

Review Article

Review on Community-Based Animal Health Workers in Ethiopia

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Abstract

The expansion of livestock industry requires strong governance of animal health systems to acquire human and logistical resources, which help in addressing the risks associated with the livestock sub-sector. However, the delivery of veterinary services in remote rural areas of most developing countries remains a serious challenge due to poor veterinary infrastructure, limited professionals and security concerns. Under these circumstances, a useful approach to improve primary-level veterinary service and disease surveillance is the introduction and promotion of Community-Based Animal Health Workers (CAHWs). Community-based animal health workers are knowledgeable farmers who are selected by their communities and trained to provide basic animal health services at village level. Depending on training and the material resources available to them, CAHWs can provide preventive, diagnostic and curative services relevant to the most pressing animal health problems to the concerned communities. In Ethiopia, the CAHWs model has been one of the ways utilized in the delivery of animal health services following the veterinary service reforms especially over the last two decades. Nonetheless, the sustainability of most CAHWs initiatives in the pastoral districts of the country has been challenged by several factors. As many of the CAHWs projects had been implemented by NGOs and bilateral agencies, the CAHWs services do not continue to operate when the funding organizations withdraw. Moreover, there are no national regulations stipulating the level of supervision and professional development required for CAHWs. Thus, improving the link between CAHWs and public veterinary services, continuous capacity building, regular monitoring and assessment of their services are essential in order to accelerate and sustain community-based animal health services across Ethiopia. In this seminar paper, literature is reviewed about community-based animal health workers in Ethiopia, with emphasis to their role in delivering veterinary services, major challenges impeding their effectiveness, and future prospects to ensure the sustainability of primary animal health systems in the remote, pastoral zones of the country.

Keywords: Community-Based Animal Health Workers; Livestock Diseases; Pastoral Communities; Primary-Level Veterinary Services; Quality and Sustainability of Veterinary Services

Introduction

Livestock industry plays a fundamental role for sustainable development of most rural communities, especially in sub-Saharan Africa [1]. The rapid expansion of livestock production needs significant investment in animal health systems to acquire human and logistical resources to address the risks associated with livestock industry. However, this resource has been curtailed mostly by livestock diseases, poor veterinary infrastructure and limited professionals. The situations have been worsened by continuous fiscal challenges which have been limiting the effective provision of veterinary services in remote areas [2].

Thus, strengthening the governance of animal health systems in both the public and private sectors is essential to minimize the above challenges. This has been partly addressed by introducing and promoting Community-Based Animal Health Services (CAHS) in many low-income countries [3]. Hence, community-based animal health services are generally regarded as having performed well with

substantial positive outcomes for rural, pastoral communities [4].

Community-Based Animal Health Services (CAHS) have been delivered by trained personnel known as Community-Based Animal Health Workers (CAHWs). Community-based animal health workers are knowledgeable farmers, usually livestock owners, who are selected by their communities and trained to provide basic animal health services at village level. To date, community-based animal health workers are present in the majority of sub-Saharan Africa where they play a key role in the delivery of basic veterinary treatments, vaccination, drugs distribution and disease surveillance [5,6,7].

In Ethiopia, community-based animal health workers provide a range of community services depending on their training and the material resources available to them. It has been realized that they often provide preventive, diagnostic and curative services relevant to the most pressing animal health problems in remote and marginalized areas of the country [8]. Hence, the CAHWs model has been one of the ways utilized in the delivery of animal health services following

the veterinary service reforms especially over the last two decades [9,10].

Nevertheless, community-based animal health workers have been challenged by several factors in the course of delivering primary animal health services. The sustainability of CAHWs heavily relies on the level of income received from animal health services, the degree of integrity of financial management of drug inputs and a satisfactory remuneration for the individual community based animal health workers [11]. Lessons learned from CAHWs projects in the pastoralist areas of Ethiopia indicated that when funding organizations withdraw, the CAHWs services do not continue to operate [12,13].

Furthermore, effective training and regular supervision of CAHWs are fundamental requirements of successful implementation of primary animal health service initiatives. However, Ethiopia had installed pro-CAHW policies; it is struggling to implement this policy due to weak institutions. In addition, there are no national regulations stipulating the level of supervision and continuing professional development required for community-based animal health workers [3,13]. In addition, in the absence of official regulation, ineffective or dishonest CAHWs are not tolerated by the communities who select them and pay their incentives [14].

Based on the above background, this review paper is prepared with the objectives to:

- Briefly summarize the role of community-based animal health workers in the delivery of veterinary services;
- Highlight the status of community-based animal health services in Ethiopia;
- Delineate the major challenges facing community-based animal health workers.

The Concept of Community-Based Animal Health Workers

Definitions

Community-Based Animal Health Service (CAHS) is a general issue, which takes account of a number of measures focusing on enhanced livestock health and production mostly in developing countries [15]. Community-based animal health services are veterinary services provided by the community for the community. Here, community associations or individuals take the responsibility to plan, manage, deliver, and finance the provision of services to their own community [16].

Community-based animal health services involve institutionalization of programs and workers, integrating into the wider animal health policy. They are an alternative to state services and can complement such service at other levels. In short, it pursues a rather holistic approach to community development avoiding pure veterinary-minded actions, thus ensuring part-privatization of field veterinary services [17,18].

On the other hand, the term “Community-Based Animal Health Workers” (CAHWs) encompasses a range of names used for primary-level veterinary workers, including community-based animal health workers; para-vets, barefoot vets; health auxiliary worker; health

volunteer; community health aide, village health workers, etc. [16]. In the current decade, CAHWs are seen as persons who live and probably grew up in the community concerned. They are known and respected in the community, recognized as knowledgeable livestock keepers, and are selected for training by the community to deliver the service [19,20].

Community-based animal health services

The delivery of adequate veterinary services in rural and marginalized areas of most developing countries remains to be a serious challenge due to their large physical size but weak infrastructure, frequent insecurity, and the need to reach mobile communities. In nearly all cases, veterinarians have been unwilling to work in these remote and underdeveloped areas [14,20]. Thus, there is a need for alternatives to initiating, improving and sustaining the delivery of veterinary services in these areas. One publicized initiative to refocus service delivery has been the introduction of community-based animal health services [21]. The rationale behind Community-Based Animal Health Services (CAHS) is that, while a wide range of diseases may potentially affect livestock, the overwhelming majority of morbidity and mortality in any given locality is caused by a finite set of common and predictably occurring disease problems that are conditioned by an interplay of local geography, climate, and animal management systems [22,23].

Therefore, the primary objective of community-based animal health programs is to reduce livestock loss, thereby increasing the productivity of various animal resources by improving the access of rural livestock keepers to affordable, basic animal health services [3,22]. This is accomplished through appropriate identification of livestock diseases, selection and training of community representatives to deliver the services, follow-up training, and community-level monitoring and evaluation of the services delivered for the concerned communities [12,23-25].

Community-based animal services have been effective mostly in pastoral areas where there is active involvement of local communities in the entire cycle of the initiatives. The relatively low cost and local acceptability of community-based animal health services seems to offer a way forward, particularly if these services are supervised by public veterinary officers or nearby private veterinarians [20]. Therefore, community-based animal health services, implemented by governmental veterinary statutory bodies, NGOs or bilateral organizations, are regarded generally as having performed well with substantial positive outcomes for the communities concerned [26,27].

The need for community-based animal health workers in veterinary services

Historical perspectives of community-based animal health workers: The concept of Community-Based Animal Health Workers (CAHWs) probably arose from experiences in the human health sector. The terminology “barefoot vets” was derived from China’s successful and ongoing use of “barefoot doctors” to bring basic services to the masses [21]. In the early 1970s, the World Bank advocated that livestock producers’ associations should include “grassroots level para-veterinarians” to deliver sustainable veterinary services for remote rural communities. Since that time, various Non-Governmental Organizations (NGOs) and bilateral agencies have developed and refined CAHWs systems, as shown in Table 1 below

[27].

Until the mid-1980s, many governments in the greater horn of Africa had been the main providers of veterinary services, either free of charge or at highly subsidized level. However, with the growth of their livestock sectors, the range and volume of veterinary services to be provided increased tremendously, limiting the governments' capacity in service delivery. These approaches principally entailed privatization and were undertaken after considerable prodding from donors, mainly the World Bank and European Union [14,16,22].

Literature on the role of community-based animal health workers revealed that CAHWs initiatives have been implemented in 46 nations of Africa since the beginning of structural reforms in veterinary services. Consequently, there has been a growing interest in CAHWs systems, which is largely related to the high impact on animal health and human livelihoods resulting from improved basic veterinary care in rural communities [20,26].

There is increasing evidence from the dryland areas of eastern Africa that community-based veterinary services can provide effective animal health care for pastoral communities. For instance, a recent survey by the Pan African Program for the Control of Epizootics (PACE) identified over 390 CAHWs projects in the horn of African countries alone [25]. Today, community-based animal health systems cover a substantial area of southern Sudan, pastoral areas of northern Kenya, north-east Uganda, northeastern Ethiopia and northern Tanzania [16]. Table 1 below summarizes the number of CAHWs trained in nine countries of the Greater Horn of Africa [15,24]. However, it should be noted that there could be far more CAHWs in these countries, as the information presented in this paper represents the document reviewed before some 15 years [26].

Community-Based Animal Health Workers (CAHWs) have been responsible for the delivery of primary-level veterinary services, most importantly in remote rural area of developing countries (Table 2). The process of privatization of veterinary services in many countries of sub-Saharan Africa means that farmers and CAHWs are often responsible for the treatment of the common livestock diseases [28]. Community-based animal health workers can also apply insecticides, administer vaccines and provide primary animal health services [3,29].

Furthermore, most pastoral societies in the remote districts of sub-Saharan Africa use CAHWs mainly as a source of veterinary drugs and related inputs [3]. In addition to this, CAHWs have been used by the farming community as the reliable source of animal health advice. It has been revealed that when there is a CAHW, over 70% of livestock keepers would rank them as their preferred source of animal health advice. Interestingly, despite their greater knowledge, veterinarians have not been ranked highly as sources of advice, since they were simply too far away [28]. Under this circumstance, CAHWs remain the fundamental source of animal information, advice and to improve quality of veterinary services [3,18].

Obviously, animal disease surveillance data is of fundamental importance for countries wishing to engage in international livestock trade, as it contributes to the identification and recognition of most pressing diseases and associated health problems. However, establishing and maintaining nationwide animal disease surveillance

systems remains a major challenge in many developing countries [14]. This has been mostly attributed to poor basic infrastructure and limited veterinary professionals to conduct adequate surveillance in remote areas [3].

One useful approach for improving disease surveillance in rural areas is using CAHWs. These workers can act as the interface between livestock keepers and official disease surveillance systems [30]. Community-based animal health workers can be trained to complete basic disease monitoring forms and report disease outbreaks to the nearest veterinarian or veterinary assistant. Thus, apart from routine treatment of animals, CAHWs have contributed to the management of outbreaks of notifiable diseases, including contagious bovine pleuropneumonia (CBPP), Foot- and-Mouth Disease (FMD) and Anthrax [18,31].

Similarly, CAHWs play key roles in the eradication of some epidemic diseases. For instance, CAHWs played an important role in Rinderpest (RP) eradication in pastoral areas that are inaccessible to conventional government veterinary services and disease reporting system. This has been made possible by the development of a heat-stable Rinderpest Vaccine (RPV) that can be used by CAHWs without the need for extensive cold chains [32]. Moreover, CAHWs have been engaged in the eradication campaigns of arthropod vectors, such as tsetse flies, by applying insecticides to cattle and deploying traps [15,33].

Selection of community-based animal health workers for veterinary services: Most of the community-based animal health workers which have been operating in sub-Saharan Africa were selected by government authorities and/or veterinary officers, funded and implemented by NGOs or bilateral organizations. However, it has been noticed that when these organizations withdraw, the community-based animal health systems do not continue to operate [14]. One of the reasons has been the selection process of the Community-Based Animal Health Workers (CAHWs) whose qualities do not always suit the communities as they are imposed hierarchically through local authorities [17].

In other words, proper selection of CAHWs strongly influences long-term success of community-based animal health services. Thus, the selection criteria have to be developed based on the local custom and project goals, in which the concerned community should take active role in the selection process. Essentially, governments, donors and NGOs have to acknowledge that local people should take part in all stages of community-based animal health services, including monitoring and evaluation of the success of these initiatives [14,26].

On the other hand, an effective mechanism should be designed to promote the selection, subsequent training and monitoring of female pastoralists as CAHWs. Finally, the training and supervision of the selected CAHWs should be done locally whenever possible, and should not be too far from homestead, so as not to compromise the livelihoods of trainees by removing them from their homes, families and livestock resources [25,26].

Effectiveness and sustainability of community-based animal health workers

Effectiveness of community-based animal health workers: Evaluation of animal health systems delivered by CAHWs is generally

Table 1: Number of NGOs involved in CAHS in the Greater Horn of Africa.

List of countries	No. of NGOs involved in CAHS initiatives
Kenya	72
Tanzania	48
Uganda	30
Ethiopia	24
CAR	21
Sudan	17
Somalia	17
Eritrea	1
Total	230

based on established criteria, such as equity, accessibility of service, quality of service, human and financial resources. The equity criterion describes fairness in a given system, or making animal health services readily available and affordable to livestock owners in remote areas. Equity of veterinary service remains one of the core challenges to effective animal healthcare in most sub-Saharan Africa [14,26].

On the other hand, accessibility of veterinary service describes physical distance to animal health centers including uneven access of CAHWs to transportation, and social distance. As infrastructure is not generally well-developed in Africa, under these circumstances CAHWs are an important asset in reducing physical distances to animal health systems and, thus decreasing inequalities in access to veterinary services [34]. Social distance, understood as differences in access to service due to gender, ethnicity, education and wealth status, may also play an important inhibiting role in veterinary service delivery [11].

Qualities of services delivered by CAHWs are also indicators of veterinary services. Quality of service is usually associated with application of medicine and the services performed. Several studies have pointed out that communities recognize drugs sold by CAHWs as having a better quality than those sold in black markets [23]. Further, incorrect administration of unregulated drugs has been highly reduced by the presence of CAHWs. Yet, proper selection and supervision of CAHWs are also essential considerations in the delivery of effective veterinary services [14].

Sustainability of community-based animal health workers: Sustainability of the CAHWS services is often related to the level of income generated from their livestock health work; linkage with local drug suppliers; the level of training and supervision by veterinary statutory bodies; and institutional arrangement for legalization and promotion of the services delivered by CAHWs [3]. In summary, the sustainability of CAHW initiatives have been influenced by the following factors which led to immediate failures of the services:

- Absence of regular technical and material inputs to the CAHWs;
- Unnecessary competition from external official service delivery programs;
- Poor commitment of the implementing bodies to materialize the targeted out puts, most importantly weak follow up of the donors and local governments to sustain CAHWs programs.

Table 2: Number of CAHWs trained in the Greater Horn of Africa.

Countries	Minimum number of CAHWs	Estimated number of CAHWs
Kenya	7777	8652
Tanzania	2031	2669
Uganda	1110	1294
Ethiopia	1423	1589
CAR	7190	8218
Sudan	2138	2264
Somalia	505	673
Eritrea	142	142
Total	22,174	25,501

• Therefore, the following key activities should be accomplished in order to ensure the sustainability of any the services delivered by community-based animal health workers.

- Meeting the actual service demands of the community concerned;
- Designing clear projects with defined exist strategy to be ensured during project life and strong appraisal to see the possibility of achieving the out puts;
- Full commitment by local governments, project donor and other partners to follow up the effective implementation, supervision and monitoring of CAHWs [35].

Status of Community-Based Animal Health Workers in Ethiopia

Although Ethiopia has the largest livestock resource in Africa, the production system is generally subsistence and productivity is very low. Most importantly, the subsector has been hampered by rampant livestock diseases and poor veterinary services due to limited infrastructure and veterinary personnel [4,22,36].

Veterinary service provision has mostly been dominated by the public sector, focusing more to the highland areas. Therefore, the huge livestock resource in the remote pastoral areas has been suffering from diseases and associated problems [37]. In response to these gaps, governmental and Non-Governmental Organizations (NGO) introduced different models of community based animal health service delivery systems as measures to minimize the vulnerability of livestock to detrimental conditions. The system supports provision of basic animal healthcare by community-based animal health workers [22,38].

The origin of community-based animal health workers in Ethiopia

Community-Based Animal Health Workers (CAHWs) were first trained in Ethiopia in the 1970s, when new ideas on rural development led some development organizations to work more closely with communities to prioritize and address local problems in a practical and sustainable manner.

With many remote livestock-rearing areas underserved, a phase of scaling-up of CAHW initiatives began in the early 1990s. Over time, CAHWs attracted the attention of government veterinary services, and by the mid-1990s, there was a call for CAHWs to be



Figure 1: Community-based animal health workers diagnosing livestock diseases, Afar region.



Figure 2: Community-based animal health workers in vaccination programs, Somali region.

formally recognized and regulated [26].

The US Office of Foreign Disaster Assistance (OFDA) commissioned CAHWs projects in 1998, which highlighted substantial achievements of CAHWs in terms of rinderpest control and basic clinical veterinary service provision, especially in remote or conflicted-affected dryland areas of eastern Africa, including Ethiopia [26]. Most importantly, the effectiveness of CAHWs initiatives in the Afar region influenced the development of CAHW projects across the northeastern and southeastern regions of the country [34]. Subsequently, CAHWs were successively trained by collaboration of government and NGOs in these regions [37].

As the number of CAHWs increased and their impact became more widely known, humanitarian projects increasingly used them for emergency response and rebuilding livelihoods mostly after the occurrence of disasters. Nonetheless, in the northeast district of the country, the use of CAHWs in emergencies highlighted some important coordination issues, such as the use of subsidized emergency drugs undermining privatization initiatives. By the mid-2000s, these issues influenced the need for the development of guidelines and standards for livestock projects in emergencies [14,26].

Thus, Community-Based Animal Health Workers (CAHWs) became central to the delivery of veterinary services. Accordingly, over 2,000 CAHWs were trained in pastoral areas of Ethiopia in the mid-2000s [26]. Today, CAHWs have been found to be an

essential component of effective animal healthcare delivery system, and were much appreciated by livestock owners [35]. To ensure their effectiveness, a national-level multi-stakeholder team was set up to examine CAHWs impacts, comprising government vets and representatives from the Ethiopia Veterinary Association, University of Addis Ababa and NGOs [25].

The roles of community-based animal health workers in the delivery of veterinary services

Treatment and vaccination against livestock diseases: Community-based animal health workers have been responsible for some curative treatment and vaccination of livestock against diseases. They have been trained to recognize and treat the common livestock diseases, administer vaccine and provide simple routine services such as castration, dehorning, hoof trimming, wound management, etc. (Figure 1 and 2). They also refer more complicated services to qualified veterinary staff in their vicinity [39,40]. It has been noted that CAHWs can provide services at much lower cost than comparable services delivered by professional veterinarians, because they live locally, often use cheaper local treatments and have lower income expectations [22,28].

In the remote districts of Ethiopia, most pastoral societies use CAHWs as a main source of veterinary drugs and advice. Recent evidence suggests that CAHWs actually improve the use of quality veterinary drugs in these areas [22]. Furthermore, CAHWs have been used by the farming community as the reliable source of animal health

advice. Research in the Afar, Somali and Borana regions revealed that CAHWs improve the use of veterinary drugs [14,41].

On the other hand, it has been revealed that when there is a CAHW, over 70% of livestock keepers would rank them as their preferred source of animal health advice, and in the vast majority of cases, their advice would be correct. Interestingly, despite their greater knowledge, veterinarians have not often been ranked as major sources of advice in remote areas of Ethiopia since they were simply too far away. Thus, CAHWs main the fundamental source of information, advice and to improve quality of veterinary services [3,15].

Role in disease surveillance and eradication campaigns: Scaling and maintaining nationwide animal disease surveillance systems remains a major challenge in Ethiopia. This has been mostly attributed to poor basic infrastructure and limited veterinary professionals to conduct adequate surveillance in remote areas. One useful approach for improving disease surveillance in these areas is by using CAHWs. These workers can act as the interface between livestock keepers and official disease surveillance systems [31]. They can be trained to complete basic monitoring forms and report disease outbreaks to the nearest veterinarians or assistants. Thus, CAHWs highly contribute to the management of outbreaks of most notifiable diseases in the absence of public veterinary services [24,41].

Similarly, CAHWs have played key roles in the notification and eradication of some epidemic diseases. For instance, they played an important role in Rinderpest (RP) eradication in the Afar and Somali areas. This activity was made possible by the development of a heat-stable Rinderpest Vaccine (RPV) that can be used by CAHWs without the need for extensive cold chains [26,32]. Moreover, CAHWs have been engaged in the eradication campaigns of arthropod-borne diseases. For example, they have been effectively engaged in the eradication campaign of tsetse flies from the southern region of Ethiopia, by mobilizing local communities, applying insecticides to cattle and deploying traps and targets [14,15].

Roles in research design and implementation: Pastoralists possess rich detailed information on animal health matters. The presence of CAHWs in the pastoral communities not only makes this knowledge accessible but also allows the identification of other animal health concerns of pastoralists upon which effective participatory researches can be conducted so as to provide the necessary solutions [19,35].

In Ethiopia, community-based animal health workers have also played active role in the design and implementation of most participatory researches. For example, they could provide essential information regarding the history, leadership, organization and possible expectations of the communities; location of livestock and seasonal movements; logistics arrangement; and areas of insecurity [3]. Furthermore, CAHWs could perform efficient tasks in sampling animals and, with some additional training and close supervision by veterinarians, taking blood or other samples. In addition, they could help in the dissemination of research findings, and incorporate new information obtained from livestock keepers [34,42].

Challenges and Future Prospects of Community-Based Animal Health Workers in Ethiopia

Challenges to the sustainability of community-based animal health workers in Ethiopia

As Community-Based Animal Health Workers (CAHWs) operate in the remote rural areas, particularly in pastoral districts, they face several challenges of social, political and logistical origin [22,42].

Legislation and policy constraints: The development and sustenance of CAHWs initiatives are made possible by a concerted action of the respective communities, governments supported by donors and NGOs. Essentially, the policies and strategies of veterinary authorities towards CAHWs systems are important components for effective veterinary services delivery [42,43]. In Ethiopia, the Ministry of Agriculture and Rural Development (MoARD) recognizes the economic and production benefits of mobile livestock rearing systems in pastoral areas, and supports the CAHWs systems which meet the needs of mobile communities and their herds [44,45].

However, there are current challenges facing CAHW systems, mainly at the level of veterinary governance. These challenges relate to the protracted capacities of government veterinary departments to train, regulate, and supervise CAHWs and other para-professionals, and ensure the quality and reliability of supply of veterinary drugs that reach them [26,35]. Support to the privatization of clinical veterinary services also remains a constraint, along with systems for the quality control of CAHWs, and veterinary pharmaceuticals [13,43,45].

Lack of adequate drug and equipment supply: During the initial phases of CAHWs programs, different NGOs had funded the projects. However, it has been found that most CAHWs generated low income from animal health work once the facilitating NGOs withdrew from the initiatives [42]. Reduced income drives CAHWs to look for alternative sources of income. Additionally, in areas where CAHWs no longer had drugs and other veterinary inputs, their recognition and respect in the community would reduce substantially [3].

Reduced income from government vaccination campaigns: Government vaccination campaigns are becoming infrequent unless various NGOs provide the necessary support. In areas where vaccines were in short supply and cost recovery was involved, government staffs often avoid using CAHWs to maximize their own income. Consequently, many trained CAHWs search for alternative work, including daily labour work and other minimum stipends [25,35,39].

The challenge of limited transport access and insecurity: In nearly all cases, veterinarians have been unwilling to work in the remote, underdeveloped areas where poorer livestock keepers live. Hence, without the frontline community-based animal health workers, there is few, if any veterinary services in pastoral areas of Ethiopia [14]. Nonetheless, most CAHWs move by foot over vast areas (with the range of 20-30km) to deliver the veterinary services. These areas mostly have poor road network, transport access and other infrastructure. Thus, many CAHWs face difficulties of accessing the most remote areas to serve the community [22,38,39].

Additionally, there have been recurrent conflicts within and among the ethnic groups of pastoral communities, which substantially

hinder the free movement of CAHWs to provide the intended animal health services. In addition, high-value veterinary drugs are often stolen, worsening the situation and thus discouraging these workers [3,17,35].

Minimal supervision and infrequent refresher training: Effective training and supervision of CAHWs are fundamental requirements of successful CAHWs projects. In the absence of private vets and NGOs, government veterinary staffs provide supervision for CAHWs. However, research disclosed that CAHWs working under government supervision could not receive sufficient supervision or ongoing training. Overall, our country had installed pro-CAHW policies, but it is struggling to implement this policy due to the presence of weak veterinary institutions. In addition, there are no national regulations stipulating the level of supervision and continuing professional development required for CAHWs [13,17].

Future prospects of community-based animal health workers in Ethiopia

The need to enhance the quality control of community-based animal health workers: Sustainable implementation of CAHW systems at national level highly depends on clear policy on veterinary service and adequate government support to CAHWs initiatives to fulfill their roles. Within this policy framework, national veterinary institutions should strengthen their regulatory capacity to control the routine activities of community-based animal health workers [43]. To this effect, veterinary services need to develop objective and transparent systems for the accreditation, monitoring and supervision of CAHWs across the country [17].

For this purpose, a standard curriculum should be developed and training of CAHWs should be assessed by veterinary inspectors, based on standardized methods. Additionally, veterinary bodies should define systems for supervision and responsibility of CAHWs, measures of CAHWs knowledge of disease diagnosis, use of veterinary pharmaceuticals, and practical skills. Finally, a procedure should exist for ensuring that all proposals for new CAHWs projects by governmental agencies, NGOs and private vets are screened by the veterinary authority to adhere to quality control indicators and minimum standards [3,43].

The need to improve the role of community-based animal health workers in disease surveillance and reporting systems: Until recently, many diseases in rural areas are not reported to concerned bodies. On the other hand, almost all cases treated and diagnosed by CAHWs programs have been reported to their respective NGOs [35]. To date, there is substantial evidence that community-based disease surveillance strengthens the national disease surveillance system in Ethiopia [14,22]. However, the challenge remains on how to feedback the information to communities and create a two-way relationship, rather than using CAHWs for 'data mining [35]. Hence, there should be a legislation which enforces field veterinarians, concerned NGOs and para-veterinarians, including CAHWs, for timely report of livestock disease outbreaks within local communities [43]. Similarly, there should be a clear way to feedback the communities regarding the appropriate measures taken by all concerned bodies to alleviate the core livestock health problems [3,13,25].

Improving the link between CAHWs and other veterinary

services: One way to improve the financial sustainability of CAHWs is to link them to public veterinary services as well as private pharmacies. As these linkages develop, it will be interesting to see how community perceptions of an ideal CAHW compare with the qualities preferred by private pharmacy owners or similar. In Ethiopia, there are no guidelines on how to ensure linkages between CAHWs and governmental veterinary services as well as private pharmacies. In addition, there are continued confusion as government constructs new animal health posts in areas where the private sector can easily operate [24,35].

Furthermore, there is no adequate institution to regulate private pharmacies linked to CAHWs. For this reason, there is a need to build linkages between public veterinary institutions, community-based animal health workers and the private veterinary service agencies, as they complement each other in order to strengthen animal health services delivery both in the highlands and the remote pastoral districts of Ethiopia [13,26].

Conclusions and Recommendations

Pastoralist livestock production continues to be the main economic activity for households in the remote drylands of eastern Africa, including Ethiopia. Provision of quality veterinary service is one of the key approaches for protecting livestock assets in these areas. To this effect, CAHWs systems represent the most viable and effective way to deliver basic veterinary services, disease surveillance and animal health information system, research and disease eradication programs. There has been substantial progress with developing CAHWs systems and their impacts on the livelihoods of pastoral communities of Ethiopia [46]. However, there are still many challenges influencing the effectiveness and sustainability of these initiatives. Many of these challenges are at the level of veterinary governance, and the capacities of government veterinary institutions to supply veterinary drugs and ensure effective regulation of CAHWs and private veterinary services. The absence of effective linkage between the veterinary statutory bodies, the CAHWs systems and private veterinary service agencies has been worsening the situation in most areas of the country. Furthermore, support to the privatization of clinical veterinary services remains a persistent constraint, most importantly in areas which are inaccessible to government veterinary services. This situation calls for a concerted action by local governments and other partners to enhance effective implementation and sustenance of CAHWs systems to meet the primary needs of mobile communities and their livestock resources in the remote, underserved pastoral districts of Ethiopia.

Based on the above conclusions, the following recommendations are forwarded:

- Ethiopia needs to establish the CAHS units within the veterinary statutory body to enhance training and supervision for all CAHWs initiatives. Moreover, there is a need for quantitative evidence on the state of private veterinary pharmaceuticals across the country.
- There should be strong and continuous government support to link CAHWs systems with public veterinary institutions and private pharmacies to improve veterinary services.

- Further efforts should be made to develop the basic rural service infrastructures, so as to promote and sustain privatization of veterinary clinical services in the pastoral areas.

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