



Transcending from Veterinary Public Health to One Health: A Review of the Role of Veterinary Medicine in Human Health

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SUMMARY

From the pre-modern era around 475 CE when ‘horse doctoring’ was the subject of veterinary attention because of economic interest to 1762 when the first veterinary school was established to control the devastating economic effects of Rinderpest (Cattle plague) in cattle; basically, veterinary medicine evolved both as a practice and a profession to attend to specific human disease, financial, economic and nutritional needs. It took 250 years after the establishment of the first veterinary school to finally get Rinderpest eradicated worldwide. Meanwhile, environmental degradation/pollution and current modern economic/trade practices have led to an estimated 61% of emerging human infections over the past fifty years or thereabout being zoonotic diseases of human beings transmitted from animals. During the same period, non-zoonotic animal diseases now have serious economic, mortality, public health, trans-boundary and international trade effects; and pets have become significant human emotive partners. These challenges call for an interdisciplinary and multidisciplinary approach, with Veterinary Medicine being the fulcrum of a One Health initiative ‘to attain optimal health for animal, humans (and plants) in a common environment’. Nigerian veterinarians have the professional agricultural-environmental--medical-veterinary responsibility to have an active and pioneer ‘paradigm shift’ towards institutionalization of One Health in Nigeria, lest it suffers from ‘paradigm paralysis’ - a harmful inaction and/or resistance to the imperative of expedient change.

Key words: Veterinary Medicine, Veterinary Public Health, Human Health, One Health. Paradigm Shift.

INTRODUCTION

The promotion of Public Health (stated as ‘protect the health of the public and environment’ in the Nigerian Veterinary Medical Association NVMA version) <www.nvma.org.ng/portfolio/the-veterinary-oath> is a phrase of the Veterinary oath every Veterinary Doctor

swears to at induction <http://vetbook.org/wiki/index.php/Veterinary_Oath>.

The word “Veterinary” originated from Latin word *veterinarius* of beasts of burden, from *veterinae* beasts of burden (working animals)

https://en.wikipedia.org/wiki/Veterinary_physician, from feminine plural of *veterinus* of beasts of burden; <<http://www.merriam-webster.com/dictionary/veterinary>>. It relates to the diseases, injuries, and treatment of farm and domestic animals https://en.wikipedia.org/wiki/Veterinary_physician; relating to the medical care and treatment of, relating to, practicing, or being the science and art of prevention, cure, or alleviation of disease and injury in animals and especially domestic animals. Veterinary medicine is the branch of medicine that deals with the prevention, diagnosis and treatment of disease, disorder and injury in non-human animals. The scope of veterinary medicine is wide, covering all animal species, both domesticate and wild, with a wide range of conditions which can affect different species. http://en.wikipedia.org/wiki/Veterinary_medicine

Likewise, the word "Medicine" relates to the science and art dealing with the maintenance of health and the prevention, alleviation, or cure of disease; the branch of medicine concerned with the nonsurgical treatment of disease <<http://www.merriam-webster.com/dictionary/medicine>>

The word "Health is defined "A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." (Constitution of the World Health Organization, 1948).

The word 'health' was derived from the old English word 'hoelth', which meant a state of being sound, and was generally used to

infer a soundness of the body (Dolfman, 1973)

Health [hoelth] is a relative state in which one can function well physically, mentally, socially, and spiritually to express the full range of one's unique potentialities within the environment in which one is living. The opposite of Health is Dis-ease: anything that makes a living being not to be at ease
Ease: The condition of being comfortable or relieved.

Un-ease: Lacking a sense of security; anxious or apprehensive

Stress: is a person's response to a stressor such as an environmental condition or a stimulus. *Stress* is a body's way to react to a challenge.

Distress: may refer to occurrence when an individual cannot adapt to stress; i.e. suffering.

Current views of health and illness recognize health as more than the absence of disease. The need for a more realistic definition of the word "Health" was expressed by Bedirhan and Robert (2005) in an article titled: "Re-defining Health" which appeared in the *Bulletin of the WHO* 83:802. They quoted Australian Aboriginal people who generally define health thus: "...*Health does not just mean the physical well-being of the individual but refers to the social, emotional, spiritual and cultural well-being of the whole community.*

This is a whole of life view and includes the cyclical concept of life-death-life (NHMRC, 1996).

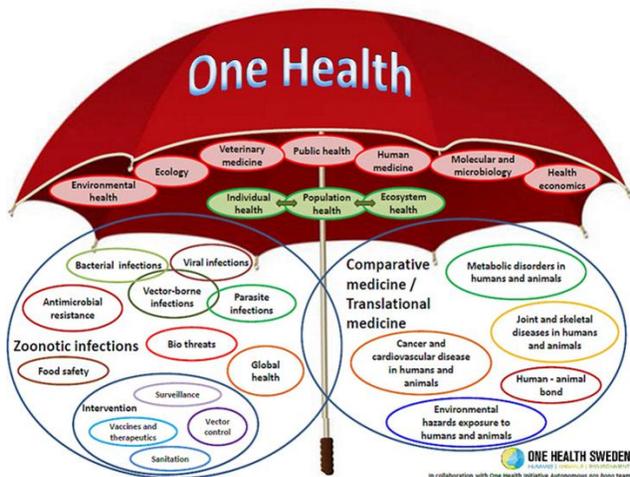


Figure 1: One Health Umbrella (created by One Health Sweden)



Figure 2: One Health Initiative logo. (Source: < <http://onehealthinitiative.com/>>)>

SOME EXISTING HEALTH TERMS

Public health: The field of medicine and hygiene dealing with the prevention of diseases of human community health by government agencies. It is an extremely large, multi-disciplinary field with many professions working together to safeguard and improve the health of people across the globe (The Columbia University Encyclopedia, 2003).

Public health refers to all organized measures (whether public or private) to prevent disease, promote health, and prolong life among the population. Its activities aim to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases. Thus, public health is concerned with the total system and not only the eradication of a particular disease. The three main public health functions are:

1. The assessment and monitoring of the health of communities and populations at risk to identify health problems and priorities.
2. The formulation of public policies designed to solve identified local and national health problems and priorities.
3. To assure that all populations have access to appropriate and cost-effective care, including

health promotion and disease prevention services.

Public health professionals monitor and diagnose the health concerns of entire communities and promote healthy practices and behaviors to ensure that populations stay healthy.

<http://www.who.int/trade/glossary/story076/en/>

Public Health is community-based and its 'patient' is the community (Lisa and Tanja, 2006)

Global health: Global Health is the health of populations in a global context and transcends the perspectives and concerns of individual nations (Brown *et al.*, 2006). It is the area of study; research and practice that places a priority on improving health and achieving equity in health for all people worldwide (Koplan *et al.*, 2009). Global health is typified by the international activities of the World Health Organization

International health: International health is defined as a well-established branch of public health, with origins in the health situation of developing nations and the efforts of industrialized countries to assist them. Global health is not to be confused with international health, which is defined as the branch of public health focusing on developing nations and foreign aid efforts by

industrialized countries. (White and Nanan, 2008).

Comparative medicine: It is a field of study concentrating on similarities and differences between veterinary medicine and human medicine (Farlex, 2012).

The study of human disease by comparison with the diseases of animals, depending largely on work with naturally occurring diseases of animals that are models for human diseases. (Saunders Comprehensive Veterinary Dictionary, 3rd edition. © 2007 Elsevier, Inc.);

Veterinary Public Health (VPH): In 1975, the WHO recognized the role of Veterinary Public Health in human health and commissioned the report of a Joint FAO/WHO Expert Committee on Veterinary Public Health. (WHO 1975. Technical Report Series, No. 573).

Twenty-five years later in 1999, a study group on Veterinary Public Health (VPH), convened jointly by the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), and the Office Internationale des Epizooties (OIE), and including twenty-eight experts from eighteen countries, defined veterinary public health as *"The contribution to the complete physical, mental, and social well-being of humans through an understanding and application of veterinary medical science."* (WHO 2002. Technical Report Series, No 907). The meeting was opened by Dr F.-X. Meslin, Coordinator, Animal and Food-related Public Health Risks, World Health Organization (WHO), who pointed out the increasing importance of VPH for both developing and developed countries, as well as its role in helping to achieve the Health for all in the twenty-first century strategy adopted by the World Health Assembly in 1998 (Document WHA51.5).

Waltner-Toews (2002) had narrowed the focus of veterinary public health to those aspects that are directly pertinent to the

practice of public health, rather than to human health in general to three broad areas of involvement-

- i. Investigating and controlling animal diseases that threaten either food supplies or animal transportation and labor, which are essential elements in food production throughout much of the world.
- ii. Control of the transmission of zoonotic diseases, either directly or through foods.
- iii. Developing and implementing new methods of promoting sustainable public health that is Eco systemically grounded, culturally feasible, and economically realistic.

Veterinary Contribution to Public Health

In a 25-page article titled "Veterinarians: Integral Partners in Public Health", the Association of American Veterinary Colleges exhaustively listed Veterinarians contribution to Public Health. This was in response to a January 30, 2004 national call and directive by President Bush to support higher education and provide capacity-building grants to colleges of veterinary medicine for training in exotic animal diseases, and public health. (Chaddock, 2006)

Traditionally VPH activities in Public Health have included (WHO, 1975; FAO, 1990) but not limited to:

- i. zoonoses diagnosis, surveillance, control, prevention and eradication;
- ii. occupational hazards and diseases associated with live animals and their products;
- iii. biologics development and production;
- iv. control of animal populations which may serve as reservoirs or be noxious;
- v. prevention and control of food-borne illness of animal origin;

- vi. ante-mortem and post-mortem meat and poultry inspection;
- vii. participation in outbreak investigations;
- viii. environmental health activities including vector, water, wildlife and use of animal monitors;
- ix. biomedical research;
- x. emergency actions including natural and man-made disasters;
- xi. social aspects including natural and man-made disasters;
- xii. Social aspects including service animals and human animal bonding. <http://www.fao.org/docrep/006/y4962t/y4962t01.htm>

A World Health Organization (WHO) publication of 2002 study group report describes the increasing emergence and re-emergence of zoonotic diseases in the 1980s and 1990s and their importance for global public health. To effectively meet these challenges, human and animal health issues must be merged into a new public health agenda. (WHO 2002 Technical Report series; 907. 2002)

Human health, animal husbandry and animal health are closely connected and VPH is a fundamental part of public health whereby human health and well-being are the main objectives. VPH is multidisciplinary and contributes to many areas of public health that are not always related to animals. To integrate veterinary public health into the goals of public health, it is essential to improve collaboration between human and veterinary medical science, environmental science and other related fields - in accordance with "One Health" principles (FAO's Veterinary Public Health E-Bulletin No. 23).

According to King (2006), Veterinary Medicine practice contributes to Human and Public Health in the following ways among others:

- i. Bridging and improvement of Agriculture, Livestock and Food Systems

- ii. Care of Companion Animals, Wildlife, Exotic Animals and Food Animals
- iii. Biomedical and Comparative Medicine Research
- iv. Prevention and Control of Zoonotic Diseases
- v. Enhancing Ecosystem Management/Environmental Health
- vi. Epidemiology and Disease Control Tactics
- vii. Understanding and Control of Emerging Diseases
- viii. Humane Ethics and Values

Veterinarians have expertise in population health and public practice. In addition to traditional research involving production animals and biomedical research using animal models, veterinarians have a distinct advantage because of their understanding of species epidemiology and the ecology of zoonotic infections (Hoblet *et al.*, 2003).

Resurgence of One Health:

One Health Concept, the recent realization of the need to actualize the concept as the fulcrum of modern human health, arose largely from the report of researchers from the Zoological Society of London (ZSL), and the US-based University of Georgia and Columbia University's Earth Institute who analyzed 335 Emerging Infectious Diseases (EID) from 1940 to 2004 and found that 60% of EID events were caused by "non-human animal" sources. They add that 71% of these outbreaks were "caused by pathogens with a wildlife source. The study determined that zoonosis – diseases that originate in animals – are the current and most important threat in causing new diseases to emerge.

It was reported that of the 1,461 diseases now recognized in humans, approximately 60% are due to multi-host pathogens characterized by their movement across species lines. Over the last three decades, approximately 75% of new emerging human infectious diseases have been zoonotic or

transmitted from animals to humans. (Jones *et al.*, 2008)

Veterinary Medicine and One Health

More than 20 key officials from the American Veterinary Medical Association and the Association of American Veterinary Medical Colleges met with staff from the Centers for Disease Control and Prevention (CDC) December 5-6, 2002, to discuss the increasing convergence of issues confronting human and animal health. Among the officials in attendance were the Deans from more than half of all U.S. veterinary schools. (King and Khabbaz, 2003)

In the context of the 2004 *Manhattan Principles* statement, a reasonable case was made that veterinarians are particularly well prepared by their training and professional experience to embrace and work effectively in the One Health paradigm, and indeed to take a leadership role in moving it forward from concept to practice. Furthermore, veterinarians are already active in public health, working closely with physicians, other health professionals, and disaster response specialists on disease investigation, disease surveillance, and effective outbreak response Cook *et al.*, 2003).

Veterinarians in the zoo and wildlife sectors are gaining valuable experience in the evolution of disease in wild animal species and populations and are developing productive, interdisciplinary relationships with wildlife biologists, ecologists, and other relevant specialists. Companion animal veterinarians can also play an important role in detecting newly emerging zoonotic diseases since companion animals, including exotic pets; can serve as sentinels for such diseases. The monkey pox outbreak in the United States in 2003, in which a staff at a veterinary medical clinic was affected by contact with infected pet prairie dogs, is a case in point (Croft *et al.*, 2007)

For the reasons outlined above, the veterinary medical profession is poised to

become actively engaged in the One Health approach to human, animal, and environmental well-being. (Sherman, 2010; Sherman 2010)

Realizing the value and importance of such an approach, the American Veterinary Medical Association AVMA in 2007 established a One Health Initiative and created a One Health Initiative Task Force to “study the feasibility of an initiative that would facilitate collaboration and cooperation among

- i. health science professions,
- ii. academic institutions,
- iii. governmental agencies, and

Industries to help with the assessment, treatment, and prevention of cross-species disease transmission and mutually prevalent, but non-transmitted, human and animal diseases and medical conditions” (AVMA, 2008).

One Health

One Health has been defined as “*the collaborative effort of multiple disciplines — working locally, nationally, and globally — to attain optimal health for people, animals and the environment*” (AVMA, 2008). https://www.avma.org/KB/Resources/Reports/Documents/onehealth_final.pdf.

The One Health Commission defines *One Health as the collaborative effort of multiple health science professions, together with related disciplines and institutions-working locally, nationally, and globally- to attain optimal health for people, domestic animals, wildlife, plants and our environment* <https://www.onehealthcommission.org/en/why_one_health/what_is_one_health/>

During the International Conference on Emerging Infectious Diseases 2012, a presenter gave a more comprehensive definition of One Health as: “*All collaborating efforts of various human activities, occupations and professions; laboring as companions, working together, united to achieve a common (but differential) mandate, purpose and responsibility of making man to be at ease*

with other biological and non-biological components of the earth and its environment.” (Babalobi, 2012)

Disciplines involved in OH include:

- i. Professions: Agricultural, Biomedical Health, Ecological/Environmental, Laboratory, Medical and Veterinary Health
- ii. Academic and Research Institutions: University Faculties/Schools/Colleges of Agriculture, Animal health and Production; Environmental Sciences; Biomedical, Medical, Nursing, Public Health, Community and Social Medicine; Veterinary Biomedical, Clinical and Pathological Medicine, Public Health and Preventive Medicine; Biomedical, Environmental and Veterinary Research Institutes)
- iii. Relevant professional students/trainees: (Agricultural, Biomedical, Environmental Health, Laboratory, Medical, Nursing, Public Health, Veterinary etc.
- iv. Other non-professional/ occupational trainees

The One Health Initiative

The One Health Initiative is a movement to forge co-equal, all- inclusive collaborations between physicians, osteopaths, veterinarians, dentists, nurses and other scientific-health and environmentally related disciplines. Additionally, more than 800 prominent scientists, physicians and veterinarians worldwide have endorsed the initiative

<http://www.onehealthinitiative.com/index.php>

It is an initiative that calls for all health sciences professionals, the health sciences colleges and schools—including veterinary schools and human medical colleges—health sciences associations, government agencies and related industries to coordinate

efforts on a global basis to combat disease and promote health. (AVMA, 2008)

Any interested biomedical, laboratorial, physician or veterinarian may be added to the International “One Health Initiative” Movement <<http://onehealthinitiative.com/>> by contacting bkapdvm@verizon.net and including curriculum vitae or brief biography, title, degree(s), affiliation, and address

One Health Commission

<<https://www.onehealthcommission.org/>>

The One Health Commission is a US-based globally focused organization dedicated to improved health of people, domestic animals, wildlife, plants and the environment. It is dedicated to informing all audiences about the importance of transcending institutional and disciplinary boundaries, and transforming the way that human, animal, plant and the ecosystem health professionals, and their related disciplines, work together to improve the health of all living things and the environment. The One Health Commission has a resource page on One Health initiatives and activities worldwide <https://www.onehealthcommission.org/en/one_health_resources/whos_who_in_one_health/>

One Health in Nigeria

In 2008, a proposal for the adoption of the One Health Initiative by the Nigerian Veterinary Medical Association NVMA at her 45th Annual Congress in Owerri, Imo State, Nigeria was raised and adopted on presentation on 22nd October 2008. A second proposal seeking the initiation of partnership between the NVMA and the Nigerian Medical Association NMA was stepped down for consultation with the NMA. Recent One Health related efforts including a proposal for a joint NMA/NVMA Journal seeks to actualize the stepped down partnership.

The Nigeria Field Epidemiology and Laboratory Training Program (NFELTP)

The Nigeria Field Epidemiology and Laboratory Training Program (NFELTP) is a two-year training program aimed at improving public health systems in Nigeria through training of field epidemiologists and public health laboratorians and provision of epidemiological services. The NFELTP is like programs that have been established in more than 80 countries and is modeled after the 65-year-old U.S. Centers for Disease Control and Prevention's (CDC) two-year Epidemic Intelligence Service (EIS) training program. The Nigerian program was started in 2008 because of the 2006 Avian Influenza outbreak in Nigeria and a subsequent report of a human case. It is affiliated to two Nigeria Universities - Ahmadu Bello University Zaria and the University of Ibadan.

The NFELTP offers a Masters of Public Health (MPH) in Field Epidemiology, Laboratory Epidemiology and Management, and Veterinary Epidemiology. The veterinary track was introduced to address the increasing threat of zoonotic and epi-zoonotic diseases in Nigeria. The NFELTP was the first program in the 80- member Network to offer this track. This enables veterinary epidemiologists to be trained alongside public health professionals to address the ever-growing threats of zoonotic and epi-zoonotic diseases to improve public health.

<http://www.afenet.net/new/images/popups/Nigeria.html>

It is the first program of its kind worldwide to train residents in public health practice using the One Health concept. It is run by the American Center for Disease Prevention and Control CDC-Atlanta. It is also the first of such Field Epidemiology and Laboratory Training Program to include veterinarians to join physicians and laboratorians in a joint training public health program <https://www.cdc.gov/globalhealth/healthpromotion/fetp/about.html>

It is among the few programs offering a veterinary component to advance the One World One Health concept in addressing Zoonosis (diseases that are transmissible from animals to humans), emerging infectious diseases (majority of which are of animal origin) and other health issues involving the human/animal interface. This is done through gainful collaborations and networking between the animal and human health sectors.

<https://afenetnigeria.net/projects/index?id=%201>

Nigeria FELTP

- i. forges collaborative relationships between the Ministries of Health and Agriculture,
- ii. incorporates education from University Colleges of Medicine and Faculties of Veterinary Medicine, and
- iii. combines Human and Animal Health endeavours into a multidisciplinary training program, in which 30% of each cohort consists of licensed veterinarians.

Nigeria FELTP uniquely combines the efforts of Human Health (Federal Ministry of Health) and Animal Health (Federal Ministry of Agriculture & Rural Development) into one initiative referred to as "One Health" http://nigeria-feltp.net/one_health.php

Since its inception in 2008, the program has responded to 133 suspected outbreaks ranging from environmental related outbreaks, vaccine preventable diseases, water and food borne zoonosis, (including suspected viral hemorrhagic fevers) as well as neglected tropical diseases. With its emphasis on one health approach to solving public health issues, the program has recruited physicians, veterinarians and laboratorians to work jointly on human, animal and environmental health issues. Residents have worked to identify risk factors of disease at the human animal interface for influenza, brucellosis, tick-

borne relapsing fever, rabies, leptospirosis and zoonotic helminthic infections. The program has been involved in polio eradication efforts through its National Stop Transmission of Polio NSTOP (Nguku *et al.*, 2014).

The NFELTP Veterinary Epidemiology Curriculum was drawn up in Nigeria in 2008 by expert American Veterinary Epidemiologists invited by the CDC's National Center for Emerging and Zoonotic Infectious diseases with inputs from a Nigerian Epizootiologist from one of the two affiliated universities. The Nigerian Epizootiologist later spent his 2011-2012 sabbatical leave taking the lead to organizing a multidisciplinary team to draw up a One Health Curriculum for the African Field Epidemiology Network AFENET (2011-2012), under CDC's Animal-Human Interface Project (AHIP). CDC's Animal-Human Interface Project (AHIP) promotes health systems strengthening by encouraging interagency collaboration, preparedness, and response to outbreaks of diseases spread between humans and animals (zoonotic). In the last decade, about 75% of all emerging infectious diseases that affect humans originate from animals and 60% of all existing human infectious diseases are zoonotic. CDC's AHIP provides consultation to country partners on animal and public health issues directly, and through education and training residents of the Nigeria Field Epidemiology and Laboratory Training Program. Since 2009, this program in Nigeria has:

- Provided technical expertise for response to outbreaks of pandemic influenza H1N1, rabies, Lassa fever, and leptospirosis;
- Conducted studies to detect influenza viruses in swine, identify novel pathogens and diseases in bats that could be transmitted to humans; and,
- Determined prevalence of vector-borne diseases, brucellosis, and zoonotic tuberculosis.

<https://www.cdc.gov/globalhealth/countries/nigeria/what/zoo.htm>

One Health Nigeria (OHN) Electronic Mail Group

The onehealthnigeria@googlegroups.com, OHN e-mail group is an interactive email discussion forum created in June 2011 as a private initiative created to actively promote the One Health Concept and the institutionalization of One Health in Nigeria. The OHN e-group is open to be subscribed by just sending an email request for subscription to the group address: OneHealthNigeria@googlegroups.com

Conclusion

Even though the Nigerian Veterinary Medical Association NVMA has since 2008 adopted a congress resolution acknowledging, accepting and supporting the "One Health" initiative, second pertinent proposal for adoption of Congress resolution for a "One Health" partnership concept between the Nigerian Veterinary Medical Association NVMA and the Nigerian Medical Association NMA is been activated through a proposed joint NMA/NVMA publication with co- Editors-in-Chief and the Editorial Board composed of three members from both associations.

Finally, more NVMA members are enjoined to subscribe and contribute to the onehealthnigeria@googlegroups.com, an interactive email discussion forum created on June 06, 2011 to actively promote the institutionalization of One Health in Nigeria (OHN). Subscription to OHN e-group is open to all professions by invitation, through an email expression of interest to the list-creator or directly through the website <http://groups.google.com/group/onehealthnigeria>.

Veterinarians worldwide have been the pioneers of One Health. Nigerian veterinarians have the professional agricultural-environmental--medical-veterinary responsibility to have an active and pioneer 'paradigm shift' towards

institutionalization of One Health in Nigeria, lest it suffers from 'paradigm paralysis' - a harmful inaction and/or resistance to the imperative of expedient change.

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