Global Veterinaria 5 (6): 294-301, 2010
ISSN 1992-6197

Global Crisis and the Challenge of Veterinary Teaching in Ethiopia

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Abstract: The aim of this study was to explore the consequences of the current global crisis namely climate change, financial crisis, food and energy crisis on veterinary education. In the advent of these events quality of education is expected to be falling and the role of veterinarians will change. Hence an attempt was done to provide an insight into the current state and future changes of veterinary education in Ethiopia. The paper address coping strategies for the veterinary education, it also elaboratedthe Principles of "The One World One Health concept" (OWOH), the need to incorporate medical courses in veterinary education; In general it emphasized on using the current crisis for innovation and reform of the veterinary education.

Key words: Global crisis · Veterinary curriculum · Quality education · Veterinary education · Ethiopia · Higher education

INTRODUCTION

The environment of veterinary medicine is one of change. There are major demographic, political and environmental, disease, technological and economic influences, all driving changes in society [1]. These changes will have significant impacts on future veterinary medicine and veterinary medical education. In the context of, the current global-warming, economic crisis, food crisis and energy crisis. universities and its members of staff have to deal with major constraints [2]. There is a clear need for greater awareness of both the real impact as well as the future threats posed on universities as a result of the global crisis [3]. Higher education is one of the fastest growing education sector in Ethiopia. Until the last decade there was only one university for about 62 million people and higher education enrollment was 0.3% which was the least in sub-Saharan Africa [4]. However, in the last decade the Ethiopian government, in order to address the manpower needs of the country and democratize education, the number of universities has increased from one to thirty three. More student enrollment rate diversification of programmes, rising of graduate programs has occurred. However, after remarkable years of rapid growth there is a big concern in that, the financial crisis could negatively affect the education sector at all levels and more broadly, for social development and the achievement of the Millennium Development Goals and in particular more severely the tertiary education as it is a capital intensive venture.

The rise in human population and activities signals enormous problems for human and animal health. It is paralleled by a rise in the global population of livestock to equally outstanding and unprecedented numbers and densities, all over the world [5]. It is also paralleled by the rising curve of emerging infectious diseases, mostly animal diseases and diseases transmissible from animals to people [6]. These have made animal agriculture difficult and expensive in many parts of the world. They have reduced the diversity and richness of the plants and animals that are the engines of our ecosystems and, hence, of our own survival and they have imposed a huge new burden of disease on human society. We are now 6.9 billion people on earth. The first billion was achieved in just over 100 000 years; the most recent billion was added in 12 years (Population Reference Bureau, 2010). Our use of energy has grown much faster even than our absolute numbers [7]. Our thin green biosphere has become the ultimate case of the "Tragedy of the Commons" [8]. Climate, energy, food and economic crisis are reinforcing each other. Humans currently make direct use of approximately 60% of the earth's total capacity for photosynthesis [9]. The global forests, wetlands and grasslands that supply the essential ecological services of oxygen production, carbon sequestration, water retention, soil fertility and complex buffers against epidemic disease have been severely reduced. No one is currently able to reverse the above mentioned crisis; rather these crises should be capitalized for innovation and reform particularly in the battle against disease, future

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direction of veterinary profession and education. The objective of this paper was to explore the impact of global crisis on veterinary education at present and in the future. Look coping mechanisms and future direction for academic veterinary medicine. It was sought to explore models for responsive and flexible education system that would prepare a veterinary for myriad opportunities challenges arising now and over the coming years.

Current Status of Higher Education in Ethiopia: Although Ethiopia possesses a 1,700 year tradition of elite education linked to its Orthodox Church and Quranic teaching, secular higher education was initiated only in 1950 with the founding of the University College of Addis Ababa. This university and other subsequent higher education institutions strived, with considerable early success, to meet international standards. But, as the 20th century drew to a close, Ethiopia's higher education system found itself regimented in its management, conservative in its intellectual orientation, limited in its autonomy, short of experienced doctorates among academic staff, concerned about declining educational quality, weak in its research output and poorly connected with the intellectual currents of the international higher education community [10].

Recognizing these shortcomings, Ethiopia is currently engaged in a highly ambitious effort to realign its higher education system in order to contribute more directly to its national strategy for economic growth and poverty reduction. Its achievements over the past five years have been little short of extraordinary. The reforms have targeted all levels: the overall system, the institutions and the academic programs [11].

Since the year 2000, public investment in education has risen as a share of GDP from 3.2 to 4.5%. This level of financial effort is higher than the 3.9% registered for Sub-Saharan Africa as a whole. Education expenditure has also increased as a proportion of the overall government budget from 9.5 to 16.8%. This still falls below the general range of 20 to 25% for most developing countries, suggesting that scope remains for a further increase in the government's education financing effort. At the same time, the share of the education budget devoted to higher Education has risen from 14.9 to 23% in response to the recent rapid expansion of this sub sector. In the last 20 years 22 new universities were opened and 10 universities are under construction. Recently, the higher education system in Ethiopia is moving away from exclusive enrolments of about 1% of the age cohort towards increasing massification of over 5%. Not only enrolments, but also issues of quality and relevance, as well as equity that mainly revolve around gender and underserved or marginalized regions loom large as issues seriously confronting higher education development in the country [4].

At a time when the education system has expanded in size to a point unprecedented in history, a crisis of similar proportions has affected the ability of the system to operate. This crisis has deeply hurt the quality of education in developing countries. It has been particularly devastating to the non-salary category of the recurrent budgets [12]. To keep up the growing momentum, low-

income countries face the challenge of expanding access, building more classrooms, training and hiring more teachers and improving the quality of learning at all levels. Sheer demographics point to increased participation and increased demand in primary, secondary and tertiary in several developing regions [13]. Despite A decline in donations, devaluation by 20% of the Ethiopian money the *Birr,* voluntary contributions, the capacity of students to pay fees which is very low, higher education is continuing massive infrastructure development and increase in student enrollment.

The student fees form the main source of income for private institutions. During crisis periods households find it difficult to pay fees, scholarships decline and students substitute subsidized public institutions for fee-paying private institutions. Many governments introduced student support systems. The Ethiopian government has introduced cost sharing scheme however, cost recovery is very low primarily due to earning low salary after their graduation. In the advent of these crisis to balance budget deficits some countries cut higher education budgets, some maintain the budgets at the same level and some others increase allocations to higher education [14].

Many institutions of higher education are in the process of restructuring, retrenching employees, freezing recruitment and readjusting student support systems to survive the crisis. One positive trend is that higher education enrolments are surging and cross-border education is expanding despite the budgetary constraints due to the crisis positive household responses and government willingness to invest have contributed to this surge in enrolment. What is more important to note is the fact that the higher education sector, which used to be an easy target for budget cuts, is, perhaps, more protected during the current crisis period. It can be argued that it results from a major change in attitude towards investing in higher education and reflects the recognition of contributions of higher education and research to economic growth and national competitiveness.

Resultantly, education, especially higher education, is seen as part of the solution and is becoming an element in the recovery plans and stimulus packages.

Status of Veterinary Education in Ethiopia: Eighty percent of Ethiopians subsist on agriculture and the livelyhood of 26 percent of the population wholly subsist on traditional livestock husbandry. Ethiopia has the largest livestock population in Africa FAOSTAT, [15] This resource is untapped. But, many animal diseases are still rampant, productivity per head is very low and thereof there is little contribution to export market. During the last century little attempt was done to modernize the agriculture system.

The first veterinary institution was established 1903 by Italians. Then through the UNDP/FAO fund, the school of Animal Health was materialized in the Sixties and at the end of the Seventies it was upgraded to Faculty of Veterinary Medicine graduating veterinary doctorst. The number of veterinarians was very low until the last decade there was only one veterinary college graduating on the average 25 veterinarians per year and the ratio of veterinarians to animals was about 1: 500,000 (One veterinarian to five hundred thousand animals.) The Federal Government of Ethiopia in its effort to democratize education and address the trained manpower requirement of the country and to fill the existing gap, very recently has established nine more veterinary colleges training veterinarians and five more, colleges two government and three private ones training animal health assistants. This has spiked the number of veterinarians to about 600 graduates per year. Ethiopia clearly understands that economic growth in the 21st century will be driven by the nation's performance in raising its levels of national productivity in comparison to its economic competitors and it is determined to makeup the ground lost over the past two decades because of political instability and economic stagnation. The rapid expansion and resource limitation has hampered the quality of education.

Although no research is done, at the annual conference of the Ethiopian Veterinary Association (EVA) which was held at the African Union June 2010, many veterinarians complained about quality of current veterinary graduates and the problem is very serious and critical. The profession is steadily falling. This will result in negative effect through accumulation of unqualified staff. Despite all difficulties, enrolment in higher education is on the increase. Between 2008-2009 enrolment increased by 20% with massive expansion plan.

Concluding observations are contrary to expectations, budget cuts were less widespread and enrolments continued to expand in higher education during the crisis period.

Global Crisis and Veterinary College Strategic Response: Because human and financial resources are very scarce, Ethiopian universities will be well served by efforts to develop the efficiency and efficacy of their management. Management skills development may be the single most important short-term goal for the higher education system. However, veterinary colleges have to adapt new strategies. The following recommendations address the needs:

Cost Minimization: Universities should think about revenue diversification to reduce their dependency on any single income source. And intensify income generation activities. Like establishment of diagnostic services, farms and they should have clear cost minimizing policy. Teach better and teach less and structural reforms. Among the opportunities for innovation or re-examination for tertiary education sectors are: Tertiary education institutions reassess their funding strategies and labor market linkages to reduce their dependency on any single income source, tertiary education institutions need to reassess the balance among existing funding sources and intensify income generation activities [16].

Information and communications technologies (ICTs) hold the potential to enable higher education systems to enhance teaching and learning experience, improve access to educational resources and programs, expand distance learning opportunities and reduce the costs of education in the long term. For this to happen, various prerequisites are necessary. These include: supportive government policies and an enabling regulatory environment for ICTs; robust telecommunications and information technology infrastructure; strong human resource capacity development in new technologies; clarity of educational sector objectives and the role of ICTs in facilitating achievement of those objectives; strong buy-in from students, teachers and administrators; a sustainable funding base; and an institutional culture that motivates and rewards collaboration, information sharing, partnership and innovation.

Technology: The absolute key for the future veterinary medical profession is adaptiveness and responsiveness. Technological advances in the future will be rapid and will

exceed all expectations. Therefore, the need for the profession is to expect change and be ready to adapt and accommodate changing needs and opening opportunities. Academic veterinary medicine must prepare veterinarians for these events.

Academic veterinary medicine should take full advantage of new technology. As an integral part of the education process, technology can help colleges increase the number of students and generate revenue. Distance education from experts at centers of emphasis can occur both nationally and internationally. Virtual technology can be used to complement hands-on experience and to customize educational programs. Tele-medicine will permit the availability of focused expertise at the colleges to smaller or remote practices, to smaller urban clinics.

There is a role in scanning and interpreting new science and technology development and in evaluating new skills and tools such as genomics and bio-information. Another subject we should touch upon is technology-based teaching. Nowadays, technology is having a dramatic impact on how educational services, particularly the transmission of knowledge, are delivered. Cyber education and information technologies affect and transform our Faculties. There has been a gradual shift, over the last two decades, in the way we deliver teaching and facilitate learning of undergraduate students. The rapid advances and almost ubiquitous availability of information and communication technologies coupled with government-led initiatives to increase student numbers and widen participation have led many universities to rethink curriculum design, delivery and management to take advantage of this new learning environment [1]. In contrast to the relatively monastic way in which scholars have traditionally operated, veterinary courses are becoming far more learner-centred than faculty-centred organizations. They now encourage and develop valuable qualities such as capacity for analysis and synthesis, independence of judgement, curiosity, teamwork and ability to communicate.

Revising Curriculums: To respond to both foreseeable and, as yet, undetermined future needs, a broad range of skills, knowledge and attributes will be required, e.g., communication skills, leadership abilities, cultural competence, business skills, interpersonal skills, values and ethics. At present it is difficult for all colleges to deliver all the desired skills. Therefore, colleges should consider developing areas of professional focus, perhaps identified as centers of emphasis. These would create critical masses of expertise and efficiencies of financial, human and physical resources. The range of training could be reflected in a national plan which would ensure that all options of veterinary endeavor in the future would be available for training at some colleges within the context of an integrated educational framework.

All colleges should collaborate on the total delivery of the national veterinary medical educational program and students could choose to qualify for their DVM degree by attending multiple institutions. Training could occur through cooperation amongst multiple institutions. Additionally, collaboration with other health professions and with other disciplines and departments on campus, could expand options for educational delivery.

Structure of Academic Programs: On the basis of a national plan, colleges should choose to focus on certain areas of competency development that reflect their expertise and are most cost-effective for them. National standards could be developed to permit college accreditation, taking into account these areas of professional focus. Examples for possible veterinary medical program designs are:

Following a specifically defined prerequisite program, there could be a two- or three-year core program, standardized across the country. This would be followed by a one- or two-year program in an area of professional focus, which would lead to a DVM (professional focus) degree. If desired, a postgraduate program could follow, leading to additional advanced degrees e.g., PhD. The professional focused training could be provided in institutions that are different from those providing the core training.

Dual degrees could be obtained simultaneously under intensified full-year programs, such as DVM/MVSc. DVM/biomedical engineering, or DVM/information and data analysis.

Research, including clinical research, should be an essential part of the functioning of each area of professional focus to advance knowledge and to be on the leading edge of that particular area.

Global Crisis and the Challenge for Job Creation: Veterinarians may be employed in various disciplines of private and industrial sector milk and meat production academia and research institutions, civil-community areas (e.g.: agricultural ministries, food and drug administration, community veterinarians).

The veterinary education in Ethiopia has played a very vital role in preparing human resource as researchers, teachers extension work and clinical services contributing

significantly in the economic development of livestock. Due to rapid changes in agricultural scenario it has become essential to analyze the present veterinary education and the job market to facilitate manpower planning and strategies and for veterinary colleges achieve educational goals.

None the less the demand for specialized manpower for sustained economic development is still immense. Since the global financial crisis thousands of jobs cuts have been announced across all sectors of the world economy. Now days, it is common in Ethiopia to wait after graduation two to three years without job. The main employer the public sector Ministry of Agriculture, teaching, research and NGOs will soon saturate. Thus the private practice is the only reaming opportunity. This year it has been announced not to employ students of pharmacy graduates due to saturation of the government job market. This is a good indicator for veterinary profession. EVA (Ethiopian Veterinary Association) should look loans for private veterinary students to establish veterinary firms. Again EVA should establish licensing criteria who should do what and from unqualified personnel doing the job. Apparently there is no legal grounds on what a layman, a paravet veterinary assistant, veterinary nurse and the veterinarian could do. Ethiopia faces shortage of veterinarians the need represents a real pressure on the country's' system of higher education to form personnel faster and more efficient. The demand for increased man power should be to address the needs rather than compete with existing veterinarians Thus there should be a balance between job market and graduate numbers. The following private business models are suggested.

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Public Model-Jobs in the ministry of agriculture and teaching positions will soon be saturated. There may be a growth into convergent team practices, which are linked to human health. As "health management organizations." In most communities, veterinarians could develop into "health care practitioners" who provide a public health and medical advisory role as well to the community. This growth into public health roles could lead to having this function built into a public service cost.

Urban Models: The trend in urban companion animal will decline, possibility. This business is unlikely to grow in the next 10 years housing, cultural, social and economic factors are responsible.

Rural Models: The trend is toward corporate practices made up of multiple veterinarians would be better than single practice, to address food animal production. The elements of emphasis are toward bio-security and industrial farming.

Corporate Model: some corporations may develop on the basis of leading-edge diagnostic technology. Although capital intensive, these could develop into expert corporations providing such pharmaceuticals, therapeutics, diagnostics, equipments and agriceuticals, etc.

Generally the trend is all models should point toward a more business-based orientation with a trend toward the outsourcing of practice management and other competencies such as nutrition, husbandry and engineering.

The Global Crisis as an Opportunity for Veterinary Education Inovation and Reform: Tertiary education institutions use the crisis to launch innovative projects and implement structural reforms Institutions may be in a position to capitalize on the downturn by investing (at lower costs or, in some cases getting more for their money) in faculty and infrastructure improvements. Increased focus on international partnerships between institutions is seen as an opportunity for future economic and social development. Strategic partnerships amongst academic institutions are mechanisms that can drive innovation and support industry and business with capacity building to effectively compete in global and regional markets during times of crisis and beyond. Reforms of grant and loan programs need to consider that strong governmental structures are needed to effectively address the administrative requirements of such programs. This crisis may offer an opportune moment to re-think and re-examine curricular and pedagogic foundations in a search for more efficient and effective mechanisms for high-quality tertiary education [16].

In the year 2011 the veterinary profession will celebrate its 250th year anniversary. Animals have provided people with food, energy, wealth, companionship and prestige. The relationship is a very intimate one, which is both passive and active. Until the First World War, horses were a mark of pride and a symbol distinguishing gentry from peasants. After World War I, the influence of horses as a means of

transportation declined and agricultural productivity expanded. the emphasis of the veterinary medical profession shifted once again by the 1950s toward companion animal medicine an emphasis that remains today.

Therefore the emphasis of the veterinary medical profession has evolved from Over the centuries Horse→ Livestock→ companion animals→ to possible new point of transition.

The single characteristic that distinguishes veterinarians, in every role they play, is their unique relationship with animals, operating at the interface between society and animals. Veterinary medicine is the only profession in the health and medical field that is trained in comparative medicine. Concern for animals, their health and well-being and their interface with people, inserts veterinarians as critical components of public health and as essential health care providers to society locally, nationally and internationally

Recent outbreaks of West Nile Virus, Ebola, Hemorrhagic Fever, SARS, Monkey pox, Mad Cow Disease, Avian Influenza and Swine Influenza remind us that human and animal health are intimately connected. A broader understanding of health and disease demands a unity of approach achievable only through a consilience of human, domestic animal and wildlife health - One Health.

One Medicine, One Health- Health care professionals acquire unified basic training and public health services are subject to similar standards for humans and animals. Recurring threats of zoonotic diseases have created a move to standardize the basic training and preparedness of all health professionals. Public health agencies are staffed with specialists in human health as well as animal health. Science and technology are continually adapting these practices, as humans demand the best for themselves, their animals and their food.

EVA and the colleges should promote public acceptance of the role of veterinarians in improving and protecting the health of people, of animals and of the environment. This will require first creating awareness, then integration into public health and human health and then finally acceptance.

Through closer collaborations with public health and human health, particularly in communications and training, common integrated roles can be developed for the benefit, security and prosperity of society.

The Need for Quality Control: Three factors suggest that levels of educational quality may be declining. First, expenditures per student have contracted over the past decade. Second, the proportion of senior academic staff with doctoral degrees has been weakening within the system. Consequently, the short term generation of sufficient numbers of academic staff, trained at the necessary levels, may be the single most difficult challenge currently faced by the higher education expansion and reform program. Third, rapid enrollment expansion is inevitably bringing progressively less qualified students into the system. Current efforts to double the size of undergraduate student numbers and to carry out an even greater expansion of graduate training, run the risk of lowering quality further unless major quality assurance efforts are incorporated into the expansion process. To this end, it is critical to establish effective quality assurance capacities at the national and institutional levels. This is a vital yet complex process that will require careful planning, decisions about types of standards and methods to be used, a time-table for implementation of its parts and thoughtful consultations to insure its legitimacy. Establishing an effective national quality assurance and accreditation process will need to be carried out in stages over the next three to five years at both the national and institutional level. In the discussion below, recommendations are made about what should be done both at the national and institution levels. The system had a target to reach public enrollments of 130,000 students in 2007, 120,000 under-graduate plus 10,000 graduate students and if we assume a more efficient staff/student ratio of 1:20, some 3,608 new academic staff were required. This represents a 125 % increase in just five years over that period contingent of 2,892 academic staff. If the proposed qualifications guidelines (30% PhD's, 50% Master's degrees) were applied, this would mean 100 new PhD holders and 200 newMaster's degree recipients. During that period, just 5 Ph.D. students were registered at Addis Ababa university[10].

Veterinary education should lead to producing "Omni-competent" professionals. It is believe that, decline in quality will change Omni-competence to increasingly become Omni-incompetence. The veterinarian will increasingly become a veterinary technician. The level of competence in all branches of veterinary practice will fall.

In Ethiopia "Veterinary Profession "still lacks best practice or any coherent structure for the enforcement of operating standards, certification and accreditation. Certification is simply the ability to expel a bad veterinarian form practicing. After all without Certification / licensing, there is nothing demonstrates incompetence or unethical behavior. By preventing incompetent or unscrupulous provides restriction from serving the public. Legal restriction on occupational entry is supposed to result in higher quality services than would occur in the absence of such restrictions.

The demand for instituting certification of veterinarians must come from those working in the profession or those desiring to work in the profession who would like a certification route to acquiring competence in the discipline. Or the demand might come from employers who believe that existing education programs aren't meeting the education needs of their employees or their businesses.

EVA and universities do not appear to have a strong enough vested interest in certification to initiate or manage such a program. The research and university academic community has as its primary interest and mission the improvement of its own in-depth and comprehensive programs so that an academic degree speaks for itself.

Accreditation standards for academic programs are often established through a joint effort of academics who wish to bring distinction to the level of the program they are offering and representatives from professional organizations that would like to increase the caliber or consistency of knowledge that can be expected of graduates of accredited programs. Accreditation criteria are established primarily for undergraduate programs. However, theoretically none of the colleges in Ethiopia could fulfill the minimum accreditation criteria as academic programs are initiated spontaneously. There is also lack of accreditation criteria and any law regarding the practice of veterinary medicine to give a license. And in the absence of such regulations it will be difficult to reinforce penalties.

Within the profession, the single most credential that a veterinarian can present is for employment is his/her degree. In Ethiopia, although the veterinary curriculum was harmonized, to allow students freely move from college to college ignoring center of focus (Center of excellence) there is also a wide discrepancy in teaching practices, teaching facilities, grading systems and the lack of standard in the externship program (Repetition of thesis, lack of resource has resulted in 90% of the thesis to focus on parasitological projects, lack of uniformity in externship exam has resulted in unfair employment rates of some graduates. Because the only criterion for employment is the GPA and some colleges generously reward their students. Moreover, despite invitation of expatriate staff from Europe and USA, as external examiners. There has been very little role in the improvement of the quality of veterinary education. Globalization and technology diffusion require standardization of competencies. For academic veterinary medicine and the colleges to respond to the broader needs of society, the verification of competence should be based on outcomes and the standards established by EVA and administrative boards will form to verify competency in standards of service and codes of ethics, so that unqualified persons would not be allowed to dupe an ill-informed public. EVA should standardize the exam at the end of Externship. This time there is no any standardized exam.

In conclusion, veterinary medicine must remain relevant to the changing needs of society. Veterinary medical education can respond to these changing needs only by expanding the areas of education required to prepare the veterinarians of the future. Veterinary medical colleges can achieve this expansion by identifying areas of professional focus. In addition to meeting the demand created by population growth and increasing expectations for traditional services, the number of graduating veterinarians must be increased to allow the profession to respond to new demands and roles. This increase could be facilitated by a publicity campaign to expand the image of the profession. It is necessary that legislators and policy makers understand the extent of the value that veterinary medicine brings to the health and well-being of society and actively support the profession with appropriate legislation and increased funding. There is an opportunity for veterinary medicine to capitalize on new technology for the delivery of education and veterinary services. Veterinary medicine should seek to achieve greater collaboration and cooperation with human health in the public health area, with veterinarians playing a more dominant role in the management of zoonotic disease, public health and the impact on eco-system health.

The "One Medicine" concept is an exciting and logical future goal. The national efforts are wonderful supplements but they are not in my judgment substitutes for efforts at college or university level. The future progress will be measured by how many suggestions and recommendations are translated into action.

REFERENCES

1. Willis, N., F. Monroe, J. Potworowski, G. Halbert, B. Evans, J. Smith, K. Andrews, L. Spring and A. Bradbrook, 2004. Envisioning the future of veterinary medical education: the association of american veterinary medical colleges foresight project, final report. J. Veterinary Med. Edu., 34(1): 1-41.
2. Fouilloux, M., 2010. The Global Economic Crisis: Education international speaks out. IAU, 16(1): 20-22. www.iau-aiu.net. Accessed, December, 2010

3. Varghese, N.V., 2009. Running to stand still: Higher education in period of global economic crisis. Global forum on higher education (GFEF), pp: 13-16. December 2009. Penang, Malaysia. (www.gheforum. usm.my/2009). Accessed, April, 2010.
4. Yizengaw, T., 2004. The Status and Challenges of Ethiopian Higher Education System and its Contribution to Development; Ethiopian Journal of Higher Education, 1:(1) 1-19
5. Cohen, J.E., 1997. Population, economics, environment and culture. An introduction to human carrying capacity. J. Appl. Ecol., 35: 1325-1233.
6. Leighton, F., 2007. Veterinary medicine for a world in crisis. Can. Vet. J., 48(4): 379-385
7. McNeill, J.R., 2000. Something New Under the Sun: An Environmental History of the twentieth Century World. New York: WW Norton, 421.
8. Hardin, G., 1968. The tragedy of the commons. Science, 162(3859): 1243-1248.
9. Imhoff, M.L., L. Bounoua, T. Ricketts, C. Loucks, R. Harriss and W.T. Lawrence, 2004. Global patterns in human consumption of net primary production. Nature, 429: 870-873.
10. World Bank, 2004. Higher education development for Ethiopia: Pursuing the vision. Ethiopian Ministry of Education, Addis Ababa. Ethiopian Ministry of Education. 1997. The future directions of higher education. January 1997, Addis Ababa.
11. Anastasia, S., A. Tsingotjidou, C. Batzios and G. Papadopoulos, 1990. Economic crisis and the quality of education. Intl. J. Edu. Development, 10(2-3): 115-129.
12. Varghese, N.V., 2001. Impact of the economic crisis on higher education in East Asia: Country experience, Paris: IIEP/UNESCO.
13. Varghese, N.V., 2010. Higher education and the global economic crisis. IAU. 16(1): 12-13. www.iau-aiu.net. Accessed, Decembers, 2010.
14. FAOSTAT., 2004. Livestock sector brief Ethiopia 2003. Food and Agriculture Organization of the United Nations (FAO). on-line statistical service. Rome: FAO. http://apps.fao.org. Acessed on December 2010.
15. Bassett, R., 2010. The financial crisis as an opportunity for tertiary education innovation and reform.IAU, 16 (1):16-17 www.iau-aiu.net. Accessed, Decembers, 2010.