ISSN1595-1529

Epizootiology and Animal Health in West Africa

RABIES SURVEILLANCE AS A ONE-HEALTH MODEL

Volume 9 (1) January - June 2013

www.vardsolutions.com

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Epizootiology and Animal Health in West Africa

Volume 9 (1), January - June 2013

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contents available at VARD Solutions

Epizootiology and Animal Health in West Africa

Journal homepage: www.vardsolutions.com/eahwa

The importance of indigenous knowledge and practices associated with rabies in Oyo State, Nigeria: implication for global health training at the University of Ibadan

Bolanle Wahab

Summary

Traditional African societies possess indigenous knowledge systems (IKS) which enable the indigenous people to comprehend ancestral-communal efforts that have been established to generate socio-economic, physical and mental well-being (*àlàáfíà*). These knowledge systems not only reflect the people's health values and needs, they have developed in response to local environments and conditions. This paper argues that Africa's health systems including traditional veterinary practices, must be rooted in her indigenous knowledge for sustainability, studied and incorporated into formal health education curricula and research for greater understanding, and utilization to make her a relevant partner in the global health education. Using a combination of literature review, rapid key informant and in-depth interviews conducted in twelve purposively selected communities in six local government areas of Oyo state, this paper presents the knowledge and practices of the indigenous people about rabies. Local farmers, hunters and traditional healers who kept and used dogs claimed that rabid dogs and their human victims were curable and regularly cured with local herbs (*apààsà*, *imí-èsù*, goat weed) and materials (*àdí-èyan*). Orthodox veterinary practitioners stated that there was no cure for rabid dogs but human victims were often treated of the symptoms of rabies in human hospitals. The paper stresses the importance of indigenous veterinary knowledge and practices related to human-animal diseases control and advocates the need for their integration into the health education curricula of higher education and research in Africa to encourage knowledge-documentation and sharing and promote global health education for the benefits of the people.

Key words *Indigenous knowledge, rabies, traditional healers, global health education, collaborative research*

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Introduction

Zoonoses and trans-boundary animal diseases (TADs) represent a major constraint to the development of the predominantly rural economy of the African continent. Twelve of the major animal diseases are present in Africa [1]. Within the African continent, Western Africa has the highest animal disease burden [2]. Animal diseases alone are responsible for 20% loss in production in Africa, thus impacting negatively on human health in terms of malnutrition and deficiency of protein and micro-

nutrients derived from milk, eggs and meat [1, 3]. Most diseases that affect humans directly are caused by multi-host pathogens, and majorities (816 out of 1407) are shared with animals and are, therefore, classified as zoonotic. Rabies is a zoonotic disease. Rabies was one of the eleven most important diseases reported by African countries between 2002 and 2006 with 20, 19, 22, 18 and 20 countries reporting in 2002, 2003, 2004, 2005 and 2006 respectively [4]. Of the eleven diseases reported in 2006 by 20 countries, rabies had the highest number of 921 outbreaks followed by Trypanosomiasis with 730 outbreaks and Blackquarter 381 as the least. A total of 1078 deaths were recorded [4] (see Table 1). In 2010, rabies had the highest number of outbreaks in terms of prevalence, while in 2011 it had the widest spatial distribution affecting 34 out of the 42 countries with 1608 outbreaks (7.2% of all disease outbreaks), 2779 total cases, 1524 deaths, 211 slaughtered and 1416 destroyed [5]. Nigeria reported 14 outbreaks of rabies in 2011 with 30 cases, 10 deaths, 3 slaughtered and 11 destroyed [5]. Both animal and human rabies is preventable with proper and timely administration of the anti-rabies vaccine. However, if a patient does not recognize the risk associated with an animal bite, an attack by a rabid animal could lead to death [4].

Rabies is an infectious disease which affects wildlife, domestic animals, humans and human livelihoods. In Eastern Africa from 2006-2008 rabies was reported to be endemic in the sub-region with periodic outbreaks occurring in all countries. Most cases were in dogs and vaccination of dogs was the control measure applied [1]. There has been successful use of herbal remedies in modern health care systems in China, India and the Soviet Union [6]. However, while serious efforts are being made in some African countries including Nigeria, Tanzania and Ghana [7], very little is being done to exploit traditional medicine as it applies to veterinary practices, even though the integration of traditional remedies may be much easier in veterinary medicine than in the human medical field.

Traditional African societies possess indigenous knowledge systems (IKS) which reflect the people's health values and needs, mental well-being *(alaafia)* biological, technological, and spiritual development. This paper argues that Africa's health systems including traditional veterinary practices must be rooted in her indigenous knowledge for sustainability. As [8] observes, owing to the harsh economic trends, the cost of veterinary care in Nigeria is prohibitively high, while some drugs are not obtainable at all. The fact that the poverty level in Africa is still very high and over 50% of Nigerian population is rural makes it the more timely and justifiable to examine the local people's perception of rabies, the indigenous techniques of handling rabid dogs, and human victims of rabid dog bites. This paper stresses the importance of integrating indigenous knowledge and practices about human-animal diseases and rabies in the global health education curriculum from post-primary schools to universities and research institutes in West Africa.

Conceptualizing

Indigenous Knowledge Systems

The term 'indigenous' means belonging to or originating in a place or an area, not introduced while 'knowledge' is what one knows and understands; the awareness and understanding of facts, truths or information gained in the form of experience or learning [9]. Indigenous knowledge systems (IKS) are referred to variously in the literature as [9, 10]: local knowledge, traditional knowledge, community environmental knowledge, indigenous technical knowledge, traditional ecological knowledge, village science, rural people's knowledge, ethnobotanical

knowledge systems, and ethnobiology/ ethnobotany/ ethnozoology [11] among others. Scholars have also defined IK in different ways [12, 13, 14, 15] Indigenous knowledge is defined [16]: "the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments, and intimate understanding of the environment in a given culture. IK is local knowledge that is unique to a given culture or society. It is the formation base for a society which facilitates communication and decision-making. IKS form the basis for decision-making, which is operationalised through indigenous organisations, and they provide the foundation for local innovations and experimentation."

Indigenous and local knowledge is the cumulative and complex bodies of knowledge, know-how, practices and representations that are maintained and developed by people with extended histories of interactions with the natural environment [11]. Indigenous communities in different parts of the world are acknowledged for their self-reliant strategies in food production, livestock rearing and animal health-care practices, shelter provision, settlement planning and management, traditional human medicine, poverty alleviation, infrastructure provision and management, and protection of the forest and its fragile ecosystem, long before their exposure to European forces. Indigenous knowledge possesses the following characteristics [15]: it is unique to a group of people; serves as a springboard to technological development; dynamic rather than static; holistic and culturally bound; oral (not formally documented); experiential, and highly accessible. Other characteristics identified by [16, 17, 9] are that local knowledge is not only possessed and practised by men but also by women; it promotes meaningful communication between extension agents and their clientele; it is resource conserving, environment-friendly, and a ready tool for the attainment of self-reliance and sustainability; the type, extent and distribution of valuable local knowledge is not uniformly observed in the less developed countries; local knowledge is couched in a broader socio-economic and political context, that is, influenced by the dominant Western European culture and market economy; it is increasingly regarded as an "intangible resource" which is highly vulnerable to (commercial) exploitation.

Table 1:
Rabies outbreaks and deaths among humans in Africa, 2006

S/No.	Countries	Outbreaks	Deaths
1.	South Africa	423	230
2	Tunisia	172	49
3	Tanzania	64	128
4	Algeria	60	289
5	Swaziland	37	52
6	Botswana	37	35
7	Ghana	36	26
8	Kenya	24	24
9	Lesotho	21	101
10	Mauritania	10	4
11	Uganda	8	54
12	Mozambique	8	8
13	Angola	6	70
14	Burkina Faso	2	2
15	Cote d'ivoire	2	2
16	Eritrea	1	2
17	Guinea Conakry	1	0
18	Benin	1	1
19	Nigeria	1	0
20	Senegal	1	1
	Total	**921**	**1078**

Source: AU-IBAR, 2006, p. 27

Indigenous or Traditional Knowledge (IK/TK) is receiving increasing attention in academia as well as in national and international development institutions. This is due largely to the realization of the tremendous potential of IK in the sustainable development project. It (IK) is one of the key action themes identified by UNESCO in the UN Decade for Education for Sustainable Development (2005-2014) [18]. There is a growing conviction in many quarters and among international development organisations of the need for the global community to tap into the stock

of indigenous knowledge in order to achieve meaningful, inclusive and sustainable development in all spheres of life [19, 20, 21, 22, 9]. Such conviction has contributed to the current institutionalisation of IK as an object that can be essentialized, archived and indeed transferred [23]. There is no doubt that IK can contribute to our contemporary understanding in areas such as human and veterinary medicine, technology, resource management, meteorology, biology, and in basic human endeavours, including educational practices.

Indigenous knowledge and practices in animal healthcare giving in some communities in Oyo State, Nigeria

Traditional medicine refers to ways of protecting and restoring health that existed before the arrival of modern medicine. Indigenous African healers who are made up of herbalists, traditional priests and priestesses, traditional birth attendants, and bone setters use plants, animals and other naturally occurring mineral substances and methods that are based on the socio-cultural and religious beliefs of the people to heal patients and meet their health care requirements [24, 25]. As reported by [26], the local knowledge of the Tzeltal and Tzotzil Maya of the Highlands of Chiapas, Mexico, of more than 250 classes of health conditions grouped into about 20 major classes and which conditions are treated by a pharmacopoeia that includes about 600 medicinal plants species. Eight major classes of recognised afflictions which account for 80% of all of the ailments commonly treated with medicinal plant species are: gastro-intestinal diseases; dermatological infections; respiratory conditions; wounds resulting from accidental injuries and violent acts; broken bones and sprains; fevers; infections of the teeth and mouth, and eye infections.

Health planning statistics indicate that practitioners of traditional medicine form the basic core of primary health care workers for about 90% of the rural populations in developing countries [27]. The World Health Organisation in 1976 emphasised the role of traditional medicine in the development of Africa [28]. In Nigeria, the only means of health care available to most of 80% of her population who live in the rural areas are the traditional healers [29]. In the more rural areas of Africa during the colonial as well as post-colonial eras, indigenous healers often were the sole source of human and animal health care available to rural populations. For example, in 1977, the Ghanaian National Health Planning Unit discovered that indigenous healers provided most of the health care for about 70% of the Ghanaian population living in rural towns and villages [14].

The Yorubas of Nigeria possess an extensive knowledge of physical health and physical health problems/ diseases are tackled by traditional medicine whose ingredients are composed from traditional religious knowledge/practices. Liquid concoctions, medicinal food (*"ọseje"*) and medicinal soaps are frequently used. Traditional treatment may at times include mechanisms such as medicinal incantations (*"ọfo"*), incisions (*"gbere"*), and antidotes for spiritual and herbal poisons (*"ero"*). The herbalist (*"onisegun"*, *"adahunse"*), the Ifa Priest (*"babalawo"*), the traditional midwife (*"agbebi"*), shrine priest (*"olorisa"*, *"abore"*) are the common traditional Yoruba healers and are readily available in most rural communities providing cure for human and animal diseases [30]. They have a deep understanding of the physical characteristics, food and eating habits, ailments and treatments of animals around them especially their domesticated animals such as dogs, chickens, ducks, pigeons, goats, and sheep. As a result, they grow within the surroundings of their town houses and on the farms basic herbs and plants for common diseases and ailments affecting humans and the

animals they keep. This is similar to the knowledge possessed by the Fulani pastoralists in Nigeria, Cameroon and, as [31] reported, the rural pastoral people of Dindigul district, Tamilnadu in India.

The local Yoruba farmers, hunters and traditional veterinary healers have adequate knowledge of the causes, symptoms, effects, prevention and treatment of rabies(*dìgbòlugì*). The key informants interviewed in the course of writing this paper traced the source of their knowledge and practices to their interactions with their fathers, grandfathers, village and compound elders while they were growing up. They acquired the knowledge through participant observations while on their way to their farms or performing activities on their farms, during hunting expeditions, moonlight stories, festivals, during healing consultations, and experience-sharing among others. The medium of documentation is their memory as the knowledge and practices are transmitted orally.

A combination of literature review, rapid key informant interviews (KII) and in-depth interviews (IDIs) was used to elicit information on local people's indigenous knowledge and practices about rabies, its causes, symptoms, and treatment in twelve (12) purposively selected rural and peri-urban communities in six (6) local government areas (LGAs) of Oyo state. The communities covered were: Iseyin (Iseyin LGA), Otu and Okaka (Itesiwaju LGA), Moniya (Akinyele LGA), Ogidi village (Lagelu LGA), Akanran, Isale Akanran, Idi-Ose and Apoku (Ona-Ara LGA), Inu-Odi Oloje village, Oloje-Oko and Idigbaro village (Ido LGA). In these communities, local farmers and hunters who kept and used dogs in the farming and hunting activities were the target respondents. A total of five farmers, seven farmers/hunters, four hunters, one farmer/businessman, one hunter/furniture maker, one traditional healer, one Ifa priest, and one herbal medicine practitioner were interviewed. A practicing barrister who lived on the farm in Aba-Oke village, Iseyin LGA, with his father and relations in the first 22 years of his life and who experienced the handling of rabies and rabid dogs was interviewed. A Senior Lecturer in the Department of Forest Resources and Management, University of Ibadan, who has a deep knowledge of the use of herbs was also interviewed. Two veterinary doctors who worked at the Oyo State Government Veterinary Clinic, Mokola, Ibadan and two other veterinary doctors who ran private veterinary clinics in Ibadan were also interviewed on rabies and their perception of local treatment of rabid dogs and their human victims. The findings of the IDIs and KIIs are presented in the following paragraphs and also Tables 2-4 and text Box 1.

Results and discussions

Local knowledge about causes, symptoms and effects of rabies

The local farmers and hunters who kept and used dogs and the traditional healers who treated rabies interviewed claimed that rabid dogs and their human victims were curable and regularly cured with local herbs (*apààsà*, *imí-èsù*, goat weed) and materials (*àdí-èyan*). They contended that cases of rabies were much common in urban than rural areas because in the rural areas dogs had adequate food to eat and there was effective traditional health care treatment. Also that the chances of dogs killing and eating intestines of rabbits (*òkété*) that could infect dogs that ate the intestines with rabies, were very high in the rural areas. The summary of their responses are presented in Table 2. Those interviewed in Lagelu LGA emphasised that a person bitten by a rabid dog could only be treated when the dog was killed and its blood (*èjè*) and bile (*òróònro*) mixed

with other ingredients to treat the victim. However, in a situation where the victim was treated without the blood and bile of the rabid animal, the consequence was that the human victim would only be partially cured which is detrimental to the well-being of the victim. Any affected person that was not treated within a few days would run mad and consequently die. They advised that victim(s) of rabies should be treated promptly to avoid the loss of lives while animal(s) affected should be exterminated to avert further attacks on innocent people.

Four orthodox veterinary doctors (the Director of NUKAZ-Agro Veterinary Ventures, Ibadan; the Director of Kings Dog Gallery, Ibadan and two veterinary doctors at the Oyo state government veterinary clinic, Mokola, Ibadan) were interviewed on the characteristics, causes, effects and treatment of rabies. They stated that there was no cure for rabid dogs but human victims were often treated of the symptoms of rabies in human hospitals. One of them confirmed that the treatment of rabies with traditional medicine existed in Oyo state but such treatment was very slow in action and not very effective as the orthodox vaccination. Their combined responses are presented in Box 1.

Local methods of prevention and treatment of rabies

As noted [4] that both animal and human rabies is preventable with proper and timely administration of anti-rabies vaccine. Table 3 presents the various traditional herbal medications/treatment given to human victims of rabies by the local people and their perception of the effectiveness of the treatments. Table 4 also contains the type of herbal medications administered to rabid dogs and the local people's perception of the effectiveness of the treatments. In both cases, the respondents were emphatic about the efficacy of the treatments using plant species alone and/or in combination

Table 2
Indigenous knowledge of causes, symptoms and effects of rabies

Causes of Rabies	Symptoms
igbóná, olóde, (smallpox , measles). high temperature, *ògbelè* (dry weather). inadequate and irregular feeding of a dog. if a local charm is tested on a dog the repercussion may make the dog run mental, become wild and bite people about. If *ológbò* (cat) or *ejò* (snake) or *asínrín* bites a dog, their poison can make the dog run mental and become rabid. if an infected dog bites another one and its teeth gets in contact with the blood of its victim. eating of poisoned and dead animal. eating of intestine of *òkété* (rabbits), *akérésè, òkèkajòkè, ojúiná,òkéré*(squirrel), *ikún* and any animal that eats *obì* (kolanut). eating of *asínrín,*(pointed-nose rats) *àláámù* (lizard). lack of vaccination at early age as a puppy (*omo ajá*). incessant flogging or maltreatment of a dog. eating of toxic foods/objects. encountering of jinn (*àlìjànnú*), demons (*iwin* or spirits of dead persons (*òkú*) in the midnight. eating more than own portion of a spiritual sacrifice (*ebo*). **Effects** Human victim barks (*gbó*) like a dog if not attended quickly. May become mad (*ya wèrè*). Wild behaviour. Sudden death.	Infected dog will be barking furiously. Eyes will become red with continuous flow of pus from the eyes. High body temperature. Tail will drop, won't raise. Loss of weight. The tongue will be out constantly. Restlessness and aggressiveness. It becomes unfriendly. It will behave like a mad creature. Become wild and ready to attack anyone and anything. Knocking its head against objects including trees (*digbolugi*). Aggressive outside, gentle within the owner's premises. **Whether Curable** Preventable and curable. Kill the rabid dog. Sacrifice the dog to *ògún* (god of iron). No medication, just kill the dog.

Source: Author's field interview, December, 2012

Table 3
Treatment of human victims of rabies by local famers, hunters and traditional healers

Methods of Treatment of human victim	Effectiveness
Rob the bitten spot with ***èko tútù*** (cold pap) and give to eat. Rob bitten spot with juice of ***ògèdè*** plant, or juice of ***emi*** (shea butter). Mix ***imí èsù/apàásà*** (ageratum conyzoides) with gin and give the victim to drink. Make incisions round the bitten spot and rob with the leaves of ***imí èsù***. Yearly treatment. Grind teeth and tongue of the rabid dog, mix with other ingredients and give to drink. Flesh of local pig (***eran elédè àbáláyé***) plus red oil; rob on the person's body and give to eat. Apply treatment for madness (psychiatric problem). Rob bitten spot with heated ***ewé pákí*** (cassava leaves) and its juice. A mixture of ***òri*** (shea butter) and ***oró adétè*** placed in the sun for long hours and when cooled give to the person in small quantities to swallow. ***Omi ìgbín*** (snail fluid) plus red oil to rob his body and leak. Most of the identified medications for the rabid dog are applicable for the treatment of the human victims as well. Human victim to take plenty of ***gbègìrì*** (bean soup) with a lot of ***irú*** (locust bean seed) always.	Victim will pass out the poison through feaces and urine after taking the ***aporó,*** (anti-dote), ***èbè*** (anti-poison).

Source: Author's field interview, December, 2012

with animal parts. Indigenous animal medicine was considered by the respondents as affordable and accessible and modern medicine costly and inaccessible.

Process of integration into a University curriculum

Based on its value in healing and healthcare delivery, the recognition of IKS is crucial for social, cultural, and the economic empowerment of both the indigenous people and the world in general. Indigenous medicine, according to Egunjobi and Osunwole [32], was the only means of managing health and disease long before the introduction of synthetic drugs to most developing societies by the colonialists. The failure of conventional development models, the pluralistic nature of society and the ecological interdependence between nations demand that indigenous and modern knowledge systems must be integrated [23, 33, 34]. This is particularly so with animal health care delivery in Africa where dogs are important companions to poor rural farming and hunting communities and the urban elite as a security measure.

Indigenous knowledge is now widely regarded as an important commodity in global health development because of its holistic approach to solving local problems. As reported by Okali et al. [21], part of the declarations at the 1999 World Conference on Science is that indigenous knowledge systems represent enormous wealth; not only do they harbour information as yet unknown to modern science, but they are also expressions of other ways of living in the world, other relationships between society and nature, and approaches to the acquisition and construction of knowledge (see Box 2).

Some traditional healers combine indigenous knowledge with Western knowledge as in the example of a traditional healer, Muthy who interprets x-rays before handing over herbal medicines to the patients [35]. The WHO in 1978, during the Health for All Declaration, highlighted the need to include local people, their traditions and practices in Primary Health Care (PHC) [36]. Africa's IKS needs to be intensively and extensively studied and incorporated into formal health education and research for greater understanding, appreciation,

Box 1: Characteristics, causes, effects and treatment of rabies by orthodox veterinary doctors

- Rabies is a zoonotic disease caused by a Lassa virus.
- Rabies is a contagious and fatal viral disease of dogs and other mammals that is transmissible from dogs to dogs or dogs to humans through bite or contact with the mucous membrane.
- The disease attacks the central nervous system and causes encephalitis.
- Dogs could contact rabies from wild animals like bats (*àdán*), racoons, wolf (*ìkoòkò*), skunk, and rats (*èkúté*).
- It manifests in the dog in a change in behaviour (temprament) in either dumb form (paralytic) or the furious form– profuse salivation.
- The bite of a rabid dog could cause brain inflammation in humans, salivation and bad temperament with furious hydrophobia, physical and mental disorder and, later, death.
- A rabid dog will behave aggressively, irrationally and fall sick.
  Rabies in dogs, like parvovirus disease, is not curable if symptoms prevail.
- Rabies' bite in humans could be cured if detected early and had not tampered with the cerebrum part of the brain.
- Rabies cases were not that frequent in Ibadan and only four were recorded at the Mokola Veterinary Clinic between July and November, 2012.
- Treatment of rabies with traditional medicine existed in the state but such treatment, was very slow in action and not very effective as the orthodox vaccination.
- Cases of rabies were treated monthly by NUKAZ-AgroVeterinary Ventures in Ibadan. The treatment involved giving rabies vaccination (immunoglobin) to dogs presented at the clinic.
- As a preventive measure, human contact with dogs must be taken with extreme caution and the plates, tools and other materials used for and by dogs must be separated from those of humans.
- Human drugs for treating rabies were not available in Nigeria (as earlier reported by Ibrahim, 1986) and human victims were usually referred to human hospitals where they were given hyper-immune serum at regular intervals.

Source: Author's interview with veterinary doctors, December, 2012.

Table 4
Methods of treating rabid dogs by local famers, hunters and traditional healers

Treatment (anti-dote)	Effectiveness
Chain the dog until fully treated Apply ***aporó*** (anti-poison) such as ***èpa-ìjèbú*** As first aid, tie dry cocoyam leaves round the neck of the dog, then give boiled back and leaves of ***àìdan*** tree to the rabid dog to leak. Water from crocodile (***òni***) pit: use to bath the rabid dog and give to drink. Regular feeding of dog with good food Add ***yánkò*** or ***àdí-èyan*** (palm-kernel butter), or ***epo-ìsèlé*** (high quality red oil) to the dog's food to eat. Put ***ìfun ejò oká*** (cobra's intestine) plus ***egbò agbàsàsà*** (agbasasa root) in a bowl of clean water and give to dog to leak and bath with. Obtain vaccination for puppies ***Bòòbí àwòdì***(a garden-egg-like seed), ***imí èsù*** (ageratum conyzoides) ***omi òjò*** (rain water) ***omi ìbùlè*** (spring water) and salt with some incantations Give plenty palm-oil (***epo-pupa***) ***Ewé eeran*** and the root plus ***àgbáàrín pupa*** Cut fresh ***ilá*** (okro) and rob the bitten spot with it to suck out the poison (but don't publicize the application) Cut ***ògìrìsákó*** plant and place it on the bitten spot to suck out the poison. ***ògìrìsákó, tàngbòdó*** and ***èwà*** (beans) cooked and given to the dog to eat Pound ***máfowókan-omòmi*** leaf, add high quality red oil (***epo ìsèlé***) and rob on the dog's body and give to leak Apply smallpox medication Flesh of local pig (***eran elédè àbálàyé***) plus red oil; rob on the dog's body and give to eat Bath the dog with ***èjè elédè*** (blood of pig) mixed with ***ose dúdú*** (black soap) and dog water ***Ewéòdúndún***, red maize and red oil put inside ***kòònjò*** (small gourd) is robbed on the dog's body and mixed with its food. A mixture of ***oòríi*** (shea butter) and ***oró ádétè*** placed in the sun for long hours and when cooled give to the dog in small quantities to swallow. ***Omi ìgbín*** (snail fluid) plus red oil to rob its body	• Local treatment more effective • Slower but lasts longer • Cost less • Accessible • Locally available any time • Orthodox treatment is quick but does relapse • Orthodox treatmentis expensive • Vaccines are notreadily available **Prevention** • ***Ewe làabelàabe, ewe èèsì, ewée wèerèepèe*** all cooked in a small clay pot (***orù***) ready to drink.

Source: Author's field interview, December, 2012

Box 2: UNESCO's Declarations on bringing modern scientific and traditional knowledge together.

In the 1999 World Conference on Science held in Budapest, several considerations and recommendations concerning traditional knowledge were included in the two principal documents approved by the conference - the 'Declaration on Science and the Use of Scientific Knowledge' and 'Science Agenda: Framework for Action,' known as the Declaration and Framework respectively. Some of the declarations are that:

- Traditional societies, many of them with strong cultural roots, have nurtured and refined systems of knowledge of their own, relating to such diverse domains as astronomy, meteorology, geology, ecology, botany, agriculture, physiology, psychology and health.
- Such knowledge systems represent an enormous wealth. Not only do they harbour information as yet unknown to modern science, but they are also expressions of other ways of living in the world, other relationships between society and nature, and other approaches to the acquisition and construction of knowledge.
- Special action must be taken to conserve and cultivate this fragile and diverse world heritage, in the face of globalization and the growing dominance of a single view of the natural world as espoused by science.
- Modern scientific knowledge and traditional knowledge should be brought closer together in interdisipinary projects dealing with the links between culture, environment and development in such areas as the [human and animal medicine], conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact.
- A closer linkage between science and other knowledge systems is expected to bring important advantages to both sides.

Source: UNESCO (2000)

dissemination and utilization to make her a relevant partner in a global exchange of scientific knowledge especially the global health education. Higher education institutions in the African region need to acquire these IK and practices through innovative learning and research programmes and interaction with the different communities to facilitate knowledge transfer between different generations and groups [10]. There is increasing awareness among scientists that traditional knowledge and technology may present valuable solutions to contemporary problems, such as animal and human health, environmental planning and management, and food preservation [10].

Traditional veterinary healers, herbalists, priests and pastoralists' knowledge systems and practices about the habitats and life cycles of plant species used in animal health care need to be built upon through integration into the formal veterinary education system by inclusion in the curricula of veterinary schools in colleges and universities and research institutes. Students should be encouraged to undertake research and write dissertations on different aspects of indigenous animal health care and publish the results for knowledge sharing and global dissemination. The globalization process is perceived as widening and deepening the international flow of information.

However, under the twin processes of globalization and modernisation, IK and practices are being lost. To protect and preserve these knowledge systems requires rigorous and aggressive documentation, awareness raising and training programmes. This integration will require curriculum development and or review. Integration will assist to create conditions in which the highest value of IKS will assist in shaping veterinary medicine policies and practices, encourage co-sharing of benefits, development of new and affordable drugs from indigenous plants used by the traditional veterinary practitioners.

The need to integrate IK into the veterinary education system is based on the philosophy of moving from the known to unknown. It will also: allow local indigenous animal health care givers and elders to share their knowledge with the students and be involved in an effective way of teaching outside the normal school time; arouse interest of students teachers and researchers in indigenous peoples and societies and provide opportunities to

the veterinary scientists and indigenous animal specialists thereby counter-balancing the biased view that only scientists can produce valid or valuable knowledge, and provide opportunity of a living laboratory for readymade observations and further actions on veterinary education and research.

More African scholars would also be trained in the way of employing local resources for researches and inventions which would pave the way for the development of locally manufactured veterinary drugs and products from the abundant local resources and this may probably revive our battered economy. As UNESCO noted, closer linkage between science and other knowledge systems is expected to bring important advantages to both sides [21].

The integration of IK and practices of human-animal diseases prevention and treatment with the postgraduate programme of the CCPZ at the University of Ibadan and other partnering Universities can be done in two ways:

i. inclusion as "line statements" within the course contents/outlines of existing courses, and
ii. inclusion as a separate module in the curriculum of the CCPZ and other academic veterinary programme (s). This requires due process to be followed from the Department through the Faculty Board, the Board of the Postgraduate School to the University Senate.

The proposed global health education curriculum should include a module on indigenous methods and the geographical variations across Africa of early detection of zoonotic disease at source, the preventive and control measures for managing the risks associated with rabies. Presently, the proposed pool of twenty-or Zoonoses studies curriculum prepared by the Centre for Control and Prevention of Zoonoses, University of Ibadan does not contain indigenous knowledge and practices. The gap should be filled by considering the inclusion of **MIK 738 Course;**

Indigenous Veterinary Knowledge and Practices in the curriculum.

Challenges

Integrating IK and practices into the Global Health Education Curriculum in West Africa is faced with the following challenges: non-documentation of the valuable heritage inherent in IK; the rapid disappearance of indigenous knowledge and practices; lack of indigenous people with advanced indigenous expertise and Western research experience; lack of relevant basic books and other reading materials on IK in the libraries; operationalisation of the integrative curricula especially given the few university teachers and researchers involved in mainstream (core) IK or IK-related research; lack of political will on the part of western-trained Heads of Government and education ministries to recognize and promote IK; political instability and policy inconsistency and/or continuity in many countries in West Africa; poor funding of higher education and research, and the bias of the practitioners of modern science, the education administrators and those who formulate educational policies for indigenous knowledge [10, 38].

Any meaningful and effective action in preventing and controlling zoonoses, especially rabies, in West Africa has to contend with the lack of or insufficient resources and initiatives that support collective actions between the custodians of indigenous or traditional veterinary knowledge and practices and the practioners of orthodox veterinary

healthcare systems. Traditional veterinary medicine is not given adequate publicity attention compared to the traditional human medicine [8]. The print and electronic media in Nigeria regularly feature news and commentaries on traditional human medicine but rarely on traditional veterinary medicine. The near-zero publicity must be addressed.

Plant species used for traditional veterinary medicine are becoming scarce with few projects or initiatives undertaken to propagate or breed those species being used for both traditional human and animal medicine. In Eastern and Southern parts of Africa, over 100 species of plants have become very scarce [39]. There is also the challenge of reconciling indigenous animal healthcare systems and modern veterinary medicine without substituting each other but building on individual strength. How to accord deserved respect to indigenous veterinary healers and herbalists while interacting and exchanging ideas with modern veterinary medicine practitioners is part of the challenge coupled with the issue of copyright, that is, paying appropriate compensation to indigenous knowledge holders for giving out their age-long ancestral and community-based knowledge of animal health care.

Recommendations

In order to adequately inform the public of the danger of rabies, there is need for the creation of public awareness of the types of risks involved, precautionary actions, where and how to seek immediate medical intervention once bitten, and intensification of vaccination campaigns. The formal and informal (traditional) communication channels must be extensively utilized.

There is need for synergy, collaboration and networking within the ECOWAS Member states in the West African sub-region as is the case in East Africa where some participating states established and are very active in the Southern and Eastern African Rabies Group (SEARG) network where key issues relating to rabies control are discussed and implemented.

At the level of universities, strong networks must be established among faculties/colleges, Departments and units in each university and, by extension, between Universities across national and trans-national borders on the teaching of and research into traditional veterinary medicine covering the TDAs and zoonoses. The Pan-African University has a role to play here. Universities in Africa should collaborate and conduct intensive and extensive inter-disciplinary, trans-national and trans-boundary researches on various aspects of indigenous veterinary knowledge and practices of the African people to assist the continent overcome some of the constraints to her socio-economic and technological development and also promote south-south collaboration. Intra- and inter-university collaboration should be promoted among African universities and between Africa, North-South and South-South in curriculum development, teaching and learning, capacity building, networking and staff and students exchange.

There is also the urgent need to adopt the One Health (Global Health) concept at the national, regional and continental levels in Africa as a way of reducing risks of TADs and zoonoses at the animal-human-ecosystems interface. Establishment of joint and integrated multi-disciplinary programmes on animal-human ecosystems interface (IMPAHEI) (interactions or nexus) in each university involving, but not limited to, faculties of veterinary medicine, human medicine, agriculture and forestry, livestock and fisheries, indigenous knowledge and development programme, education, basic sciences, social sciences,

environmental planning and design, African languages and religion, institute of African studies, pharmacy, and law. As an important outcome of the 2012, First International Conference on Rabies in West Africa (RIWA), the University of Ibadan's Centre for Control and Prevention of Zoonoses (CCPZ) should take-up the challenge of establishing IMPAHEI as a model in the West Africa sub-region.

It is imperative to reach out to development partners including the African Union (AU), the EU, WHO, UNICEF, UNESCO, World Bank, MacArthur Foundation (under the MacArthur Higher Education Initiative in Africa Grant), START, IDRC, and Bill and Melinda Gates Foundation, among others, to provide support and material resources for the production of critical mass of teachers and researchers in indigenous knowledge and development to effect and sustain the proposed initiatives of integrating indigenous knowledge and practices (IKAP) in Global Health education curricula in West Africa. The University of Ibadan, the University for Development Studies, Tamale, Ghana and other universities or research centres in Africa running formal programmes in IK should be funded in this regard.

There must be the political will on the part of university administrators and their funders to ensure continuity and sustainability of the integrative education curricula to enhance indigenous knowledge collection, analysis and documentation, sharing and utilization for the over-all well-being of the entire people of Africa.

There is the need to establish an ethno-veterinary pharmacological unit at the University of Ibadan, which is hosting the Centre for Control and Prevention of Zoonoses, that will analyse the contents of different herbs and local materials being used by indigenous healers in West Africa for the prevention and managem-ent of cases of rabies. This will lead to the local manufacturing of anti-rabies drugs that will be readily available, accessible and affordable to both the urban and rural poor.

As one of the first steps in the process of integration, an inventory of teachers and researchers involved in IK or IK-related activities in all the universities and research institutes across West Africa is required to establish a data base. A bibliographic survey of available publications, students' dissertations and thesis, technical reports, seminal works, archival records etc. on indigenous veterinary knowledge and practises should be undertaken in each university and the output in form of reports made available to other universities for easy access to students, researchers, policy makers and the larger society. This will facilitate the conservation and preservation of these knowledge materials and promote their utilization for sustainable development.

Conferences, seminars, workshops and exhibitions are to be organized regularly to bring together scholars and researchers as well as the indigenous veterinary healers and practitioners to exchange information on individual, group and institutional engagements.

Indigenous knowledge and development programme at the Centre for Sustainable Development, University of Ibadan

One of the strategic objectives of the University of Ibadan's Five-Year Strategic Plan (2009-2014) is to **promote research and documentation of indigenous knowledge systems".** In 2010, the Senate of the University of Ibadan (UI) approved the formal establishment of Indigenous Knowledge and Development (IKAD) Programme as a unit in the Centre for Sustainable Development (CESDEV). The

unit was established to provide leadership in IK in Africa through multi-disciplinary academic training and research, documentation and publication in different dimensions of IK and development geared towards better informing development policy and practice.

The Senate of the University Ibadan approved in 2012 three postgraduate programmes namely: Postgraduate Diploma, Professional- and Academic Masters in Indigenous Knowledge and Development, to be run by the Centre for Sustainable Development (CESDEV), University of Ibadan beginning from the 2012/2013 academic session. The programmes are aimed at teaching and research in indigenous knowledge and development. The curricula for the three programmes contain some courses that may interest the Centre for the Control and Prevention of Zoonoses (CCPZ): MIK 714 Indigenous health systems; DIK 707 Introduction to ethno-botany; Advanced ethno-forestry; Theory of African traditional medicine, and MIK 716 Indigenous medicinal and poisonous plants.

The Centre for Sustainable Development (CESDEV) is willing to partner with CCPZ to achieve some of its objectives especially in the area of building sub-regional capacity for zoonoses containment by developing human resources through training courses, conferences and workshops. The Centre is also ready to provide teaching and research expertise in the area of traditional veterinary and human medicine and particularly to teach the **MIK 738 Traditional Veterinary Knowledge and Practices** suggested for inclusion in the M.Sc. Epizootiology or Zoonoses studies curriculum.

Conclusion

Trans-boundary animal diseases (TADs) and zoonoses are a major constraint to sustainable development in the African continent. There is the continuous threat of TDAs and zoonotic diseases, including rabies, due to increases in animal production to meet human demands for meat, eggs and milk on the one hand, and for household security and hunting expeditions which are the two most important services which dogs provide their keepers in both urban and rural communities. The use of dogs as pets and 'companions' by the elites and the unlimited freedom given to such dogs to share the living room and even bedrooms with members of their households creates unlimited interaction between dogs and humans in urban communities thereby increasing the risks associated with rabies.

In Africa, local knowledge and values still form the main driving force for rural people's decision on health practices, teaching, learning and experimenting [40]. The people have over the years developed reliable, affordable and sustainable strategies of for the detection, control and management of zoonotic diseases. With the leaves, backs, roots of local creepers, shrubs, trees and grasses that they grow around their homes and farms, mixed occasionally with some of their local staple foods and animal parts, the indigenous communities are able to treat rabid dogs and human victims of rabies. However, this age-long and timeless knowledge and practices are rapidly going into extinction as the custodians of the knowledge systems and practices are dying with the knowledge without an organised documentation for healthy preservation and sustainable utilization. This trend must be halted in the spirit of some of the declarations at the 1999 World Conference on Science in Budapest: that traditional and local knowledge systems, as dynamic expressions of perceiving and understanding the world, can make, and historically have made, a valuable contribution to science and technology,

and that there is a need to preserve, protect, research and promote this cultural heritage and empirical knowledge. Governments, in co-operation with universities and higher education institutions, and with the help of relevant United Nations organizations, should extend and improve education, training and facilities for human resources development in environment-related sciences, also utilizing traditional and local knowledge. Countries should promote better understanding and use of traditional knowledge systems, instead of focusing only on extracting elements for their perceived utility to the S&T system [23].

Now that the world is tending towards a global village, 'the One Health' concept or strategy must be adopted that will bring universities in Africa together to conduct intensive and extensive inter-disciplinary, trans-national and trans-boundary researches on various aspects of indigenous veterinary knowledge and practices of the African people to assist the continent to overcome some of the constraints to her socio-economic and technological development. Indigenous knowledge systems must be integrated into the Global Health education curriculum for this goal to be realised.

Acknowledgement

The following persons who are custodians of Yoruba indigenous knowledge are deeply appreciated for sharing with me their hard-earned knowledge about rabies without demanding any compensation: A lecturer in the Department of Forest Resource Management, University of Ibadan; a practising Barrister-at-law in Akinyele local government area (LGA); two farmers/hunters and one hunter in Ido (LGA); a farmer and four farmers/hunters in Ona-Ara LGA; two hunters in Lagelu LGA; one farmer, one farmer/businessman, one farmer/hunter, and one traditional healer in Iseyin LGA; an Ifa orator, the Head of hunters, two farmers and one hunter/furniture maker in Itesiwaju LGA; private sector veterinary doctors in Ibadan, and two civil service veterinary doctors in a government veterinary clinic in Ibadan; my research assistants Adesoji Adeyemi (Ph.D student, Dept. of Forest Resource Management, University of Ibadan), Town Planners Taiwo Kayode and Adediji Alaba, Alhaj Ademola Fadipe (Vice Principal, Community Grammar School, Otu), and Elder. Francis Adeoti (Deputy Director, Dept. of Environmental Health, Kisi).

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