



UNIVERSITY OF NAIROBI

HERBAL MEDICINES: DO THEY REALLY WORK?

INAUGURAL LECTURE

BY

JULIUS WANJOHI MWANGI

E.B.S., B. Pharm., MSc.(Pharmacy), Ph.D.

Professor of Pharmacognosy

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DEDICATION

This inaugural lecture is dedicated to all traditional practitioners in Kenya.

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This inaugural lecture could not have been possible without the assistance from many colleagues and friends. It has been a journey that started many years ago. To all of you who have played some part, I humbly salute you. Consider that I am your product.

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Prof. 1.0. Kibwage and Prof. G. N. Thoithi have given me a lot motivation by their positive criticism. Others who have played some role include Professors Gichuru Muriuki and R. M. Munavu, for giving me support when the going was rough. I cannot forget the technical and other support staff in the School of Pharmacy who have been out to support me in research activities. I would like to recognize the University of Nairobi for creating the environment that has enabled me to be in the University of Nairobi since 1975 as a student, researcher and teacher.

This lecture is dedicated to all traditional practitioners in Kenya. I have associated with these men and women for over 25 years. I acknowledge the trust they have in me and educating me on certain aspects of traditional medicine.

I cannot forget my family which has given a lot inspiration by taking my research adventures as part of them. I owe great tribute to my wife who used to bear with my disappearance to such places as Chalbi Desert in Marsabit for days on end without any communication in 1980s in the name of research. Finally, I thank Mrs. Charity W. Maina, formally of Intellectual Property Management Office, University of Nairobi, for typing the bulk of this lecture.



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BIBLIOGRAPHY

Prof. Julius Wanjohi Mwangi was born in Ndia Division, Kirinyaga County in 1953. He went to Kianjege Primary School in 1961. He proceeded to Nyeri High School for his secondary school education in 1969 where he was the best student in the school for 1972 examination. For higher secondary education, he joined Kangaru School, Embu in 1973 where he completed A-level in 1974.

He was admitted to the University of Nairobi in 1975 for a Pharmacy Degree program and graduated in 1979. He proceeded for his postgraduate studies and graduated in Master of Science (Pharmacy) in 1993 and PhD in 1990 at the University of Nairobi.

Prof. Mwangi joined the University in 1980 as a Graduate Assistant, through Tutorial fellow, lecturer in 1984, Senior lecturer in 1995, Associate Professor in 1995 and finally to Professor of Pharmacognosy in 2001. His areas of interest include traditional medicine/complementary medicine especially herbal medicine on their composition, activity, safety, efficacy, quality, use and commercialization. He is a practicing herbalist. He has grown a lot of interest in intellectual property issues in the last 13 years and has undergone many training sessions in this area. He holds some intellectual property rights.

Prof. Mwangi was the first Chairman of the Department of Pharmacology and Pharmacognosy for 9 years from 1995 to 2004 and has acted Dean of the School of Pharmacy in many occasions. He has been the Intellectual Property Coordinator of the University of Nairobi since 2007. He is also a member of many University Committees including Research Development and Advisor Board.

Prof. Mwangi has also been a board member of Kenya Industrial Property Institute, Pharmacy and Poisons Board, Kenya Copyright Board. From 2006 to 2009 he was a member of Program Advisory Committee representing Kenya in the East African region. He has also been a member of several task forces both at the University and in the Government. Such was the task forces on Protection of Traditional Knowledge, Genetic Resources and Folklore that came up with the National Policy for the same. He is trained in corporate governance.

Prof. Mwangi has 57 scientific publications in local and international journals and has presented about 50 conference papers. For these efforts, he has been cited in WHO's WHO in the World, WHO is WHO in SCIENCE and ENGINEERING, OUTSTANDING SCIENTISTS OF 21ST CENTURY among others. He has been an external examiner in Universities of Dar-es-Salaam, Muhimbili University of Health and Allied Sciences in Tanzania and Makerere University and an Assessor for Professorial and other senior academic appointments in many universities.

In recognition of Prof. Mwangi's contribution in traditional medicine, on 12th December 2011, the President of Kenya His Excellency Hon. Mwai Kibaki awarded him the Elder of the Order of the Burning Spear (E.B.S) for his distinguished role in promoting alternative medicine.

PREAMBLE

The start of my curiosity on herbal medicine may have been lost in history. It may have started with eating wild fruits of **Mūbirū** (*Vangueria madagascariensis*), **Ngawa** (*Carissa edulis*) **Ndūra** (*Ximenia americana* var *americana*), **Ngambura** (*Dovyalis abyssinica*), **Thūthūri** (*Sorindeia obtusifoliolata*) and **Ndare** (*Rubus steudneri*) in early 50s as I looked after my grandfather's cows often clad only in oversize shirts. It could have been the times my mother used to put **Mūnyua Maĩ** (*Eucalyptus* leaves), **Gacūkĩ** (*Ocimum bacilicum*) and **Mathirītĩ** (*Lippia ukambensis*) leaves in hot water in a basin, cover me with a blanket so that I could recover from flu and chest problems. Maybe, it was after being sent to look for stagnant water from tree trunks to treat otitis media (ear infection) or after being treated for measles by smearing special soil all over my body. It could have occurred after seeing naughty boys put very inflammatory latex of **Mwatha** (*Synadenium compactum*) on other boys' private parts resulting in early "circumcision". Could it be due to the fact that our primary school teacher always insisted on us spreading **Mĩbangi** (*Tagetes minuta*) in our classrooms on the closing day in order to repel fleas and protect us from jiggers?

But the treatment I can remember most was a visit to a **Mūndū Mūgo** (Medicine man) treatment, where herbal medicine was administered. This Kikuyu traditional medicine consisted of *Ekebergia capense* (**Mūkūria Hūngū**), *Ocimum suave* (**Makūri**), *Ocimum basilicum* (**Gacūkĩ**), *Mondia whitei* (**Mūhukūra, Mugombero**) and *Abrus precatorius* (leaves) (**Gacanga Mūrio, Motĩpitipi, Mwangi La Nyuki, Ombulu,**). These were dried in the sun and on a broken piece of pot, powdered and put in different gourds. The medicine man then licked each powder. The mixture was then put in a big calabash and water added. The contents in the calabash were then mixed with branches of *Vernonia auriculifera* (**Mūthakwa, Musabakwa, Olusia, O-masakwa, Tebinguet**) and *Markamia lutea* (**Mūũ, Mtarawanda, Moo, Kyoo, Siala, Shisimbali, Mogu, Mobet**) and the stems thrown away while

saying "Devil go away, sun and moon come!!" Leaves of *Lantana trifolia* (**Mūkenia, Mvepe, Kate, Muvisavisi, Becap-torit, Chomosong, Petiapteriet, Sekechewo, Lumenenambuli, Nyabend-winy, Ol-magiriana,**) or *Microglossa pyrifolia* (**Mūtei**) and **Itharigo** (part of kid leg with hoof) were used to administer the medicine alternatively each time spitting the contents while some words were recited repeatedly during the process: The patient and the escorts would then enter the house as water was sprinkled on their feet as they recited "**Gatitika Gatitika Mūndū**" (Carry away, Carry away, the Person)

There are over 100 complementary medicine practices worldwide including homeopathic, Traditional Chinese Medicine, Ayurveda, hypnotism, chiropractic, touch therapy, pet therapy, laugh therapy, reflexology, massage, yoga, and traditional herbal medicine. But this lecture concentrates on herbal medicine and medicinal plants.

I would like to quote the following passage on traditional medicine by Willard Harris, of Trinidad Tobago, as it would have equally applied to our local situation (Seaforth *et al.* 1983).

OLD TIME REMEDY

1. I have made up my mind,
To live like the people of olden time,
I lived at my granny, and was cocksure,
Anything wrong with me, she could find the cure,
Modern-day medicine is really disgusting,
Just two small tablets cost a dollar and something.
I say this kind of thing is too expensive.
So, it's like the old people I want to live.

Remove all the bruised blood you get from burns or blows,
With a good dose of egg, Nutmeg and Aloes,
And if you happen to suffer with gas,
Hot orange peel tea bound to make it pass,

Again, don't find I making a fuss,
Hot orange tea bound to break your gas.

2. Traditional knowledge of the old people need to be studied,
They were always first class with their remedy,
Any part of the family that looked sick,
They could always fix up a remedy quick.
You could have cold, you could have flu,
Well, let us suppose you can't remember through,
No need to panic, no need to worry,
All you needed was the old people remedy.

INTRODUCTION

Traditional medicine is a worldwide practice that has preoccupied mankind in his evolution.

Traditional herbal medicine is as old as mankind. People in prehistoric times used plants quite intuitively for food, shelter and even curing man bodily disorders and thereby kept their health in perfect state of fitness and lived a long life. By trial and error, they learned that eating certain mushrooms, berries and roots could produce various degrees of discomfort or death whereas others could be ingested safely. Gradually a body of knowledge was built in different cultures and today every culture has a rich heritage of such knowledge passed down the generation.

The history of usage of plants as medicines dates back many years. In China medicinal properties of plants were known around 4500 BC. Use of medicinal plants in India, Greece and in Arab countries goes back to thousands of years. Hipocrates (460-337 BC) father of allopathic medicine wrote important works on the value of using herbal medicine. It is needless to say that use of medicinal plants for treating diseases is probably the oldest existing method that humanity has used to try to cope with illness.

The plant kingdom can indeed, be regarded as perhaps the single largest potential source for the development of new

drugs. From 1981–2002, for example, over 60% of all new drugs introduced worldwide were based on compounds found in nature (Ariyawardana *et al.* 2009). It is estimated that 25% of modern medicines are derived from plants first used traditionally (WHO 2003). Most of these owe their origins to the tropical rain forests of Africa, Asia and South America. The herbal medicine industry is estimated to have an annual retail value worldwide of about \$65 billion and growing steadily (Ariyawardana *et al.* 2009). If, for example, the oncologists' chemotherapeutic armamentarium today were examined, one would find that there are a number of drugs including vibramycine, vincristine, etoposide, and taxol (docetaxel, for advanced breast cancer), all developed from higher plants resulting from traditional herbal use. Others like quinine, artemisinin and its derivatives (the most recent anti-malarials), digoxin, aspirin, d-tubocurarine, reserpine and ephedrine also came to us through the same route (WHO 2002, Mwangi 2004).

Traditional use of medicines is recognized as a way to learn about potential future medicines. In 2001, researchers identified 122 compounds used in mainstream medicine which were derived from ethnomedical plant sources; 80% of these compounds were used in the same or related manner as the traditional ethnomedical use (Fabricant and Farnsworth, 2001)

At National Cancer Institute, Maryland, USA 70% of the promising anticancer drugs come from plants in tropical rainforests and about 80% of the world population depends on medicines from nature (used in either modern or traditional medical practice) for primary healthcare (Mwangi 2010, Chivian and Bernstein, 2000).

POPULARITY

Traditional herbal medicine has maintained its popularity in all regions of the developing world and its use is rapidly spreading in industrialized countries (WHO 2003). This practice is now being treated, in many developed countries, as legitimate mainstream medicine. More and more people in the western

world are looking to foods and supplements extracted from natural sources to take them beyond good nutrition into the prevention and treatment of disease. While in developing countries accessibility and affordability is the driving force for increased use of herbal medicines, in developed countries popularity of herbal medicine has been fuelled by concern about the adverse effects of conventional drugs, questioning of the approaches and assumptions of conventional medicine, and greater public access to health information. For many patients, herbal medicine appears to offer gentler means of managing chronic, debilitating diseases such as heart disease, rheumatoid arthritis, cancer, diabetes and mental disorders as compared to conventional medicine (Mwangi 2004).

WHO has noted that there is a striking increase in affluent societies. It is the popularity of herbal medicine that complements orthodox medicine or sometimes serves as an alternative to conventional treatments. Recent studies conducted in North America and Europe indicate that herbal medicine remedies tend to be used mostly in groups with higher incomes and higher levels of education. In these countries, this does not look as the poor man's alternative to conventional care.

What explains the sharp rise in the use of herbal medicine? Some may interpret this trend as a biting criticism of high-technology, specialized medicine, despite all its well-documented merits. Some consider too much invasive examinations as a denial of their personal rights. Many patients consider that medical care has become depersonalized; some would even say "hardhearted". In most affluent countries, the number of family physicians and primary care doctors continues to decline. The trend towards highly specialized care works against a sympathetic doctor-patient relationship. In too many cases, the patient is no longer treated as a person, but rather as an assembly line of body parts each to be managed, often with great expertise, by an appropriate specialist in a non-integrated manner.

The rise of herbal medicine is a quest for more compassionate, personalized, and comprehensive health care. The trend is

almost certainly also fuelled by a growing faith in so-called natural products as intrinsically good and safe, which is not always, true (Shan 2008).

There is still much to find out about the optimum use of herbal remedies, not least how they interact with each other and with concurrently administered drugs. But as has been stated earlier, customers are not waiting for all the clinical evidence to be supplied before trying this branch of therapy. They say it is helping them anyway. They see dual holism of the total herb preparation for the total personal need of the patient in terms of body, mind and environmental health, rather than disease.

World Health Organization (WHO)

Traditional herbal medicine is a worldwide practice that has preoccupied mankind in his evolution. It is estimated by WHO that 70-90 % of Africa's rural population still relies on traditional medicine to meet, partially or totally, its health needs. Indeed, herbal medicine is recognized by WHO as an essential component of primary health care (WHO 2002, Mwangi *et al.* 2000). Herbal medicine is now practiced worldwide and has been recognized by the WHO as an essential building block for primary health care.

The World Health Organization launched its first ever comprehensive traditional medicine strategy in 2002. The strategy was designed to create a stronger evidence base on the safety, efficacy and quality of herbal medicines, ensure availability and affordability of these medicines and to promote therapeutically sound use of the medicines by providers and consumers (WHO 2003).

WHO has found that there is worldwide call for a renewal of primary health care which creates an ideal opportunity to revisit the place of traditional herbal medicine, to take a positive look at its many contributions to health care that is equitable, accessible, affordable, and people centered. It is the view of WHO that traditional herbal medicine should be accorded its proper place in addressing the many ills that face all our modern and traditional societies (Chan 2008). However WHO

recognizes national policies and regulatory frameworks, safety, efficacy, quality, access, rational use and intellectual property issues as the main challenges in herbal medicines (WHO 2002).

United States of America

The sale of herbs and botanicals in the US in 2000 was US\$17.5b and over 158 m people were on herbal products and herbal medicine. In 2007 there were 354 million visits to Complementary and Alternative medicine (CAM) practitioners and 835 million purchases in USA. Most of these purchases were herbal-based (Ariyawardana *et al.* 2009). USA has established The White House Commission for Complementary and Alternative medicine to promote CAM (WHO 2002).

European Union

European Union Parliamentary Assembly member states have been called upon to promote official recognition of herbal medicine in medical faculties, to encourage its use in hospitals, and to encourage allopathic doctors to study it at university level. Herbal medicine, together with other forms of complementary medicine, is practiced in public hospitals in Germany and Norway (WHO 2002, Silano 2004)

East Asia Countries

In the Eastern countries herbal medicine is very advanced and widespread. In Malaysia, consumption of traditional medicine products is double that of modern pharmaceuticals and in South Korea per capita consumption of herbal medicine is about 36% more than the modern drugs. China, Republic of Korea and Vietnam have adopted measures to promote integration aimed at exploiting the complementarities of traditional medicine and modern medicine.

In China for example, a combination of Good Agricultural Practice, Good Extracting Practice, Good Manufacturing Practice, Good Laboratory Practice and Good Clinical Practice

has led to the development of safe, high quality and efficacious medicines from herbal medicines. Over 2165 monographs of traditional medicines are included in the Chinese Pharmacopoeia of 2010. This is just a fraction of about 12807 natural remedies consisting of 11146 plants, 1581 from animals and 80 from minerals used in traditional Chinese medicine. In China, there are numerous hospitals, universities and large pharmaceutical industries dealing with herbal medicines. Traditional herbal preparations account for 30%-50% of the total medicinal consumption in China (Limin HU 2010, WHO 2003).

In China the constitution declares that the state should "develop both modern medicine and traditional medicine" and that "traditional complementary medicine and western medicines should unite and learn from each other, mutually complement each other and improve together, in order to promote the integration of traditional Chinese and western medicine.

Africa

A number of African countries including Ghana, Mali, Nigeria and Rwanda have in place a national policy, legal framework, a national management coordinating body and national budgetary allocation for complementary medicine (WHO 2002, 2005). In Madagascar for example, there are over 40 plant-based medicines in their health care system developed by Institute of Research Application. In that country diagnosis and the prescription are made by a medical doctor who is well versed in herbal medicine (Taracha 2010). In South African College of Herbal Medicine and Health was established in 1989. At the Centre for Scientific Research Into Plant Medicine in Ghana, herbal medicines developed and produced by the Centre are prescribed to patients whose average daily attendance is 90-100 patients. There are more than 300 herbal medicines mostly from local plants in Egypt and several herbal-based pharmaceutical companies.

(<http://ressources.ciheam.org/om/pdf/c23/CI011062.pdf>).

Kenya

Before the introduction of conventional medicine at the turn of the 19th century, traditional practitioners were the only medical practitioners in Kenya. Not only were they regarded as medical specialists, but were also expected to deal with a wide range of social problems. However many a great family whose progenitors were well versed in herbalism has lost the invaluable heritage owing partly to lack of adequate records, security, religion, western education and colonialism (Mwangi *et al.* 2002)

At the moment however, a large number of Kenyans irrespective of their social status, ethnic group or religion regularly use herbal medicines. They are not waiting for research results. The medicines are prepared at home or obtained from herbalists, pharmacies and supermarkets. Others import them for their own use. (Mwangi *et al.* 2002). The growing popularity and the extent of people already being seen by the herbalists in Kenya is shown in Table 1 and 2. The tables indicate that one traditional practitioner's clinic treated 363 patients in 2000 while another treated 12,894 in 2008. The diseases treated by the traditional medical practitioners are varied and include cardiovascular problems, diabetes, cancers, gastrointestinal problems, malaria and fibroids (Matoke 2010, Muiruri 2001).

In a study by Kimani (1978), it was found that availability of modern scientific health care does not necessarily diminish dependence and utilization of traditional medicine among large segments of Kenya rural and urban communities. As a corollary to this, absence/shortage of modern medical facilities, especially in the rural areas was not a precondition for utilizing traditional medicines. Further, education and income level did not automatically differentiate the users and non-users of traditional medical resources in Kenya. It was also found that whereas the importance of rural traditional medicine is relatively unchanged, or is even diminishing in some areas;

urban traditional medicine was expanding both in scope and influence. So the notion that use of herbal medicine in Kenya is a sign of poverty, uninformed and underprivileged rural poor is not completely right.

JUSTIFICATION

Traditional herbal medicine has now emerged as a fundamental issue for the achievement and sustaining of health care, economic and social progress. It needs to be respected and supported as a valuable source of leads for therapeutic advances and the discovery of new classes of drugs (Shan 2008). These resources may serve as templates for pharmaceutical chemists to synthesise new compounds of even greater therapeutic value. New medicines against diseases for which suitable cures are not yet available may be obtained through this route.

More than two thirds of the world's plant species - at least 35,000 of which are estimated to have medicinal value come from the developing countries. At least 7,000 medical compounds in the modern pharmacopoeia are derived from plants (European Union 2005).

Many countries are exploiting plant raw materials imported from the third world to manufacture medicines. The medicines from these materials are not accessible to third world populations due to cost. Such plants as *Prunus africana* bark for benign prostate enlargement, *Centella asiatica* for treatment of wounds and *Pelargonium sidoides* for treatment of respiratory conditions are exported, as unprocessed raw materials, to Western countries from Africa. There are also many patents on medicinal compounds or their derivatives originally obtained from plants in Africa. No benefit sharing arrangements are available to the source countries.

Kenya has abundance of plants, a very large number of which have not yet been described and identified. Many plants used in herbal medicine have been used in folklore for generations. This knowledge unfortunately is fast disappearing as the older generation disappears through age. We have an academic,

moral and a practical obligation to salvage some of the medical-botanical lore before it is lost.

Let me emphasize that if we are to achieve vision 2030, every benefit that may be obtained from herbal medicine must be encouraged.

HERBAL MEDICINES: DO THEY REALLY WORK?

Let me give a few personal observations so that we can try to answer this question together.

Allergy

A 17 year old girl had severe skin allergic reactions to beans. She was put on topical and oral steroids, non-steroidal anti-inflammatory agents and antibiotics. These did not help. She was later put on a traditional herbal medicine containing 15 items, some of which were powders or some liquids. The problem was solved in three weeks.

Duodenal ulcer

A 48 year old man was diagnosed to have duodenal ulcer with *Helicobacter pylori*+++ . Conventional medicine was administered followed by many hospital admissions. The condition did not improve. A herbal medicine powder containing many ingredients with banana parts being the major component was administered for two months. Six years have now passed without a relapse.

Poor venous return

A lady was diagnosed to have varicose veins with poor venous return. The legs were swollen with some skin ulcerations. Medical elastic bandage was prescribed. Herbal medicine for a number of months alleviated the problem. The problem has not recurred for the last six months.

Haemorrhoids

A man of 50 years had been diagnosed with haemorrhoids and a surgical intervention was indicated after some medication failed to address the problem. He took herbal medication as he was waiting to go for surgery. The problem disappeared without the need for the surgical procedure.

Insulin independence diabetes

A man over 60 years was down with diabetes. He was put on oral anti-diabetic medicines but later combined with herbal medicine taking them concurrently. The conventional medicines were gradually reduced until the patient did not require any antidiabetic medicine. His sugar levels have normalized for the last 4 years.

Insulin dependence diabetes

A lady of 85 years had lived with diabetes 10 years. At the time of taking herbal medicine she was on insulin 18 and 12 units in the morning and evening respectively while her sugar level was 26 mmol/L Check. She started herbal medicine in combination with injection. Subsequent readings for the following 15 days were as follows: 24.7, 25.6, 22.8, 18.4, 14.1, 10.9, 10, 11.7, 10.1, 12.9, 9.2, 8.4, 8.1, 7.4, 8.9 mmol/L. Clearly there was good improvement. The patient went back to rural areas on oral hypoglycaemics and proper diet.

Disc slip/arthritis of backbone

A 50 year old man had back and leg pains. Magnetic Resonance Imaging indicated pressed nerves by back bones. Physiotherapy was prescribed while surgery was suggested. He took herbal medicine resulting in great improvement in 4 months. Problem has not recurred for the last 4 years

Prostate cancer

A man over 70 year old man was diagnosed with prostate cancer which had metastasis to all bones. No chemotherapy or radiotherapy was indicated due to the extent of the metastasis. He was sent home on non-steroidal anti-inflammatory agents and anti-androgen injection which he received only twice. In the meantime he had started on herbal medicine medication which he took for about one year. The old man has been healthy for the last 5 years without any need of any medication.

Breast cancer

A 55 year old female was diagnosed with lobular cancer of the breast and advised for removal of the breast. The lady instead opted for herbal medicine for 12 months. The swelling regressed tremendously to almost undetectable level. She no longer uses any medication 4 years later.

Liver cancer

An 83 year old lady was diagnosed with primary hepatoma with peripancreatic and peri-caudate metastasis (liver cancer) with several masses in the liver. The lady who was bed-ridden was discharged from the hospital for palliative care at home. After taking herbal medicine for 1.5 months she was able to walk and lived for six more months before death.

Cancer of the cervix

A lady of 45 years was down with cancer of the cervix. She was admitted for removal of the uterus but when it was found that the cancer had advanced from stage IB to IIB, she was booked for radiotherapy. She started on the herbal medicine as she waited for radiotherapy. Two weeks on, the radiotherapy had not been done but bleeding had stopped with only non-bloody discharge. Her general outlook had also improved tremendously. Radiotherapy was later done without any need for blood transfusion. She has continued taking herbal medicine for three months after radiotherapy and reported feeling quite healthy.

Fibroids

A lady of 50 years was diagnosed with uterine fibroids measuring 2.1×3.5 cm and 2.1×3.3 cm by pelvic ultrasound in 2003. Hysterectomy was advised but she decided to take herbal medicine instead. The fibroids regressed in time and the symptoms disappeared. In 2010 she decided to go for ultrasound. Happily the report indicated that the myometrium echogenicity was normal and no fibroids were seen.

Benign prostate hyperplasia (BPH)

An old man of 70 years was diagnosed with BPH (non cancerous prostate enlargement). He was put on conventional medicines. Since he was not satisfied with the treatment, he opted for a herbal medicine preparation containing Prunus extract (100 mg in two divided doses). He took the medicine for a month and has experienced no prostate problems 7 years later.

HIV/AIDS medicine – SOUTH AFRICA

A decoction containing 5 plants was administered to 33 patients in South Africa. There was improved overall health condition and immune system, increased in CD4 + T cell count and decrease in viral load count. The preparation was an obvious immune system booster and a probable “viral-cidal” factor. Indeed 2 out of 33 investigated patients recovered their immune system and had an undetectable level of viral load after 8 months. The severely ill AIDS patients almost fully recovered from their illness and over 50% of patients in the study were fit enough to resume their previous jobs (Tshibangu et al. 2004).

THE QUESTION WE NEED TO ASK IS, DID THESE PREPARATIONS WORK IN THE ABOVE-CITED CASES? WAS IT A ONE OFF CHANCE HEALING? WHAT IS NEEDED TO CONFIRM OR IGNORE THESE OBSERVATIONS?

RESEARCH and DEVELOPMENT (R&D)

In most developing countries, research on medicinal plants is one of the most popular subject of research in the chemical and related biological sciences. It has an immediate popular appeal among scientists and non-scientists alike and for most people; it is a natural subject of research for developing countries. In many of these countries, there is abundance of plants, a very large number of which have not yet been described and identified. Many of these plants are used in local traditional medicine and have been reputed, through knowledge inherited from one generation to the other, to have useful medicinal activity.

Research and development in traditional herbal medicine is part of the WHO global strategy and plan of action on public health, innovation and intellectual property (Shan 2008).

With the expansion in use, the safety, efficacy and quality control of herbal medicines, R&D automatically becomes a cornerstone in herbal medicine. We should therefore carry out research on pharmacological profile, clinical effects, composition, and formulation, standardization and good agricultural practice so that more people can benefit.

Unless we are able to carry out these studies within Kenya, our laboratories and scientists will be no more than extraction agencies preparing extracts and isolating compounds for others to investigate at their own discretion, selecting the ones they want to develop and suppressing those they think will be in direct conflict with their research and development interests.

R&D therefore helps to standardize material, method and measures of preparation, presentation, preservation, administration and give scientific meaning and significance to the fundamental principles of the system. It rationalizes the utility of positive and judicious use of modern scientific method that pertain to the development of traditional medicine. Research can provide identification of the active principles of medicinal plants and investigation of the extracts in order to

ensure that they are safe, effective and of consistent activity. The isolation of these active principles, and the determination of their active principles and their structures is also important so that they may be synthesized, structurally, modified or simply extracted more efficiently.

However R&D of medicines is not an easy, cheap venture in which one can shout 'Eureka' every day. It involves a lot of expense and is a long term investment. For example, it is estimated that it takes 10 - 17 years and US\$ 200 million to over US\$2 billion to develop a conventional medicine (Grubb 1999, Wikipedia 2011). The costs are double for drugs developed from medicine plants. This is compounded by regulatory burden for medicines, being one of the most regulated industries in the world, low probability of success, low chance to reach medicine approval, low chance for drug to recoup costs and intellectual property issues. Our research efforts should not necessarily aim at getting patents from plant research. That is very expensive and time-consuming venture which resources at our disposal at the moment cannot meet. But there is hope. We can learn from Chinese who have been able to conduct low level and high technology R&D for their traditional Chinese materia medica. They are using their herbal medicines as they improve them through R&D. All we may need at the moment is to give some clear scientific evidence that this art is not hocus-pocus (Addae-Mensah 1992). Quality control, efficacy and safety issues may be the only requirement we need in some preparations.

There are other challenges facing R&D in Kenya. Chief among these include apathy by industrial firms, foundations, academic institutions, and government agencies to provide adequate funds for long enough periods of time so that a herbal medicine program would be expected to yield clinically useful agents. Right animal experimental set up, complex nature of ingredients or items, intellectual property issues and small market size are another set of challenges to be overcome.

QUALITY CONTROL

As the use of herbal medicines gains recognition globally there are legitimate demands that the medicines be safe, efficacious and of good quality. The required parameters for their quality evaluation include assessment for inorganic matter (dust), absence of adulteration, microbial load, identification and profile of contents and where possible quantification of the active compound or marker compounds. Also of importance are heavy metals, pesticides and product stability.

Quality control and standardization of herbal medicines pose a big challenge. The multi-component nature of these preparations containing not only the active therapeutic agent(s) but also many other additional sometimes apparently useless or irrelevant or irrational ingredients make the quality control more complicated. Some of the added materials may be useful for enhancing the activity of ingredients, preservation, sweetener, coloring or simply for treating any other disease the person may be suffering from. The content profile becomes difficult to replicate from batch to batch, while quantification of the active compound(s) in such multi-component products requires prior complicated processing to isolate and identify the chemical compounds (Kibwage *et al.* 2005).

Other problems associated with quality control and standardization of traditional herbal medicines in order to come up with effective, cheap and acceptable remedies include:

- a) Good wild harvesting and good agricultural practice
- b) Good laboratory practice
- c) Post-harvest processing of the raw material
- d) Good manufacturing practice

As indicated above, there is evidence that certain herbal medicines have good therapeutic actions. But because these are not patentable, in addition to being subject to same quality standards as conventional medicine, there is little possibility of them being developed as medicine. Some proponents have said

that "A strong case can be made that these, and many other constraints on herbal medicine development, have little to do with efficacy or safety but are more related to protectionist needs of multinational industrialized country drug companies."

CLINICAL RESEARCH AND USES

The gold standard for pharmaceutical testing is repeated, multicentre, large-scale, randomized, double-blind controlled clinical trials in order to provide the highest level of evidence for efficacy. Such studies facilitate the acceptance of herbal medicines in different regions and people with different cultural traditions. However, methods such as randomization and use of a placebo may not always be possible as they may involve ethical issues as well as technical problems. For example, it may not be possible to have a placebo control if the herbal medicine has a strong or prominent smell or taste. In addition, patients who have been treated previously with the herbal medicine under investigation with a characteristic organoleptic property, cannot be randomized into control groups (WHO 2000).

Standard clinical trials for many herbal medicines used today are not available. The challenges associated with clinical trials include:-

- a) The complex nature of ingredients unlike conventional medicine where efficacy of a single component or drug or well defined compounds constitutes the medicine. The combination in herbal medicine may serve the role of improvement of tolerance and compliance, amplification of the dosage-scheme or avoidance of pharmaceutical incompatibilities. It may therefore be said that the efficacy of the total formulation is more important than any single herb or compound in many herbal medicines. This makes it difficult to predict which compound or herb gives the total outcome of clinical trial.
- b) Herbal medicines are not patentable due to long usage. They are considered to be in public domain. Without a patent, manufactures are not inclined to

invest in expensive clinical research. They see no gain in the expensive and laborious input of the research in what they consider a small, non-monopolistic market size in which others will start manufacturing the same medicines before they recoup their expenses.

- c) The fact that herbs may enhance vital force (encourage the body to treat itself) rather than heal directly generates a different question.

In the present times of evidence-based therapies, this evidence is best evaluated by, traditional folklore, systematic reviews and net-analyses of available clinical data and reviews. Such approaches and reviews are now available for a number of herbal medicines. A 2004 Cochrane Collaboration review found that herbal therapies are supported by strong evidence but are not used in all clinical settings (Cochrane reviews 2004).

In most countries different approaches on clinical trials have been adopted. For example in 2004 the U.S. National Center for Complementary and Alternative Medicine of the National Institutes of Health began funding clinical trials into the effectiveness of herbal medicine. In fact herbal safety is determined on an *ad hoc* basis usually following a consumer complaints by Food and Drug Administration of USA.

Examples of some evidence-based studies

There are many clinical studies suggesting that a number of well formulated and standardized herbal medicines are effective in treating certain conditions. Some of these can be highlighted.

Ginkgo (*Ginkgo biloba*) for example is used in the treatment of age related mental malfunction, including multifarct dementia and Alzheimer's disease (Mwangi *et al.* 2005). It has been found safe and capable of stabilizing and, in a substantial number of cases, improving the cognitive performance and the social functioning of demented patients. Clinical findings include increased speed of information processing, faster reaction

times on tasks and improvement of quality of life and sleep parameters (Renzo 2000).

St. John's Wort (*Hypericum perforatum*) is well known for the treatment of moderate depression, anxiety and nervous unrest. *Prunus africana*, *Urtica dioica*, *Serenoa repens*, and *Cucurbita pepo* are known for their usefulness in the treatment of benign prostate hyperplasia. This has been supported by many clinical studies (Bombardelli and Morazzoni 1997, Mwangi *et al.* 2005)

A clinical evaluation of the antidiabetic and adaptogenic properties of the common vegetable *Momordica charantia* (Karera) extract has been carried out with good results. The same applies for *Jatropha curcas* in the treatment of common warts. Double-blind, placebo controlled, multi-centre studies have demonstrated the efficacy and tolerability of Valerian (*Valeriana officinalis*) and its combinations in improving the quality of sleep (Mwangi *et al.* 2005).

Pycnogenol® (Procydin®) a formulation from the grape seed or *Pinus palustris*, has been shown to be effective in patients with chronic venous insufficiency, secondary to deep venous thrombosis or idiopathic venous-lymphatic deficiency. In France, this drug is regularly prescribed to diabetics to prevent retinopathy or halt further deterioration (Arcangeli 2000). In Kenya, *Ximenia americana* has a lot of proanthocyanidins which are the active ingredients in Pycnogenol® (Mwangi *et al.* 1994).

There are also many examples of polyherbal formulations which have proved useful in the treatment of some ailments. Niprisan® (Nicosan®) has been found to be a safe and efficacious herbal medicine for the management of patients with sickle cell disorder (Wambembe 2001, Nathan 2009) while Mupal has been found to be useful in treatment of duodenal stomach ulcers (Mwangi 2000).

My recommendation is for Kenya to adopt Kenyan solution to Kenyan problems. We could also learn from Chinese who are doing a lot of clinical and other scientific work on their herbal medicines while concurrently being using them in their hospitals and in other outlets at the same time taking care of safety and efficacy.

NATIONAL POLICY, LEGAL FRAMEWORK AND REGULATION

Not many countries have national policies for traditional medicine. Regulating traditional medicine products, practices and practitioners is difficult due to variations in definitions and categorizations of traditional medicine therapies. The use of herbal medicines poses sensitive challenges to drug regulatory authorities responsible for the safety, efficacy and quality of medicines both nationally and internationally. A single herbal product could be defined as, a food, a dietary supplement or a herbal medicine, depending on the country. This disparity in regulations at the national level has implications for international access and distribution of products. However, more than 100 countries have regulations for herbal medicines (WHO 2008).

The issue of regulation is an area of continuing controversy in the EU and USA. At one end of the spectrum, some herbalists maintain that traditional remedies have a long history of use, and do not require the level of safety testing as conventional single ingredients in an artificially concentrated form. On the other hand, others are in favor of legally enforced quality standards, safety testing and prescription by a qualified practitioner. Some professional herbalist organizations have made statements calling for a category of regulation for herbal products. Yet others agree with the need for more quality testing, but believe it can be managed through reputation without government intervention. The legal status of herbal ingredients varies by country.

In the United States, most herbal remedies are regulated as dietary supplements by the Food and Drug Administration. Manufacturers of products falling into this category are not required to prove the safety or efficacy of their products, though the FDA may withdraw a product from sale should it prove harmful (USA Act 1994).

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In the new European Union legislation on traditional herbal medicine, superfluous testing and charges borne by pharmaceutical companies is avoided, as the regulation does not require new clinical or pre-clinical testing if sufficient information on a given product is already available. Being in medicinal use for a sufficiently long time and hence considered not harmful under normal circumstances is deemed a good justification for registration. The only rider is that the user should consult a doctor or a qualified health care practitioner if the symptoms persist during the use of the medicinal product or should adverse effects not mentioned in the package leaflet occur (Mwangi 2004, Silano et al. 2004)

A number of African countries have in place legal framework, national management or coordinating body and national budget allocation e.g. Ghana, Mali, Nigeria and Rwanda. It also exists in China, Korea, Vietnam and India.

Kenyan situation

Traditional Health practitioners are currently regulated as traditional and cultural practices through Department of Culture. In order to streamline this practice there should be a government sanctioned mechanism to promote, supervise and prevent abuse. Traditional herbal medicine practice should be placed under the Ministry of Health under a council or any other body with presentation by relevant stakeholders. The Ministries of Health should recognize herbal medicine as a major contributor to primary health care.

As an indication of lack of official policy in our Ministries of Health, in early 2002 the Minister of Public Health announced that a bill incorporating herbal medicine into formal healthcare system was in the pipeline. The Minister indicated that there were plans to institutionalize traditional medicines and integrate it into medical practice and that it was soon to be made available at health institutions if the proposed bill was to become law and the Government was studying a report on how these medicines could be dispensed at health institutions and pharmacies.

This was the strongest policy direction ever made by a minister in Kenya on herbal medicines. While this was applauded by some including WHO, others poured cold water on it arguing that this was a plan to appease poor Kenyans for what the Government was unable to provide in form of health care (Nation Newspaper 12/1/ 2002, 3/4/2002).

There have been several attempts to address issues on traditional herbal medicine in Kenya. These include:-

- a) Kenya National Drug Policy (1994) which stated that traditional medicines will continue to be an essential part of the Nation's culture and will need to be harmonized with health care systems.
- b) Registration of Herbal and Complementary Medicine: Guidelines to Submission of Applications. Pharmacy and Poisons Board, Draft 2011.
- c) National Pharmaceutical Policy Draft (2010) which says, "Recognizing Complementary/Alternative medicine as essential part of the Nation's culture, the Ministry of Health will promote appropriate utilization of these within the national healthcare system in order to maximize the benefits and reduce the risks involved".
- d) National Policy on Protection of Traditional Knowledge, Genetic resources and Cultural expressions, 2009.
- e) National Policy on Culture and Heritage (2009) by Department of Culture.
- f) The Traditional Healthcare Practitioners Draft Bill (2002) by Ministry of Health.
- g) Traditional and Alternative Healthcare Practitioners 2003 Draft Bill by Ministry of Health.
- h) The National Policy on Traditional Medicine and Medicinal Plants Draft '2005 by The National Coordinating Agency for Population Development 2005.
- i) National Economic and Social Council is interested on how the Medicinal and herbal plants can impart positively on economic and social aspects of the Kenyan people.

My take on the regulation, policy and legislation of herbal medicines is that we should take the direction many countries have adopted. We should apply a licensing policy that promotes the efficacy, safety and quality of phytomedicine without imposing an unbearable conventional medicine burden on their manufacturers. Kenya should create awareness and official recognition of traditional herbal medicine and provide technical and development assistance in this area at policy-making level.

INTEGRATION OF HERBAL MEDICINE WITH CONVENTIONAL MEDICINE

As has been mentioned earlier herbal medicine is becoming increasingly popular all over the world. Many countries have brought the two systems together in highly effective ways. In several countries where health systems are organized around primary health care, herbal medicine is well integrated and provides a backbone of much preventive care and treatment of common ailments. Indeed WHO has put a lot of effort into bringing traditional knowledge and western medicine together in ways in which the two systems need not clash. Within the context of primary health care, they can blend together in a beneficial harmony, using the best features of each system, and compensating for certain weaknesses in each (Chan 2008).

For example, during the 1st Congress on traditional medicine in Beijing, China in November 2008 WHO unveiled the Beijing declaration which encourages communication between western and traditional practitioners.

While China, the Democratic People's Republic of Korea, the Republic of Korea and Vietnam have fully integrated traditional medicine into their health care systems, many countries are yet to collect and integrate standardized evidence on this type of health care (WHO 2003). In China, herbal therapy of proven utility in many disorders is provided in state hospitals throughout the country, alongside conventional medicine (Chan 2008).

Some of our scientists and medical fraternity believe that all herbal medicines are harmful but if found efficacious they are chance discoveries. Herbal medicines are not all products of chance, but results of years of careful experimentation and pains-staking observations. Unlike many other countries of the world, medical doctors in Kenya do not receive any training in herbal medicine. In Germany and France for example, all health professionals receive training in herbal medicine. Herbal medicines are for example a core part of their treatment options. In many other countries of the world medical doctors, especially in Asia, acquire postgraduate degrees or diplomas on herbal medicines.

Some conventional medical professionals often oppose integration of herbal with the conventional medicine on the grounds that providing medical care is too important, too complex and too dangerous to be left in the hands of less trained or differently trained personnel. While I agree that health care is an important matter not to be treated lightly, the role already being played by traditional herbal practitioners in the rural areas in health care should be given due recognition. At the same time, however, the need to evaluate traditional medicine herbal practices should be emphasized with a view to noting procedures which need to be eliminated or modified in order that the traditional practitioners' contribution to health care can be improved upon. The importance of herbal medicine does not lie in proving that it is superior or inferior to modern medicine but rather that it is yet another form of medicine that is complementary to conventional medicine in health care.

Several challenges face Kenya in the integration of traditional herbal medicine in national health care. These include: lack of a national policy and regulatory framework; issues pertaining to safety, efficacy, quality, access and rational use of traditional herbal medicine and lack of healthy cooperation and communication between complementary medicine providers and medical practitioners. However, integration cannot happen all by itself which means that deliberate policy decisions have to be made.

However experience has shown that there is a lot of dual therapy going on in Kenya. Members of the public either go to traditional healers first before attending modern medical facilities and vice versa. Sometimes the therapies are sought concurrently. Other countries are not waiting for us. In Auckland for example, 30% of general practitioners practiced complementary medicine and alternative medicine and 69 % referred patients to other complementary medicine and alternative medicine practitioners (Rotblatt and Ziment 2004).

INDUSTRY AND COMMERCIALIZATION

Herbal treatments are the most popular form of traditional medicine, and are highly lucrative in the international marketplace. Annual revenues in Western Europe reached US\$ 5 billion in 2003-2004. In China, sales of products totaled US\$ 14 billion in 2005. Herbal medicine revenue in Brazil was US\$ 160 million in 2007 (WHO 2008) and as has already been mentioned, the trade on herbal medicines is over US\$ 65 b/yr and growing at 10-15%.

There is need to develop local industries to produce suitable pharmaceuticals from traditional herbal medicines. Adding value to local raw materials is widely accepted as a potent way of promoting plants' sustainable use by the local custodians. These enterprises can help expand employment outside existing industrial centers, and thus play an important role in local and regional development initiatives. Cultivation of medicinal plants can be an essential source of income and employment opportunities for the poor in general and for rural women and other marginalized groups in particular. The goal would be to provide the rural people with good opportunities to earn income beyond those provided by the familiar crops and to add value locally instead of selling them as cheap raw materials.

No industry in Kenya is seriously manufacturing herbal based medicinal products. Many countries world-wide now do have industries where dosage forms are made, standardized and packaged at very low cost using appropriate technology.

The herbal plants industry in Kenya is hampered by various challenges such as lack of ethno-botanical information on uses; attributes and commercial value of Kenyan medicinal plants and their possible products; lack of quality standards, weak quality control and product standardization practices; lack of public and private sector investment in infrastructure that facilitates value addition processing opportunities and thus international trade; lack of scientific programs to identify potential uses and increase quality and intellectual property issues. But in spite of these challenges Kenya must develop ways and means of solving Kenyan problems

The following examples illustrate some Kenyan plants that could be of immediate commercial value

ALOE SECUNDIFLORA (ALOEACEAE)

The plant is known by several local names such as **Kiluma, Kiruma, Linakha, Omogaka** and Aloe. The leaves of *Aloe secundiflora* are applied to wounds to assist healing, used as an appetizer, anti-nausea, to treat malaria, typhoid fever, edema, nosebleed, headache, pneumonia and chest pain. A number of people are known to control diabetes by using the plant and those who take preparations containing this plant are able to control HIV/AIDS better in combination with conventional antiretroviral viral medicines. The sap is also used in several soap preparations.

In preventing or treating coccidiosis and Newcastle disease in poultry, leaves are pounded and added to drinking water. *A. secundiflora* is active against fowl typhoid caused by *Salmonella gallinarum* and against Newcastle disease virus (NDV) in chickens.

In 2003 - up to 85,000 kg of solid 'bitters' with a market value of about US\$ 840,000 were exported from Kenya with China and Saudi Arabia being the main importers. The plant has great potential in cosmetic and pharmaceutical industry. Of the 62 Aloe species in Kenya, *A. secundiflora* and *A. turkanensis* are the most exploited commercially.

CENTELLA ASIATICA (UMBELLIFERAE)

This is a common herb in wet places in Kenya and is known by several names including Iritora, Gotu kola, Herba centella, Hydrocotyle and Indian pennywort. It is widely used for wound treatment, tonic, fever, leprosy, syphilis, and as a diuretic and purgative. It is also taken to relieve the symptoms of venous and lymphatic vessel insufficiency and as herbal tea.

The plant has been used for treatment of indolent ulcers, wounds, hemorrhoids, burns, keloids, hypertrophic scars, chronic post operative and post trauma wounds. A lot of clinical studies have been carried out on the plant (WHO 1999).

Chemicals found in *C. asiatica* extract include, triterpenes such as asiaticoside, modecassoside, madecassic acid (bráhmic acid), madasiatic acid, Asiatic acid and derivatives of ursenoic acid. Other ingredients include polyacetylenic compounds, mono and sesquiterpenes, flavone derivatives including quercetin-3-glucoside, kaemferol-3-glucoside

1992-1995 Kenya exported 100 tonnes out of which 36 tonnes went to France for manufacturing medicines.

PRUNUS AFRICANA (ROSACEAE)

Red Stinkwood, African Cherry also known as **Muiri, Mutimailu, Kiburabura, Mwiritsa, Tenduet, Ol-Koijuka, Lamalan** is an evergreen tree about 30 m and widely spread only in Africa. The Africans used the bark to relieve micturation difficulties caused by prostatic enlargement (old man's disease). Many pharmaceutical companies use Prunus extract to formulate medicine for Benign Prostrate Hyperplasia (BPH). The retail annual value is estimated to be over US\$ 200 m. The extract is regarded as a natural pharmacological combination in which different components exert a synergistic action, counteracting some of the biochemical and functional changes that characterize BPH. Clinical studies and toxicological studies have already been carried out. (Bombardelli and Morazzoni 1997, Gathumbi 1995).

The chemicals in the extract include fatty acids (C12 -C24) esters, Sterols (β -sitosterol, β -sitosterol-3-O-glucoside, β -sistostenone and campesterol), Pentacyclic triterpenoids (ursolic acid, 2- β -hydroxyursolic acid, oleanolic acid, crataegolic acid, maslinic acid, epimaslinic acid and friedelin) and free and transferulic esters of alcohols (n-tetracosanol and n-docosanol).

In Africa, more than 3,500 tonnes of African Cherry (*Prunus africana*) bark are harvested each year and exported to Europe. The biggest problem associated with African Cherry is the over-exploitation in the international markets due to its great demand.

WITHANIA SOMNIFERA (SOLANACEAE)

Ashwagandha, Winter cherry, Indian ginseng, Poison gooseberry. Other names are **Mtemua shamba, Mhulapori, Idigaga, Murubae, Chepterekiat, Ofuyaendwa, Ol-assaiyet, Lopotwo** and **Emotoe**.

Roots are traditionally used for gastric ulcer, colds, skin rashes, labor pains and as a tonic.

In Ayurvedic medicine the plant is used to improve overall physical and mental health and increase longevity and vitality by rejuvenating the body. The plant is also considered hypnotic, aphrodisiac, liver tonic, purgative and diuretic, and is used in the treatment of tuberculosis, senile debility, nervousness, rheumatism, furuncles, sores, dropsy, cough and hiccup. The plant is also taken to purify the blood, for gonorrhoea, cough, asthma, epilepsy, hemorrhoids, sores, abscesses, smallpox, anthrax pustules, otitis, poorly healing open wounds, labor pains, general ill health, dysuria and asthma (database.prota.org/)

Extracts and extracted compounds have shown broad spectrum of pharmacological activities, and anti-oxidant effects or modulation of oxidative processes.

Research on effects on brain stimulation, heart disease, sugar level, anxiety and stress, Parkinson's disease, snake venom, inflammation, immunomodulation and cancer have given positive results.

W. somnifera, herbal rejuvenative tonic widely used by Ayurvedic physicians in India, has been tested for its adaptogenic properties. Pre-treatment with this drug increased the swimming endurance in mice. It prevented gastric ulcers induced chemically or by stress in rats. Milk-induced leucocytosis was also prevented in mice. The drug prevented increase in adrenal weight and decrease in ascorbic acid and cortisol content of adrenals during stress. It appears to induce a state of non-specifically increased resistance (SNIR) during stress (Singh *et al.* 1982).

A very large number of bio-active compounds have been isolated from the plant. These include ergostane-type steroidal lactones, the most important ones being withaferin A, withanolides (especially withanolide E), withasomniferols and withanone, dimeric thiowithanolide – ashwagandhanolide.

The roots are widely used as a commercial product in India and they are popular with herbalists in Kenya.

OTHER PLANTS

Other plants that could be commercially exploited include *Sclerocarya birrea* (A. Rich) Hochist "AMARULA" **Mngongo, Didissa, Muua, Ol-Mwangi, Muura, Oraluo, Tolotlokiw**. This plant is the source of Amarula, the famous South African wine, that has taken the local market by storm which could be produced from a locally available tree found in Tharaka District in Eastern Province whose fruits are at present going to waste. The stem bark is also traditionally used to treat dysentery, liver and rheumatism.

ESSENTIAL OILS AND MARINE RESOURCES

Essential oils are the subtle, aromatic and volatile liquids extracted from the flowers, seeds, leaves stems, bark and roots of the herbs, bushes, shrubs and trees, through distillation. They are the oldest form of medicine and cosmetic known to man and were considered more valuable than gold. They are high value commodities. These oils are the backbone of perfume, soap, spice and some pharmaceutical industries and they are the main ingredients in aromatherapy (Mwangi 1999).

Research on essential oils in Kenya has been in progress since 1978 in the School of Pharmacy, University of Nairobi. In this regard we have published more than 40 articles on essential oils and arising from this work, many plants have been suggested for further research and development with the view of cultivation and commercialization of essential oil based products. Review of the data available shows that the uses of these indigenous natural resources are under-recognized and underutilized (Mwangi *et al.* 2009, Mwangi 1990, Mwangi 1983, Mwangi *et al.* 1995).

Research and development could extend to *Osyris lanceolata* Hochst & Steudel (East African Sandal wood) in the family Santalaceae. This indigenous plant is currently under presidential protection due to piracy of the plant resulting in an extinction threat. About 150 tonnes of logs of the plant, including roots, are pirated every month to produce 750-800 kg of the oil which is in high demand in perfumery industry (Mwangi *et al.* 2009).

Marine fauna and flora is considered as a very important source of medicines. Indeed several compounds isolated from various marine plants (microorganisms, algae and fungi) are undergoing studies worldwide with the aim of producing pharmaceutical medicines. A number of them may serve as templates for synthetic modification or drug candidates (Fenical 1996, Jirge and Chaudhari 2010). Acarbose an anti-diabetic

drug isolated from microbes from Ruiru dam whose sales amounted to US\$ 379 in 2004 is just one example of the economic and health potential of marine life in Kenya.

BIODIVERSITY, CONSERVATION, BIOPROSPECTING AND INTELLECTUAL PROPERTY

Biodiversity and conservation

The estimated number of world's plant species is 300,000 – 500,000, 250,000 identified and classified (Heywood 1988). Kenya is classified as a bio-diversity rich nation (Wambugu and Muthamia 2009). It is estimated that Kenya is the home of some 7,500 higher plant species of which 1100 are thought to be rare. The flora of the lower plants is largely unexplored. Among useful higher plants are wild species of vegetables, fruits, forage, grasses, legumes, browse plants, cereals, oil crops and medicinal plants. This high diversity is due to various different ecosystems throughout Kenya that include moorland on top of high mountains, moist highland forests, dry forests, evergreen and semi-evergreen woodlands, savannahs, coastal forests and woodlands, riparian vegetation and mangrove.

Kenya has therefore a unique potential for creating a herbal medicine/ medicinal plants industry. Actually only a small percentage of the total diversity of wild species has been investigated for potential sources of new drugs. So we must wake up to the commercial significance of our "green gold" before other nations come for it.

Conservation of biodiversity has ceased to be a tool for threatened species being protected against extinction. Instead it is a tool for achievement and sustaining of economic and social progress. Indeed benefit sharing can provide a synergy between conservation and sustainable use of natural and intellectual resources. I would like to reiterate that biodiversity has value. You can bargain for it, you hide it, it may be stolen, or be put in the bank.

Destruction of wild plant species and habitats hurts us all. Useful products cannot be manufactured from extinct species. There is a growing herbal market, as it is estimated that 5 billion people benefit from traditional plant-based medicine for health care (WHO 2008). This market and great commercial benefit might pose a threat to biodiversity through the over harvesting of the raw material for herbal medicines and other natural health care products: These practices, if not controlled, may lead to the extinction of endangered species and destruction of natural habitats and other resources (WHO 2003).

In Kenya, herbal materials for the medicines are collected from wild plant populations. As a result plants for making the medicines are becoming more difficult to find. The consequences of these do not require explanation. Kenya must make a concerted effort in the conservation of endangered medicinal plants, if we are to reap the benefits in future. At present in Kenya, there is a great urge for wanton destruction and degradation of indigenous forests. This practice will result in disappearance of plants of potential medical value.

There is need for multiplication and conservation of endangered valuable medicinal plants used in traditional herbal medicine in Kenya. These plants include *Aloe* species, *Prunus africana*, *Warbugia ugandensis*, *Zanthoxylum* species, *Rhamnus prinoides*, *Ximenia americana*, *Mondia whitei*, *Asparagus racemosus*, *Olea europaea ssp. africana*, *Osyris lanceolata*, *Artemesia afra* and *Rubia cordifolia*. Rampant biopiracy of some of these plants such as *Prunus africana* (Redstick wood) and *Osyris lanceolata* (Sandalwood) is a great threat to medicinal plants in Kenya. I can foresee some medicinal plants in Kenya becoming extinct before research is carried out on them unless conservation measures are undertaken more vigorously.

In order to determine which plants to conserve or cultivate collaboration with traditional medicine associations, communities, Government and Non Governmental Organizations will be of great assistance. Research work on

improvement of cultivation in order to produce varieties with higher pharmacologically active compounds must be enhanced. It is also important to study wild medicinal plants trade and impact in Kenya. *Ex situ* and *in situ* conservation techniques in botanical gardens and gene banks should be given more prominence. Finally, research on tissue culture of medicinal plants and other biotechnological techniques are required.

Bioprospecting

Bioprospecting can be a good catalyst for sustainable use of biological resources, their conservation and socioeconomic development for biodiversity rich Kenya. Without adequate measures for conservation and compensation, it may be too easy for a developer to remove biological resources. However, without established standards and procedures, it may be too difficult for the parties to reach fair contracts about benefit sharing. Bioprospecting should be operated on a commercial scale as a biotechnology-based business that adds value to a natural resource, if it is to provide incomes to the country and its traditional people and incentives for the conservation of biodiversity resource.

Bioprospectors should share benefits of their efforts with indigenous peoples and traditional healers who are stewards of the biodiversity and biocultural resources and who have unique and irreplaceable knowledge of how to use local plants and animals. If innovators in the "formal" system of innovation receive compensation through intellectual property rights (IPRs), justice requires that holders of traditional knowledge be similarly treated.

The risk of not doing this is loss of this invaluable knowledge, which has been gained over thousands of years, as no herbalist or community is willing to share the knowledge without any obvious gain. The herbalists must be informed about intellectual property (IP) issues and benefit sharing, short term and long term before any information is released. An international company that collects information and plants from

indigenous people when asked what benefit the people or country got said "A portion of the costs of the expedition is donated to the locals. We have purchased boats and bicycles for local transport, and we put together the native healer and physicians". This company has obtained many patents from this activity. No benefits came to the traditional people. This is the easiest way of denying human kind future medicines! It would therefore be naïve to expect a major pay-off in royalties from multi-nationals. The best bioprospectors should be the Kenyans themselves.

Access, Benefit Sharing and Intellectual Property Rights

Traditional herbal medicine has been recognized in western science as a valuable source of products and treatments for healthcare. It often provides leads for the development and commercialization of new pharmaceutical and agricultural products. In almost all these cases, medicines and other products developed with the input of traditional knowledge and associated genetic resources is uncompensated and unacknowledged.

The current IP system considers traditional medicine and traditional knowledge as information in the "public domain", freely available for use by anybody. Traditional medicine and traditional knowledge have therefore been exploited in western contexts without any recognition, moral or economic, accorded to those who originated or held the relevant knowledge. According to our current constitution, Kenyans are entitled to full ownership, control and protection of their intellectual property rights.

Herbalists and local community routinely give plant samples to researchers, bioprospectors and others without payment changing hands or any explanation on intellectual property rights or material transfer agreements. It is very easy for them to be exploited or shunted aside from transactions involving the resources that they need for survival. If full benefits from traditional herbal medicine are to be achieved, intellectual property issues must be addressed.

Lack of prior informed consent, access and benefit sharing systems, which are pillars in research, development and commercialization of traditional herbal medicine, have compounded the development of traditional herbal medicine. Without well established systems, traditional medical practitioners are sceptical and unwilling to surrender their traditional medical knowledge thereby jeopardizing the scientific exploration of traditional medicines.

There is no single binding treaty on the protection of indigenous knowledge. Delegations from the developed countries (consumer countries) feel that a legally-binding international *sui generis* system for the protection of traditional knowledge is premature or even in some cases unnecessary. On the other hand, many developing countries (source countries) support an international treaty and see such a treaty as an urgent priority. Source countries feel that using classic instruments for the protection of IPRs and current system does nothing to prevent biopiracy of traditional knowledge and associated genetic resources. Suggestions that geographical source must be indicated before a patent is issued is being vigorously resisted by consumer countries.

Kenya must therefore develop legal and policy frameworks to regulate access to traditional knowledge and products in order to promote fair and equitable distribution of benefits derived from the use of traditional knowledge for the benefit of indigenous peoples and humanity as a whole. The concern by Council for Science and Technology, Legal Notice 160 of 2001 and National policy on Protection of Traditional Knowledge and Genetic resources (2009) by Government are good efforts but they do not fully address intellectual property issues of herbal medicine.

ADVERSE REACTIONS, INTERACTIONS AND TOXICITIES

It would not be prudent for me to create a very rosy picture on herbal medicines without talking about their downside. Many

people believe that because the medicines are herbal (natural) or traditional, they are safe (or carry no risk for harm). However, traditional medicines can cause toxicity or adverse reactions if the product or therapy is of poor quality, or if it is taken inappropriately or interact with other drugs and herbs (Barnes 2002, WHO 2008).

Interactions

There is concern with respect to the numerous well-established interactions of herbs and conventional drugs. Some herbal remedies have the potential to cause adverse drug interactions when used in combination with various prescriptions and over the counter pharmaceuticals. Just as a patient should inform a herbalist of their consumption of orthodox prescription and other medication, usage of herbal medicines should also be revealed to the physician or pharmacist (Elvin-Lewis 2001).

The following can be used to illustrate this. Ephedra, Garlic, Ginkgo, Ginseng, Kava, St John's Wort and Valerian are commonly used herbal medications that may pose a concern during the perioperative period. Complications can arise from these herbs' direct and pharmacodynamic or pharmacokinetic effects. Direct effects include bleeding from Garlic, Ginkgo, and Ginseng; cardiovascular instability from Ephedra; and hypoglycemia from ginseng. Pharmacodynamic herb-drug interactions include potentiation of the sedative effect of anesthetics by Kava and Valerian. Pharmacokinetic herb-drug interactions include increased metabolism of many drugs used in the perioperative period by St John's Wort. (Michael *et al.* 2001).

The importance of the above is that during patient evaluation, physicians and clinical pharmacists should explicitly elicit and document the history of herbal medication use. This means that physicians should be familiar with the potential effects of the commonly used herbal medications to prevent, recognize, and treat potential problems associated with their use.

Toxicities

The absence of any reported or documented side effects is not an absolute assurance of safety for herbal medicines. However, a full range of toxicological tests may not be necessary. Tests which examine effects that are difficult or even impossible to detect clinically such as immunotoxicity, genotoxicity, carcinogenicity and reproductive toxicity should be encouraged. The following are some Kenyan plant examples whose use or inappropriate use may be toxic (Verdcourt and Trump 1969, Clarke *et al.* 1981)

Plants containing pyrrolizidine alkaloids

Pyrrolizidine alkaloids (PAs) are common constituents of many plant species around the world. PA-containing plants are probably the most common poisonous plants affecting livestock and wildlife. They can inflict harm to humans through contaminated food sources, herbal medicines and dietary supplements. Half of the identified PAs are genotoxic and many of them are tumorigenic and hepatotoxic. Plants such as *Senecio*, *Crotalaria*, *Heliotropium*, *Echium*, *Cynoglossum*, *Trichodesma* and *Indigofera* commonly found in Kenya contain PAS. The compounds may also cause veno-occlusive disease and deaths in humans from ingestion of pyrrolizidine alkaloids in herbal remedies (Chen *et al.* 2010)

Plants containing aristolochic acid

Aristolochic acids (nitrophenanthrene carboxylic acids), are present in different kinds of plants, many of which are used as herbal medicine, food supplements or weight-loss remedies. Aristolochic acid is considered one of the most potent plant carcinogen, nephrotoxic and mutagenic in humans and animals. Prolonged exposure to aristolochic acid has been shown to pose rapid progressive renal fibrosis in women in slimming formulations (Mengs *et al.* 1982). *Aristolochia albida* found in Masabit, Maralal, Moyale and the Coast is known as

Tamba Ya Nyoka.

Plants containing lectins

These are plant proteins that posse haemagglutinating and potent mitogenic properties. They are phytotoxins. *Adenia volkensis* (**Kilyambiti, Berendai**), *Jatropha curcas*, *Abrus precatorius* CRAB'S EYES, (**Mturituri, Mongaluchi, Gacanga Murio**) and *Ricinus communis*, CASTOR PLANT are some of the Kenyan plants containing lectins.

Other plants

There are many other plants whose acute and obvious signs of toxicity are well known and whose use should be avoided. These include *Capparis tomentosa*, (**Ongono, Wangombe, Goragala, Akadekodet, Makiruti**). This plant is very poisonous to cattle and camel due to presence of betaines plus other quaternary ammonia compounds (Mchlean 1999). Another plant to watch out is *Phytolacca dodecadra*, (**Libokho Ingorosoi, Muogo, Muhoko**) whose poisonous nature is due certain saponins. Death may occur 1 hour after ingestion.

Datura stramonium, *Datura*, (**Magurukia**), have caused hospitalization of many Kenyans when confused with the popular vegetables *Solanum nigrum*, (**Managu**) due to presence of tropane alkaloids. *Gloriosa simplex*, (**Molok, Marau, Mwana Funzi, Hamo, Ngwaci Cia Nduru**) due to presence of colchicine which produces progressive paralysis of the central nervous system resulting in cassation of respiration should be avoided. *Solanum incanum*, SODOM APPLE, (**Adur, Ochok, Labotwa, Mtando, Ndongu, Ndwa, Mtunguja, Endallelei**), may cause headache, severe colic, vomiting, diarrhea, apathy, cyanosis, accelerated weak pause, fever, profuse perspiration, dizziness, lassitude, hallucination followed by due to heart failure. The plant contains alkaloidal saponins. *Oxalis corniculata*, (**Nandwa, Schwatarit, Awayo, Kyunyu**) may causes kidney damage due to crystals of calcium oxalate.

I have given a few examples of poisonous plants. Fortunately most practicing traditional herbal practitioners know these plants and usually avoid them in their preparations.

What should be remembered is that the world of medicines is very complicated sometimes with no easy solutions. It is estimated for example that serious adverse drug reactions (ADR) in US Hospitals, account for 2,216,000 hospitalized patients/year and 106,000/year die from an ADR. Fatal ADRs rank 4th to 6th in leading cause of death by Food and Drug Agency approved medicines and prescribed by the best physicians. Such studies have not been published in Kenya (Bond and Raehl 2006). However preliminary work indicates that medication errors and ADRs of conventional medicines is rampant (Kahiga 2011).

National surveillance systems to monitor and evaluate adverse reactions of herbal medicines need to be put in place in Kenya. Increased patient awareness about safe usage is important, as well as more training, collaboration and communication among providers of traditional medicines and the conventional medicines.

SUSPICIONS AND SKEPTICISM

There are many suspicions and doubts cited by critics of traditional herbal medicines which include:-

- i. Lack of scientific proof of therapeutic efficacy
- ii. Lack of precise dosage medicine
- iii. Incompatibility and toxicity.
- iv. Lack of quality control and good manufacturing practice
- v. Lack of sound information and abundance of misinformation
- vi. Jungle of exaggerated claims and unsubstantiated assertions

These are generally valid arguments which cannot be easily dismissed. For example pathology of certain diseases may be unknown to traditional herbal practitioner. In such a case

imprecise diagnosis could lead to further complication as in case of stomach problems due to indigestion, ulcer, cancer or any other cause.

Reluctance by some people to accept the validity of the herbal medicine reinforces the suspicion and skepticism. These critics see increasing popularity of herbal medicine as a retrogressive step. They consider this type of health care as black magic, sorcery, quackery and unscientific, ignoring any evidence to the contrary. But it must be remembered that in developed countries where there is choice, more people are choosing herbal medicine as self-medication.

Patients are reluctant to report use of herbal medicine because they anticipate negative response from their physicians. On the other hand medical doctors may be hesitant to ask specifically about herbs because of inadequate knowledge about this type of medicine. This indicates that conventional doctor has much to learn from herbalists and much to contribute to it in return.

The herbalist must know that to trust in nature does not mean that you should deprive yourself of the discoveries of science. There are many diseases for which the modern medical profession is better at treating than traditional herbal medicine. These must be referred to the hospital or clinic without delay.

Having said the above, it has been observed that a number of herbalists in Kenya now have basic diagnostic equipment e.g. blood pressure machine, weighing balance and stethoscope in their practice. Some keep records and even ask for laboratory results before treatment. They take detailed history before treatment.

The herbalists should undergo short workshops to teach them simple scientific concepts, for example, diagnosis, simple tests, anatomy, quality assurance, record keeping, hygiene and use of blood pressure equipment, glucometer, stethoscope, thermometer, use of laboratory results, and the need to refer certain patients to other health professionals.

There should also be training in some form of good manufacturing practice with special emphasis on proper identification of plants, voucher specimens, post-harvesting preservation, measurements and storage. They could also be enlightened on formulation, packaging and labelling. Conservation, cultivation, and plants chemical variability on commonly used medicinal plants should also be emphasised.

The traditional herbal practice should be formally recognized in all aspects by the Government. Genuine herbalists should be encouraged and registered. The herbal practitioners should realize that spurious claims advertised in the media and on billboards only help to spoil the name of genuine herbalists.

FOOD AND HEALTH

Over the last few years, there has been a worldwide distinct shift in the healthcare paradigm, away from the treatment of symptom and towards a more holistic approach of both attaining and adopting a more preventive and functional approach to health care. More people are taking it upon themselves to preserve their health by adopting healthy lifestyles such as eating healthy foods and exercising regularly.

Herbal medicine has become all the more relevant given the three main ills of life in the 21st century: the globalization of unhealthy lifestyles, rapid unplanned urbanization, and demographic ageing. These are global trends with global consequences for health, most notably seen in the universal rise of chronic non-communicable diseases, such as heart disease, cancer, diabetes and mental disorders. For these diseases and many other conditions, traditional herbal medicine has much to offer in terms of prevention, comfort, compassion and care. During its 3000-year history, traditional Chinese medicine pioneered interventions such as diet, exercise, awareness of environmental influences on health, and the use of herbal remedies as part of a holistic approach to health (Shan 2008)

Eating vegetables especially of the cabbage family (Cruciferae) is healthy. Research indicates that glucosinolates (e.g. sulforaphane glucosinolate) and their derivatives may have potential in fighting human cancers. Inclusion of *Brassica oleraceae* and broccoli vegetables appear to help protect against rectal and colon cancer. These vegetables aid in the detoxification of carcinogens such as aflatoxins and polybromobiphenyls. They enhance the activity of several hepatic enzymes used in detoxification processes. Benzyl isothiocyanate and thiocyanate have been shown in the laboratory to inhibit tumor development in animals exposed to carcinogens. Indole-3- carbinol, a product of glucosinolates, is a compound with promise in anticancer research (www.ansi.cornell.edu/plants/toxicagents/glucosin.htm).

Garlic is good for you. Indeed folklore has it that if two people share a bed— one a garlic eater, the other not, the latter will steadily decline and die (The German Tribune No. 1364 26/3/1989). The person does not die from the fumes produced by garlic. Another saying is "A clove of garlic a day keeps the doctor away". This is probably to emphasize the many good effects of garlic. Its anticholesterol, fibrinolytic, antiplatelet and blood pressure lowering effects are well known. Other minor effects include antimicrobial, anticancer and hypoglycemic effects. Eating 3-4 "cloves" of fresh garlic every evening stabilizes blood pressure and may even restore it to normal when used concurrently with conventional medicines.

Eat as much unskinned tomatoes as possible. The skin contains a compound called lycopene, one of the most potent natural antioxidant. It may prevent It may protect one against cancer of the lung, stomach, and prostate. It may also help to protect against cancer of the cervix, breast, mouth, pancreas, esophagus, and colon and rectum. Again sour milk, yogurt or **Mursik** is good for you. It contains friendly bacteria (probiotics) that are useful for health.

Solid fats are dangerous to your health. Go for liquid vegetable oils. Let me explain why. Solid fats contain saturated fatty acids

while liquid oils are made of unsaturated fatty acids. Cholesterol is very important to us. It is used by our bodies to make cell membranes, brain and nerve tissues, steroidal hormones and bile acids which are important to the body. Cholesterol is transported to the required sites as low density lipoproteins (LDLs) that is, cholesterol combined with saturated fatty acids or high density lipoproteins (HDLs) "cholesterol +unsaturated fatty acids". High levels of LDLs in the blood stream can lead to fatty plaque deposits on arteries and can predispose a person to have a heart attack so it is referred as "Bad cholesterol".

Do you have or know a friend who suffers from diabetes? Advise the same to eat beans, peas, ndengu, soya and such foods and avoid "starches" as much as possible. The person may finally control the problem with diet only.

You should avoid mouldy foods, beverages or medicines as they may contain aflatoxins which are very poisonous.

Above all, exercise wherever possible. Walking briskly may be one of such exercises. Observe your weight. Eat healthy – not wealthy and behave responsibly while you seek medical advice and attention before your medical problem gets worse.

CONCLUSION

It is obvious and imperative from the foregoing that we in Kenya adopt a more positive, rational and non-prejudicial attitude to the potential of herbal medicine and develop a more meaningful approach to serious examination of this vast potential in meeting our health care requirements.

I recommend that Kenya should re-evaluate the practice of herbal medicine and seek strategies for integration with conventional medicine through:

- Development policies, regulatory legal framework and technical guidelines in order to provide for continued availability of effective, safe and quality herbal medicines. This would assist inclusion of herbal

medicines in health care system, insurance programs and on essential medicine list.

- Harmonization of policies and regulations related to traditional medicine between the Ministry of Medical Services, Ministry of Public Health and Sanitation, Ministry of National Heritage and Culture, and State Law Office in order to reduce unnecessary duplication of effort.
- Development of an advisory group of traditional medicine professionals that would enhance the understanding of traditional medicine by government officials, industry, media and other healthcare professionals. This would improve communication between stakeholders regarding policy, regulation, scientific, social, and economic issues with respect to traditional medicine.
- Development of a Division in the Government National Quality Control Laboratory for quality control and quality assurance of herbal medicines.
- Development of programs to conduct evidence-based research (botanical, chemical, biological, and clinical), strengthen herbal medicine research Institutions to become centers of research excellence and enhance infrastructure (personnel and facilities) in the government, academic institutions and private sector. Such Institutions include Kenya Medical Research Institute and University of Nairobi.
- Development of national evidence-based programs on herbal medicines for: local diseases for which the medicines are not available or too expensive ; known or emerging diseases for which there are no known locally available effective medicine and diseases (cancer, malaria, TB, microbial and HIV/AIDS) for which there is significant resistance to existing therapeutic agents.
- Development of programs for acquiring and maintaining an inventory and data base on medicinal plant resources and enhance conservation programs to ensure sustainability of medicinal plants.

Allow me to finish this lecture with what Okot p'Bitek said in his book "Song of Lawino"

It is true
White man's medicines are strong,
But Acoli medicines are also strong.

The sick get cured
Because his time has not come:
But when the day has dawned
For the journey to Pagak
No one can stop you,
White man's medicines
Acoli medicine,
Crucifixes, rosaries,
Toes of edible rats,
The horn of a rhinoceros
None of them can block the path
That goes to Pagak!

Again I pose the same question again "**HERBAL MEDICINES:
DO THEY REALLY WORK?**" I hope we are in a better position
to answer the question.

Table 1. Number of visits and diseases treated with herbal at a Clinic in Gatundu, Kiambu County from 1997 - 2001

| NO | DISEASE | YEAR AND NUMBER OF VISITS | | | | | Total |
|-----|--------------------------------|---------------------------|------|------|------|--------|-------|
| | | 1997 | 1998 | 1999 | 2000 | 8/2001 | |
| 1. | Respiratory cases | 15 | 45 | 60 | 55 | 18 | 193 |
| 2. | Microbial infections | 32 | 32 | 50 | 67 | 39 | 220 |
| 3. | Malaria | 17 | 21 | 30 | 22 | 22 | 112 |
| 4. | Typhoid | 3 | 11 | 21 | 20 | 19 | 74 |
| 5. | Gastro-intestinal problems | 20 | 29 | 40 | 59 | 2 | 150 |
| 6. | Nephritis' edema | 3 | 17 | 24 | 11 | 8 | 63 |
| 7. | Cardiovascular system problems | 2 | 19 | 20 | 15 | 26 | 82 |
| 8. | Diabetes | 9 | - | 15 | 13 | 14 | 51 |
| 9. | Arthritis, lumbago, gout | 29 | 78 | 67 | 72 | 52 | 298 |
| 10. | Cancers | 13 | 7 | 3 | 8 | 8 | 39 |
| 11. | Others | 11 | 12 | 18 | 21 | 13 | 75 |
| | Total | 154 | 271 | 348 | 363 | 221 | 1357 |

Table 2. Number of visits and diseases treated with herbal medicine at a Clinic in Nakuru from 2005 – August 2010

| NO | DISEASE | YEAR AND NUMBER OF VISITS | | | | | Total |
|-----|--------------------------------|---------------------------|------|-------|-------|---------|-------|
| | | 2005 | 2006 | 2006 | 2008 | 09-8/10 | |
| 1. | Respiratory cases | 1260 | 1400 | 1840 | 1800 | 2558 | 8858 |
| 2. | Prostate problems | 140 | 200 | 300 | 120 | 540 | 1300 |
| 3. | Microbial infections | 200 | 289 | 430 | 753 | 1162 | 2834 |
| 4. | Malaria | 850 | 1022 | 2940 | 2562 | 2248 | 9622 |
| 5. | Typhoid | 452 | 734 | 1622 | 2045 | 4125 | 8978 |
| 6. | Gastro-intestinal problems | 163 | 253 | 652 | 835 | 1182 | 3085 |
| 7. | Nephritis' edema | 16 | 27 | 53 | 19 | 107 | 222 |
| 8. | Cardiovascular system problems | 375 | 622 | 920 | 1163 | 3024 | 6104 |
| 9. | Diabetes | 295 | 740 | 1008 | 2154 | 3553 | 7750 |
| 10. | Arthritis, lumbago, gout | 325 | 375 | 620 | 1022 | 1972 | 4314 |
| 11. | Cancers | 115 | 189 | 322 | 421 | 732 | 1779 |
| | Total | 4191 | 5851 | 10707 | 12894 | 21203 | 54846 |

**Table 3. Commonly Used Plants in Traditional Medicine in Kenya Between 2002 - 2009
(As presented to Mitishamba Research Centre, School of Pharmacy**

| Scientific Name | Vernacular/common Name | No. |
|---|---|-----|
| <i>Ajuga remota</i> | Wanjiru Wa Rurii, Akech, Iritotoni | 33 |
| <i>Allum sativum</i> | Kitunguu Saumu, Garlic | 14 |
| <i>Aloe species</i> | Kiluma, Linakha, Omogaka, Aloe | 53 |
| <i>Amaranthus spp</i> | Ototo, Edodo, Iziboga, Terere | 8 |
| <i>Azadirachta indica/Melia azadract</i> | Murubaine, Neem, Mwalubaine | 33 |
| <i>Bidens pilosa</i> | Mucege, Ekemogamogi, Lukohi | 14 |
| <i>Caesalpinia volkensii</i> | Mabuthi, Mucuthi, Sinaguru | 8 |
| <i>Citrus lemon</i> | Endimu, Lemon, Ritunda Iruru Ndimu, | 8 |
| <i>Cleodendrum myricoides</i> | Mujuga Iria, Shikuma, Muva | 11 |
| <i>Croton megalacarpus</i> | Mukinduri, kikomoni, Muthulu, Musine | 19 |
| <i>Eucalyptus species</i> | Mubau, Omurigamu Musanduku, Telidet | 24 |
| <i>Launea cornuta</i> | Muthunga, Ekenyawusie, Urunisia | 11 |
| <i>Leonotis mollissima</i> | Mucii, Esusunyi, Nyanyozi Umuzuni | 13 |
| <i>Persea americana</i> | Mukorobe, Kikato, Ebukato | 8 |
| <i>Physalis puruviana</i> | Manathi, Kinathi, Nathi | 10 |
| <i>Plectranthus barbatus</i> | Muigoya, Ekeroka, Irokwet, Omoroka | 8 |
| <i>Prunus africana</i> | Muri, Omuwanja, Tenduet, Ol-kaijuka | 33 |
| <i>Ricinus communis</i> | Mwariki, Kivunu, Menuet, Oldule | 7 |
| <i>Rosemarinus officinale</i> | Rosemary | 24 |
| <i>Senna didymobortya</i> | Omobinu Mweni, Lubino Munuka | 35 |
| <i>Solanum incanum</i> | Mutongu, Omotobo, Ochok, Lobotwet | 18 |
| <i>Strychnos henningsii</i> | Muteta, | 9 |
| <i>Urtica massaica</i> | Thabai, Rise, Stinging nettle, Kinyeri | 30 |
| <i>Vemonia lasiopos</i> | Mustapha, Muvatha, Munyi, Umusuritsa | 26 |
| <i>Warbugia ugandansis</i> | Muthiga, Olsogonoi, Sogoet, Apacha | 31 |
| <i>Withania somnifera</i> | Murumbae, Ol-asaiyet, Chepterekiat, Idi | 7 |
| <i>Zanthoxylum usambarensis /gilletii</i> | Mugucwa, Sagawaita, Ol-oisugi, Mukenea, | 12 |
| <i>Zingiber officinale</i> | Ginger, Tangawizi, Entangawizi | 10 |

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