acrid milky latex and/or clear sap to which the toxicity of the species is attributed. The 1930 decree on the provision and sale of poisonous substances goes as far as considering not only the latex but even the honey from ‘QULQWAL’ to be poisonous and prohibits the sale of such honey (3). Most of the medicinally used plants in this family such as Croton macrostachys (bisana), Jatropha curcas (ayderke), Ricinus communis (gulo), Euphorbia tirucalli (kinchib), etc. accumulate diierpene esters that exhibit not only acute toxicity but also act as co-carcinogens depending on the extent of exposure. Other important medicinal plants that pose havoc to the well-being of people include members of the genera Crotalaria (Leguminosae), Senecio (Compositae), Cynoglossum and Heliotropium (Boraginaceae) all most all of which contain pyrrolizidine alkaloids which gum up the blood vessels that supply the liver and causing cirrhosis. Thus the major poisonous principles found among plants are compounds such as, alkaloids, terpenoids, glycosides, oxalates, certain proteins and tannins.

The outstanding medicinal families, genera, and/or species containing these compounds are shown in Table 1. However, it is not that easy to distinguish between toxic and non-toxic plant. In fact most of our drugs that have been manufactured from natural sources originate from plants that are known to be highly toxic, e.g. digitoxin, quinine, etc. from species of Digitalis and Cinchona, respectively.

As far back as 16th century, Paracelsus noted that “All substances are poisonous; there is none which is not poison. The right dose differentiates a poison and a remedy.” Even over-the-counter analgesics can cause liver damage in susceptible people. But because they are tested and prescribed at specific doses, risks and benefits are well known. Similarly, most of the dangerous plants used as local remedies could prove most important medicinally, for in small, controlled doses, many of their potentially lethal constituents may be of great therapeutic value.

Unfortunately, however, traditional medicine is by and large an art rather than science and the safety of the herbal remedies cannot simply be pinned down to a single factor of dose but to many other parameters, such as method of preparation, part of the plant used, the growth stage in which the plant is to be found, the season of harvest, the purpose it is used for, and the constitution, age and even gender of the individual the plant is prescribed for, etc.

The existing situation, however, indicates that there are problems which, undermine the need for observing all or most of the above conditions before or during administering of the plants as remedies. The reasons for this oversight are many, but the most important ones include:

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1. The ageing and the consequent decline in the number of knowledgeable herbalists
2. The resurgence of interest in and the worldwide popularity of medicinal plants and the burgeoning trade in herbal remedies have encouraged involvement of exclusively profit-motivated people with no etiquette or knowledge of traditional remedies. Such unscrupulous elements are not only engaged in prescribing or selling of individual part of the part of the plant they hardly know but also in the irrational compounding of parts of various species as well as compounding of plants with synthetic drugs. A remedy from a single source that may be harmless by itself, inevitably interact in combination with others, possibly producing unexpected negative effects. Herbal products and conventional drugs are also shown to interact, altering the way they are metabolized. The traditional ayurvedic preparation containing the alkaloid piperine, for example, is stated to increase the toxicity of theophylline (a bronchodilator) and of phenytoin, an anticonvulsant (4).

3. Free access to the media including those of the government to make covert or overt enticing advertisement claiming all kinds of cures for traditional remedies by the profiteers, and
4. The preference of the population relying on herbal remedies for medicaments with far-reaching pharmacological effects and the importance they attach to these as better drugs than those with subtle action

In conclusion, it should be born in mind that that there are several species with excellent record of safety and that plant preparations are not more dangerous than manufactured pharmaceuticals. However, in the absence of regulatory mechanism, many of the plant preparations could have adverse effects that do not justify their use. Therefore, there is no doubt we need self-regulation or government regulation or both to regulate the herbal market which now seems to ride unbridled.

References

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Table 1. Commonly employed medicinal plants with toxic constituents

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Species</th>
<th>Family</th>
<th>Effects of exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td><em>Croralaria</em> spp</td>
<td>Leguminosae</td>
<td>Hepatoxic</td>
</tr>
<tr>
<td>(Pyrrolizidine)</td>
<td></td>
<td>Boraginaceae</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Cynoglossum</em> spp</td>
<td>Composite</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Heliotropium</em> spp</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Senecio</em> spp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Glycoalkaloids)</td>
<td></td>
<td>Solanaceae</td>
<td>Nausea, irritation, constipation, apathy, diarrhea, drowsiness, unconsciousness, etc</td>
</tr>
<tr>
<td>(Tropane)</td>
<td><em>Solanum</em> spp</td>
<td></td>
<td>Mydriasis, delirium, respiration failure, neuro-toxic, hallucination</td>
</tr>
<tr>
<td></td>
<td><em>Datura stramonium</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Withania somenifera</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Heteroside)</td>
<td><em>Calotropis procera</em></td>
<td>Asclepiadaceae</td>
<td>Toxic</td>
</tr>
<tr>
<td>(Colchicine)</td>
<td><em>Gloriosa superba</em></td>
<td>Liliaceae</td>
<td>Cytotoxic</td>
</tr>
<tr>
<td>(Crinamine)</td>
<td><em>Crinum</em> spp</td>
<td>Amaryllidaceae</td>
<td>Toxic</td>
</tr>
<tr>
<td>(Sanguinarine)</td>
<td><em>Argemone mexicana</em></td>
<td>Papaveraceae</td>
<td>Abdominal dropsy, glaucoma</td>
</tr>
<tr>
<td>Terpenoids</td>
<td><em>Euphorbia</em> spp</td>
<td>Euphorbiaceae</td>
<td>co-carcinogenic &amp; pro-inflammatory</td>
</tr>
<tr>
<td>(Diterpene esters)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Croton macrostachys</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Jatropha curcas</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Gnidia</em> spp</td>
<td>Thymelaeacea</td>
<td>co-carcinogenic</td>
</tr>
<tr>
<td>(Tetracyclic triterpenes)</td>
<td><em>Cucumis ficifolius</em></td>
<td>Cucurbitaceae</td>
<td>Highly cytotoxic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glycoside (Cynogenic, cardiac, saponin, coumarin)</td>
<td>Acokanthera schimperi</td>
<td>Various families</td>
<td>Cytochrome oxidase inhibition, cardiotoxic haemolytic, GIT, &amp; respiratory irritants, convulsant, haemorrhagic, vesication, erythema</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Adenia venenata</td>
<td>Ageratum coinizoides</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artemisia spp</td>
<td>Cassia spp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commelina benghalen</td>
<td>Eucalyptus globulues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficus spp</td>
<td>Phytolacca dodecandra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prunus spp</td>
<td>Ranunculus spp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruta chalepensis</td>
<td>Trifolium spp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ximenia americana</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Oxalates | Rumex spp | Polygonaceae | Colic, depression, coma, paralysis of nervous system, irritation |
| --- | Arisaema spp | Araceae | |
| Oxalis spp | Oxalidaceae | | |
| Portulaca oleracea | Portulacaceae | | |

<table>
<thead>
<tr>
<th>Phytotoxins (such as ricin, curcin, abrin modeccin)</th>
<th>Ricinus communis</th>
<th>Euphorbiaceae</th>
<th>High toxic protein molecules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jatropha curcas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abrus precatorius</td>
<td>Leguminosae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adenia venenata</td>
<td>Passifloraceae</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tannins (5-28%)</th>
<th>Punica granatum</th>
<th>Punicaceae</th>
<th>The liver, GIT irritant, destructive to liver, oncogenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osyris spp</td>
<td>Santalaceae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ekebergia capensis</td>
<td>Meliaceae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calpumia aurea</td>
<td>Leguminosae</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acacia spp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catha edulis</td>
<td>Celastraceae</td>
<td></td>
<td></td>
</tr>
</tbody>
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An EMIC Understanding of Health and Health Problems Among Selected Oromo Communities of Western Ethiopia

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Abstract
The Oromo people constitute the largest single ethnic group in the Horn of Africa, occupying nearly a third of Ethiopia’s land area. In as much as the ethnic group occupies an extended geographical setting and owns a rich socio-cultural system, there are important locally viable resources at its disposal. Among such resources, indigenous medical wisdom and medicinal formulations are believed to be only few. Nevertheless, there are not enough studies done on these important resources. This study was conducted with the intention of investigating and documenting how health and health problems are understood in two neighboring zones of western Ethiopia. Initially, a four-month exploratory investigation was made from November 1992 to February 1993 and follow-up fieldwork was carried out in December 1996 and January 1997 in Illubabor and Jimma zones. The methods of data collection included observation of patients during their conversation with healers; the healing process itself; in-depth interviews with patients under treatment as well as focus group discussions with local healers and selected notable members in the study communities. The results showed that there were clear differences between formal health institutions’ documentation and what local people believe to be prevalent health problems in the study communities. According to the health institutions’ documents, helminthiasis, lung disease, infection of the skin, rheumatism and diarrhoea are the common health problems reported to health delivery points in both zones. On the contrary, the community level study invariably revealed that afuura lafaa (allergy from earth breath), busa (malaria), dhukuba dhiira (gonorrhoea), shimbirro (jaundice) and saree maratu (rabies) were the most common health complaints. Furthermore, it was found that local understanding of causes of health problems determine subsequent treatment seeking and decision to visit traditional healers or western healthcare providers. This study suggests that planning appropriate health service delivery needs to consider local wisdom about causes and management of health problems and locally available resources.

Introduction
Studies conducted thus far have shown plant medicine to play vital role in health care of large sections of the population in developing countries (1). It was also argued that plant medicine helps to bridge the gap between demand for, and supply of, modern medical services (2). It is widely known that modern medicine has benefited from plants in discovering cures for various health problems (3).

In developed countries, plant derived solutions still serve important purposes (4). Developing countries like China, Pakistan, India and Vietnam have identified potential usage of plant medicine and incorporated them into their overall health care system (3). Among African countries, Ethiopia is often quoted as one of the six countries of the world where about 60% of the plants are said to be indigenous with their healing potential (5). These plants vary in their.

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distribution over the country due to the varied geographic and climatic conditions of the country (6). Only few studies were geared towards indigenous medicine with an objective to improve their usage. Consequently, the overall use these plants remained within the domain of local healers as they often resort to them for the treatment of different health problems. Among rural Oromo communities of Jimma and Illubabor zones, as would be the case elsewhere traditional health system is believed to be an important health care system. Although there exists an established wisdom about health care at community level, the role of traditional medicine in health service coverage and the knowledge of the community about traditional medicine is lacking. The present study was undertaken to identify community’s perspective of how health and health problems are understood, identify strategies to manage prevailing health problems within community settings, and contribute to the already scarce resource.

Methods
Basic data on major health problems and their causes, treatment strategies and the community’s general understanding of health and health problems were collected from Chora District of Illubabor zone and Qersa District of Jimma zone. Initial data was collected during November 1992-February 1993 with a follow up field visits during December 1996 and January 1997. Data was collected from key opinion leaders (19), selected healers (7) and clients to the healers (49). In depth discussions and FGDs were the major methods employed to collect data. However, observations and informal discussions were also important to generate relevant information. Unstructured questionnaire was used to generate present information. In the process of data collection the local language (Oromiffaa) was employed. The collected information was carefully analyzed and described.

Results and discussion
The concept of health and health problems
Among those in the study community, health was unanimously defined as fayya (literally means well-being). However, its specific meaning depends on the contexts under which it is used. From discussions with elders, it was gathered that health was defined in a number of ways such as:

“Yoo nagaa qabaatne fayyaa qabna” (If we have peace we have health)

“Maa fayyaa na dhowwitaa?” (Why do you disturb me?)

“Coraan fayyaa nan qabuif (I do not feel healthy)

“Jireenyi tollaan fayyaan hindhabamu” (If life is joyful, health will be there)

From these constructs it was gathered that fayyaa is reflected in peace, joy, absence of ill feeling and success in routine life. This indicates that the concept of fayyaa is comprehensive, referring to a balanced and harmonious relationship between human beings, nature and Waaqa/Rabby reflecting that health problems are related to social life processes. The study result further indicated that an Oromo in both communities would say “fayyaa hinqabu” (I do not feel healthy) when she/he feels not comfortable in life, be it due to problems related to physical health or otherwise. However, physical ill feeling is expressed as dhukkubsachu (feeling sick physically). A sick person expresses her/his sickness by this latter concept [nadhukuba (I am sick)] which is more specific. The community perceives that a person who encounters health problems or any other problem in life when she/he violates established social norms. It is believed in the study communities that breaching socially acceptable behaviour such as lying (sobu), lack of both spiritual and physical purity (qulqulumaa dhabu) and failure
to respect each other and nature in general (*kabaja dhabu*), all which is referred to as sinning (*cubbu*) intensifies health problems.

### Table 1: Cause and symptoms of the complained health problems as identified from the study subjects

<table>
<thead>
<tr>
<th>Common ill-health</th>
<th>Causal attributes</th>
<th>Symptoms manifested</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Afuura laffa</em> (literally means earthen breath)</td>
<td><em>Shetana</em> (satan/devil)</td>
<td>Headache, swelling of the body, painful feelings in the back and joints, complete or partial paralysis and madness</td>
</tr>
<tr>
<td><em>Busa</em> (unknown epidemic)</td>
<td>Wind and contagion with an infected person</td>
<td>Headache, malignant diarrhoea and abdominal discomfort</td>
</tr>
<tr>
<td><em>Dhukuba dhiira</em> (gonorrhoea)</td>
<td>Sexual intercourse with an infected person</td>
<td>Mucous discharge from the urethra, irritation while urinating</td>
</tr>
<tr>
<td><em>Shimbiro</em> (jaundice)</td>
<td>Urine of bat</td>
<td>Wounding of the nose and itching in the forehead</td>
</tr>
<tr>
<td><em>Sabata waaqayyo</em> (literally means belt of waqa, rainbow)</td>
<td>Urinating at the direction of the rainbow</td>
<td>Urinary complication stomach swelling and loss of appetite</td>
</tr>
<tr>
<td><em>Saree maratu</em> (rabies)</td>
<td>Biting of &quot;bad dog&quot;</td>
<td>Isolation, hating sounds and eventual madness</td>
</tr>
</tbody>
</table>

Respect for elders, truthfulness and love, proper use of natural resources and loyalty to the creator are signs of well being. *Waqa/Rabby* controls the day-to-day activities of human beings through His intermediary spirits called *ruhaniya* or *ayaana*. According to local wisdom, health among the study communities is understood within the framework of religion. The communities believe in Rabby an omnipresent, creator and saviour of life. Harmony among people and between people and the physical environment is believed to produce a healthy life. Misfortunes are manifested in experiencing illness, death and disturbance of well being are signs of Rabby’s exasperation consequent to violations of shared agreements. The results indicate that beliefs about causes of health problems are determinants of treatment seeking decisions (7).

### Identification of treatment strategies

In the study communities, treatment strategies can be classified as home remedies, indigenous medicine by local healers and ‘modern medicine. Despite their distinct features and procedures of treatment, the three health care strategies often overlap, as patients appear to utilise one strategy after another without taking time to see the effect of each trial. Home remedy is the most popular but is an overlooked sector of health-care strategy among all societies in Ethiopia and elsewhere (8). This health care strategy, often called "self-care", is the first and universal health care option available to every one. It is the basic level where the problem is recognised and defined. People always exploit their shared wisdom in order to manage health problems at home before looking for other options regardless of the type of health problem and its intensity.
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On the basis of diagnosis, the sick person is given either medicine (qoricha) prepared from plant and animal sources to be used orally or topically or is spiritually strengthened through prayer (duai). However, often both are employed combination for the treatment of specific health problems. Seeking modern health service often comes after the above are exhausted or simultaneously rarely. Local patterns of seeking health care in the study area can be explained in terms of four different but overlapping factors:

1. The type of felt health problem:— Inconveniences in life which are known to be psycho-social are understood among the study communities as caused by sheytan (devil) and ekera (spirit of a dead relative). Such problems are believed to be better treated either at home or by indigenous healers.

2. The general health cosmology:— According to local wisdom, those problems which the society claims to have lived with, such as those caused by afuura lafuu and sabata waqayyo, shimbiroo and saree maraatu, can easily be treated at local level by healers. On the other hand, gastritis, problems of kidney, heart diseases and mental health problems are believed to have come along with modern medicine. These problems are often taken to modern health institutions.

3. Physical accessibility to health care facilities:— Usually, unlike modern healthcare institutions, local healers are found within accessible distance. This was found to affect the decision of individuals to look for health care options.

4. Cost of treatment:— The problems involved in readily getting health service with affordable cost is also a factor that determines healthcare choice of individuals or their relatives. Local healers provide health care with relatively manageable and negotiable prices. These factors singly or in combination justify the rationality behind patients' health care seeking patterns of communities living in the Chora District of Illubabor zone and Qersa District of Jimma zone.

Conclusions and recommendations

Although proper studies on indigenous medical ideology are very much limited, the few studies conducted have shown that causes both in those earlier days and even currently are always attributed to Waqa/Rabby. Thus, treatment practice involves divination in the name of Waqa/Rabby. Similarly, appreciating the local treatment practices of the Oromo, has witnessed that the Oromo are famous for their treatment of different health problems by making invocation to their Waqa/Rabby.

Even later after the advent of 'modern' medicine, the majority of the Oromo continued to employ indigenous medicine as a dependable health care strategy without refuting the former altogether. Rather, they have incorporated it into their medical cosmology as an alternative medical strategy. Thus, it is important to pinpoint that health institutions should pay due attention to what are believed to be common health problems, their causes, underlying cosmology and resources in efforts to provide acceptable health services.

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Ethnobotanical Survey and the Medicinal Plants of Some Areas in South and Central Ethiopia

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Abstract
Ethiopia is a land with multiplicity of ethnic groupings with complex cultural diversity which, needs to be preserved by documenting the indigenous information. One field of such studies, which has not been given due attention, is ethnobotany, the scientific investigation of plants as used in indigenous cultures. The rapid loss of the natural habitat of these plants forces the documentation of uses of Ethiopian plants. In this study, an ethnobotanical survey of different ethnic groups was performed to document the indigenous knowledge of plant importance to the local people. Plants of ethnobotanical importance in some parts of Southern and Central Ethiopia were documented. Some of the plants of medical importance were extracted by organic solvents and the crude extracts tested for their biological activity on brine shrimp (Artemia salina). The results indicate that the diversity of plants and their ethnobotanical importance in the areas surveyed is so vast. This calls for the need to record the information before such a rich heritage is lost due to various anthropogenic and other natural causes.

Introduction
Ethnobotany is the study of plants used by people and literally means "people's botany" and is defined as the study of plants of importance to "primitive people" (1). It involves an interdisciplinary approach encompassing the fields of botany, chemistry, pharmacology, and anthropology (2). Some of the steps followed in ethnobotanical research include, documenting how people classify, identify and relate to plants, examining the reciprocal interactions of plants and people, taxonomic identification of the selected plants and biological and chemical evaluation of their constituents (3). In general ethnobotany is the scientific investigation of plants as used in indigenous cultures for food, medicine, magic, rituals, building, household utensils and implements, musical instruments, firewood, pesticide, clothing, shelter and other purposes (4).

Ethnomedicine studies the indigenous ethnic medicinal plants. Since medicinal plants are the main, often only sources of medicine for the rural population and are of high demand in the health care systems of these population as compared to modern medicines. This is partly because modern medical services are either unaffordable or unavailable to the vast majority of local people due to their skyrocketing cost coupled to lack of transport to and from health care centres. Hence medicinal plants are widely used in the treatment of numerous human diseases.

Ethiopia is a land of great topographical diversity of high rugged mountains, flat topped plateau, deep gorges, incised river valleys and rolling plains which are responsible for tropical, sub-tropical and temperate climatic conditions. This environmental mosaic accentuated the diversity of plant and animal life. The country is a land not only of highly varied landscape and hence flora and fauna, but also of a multiplicity of ethnic groupings with complex cultural diversity. Furthermore, the existing archaeological evidence suggests that Ethiopia is one of the
few countries considered to be the cradles for the evolution of mankind-a fact that this is also a testimony to the great antiquity and diversity of cultural values (5).

The documentation of medicinal and other uses of Ethiopian plants is becoming increasingly urgent because of the rapid loss of the natural habitat of some of these plants due to anthropogenic and other natural activities. According to Hedberg (1979), the area of forest and woodland that used to constitute 16% of the country in 1954 has gone down to a mere 4% by 1979 (6). At present less than 3% of the total land area is presumed to be covered by forest. Habitat conversion threatens not only the loss of plant resources but also traditional community life and cultural diversity, and the accompanying knowledge of the medicinal and cultural value of several endemic species (7).

To preserve indigenous knowledge of plant use in general and of traditional medicine in particular, an ethnobotanical survey of ethnic groups is very crucial. This study was performed with this background to contribute to the documentation of traditional knowledge of medicinal and other uses of Ethiopian plants.

Areas of study
This study was conducted in selected areas of Southern and Central Ethiopia. Namely: Esera district (Dawro Zone); Ankober, Aliyuamba, Aferbaine, Getagedel and Debrelibanos areas (Northern Shewa Zone); Kemissie, Dessie and Wajja (Wello Zone); Wosha, Wondogenet and Shashemene (Sidama Zone); Jima, Giren, Boye, Yebu and Seka areas (Jima Zone).

Methods of study
Ethnobotanical survey: The ethnobotanical information was collected by undergoing field trips to villages of different ethnic groups; making friendships with one of the natives and persuading him/her to documents and/or collect which plants and what parts are used by the local population and for which purpose. When trying to get information on medicinal plants, subjects who were treated by traditional medicine were contacted directly, since healers keep their professional secrets and are unwilling to reveal to outsiders. Enlisting the help of the local political leaders, to help us to talk to the healers in their area and to inform them the arrival of a scientific expedition, was another method used in gathering information. And even an attempt was made to convince the healers in such a way that their co-operation is of great benefit to the country and at the same time their revelation of their knowledge of medicinal plants will not in any way interfere with the continued practice of their art and the secrecy of the medicinal plants is kept from our side. Subsequently, plants of importance to the local people were documented. For the botanical authentication of the plants documented, vernacular names were used since they are of great importance in locating a specimen bearing similar vernacular name from the herbarium collections. Some of the plants used in traditional medicine were collected for screening with information on their habit, nature of useful parts, and their medicinal use or disease treated. Voucher specimens of the plant materials were collected and deposited in the National Herbarium, Addis Ababa University.

Biological activity: Plants brought for studying their biological activity were air dried, ground to powder and extracted with CHCl₃/MeOH (1:1). The crude extracts were screened for biological activity on brine shrimp, an indicator of general bioactivity and cytotoxicity, at 200

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mg/ml and 100 mg/ml concentration according to the method described by Solis et al (1993) (8).

Results and discussion

This study lists plants that have ethnobotanical importance to the local population in South and Central Ethiopia. Emphasis was made on documenting plants that have medicinal value, on those that are used as spice or additives to food (known locally as 'kimem'), on those used for their fragrance (known locally as 'Mitin tis'), on others used in hair softening and on some used as hedges (Tables 1-11). Biological activity of the crude extracts of those that were used by the local population in alleviating ailments were screened on brine shrimp (Artemia salina) and are shown in Tables 1 and 4.

The data presented in this study indicated that: i) one type of plant was usually indicated to be used for treating a number of different ailments; ii) one part of a plant was mentioned to be used for treating different types of less related ailments; iii) different parts of plants could be used to treat different ailments; iv) different parts of plants were recommended to be used for treating one kind of ailment; v) only certain selected parts of plants were indicated to be used for medicinal purposes and; vi) some plants were mentioned to be used only in combination with other medicinal substances.

The report by no means gives a complete account of useful plants of the regions. But the surveyed areas are assumed to give a representative picture of the use of plants for the described uses by the different ethnic groups of the regions. All other aspects of plant use require additional in-depth studies since the diversity of both vegetation and the ethnic groupings in the areas imply a potentially vast amount of information to be recorded before such a rich heritage is lost due to various anthropogenic and other natural causes. Detailed botanical and taxonomic information of Ethiopian plants have been documented in several volumes of Flora of Ethiopia. The present study and a few other reports by the author (Kassu et al., 1999; Kassu and Wondimkun, 2002) are believed to supplement the existing knowledge on Ethiopian plants (9,10).

References


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Acknowledgements: Financial support for the ethnobotanical field trips was obtained from NAPRECA through Professor Ermias Dagne, Department of Chemistry, Addis Ababa University. Ato Melaku Wondafrash and W/t Yaltashework Ketema of the National Herbarium, Addis Ababa University, are thanked for their valuable help in herbarium processing and specimen identification.

Table 1: Medicinal plants collected from Esera district, Dawro Zone and result of biological activity on brine shrimp

<table>
<thead>
<tr>
<th>Local name**</th>
<th>Scientific name (Voucher No.)</th>
<th>Plant part***</th>
<th>Ailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attuch A, Hambalachua D</td>
<td>Verbena officinalis (S535)</td>
<td>LF</td>
<td>Indigestion</td>
</tr>
<tr>
<td>Chawla D</td>
<td>—-(S538)*</td>
<td>Sd</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Kebaricho A, Bursa D</td>
<td>Echinops kebericho (S539)*</td>
<td>Rt</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Korch A, Bortua D</td>
<td>Erythrina abyssinica (S536)*</td>
<td>Rt BK</td>
<td>Indigestion</td>
</tr>
<tr>
<td>Kosso A, Soydua D</td>
<td>Hagenia abyssinica (S532)*</td>
<td>Fl</td>
<td>Taeniasis</td>
</tr>
<tr>
<td>Mekmeko A, Cholea D</td>
<td>Rumex abyssinicus (S540)*</td>
<td>Rt</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Mitashiya D</td>
<td>Pittosporum sp. (S534)*</td>
<td>St Bk</td>
<td>Ascariasis</td>
</tr>
<tr>
<td>Timiz A, Tinja D</td>
<td>Piper capense (S537)*</td>
<td>Sd</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Tult A, Zantala D</td>
<td>Rumex nepalensis (S535)*</td>
<td>Rt</td>
<td>Yehod Kurtet</td>
</tr>
</tbody>
</table>

Key: negative to brine shrimp test a: 20% mortality at 200mg/ml b: 100% and 90% mortality at 200mg/ml and 100mg/ml. c: 90% and 70% mortality at 200mg/ml and 100mg/ml respectively.**,***-See Table-11.

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Table 2. List of plants used in traditional medicine as practiced in some villages of Esera district, Dawro Zone

<table>
<thead>
<tr>
<th>Local Name**</th>
<th>Scientific Name</th>
<th>Plant Part***</th>
<th>Ailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abalo⁴, Shushalia⁴</td>
<td>Brucea antidysenterica</td>
<td>Lf</td>
<td>Syphilis</td>
</tr>
<tr>
<td>Aleblabit⁴, Kona⁴</td>
<td>Tragia pungens</td>
<td>Lf</td>
<td>Snake bite</td>
</tr>
<tr>
<td>Anfar⁴, Kampara⁴</td>
<td>Buddleja polystachya</td>
<td>LF</td>
<td>Malaria</td>
</tr>
<tr>
<td>Ariti, Natru⁴</td>
<td>Artemisia rehman</td>
<td>Lf</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Atefaris⁴, Laflafi⁴</td>
<td>Datura stramonium</td>
<td>Lf</td>
<td>Wound</td>
</tr>
<tr>
<td>Azamir⁴, Walasonia⁴</td>
<td>Bersama abyssinica</td>
<td>Rt/Bk</td>
<td>Ascariasis</td>
</tr>
<tr>
<td>Bisana⁴, Soyda⁴</td>
<td>Croton macrostachys</td>
<td>Lf</td>
<td>Taeniasis</td>
</tr>
<tr>
<td>Bidara⁴</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damakesse⁴</td>
<td>Ocimum lamifolium</td>
<td>Lf</td>
<td>Mich-Beshit</td>
</tr>
<tr>
<td>Dokma Ocha⁴</td>
<td>Syzygium guineense</td>
<td>Rt</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Embuya, Bulua⁴</td>
<td>Solanum sp.</td>
<td>Lf</td>
<td>Cough</td>
</tr>
<tr>
<td>Emua⁴</td>
<td></td>
<td>Rt</td>
<td>Syphilis</td>
</tr>
<tr>
<td>Endod⁴, Hanchicha⁴</td>
<td>Phytolacca dodecandra</td>
<td>Rt</td>
<td>Gonnorhoea</td>
</tr>
<tr>
<td>Enkiko⁴, Kankue⁴</td>
<td>Embelia schimperi</td>
<td>Fr</td>
<td>Taenia</td>
</tr>
<tr>
<td>Feto⁴, Sibika⁴</td>
<td>Lipidium sativum</td>
<td>LF/Sd</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Gesho⁴, Geshua⁴</td>
<td>Rhamnus prinoides</td>
<td>Sd</td>
<td>Ring worm</td>
</tr>
<tr>
<td>Grawa², Gara²</td>
<td>Vernonia amygdalina</td>
<td>Rt/Lf</td>
<td>Malaria</td>
</tr>
<tr>
<td>Gulo², Tema²</td>
<td>Ricinus communis</td>
<td>Sd</td>
<td>Forefor</td>
</tr>
<tr>
<td>Kesse², Shasha²</td>
<td>Lippia sp.</td>
<td>Lf</td>
<td>Ring worm</td>
</tr>
<tr>
<td>Korerima², Okashiya²</td>
<td>Aframomum corrorima</td>
<td></td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Korikocha²</td>
<td></td>
<td>Rt</td>
<td>Gonnorhoea</td>
</tr>
<tr>
<td>Kukua², Kaka²</td>
<td>Euphorbia abyssinica</td>
<td>Rt</td>
<td>Gonnorhoea</td>
</tr>
<tr>
<td>Matolia²</td>
<td></td>
<td>Lf</td>
<td>Ring worm</td>
</tr>
<tr>
<td>Misirich, Alga²</td>
<td>Clerodendrum myricoides</td>
<td>LF</td>
<td>Eye disease</td>
</tr>
<tr>
<td>Muja, Maga²</td>
<td>Snowdenia polysyachya</td>
<td>WP</td>
<td>Ring worm</td>
</tr>
<tr>
<td>Nechbhrzaf², Barzafia²</td>
<td>Eucalyptus globulus</td>
<td>Lf</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Nechshincurt², Tumua²</td>
<td>Allium sativum</td>
<td>Bb</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Saa okata²</td>
<td></td>
<td>WP</td>
<td>Indigestion</td>
</tr>
<tr>
<td>Sangana²</td>
<td>Cucumis sp.</td>
<td>Rt/Bk</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Sensel², Sansalia²</td>
<td>Adhathoda schimperiana</td>
<td>Lf</td>
<td>Ascariasis</td>
</tr>
<tr>
<td>Seta adam², Talotya²</td>
<td>Ruta chalepensis</td>
<td>Lf/Fr</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Tumua²</td>
<td></td>
<td>Rt</td>
<td>Taeniasis</td>
</tr>
<tr>
<td>Woshilecho²</td>
<td></td>
<td>WP</td>
<td>Etil-beshita</td>
</tr>
<tr>
<td>Wulkifa, Lolwu²</td>
<td>Dombeya sp.</td>
<td>Fl</td>
<td>Eye disease</td>
</tr>
<tr>
<td>Yemdirberbere², Aydmania²</td>
<td>Spilanthes sp</td>
<td>F1</td>
<td>Tooth ache</td>
</tr>
<tr>
<td>Zinjibil², Jenjelu²</td>
<td>Zingiber officinale</td>
<td>Rh</td>
<td>Yehod Kurtet</td>
</tr>
</tbody>
</table>

** See Table-11
### Table 3: Medicinal plants in Ankober and Aliyuamba areas, East Shewa zone

<table>
<thead>
<tr>
<th>Amharic Name</th>
<th>Scientific Name</th>
<th>Plant Part**</th>
<th>Ailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aleblabit</td>
<td><em>Tragia pungens</em></td>
<td>Rt</td>
<td>Impotence</td>
</tr>
<tr>
<td>Azo hareg</td>
<td>---</td>
<td>Lf</td>
<td>Chife</td>
</tr>
<tr>
<td>Bisana</td>
<td><em>Croton macrostschyus</em></td>
<td>Bd</td>
<td>Gonorrhea</td>
</tr>
<tr>
<td>Chew wanza</td>
<td>---</td>
<td>Bd</td>
<td>Gubet</td>
</tr>
<tr>
<td>Damakesse</td>
<td><em>Ocimum lamiifolium</em></td>
<td>Lf</td>
<td>Mich, poison</td>
</tr>
<tr>
<td>Dedeho</td>
<td><em>Euclea shimperi</em></td>
<td>Lf</td>
<td>Dem abnet</td>
</tr>
<tr>
<td>Dedeho</td>
<td><em>Euclea shimperi</em></td>
<td>Bd</td>
<td>Entil</td>
</tr>
<tr>
<td>Enchibir</td>
<td><em>Rubia cordifolia</em></td>
<td>Rt</td>
<td>Cough</td>
</tr>
<tr>
<td>Etsefaris</td>
<td><em>Datura stramonium</em></td>
<td>Lf</td>
<td>Lash</td>
</tr>
<tr>
<td>etse menahe</td>
<td><em>Securidaca longipedunculata</em></td>
<td>Wp</td>
<td>Snake bite, Syphilis</td>
</tr>
<tr>
<td>Fikru tena</td>
<td>---</td>
<td>Bd</td>
<td>Gonorrhoea</td>
</tr>
<tr>
<td>Game</td>
<td><em>Ehretia cymosa</em></td>
<td>Bd</td>
<td>Gonorrhoea</td>
</tr>
<tr>
<td>Hake nur</td>
<td>---</td>
<td>Wp</td>
<td>snake bite</td>
</tr>
<tr>
<td>Mehan endod</td>
<td><em>Phytolacca dodecanra</em></td>
<td>Rt</td>
<td>Gonorrhoea</td>
</tr>
<tr>
<td>Mezaze</td>
<td>---</td>
<td>Lf</td>
<td>Wound, poison</td>
</tr>
<tr>
<td>Kermano</td>
<td>---</td>
<td>Lf</td>
<td>Dem abnet, Nesir</td>
</tr>
<tr>
<td>Kitkita</td>
<td><em>Dodonea viscosa</em></td>
<td>Sd</td>
<td>Megagna</td>
</tr>
<tr>
<td>Kurinchit</td>
<td>---</td>
<td>Rt</td>
<td>Ayinmetal</td>
</tr>
<tr>
<td>Segemeti</td>
<td>---</td>
<td>Lf</td>
<td>Guroro</td>
</tr>
<tr>
<td>Sensel</td>
<td><em>Adhathoda schimperiana</em></td>
<td>Bd</td>
<td>Gonorrhoea</td>
</tr>
<tr>
<td>Sensel</td>
<td><em>Adhathoda schimperiana</em></td>
<td>Lf</td>
<td>Gonorrhoea, Gubet</td>
</tr>
<tr>
<td>Shinbrut hareg</td>
<td>---</td>
<td>Wp</td>
<td>Snake bite</td>
</tr>
<tr>
<td>Telenj</td>
<td><em>Achyranthes aspeera</em></td>
<td>Lf/Rt</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Tenbele</td>
<td><em>Jasminum abyssinicum</em></td>
<td>Sd</td>
<td>Megagna</td>
</tr>
<tr>
<td>Tifrendo</td>
<td>---</td>
<td>Rt</td>
<td>Bird</td>
</tr>
<tr>
<td>Tife</td>
<td>---</td>
<td>Lf</td>
<td>Guroro</td>
</tr>
<tr>
<td>Tife</td>
<td>---</td>
<td>Wp</td>
<td>Nekersa, Entil</td>
</tr>
<tr>
<td>Timbaho</td>
<td><em>Nicotina tabacum</em></td>
<td>Lf</td>
<td>Lash, Python bite</td>
</tr>
<tr>
<td>Tult</td>
<td><em>Rumex nepalensis</em></td>
<td>Lf</td>
<td>Gubet</td>
</tr>
<tr>
<td>Yeahya joro</td>
<td>---</td>
<td>Lf</td>
<td>Megagna</td>
</tr>
<tr>
<td>Yemidir embuay</td>
<td><em>Solanum indicum</em></td>
<td>Rt</td>
<td>Gonorrhoea, Gubet</td>
</tr>
<tr>
<td>Yeset mlas</td>
<td>---</td>
<td>Bd</td>
<td>Entil</td>
</tr>
<tr>
<td>Yeslam gobez</td>
<td>---</td>
<td>Rt</td>
<td>Ebach, Chife</td>
</tr>
<tr>
<td>Yewusha berbere</td>
<td>---</td>
<td>Rt</td>
<td>Dem abnet, Entil, Nesir</td>
</tr>
<tr>
<td>Yewusha berbere</td>
<td>---</td>
<td>Rt</td>
<td>snake bite</td>
</tr>
<tr>
<td>Yewusha berbere</td>
<td>---</td>
<td>Sd</td>
<td>Malaria</td>
</tr>
<tr>
<td>Yelam wetet</td>
<td>---</td>
<td>Rf</td>
<td>Stomach ache</td>
</tr>
<tr>
<td>Yifat</td>
<td>---</td>
<td>Lf</td>
<td>Wound</td>
</tr>
</tbody>
</table>

***See Table-11***
Table 4: Medicinal plants of Debre Libanos area, North Shewa Zone

<table>
<thead>
<tr>
<th>Local Name**</th>
<th>Scientific name (Voucher No.)</th>
<th>Plant part***</th>
<th>Ailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ailebit A</td>
<td>Tragia pungens (S683)*</td>
<td>Rt</td>
<td>Impotence</td>
</tr>
<tr>
<td>Chicho A</td>
<td>----- (S684)*</td>
<td>Lf</td>
<td>Eye disease</td>
</tr>
<tr>
<td>Enzerezyz</td>
<td>Gladiohus sp. (S679)*</td>
<td>Bb</td>
<td>Aganint maentent</td>
</tr>
<tr>
<td>Este-menahe A</td>
<td>Securidaca longepedunculata (S685)*</td>
<td>Rt</td>
<td>Snake bite, Wugat</td>
</tr>
<tr>
<td>Geram Tinjut A</td>
<td>Ototegia sp. (S677)</td>
<td>Lf</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Gindosh A</td>
<td>Cyphostemma sp. (s680)*</td>
<td>Wp</td>
<td>Snake poison</td>
</tr>
<tr>
<td>Mirez A</td>
<td>Carissa sp. (S686)</td>
<td>Lf</td>
<td>Tela maentent</td>
</tr>
<tr>
<td>Tinjut A</td>
<td>Ototegia sp. (S675)</td>
<td>Lf</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Woynagft A</td>
<td>Cnyza sp. (S676)</td>
<td>Lf</td>
<td>Eye disease</td>
</tr>
<tr>
<td>Work Be-meda A</td>
<td>Dorstenia sp. (S681)*</td>
<td>Rt</td>
<td>Poison, Hypertension</td>
</tr>
<tr>
<td>Yedoro Kus A</td>
<td>Solanum sp. (S682)*</td>
<td>Rt</td>
<td>Tesibo, Asim</td>
</tr>
<tr>
<td>Ye Ibab Medhanit A</td>
<td>Polygala sp. (S687)</td>
<td>Rt</td>
<td>Snake poison</td>
</tr>
<tr>
<td>Yezingero Besobila</td>
<td>Ocinum sp. (S678)</td>
<td>Lf</td>
<td>Kinkin maentent</td>
</tr>
</tbody>
</table>

**See Table-11. * Screened for biological activity on brine shrimp at 100 and 200 mg/ml and only Dorstenia sp. showed 60% activity at 200 mg/ml.

Table 5. List of plant materials sold at the Kemissie market, South Wello Zone, for their fragrance ‘Mitin tis’

<table>
<thead>
<tr>
<th>Amharic name</th>
<th>Scientific name</th>
<th>Plant part**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abalo</td>
<td>Brucea antidysenterica</td>
<td>St</td>
</tr>
<tr>
<td>Ades</td>
<td>Myrthus communis</td>
<td>Lf</td>
</tr>
<tr>
<td>Birgud</td>
<td>---</td>
<td>Re</td>
</tr>
<tr>
<td>Chenotis</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Chika Birgud</td>
<td>---</td>
<td>Re</td>
</tr>
<tr>
<td>Chin adam</td>
<td>---</td>
<td>Wp</td>
</tr>
<tr>
<td>Dech merech</td>
<td>---</td>
<td>Rt</td>
</tr>
<tr>
<td>Ekma</td>
<td>Terminalia sp.</td>
<td>St</td>
</tr>
<tr>
<td>Etan</td>
<td>---</td>
<td>Re</td>
</tr>
<tr>
<td>Enslal</td>
<td>Foeniculum vulgare</td>
<td>Lf</td>
</tr>
<tr>
<td>Gendo</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Gewule</td>
<td>---</td>
<td>Rt</td>
</tr>
<tr>
<td>Jawe</td>
<td>---</td>
<td>Rt</td>
</tr>
<tr>
<td>Kebericho</td>
<td>Echinops sp.</td>
<td>St</td>
</tr>
<tr>
<td>Koladi</td>
<td>---</td>
<td>Rt</td>
</tr>
<tr>
<td>Korera</td>
<td>Acacia tortilis</td>
<td>Rt</td>
</tr>
<tr>
<td>Kufkuaf</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Kurkura</td>
<td>Zizyphus mauritiana</td>
<td>Rt</td>
</tr>
<tr>
<td>Mechela</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Meleho</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Misk</td>
<td>---</td>
<td>Lf</td>
</tr>
<tr>
<td>Sorsa</td>
<td>---</td>
<td>Rt</td>
</tr>
<tr>
<td>Wegert</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Wersames</td>
<td>---</td>
<td>St</td>
</tr>
<tr>
<td>Weyra</td>
<td>Olea europaea</td>
<td>St</td>
</tr>
</tbody>
</table>

**See Table-11

Proceeding of the First National workshop on traditional medicine June 30 – July 2, 2003
Table 6. Plant materials sold at Kemissie market, South Wello Zone, as spice of additive to food "kmem"

<table>
<thead>
<tr>
<th>Amharic name</th>
<th>Scientific name</th>
<th>Plant part ***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abish</td>
<td>Trigonella sp.</td>
<td>Sd</td>
</tr>
<tr>
<td>Besobila</td>
<td>Ocimum sp</td>
<td>Ap</td>
</tr>
<tr>
<td>Dinblal</td>
<td>Coriandrum sativum</td>
<td>Sd</td>
</tr>
<tr>
<td>Erd</td>
<td>Curcuma longa</td>
<td>Rh</td>
</tr>
<tr>
<td>Kamu</td>
<td></td>
<td>Lf</td>
</tr>
<tr>
<td>Kundoberbere</td>
<td>Capsicum nigrum</td>
<td>Sd</td>
</tr>
<tr>
<td>Kerefa</td>
<td></td>
<td>Bk</td>
</tr>
<tr>
<td>Korerima</td>
<td>Aframomum corrorrma</td>
<td>Sd</td>
</tr>
<tr>
<td>Nech azmud</td>
<td>Trachypermum ami</td>
<td>Sd</td>
</tr>
<tr>
<td>Tikur azmud</td>
<td>Nigelia sativa</td>
<td>Sd</td>
</tr>
<tr>
<td>Timiz</td>
<td>Piper capense</td>
<td>Sd</td>
</tr>
</tbody>
</table>

***-See Table-11

Table 7. Plants sold at the Kemissie market, South Wello Zone, for their value in hair softening after mixing with butter ‘Kuni’

<table>
<thead>
<tr>
<th>Amharic name</th>
<th>Scientific name</th>
<th>Plant part***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ades</td>
<td>Myrthus communis</td>
<td>Lf</td>
</tr>
<tr>
<td>Alashume</td>
<td></td>
<td>Lf</td>
</tr>
<tr>
<td>Arti</td>
<td>Artemisia rehan</td>
<td>Lf</td>
</tr>
<tr>
<td>Gendemeri</td>
<td></td>
<td>Lf</td>
</tr>
<tr>
<td>Gicha</td>
<td></td>
<td>Bb</td>
</tr>
<tr>
<td>Ketenayehu</td>
<td></td>
<td>Lf</td>
</tr>
<tr>
<td>Sinbul</td>
<td></td>
<td>Lf</td>
</tr>
</tbody>
</table>

***-See Table-11
### Table 8. Some of the medicinal plants sold in Jimma Main Market, Jimma Zone

<table>
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<tr>
<th>Local name**</th>
<th>Scientific name</th>
<th>Plant part***</th>
<th>Ailment</th>
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</thead>
<tbody>
<tr>
<td>Alamiro</td>
<td></td>
<td>Rt</td>
<td>Malaria, dembizat</td>
</tr>
<tr>
<td>Amum</td>
<td></td>
<td>Rt</td>
<td>Gonnorhoea, Tooth ache</td>
</tr>
<tr>
<td>Arkensi</td>
<td></td>
<td>Rt</td>
<td>Asm</td>
</tr>
<tr>
<td>Bisana</td>
<td>Croton macrostachyus</td>
<td>Lf</td>
<td>Ebd wusha yenekesew</td>
</tr>
<tr>
<td>Barjel</td>
<td></td>
<td>Rt</td>
<td>cheguara beshita</td>
</tr>
<tr>
<td>Dawa</td>
<td></td>
<td>Rt</td>
<td>Eti, Gubet</td>
</tr>
<tr>
<td>Orahman</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dechmerch</td>
<td></td>
<td>Rt</td>
<td>Ebach</td>
</tr>
<tr>
<td>Dingetegna</td>
<td>Taverniera abyssinica</td>
<td>Rt</td>
<td>Buda, Stomach ache, Vomit</td>
</tr>
<tr>
<td>Enay</td>
<td></td>
<td>Lf</td>
<td>Dem manes</td>
</tr>
<tr>
<td>Huda</td>
<td></td>
<td>Rt</td>
<td>Malaria, Asm, Bird</td>
</tr>
<tr>
<td>Jergeda</td>
<td></td>
<td>Lf/St</td>
<td>Kola kusil, Wuha til</td>
</tr>
<tr>
<td>Kosso</td>
<td>Hagenia abyssinica</td>
<td>Rt</td>
<td>Taenia, Buda</td>
</tr>
<tr>
<td>Oodasalib</td>
<td></td>
<td>Rt</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Sensel</td>
<td>Adhathoda schimperiana</td>
<td>Lf</td>
<td>Egir lab, Wound, Forefor</td>
</tr>
<tr>
<td>Temrelhnd</td>
<td></td>
<td>Sd</td>
<td>Amoebiasis</td>
</tr>
<tr>
<td>Suret</td>
<td></td>
<td>Lf</td>
<td>Afincha til</td>
</tr>
<tr>
<td>Suruma</td>
<td></td>
<td>Lf</td>
<td>Wogeb beshita</td>
</tr>
</tbody>
</table>

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*Proceeding of the First National workshop on traditional medicine June 30 – July 2, 2003*
<table>
<thead>
<tr>
<th>Local name**</th>
<th>Scientific name</th>
<th>Plant part***</th>
<th>Ailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abish</td>
<td>Trigonella sp.</td>
<td>Sd Cheguara</td>
<td></td>
</tr>
<tr>
<td>Aja</td>
<td>Hordeum sp.</td>
<td>Sd Ebach</td>
<td></td>
</tr>
<tr>
<td>Aleltu</td>
<td>Salix sp.</td>
<td>Lf Sibirat, Kurtmat, Kisat</td>
<td></td>
</tr>
<tr>
<td>Armagusa</td>
<td>Ajuga remota</td>
<td>Lf Kurtimat, Sibirat</td>
<td></td>
</tr>
<tr>
<td>Bakela</td>
<td>---</td>
<td>Sd Cheguara</td>
<td></td>
</tr>
<tr>
<td>Bedesa</td>
<td>Syzygium guineense</td>
<td>Lf Syphilis</td>
<td></td>
</tr>
<tr>
<td>Bedesa</td>
<td>Syzygium guineense</td>
<td>Wp Egir ibtet</td>
<td></td>
</tr>
<tr>
<td>Bisana</td>
<td>Croton macrostachys</td>
<td>Lf Dem abinet, Chirt</td>
<td></td>
</tr>
<tr>
<td>Dalile</td>
<td>Amaranthes sp.</td>
<td>Sd Ibwdwsa Lenekesew</td>
<td></td>
</tr>
<tr>
<td>Damakesse</td>
<td>Ocimum lamifolium</td>
<td>Lf Mich, Cold</td>
<td></td>
</tr>
<tr>
<td>Dedecha</td>
<td>---</td>
<td>Rt Gonnorhoea</td>
<td></td>
</tr>
<tr>
<td>Ditacha</td>
<td>---</td>
<td>Lf Ekek</td>
<td></td>
</tr>
<tr>
<td>Endod, Alkisa</td>
<td>Phytolacca dodocandra</td>
<td>Lf Kulalit</td>
<td></td>
</tr>
<tr>
<td>Gatira</td>
<td>Juniperus proceera</td>
<td>Lf Forefor</td>
<td></td>
</tr>
<tr>
<td>Goraguracha</td>
<td>---</td>
<td>Lf Syphilis</td>
<td></td>
</tr>
<tr>
<td>Ham ata</td>
<td>---</td>
<td>Wp Egir ibtet</td>
<td></td>
</tr>
<tr>
<td>Hanku</td>
<td>Embelia schimperi</td>
<td>Wp Egir ibtet</td>
<td></td>
</tr>
<tr>
<td>Hidafti</td>
<td>---</td>
<td>Lf Ebach, Dem abinet</td>
<td></td>
</tr>
<tr>
<td>Hinda</td>
<td>---</td>
<td>Lf Forefor</td>
<td></td>
</tr>
<tr>
<td>Kelkelcha</td>
<td>Withania sominifera</td>
<td>Rt Lebuda</td>
<td></td>
</tr>
<tr>
<td>Kelkelcha</td>
<td>Withania sominifera</td>
<td>Lf Tppthache</td>
<td></td>
</tr>
<tr>
<td>Key Kocho</td>
<td>Ensete ventricosum</td>
<td>Lf Engide lii siker</td>
<td></td>
</tr>
<tr>
<td>Kisiks</td>
<td>---</td>
<td>Rt Amoebiasis, Indigestion</td>
<td></td>
</tr>
<tr>
<td>Korch, Welensu</td>
<td>Erythrina sp.</td>
<td>Rt Gonnorhoea</td>
<td></td>
</tr>
<tr>
<td>Kobo</td>
<td>Ricinus communis</td>
<td>Lf Gonnorhoea</td>
<td></td>
</tr>
<tr>
<td>Kulubi</td>
<td>Allium sativum</td>
<td>Lf Forefor</td>
<td></td>
</tr>
<tr>
<td>Kumbudu</td>
<td>---</td>
<td>Lf Ascariasis</td>
<td></td>
</tr>
<tr>
<td>Kunti</td>
<td>---</td>
<td>Lf Joro megil</td>
<td></td>
</tr>
<tr>
<td>Limich</td>
<td>Clausena anisata</td>
<td>Lf Mich</td>
<td></td>
</tr>
<tr>
<td>Magna</td>
<td>---</td>
<td>Lf Yehod Kurtet</td>
<td></td>
</tr>
<tr>
<td>Mekansa</td>
<td>---</td>
<td>Wp Egir ibtet</td>
<td></td>
</tr>
<tr>
<td>Misir</td>
<td>Lens culinaris</td>
<td>Sd Cheguara</td>
<td></td>
</tr>
<tr>
<td>Mukabofa</td>
<td>---</td>
<td>Wp Egir ibtet</td>
<td></td>
</tr>
<tr>
<td>Regi</td>
<td>---</td>
<td>Wp Egir ibtet</td>
<td></td>
</tr>
<tr>
<td>Senameki</td>
<td>Senna sp.</td>
<td>Lf Snakebite</td>
<td></td>
</tr>
<tr>
<td>Sensel</td>
<td>Adhaithoda schimperiana</td>
<td>Lf I bid wusha lenekesew</td>
<td></td>
</tr>
<tr>
<td>Shankila Medhanit</td>
<td>---</td>
<td>Lf Dem abinet</td>
<td></td>
</tr>
<tr>
<td>Suf</td>
<td>Carthamus tinctorius</td>
<td>Sd Cheguara</td>
<td></td>
</tr>
<tr>
<td>Surma</td>
<td>---</td>
<td>Lf Sibirat, Kurtmat, Kisat</td>
<td></td>
</tr>
<tr>
<td>Tena Adam</td>
<td>Ruta chalepensis</td>
<td>Wp Yehod Kurtet</td>
<td></td>
</tr>
<tr>
<td>Togo</td>
<td>---</td>
<td>Lf Mich</td>
<td></td>
</tr>
<tr>
<td>Yemidir Beerbere</td>
<td>Spilanthes mauritiana</td>
<td>Lf Dingetegna, Tooth ache</td>
<td></td>
</tr>
<tr>
<td>Yeriyo</td>
<td>---</td>
<td>Lf Mich</td>
<td></td>
</tr>
</tbody>
</table>

**,**,**.See Table-11
Table 10: Hedge plants of the Jimma area, Jimma Zone.

<table>
<thead>
<tr>
<th>Local name**</th>
<th>Scientific name</th>
<th>Voucher no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arengama O</td>
<td>Caesalpinia decapetala</td>
<td>S802</td>
</tr>
<tr>
<td>Atakili O</td>
<td>Eucalyptus globulus</td>
<td>S760</td>
</tr>
<tr>
<td>Bupa</td>
<td>Brugmansia condida</td>
<td>S799</td>
</tr>
<tr>
<td>Chada B, Kinh A</td>
<td>Euphorbia tirucalli</td>
<td>S799</td>
</tr>
<tr>
<td>Dumuga B, Sensel A</td>
<td>Adhatoda schimperiana</td>
<td>S798</td>
</tr>
<tr>
<td>Garu O, Kontrir A</td>
<td>Pterolobium stellatum</td>
<td>S803</td>
</tr>
<tr>
<td>Key Bahrzaf A</td>
<td>Eucalyptus camaldulensis</td>
<td>---</td>
</tr>
<tr>
<td>Senameki B</td>
<td>Senna sp.</td>
<td>S796</td>
</tr>
<tr>
<td>Senamekeiareba O</td>
<td>Senna didymmobotrya</td>
<td>S796</td>
</tr>
<tr>
<td>Shewshewe A</td>
<td>Casuarina sp.</td>
<td>---</td>
</tr>
<tr>
<td>Welensu B, Korch A</td>
<td>Erythrina sp.</td>
<td>S800</td>
</tr>
<tr>
<td>Yeabesha Tid A</td>
<td>Juniperus procera</td>
<td>---</td>
</tr>
<tr>
<td>Yeferenj Tid A</td>
<td>Cupressus sp.</td>
<td>---</td>
</tr>
<tr>
<td>Yeriyo O, Tontona A</td>
<td>Plectranthus sp.</td>
<td>S801</td>
</tr>
<tr>
<td>---</td>
<td>Thuja orientalis</td>
<td>---</td>
</tr>
<tr>
<td>---</td>
<td>Solanum sp.</td>
<td>---</td>
</tr>
</tbody>
</table>

**-See Table-11

Table 11: Plants used as source of traditional medicine at Wondogent locality, Sidamo Zone.

<table>
<thead>
<tr>
<th>Local name**</th>
<th>Scientific name</th>
<th>Plant part***</th>
<th>Ailment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aleblabit A</td>
<td>Tragia pungens</td>
<td>Wp</td>
<td>Asm</td>
</tr>
<tr>
<td>Bisana A</td>
<td>Croton macrostachys</td>
<td>Lf</td>
<td>Malaria</td>
</tr>
<tr>
<td>Damakesse A</td>
<td>Ocimum sp.</td>
<td>Lf</td>
<td>Mich</td>
</tr>
<tr>
<td>Digita A</td>
<td>Calpurnia aurea</td>
<td>Lf</td>
<td>Ascariasis</td>
</tr>
<tr>
<td>Ehulgeb A</td>
<td>Solamum sp.</td>
<td>Rt</td>
<td>Yehod Kurtet</td>
</tr>
<tr>
<td>Embuyu A</td>
<td>Foeniculum vulgare</td>
<td>Ap</td>
<td>Yekulalit teter</td>
</tr>
<tr>
<td>Hare B</td>
<td></td>
<td>Rt</td>
<td>Mich, Ebach</td>
</tr>
<tr>
<td>Kelala A</td>
<td></td>
<td></td>
<td>Gubet</td>
</tr>
<tr>
<td>Nechbahrzaf A</td>
<td>Eucalyptus sp.</td>
<td>Lf</td>
<td>Cold</td>
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<tr>
<td>Raskimir A</td>
<td>Leucas sp.</td>
<td>Lf</td>
<td>Cough</td>
</tr>
<tr>
<td>Raskimir A</td>
<td>Leucas sp.</td>
<td>Fl</td>
<td>Head ache</td>
</tr>
<tr>
<td>Yeabasha tid A</td>
<td>Juniperus procera</td>
<td>Lf</td>
<td>Woranto</td>
</tr>
<tr>
<td>Yeabasha tid A</td>
<td>Podocarpus falcatus</td>
<td>Re</td>
<td>Wound</td>
</tr>
</tbody>
</table>


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Screening of Ethnomedicinal Plants of Ethiopia for Their Antimicrobial Effects


1Infectious and Other Diseases Research Department
2Department of Drug research
Ethiopian Health and Nutrition Research Institute, Addis Ababa

Abstract
Numerous plant species are used to treat infectious agents in the indigenous health care delivery system of Ethiopia. The objective of this study was therefore to assess the antimicrobial and antifungal effects of the crude extracts of traditionally used medicinal plants. The crude methanol, petroleum ether and aqueous plant extracts of 67 plant species were subjected to preliminary antibacterial screening against ten strains of bacterial species and six fungal strains using the agar dilution method. The results indicated that 50 different plant species exhibited activity against one or more of the tested bacterial organisms. Twenty-three species inhibited or retarded growth of one or more organisms at dilution as low a 250μg/ml. The species that is most active antimicrobiologically is Albezia gummifera, which was found to show activity against all the ten test bacterial organisms at different gradient of dilution. Crude extracts of eight plant species showed growth inhibition against one or more of the six pathogenic fungal organisms. Trichila emetica and Dovyalis abyssinica which, inhibited growth of four and three fungal strains, respectively, are the most active ones. The chemical profile of the extracts showed the presence of several secondary metabolites viz., polyphenols, alkaloids, tannins, sterols/terpenes, saponins and glycosides.

Introduction
Plants have served as source for the development of new drugs and as templates for the synthesis of new drugs. Some examples of such importance include the anti malarial sesquiterpene, artemisinin, the anti hypertensive agent, forskolin, have been obtained from Artemisia annua and Coleus forskolin. Both plants have been in use for thousands of years especially, in the indigenous health care delivery system. Others of such use include plants like: Digitalis, Cinchona, Rauwolfia, etc. Any folklore or traditional use of plants is the best criterion for selection of plants for biological activity and eventual establishment of new or better therapeutics (1). A survey by the National Cancer Institute, for example revealed that 52.2% of the genera and 29.3% of the species traditionally used as antihelmentics were active as anticancer agents (2).

In Ethiopia, an estimate of 800 or so plant species are employed as medicinal agents, showing very high chance of locating a dozen or more plants with therapeutic potential to alleviate the direct pharmaceutical situations. The drug and health polices of the government stress the need for the investigation and development of medicinal plants, data from biological and phytochemical screening can support or reject the claimed clinical efficacy of the plants in traditional usage. Detection of bioassay guided active metabolites from plants is a crucial step in the search and consequent development of useful drugs.

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Broad-spectrum biological screening as envisaged in this project is imperative because, the activity of the metabolites may be different but equally important from the folkloric use of the plant; a particular medicinal plant may have multiple therapeutic applications in the indigenous system. Traditional health care system often heavily relies on symptoms in diagnosing diseases to which a given remedy is prescribed. But a symptom may have a different or more than one underlying causes. Such pre-clinical investigations will generate information that would create a platform for health professionals and traditional healers to work together in research and indeed in promoting the health of the people. Clues to the existence of bioactive compounds can arise from different sources such as: Ethnopharmacology or traditional medicine, observation, general screening, target-directed screening, or serendipity.

Other additional factors that make conducting a broad-based biological screening desirable are: drug or compound isolated may be useful for treating a disease quite different from that originally known in folk medicine (3-6). The indigenous health care system relies on symptoms, visible signs, and traditional ideas in diagnosing a disease or its etiologic agent. Health professionals with serious view of science and healers who attach importance to experience will come together if there is a good deal of scientific data demonstrating the potency of traditional drugs and the active components to which the claimed or observed effects can be attributed to. Thus, phytochemical screening should also be initiated prior to or in parallel with the biological screening of the selected medicinal plants to offer logical explanation as to what is behind the observed effect or the absence of any effect.

Such identification of the class of compound(s) is one of the important initial steps in bringing the whole aspect of the validity of traditional remedies into perspective (7). Phytochemical screening is helpful in establishing the plants or parts thereof with better yield or viability for a given compound (8). Exploration of plant kingdom for these and other reasons is therefore still an important task to pursue. In the present study the major trust is to look for biologically active compounds through the effect they produce in the test systems. To a lesser extent, it will be searched for limited number of known compounds in some of the species of this country. Hence, the objectives for this study are to short list rank-ordered plants for development and further research, to provide a rationale for the traditional use of drugs, to document and disseminate the results of the biological and phytochemical studies, to standardize empirical medicaments and produce scientifically sound preparations for use at the primary health care level from local vegetable drugs.

Material and methods

a. Collection and identification: In view of the fact that natural products are not distributed in all parts of the plants uniformly and the constituents in various plants could vary according to the age of the plant, the season and the area, where it is gathered from the collection of the plant material for biological and/or phytochemical screening will target different plant individuals and parts of the same species from different localities and categorized in the following way: Herbaceous plants: roots, above ground part (s), seeds /fruit; woody plants, stem bark (SB), leaf (LF), root bark (RB), twig (TW), fruit/seeds (FR).
b. Phytochemical screening: Freshly collected and identified of the selected plant species were extracted and the materials were tested for their content of different class or classes of compounds, such as alkaloids, flavonoids, terpenoids, etc by the method outlined by Harborne and Fansworth (9,10). This helped to check positive or even negative results that the plant extracts exerted in vitro and/or in vivo. The extracts with demonstrable effects were subjected to more detailed assessment like chemical fractionation and monitored by additional biological screening.

c. Biological screening: This involves studying the effects of the crude plant extracts at a certain arbitrarily fixed dose levels in in vitro systems using broad-based screening methods. The antibacterial tests were carried out on standard organisms and clinical isolates in comparison with reference antibiotics using the general methods outlined by Ashebir and Ashenafi (1999), Rios et al (1988) while their antifungal property was determined using the method outlined in Hufford and Clark (1988) and Rahalison et al (1993) (5,11-13).


Minimum Inhibitory Concentration Analysis: All the bacterial strains were prepared to the appropriate suspensions and inoculated into plates of appropriate solutions of the Agar medium plus plant extract mixtures pre-prepared by double dilution method to give concentrations of 2000 µg/ml, 1000 µg/ml, 500 µg/ml and 250 µg/ml.

Preparation of the extract stock solution: The required amount of plant extract suspended in solvent and two fold serial dilution prepared starting from 1:10 in dry weight up to the needed dilution. 2 ml of the serial dilution transferred to a sterile plate and 18 ml of various bacteriological media was poured at 50-60°C and mixed thoroughly before drying.

Results and discussion

The results of some of the plants extracts that are summarized in Table 1-3 indicate that most of the plants tested exhibited activity against one or more strains tested for. The alcoholic extracts exhibited higher anti-bacterial effects than the corresponding petroleum ether and aqueous extracts. The anti-microbial activity of the extracts of the various parts of the investigated plants such as roots, leaves, fruits, seeds, etc appears to be due to the presence of secondary metabolites such as polyphenols identified in 91% of the plant species, triterpenes/sterols (83%), saponins (27%), tannins (13%), alkaloids (44%), glycosides and polysaccharides (11%) while cardiac glycosides were identified in few species (2%), as shown in Table 4. The activity of some of the plant extracts on different organisms explains their broad spectrum nature while most of the plant extracts found to have effect on one organism may be due to their narrow spectrum activity. This difference of activity appears to be directly related to the qualitative and/or quantitative diversity of the compounds that are being accumulated by the plants investigated. Work is in progress on fractionated samples of plant extracts that showed promising results.
Research On Traditional Medicine

References

<table>
<thead>
<tr>
<th>No</th>
<th>Plant species (family)</th>
<th>Solvents</th>
<th>metabolites</th>
<th>Single organisms having GI effects by the test at</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2000µg/ml</td>
</tr>
<tr>
<td>1</td>
<td>LR-2047/B Lobelia rhynechopetala (Lobeliaceae)</td>
<td>MeOH</td>
<td>A,C,E,</td>
<td>Ng</td>
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<tr>
<td>2</td>
<td>LG-2046/B Lobelia gibora (Lobeliaceae)</td>
<td>&quot;</td>
<td>A,C,E</td>
<td>Ng</td>
</tr>
<tr>
<td>3</td>
<td>MS-2039 Myrica salicifolia (Myricaceae)</td>
<td>&quot;</td>
<td>C,D,E,F,</td>
<td>4 Orgms</td>
</tr>
<tr>
<td>4</td>
<td>OE-2042 Olea europea (Oleaceae)</td>
<td>&quot;</td>
<td>C,D,E</td>
<td>4 Orgms</td>
</tr>
<tr>
<td>5</td>
<td>Oc-2044 Osyris quadripartite (Santalaceae)</td>
<td>&quot;</td>
<td>C,E,</td>
<td>2 Orgms</td>
</tr>
<tr>
<td>6</td>
<td>TR-2041 Trichelia roka (Meliaceae)</td>
<td>&quot;</td>
<td>C,D,E</td>
<td>6 Orgms</td>
</tr>
<tr>
<td>7</td>
<td>Bae-35A Bersama abyssinica Root bark (Meloantaceae)</td>
<td>Ethanol</td>
<td>B,E</td>
<td>3 Orgam+1</td>
</tr>
<tr>
<td>8</td>
<td>CM-1194 Croton macrostachys Fruit (Euphorbiaceae)</td>
<td>Methanol</td>
<td>A,C,E,G</td>
<td>Ng</td>
</tr>
<tr>
<td>9</td>
<td>HH-2039 Hedra helix (Araliaceae)</td>
<td>&quot;</td>
<td>C,E,F</td>
<td>Ng</td>
</tr>
<tr>
<td>10</td>
<td>AG-2006 Albizia gummifera Seeds (Leguminosae)</td>
<td>&quot;</td>
<td>C,E,F,G</td>
<td>All Orgms</td>
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<td>11</td>
<td>Bae-35D Bersama abyssinica Root bark (Meliaceae)</td>
<td>DilH2O</td>
<td>B,E,</td>
<td>Ng +4RG Orgms</td>
</tr>
</tbody>
</table>

*See Table-4 & 4, RG- Growth retarded, GI-growth inhibition. N.gonorrhea

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Table 2: Some of the aerial parts of plant extracts having a growth inhibition effects against multiple of bacterial pathogens.

<table>
<thead>
<tr>
<th>No</th>
<th>Plant species</th>
<th>Solvents</th>
<th>Metabolites *</th>
<th>Multiple organisms having GI effect by the test at*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2000 µgm/ml</td>
</tr>
<tr>
<td>1</td>
<td><em>Artemisia abyssinica</em></td>
<td>Ether</td>
<td>C,E,</td>
<td>Bee, Ngn</td>
</tr>
<tr>
<td>2</td>
<td><em>Artemisia abyssinica</em></td>
<td>EtOH</td>
<td>C,E,</td>
<td>Sa Bc Ng</td>
</tr>
<tr>
<td>3</td>
<td><em>Momordica foetida</em></td>
<td>MeOH</td>
<td>C,E,</td>
<td>1 Orgm</td>
</tr>
<tr>
<td>4</td>
<td><em>Albizia gummifera</em></td>
<td>MeOH</td>
<td>C,E, F,G</td>
<td>All 10 Organisms</td>
</tr>
</tbody>
</table>

*-See Table-3 & 4

Table 3. The Level of the bioactive compound determined from the extracts of the investigated plant species

<table>
<thead>
<tr>
<th>No</th>
<th>Metabolites detected</th>
<th>% of secondary metabolites identified in plant parts</th>
<th>Plant species with the detected secondary metabolites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aerial part (%)</td>
</tr>
<tr>
<td>1</td>
<td>A = Alkaloids</td>
<td>16/36 (44.44)</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>B = Cardiac glycosides</td>
<td>1/36 (3.78)</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>C = Polyphenols</td>
<td>33/36 (91.67)</td>
<td>6/8 (75.00)</td>
</tr>
<tr>
<td>4</td>
<td>D = Tannin</td>
<td>5/36 (13.89)</td>
<td>1/8 (12.50)</td>
</tr>
<tr>
<td>5</td>
<td>E = Sterol/or triterpenes</td>
<td>30/36 (83.33)</td>
<td>7/8(37.50)</td>
</tr>
<tr>
<td>6</td>
<td>F = Saponins</td>
<td>10/36 (27.78)</td>
<td>3/8 (37.50)</td>
</tr>
<tr>
<td>7</td>
<td>G = Glycosides/ carbohydrates</td>
<td>4/36 (11.11)</td>
<td>0</td>
</tr>
</tbody>
</table>

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Table 4: Some of the plant parts having growth inhibition effect against multiple bacterial pathogens.

<table>
<thead>
<tr>
<th>No</th>
<th>Plant species</th>
<th>Solvents</th>
<th>Metabolites</th>
<th>Multiple organisms having GI effects at 2000 μg/ml</th>
<th>1000 μg/ml</th>
<th>500 μg/ml</th>
<th>250 μg/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lippia adoensis, Verbenaceae, Leaf</td>
<td>EtOH</td>
<td>C,D,E</td>
<td>SaBcNg</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Bersama abyssinica, Root</td>
<td>EtOH</td>
<td>B,E</td>
<td>Ng ShA &amp; B</td>
<td>Ng, ShA</td>
<td>Ng ShA</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bersama abyssinica</td>
<td>Dih H₂O</td>
<td>B,E</td>
<td>Sa,Ng,ShA,B</td>
<td>Sa,Ng,SA,SB</td>
<td>Ng,SA,S</td>
<td>Ng,SA,S</td>
</tr>
<tr>
<td>4</td>
<td>Gardenia lutea (Rubaceae), St.Br</td>
<td>MeOH</td>
<td>C,E</td>
<td>Sa,Be,Ng,ShA,B</td>
<td>Ng,ShA,ShB</td>
<td>Ng,ShA</td>
<td>Ng,ShA</td>
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<tr>
<td>5</td>
<td>Myrica salcifolia, St.Br</td>
<td>“</td>
<td>C,D,E</td>
<td>Sa,Be,Ng,ShB</td>
<td>Sa,Ng</td>
<td>1 Orgm</td>
<td>1 Orgm</td>
</tr>
<tr>
<td>6</td>
<td>Discopodium peninervum, Leaf</td>
<td>“</td>
<td>C,D,E,F</td>
<td>Sa,Be,Ng,ShB</td>
<td>Sa,Be,Ng,SB</td>
<td>1 Orgm</td>
<td>1 Orgm</td>
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<tr>
<td>7</td>
<td>Discopodium peninervum</td>
<td>“</td>
<td>C,E,F</td>
<td>Sa,Sp,Spn,Ng</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Olea europea, Leaf</td>
<td>“</td>
<td>C,D,E</td>
<td>Sa,Sp,Spn,Ng</td>
<td>1 Orgm</td>
<td>-</td>
<td>-</td>
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<tr>
<td>9</td>
<td>Olea europea, Leaf</td>
<td>“</td>
<td>C,D,E</td>
<td>Sa,Sp,Spn,Ng</td>
<td>Sa,Sy,Sn,Ng</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Osyis quadripartite, St.Br</td>
<td>“</td>
<td>C,E</td>
<td>Bce,Ngn</td>
<td>Bce,Ngn</td>
<td>1 Orgm</td>
<td>Ngn,ShA</td>
</tr>
<tr>
<td>11</td>
<td>Trichelia roka, Stem Br</td>
<td>“</td>
<td>C,D,E</td>
<td>Sa,Be,Ng,St,Sm,ShB</td>
<td>Sa,Ng,ShB</td>
<td>1 Orgm</td>
<td>Ngn,ShA</td>
</tr>
<tr>
<td>12</td>
<td>Bersama abyssinica, Stem Br</td>
<td>“</td>
<td>B,E</td>
<td>Be,Ng,ShA</td>
<td>Be,Ng,ShA</td>
<td>Ng,ShA</td>
<td></td>
</tr>
</tbody>
</table>

Organisms: 1- Bacillus(Bc), 2- N.gonorrhoea (Ng), 3- S.pyogenes, 4- S.pneumonia(Spn), 5- S.aureus(Sa), 6- S.typhi(sty), 7- S.typhimurium(stym), 8- Shigella flexineri (ShB), 9- Shigella dysentriea (ShA), 10- E.coli(Ec).

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Proceeding of the First National workshop on traditional medicine June 30 – July 2, 2003
Conservation of Medicinal Plants in Ethiopia

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Abstract
The Ethiopian flora is estimated somewhat between 6500 and 7000 species of higher plants out of which more than 14% are used in traditional medicine. The medicinal plants of Ethiopia constitute a substantial proportion whose greater part is neither cultivated nor fully documented and conserved. A significant proportion of medicinal plants are gathered from the wild. Detailed information on the medicinal plants of Ethiopia could only be obtained when studies are undertaken in the various parts of the country where little or no botanical and ethno botanical explorations have been made. With the present ecological and socio-economical changes, these plants together with the ethnobotanical knowledge may disappear and thus may be lost from humanity forever. Therefore, botanical collection and documentation of the associated ethnobotanical knowledge should be done as soon as possible. The Institute of Biodiversity Conservation and Research (IBCR) is working on ex situ and in situ conservation of medicinal plants genetic resources and documentation of ethnobotanical information through its Medicinal Plant Genetic Resources and Ethnobiology Departments, respectively. The two ex situ conservation techniques practiced are seed storage in Cold Room Gene Bank and planting in Field Gene Bank. In collaboration with farmers, in situ conservation of few medicinal plants is underway since 1996. Recently, IBCR in collaboration with various stakeholders has started implementation of a project on in situ conservation of medicinal plants in and around Bale Mountains National Park. The lessons that are going to be learned from this project will help in the establishment of other medicinal plants in situ conservation sites. This paper deals with the conservation status of medicinal plants in Ethiopia based on available literature and information.

Introduction
Ethiopia’s boundaries encompass the major part of eastern African highland massif. On the northern and western boundaries lie the foothills of the main massif. The Great Rift Valley cuts diagonally across the country from Red Sea to Kenya, creating a vast depression. The dry areas have isolated the highlands. Thus, there is great variation of altitude from 116 meters below sea level to 4620 meters above sea level. Rainfall also varies widely in amount and distribution. These factors strongly influence Ethiopia’s extraordinary range of terrestrial and aquatic ecosystems and contributed to the high rate of endemism and diversity. Endemism is particularly high in the Ogaden and the Afro-alpine vegetation zone and the Dry Montane Forest Grassland complex.

The Ethiopian flora is estimated to contain between 6,500 and 7,000 species of higher plants (1). The diverse flora of the country coupled with a rich plant lore that accumulated over a long period of time portrays its botanical wealth as well as the highly valued ethnobotanical knowledge and the long-standing use of plant products.
The medicinal plants of Ethiopia constitute a substantial proportion whose greater part is neither cultivated nor fully documented. Detailed information on the medicinal plants of Ethiopia could only be obtained when studies are undertaken in the various parts of the country where little or no botanical and ethno botanical explorations have been made. Ethno botany tries to find out how people have traditionally used plants, for whatever purposes, and how they are still doing so (2). Thus, ethno botany tries to preserve valuable traditional knowledge for both future generations and other communities. Recently, the subject has adopted a much more scientific and quantitative methodology and has studied the ways in which people manage their environment (3). There are a number of previous studies carried out on the medicinal plants of Ethiopia (4-15).

The current account of medicinal plants of Ethiopia as documented for National Biodiversity Strategy and Action Plan by Tesema Tanto et al., (2002), there are more than 887 plant species reported to be utilized in the traditional medicine of Ethiopia (15). This indicate that about 14% of Ethiopian Flora is used in traditional medicine. Among these, about 26 species are endemic and they are becoming increasingly rare and under threat of extinction. Equally threatened is the knowledge base on which the traditional medicinal system is based, as the ethno botanical information is not documented, remains in the memory of elderly practitioners.

The main purpose of this paper is to address both the past and ongoing conservation activities on medicinal plants of Ethiopia by the Institute of Biodiversity Conservation and Research (IBCR). The paper will hopefully contribute towards ensuring availability of the genetic potential of medicinal plants for future development of health sector in Ethiopia.

Threat to medicinal plants and the associated knowledge

Some studies have shown that most of the medicinal plants utilized by the Ethiopian people are harvested from the wild (13,14). As time goes by, however, these wildly occurring medicinal plant species and the associated traditional knowledge are getting eroded. There are basically two sources of threats to medicinal plants: natural and man-made. Man-made include: agricultural expansion, development of urban centers, population pressure, civil strife, over harvesting, destructive harvesting (up-rooting or debarking) and invasive species (such as Prosopis juliflora in eastern Ethiopia), etc. The natural causes include: recurrent drought, bush fires, diseases and pest outbreaks.

As the plants that have been serving as raw materials for the preparation of different remedies get destroyed the traditional practice associated with them would also get diminished. During an ethno botanical survey to document medicinal plants used by the Zay people of Ethiopia (13), it was revealed that the practice of using plant remedies by the community to treat different ailments has been dwindling from time to time mainly as a result of continued deforestation in the area where they live. This in turn has brought about the local loss of important medicinal plants. One of the factors that are believed to have exacerbated the loss of traditional knowledge associated with medicinal plants has been the expansion of modern education, which has made the younger generation underestimate its traditional values. Migrations from rural areas to towns and resettlement of people from drought-stricken regions.
Research On Traditional Medicine

Research On Traditional Medicine

The Government of Ethiopia has reorganized the former Plant Genetic Resources Center/Ethiopia (established in 1976) to the Institute of Biodiversity Conservation and Research (IBCR) in 1998 through the Proclamation No. 120/98 and 167/1999 (as revised). The establishment of IBCR is to conserve, evaluate and enhance the sustainable utilization of biodiversity (at gene, species and ecosystem level) of the country. IBCR has ten technical departments among which Medicinal Plant Genetic Resources and Ethnobotany Departments are responsible for conservation of medicinal plants genetic resources and documentation of ethno botanical information, respectively.

Gaps and constraints in conservation of medicinal plants and associated knowledge

The problems and difficulties of medicinal plant conservation are enormous. Some medicinal plants differ from cultivated crop plants in that they are far less domesticated. Their sampling strategy and conservation methods are not studied. Knowledge on the genetic structure of a species is important in capturing genetic diversity for conservation. There is practically little or no work undertaken on genetic diversity of medicinal plants in the country.

Cultivated medicinal plants are traditionally conserved on farm through community networks, those that continued being used from the wild flora are faced with problems related to unsustainable resource use. With the growing demand for medicinal plants and high rate of destruction of natural habitats, urgent measures should be taken to enhance conservation and protection strategies. The major constraints of medicinal plants conservation and sustainable utilization can be summarized as follows:

1. There is no nationwide and systematized targeted program and efforts for identification, documentation and maintenance of medical lore.
2. Little or no study has been made on the medicinal plant genetic resources exploration, collection conservation, characterization, evaluation and diversity study in the country.
3. Coordination of traditional healers, botanists and geneticists/agronomists are not adequate.
4. Extension services are not well coordinated and developed as a system to upgrade traditional medicine.
5. Inadequate knowledge and awareness in the community about conservation issues of medicinal plants.
Table 1 Medicinal plants conserved in the Cold Room/Gene Bank of IBCR

<table>
<thead>
<tr>
<th>S. No</th>
<th>Botanical name</th>
<th>Family</th>
<th>No. accession(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calpurnia aurea</td>
<td>Fabaceae</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Cardiospermum corindum</td>
<td>Sapindaceae</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Casis sp.</td>
<td>Fabaceae</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Celosia trigyna</td>
<td>Amaranthaceae</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Clematis simensis</td>
<td>Ranunculaceae</td>
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<tr>
<td>6</td>
<td>Coriandrum sativum</td>
<td>Apiaceae</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Cucumis propinetarum</td>
<td>Cucurbitaceae</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Cucurbita pepo</td>
<td>Cucurbitaceae</td>
<td>70</td>
</tr>
<tr>
<td>9</td>
<td>Datura metel</td>
<td>Solanaceae</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Datura stramonium</td>
<td>Solanaceae</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Diechrostachys cinerea</td>
<td>Fabaceae</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Dodonaea angustifolia</td>
<td>Sapindaceae</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Dolichos sp</td>
<td>Fabaceae</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>Embelia schimperi</td>
<td>Myrsinaceae</td>
<td>11</td>
</tr>
<tr>
<td>15</td>
<td>Glinus lotoides</td>
<td>Molluginaceae</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>Gnidia sp.</td>
<td>Thymelaceae</td>
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<tr>
<td>17</td>
<td>Lagenaria siceraria</td>
<td>Cucurbitaceae</td>
<td>12</td>
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<tr>
<td>18</td>
<td>Lepidium sativum</td>
<td>Brassicaceae</td>
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<td>19</td>
<td>Lupinus albus</td>
<td>Fabaceae</td>
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<tr>
<td>20</td>
<td>Myrsine africana</td>
<td>Myrsinaceae</td>
<td>1</td>
</tr>
<tr>
<td>21</td>
<td>Ocimum suave</td>
<td>Lamiaceae</td>
<td>1</td>
</tr>
<tr>
<td>22</td>
<td>Phytolacca dodecandra</td>
<td>Phytolaccaceae</td>
<td>159</td>
</tr>
<tr>
<td>23</td>
<td>Plumbago zeylandia</td>
<td>Plumbaginaceae</td>
<td>1</td>
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<td>Premna schimperi</td>
<td>Verbenaceae</td>
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<tr>
<td>25</td>
<td>Prunus africana</td>
<td>Rosacea</td>
<td>1</td>
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<tr>
<td>26</td>
<td>Rumex abyssinicus</td>
<td>Polygonaceae</td>
<td>4</td>
</tr>
<tr>
<td>27</td>
<td>Ruta chalepensis</td>
<td>Rutaceae</td>
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</tr>
<tr>
<td>28</td>
<td>Solanum incanum</td>
<td>Solanaceae</td>
<td>13</td>
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<tr>
<td>29</td>
<td>Tamarindus indica</td>
<td>Fabaceae</td>
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<tr>
<td>30</td>
<td>Verbascum sinaticum</td>
<td>Scrophulariaceae</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td>Vernonia spp.</td>
<td>Asteraceae</td>
<td>65</td>
</tr>
</tbody>
</table>

Total No. accession(s) 662

6. Use of medicinal plants without scientific evaluation for treatment among the rural society has got considerable side effects that call for a bridging between traditional medicine practitioners and modern science through research.

7. Insufficient trained manpower and infrastructure to conduct research and conservation are few to mention among the existing gaps.

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Conservation efforts

IBCR is working on ex-situ and in situ conservation of medicinal plants genetic resources. The two ex situ conservation techniques practiced are seed storage in Cold Room Gene Bank and Field Gene Bank. The ex situ conservation in cold room is suitable for those plants that produce orthodox type of seeds and field gene bank for plants that propagate vegetatively or produce recalcitrant seeds. To strengthen these efforts, IBCR, in collaboration with relevant stakeholders, has currently developed a five-year project entitled: "Conservation and Sustainable Use of Medicinal Plants Project (CSUMPP)". The project was launched on 16 October 2001 and has both ex situ and in situ conservation components to be implemented by IBCR in collaboration with the stakeholders. The project is jointly financed by the Ethiopian Government, International Development Association (IDA) and Global Environmental Facility (GEF).

Ex situ conservation

So far IBCR has conserved about 662 samples (accessions) of 31 medicinal plant species (Table 1) in cold room gene bank, although their storage behavior is still not studied. Until storage techniques are in place it is better to conserve medicinal plants as ex situ stands in field gene banks. Through financial support obtained from CSUMPP, IBCR has recently established medicinal plant field gene bank at Wendo Genet in collaboration with the Essential Oils Research Centers and the Traditional Healers Association. Since the beginning of the project in October 2001, exploration and collection of medicinal plants had been conducted in areas of high rate of deforestation and over exploitation. Thus, Kafa, Wendo Genet, Buta Jira, Hosa'ena, Sodo, Gedo, Guder and Debre Libanos areas were explored and about 300 samples of medicinal plants were collected. The samples were conserved in Wendo Genet Medicinal Field Gene Bank.

In situ Conservation

Through support of a dynamic farmer-based conservation of Ethiopia’s plant genetic resources project, some medicinal plants were conserved in collaboration with conservator farmers since 1996. For these purpose botanic gardens were established in 12 weredas of six sites. They are Kafa (Decha and Chena), Bale (Agarfa and Goro), Tigray (Ganta Hafeshom and Hawzen), North Shewa (Ensaro-Vayu and Ankober), South Welo (Harbu and Were Ilu) and East Shewa (Ejere and Chefe Donsa).

The other in situ conservation is initiated in and around Bale Mountains National Park. It is financially supported by CSUMPP. In this activity five stakeholders were involved. They are IBCR, Dromiya Rural Land and Natural Resource Administration Authority, National Herbarium, Institute of Developmental Research and Ethiopian Wildlife Conservation Organization. Major activities to be undertaken are on-site management, harvesting and management guideline development, farmer based cultivation, training, public education and mass awareness and monitoring for conservation and sustainable use of medicinal plants.

Medicinal plant harvesting and management guidelines will be developed through participation of all stockholders including farmers and traditional healers. The guideline is to restrict harvesting of medicinal plants under risk through agreement with the community so that there is a seasonal

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restriction for certain species, prevention of destructive harvesting (up-rooting or debarking) and creation of a system for the involvement of specialists in harvesting.

**Recommendations**

If existing medicinal plant resources need to be adequately conserved through the development of appropriate policies and legislation, awareness of conservation issues and of the importance of sustainable utilization needs to be raised among all stakeholders. Perhaps most importantly local people need to be supported and encouraged to take the necessary steps to conserve this valuable resource. The collection of medicinal plants must be guided by an accurate knowledge of the biology of the species concerned, and steps must be taken to avoid over-exploitation, and the collection of rare or otherwise endangered species. Specific recommendations for conservation and sustainable use of medicinal plants should consider:

1. Explore and identify a priority list of medicinal plants for collection, conservation and sustainable use.

2. Encourage and support the establishment of botanic gardens and arboreta. Therefore, there is a need to take initiatives to encourage local municipalities and government agencies to include local medicinal plant species in planting programs.

3. Conduct research on seed storage behavior of medicinal plants. There have been little or no systematic studies to determine the seed storage behavior of medicinal plants. Basic seed storage behavior research is prerequisite to undertake ex situ conservation of medicinal plants. In the absence of adequate knowledge on the response of seeds of medicinal plant species to drying and low temperature environment, the conservation of these species in cold storage facilities may be a vain exercise.

4. Developing sustainable harvesting techniques and guideline for medicinal plants. Some harvesting methods of medicinal plants are basically destructive; especially the methods that employ roots and barks are deadly for the plants. The development of sustainable harvesting techniques and guideline as part of research initiatives should be part of future undertakings. The promotion of in situ conservation at appropriate sites is recommended in light of the advantages of the strategy. It is essential to develop model for conserving value biodiversity in situ by increasing the benefits that are derived from the resource and ensuring that those benefits accrue first and foremost to local communities. Information exchange; and education at all levels to increase awareness of medicinal plants and the economic potential in drug production should be the focus of future undertakings.

5. Create linkage of conservation with drug development.

6. Develop legal mechanism for benefit sharing, access to medicinal plants and associate knowledge.
References


solidifying agent. The prepared media was sterilized by autoclaving at 121°C and 15 psi. for 20 min. Source explants from previously germinated and maintained seedlings (under axenic condition) of dingetegna and senemeki were directly transferred into the prepared medias under axenic condition. However, source explants from endod were first treated with 10% sodium hypochlorite, rinsed in several changes of sterile distilled water, and inoculated into the prepared media under laminar flow cabinet, and incubated in a growth chamber maintained at 25°C - 28°C under continuous illumination. Explants were transferred to new media within 15 days.

Results and discussion

Effect of mechanical and chemical treatments

The rate and final percentage germination of dingetegna and senemeki seeds were enhanced using both mechanical and chemical treatments as compared to the control is shown in Table 1. Seed germination of both species has increased from less than 10% (control) to 100% using mechanical scarification and concentrated (98%) H₂SO₄ treatment for 5-20 minutes (Table 1). However, the same concentrations of H₂SO₄ for longer duration has decreased germination percentage and damaged the seed to the extent that there was no viable one to germinate. Lower concentration (<50%) of the same and all the other acids viz. HNO₃ and HCl (even if they are concentrated or diluted) have either lower or do not have germinating effect on seeds of both species. Even if soaking seeds in water under certain different temperature regimens and treatment durations had relatively increased seed germination, hot water maintained under 70°C for 2 to 2.30 hours has showed the highest percentage germination in both species (Table 1).

Table 1. Best pretreatment methods for promotion of T. abyssinica and S. alexandrina seeds

<table>
<thead>
<tr>
<th>Pretreatment</th>
<th>Mean final percent germination at different durations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T. abyssinica</td>
</tr>
<tr>
<td></td>
<td>Days after planting</td>
</tr>
<tr>
<td>Control</td>
<td>0</td>
</tr>
<tr>
<td>H₂SO₄ (98%), for 10 min</td>
<td>0</td>
</tr>
<tr>
<td>H₂SO₄ (98%), for 20 min</td>
<td>0</td>
</tr>
<tr>
<td>Nicking (scarification)</td>
<td>0</td>
</tr>
<tr>
<td>Hot water (70°C), 2hrs</td>
<td>0</td>
</tr>
</tbody>
</table>

Generally, mechanical scarification and concentrated sulfuric acid treatments have showed the highest percentage germination. However, under Ethiopian condition, it is very difficult to use sulfuric acid at household level. However, it could at least be used in centrally established nurseries and research stations aimed at saving the lives of these and other precious endangered plant species. Utilization of mechanical scarification is the cheapest method. However, due to

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small size of the seeds to handle which consecutively will make scarification difficult and labor intensive, the method is not easily applicable. However, if cheap and easily applicable devices are developed, it will be the most appropriate method in Ethiopia.

**Plant tissue culture (Micropropagation)**

In order to produce a number of true-to-type seedlings from a single plant source, there was a need to develop callus. White, yellowish and green callus tissues of all the three medicinal plant species were developed from shoot tip, internodes and leaves. Moreover, somatic embryos and subsequent adventitious shoots were subsequently developed from the disorganized tumor tissue. Unlike *Phytolaca dodecandra* type 44, root induction of the legumes (dingetegna and senemeki) failed to develop from adventitious shoots. The *in vitro* developed seedlings of endod were taken out, rinsed well using sterile distilled water, transferred to pots with sterile forest soil and kept under modified incubator (incubator with 24 hours florescent light, a beaker of water to increase humidity and adjusted to 24-27°C) for acclimatization but failed to survive. This may be due to lack of convenient environmental condition for acclimatization of the seedlings.

**Conclusion and recommendations**

Mechanical and chemical (using concentrated H₂SO₄) scarifications are powerful germination initiators of dingetegna and senemeki seeds. Mechanical scarification is the best option to be used in every Ethiopian household provided that cheap and easily applicable scarifying devices are developed. Even if protocols are developed to propagate these endangered species (dingetegna and senemeki), there is a need for concerted effort among concerned governmental and non-governmental organizations to use the protocols and save the lives of these precious plant species, particularly dingetegna which is highly endangered and endemic medicinal plant species in Ethiopia.

There is a need for continuous research activities in the field of endod TC to produce true-to-type seedlings with relatively cheaper cost that can be made available to the end user.

**References**


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antifungal effects of freshly pressed garlic juice on the major pathogenic yeasts, moulds and dermatophytes.

Materials and methods
Fresh garlic was purchased from a local market in Mekaneselam, Wollo, where it is traditionally claimed that garlic with high medicinal efficacy is available. The cloves were peeled, weighed (500g) and ground to obtain fresh garlic paste. The paste was squeezed through fine gauze pads to obtain freshly pressed garlic juice. The juice was again filtered through a Whatman No 1 and 18.5 cm to remove coarse materials. Part of the juice was lyophilized, weighed and calculated to determine the extract concentration. Once the concentration of the juice was determined, the rest of the juice and those obtained in subsequent repeated pressings were combined and stock solution prepared.

Test microorganisms: Seven standard test microorganisms and one clinical isolate of *Aspergillus niger* (ATCC 10533) were included in the study. The growth or inhibition of *Candida albicans* (ATCC 34133), *Cryptococcus neoformans* (ATCC 13690), *Aspergillus niger* (ATTC 10533),  *A. flavus* (ATCC 13697), *Trychophyton rubrum* (ATCC 38784), *T. mentagrophytes* (ATCC 18748), *Microsporum canis* (ATCC 26442) and *Epedermatophyton floccesum* (ATCC 52062). The standard ant-fungal drug of Nystatin (Sigma, Lot 124 H0084) was used in the study as a positive control and its stock solution was prepared in Dimethyl Sulfoxide (DMSO). Cultures of the test organisms were prepared following the method adopted from Leven M. (12-13). In brief prior to testing, cultures of *Candida albicans* and *Cryptococcus neoformans* were sub-cultured in Sabouroud Dextrose Broth (SDB) medium (Oxoid) for 48 hours at 25°C. Test inocula of *A. niger* and *A. flavus* were prepared by harvesting mature sporulating cultures with SDB. The turbidity of each cell suspension was measured at 530nm adjusted with sterile distilled water to match that of a 0.5 of McFarland standard to obtain approximately the organisms' number in the range of 1x10^6 to 5x10^6 CFU/ml. Then by diluting this to 1:100 gave us the starting inoculum 1x10^4 CFU/ml, which was used for the test. For inoculation with dermatophytes 2x2mm portion of three weeks old mycelial cultures were used for the tests.

Determination of anti-fungal susceptibility
The anti-fungal susceptibility of the fresh garlic juice and the standard drug nystatin were determined by using agar incorporation technique in Sabouraud Agar medium and following the standard procedure, the Minimum Inhibitory Concentration (MIC) of the juice and the standard drug was determined (14-15). The agar medium under sterile conditions at 45°C was mixed with different amounts of freshly pressed garlic juice to a final concentration of 12.5, 25, 37.5, 50, 75, and 100μl per ml (v/v) of agar media. This is equivalent to 5, 10,15, 20, 30, 40 mg/ml (w/v), respectively. The standard drug nystatin was prepared to the concentration of 0.25, 0.50, 0.75 and 1mg/ml (w/v) of media. A separate agar plate without test sample or the standard drug was also prepared in order to provide an appropriate growth of the organisms. Then all the prepared plates were inoculated with the test organisms. After inoculation the plates were incubated at 25°C for up to three to seven days except for dermatophytes which were incubated for up to three weeks at the same temperature. Inhibitory effect of the different
concentrations of the juice was judged by direct visual comparison of the test cultures with the control cultures. All the tests were carried out in triplicate and the MIC was recorded as the lowest concentration of freshly pressed garlic juice capable of completely inhibiting growth of the microorganisms after incubation for different period of time for different organisms at specified temperature.

Results

The results of the *in-vitro* susceptibility of the test organisms to the freshly pressed garlic juice are given in Table 1. Of all the microorganisms tested, 89% were sensitive at a concentration 75\(\mu\)l/ml (30mg/ml). The antifungal activity was assayed for garlic juice and the standard drug nystatin. From the study results garlic juice was found to inhibit the growth of the standard organisms of *C. neoformans*, *A. niger* and the clinical isolates of *A. niger* at the concentration of 25\(\mu\)l/ml (10mg/ml). The standard organisms of *A. flavus* was inhibited at the concentration of 37.5\(\mu\)l/ml (15mg/ml) and the standard organisms of *T. rubrum*, *T. mentagrophyte*, *M. canis* and *E. flocosum* were inhibited at the concentration of 75\(\mu\)l/ml (30mg/ml). From all the tested organisms the standard organism of *C. albicans* was found to be less sensitive and inhibited at the concentration of 100\(\mu\)l/ml (40mg/ml).

To compare the result of the anti-fungal activity of garlic juice with that of the standard drug, nystatin was also included in the study and the result showed that it inhibited both the standard and the clinical isolate of all the tested organisms at the concentration of 0.75mg/ml. From the results the MIC value for the standard organisms of *C. neoformans* and *A. niger* and the clinical isolates of *A. niger* was 25\(\mu\)l/ml (10mg/ml) and for that of the standard organism of *T. rubrum*, *T. mentagrophyte*, *M. canis* and *E. flocosum* was 75\(\mu\)l/ml (30mg/ml). The MIC value for the standard organism of *A. flavus* and *C. albicans* was 37.5\(\mu\)l/ml (15mg/ml) and 100\(\mu\)l/ml (40mg/ml), respectively.

Discussion

Investigations conducted on the effects of garlic preparations, including dehydrated raw garlic powder, dehydrated boiled garlic powder and aged garlic extract have long been documented and indicated the antimicrobial effects of garlic (5-8). However, the few recent studies conducted on its antifungal effects have also created additional insight into the field and new findings have been documented. The present study was conducted with direct focus on the freshly pressed garlic juice unlike the previous studies which, have documented the effects of aqueous extracts, dry powders or isolated compounds.
Table 1. The anti-fungal activity of freshly pressed garlic juice. Minimum Inhibitory Concentration (μl/ml of media)

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Concentration tested (μl/ml media)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12.5</td>
</tr>
<tr>
<td><em>Epidermatophytes flocusum</em></td>
<td></td>
</tr>
<tr>
<td>(ATCC 52062)</td>
<td></td>
</tr>
<tr>
<td><em>Cryptococcus neoformans</em></td>
<td></td>
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<tr>
<td>(ATCC 13697)</td>
<td></td>
</tr>
<tr>
<td><em>Aspergillus flavus</em></td>
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<tr>
<td>(ATTC 13697)</td>
<td></td>
</tr>
<tr>
<td><em>Trichophyton rubrum</em></td>
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<td>(ATTC 38784)</td>
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</tr>
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<td><em>Aspergillus niger</em></td>
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<td>(ATCC 10535)</td>
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</tr>
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<td><em>Trichophyton mentagrophytes</em></td>
<td></td>
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<td>(ATCC 18748)</td>
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<tr>
<td><em>Microsporum canis</em></td>
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<td>(ATCC 26442)</td>
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<td><em>Candida albicans</em></td>
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<td>(ATCC 34133)</td>
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<tr>
<td><em>Aspergillus niger</em></td>
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<td>(Clinical isolate)</td>
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Note: + indicated inhibition. - indicates bacterial growth

However, the results obtained are in conformity with the previous few study results of investigations on freshly pressed garlic juice against yeasts, molds and dermatophytes (10). The results show that the freshly pressed garlic juice exhibited in vitro antifungal activity, inhibiting 89% of the microorganisms tested below 75μl/ml (30mg/ml) and all of them below 100μl/ml (40mg/ml) concentration.

Generally, a higher concentration of the garlic juice was needed to demonstrate an inhibitory effect on *Candida albicans*. Compared with other test organisms, *C. neoformans*, *A. niger* and the clinical isolates of *A.niger* are more sensitive to the garlic juice followed by *A. flavus*. However, none of the test microorganisms were completely inhibited at garlic juice concentration of less than 25μl/ml (10mg/ml) of media. Our results on the growth inhibitory activity of freshly pressed garlic juice against the test organisms are consistent with previous similar studies elsewhere (10). The results indicate values for Minimum Inhibitory Concentrations (MIC) for freshly pressed garlic juice against test organisms and at 75μl/ml (30mg/ml), garlic juice was found to inhibit 89% of all the test organisms. The highest concentration was recorded for *Candida albicans*.

It is remarkable especially that these strongly pathogenic fungi, which are responsible for various infections are highly sensitive to garlic at such a rationally low inhibitory concentration, 25μl/ml (10mg/ml) of media. Therefore, it seems quite possible that garlic would be in all cases, and even would work against those strains that have become resistant to various antifungal drugs, as has been demonstrated previously.
Since garlic is a pharmacopoeial standard medicinal plant, the efficacy and safety of the plant have previously been established. In addition to the observation of antibiotic properties, the complete lack of resistance of microorganisms to garlic has been reported in previous studies. It is also well documented that dosing of garlic and its preparation have been established with a wide range of safety margin, therefore, no side effects were noted, even with relatively large doses during many toxicological studies and garlic preparations have a wide range of safety margin. This indicates that garlic juice can be safely used in prophylaxis and treatment of common conditions related to fungal infections. Therefore, this study and the other studies carried out on garlic can probably indicate the implementation of garlic therapy regimen, after an appropriate clinical trial and proper formulation, to the relief of the health care system that has already been stressed with fungal infections, shortage of basic antibiotics and/or microbial resistance to the commonly used antibiotics.

In conclusion, the in vitro antifungal effectiveness of the freshly pressed garlic juice has been well demonstrated in repeated studies and further purification and formulation of the juice would give a true antifungal activity comparable to standard antibiotics. Freshly pressed garlic juice could, therefore be used successfully for treating fungal infections because it is effective, readily available, cheap and has no ill effects. Nevertheless, clinical trials on the effects of freshly pressed garlic juice in fungal infections is essential, before advocating large-scale therapy.

References


Antibacterial Activity of the Essential Oil From Eucalyptus globulus and Cymbopogon citratus

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Abstract
The essential oils from the leaves of Eucalyptus globules and Cymbopogon citratus were assayed for their anti-bacterial activities against the standard and clinical isolates of Staphylococcus aureus, Klebsiella pneumoniae and Streptococcus pneumoniae by using agar dilution method, and the Minimum Inhibitory Concentration (MIC) of the essential oils capable of completely inhibiting growth of the bacteria was determined. From the study results, all the test organisms were inhibited at the concentration of $\geq 0.60\%$ (v/v) of the essential oils from both plant species. Eventhough, the essential oils from leaves of these plants could be used as antibacterial for pathogenic organisms, further investigation on chronic and acute toxicity of the oil are required to be carried out.

Introduction
Pneumonia is one of the most common respiratory tract infections of young children under the age of 5 years. Even though pneumonia is caused by viruses and fungi, it is known that more than half of all pneumonia cases are caused by bacteria and the disease ranks among the top causes of deaths from infectious diseases (1). Streptococcus pneumoniae (pneumococcus), a gram positive, and capsule forming coccus, is the most frequent etiologic agent of bacterial pneumonia (2,3). Death rate from untreated pneumococcal pneumonia is about 30% (4). Several other bacteria including Staphylococcus aureus and Klebsiella pneumoniae are also responsible for a significant number of cases of pneumonia (5).

Pneumonia is highly prevalent Ethiopia. Some studies show that most hospital admission cases are respiratory disease with pneumonia (6,7,8). Diagnosis and management is also a challenge in the primary health care in resource-poor countries. Even if properly diagnosed, people in these regions cannot afford to pay for the conventional drugs (9). More over the extensive use of antibacterial drugs lead to the rapid emergence of resistance against most of the commonly used antimicrobial drugs, and additional burden in the mixture of bacterial infections (10). As a result, pneumonia remains to be a major cause of death among young children.

In view of the high prevalence and resistance development of pneumonia for the existing antibiotics the present investigation was initiated to study the antibacterial activities of the essential oil components of Eucalyptus globulus and Cymbopogon citratus against pneumonia causing microorganisms.

The leaves of Eucalyptus globules are traditionally employed as a remedy for colds. The plant contains up to 3% of volatile oil, the major constituents of which is cineole together with tannin a bitter principle and resin (11). The medicinal plant Cymbopogon citratus is commonly
PART IV. PRESENTATION OF ABSTRACTS
The Use of Cultured Hepatocytes for Toxicity Studies on Herbal Medicines: the Case of Moringa stenopetala

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Abstract

A study that illustrates the utility of cell culture for screening plant extracts (Moringa stenopetala) for potential toxicity is presented. The cytotoxicity of extracts from a widely used species of plant, Moringa stenopetala, was assessed using leakage of lactate dehydrogenase (LDH) and uptake of Trypan blue in cultured hepatocytes (HEPG2 cells). The functional integrity of extract-exposed cells was determined by measuring levels of ATP and intracellular levels of glutathione (GSH).

The ethanolic extracts of leaves and seeds significantly increased LDH leakage in a dose- and time-dependent manner. The water extract of leaves and the ethanolic extract of root of Moringa stenopetala did not increase LDH leakage. A highly significant decrease in the percentage of viable hepatocytes was found after incubating the cells with the highest concentration of the ethanolic leaf and seed extracts of the plant. ATP levels were less drastically affected, although the water extract of leaves significantly increased ATP levels at the highest concentration employed; lower concentrations had no effect. In contrast to the above finding, the highest concentration of the ethanolic extract of the leaves significantly decreased ATP. The root and seed extracts had no significant effect on ATP levels. Likewise, the ethanolic leaf extract decreased GSH levels at the highest dose level.

The water extract of the leaves did not alter GSH or LDH levels or affect cell viability. This suggests it may be non-toxic, and is consistent with its use as a vegetable.

The data obtained from the studies with the ethanolic extract of the leaves and seeds from Moringa stenopetala shows that they contain toxic substances that are extractable with organic solvents or are formed during the process of extraction with these solvents. The significant depletion of ATP and GSH only occurred at concentrations of extract that caused leakage of LDH. Further investigation with this plant in order to identify the constituents extracted and their individual toxic effects both in vivo and in vitro is warranted.

Key words: Moringa stenopetala, cultured hepatocytes, cytotoxicity, plant extracts.
Conservation and Sustainable Use of Medicinal Plants Project (CSMPP) in Ethiopia

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Abstract

In light of the importance of the medicinal plant genetic resources that provide the health care needs for the majority of human and livestock population in Ethiopia, and also the fact that medicinal plants could be used as sources of revenue for farmers, the Institute of Biodiversity Conservation and Research (IBCR) has developed a project on Conservation and Sustainable Use of Medicinal Plants (CSMPP) in collaboration with relevant stakeholders.

The overall objective of the project is to promote conservation, management, and validation of traditional medicine for sustainable use of medicinal plants for human and livestock healthcare in Ethiopia. The project is aimed at developing three phytomedicine used for treatment of human diseases (hypertension, bronchopneumonia and tapeworm infections) as well as three phytomedicine for livestock health care focusing on mastitis, dermatophilosis and tapeworm infections. Other activities include development of Intellectual Property Right (IPR) guideline to protect the indigenous knowledge involved in the practice.
Antiviral Activity of Selected Ethiopian Medicinal Plants Against Human Immunodeficiency Virus Type-1 (HIV-1) and Type-2 (HIV-2)

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Abstract

Plants have always proved to be rich sources of remedies of diseases, and also of new drugs. The biodiversity of the Ethiopian flora offers great possibilities in the search for natural products with novel structures that have a range of biological activities (1,2). Unfortunately, many of the plants used in Ethiopian traditional medicine have not been investigated either from the point of view of their chemical composition or their pharmacological activities. Because of the aforementioned reason and also an attempt to find natural products as potential anti HIV agents, seventy-four organic extracts from twenty-two plant species distributed in fourteen families were evaluated for antiviral activity against human immunodeficiency virus type-1 (HIV-1) and type-2 (HIV-2). Selective inhibition of viral growth was assessed by the simultaneous determination of the \textit{in vitro} cytotoxicity of each of the extracts against MT-4 cells as described by Pauwels \textit{et al.} (3). Eight extracts prepared from the root bark of \textit{Bersama abyssinica} Fresene, the stem bark of \textit{Combretum molle} (R. Br. Ex G. Don.) Engl \& Diels and the leaves of \textit{C. paniculatum} Vent. (Combretaceae), the leaves of \textit{Dodonaea angustifolia} L.f. (Sapindaceae), and the stem bark of \textit{Ximenia americana} L. (Oleaceae) displayed antiviral activity at concentrations that were nontoxic to MT-4 cells. The highest selective inhibition of HIV-1 replication was observed with the acetone fractions of \textit{C. molle} and \textit{C. paniculatum}, and the methanol fraction of \textit{D. angustifolia} which showed selectivity indices (ratio of 50% cytotoxic concentration to 50% effective antiviral concentration) of 7.0, 6.4 and 4.9, and afforded cell protection of viral induced cytopathic effect of 100%, 100% and 99%, respectively, when compared with control samples. The greatest degree of antiviral activity against HIV-2 was achieved with the acetone extract of \textit{C. paniculatum} (EC₅₀: 3 µg/mL), which also showed the highest selectivity index (4). Only the polar extracts that were obtained by extraction with hydroalcohol, methanol or acetone exhibited inhibition of viral growth at sub-toxic concentrations. The results obtained in this study enable the selection of extracts which show some specificity of action and support further investigation of these extracts for their potential as new lead antiretroviral compounds. Accordingly, phytochemical analysis of one of the active extracts namely, the acetone fraction \textit{C. molle}, was carried out. The investigation resulted in the isolation of two classes of secondary metabolites namely, hydrolysable tannins and saponins. The identities of the compounds were established by means of their UV, mass, proton and \textsuperscript{13}C NMR spectral characteristics. All the saponins did not inhibit viral growth, whilst the ellagitannin punicalagin displayed strong inhibition against HIV-1 with EC₅₀ value of 0.96 µg/ml and selectivity index of 25.

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![Punicalagin](image-url)
In Vitro and In Vivo Studies of Some Traditionally Used Antihypertensive Herbs

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Abstract

In Ethiopia, several herbal medicines are traditionally used to treat hypertension or other diseases. In the present work five plants were selected namely: *Carica papaya*, *Plumbago zeylanica*, *Ajuga remota*, *Croton macrostachys* and *Lupinus albus*; with the aim of 1) examining their effect on blood pressure in anaesthetized guinea pigs and or rabbits 2) their effect on transmurally activated longitudinal muscles of guinea pig ileum and 3) to examine whether isolation of bioactive principles might be possible. The results indicate that 1) Two of the five selected plants, *Croton macrostachys* and *Lupinus albus* produces marked lowering of arterial blood pressure in anaesthetized guinea pigs and/or rabbits and both the crude extracts and fractions obtained after HPLC chromatograms produce long-lasting inhibitory effect on transmurally activated longitudinal muscles of guinea pig ileum. 2) Comparative studies made on HPLC run extract of *Croton macrostachys* (fraction 14) and adenosine, isoguanosine and guanosine showed that the extract was similar to isoguanosine both in its bioassay and HPLC peak retention time and UV absorbance pattern.
PART V. CODE OF ETHICS AND PRACTICES
Code of Ethics for Pharmacists Practicing in Ethiopia

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Abstract
Professional Ethics is the foremost requirement in the practice of any profession. However, its effective application is even more emphasized in health professions like Medicine, Pharmacy, Nursing etc. as these professions are exclusively linked with taking care of the human health. Any ethical failure in practicing these professions due to various reasons can cause a big damage. As a result, strict follow-ups by professional associations and other pertinent public authorities are expected to be undertaken as to the ethical practices of health professionals. Pharmacy is one of the health professions taking part in the provision of human health service and a higher grade of ethical practice is duly emphasized in pharmaceutical practice. It is the health profession dealing mainly with the scientific, technological and clinical aspects of drugs used for humans and animals. It is the profession specifically dealing with synthesis, compounding, formulating, quality assurance and dispensing of drugs with pertinent patient drug counseling. The pharmacist also renders vital drug advice service to health professionals like physicians and nurses in order to make positive contributions towards rational drug prescribing. The contemporary pharmacy practice is more of clinical/patient/disease oriented and subsequently there are several humanistic issues demanding for stringent ethical standards in practicing the profession. From the basic definition, responsibility and nature of the profession of pharmacy we can envisage that ethical professional practice is decisive to the quality of pharmaceutical service being rendered. In a contrary the unethical pharmacy practitioner can cause irreversible damage to the well being of the public in general and to the patient in particular. Therefore, pharmacy professionals are obliged to give the highest emphasis to professional ethics while practicing their profession. Their professional service being rendered could contribute to either saving the life or destroying it due to ethical or unethical practice respectively. The practicing pharmacy professionals should be highly sensitive to this fact. The code of ethics for pharmacists practicing in Ethiopia puts ethical statements clearly as to what the pharmacists should do and what they should not do while practicing their profession. The five major areas of ethical emphasis of code of ethics for practicing pharmacists are: the pharmacist in relation to his (her) job; the pharmacist in relation to his (her) patient; the pharmacist in relation to his (her) fellow professionals; the pharmacist in relation to other health professionals and the pharmacist in relation to the public. The major ethical standards of the "Dos" and "Do Not Dos" of the Ethiopian Pharmaceutical Code of Ethics will be discussed in this paper in relation to the above-indicated five major areas.

Introduction
Pharmacy is a health profession with diversified disciplines within it. It is the profession dealing with the overall aspects of drugs and its clinical applications. It is an obvious fact that this concept is broad. The practice of pharmacy is defined as preparing, compounding, preserving, or the dispensing of drugs, medicines, and medical devices on the basis of...
prescriptions or other legal authority. This is basically “Product Oriented” definition. Other definitions may be more elaborate and include personal services as well as drug control. For example the Virginia Pharmacy Act defines “Practice of Pharmacy” as follows:

The practice of pharmacy is the personal health service that is concerned with the art and science of selecting, procuring, recommending, administering, preparing, compounding, packaging, and dispensing of drugs, medicines and devices used in diagnosis, treatment, or prevention of disease, whether compounded or dispensed on a prescription or otherwise legally dispensed or distributed, and shall include the proper and safe storage and distribution of drugs, the maintenance of proper records therefore, and the responsibility of providing information, as required, concerning such drugs and medicines and their therapeutic values and uses in the treatment and prevention of disease”.

The words “Drugs” and “Devices” as used in this definition shall not include surgical or dental instruments, physical therapy equipment, X-ray apparatus, their component parts or accessories or glasses or lenses for the eyes. The Practice of Pharmacy shall not include the operations of a Manufacturer or Wholesaler.

Clinical oriented or contemporary definition of pharmacy

Pharmacy is a profession (a system) which, renders a health service by concerning itself with knowledge about drugs and their effects on human and animals. It is both a health service and knowledge system. This is patient oriented.

Pharmacy practice: A Pharmacist is the one who practices the profession of pharmacy. The professional responsibility of the profession of Pharmacy is the combination of the two earlier definitions i.e. product oriented responsibility and patient/clinical/disease oriented responsibility. Therefore, the Ethical principles to be obeyed by a pharmacist are influenced by these two basic professional responsibilities (activities).

Code of Ethics for Pharmacists Practicing in Ethiopia

As a matter of fact these principles of professional Ethics have also got Global Nature i.e. Professionalism is Global in Nature. For example, Pharmacy is one profession wherever it is on the globe except its differences in degree of scientific and technological advancements, quality of professional service being rendered, extent of implementation of ethical principles and degree of competence of professionals from country to country. Therefore, the basic principles of Code Ethics for practicing pharmacists are more or less similar globally except language differences and their slight differences or deviations attributed to or influenced by differences in the social, cultural, economic, scientific and technological advancements among global countries. These principles of professional conduct are established to guide pharmacists in relationships with their job, with patients, with fellow practitioners, with other health professionals and with the public.

Accordingly, the following ethical principles are forwarded:

A) A pharmacist in relation to his/her job

The primary concern of a pharmacist should be to promote the health and well-being of the patient and the public at large. A pharmacist should avoid any act that endanger the patient’s health and well-being.
A pharmacist should get involved in the profession only after having been registered to practice the profession and/or obtaining the legal license to operate the pharmaceutical establishment.

A pharmacist should give comprehensive service in his/her profession.

A pharmacist should not delegate his/her subordinate and/or assistant to tasks which, he/she should perform personally. In case he/she delegates his/her subordinates, he/she should carry out the necessary guidance and supervision.

A pharmacist should immediately report any observed unwanted reactions, side effects and adverse drug reactions to the attending physician and/or pertinent authority.

A pharmacist should carry his/her responsibility within his/her professional competence, for example, cases of emergency.

A pharmacist shall update his/her knowledge and maintain professional competence directly related to his/her specific area of practice.

A pharmacist shall provide current drug information to the public as well as to other health professionals.

B) A pharmacist in relation to his/her patient

1. Shall not abuse his/her relationships for personal gains and shall not show partiality between his patrons. Therefore, he/she shall not discriminate between patients by nationality, creed, color, religion, social status, political stand etc.

2. Shall give the necessary advice to the patient, the patient’s family and the community in the prevention of diseases and the promotion of health.

3. Shall provide all the necessary information and guidance on proper use of drugs and medical devices.

4. Should respect the right of a patient not to take a drug unless the disease condition requires otherwise by law.

C) A pharmacist in relation to his/her fellow professional

1. Shall extend all support, respect and cooperation to fellow members of his/her needs for scientific and technical information.

2. Shall have the responsibility to expose any act of misconduct or malpractice committed by a fellow professional to keep up the honor and integrity of the profession and to cooperate with the enforcement of the law.

3. Shall strive to join and participate in the activities of professional associations and scientific societies with the objectives of promoting the profession.

D) A pharmacist in relation to other health professionals

A pharmacist, maintaining good professional relationship with other health professionals, should in general respect the reputation of the prescribes to a patient by way of:

1. Not showing undue alarm or reaction on receipt of a prescription for dispensing.

2. Not giving comments on the merits and demerits of the drug prescribed to a patient.

3. Exposing deliberate acts of malpractice through the appropriate channel.

4. Giving professional consultancy services in collaboration with other health professionals on appropriate use of drugs and medical devices.

5. Shall not recommend a particular medical practitioner to a patient. This, however, does not mean that a pharmacist should not advice a patient on the basis of the nature of his/her complaints.
6. Not entering into any secret arrangement or negotiations with a medical practitioner by way of giving any offer, commission etc. in return for his/her favor of patronage by recommending his/her establishment
7. Not being an accomplice to any act of malpractice with other health professionals.
8. Striving for the promotion of health, expansion of health services and the development of teamwork spirit with other health professionals.

E) A Pharmacist in relation to the public
1. Shall observe secrecy and confidentiality
2. Shall be accountable and liable due to negligence
3. Shall be responsible as a pharmacist.

Ethical principles towards traditional healing
There is no information as to whether such code of ethics is existing or not in Ethiopia. However, ethically, a traditional diagnosing or treating procedures should never be used unless its merits are proven over the modern medicine or/and their safety is unequivocally proven. Traditional medicine should also be used if there is no better alternative in the modern medicine. However, there are several euphoric and misleading claims in this respect in different regions of our nation. Careful scrutiny should be done and meticulous work should be accomplished before launching for traditional medicine use.

Problems of ethical practices in Ethiopia
Some of the major problems of ethical practices in Ethiopia are attributed to failure of its effective implementation, lack of ethical commitment by some health professionals giving priority to personal gains and lack of proper accountability for ethical breaches.

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Codes of Public Health Ethics

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Abstract
Ethics is the philosophical study of the moral value of human conduct and the rules that govern it. The practical manifestation of ethics relates to codes of normative behavior for society and an awareness of issues within society that have moral importance. Codes of ethics for a given profession serve as a guide for the conduct of members and contain standards of ethical behavior in their professional relationships. Such codes also incorporate standards of ethical behavior governing personal behavior, particularly when that conduct directly relates to the role and identity of the professionals concerned. Until recently, the ethical nature of public health has been implicitly assumed rather than explicitly stated. However, society is increasingly demanding explicit attention to ethics. This demand arises from technological advances that create new possibilities; the flourishing of the market sphere in public health; and new challenges to health. When we come to the particular situation in Ethiopia, activities and spheres of public health are rapidly expanding with implications of the need for raising ethical awareness within the conduct of the profession. As the Ethiopian Public Health Association is one of the bodies that should take the lead in addressing such issues, it has recently come up with a “Codes of Public Health Ethics”. In addition to the general codes of public health ethics, the document contains codes of ethics related to health research including ethical review procedures, ethical codes for the performance of members of health management as well as those of public health educators.

Introduction
Code of ethics was first developed by societies of physicians in Europe and then in America. These societies called for professional conduct in the relationships between physicians and patients and among physicians. The early 19th century code in America even spoke of the duty of physicians to be ever vigilant for the welfare of the community. The challenge to medical ethics is to influence physician behavior in the direction of enhancing concern for the well being of the greatest proportion of people. For centuries, codes of medical ethics have concentrated on proper behavior toward individual patients and almost ignored the doctor’s responsibilities to society. Health service reforms have come particularly from lay leaders and citizen groups and governments have applied various strategies to induce more socially responsible behaviors by physicians. Such external pressures should not be necessary if a socially oriented code of medical ethics were followed and medical education thoroughly recast to clarify community health problems and policies required to meet them. The training of medical professionals is one of the areas in which ethical considerations is most urgently needed because this is where the attitudes and perceptions of tomorrow’s medical professions are formed (1)

With the broadening scope of medicine modern day physician is a scientist and social worker, prepared to cooperate in teamwork and in close touch with the people he serves; a friend and a leader, he will direct all his efforts toward the prevention of disease and become a therapist when prevention has broken down-the social physician protecting the people and

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guiding them to healthier and happier life (2). For centuries, society has defined the obligations of the physician solely in terms of his responsibility to individual patients.

The Hippocratic oath, despite its mysterious origins, is still sworn to by new medical graduates which affirms the doctor’s maintenance of honorable relations with each patient and of devotion to his teacher. The medical licensure laws of today has no provisions about obligations of doctors to serve people in need, to cooperate with public authorities on the prevention of disease, always to put patient's welfare above pecuniary gain, or any other doctrine defining medicine's social responsibilities (3). Ethical questions related to health arise within a much wider debate, which concerns the societies we live in, what they are becoming, and what we want them to become. Though some fundamental ethical issues are unique to the field of health, much of the current debate involves the application to health of basic questions raised by world trends such as: interdependence, action on global scale, respect for diversity, rising individualism and social integrations, predominance of economic thinking, etc. Classical reference points such as Hippocratic oath no longer provide a sufficient rationale for specific medical practices, powers, and responsibilities, because these have changed in virtually every respect (4). Doctor-patient relationship such as doing patient no harm, respecting individual dignity and protecting the confidentiality of medical communication. From the streamlined code of ethics formulated by the World Medical Association, in 1948, states: I solemnly pledge myself to consecrate my life to the service of humanity (5). The pledge to practice the profession with dignity to respect one’s teachers, to regard other physicians as brothers, would find little justification in a code on social responsibility (3).

Ethics is the philosophical study of the moral value of human conduct and the rules that govern it. The practical manifestation of ethics relates to codes of normative behavior for society and an awareness of issues within society that have moral importance.

**Purpose of Code of Ethics**

The purpose of the code of ethics is to serve as a guide to conduct for members. It contains standards of ethical behavior for public health workers in their professional relationship. The code of ethics also incorporates standards of ethical behavior governing personal behavior, particularly when that conduct directly relates to the role and identity of the healthcare professionals. Until recently, the ethical nature of public health has been implicitly assumed rather than explicitly stated. Increasingly, however, society is demanding explicit attention to ethics. This demand arises from technological advances that create new possibilities; the flourishing of the market sphere in public health; and new challenges of health. When we come to Ethiopia, the profession and its activities are expanding as any professional discipline. Thus issues of ethical awareness within the conduct of the profession cannot be avoided. Ethiopian Public Health Association (EPHA) is one of the bodies that should take the lead in addressing this issue.

**Content of the draft code of public health ethics**

The draft code of public health ethics is composed of the following parts:
- Background and rationale
- The nature of professional ethics
- The rationale for the code of ethics

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Nature and scope of public health ethics:
The theoretical construct of the draft document used was
1. Preamble
2. General codes of public health ethics
3. The role of public health
4. Principles of the ethical practice of public health
5. Rules to define the public interest
6. Rules to avoid conflict of interest
7. Ethics of health research including ethical review procedures
8. Ethics for the performance of members of the health management
9. Ethics for the performance of public health educators

The Public Health Ethics was drafted based on codes such as Nuremberg code, CIOMS, Declaration of Helsinki, WHO and TDR Guidelines

Ethical consideration
In the light of medicine's long historical development toward a goal of equity, a modern code of ethics should put its major emphasis on the doctor's social responsibilities. This does not imply abandonment of long-established percepts for a virtuous doctor-patient relationship, such as doing the patient no harm respecting individual dignity, and protecting the confidentiality of communication (3).

All practicing EPHA members shall take into account the undermentioned ethical considerations: Informed consent, benefits, risks, compensations, adverse event reporting, translation of informed consent to local language, confidentiality, withdrawal at anytime, ownership of intellectual property rights.

The Association objectives
The major objectives of EPHA with respect to ethics are:
1. To promote medical science, maintain honor and interest of professionals and support high standards of medical ethics and conduct among its members.
2. The general conduct of health research is guided by internationally recognized principles of human rights including the Nuremberg Code of Human Rights and the World Medical Association’s Declaration of Helsinki.

These principles also underlie the proposed International Guidelines for Biomedical Research involving human subject, issued by the Council for International Organizations of Medical Sciences in 1982.

Conclusion
The proposed public health code of ethics is based on codes such as Nuremberg code, World Medical Association Declaration of Geneva, Nuremberg Code (1949), and World Medical Association Declaration of Helsinki 1964, as well as laws of the country and incorporate the broad ethical principles:
1. Respect for persons
2. Beneficence
3. Justice

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References

Guidelines on Medical Ethics in Ethiopia

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Abstract
The development of medical code of ethics in its broader sense and written ideals of principles of medical practice were found in different countries as modern medical practice takes more momentum and becomes acceptable by the community at large. Medical code of ethics is usually formulated taking into consideration the prevailing local culture, religious beliefs, existing laws, social norms and standards of medical practice. In Ethiopia with the initiative of the Ethiopian Medical Association, a booklet entitled "Medical Ethics for Physicians Practicing in Ethiopia" was first published in 1988. The Ethiopian Pharmaceutical Association has also prepared a document entitled "Code of Ethics for Pharmacists Practicing in Ethiopia" in 1996. The Ethiopian Nurses Association has also brought forth its Code of Ethics in May 2003. The overall objectives of these medical ethics documents are to impose upon health professionals to adhere to certain norms and standards of behavior in their practices so that individuals and community at large are well protected. It is proposed that all health professionals respect their code of ethics and serve humanity with dignity, utmost care, sense of responsibility and professional excellence.

Introduction

Human values are the guides and justifications that people use for choosing the goals, priorities and means that make up that strategy. Ethics acts as the bridge between policy and values. It examines the moral validity of the choices to be made, and needs to resolve the conflict between values which inevitably occur in the process. Ethics, therefore, orders human choices in accordance with normative principles (1).

Ethics is itself grounded in socio-cultural, philosophical or religious convictions. These convictions are a society's yardsticks for right and wrong, good and evil. They are often both incommensurable in themselves and untransferable from one culture to another. To question or disagree with these convictions is often seen as an affront because they are such an integral part of the self-image of a person or nation. This is what makes trans-cultural ethical dialogue so difficult (2).

Western medicine has been dominated by what could be called the Hippocratic culture, which has provided it with a core of beliefs and values for well over 2000 years (3). Modern medical ethics as formulated by professional organizations of physicians is still influenced in varying degrees by this tradition.

Ethics in the medical profession

Ethics is defined as a systematic or scientific study of morality (of human acts through the medium of natural reason). Medical ethics: A form of special ethics concerned with the application of general principles to the moral problems of the medical profession. Medical ethics is used to refer to the relations between physician and patient, but now it refers more to the relations between the medical world and society. This transition has been occasioned not only by changing attitudes but by the major

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role now played in care by medical institutions and social financing and the growing use of sophisticated technical systems for the management of life and death. We cannot, however, separate individual ethics from social or public ethics. Social ethics is expressed and evolves within the relations between individuals, and an ethics for the medical profession would need to offer a code of conduct for each of its members.

An adequate ethical system cannot consist only in a stated set of values but must have ways to manage conflicting values in concrete situations. For instance, the value of meeting an individual’s wish, has to be managed in conjunction with the values of acting responsibility towards society and tending to other claims on health resources. The role of the hospital is central to the consideration of a new system of social ethics with regard to health. Within medicine the hospital is the ultimate expression of both institutional logic and the technical management of suffering and death (4).

Professional code of ethics

The cornerstone for professional code of ethics was laid down by the Code of Laws of Hammurabi (1790 BC), Oath of Hippocrates (400 BC), the Chinese Code (700 AD), World Medical Association Declaration of Geneva, Nuremberg Code (1949), and World Medical Association Declaration of Helsinki (1964).

There are fundamental issues and controversies in medical ethics for which every physician need to be aware of. The fundamental issues are the physician-patient relationship, ethical models, managing medical information, and decision-making. One of the most controversial issues in modern day medical ethics are issues near the end of life such as defining death, and euthanasia.

Medical technologies

Accumulated experience has brought with it increasing skepticism about the ability of technologies to solve all problems or to fulfill the excessive hopes that are still routinely placed in them. The quality of care must be evaluated on the basis of the human and therapeutic needs of the patient rather than, as is too often the case, on the novelty and sophistication of the technology used. However, the development of technologies has radical effects on attitudes, lifestyles and behavior both for the physician and the patient. This has resulted in defining new code of ethics that may include in vitro fertilization, surrogate motherhood, human genetics, etc.

Medical research (Research Ethics)

High ethical standard in health research can be achieved only when researchers aspire for such a standard in their research activity. Enhancement of human research participants protection requires the establishment of standards. The standards on human experimentation should include consent of subjects, confidentiality, risk and benefits, protection of special groups, etc.

From the streamlined code of ethics formulated by the World Medical Association in 1948 states:

I solemnly pledge myself to consecrate my life to the service of humanity (5). The pledge to practice the profession with dignity to respect one’s teachers, to regard other physicians as brothers, would find little justification in a code on social responsibility (6). New pledges that include social ethics in medicine are added to the existing pledges as follows:

I solemnly pledge myself to consecrate my life to the service of humanity.
I will do whatever I can to help my patient and the whole community to prevent disease or injury and to maintain good health.

I will respect the dignity of all persons, serving them in accordance with their health needs, irrespective of their personal status or the pecuniary rewards involved.

Realizing the greater health problems of the poor, I will make a special effort to respond to their needs conscious always that the cost of health care is borne by the people, I will do nothing wasteful or without justification.

In spite of the attractions of certain localities, I will serve the people where they live and work, whenever my skills are most needed.

I will serve cooperatively with other health workers, in the interests of effective provision of health service.

I will cooperate with public authorities in the implementation of health legislation that reflects the democratic decisions of the people.

With utmost effort I will attempt to keep myself well-informed on advances in medical knowledge.

As a socially conscious citizen, I will be alert to health hazards and do everything possible to advance the welfare of the people.

**Medical ethics for Physicians practicing in Ethiopia**

The first Medical ethics for Physicians practicing in Ethiopia was published in 1988, whereas the 2\textsuperscript{nd} was published in 1992. The document was revised and reprinted in 2003. The document contains two major parts; General Code of Ethics and Human Experimentation (Clinical Research). The objectives of the document are:

1. To safeguard the health of individual, and community, not to do harm
2. To safeguard the interest of scientific knowledge and never take precedence over the well being of individual and community

**National Ethical Clearance Committee**

This committee is established as one the several standing committees functioning under the National Health Science and Technology Council of the Ethiopian Science and Technology Commission and its functions are to review research proposals to ensure that the following are met: 1. informed consent, 2. confidentiality, and 3. Risks and benefits. All ethical review works are carried out in accordance with the National Health Research Ethics Guidelines and Procedures revised in 2003. The main objective of the National Health Research Ethics Guidelines and Procedures is to safeguard the study subjects from any harm related research and to assure that individual civil rights are being respected.

High ethical standard in health research can be achieved only when researchers aspire for such a standard in their research activity. To ensure that researchers have thorough understanding of ethical issues, Ethical Committees have been established in Teaching and Research Institutions. The National Health Science and Technology Council has also established Regional Health Science Councils. The Regional councils are expected to coordinate all health related researches including those involving human subjects be it biomedical, clinical or epidemiological and ensure that such researches obtain ethical clearance prior to their commencement.

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Conclusion

Medical practice: The oath of medical practice based on the Declaration of Geneva 1947 states that; I solemnly pledge myself to consecrate my life to the service of humanity

Biomedical Research: In biomedical research, the voluntary consent of human subject is absolutely essential as stipulated in the Nuremberg Code (7).

References

PART VI. CODE OF ETHICS AND PRACTICES FOR TRADITIONAL MEDICINE IN ETHIOPIA
CODE OF ETHICS FOR TRADITIONAL HEALTH PRACTITIONERS IN ETHIOPIA

Introduction

The development and promotion of traditional medicine constitute an important public health issue in Ethiopia. The vast majority of the Ethiopian population (90%) resorts to traditional medicine to cover its health needs. In the rural areas, it still represents the only means of providing health care. In cities and towns patients usually consult both traditional healer and modern doctor. The continued popularity of traditional medicine may be attributed to its accessibility, affordability and cultural norms.

It needs to be stressed that traditional medicine is particularly deep-rooted in the Ethiopian culture. It has enabled communities to face many health problems from time immemorial. The long experience acquired during decades of use constitutes a major advantage in mastering innocuousness of remedies used.

Also, Ethiopia has a flora that is extremely rich in its diversity. It is therefore not surprising that this flora has molecules of therapeutic value that may be used in the treatment of major diseases such as HIV/AIDS, malaria, sickle cell disease, etc.

The practice of traditional medicine is carried out by traditional health practitioners (THPs). In order to effectively integrate, THPs into PHC (primary health care) there is need to institutionalize traditional medicine. The institutionalization of traditional medicine calls for a number of actions including the setting up of professional traditional medicine bodies; the drawing up of a code of ethics, the development of norms and standards; the establishment of mechanisms for the official recognition and support of traditional medicine; and the identification, registration and accreditation of qualified practitioners.

However, apart from the need to possess of indigenous and traditional knowledge, experience and reputation in the communities where they live, THPs should also fulfill other basic requirements as provided for in the rules and regulations of Ethiopia. In return, the government should expect THPs to act according to the norms of professional practice and to fulfill their professional obligations, faithfully and honorably, giving due consideration to the well being of society.

The practice of traditional medicine should be governed and regulated by the appropriate laws of the country. In order to ensure effective utilization of THPs for PHC delivery and regulate their practice, the Ethiopian Health and Nutrition Research Institute (EHNRI) has prepared this draft code of Ethics for THPs in Ethiopia as part of the efforts to institutionalize traditional medicine. It is intended for use by the appropriate national authorities dealing with traditional medicine, members of associations of THPs, experts and professionals as well as agencies involved in the development of traditional medicine in Ethiopia.

Structure of the document
The document is divided into 6 parts:
Part I contains the objectives of the document, definitions and explanation or relevant terminologies, and definition of the term code of ethics which outline the basic foundation of ethical behavior governing the conduct of THPs, based on moral values and professional practices in relation to their job, the patient, the public and other practitioners. Part II is the code of ethics. Part III contains the code of practice which outlines the rules of conduct governing relationship between THPs and their clients and their colleagues in performing duties within their area of competence. Part IV address the disciplinary procedure which the appropriate national authority shall follow in the event of professional or ethical misconduct on the part of THPs. Part V outlines the minimum standards for the practice of THPs. Part VI contains the proposed traditional medicine Bill.

Part I. 1. Objectives
The main objectives of this document are:
1. to ensure high standard of conduct and practice among traditional health practitioners
2. to foster good relationship among THPs, patients and other practitioners
3. to increase THPs awareness of the existing rules and regulations governing the practice of traditional medicine

Part I. 2. Definitions and explanations on relevant terminologies
In this document, unless the context otherwise requires:
Association: an association of THPs recognized by the Ministry of Health
Certificate of competence: a certificate issued to a person who passed an examination set by the Council
Code of Practice: is a written set of rules governing how THPs should behave in their practice.
Code of Ethics: is a set of rules governing conduct based on moral values, which are stated by a recognized professional association.
Council: the THP's Council or a similar body established to regulate the practice of traditional medicine in the country

Ethics: is the science of moral value. The basic foundation of ethical behavior is the basic precept-“Do Good and Avoid Evil”. Ethics and law are related in that both share the social purpose of encouraging conducts acceptable to society. Whereas law attempts to achieve its purpose through the sovereign power of the state, ethics, especially professional ethics, attempts to achieve it without state intervention. Therefore, the government enforces law, while ethics, in the context of this document, is a principle based on the voluntary self-discipline of traditional medicine practitioners (TMPs) or traditional health practitioners (THPs).

Etiquette: denotes the principles and laws of courtesy observed among members of the same profession. It is therefore confined to the rules of conduct governing the relationship among members of the Association of Traditional Health Practitioners (THPs).

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Herbalist: a person who packages and sells plant medicines based on his knowledge of traditional medicine.

Herbal medicine: means a plant-derived material or preparation with therapeutic or other human health benefits, which contains either raw or processed ingredients from one or more plants. In some societies, materials of inorganic or animal origin may also be used in preparing herbal medicine.

Herbal medicine and related products include:
- a. Finished and labeled medicinal products containing plants and/or plant preparations and presented as having therapeutic or prophylactic property. They include all preparations partly or wholly containing a plant material;
- b. Animal medicinal products which are finished and labeled medicinal products containing only animal material or their preparations and presented as having therapeutic or prophylactic property;
- c. Mineral medicinal products that are finished and labeled medicinal products, and containing only inorganic material and/or their preparations;
- d. Preparations or admixtures from herbal, animal or mineral sources made, sold or advertised for use in the diagnosis, treatment, mitigation or prevention of any disease, disorder, abnormal physical state or the symptom thereof in man or animals;
- e. Preparations or admixtures from herbal, animal or mineral sources used for restoring, correcting or modifying organic function in man or animal.

Improper conduct or misconduct: any conduct which, in regard to the practice of traditional health professionals, improper or disgraceful, whether or not defined in the Bill or in by-laws.

Medicinal preparations of plant materials: means medicinal preparations that contain one or more of the following: powdered plant materials, extracts and purified active substance isolated from plant materials. In certain cases, materials of animal or mineral origin may also be included in such preparations.

Medicinal plants: a plant that is recognized in a given locality as having curative or preventive qualities against human or animal diseases.

National competent authority: refers to the authority at local, district, regional and/or national levels charged with the responsibility of regulating traditional medicine as regards practices, practitioners and products (medicines).

Practice: the practice of traditional medicine.

Premises: include any house, building, tent, structure, caravan, land, aircraft and mechanically propelled vehicle used for the practice of traditional medicine.
Processed plant materials: means plant materials treated according to traditional procedures to improve their safety and/or efficacy, facilitate their clinical use, or make medicinal preparations.

Profession: a calling as a traditional health practitioner.

Professional ethics: is the moral principle, which should guide members of the Association of Traditional Health Practitioners in their dealings with one another and with their patients, the patrons, the State, etc. An important characteristic of members of a profession is that they have or, at least, are supposed to have, a collective and disciplined concern of the group. The attitude of the professionals should always be altruistic and selfless concern for the welfare of others. Ethics is therefore an inherent characteristic of professional behavior. Commitment to professional ethical standards starts with the swearing of professional oath and acceptance of professional Code of Ethics. The oath is usually brief, general and intended to oblige and inspire a member to abide by applicable laws, codified ethics and the dictates of conscience and religious principles.

Proscribed conduct: means dishonorable conduct or professional or ethical misconduct, which transgresses the code of ethics and such other acts of misconduct as, may reasonably be determined by the appropriate national authority to be professional or ethical misconduct.

Registered: registered in the Register as provided in the Bill.

Register: the Register of THPs referred to in the Bill.

Registrar: the Registrar of the THP's Council referred to in this Bill.

The first hearing: means the date, time, and place proposed for final consideration by the TMEC of allegations of proscribed conduct.

The final hearing: means the date, time and place proposed for final consideration by the appropriate authority of allegations of proscribed conduct.

Traditional health practitioner: is a person recognized by the community in which he/she lives as competent to provide health care, using plant, animals or mineral products, or using any religious or social methods acceptable by population in the community where they live. In this body of rules, except where the context otherwise admits, the expression.

Traditional health practitioner (including traditional birth attendant): shall refer to a Traditional Healer or Traditional Medical Practitioner registered with the appropriate national authority e.g., National Traditional Healers Association, Traditional Medicine Council or similar authority, to practice traditional medicine.

TMEC: The TMEC refers to a Traditional Medicine Ethics Committee appointed by the Traditional Medicine Council so as to see allegations of proscribed conduct by traditional health practitioners.
**Traditional practitioner:** a person recognized by his/her community as having the skills for dispensing health care through plant, animal or mineral substances; the term traditional practitioner is a general term covering traditional healers, herbalists and natural healers.

**Traditional remedy or traditional drug:** a drug containing one or several substances of natural origin (natural drugs or raw materials), that is derived from plants (plant drugs) or animals (animal drugs) or minerals (mineral drugs) is a mixture of such elements. It is not intended to be injected through either intravenous, intra-muscular, intradermal or intraperitonial means.

**Traditional healer:** a traditional practitioner capable of diagnosing disease and dispensing health care based on concepts about diseases and disabilities prevailing in the society in which they live.

**Traditional medicine:** means the sum total of knowledge and practices based on holistic health care, recognized and accepted by the community for its role in health delivery and the treatment of diseases. Traditional medicine is based on the theory, beliefs and experiences that are indigenous to the different cultures and is developed and handed down from generation to generation. In Ethiopia, this knowledge is handed down mostly by oral tradition.

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**PART II. CODE OF ETHICS**

**SECTION I: TRADITIONAL HEALTH PRACTITIONERS IN RELATION TO THEIR JOB**

Individual members of the “Traditional Health Practitioners Association” shall, at all times, conduct themselves in an honorable manner in their relationship with their patients, the public and other practitioners.

Traditional health practitioners therefore shall:

**Article 1.** As a matter of primary concern, promote the health and well being of the patient and refrain from any act that may adversely affect the patient’s health.

**Article 2.** Practice traditional medicine only after having been formally registered to do so.

**Article 3.** Provide comprehensive services in their profession.

**Article 4.** Desist from delegating their subordinate and/or assistant to tasks, which they should provide without the necessary guidance and supervision.

**Article 5.** Immediately report any observed undesirable reactions and side effects noted in the cause of the treatment to the appropriate authority.

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Article 6. Limit their practice only to areas within their professional competence, e.g. traditional psychiatry, spiritualism, divination and faith healing. Cases beyond their competence should be referred to the appropriate authority.

Article 7. Update their knowledge and maintain professional competence directly related to their specific areas of practice.

Article 8. Provide information on traditional medicine to the public as well as to other health professionals when necessary.

SECTION 2: TRADITIONAL HEALTH PRACTITIONERS IN RELATION TO THEIR PATIENTS

Traditional health practitioners shall, in dealing with their patients:

Article 1. Show a high sense of integrity at all times in their interaction with their patients.

Article 2. Inform their patients about the procedures involved in the treatment, which they intend to administer.

Article 3. Respect the right of a patient not to accept treatment by traditional medicine except if the law requires such treatment of the disease. Proxy consent may be accepted in the absence of the patient.

Article 4. Refrain from abusive use of that relationship for personal gains.

Article 5. Refrain from any act(s) of discrimination towards patients. In this respect, they shall not discriminate between patients on the grounds of nationality, creed, color, religion, social status, political affiliation, etc.

Article 6. Give appropriate advice to the patient, the patient’s family and the community for purposes of disease prevention, care (including home-based care), management and health care.

Article 7. Provide all the necessary information and guidance on the proper use of traditional medicines.

Article 8. Keep clear and comprehensive records of all patients treated in the practice.


Article 10. Keep all information and views formed about patients entirely confidential, except if:

a) Disclosure is clearly and justifiably in the patient’s interest

b) There is a need for disclosure, e.g. when the practitioner considers referral as necessary.

c) When disclosure is mandatory by law.
SECTIONS 3: TRADITIONAL HEALTH PRACTITIONERS IN RELATION TO THEIR COLLEAGUES

Traditional health practitioners, in maintaining good professional relationship with their colleagues, shall:

Article 1. Support, respect and cooperate with fellow practitioners in addressing needs for scientific and technical information.

Article 2. Regard other members of the Association of Traditional Health Practitioners as colleagues and always appreciate the need for referral of case, which they cannot manage, to a specialist more competent in treating that particular type of ailment.

Article 3. Adhere to procedures laid down by the appropriate national authority when referring patients or dealing with the patients referred to them by other practitioners.

Article 4. Not express their opinion of a colleague’s competence or conduct to a third party especially a patient, as it is unprofessional and unethical.

Article 5. Report to the appropriate authority any act(s) of misconduct or malpractice of fellow traditional health practitioner in order to uphold the honor and integrity of the profession and thereby contribute to the enforcement of the law.

Article 6. Participate in the activities of their own professional associations and of other associations/organizations with the objective of promoting traditional medicine.

Article 7. Not express undue alarm or show any such reaction upon receiving a patient who has been improperly treated or referred to him by another traditional health practitioner.

Article 8. Refrain from making comments that undermine the integrity of colleagues.

Article 9. Not make any secret arrangement or negotiations with a health practitioner for offers, commission, etc.

Article 10. Not connive with other traditional health practitioners to engage in any malpractice (s).

Article 11. Strive for the promotion of health, expansion of health service and the development of teamwork spirit with other traditional health practitioners.

Article 12. THPs will, without good cause, not cast any reflection on the probity, professional reputation or skills of another practitioner nor will they be allowed to divulge in any confidential information concerning their patients, except where required to do so by law or with the consent of the patient.

Article 13. It is an offence not to allow a patient to consult another practitioner from both modern and traditional medicine.
SECTION 4: TRADITIONAL HEALTH PRACTITIONEERS IN RELATION TO THE PUBLIC

Article 1. Use of the word “Doctor”, and use of a Stethoscope
Licensed traditional health practitioner shall:
1.1. Refrain from using the title “Doctor” either directly or indirectly, in a way likely to suggest that they are registered conventional/ orthodox medical practitioners, except if that is the case. The use of the title “Doctor” could be misleading to the public.
1.2. Not use, carry or possess a stethoscope or any such equipment normally used by only qualified conventional medical practitioners or dentists.
1.3. Not administer an anesthetic; or an injection, whether by subcutaneous, intramuscular, intravenous or any other route.
1.4. Not apply or use any drug or medicine or surgery in order to facilitate the examination of any person.
1.5. The provisions of articles 1.1 to 1.4 above shall not apply should the traditional health practitioner also be a qualified and licensed medical practitioner.

Article 2. Secrecy and Confidentiality
Traditional health practitioners shall:
2.1. Subject to the requirements of the law, observe strict confidentiality as regards the patient’s diseases(s), the types of traditional medicine used or any such information that patients may disclose to them in the course of consultation.
2.2. Keep information such as the patient’s history and other records under strict secrecy except as otherwise required by law or for purposes of settlement of financial reimbursement. This secrecy shall be exercised in regard to all other confidential information in their possession.

Article 3: Accountability and Liability Due to Negligence
Traditional health practitioners shall be accountable and liable for negligence in the following situations:
3.1. damage inflicted on the patient as a result of negligence and/or non-compliance in the discharge of their professional duties.
3.2. negligence or professional misconduct on their part.
3.3. failure to report undue obstruction of their duties by an unauthorized person(s);

Article 4. Experiments involving human subjects and the use of traditional medicines
In the conduct of research on the evaluation of the safety, efficacy and/or quality of traditional medicines on humans in collaboration with scientists or institutions, traditional health practitioners or their associations that are members of such research team shall:
4.1. participate in such joint experiments involving human subjects only when all the ethical standards are fulfilled. Each experiment should receive prior ethical clearance and approval by the appropriate authority, as well as the written consent of the subject.
4.2. Immediately report, to the principal investigator of the research team, any adverse findings, especially when the health and/or well being of the subject are in danger.

**Article 5. Traditional Health Practitioner as a Citizen**

Traditional health practitioners, as responsible members of society, shall:

5.1. Be law-abiding and strictly adhere to the laws of the country as well as socially accepted norms.

5.2. Keep their honor and maintain high standard of integrity in the community where they live. They must promote and show concern for social justice in the community.

5.3. Be enlightened and conversant with the laws in every aspect of their professional practice.

**SECTIONS 5: TRADITIONAL HEALTH PRACTITIONERS IN RELATION TO SEXUAL ABUSE OF MINORS**

Minors should not be involved in traditional practices in any manner that will lead to their involvement in sexual activity. The appropriate authorities should, therefore prohibit any prescriptions or practices carried out in the name of traditional medicine, but leading to the involvement of minors in sexual activity. The appropriate authorities should, in this respect, clearly spell out in the code of practice for traditional health practitioners, the responsibilities of these practitioners to protect minors, especially young girls, from sexual abuse.

Breach of this section of the code should warrant adequate disciplinary action by the appropriate authority e.g. expulsion from the membership of registered traditional health practitioners, as well as indictment for indecent assault, incitement to commit a sexual offence, etc. Any traditional health practitioner found to be in breach of this section of the code must be reported to law enforcement agents and the disciplinary authorities for appropriate action.

**Traditional health practitioners, in dealing with minors, shall:**

**Article 1:** On no account, prescribe or administer sexual activity as a form of treatment of any ailment whatsoever, physical or spiritual. They shall not, in the course of treatment, request or require a client to undress or expose them in a manner deemed to be indecent.

**Article 2:** Under no circumstances administer under the table compensation for a young girl or young boy. The compensation must be in cash or in kind.

**Article 4:** Not prescribe any medicines made from or containing parts of the human body or organs.

**SECTION 6. MANAGEMENT AND ETHICAL UTILISATION OF TRADITIONAL MEDICINES**

Traditional health practitioners in the course of advertising, shall:

**Article 1.** At all times, abide by the rules that shall be laid down by the appropriate authority from time to time. Advertising, both in its form and content, shall aim to protect the interest of patients.
Article 2. Refrain from any act(s) purported to denigrate other traditional health practitioners or other professions.

Article 3. Refrain from falsehood, and from making fraudulent, misleading, deceptive, self-laudatory, extravagant or unduly sensational claims.

Article 4. Adhere to the legal requirements and to the provisions of the national code of advertising.

Article 5. Not display materials likely to bring the profession into disrepute and shall refrain from making false promises to cure diseases.

Article 6. Be subject to disciplinary action for contravening the national regulations if they belong to more than one association and do not adhere to regulations of such associations, thinking that their dual or multiple membership gives them immunity.

Article 7. Traditional health practitioners shall be held personally accountable for professional misconduct by their staff or assistants not registered with the appropriate national authority, but practicing under their supervisions.

Article 8. Infringement upon the Code of Ethics shall render traditional health practitioners liable to disciplinary action with possible loss of the privileges and benefits of registration with the association of THPs or other authorities.

Article 9. The appropriate national authority shall reserve the right to revise the provisions of this Code of Ethics from time to time.

Article 3. Quality of Prepared and Stocked Traditional Medicines

3.1. Traditional health practitioners shall not make available for sale or dispense to patients, traditional medicines that are substandard, mislabeled or adulterated.

PART III. CODE OF PRACTICE

Article 1. Premises and location of practice

Traditional health practitioners shall comply at all times with the requirements of the Code of Practice. Any traditional health practitioner who fails to meet the requirements of the Code of Practice shall be held in breach of the Code of Ethics and shall be subjected to disciplinary measures on the grounds of professional misconduct.

In keeping with the Code of Practice, traditional health practitioners shall:

1.1. Carry out their practice in properly registered premises or premises as specified in their license(s)

1.2. Ensure the premise is in a clean and tidy environment. If only a part of the premise is used for traditional medicine practice, the part so used must be clearly demarcated from the part used for other purposes, in order to ensure the privacy and cleanliness of the
Adequate arrangements must be made for refuse collection and disposal as well as the general upkeep of the premises.

1.3. not practice in any district or area other than that specified in their license(s) without the consent, in writing, of the appropriate authority.

**Article 2. Application for License**

1.1. An application for a license, or for the renewal of a license, to practice as a traditional health practitioner shall be addressed to the appropriate authority in the form prescribed by the authority and shall contain such particulars as are required by the relevant rules.

2.2. Whenever a licensed practitioner changes address he/she shall notify the appropriate authority of such change within a specified period, failure of which shall constitute an offence.

2.3. A traditional health practitioner who deliberately furnishes false information or information that is misleading, when applying for a license, shall be guilty of an offence.

2.4. A licence to practice traditional medicine shall be in the form prescribed by the appropriate authority

**Article 3. Areas of Competence**

Traditional health practitioners shall:

3.1. Required to reveal her/his area of competence or name of specialty

3.2. Work strictly within the areas(s) of competence for which they have been registered by the appropriate authority.

3.3. not perform an abortion when it is illegal and shall not administer an abortifacient or known uterine muscle stimulant remedies to a pregnant patient. Furthermore, they shall not administer any instrument meant to induce abortion or assist in any such illegal operation.

3.4. not to cut uvula, tonsillitis, circumcisions, extract tooth and other harmful practices

**Article 4. Patient Examination and Treatment**

Traditional health practitioners shall:

4.1. conduct intimate examination of a patient of the opposite sex only in the presence of a relative of the patient or a suitable assistant.

4.2. treat or examine a child under the age of 18, only in the presence of a parent, supervising adult, or a suitable assistant.

**Article 5. Fees**

5.1. The appropriate authority shall set an inviolable fee chargeable for the treatment of various ailments or conditions. The fee shall cover:

a) consultation and treatment in respect of a maximum amount established by the appropriate authority.

b) travel allowance, per hour, up to maximum amount established by the appropriate authority.

c) shall register all fee received during treatment or consultation
5.2. The provisions of subsection 5.1 above shall not prevent any licensed traditional health practitioner from accepting gifts voluntarily given by any patient, except that such gifts shall not be accepted prior to the completion of consultation or treatment.

Article 6. Patient Records and Noticeable Diseases
All traditional health practitioners shall be required to:

6.1. Keep complete and proper records of the name, address, age, sex and ailment of each and every patient, including the prescribed dosage, the name of the medicine dispensed or administered to the patient as well as the dates on which the patient reported for consultation or treatment. Whenever a patient is admitted for a day or more, then the record must include the dates of admission and discharge of the patient. Where the traditional health practitioners can neither read nor write, they must engage the service of a literate worker to help keep proper records.

6.2. Notify the health authority of any disease they are treating, which is on the current list of notifiable diseases.

6.3. Make all records available, upon request, for inspection by authorized persons.

May use only gloves during patient diagnosis. Use of clinical thermometers and, blood pressure apparatus and stethoscope is strictly prohibited

Article 7. Dispensing, Labeling and Administration of Traditional Medicines
Traditional health practitioners shall:

7.1. The indications for which the medicine is being presented for administration must be unambiguously stated.

7.2. Comply with the regulations laid down by the appropriate authority as regards the dispensing and labeling of medicines.

7.3. All medicines should have:

7.3.1. Clear label
7.3.2. The name and address of the patient and the date on which the medicine was dispensed.
7.3.3. The recommended route of administration
7.3.4. The proposed dosage and frequency of administration
7.3.5. The indication for use
7.3.6. Storage condition
7.3.7. Date of preparation and expiry date, stability date

7.4. Under no circumstances use or dispense modern medicines, whether alone or together with traditional remedies. Such action shall be in contravention of the regulation

7.5. Not administer traditional remedies by injection with syringes except with the official permission of the appropriate authority.

7.6. Not administer an anaesthetic. Never use psychotropic or habit inducing drugs

7.7. Not administer an injection, whether by the sub-coetaneous, intra-muscular, intravenous or any other route.

7.8. Not apply or use any drug or medicine or surgical procedures in order to facilitate the examination of any person.

7.9. Report immediately to the appropriate authority any outbreak of illness or disease involving 10 or more persons simultaneously in the area in which they are entitled to practice, which may come to their notice in the course of their practice.
7.10. A THP is not allowed to advertise his/her services or canvas or tout for patients.
7.11. The selling of traditional medicines by the road-side or in unhygienic premises.

PART IV. DISCIPLINARY PROCEDURE

_Dishonorable Conduct, Professional and Ethical Misconduct_

**Article 1.** All reported cases of professional misconduct on the part of traditional health practitioners shall be referred to the Traditional Medicine Ethics Committee (TMEC) for necessary action.

**Article 2.** In determining whether an action by a traditional health practitioner amounts to misconduct, consideration shall be given to any directions, advice or statements issued or made by, or on behalf of, the appropriate authority regards that action whether of a general or specific nature, or of any Code of Ethics or rules adopted by the TMEC.

**Article 3.** The TMEC shall serve on the traditional health practitioner concerned written notice of the allegation (s) made against him, including full details of the complaint received. The TMEC shall, in this regard, inform the traditional health practitioner concerned of the first hearing, which shall be not less than 15 days after of service of the notice specified in this article.

**Article 4.** The TMEC shall notify the traditional health practitioner concerned of his/her right to submit a full written statement of evidence, on his own behalf, or written request to personally give oral evidence on his own behalf, if he wishes to do so. In addition, the TMEC shall inform him that the statement of evidence referred to in this Article should be in full, and that such statement and/or request of the practitioners concerned must be served on the TMEC within a period specified by the TMEC after service on the practitioner concerned of the notice specified in this Article.

**Article 5.** The TMEC shall accept both oral and written evidence.

**Article 6.** Should the traditional health practitioner concerned fail to serve on the TMEC a statement and/or reply and/or notice in accordance with the relevant Articles of these Code of Ethics the TMEC may, after expiry of the time for service specified herein, proceed to the first hearing or the final hearing respectively without considering any written evidence which might have been included in such statement and/or reply and/or notice and in the absence of the traditional health practitioners concerned.

**Article 7.** The TMEC may adjourn or postpone (more than once, if necessary) the first hearing or the final hearing, respectively, for such period as it thinks fit, provided that at least 15 days before the new date fixed or such hearing or as specified by the appropriate authority, it serves on the traditional health practitioners concerned written notice of the new date, time and place for such hearing.

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Article 8. The TMEC shall, at the time and place and on the date notified for the first hearing, or of any duly notified postponement of adjournment therefore, meet to decide whether a case of proscribed conduct has been established against the traditional health practitioner concerned. If it finds that a case has not been established against the traditional health practitioner concerned, the TMEC shall dismiss the case. If it finds that a case has been established, which if proved, might lead to the de-registration of the traditional health practitioner concerned, the TMEC shall not treat that matter but refer it to the appropriate authority. If it finds that a case has been established, but considers the complaint to be of less serious nature, then it shall have a hearing the matter, by itself and, if it finds the case proved, it shall:

a. Censure the traditional practitioner concerned; and/or

b. fine the traditional health practitioner a sum prescribed by the appropriate authority. The amount of the fine shall be paid in full within a specified period, usually not exceeding 28 days or as specified by the appropriate authority.

Article 9. The provisions of Article 8 above, shall be without prejudice to the powers of the TMEC to adjourn the first hearing.

Article 10. The TMEC shall, not more than 14 days or as specified by the appropriate authority, after the hearing, serve written notice on the traditional health practitioner concerned of its decision and submit a written report to the appropriate national authority. Should the TMEC, decide to fine the traditional health practitioner concerned, the fine shall be stated in the written notice in addition to stating the period within which the traditional health practitioner concerned is required to pay the fine. Furthermore, the TMEC shall inform on his right to appeal to appropriate national authority.

Article 11. If the traditional health practitioner concerned intends to appeal to the appropriate authority against a fine imposed by the TMEC, he shall, not more than 14 days after being notified by the TMEC, or as specified by the appropriate authority; send a written notice of his intention to appeal. Should the practitioner concerned fail to serve such notice within the stipulated time frame, he shall lose his right of appeal.

Article 12. If the TMEC receives notice of appeal in accordance within the relevant articles of this Code of Ethics, it shall require the Chairman of the TMEC to convene a meeting of the Committee of the appropriate authority, and not more than 14 days or as specified by the appropriate authority after so requiring, serve on the practitioner-concerned notice of the fact that it has done so.

Article 13. Any person about whom a complaint has been made or who has lodged a complaint against a traditional health practitioner or is likely to be called upon to give evidence in any such complaint or who is directly interested in its outcome shall not be eligible to sit on the TMEC or the Committee of the appropriate authority at

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which such complaint is considered and no member of the TMEC which considers such complaint shall be eligible to sit on the Committee of the appropriate authority in respect of the same complaint.

**Article 14.** The procedure to be followed in serving notice in connection with incidents of proscribed conduct shall be as follows:

a) a notice shall be served by the committee of the appropriate authority to any practitioner, either personally or by prepaid first-record delivery post, in a letter addressed to the traditional health practitioner at his last registered address;

b) a notice sent by post shall be deemed to have been served on the day following that on which the letter containing the notice was posted.

c) any notice, requisition or other document to be served on the appropriate authority or on any of its staff shall be sent by first class postal delivery to the registered office of the appropriate authority.

**Article 15.** The Committee appointed by the appropriate national authority shall be vested in with all the powers conferred upon it by these Articles in so far as they relate to any disciplinary action to be taken against a traditional health practitioner or the reason therefore.

**Article 16.** Law shall determine the quorum of the Committee appointed by the appropriate authority, when considering a complaint. The Committee may enlist the assistance of a Legal Assessor who shall be a barrister or a solicitor.

**Article 17.** The traditional health practitioner concerned shall have the inalienable right to be heard by the Committee appointed by the appropriate authority, he/she so desires, whether in person or through his legal counsel or solicitor or through a lay representative who must also be a traditional health practitioner. He/she shall have the right to choose to submit a statement in writing.

**Article 18.** The traditional health practitioner concerned may, not less than 7 days (or as specified by the appropriate authority) before the scheduled date of the first hearing or the final hearing (but not an adjourned or postponed first hearing or final hearing), serve on the TMEC or the Committee appointed by the appropriate authority (as case may be) a request for further time to enable him/her to prepare his/her case. The TMEC or the Committee appointed by the appropriate authority (as the case may be) shall, on receipt of such a request, adjourn or postpone the first hearing or the final hearing respectively for a period of at least 15 days (or as specified by the appropriate authority) from the date of request for further time, in accordance with the applicable provisions of these Articles.

**Article 19.** The Committee appointed by the appropriate authority shall serve on the traditional health practitioner concerned a written notice informing him of the date of the final hearing which shall be not less than 15 days (or as specified by the appropriate authority) from the date on which such notice is served, and notifying him/her of his/her right to submit, either:
a) a statement of intent if any to be heard in person or to be represented by his/her counsel, solicitor or other representative; or

b) a written explanatory statement on his own behalf, to serve on the Committee appointed by the appropriate authority nor more that 14 days after service on the traditional health practitioner concerned of the notice specified in this article.

**Article 20.** The Committee appointed by the appropriate authority shall, at the scheduled time, place and date of the final hearing or on the duly notified date to which the hearing is postponed or adjourned, meet to decide on the case. In considering the case, any previous findings by a Court of competent jurisdiction or by any other relevant professional tribunal shall be binding on the Committee appointed by the appropriate national authority. After hearing all the evidence presented for and against the traditional health practitioner concerned, the Committee appointed by the appropriate authority shall determine whether the defendant has been guilty of proscribed conduct. If the Committee finds that the practitioner concerned is not guilty of proscribed conduct, it shall dismiss the case. If it finds that he/she has is guilty of prescribed conduct it shall:

a) censure the practitioner concerned; and/or

b) impose a fine on the practitioner concerned. the sum of which shall be decided by the appropriate authority. The fine shall be paid within a specified period not exceeding 28 days (or as specified by the appropriate authority). Furthermore, the appropriate national authority shall reserve right to expel that practitioner from the association of traditional health practitioner and, if it thinks fit, prescribe a period of time during which no application for his/her re-registration shall be considered and/or

c) resolve that the practitioner's registration be canceled, whereupon he/she shall ceases to be a practitioner forthwith, and, if it thinks fit, the Committee appointed by the appropriate authority may prescribe a period of time during which no application for re-registration of the practitioner concerned shall be considered. Nothing herein shall entitle the traditional health practitioner concerned to require the said Committee to re-consider its penal decision

**Article 21.** The Committee appointed by the appropriate authority shall, not more than 14 days (or as specified by the appropriate authority) after the final hearing, serve a written notice on that traditional health practitioner concerned of its decision, which shall be final and be binding on all parties and shall send a written report thereon to the Chairman of TMEC

**Article 22.** The requirement of Article 20 above, shall be without prejudice to the power of the Committee appointed by the appropriate authority to adjourn the final hearing.

**Article 23.** It is incumbent upon every traditional health practitioner who has been fined in accordance with the provisions of Article 20(b) above to pay such fine in full within the stipulated period.
Article 24. A person who has been fined and de-registered in accordance with Article 20 (b) above or whose registration has been cancelled in accordance with Article 20(c) may apply for re-registration by the committee appointed by the appropriate national authority, provided that such application is made after the period which has been prescribed in accordance with Article 20(b) and 20(c).

Article 25. The committee appointed by the appropriate authority shall have the power to take appropriate decision on any matters or procedures relating to proscribed conduct, which are not covered by these Articles, subject to approval of that decision by the appropriate authority.

PART V. MINIMUM STANDARDS FOR TRADITIONAL HEALTH PRACTITIONERS

1. Mode of Traditional Health Practice
   In Ethiopia, traditional health practitioners carry out the following modes of practice of traditional medicine:
   - Herbal medicine, animal products and minerals
   - Bone settings
   - Traditional birth attendance
   - Traditional surgery
   - Traditional psychiatry
   - Divination
   - Faith healing

2. Categories of Traditional Health Practitioners
   Traditional health practitioners in Ethiopia may be classified into the following categories:
   2.1. Herbalists. They are further classified into five categories
   2.1.1. Herbal medicine gatherer (Medihanit Korach)
   2.1.2. Herbal medicine preparer (Medihanit atechi)
   2.1.3. The expert herbalist (Yemedihanit awaki)
   2.1.4. Maker of amulets (Kitab ketabi)
   2.1.5. The medicine painter (Yemedihanit Kebi)

   2.2. Chirurgeons
   2.3. Spiritual healers
   2.4. Cuppers, tattooists and midwives

3. Skills and Qualifications of Traditional Health Practitioners
   Standards for the practice of traditional medicine in terms of skills and qualifications are not set in Ethiopia. As a point of departure, we may wish to consider adopting the following:
   a) The minimum level of education for all traditional health practitioners should be the primary school leaving certificate.
   b) The minimum age of practitioners should be 18 years.
c) Traditional health practitioners must be members of a recognized Association of Traditional Health Practitioners recognized and accepted by the community where he/she practices.

d) Every traditional health practitioner must be successfully undergone the attestation procedure stipulated for registration by the association of traditional health practitioners in accordance with guideline provided by the appropriate authority.

4. The skills required of traditional health practitioners
The skills required for the practice of traditional medicine in Ethiopia is not also determined. However, the following minimum requirements may be applied:

a) a traditional health practitioner must be able to recognize at least 30 different herbs;

b) a general herb seller must be able to recognize at least 50 herbs while those selling herbs for specific ailments must be able to identify a minimum of 10 herbs that can be used to treat various ailments (s);

c) a traditional health practitioner who administers herbs should be able to submit at least two medicaments prepared and used by him, so that they can be tested for efficacy (patent rights agreements should be signed as appropriate);

d) Practitioners who are traditional surgeons should limit themselves to the practice of non-invasive surgery. Surgery can be allowed in conditions where no alternative is available and in life threatening situations,

e) all traditional health practitioners, regardless of their mode of practice or their skills, must conduct their practice within the limits of the law.

5. Good Practices in Traditional Medicine and Quality Assurance

5.1 Record keeping and documentation
These should include:
- Scope of practices
- Effectiveness
- Case management
- Complications resulting from treatment
- Sale of herbs or products within the limits of law
- Continuing education and experience

a. Feasible guidelines for monitoring the standards for the practice of traditional medicine
These should include:
Registration and accreditation-evidence of valid registration displayed on practice premises
Re-certification (If stipulated as a requirement for valid current registration)
Monitoring of facilities, instruments and practice environment
Records of drug preparation /surgical operation procedures records
Records of patient output (quantitative and qualitative)
b. **General guidelines for herbal remedies**
   Herbal remedies should meet the quality; efficacy and safety standards set by the appropriate national authority (for herbal medicines) before they are administered to patient or sold to the public.

**References**

4. Legal Notice No. 23 of 1969. Medicine, Men and Herbalists Regulations. Minister Responsible for Health in Lesotho.
ART VII. ORGANIZATION OF TRADITIONAL MEDICINE IN ETHIOPIA
TRADITIONAL MEDICINE BILL

Purpose
The Ethiopian Health and Nutrition Research Institute (EHNRI) has organized a national workshop on traditional medicine from June 30-July 2, 2004. One of the issues raised and discussed at the workshop was organization of the traditional health care system. The workshop participants which included traditional healers, researchers and regulators have proposed drawing up of a draft Bill for presentation to Parliament by the Minister of Health. The Bill/Act will establish a Medical Council for traditional medicine to regulate the practice of traditional medicine, register practitioners and license their practice. The Bill, which may be called the Traditional Medicine Practitioners Bill, will become lawful for a registered traditional health practitioner to engage for gain in the practice of traditional medicine. When the Bill comes into operation, the practice of traditional healers in Ethiopia means every act, the object of which is to treat, identify, analyze or diagnose, without the application of operative surgery, any illness of body or mind by traditional methods.

Regulation of traditional medicine
The regulation and control of traditional medicine practice in Ethiopia is a shared responsibility of the Ministry of Health, Drug Administration and Control Authority (DACA), and Traditional Medicine Council (TMC). The Ministry of Health has the responsibility for coming up with overall policy guideline for the development of the Traditional Medicine sector and creating a conducive environment for the sector to grow. It may give the TMC directives of general nature on the policy to be followed by the council in the performance of its duties. The Drug Administration and Control Authority is responsible for the registration of the product before they are in human use. The TMC, has the responsibility to oversee the practitioners of herbal medicine and their practices. This specifically looks at the registration and licensing of the practices of the THPs.

Traditional Medicine Council (TMC)
The TMC will be set up by enacting a Bill. The TMC Bill shall come into operation on such date and such time to be determined by the Ministry of Health by statutory instrument. The purpose of the TMC is to regulate the practice of traditional medicine, register practitioners and license their practices. The Council shall have perpetual succession, a common seal and may sue or be sued in its own name, and with power, subject to provisions of the Bill, to do all such things as a body corporate may be law do or perform.

Duties and responsibilities of Council
1. To supervise and control the practice of traditional medical practitioners.
2. To promote the practice of traditional medical practitioners and foster research into, and develop the knowledge of such practice.
3. To hold enquiries on the complaints resulting from the practice of traditional medical practitioners in Ethiopia.
4. To receive funding from different sources and make grants or loans to associations and pursues when necessary on behalf of the association of traditional healers.
5. Issue certificates of registration and license to qualified THPs and shall license premises for the practice of traditional medicine.

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6. Formulate in the enforcement of a code of ethics for traditional medicine practice in conjunction with the associations of THPs recognized by the Ministry of Health.

7. Advise the national health authority on matters relating to and affecting the practice of traditional medicine.

8. Collaborate with DACA, upon request, on rules for the registration, advertisement, manufacture, packaging, preparation, labeling, sale, supply, export and import of any herbal medicine.

9. Advise the government on development of curriculum for the formal education of traditional medicine in high schools, colleges and Universities.

10. Promote training of THPs.

11. Collaborate with appropriate authorities for large cultivation of medicinal plants and for the preservation of biodiversity.

12. Make grants or loans to associations or persons where the Council considers this necessary or desirable for, or incidental to, the attainment of the purposes of the Council.

13. Perform such other functions as are ancillary to the object of the Council or assigned by the Ministry of Health.

Ministerial responsibility and directives

1. The Minister of Health shall have ministerial responsibility over the Council and may give to the council such directions as to general matters of policy to be followed by the Council in performance of its functions.

Composition of the Council

The membership of the Council shall be thirteen and include, but not limited to:

- Association of THPs (6)
- Ethiopian Health and Nutrition Research Institute (1)
- Ethiopian Medical Association (1)
- Ethiopian Public Health Association (1)
- Ethiopian Pharmaceutical Association (1)
- Drug Administration and Control Authority (1)
- Ministry of Health (1)
- Ethiopian Science and Technology Commission (1)

Tenure of office members

1. Tenure of office members of the Council shall be set forth in the Bill or related by-laws specifying the duration of tenure, the maximum number of consecutive terms, the procedures of resignation, the conditions of suspension or removal from office, etc.

Filling casual vacancy

1. Whenever the office of a member becomes vacant before the expiry of the stipulated term of office, the Minister may appoint another person to fill the vacant office only for the un-expired term of office of the person being replaced.
Meetings and decisions of the Council
1. The Council shall meet for the dispatch of its business, adjourn, close and otherwise regulate its meetings and procedures as it thinks fit, except that, at least once in each calendar, the Council shall convene a general meeting at which it shall present a report setting out the activities of the Council since the previous annual general meeting.
2. Special meetings of the Council may be convened by the chairman of the Council at any time on his own initiative or by not less than one-third of members of the Council.
3. The vice-Chairman shall preside over all meetings of the Council in the absence of the chairman.
4. At least two-third of the membership of the council is needed to form a quorum at any of its meetings.
5. All acts of the Council shall be decided by a majority vote at a valid meeting of the Council.

Establishment and Appointment of Committees of the Council
1. The Council shall establish Committees of members of the Council or non-members, to exercise any of its functions under the Bill and may appoint such registered THPs as it may consider expedient to be members of a committee of the council.
2. The committees may be assigned such functions of the Council as the Council may deem appropriate.

Regional and District Office of the Council.
1. For the purpose of decentralization, and to reach out more easily to remotest parts of the country, the Council may establish regional and district offices of the Council as deemed essential.
2. The functions of such branch offices shall be governed by the provisions of the Bill and such by-laws as are applicable to this purpose.

Allowances
1. Allowances shall be paid to members of the Council, members of committee of the Council or persons co-opted to attend the meetings of the Council, such travel and other allowances as may be approved by the Minister of Health in consultation with the appropriate authority.

Annual and other reports
1. The Council shall submit reports to the Minister regularly.
2. The Council shall also submit in writing to the Minister of Health such other reports as the Minister may require.

Registrar
1. The Minister shall, upon consultation with the Council, appoint a person to be a Registrar of the Council. Its functions shall be to act as secretary to the Council.

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2. Furthermore, the Registrar shall carry out any other duties assigned to him under the provisions of the Bill or existing by-laws or by the Council.

Register of THPs and certificates of registration
1. The Registrar shall establish a register of THPs, issue certificate of registration and licensing to practitioners.
2. Under the provisions of the Bill, the Registrar shall record in the register the registration of a person or, as the case may be, the suspension from practice or expulsion of a registered THP, stating the underlying reasons.

Rules regarding the register and registration
1. The Council may make rules concerning the register, the manner and form in which application for registration and licensing shall be made and other duties as stipulated in the Bill or by-laws.

Offences in connection with the Register
1. Any act to unauthorized entry, alteration or deletion of from the register or a certified copy thereof, or on a certificate of registrations, procurement of certificate of registration by fraud, false pretence, or willful concealment of fact, false declaration or forgery, or any similar acts shall constitute an offence punishable under the provisions of the Bill.

Registration and licensing of THPs
Registration and licensing of THPs shall have the following articles subject to the provisions of the Bill:
1. Application for registration
   a. Any person who has adequate knowledge of medicinal plants, has successfully treated a required number of patients; has no criminal record; and has passed certification test shall qualify to be registered, upon a written request, as a THP.
   b. No THP shall own or operate a practice except if he/she is duly registered and licensed to do so.
   c. Where the Register refuses to register a person as THP, he shall inform that person in writing of such refusal and the reasons thereof.

1. Council's consideration of application for registration and licensing
   1.1. The Council shall consider every application referred to it and, after due inquiry, shall grant the application to be registered if it is satisfied that the applicant possesses sufficient skills, ability and experience to be registered as THP and is of good character.
   1.2. The Council shall reserve the right to refuse to recommend the registration and licensing of an applicant if it is not convinced that the applicant meets all set criteria.
   1.3. The Council in granting an application for registration may, record the qualification of the applicant concerned, e.g. as a spirit medium, herbalist, bonesetter, etc.
3. Appeal against refusal to register
3.1. Any person aggrieved by a decision of the Council with regard to registration or licensing under this Bill shall have the right to appeal to the Minister.
3.2. The Minister may, on considering such appeal, confirm or reverse the decision of the Council, vary the decision of the Council, or remit the case to the Council for further consideration.

4. Licensing premises
4.1. Application for a license for a practice must include a copy of certificate of registration, a block plan of the premises (where applicable), a list of the types of services to be rendered, the prescribed licensing fee, and such requirements laid down by the Council.
4.2. The Council shall decide on whether the applicant meets the stipulated requirement, and shall notify the applicant, accordingly, of its decision.
4.3. Licensed practitioners shall display their license in a conspicuous place on the premises that is accessible to all patients.
4.4. All licensed practitioners shall give unhindered access anytime to inspectors sent by the Council to ascertain the suitability of the premises for the practice of traditional medicine.
4.5. Any licensed practitioner who uses a premise for services other than those for which it is licensed; obstructs the entry for inspection of authorized inspectors; operates without known address or perpetuates similar acts shall be guilty of an offence punishable under this Bill.

5. Registration of foreign citizens
5.1. A person who is not a citizen of Ethiopia shall, upon request, be temporarily or permanently registered as a practitioner, subject to fulfillment of relevant conditions such as proof of qualification as well as other conditions laid down for the registration and licensing of a practitioner who is a citizen.

6. Renewal of certificate of registration
6.1. The certificate of registration shall expire after a stipulated period, preferably 12 months, and shall be renewable, subject to fulfillment of the laid-down conditions, including a record of satisfactory practice in the past year.

7. Suspension of registration
7.1. The Council may suspend, for such period as it may determine, the registration of a practitioner when the Council is investigating an allegation of misconduct on the part of the practitioner or a contravention of any provision of this Bill or of existing by-laws by the practitioner.

8. Disciplinary action
8.1. The Council shall set up Traditional Medicine Ethical Committee to make recommendations to the Council, on all matters pertaining to disciplinary action against THPs.
8.2. Disciplinary action shall be warranted in all cases of proven improper conduct or misconduct in discharge of functions by a Council member or THP.
8.3. Cases requiring disciplinary action shall first be investigated by the Council which if it deems appropriate, shall refer the matter to the Council.

8.4. Depending on the gravity of the offence, disciplinary action shall include, but not limited to, a fine, censure, deletion of name from the Register, or where warranted, recommendation for court action.

9. Representation to the Council
9.1. No registration shall be cancelled or suspended unless the Council has given the practitioner at least 30 days notice of its intention to suspend or cancel his registration and has provided the practitioner an opportunity to make representations, if any, to the Council.

Under provision of the Bill this article shall have the following sub-articles:

10.1. Funds of the Council
10.1.1. Any expenses incurred by the Council in the exercise of its functions or the attainment of its purposes in terms of this Bill shall be made from the funds of the Council.

10.1.2. The funds of the Council shall consist of such sums as may be appropriated by the Government for the Council, such sums as may be paid to the Council as donations, contributions, fees, grants, or gifts, except that the Council shall raise money from outside the country without the prior approval of the Minister; such other moneys or assets as may accrue to, or vest in, the Council as a result of investment made, or transactions entered into, in the course of its operations.

10.1.3. The Council shall keep or cause to be kept full and correct books of account of all money received and expended by it as well as of other records relating to its accounts.

10.1.4. It may invest its funds in such manner and to such extent, as it considers appropriate.

10.2. Financial annual report
10.2.1. The Council shall keep books of account and proper records in relation to them and the accounts and records of the Council shall be in a form approved by the external auditor.

10.2.2. The accounts of the Council shall be audited annually by the external auditor.

10.2.3. Report on the annual financial affairs of the Council shall be submitted to the Minister.

10.2.4. The financial report shall include audited balance sheet, an audited statement of income and expenditure during the year and an audit report on the accounts.

Miscellaneous
Under the provision of the Bill this article shall contain the following sub-articles:

1. Approval of rules
1. Approval of rules made by the Council under this Bill shall not have the force of law until they are approved by the Minister.

2. Notification of prima facie evidence of improper conduct in a professional respect
   2.1. The court shall transmit the record of the proceedings to the Registrar for information and record purposes, and for appropriate action by the Council.

3. Regulation of fees chargeable by THPs
   3.1. The Council shall regulate the fees to be paid by patients to a traditional healer with due regard to the need for affordability, and the need to provide reasonable financial incentives for the practitioners.

4. Establishment of ethical code
   4.1. The Council shall, by rules made by it, establish an ethical code of conduct for THPs.

5. Training of THPs
   5.1. The Council shall promote the training of THPs and shall, in that respect, advise the Minister on all matters relating to the standards, curriculums, and outcomes of the training of THPs.
   5.2. The Council shall also address issues as training requirements, conditions for the award of certificate of competence, etc.

6. Intellectual Property Rights (IPR)
   6.1. This Bill shall not prevent THPs from protecting their IPRs relating to the processing of their medicinal preparations or final products providing always that they shall be entitled to sign an agreement of disclosure in any collaborative works appropriate.

7. Medicines used by THPs
   7.1. The medicinal preparations used by THPs shall meet the requirements laid down from time to time by the Council acting in consultation with DACA.
   7.2. The Council shall, in consultation with DACA, put in place such mechanisms as are necessary to help monitor adherence to such laid-down requirements, and thereby regulate the preparation and sale of traditional medicines.
   7.3. Appropriate protocols for the evaluation of the quality, safety, and efficacy of herbal medicines shall be developed in collaboration with relevant institutions.

8. Regulations
   8.1. The Minister of Health in consultation with the Council and the Ministry of Justice may establish regulations for better enforcement of the provisions of this Bill.

9. By-laws
   9.1. The Council may make by-laws as required or permitted by this Bill if the Council finds it necessary or convenient to be prescribed for carrying out the provisions of this Bill or the regulation of the practice of THPs.

10. Amendment of the Bill and by-laws
    10.1. The Council may recommend amendment of this Bill if supported by a two-third majority.

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