Addis Ababa University

College of Development Studies

Center for Rural Development

The Effect & Contribution of One-Health Approach Perception to Pastoral of Livelihood: The Case Study of Filtu & Dekasuftu woredas, Somali Regional State, Ethiopia.

Master's Thesis Submitted to the Center for Rural Development as A Partial Fulfilment of the Requirements to the Degree of Master of Arts (MA) in Rural Development

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As a thesis advisor, I hereby certify that I have read and evaluated this thesis prepared under my guidance, by **Solomon Hiruy Abebe**, entitled ***"The Effect and Contribution of One-Health Approach Perception to Pastoral Livelihood: The Case Study of Filtu & Dekasuftu woredas, Somali Regional State, Ethiopia."*** I recommend that it to be submitted as fulfilling the thesis requirement.

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Advisor	Signature	Date

As a member of the Board of Examiners of the MA Thesis Open Defense Examination, we certify that we have read, evaluated the thesis prepared by **Solomon Hiury Abebe**, and examined the candidate. We recommended that the thesis be accepted as fulfilling the Thesis requirement for the degree of Master of Arts in Rural Development.

Member of board of Examiners:

_____	_____	_____
Internal Examiner	Signature	Date
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External Examiner	Signature	Date

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Abstract

The Government of Ethiopia and its development partners recognize the critical importance of intensifying multi-sectoral and multidisciplinary collaboration and coordination to be able to effectively prevent, detect and respond to health threats at the animal, human and environmental interface. The four core One-Health government sectorial signed the Memorandum of Understanding.

The human, animal and environment interface has made the routine disease prevention and control process shows a promising start in Filtu and Deka-Suftu Woreda. This condition created a new concept, one health, in which the health of each group is interconnected and dependent. This concept is based on the collaborative efforts and communication of multiple disciplines working together to attain optimal health of people, animals, and the environment. Therefore, the objective of this review is to show how an integrated work between concerned bodies mainly animal and public health is helpful for better health in the pastoral areas of Ethiopia through one health approach; assess its contribution in livelihoods promotion and explore its overall relevance to the study area.

Many livestock diseases are not limited only to animals but directly or indirectly transmit from animals to humans and are known as Zoonotic diseases. The occurrence of zoonotic diseases involves interaction of animal, human and the environment requiring coordination and collaboration of efforts between human and animal health as well as other relevant sectors to attain optimal health for people, domestic animals, wildlife, and the environment. This is highly important and value adding in terms of manpower, resource and financial savings. However, because of no or little awareness and knowledge on zoonotic diseases and their control and prevention strategies, different sectors make separate efforts. CCM & stakeholders have recognized the gap and importance of OH approach and established OH project to focus on the creation of better understanding on zoonotic diseases and their control and prevention methods which could be achieved through trainings of environmental, animal and human health professionals, authorities, other relevant stakeholders and the community. CCM focused on their specialities of animal & human health activities, others managed the environmental part. It is also important that CCM in collaboration with other stakeholders establish One Health platform and strategy through which implementation of OH concept could be realized. This is an important step as it brings multidisciplinary sectors together for coordinated and collaborative efforts through effective mobilization of resources, early disease outbreak detection, reporting, introducing surveillance systems, joint planning, and implementation of effective and sustainable control and prevention of zoonotic diseases.

The Problem of life conditions of pastoral and agro-pastoral communities in Filtu and Dekasuftu Woreda not solved by the involvement of a number of NGOs like CCM, but also needs a participatory approach where the community, public and animal health workers, and local authorities as well as other relevant sectors was actively involved. The One-Health Approach intervention without a collaboration of the pastoral and agro-pastoral communities, the woreda, zonal, regional and federal level government bodies like universities, research institutes and donor countries should give priorities to be One-Health Approach sustainable. I recommend the following based on our research objectives and research questions that the gap what I observed to be filled by the current One-Health Approach interventions concepts.

Keywords: One-Health Approach, Zoonotic diseases**,** pastoralist livelihood, integrated approach

ACRONYMS

ACPA	Aged children Pastoralist Association
AHA	Animal Health Assistant
AHP	Animal Health Post
AHS	Animal health service
AHSP	Animal health Service providers
AHT	Animal Health Technicians
AHWs	Animal Health Workers
AICS	Italian Agency for Cooperation and Development
Alt	Altitude
AU	Africa Union
CAHWs	Community Animal Health Workers
CBPP	Contagious Bovine Pleuro-Pneumonia
CCM	Comitato Collaborazione Medica/Medical Collaboration Committee
CCPP	Contagious Caprine Pleuro-Pneumonia
CDC	Communicable Disease Centre
CISP	Comitato Internationale Per Lo SviLuppo Dei POPOLO (International Committee for the Development of People)
COOPI	Cooperazione Internazionale
FAO	Food and Agriculture Organization
FMD	Foot and Mouth Disease
GHSA	Global Health Security Agency
GIS	Geographic Information System
GoE	Government of Ethiopia
GPS	Geographic Positioning System
HC	Health center
HEALTH	Higher Education Alliance for Leadership Through Health
HHP	Human health professionals
HIV/AIDS	Human Immune Virus / Acquired Immuno Deficiency Syndrome
IHR	International Health Regulation
JEE	Joint External Evaluation
Lat	Latitude
Long	Longitude

LPDO	Livestock and Pastoral Development Offices
LSD	Lumpy Skin Disease
MoCT	Ministry of Culture and Tourism
MOEFCC	Ethiopian Wild Life Conservation Authority and the Ministry of Environment, Forest and Climate Change
MOH	Ministry of Health
MOLF	Ministry of Livestock and Fisheries
NGO	Non-Governmental Organization
NLM	Norwegian Lutheran Mission
NOHSC	National One Health Steering Committee
OH	One Health
OHCEA	One Health approach across Central and East Africa
PC	Pastoralist Concern
PCA	Pastoralist Concern Association
PPR	Peste des Petits Rruminants
RECs	Regional Economic Communities
SARS	Severe Acute Respiratory Syndrome
TWG	Technical Work Group
UNESCO	United Nation Educational, Scientific and Cultural Organization
USAID	US Agency for International Development
VSF	Vétérinaires Sans Frontières
WHO	World health Organization

Contents

Chapter One: Introduction

1.1.Background of the Study

In the early 1960s, Calvin W. Schwabe, a veterinarian with a background in biology working in Southern Sudan at the time, observed that Dinka pastoralists maintained an integrated attitude toward humans and animals. Inspired by this observation, Schwabe developed the concept of 'one medicine', stating that 'human and veterinary medicine share a common body of knowledge in anatomy, physiology, pathology and the origins of diseases in all species' (Schwabe 1964) and thereby recognising the mutual benefits available through the connection of veterinary medicine and human health. Today, this concept is expanded to 'one health': further recognising the inextricable linkage of human, livestock, companion animal and wildlife health and implying an added value to the health and wellbeing of humans and animals (Zinsstag, et al. 2011).

One Health (OH) as a development approach was adopted as the core driver of the Global Health Security Agenda (GHSA) with an alliance of over 60 governments and international partners to make the world safer from infectious diseases. It has been considered as a mechanism that enhances collaboration among the human, animal and environment sectors to deliver optimal health for humans, animals and the environment (Ethiopia National One Health Strategic Plan (2018 -2022).

Ethiopia is the 2nd most populous country in Africa and the 13th in the world with a population of 94.4 million people and has a growth rate of 2.6%[1]. This, coupled with an ambitious livestock intensification plan to cater for the growing population, a rich biodiversity and close interaction between humans and animals, puts Ethiopia at elevated risk of emerging pandemic threats and other global threats such as antimicrobial resistance, food safety issues and bio-safety and bio-security, besides the already existing burden of endemic diseases.

The lack of coordination among human and animal health sectors, coupled with inadequate resources for public health systems, has been one of the prominent factors that have contributed to weak delivery systems of the interventions and less efficient and ineffective response to public health threats in the country. Therefore, having a mutually agreed and prioritized agenda among key sectors

1 Central Statistics Authority, Country Population Projection (2017)

was seen as crucial for resource allocation and strengthening zoonotic disease and surveillance systems in the country.

Despite the multifaceted huge challenges that have hit the Horn of Africa in recent years, its people, livestock and natural resource base provides a firm foundation upon which to improve livelihoods and increase resilience. Pastoralist communities depend on the close interlinkages between rangeland, livestock and human health. This insight and understanding provides an ideal basis to apply a One Health Approach to tackle one of the key bottlenecks for pastoralists' development which is access to necessary services and inputs. The OH approach built on this foundation by supporting a bottom-up approach which is participatory, context-specific, coordinated and integrated to reshape service delivery in the form of One Health Units. These units facilitated combination of services from different disciplines in a meaningful way and thus, facilitate interactions and coordination between governmental departments, private service providers and communities. Their aim is to sustainably strengthen human, livestock and rangeland health services and support communities to develop sustainable strategies to cope with changing environments and threats related to climate change (CCM project document).

The Arid and Semi-arid areas of the horn of Africa are among the areas in Eastern Africa frequently affected by natural and man-made disasters. These areas are vulnerable to recurrent drought and other emergencies such as outbreak of infectious diseases. They are also characterised by inadequate access to basic services, inadequate infrastructure, and increased competition for resources. The countries in this region share many similarities in terms of climate, culture, population dynamics and socio-economic historical context[2].

The One Health as a new development intervention in this region promotes integrated diseases prevention and livelihood strengthening targets focusing on selected pastoral areas of some of the countries like Ethiopia Somalia and Kenya, etc as they share some common characteristics and strong cross-border dynamics.

Although Ethiopia has made significant steps to strengthen the animal and human health services both in manpower and facilities. The country has developed a national OH strategy by involving various stakeholders. The relevant ministries (Ministry of Health, Ministry of Agriculture and

[2] (According to the project document of Veterinaries SANS Frontieres Suises, CCM and ILRI page5-7)

Livestock Resources, Ministry of Culture and Tourism, Ethiopia Wildlife Conservation Authority, ministry of Environment, Forestry and Climate Change) Signed a Memorandum of Understanding to operationalize the One Health approach in the country in May 2018

Despite huge livestock resources available in pastoral communities in Ethiopia in general and Somali Regional State in particular, the livelihood condition of the community is not adequate. It is apparent that the pastoralists are relying on their livestock, their products and by product to ensure their livelihood requirement. However, the utilization of these resources could not fulfil their household requirement. Likewise, animal health service delivery in the zone is not strong compared to the well-established infrastructure in terms of AHP construction, trainings and assignment of AHWs, especially CAHWs in most of the Kebeles to facilitate accessibility of service to livestock keepers. Shortage/lack of basic veterinary equipment's, drugs and vaccines remained the most challenging issues in the proper control and prevention of livestock diseases. Moreover, various factors consisting of chronic lack of water and long periods of drought have been found to aggravate food insecurity as well as poor health care system which are often inaccessible to most people. Consequently, the livestock keepers/pastoralists/ move regularly within the region and between the border areas of Ethiopia, Somalia and Kenya, in search of more fertile land for pasture and water sources for their livestock (CCM Project document).

One-Health was implemented in our country as a pilot project based on a more participatory, context-specific, coordinated and integrated approach in the form of One Health Units (OHUs). These units are working with both the government and communities, conducting research and capacity building to sustainably strengthen human and livestock health services. The consortium of partners are working across the selected intervention areas to provide technical support according to their specific area of expertise: animal and human health, services as well as, natural resource management and research endeavours.

Through looking into the pilot project intervention in Filtu and DekaSuftu weredas of the Somali Region of Ethiopia, this research is aimed to examine how One Health as newly introduced development approach is fit into the pastoral community context; assess its contribution to the prevention of human-animal-environmental health problems and above all how, it is strengthen the livelihoods of rural communities of pastoral areas.

1.2.Statement of the Problem

One-Health is a development concept that aims at examining the commonalities between human, animal and environment health prevention among pastoralists. It is supposed to examine symmetrical relations between and among the three sectors. If livestock remains healthy, the same will be for pastoralists, and vice versa. The wellbeing of the pastoral households is based on the quantity, quality and productivity of its livestock. The sickness of a few animals will lead to a decrease of nutrition and health of the community. On the other hand, livestock needs to be tended and cured with the outmost attention: only healthy people can properly do it(Comitato Collaborazione Medica - CCM's 2004-2005 and 2015-2016, project document).

Cross-sectoral efforts to prevent, detect and respond to health threats at the interface are still at initial stage. Cross-sectoral collaborations have been limited in their lifespan and specific in their scope and are disbanded once the threat is contained or reduced.

The crux of the problem is that relationship between human, animal and environmental health appears to be asymmetric. The researches in (Comitato Collaborazione Medica - CCM's 2004-2005 and 2015-2016, project document) outlined a significantly different pattern. Pastoralists' got the chance to enhance livestock health in order to protect the wellbeing of the household for economic, social and territorial reasons. A sick herder faces economic problems in leaving his animals, such as stampedes, accidents, epidemics, social troubles like contempt, isolation, and constraints particularly in relation to the environment, distances, access (the distance of the health facilities that forces to prolonged absences from the herd). There is also a deep gap between the strategies of health promoted by Public Health initiatives and interventions and the local health practices. Due to the impossibility to grant any optimum in health, nutrition and wellbeing, the pastoralists in Filtu seek practices and remedies able to guarantee them with a minimum of efficiency and minimize risks instead of optimizing results with their livestock. According to this, the sickness of an animal can affect the health of the whole household, while the sickness of a family member can be overtaken by money or social bonds (herders can pay someone to take care of the livestock, or ask a relative to do it) (Comitato Collaborazione Medica - CCM's 2004-2005 and 2015-2016, project document).

One Health concept elaborated by Comitato Collaborazione Medica (CCM) in 2015 project document, has been augmented with an integration of biomedical and veterinarian scientific knowledge with local pastoralists' knowledge and practices. This approach is aimed to enhance maximum agency of the herder and his household through a multidimensional matrix of options -

behavioural, political, economic etc. - in order to obtain a "Household Health Serenity" based on health security, health accessibility, health sustainability and health compatibility.

The three goals of One Health "healthy people, healthy animals, and healthy environment" (Alberto Salza, human terrain analyst, 2018), have been considered as directions: One of the goals of the research is to collect data and analyse the way in which the three pillars interact in building health and promote livelihoods. The three pillars are directly contributed to the livelihoods of Filtu and Dekasuftu pastoralists indirectly contributed to the livelihoods of agro-pastoralist.

One-Health is urgent to Government has been focusing on pastoral health since the Health Sector Development Program II (2002–2005), where the need of establishing appropriate delivery systems for increasing the coverage and utilization of healthcare services by the pastoralists is clearly prioritised (Ethiopia National One Health Strategic Plan (2018 -2022)).

Therefore, it becomes meaningless to speak about 'OH vaccination campaigns' if there is no consideration about the Ecosystem, Human and Animal Health of the triangle. What if we save more animals (or human or grasses)? How is the whole health system effectiveness in preventing disease? Even when such efforts are implemented, the environmental side of health is obscured by the other two, as environment as a concept ''in itself is not fully understood.

To sum up, the research is initiated to fill the above-mentioned knowledge gap, assess the contribution of the OH approach on the livelihood of the pastoralist in Filtu and Dekasuftu Woreda. Accordingly, the findings of this study supported development practitioners and policy makers in providing pertinent information on the challenge and prospects regarding the OH Approach. There is no other imperical analysis and there is no baseline document was done as per my knowledge before starting the pilot project on this approach. Because of the One-Heal Approach is new for the country, implementing sectors and the Ministry of Health, they also gives attention earlier in 2018 G.C

1.3.Objectives of the Study

1.3.1. General objectives

The main objective of the research is to explore and review the gaps in the integrating human, animal and environmental health service delivery system in Filtu and DekaSuftu weredas as a result of the

implementation of OH, assess its contribution in livelihoods promotion and explore its overall relevance to the study area.

1.3.2. Specific Objectives

The specific objectives of the study among others include:

- Explore the experiences and meaning of one-health approach from a development perspective to the study area,
- Assess how one-health development approach is changing the health conditions of the study area through an integrated health prevention strategy in Filtu and DekaSuftu
- To analyse how this approach is used to improve the livelihoods of pastoral communities

1.4.Research Questions

In general, this study attempted to answer the following questions.

- Why One Health as a development approach is important to the Pastoralist communities?
- How do the pastoralists/project beneficiaries perceive about One-Health Approach?
- Did the One-Health Approach contribute towards the improvement of the livelihood assets of the pastoralists?

1.5.Significance of the study

The concept of OH has gained momentum as researchers from human medicine, public health, veterinary medicine, urban planning, and environmental sciences increasingly focus on holistic, integrated approaches to complex questions that address human health in conjunction with animal and environmental health commonalities. Research addresses questions at the intersections of human, animal, and environmental health through identifying and analysing the benefits and advantages the OH approach that provided to the project beneficiaries. It provides an opportunity for enhanced understanding of a range of health impacts and solutions. By looking at multiple dimensions of the problem through the lens of environmental, animal, and human health, the research highlights influencing factors that would facilitate more informed intervention to bring about improved health status.

The main purpose is to assess local pastoralists' needs, perceptions and behaviours towards human and animal health, in relation to the local socio-ecological context. Special attention given to the strategies of adaptation to the environment and addressing hindrances that prevent people to get access to the existing human and animal health facilities.

1.6.Scope of the study

The scope of the study provides the clear picture and the benefits of One-Health to our country and pastoralists, in addition to how the sectors integrated in providing services and suggesting the possible options and opportunities for development approach. The scope of this research is limited to exploring how OH as an intervention turn out to be an important development approach capable of solving many of the problems of the study area in general and address how the triangular integrated approach helps to reduce infectious diseases affecting the three pillar and thereby it paves for a more suitable solution to develop livelihoods, in particular. This mapps out through an in-depth analysis of the perceptions of the project beneficiaries and those involved in the implementation of the project in Ethiopia and neighbours. Identifying multivariate solutions to enhance of the herder and households through a multidimensional matrix of options – behavioural, political, economic etc. its help to obtain a Household Health improvement/or health security, and accessibility of services and improvement of income and livelihoods.

1.7.Operational Definitions

One-Health*:* One Health is the integrative effort of multiple disciplines working locally, nationally, and globally to attain optimal health for people, animals, and the environment. Because of their expertise, veterinarians play critical roles in the health of animals, humans, and even the environment, but these roles are often overlooked or unrecognized. (*AVMA is a not-for-profit association definition*)

Chapter Two: Review of Related Literature

2.1.The One Health Approach in the existing literature

The "One Health" approach has received a growing attention since 2004[3], becoming a key concept in Global Health and attracting policy makers, funders and practitioners and influencing research and policy programmes. In the following years, it has obtained a wide echo mainly in relation to the very high-impact interactions between people, animal production and wildlife health and to the emergence of global zoonotic pandemics and infectious diseases deemed to have arisen in animal species (e.g. SARS coronavirus, H5N1 and H1N1 influenza virus, Nipah virus, Hendra virus, human immunodeficiency virus [HIV] and recently Ebola virus). In 2007, the World Health Organization remarked that most of the new infectious diseases appeared since the 1970s are transmittable between animals and humans.

Therefore, the need of developing integrated approaches to improve human, animal and environmental health through multidisciplinary, cross-sectorial and cross-level interventions, designed to reduce and address health risks, has increasingly gained resonance[4] In a recent paper on the "Political Economy of One Health Research and Policy", Galaz, Leach, Scoones and Stein highlight three narratives dominating the conceptualization of the One Health approach[5] (Galaz et al. 2015, p. 3-5).

The first widespread narrative on "One Health, One World" insists on the centrality of an integrated

3 The concept was officially launched during the international conference "One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World", convened by the Wildlife Conservation Society with support from the Rockefeller Foundation. Most of the analysis reviewed during this report, the international resonance obtained from the concept are strictly linked to the emergence and spread of avian influenza in the early 2000s.

4 Among many others, see for ex. Coker et al. (2011); Day (2011); Galaz et al. (2015); Jones et al. (2008); King et al. (2008), Lee & Brumme (2013); Osburn, Scott, Gibbs (2009); Zinsstag et al. (2006); Zinsstag et al. (2009); Zinsstag et al. (2011).

5 The article is the result of an analysis of the bibliographical literature published on One Health from 2007 to early 2014, of the policy documents issued between 2004 and 2013, and of 83 interviews conducted between 2008 and 2013 with a range of international stakeholders with active professional interests in One Health (Galaz et al. 2015, p. 1).

6 According to the authors, examples of this framing include FAO-OIE-WHO (2010), WHO (2008), World Bank (2010), and FAO (2013) and a number of review articles in academic and scientific key journals, as Zinsstag et al. (2009); Zinsstag et al. (2011); Zinsstag et al. (2012*a* and *b*); Okello et al. (2011); Coker et al. (2011); Kahn et al. (2009); Conraths et al. (2011); Rabinowitz and Conti (2013); Hueston et al. (2013); Leboeuf (2011); Lee and Brumme (2013); Anholt et al. (2012); Conrad et al. (2013).

7 The authors quote for example CDC (2011), Dry and Leach (2010), Elbe (2010), Galaz (2014).

8 On this issue, the authors point out: World Bank (2012), Grace (2014), Rushton *et al.* (2012), Häsler *et al.* (2013*a* and *b*), Zinsstag *et al*. (2006), Narrod *et al*. (2012).

approach. A holistic attitude is necessary to deal with complex interactions between ecology, animals, people and disease at global level, and cannot be implemented by one discipline or one sectorial agency alone[6]. The second narrative is related to the outbreak of epidemics and their global diffusion. One Health is defined as a way of preventing risk and responding to crises in a more efficient and rational way through improved diagnosis and surveillance, and prevention and control activities[7]. The third narrative focuses on the potential economic benefits of implementing One Health approaches that combine human and animal health interventions[8].

According to Alessia (2016), the assumption behind the One-Medicen and OH approaches among nomadic pastoralists is based on the supposed symmetrical relation between human and animal health: if livestock is and remains healthy, the same is for pastoralists, and vice versa. The wellbeing of the pastoral household is based on the quantity, quality and productivity of its livestock; therefore, the sickness of a few animals is lead to a decrease of nutrition and health of the community. On the other hand, livestock needs to be tended and cured with the outmost attention: only healthy people can properly do it.

2.2.The Need for a One Health Approach: Human- Animal-Environment:

The world population currently has a growth rate of 1.2% per year, and the next century will represent a period of exponential growth. The global population now exceeds 7 billion people and is estimated to increase to over 9 billion by the middle of this century. It is estimated that 90% of the global population growth will take place in the developing world and the world's fastest growth will actually take place in peri urban settings that are now a part of almost all large cities in developing countries (FAOSTAT, 2012). Today particularly in Somali region in Filtu new emerging and re-emerging diseases are highly affecting the animal and human population. Almost 1 billion people inhabit these sites. Global slums are creating unprecedented conditions where new emerging and re-emerging diseases are highly probable outcomes. At the same time, we are now witnessing an era characterized by the phenomenal relocation, migration, and movement of people worldwide. The global economy is a key driver causing people to shift from rural settings to urban centres. Furthermore, new Diasporas are being created as populations relocate globally due to the changing economy and job availability, and large populations of refugees are being created due to social and political unrest. In addition to this unique human relocation phenomenon, people are also traveling more. Today more than 1 billion people across international borders each year. Not only people on the move, but

animals, vectors, food, and other commerce are also on the move and microbes are given unprecedented opportunities to migrate rapidly.

Our global travel, trade, commerce, and human movements have literally merged space, resulting in the acceleration and increase in interactions of people, animals, and animal products with potential exposure to microbes capable of crossing species lines. Approximately 1 billion people live on less than $2 a day. Worldwide, almost two-thirds of the rural poor and one-third of the urban poor depend on livestock to provide them with essential household income and a source of food and nutrients (ILRI, 2012). They add substantially to disease morbidity, mortality, and loss of productivity of livestock and poultry themselves but may also produce illnesses in their keepers. A recent study by the International Livestock Research Institute highlighted a strong association among poverty, hunger, livestock keeping, and zoonoses (Grace D, Mutua F, Ochungo P, Kruska R, Jones K, Brierley L, Lapar L, Said M, Herrero M, Phuc, 2012).

A One Health perspective is essential to reducing the huge economic, social, and health impact of zoonoses in Filtu and Dekasuftu woreda, Liben zone, Somali Region. These diseases often involve wildlife as well as domestic animals, and almost all of these zoonoses are amenable to agriculture-based interventions, which gives further credence to One Health strategies.

2.3. The Value of the One Health Approach: Shifting from Emergency Response to Prevention Zoonotic Disease Threats at their source

2.3.1. Emergency Response to Newly Identified Human Infections

The clinical response to zoonotic infections is often costly, an economic burden that can be particularly difficult in low-income countries where health budgets are already heavily restricted. Jus for the understanding: (WHO, 2005)

> Post-exposure prophylaxis for rabies, for example, has been estimated (conservatively) to cost $40 in sub-Saharan Africa and $49 in Asia, a cost that equals 5.8 and 3.9%, respectively, of the annual per capita gross national income (WHO, 2005). But zoonotic infections can also be costly in industrialized countries. Health services utilization, work absenteeism, and direct costs for hospitalization of persons with H1N1 in Spain have been estimated at €6,236 per inpatient (Mariana Galante, Olatz

Garin, Elisa Sicuri, Francesc Cots, Anna García-Altés, Montserrat Ferrer, Àngela Dominguez, Jordi Alonso, 2012). Following an outbreak caused by an emerging infection, an epidemiological investigation helps to assess the risk to humans—and to determine the source, and if the source is an animal, to understand whether there is continued risk of transmission to humans. A range of emergency response measures must then be implemented, including surveillance, contact tracing, isolation, social distancing, vaccination or prophylaxis (if vaccines and/or medicines are available), and in some instances culling of the animal source. The revised International Health Regulations (IHR 2005) (Organization, 2005) require World Health Organization (WHO) member states to rapidly assess an emerging infectious disease outbreak and notify the WHO, and through WHO the global community, if the outbreak fits the criteria established for a public health emergency of international concern and causes a risk of international spread (Rodier G, Greenspan AL, Hughes JM, Heymann DL., 2007).

If an emerging infection becomes endemic in human populations, the disease burden and cost can have a major and prolonged economic impact. The impact of AIDS in terms of lost economic output is significant, particularly in the poorest countries;

Impact on national and global economy: ➔ Health case & public health response reduced, Reduce Tourism and Travel, Trade Restrictions, Reactive animal control strategies (e.g. culling & compensation) & Workforce absences.

Severe acute respiratory syndrome (SARS) was the first major emerging infection identified in the 21st century. Close examination of its origins, the outbreak and human sickness and death that it caused, the international response, and the effect it had on Asian economies provides a clear lesson of the impact of emerging infections and the reasons they must be assessed and managed with urgency to ensure a rapid and effective response (Chan-Yeung M, 2003).

2.3.2. Understanding the determinants of Emergency & their Mitigation

The determinants of emergence are risk factors that align in such a manner as to modify the equilibrium among and between three species: humans, animals, and the infectious organisms carried by those animals. The determinants cross many sectors, including human and animal health, animal husbandry, agriculture, community planning, water and sanitation, commerce, forestry, mining, food processing of animals, trade, and agriculture. Specific determinants must be identified in each instance of an emergence, understood, and then mitigated to prevent the same alignment and emergence in the future. It is because of the cross-sectoral origin of these determinants that a One

Health approach—defined as a collaborative effort of multiple disciplines to attain optimal health for people, animals, and the environment (AVM Association, 2008).

One Health approach builds on analyses of previous emergence events to (i) identify the determinants that have aligned in past or current emergence events in such a manner as to facilitate or permit emergence; (ii) engage partners and stakeholders outside of the traditional medical community to ensure that these determinants are understood; and (iii) with these partners and stakeholders, propose and implement strategies that will mitigate and decrease the negative impact of emergence events in the short term and contribute to prevention of emergence in the future. In addition to workers who have contact with domestic animals, other occupations are risk factors for human infection from wild animals. Outbreaks of Ebola haemorrhagic fever have also been linked to occupation, its outbreak in the Democratic Republic of the Congo whose occupation was preparing charcoal in the tropical rain forest (Groseth A, Feldmann H, Strong JE., 2007) and who was exposed to an Ebola-infected animal, the origin of HIV emergence has been linked to both hunting and butchering of chimpanzees for consumption (LeBreton M, Prosser AT, Tamoufel U, Sateren W, Mpoudi-Nigole E, Diffol JL, Burke DS, Wolfe ND.).

Climate change may also be a factor in emergence of human infection. Rainfall associated with El Niño-Southern Oscillation in East Africa, for example, has contributed to frequent outbreaks of Rift Valley fever as a result of flooding that increases breeding sites of the mosquito vector (Anyamba A, Chretien JP, Small J, Tucker CJ, Formenty PB, Richardson JH, Britch SC, Schnabel, 2009). The frequency of Leptospira transmission from rodents to humans has been shown to increase following heavy rains and flooding in Latin America, Bangladesh, and India (Lau CL, Smythe LD, Craig SB, Weinstein P., 2010). Lassa fever has also emerged after severe drought in Sierra Leone, when rodents carrying the virus were forced to move closer to humans so that they could survive on agricultural products in cultivated fields or storage facilities, contaminating human food supplies (Ogbu O, 2007). Determinants related to climate change require (i) more robust civil engineering projects to prevent flooding and to channel water for irrigation, (ii) better rodent and wild animal control, and (iii) continued participation globally in the negotiation of the United Nations Framework Convention on Climate Change (Y. de Boer, 2012).

2.3.3. Turning Evidence into policy through a One Health Approach

A great amount of scientific knowledge about the risk factors or determinants of emergence at the animal-human interface is already available from previous investigations and risk assessments of emergent events. More knowledge can be obtained from in-depth study of each new emergence event

as it occurs. Research must also take into account human behavior and determine whether populations most at risk understand the measures that might be required to reduce or protect from high risk (Cascio A, Bosilkovski M, Rodriguez-Morales AJ, Pappas G., 2011).

Translation of this knowledge into policy can help shift the paradigm from detection, assessment, and response further upstream to prevention of emerging infections at the source, thus better protecting animal and human health and protecting economies. But many of these proposed evidence-based policies is encounter political barriers, especially when commercial benefits are at stake. The differences between the goals of the animal and human health sectors must be clearly understood. Agriculture is for profit -whether it is raising cattle for milk, poultry for eggs and meat, or pigs for meat and meat products. The mitigation strategies that are most easily accepted are therefore those that are shown to be cost-effective and have no negative impact on profit. For policy options that do not appear to be cost-effective, it is more difficult to achieve acceptance by all sectors of costly mitigation strategies, and enforceable legislation may be the only way they can be addressed. Through cooperative efforts at the animal-human interface using a One Health approach, emergence events in the future can be decreased, and lives and economies saved.

To summarize, it's not enough to identify and understand the determinants that cause emergence of an infection at the animal-human interface if mitigation of these determinants is to lead to successful prevention of emergence. Various evidence-based mitigation strategies must be proposed, their cost-effectiveness assessed and understood, and scenarios developed that clearly provide the information needed by those responsible for the policies across sectors that deal with issues including animal and human health, trade, education, and urban planning. Working together to prevent infections at the human-animal interface requires a true One Health approach.

2.4.One Health and Disease Surveillance Network

Zoonotic infections are important sources of human disease. The great majority of emerging infections identified to date (including HIV, Ebola virus, severe acute respiratory syndrome [SARS], Nipah virus, and enteropathogenic Escherichia coli) are zoonotic. These diseases originate as natural infections of other species that are given opportunities to cross the animal-human interface and come in contact with humans. Wildlife constitutes a particularly important source. This article gives an overview of public health surveillance and some major existing surveillance networks and reviews progress toward implementing a One Health framework (DA, 2011) (Karesh WB, Cook RA., 2009).

What is public Health Surveillance? As per Communicable Disease Center (CDC) definitions…

> … "Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health." A similar definition is used by the World Health Organization (WHO): "Public health surveillance is the continuous, systematic collection, analysis and interpretation of health-related data needed for the planning, implementation, and evaluation of public health practice"
> http://www.who.int/topics/public_health_surveillance/en/)....

2.5.One Health: Lessons Learned from East Africa

Africa is faced with many of the most daunting challenges (food insecurity, poverty, and disease) of our time. With an area of 30 million square kilometres, it is the second largest continent, covering 6% of the Earth's surface and 20% of its land mass. It currently comprises 54 sovereign countries accounting for roughly 15% of the world's human population. In 2009, 22 of 24 nations identified as having "Low Human Development" on the United Nations' Human Development Index were located in sub-Saharan Africa (http://hdr.undp.org/en/statistics/). Today, 33 of the 48 nations on the United Nations' list of least developed countries are in Africa. On the other hand, Africa also has arguably the largest proportion of intact natural ecosystems, biodiversity, and sociocultural capital and the lowest impact on global warming of any continent, with considerable "carbon credit." African leaders are faced with daily competing demands and values among a multitude of complex issues such as high human population growth, extreme poverty, food insecurity, land use policy, climate change, and biodiversity conservation. In this context, building sustainable national systems for human and/or animal health is one of the grand challenges of this generation. Fortunately, the international community has made very large investments in health over a long period of time in Africa. Unfortunately, these investments often come with requirements or priorities that do not reflect those of the local people or government. This donor-recipient mismatch has led to further frustration of local health experts while reinforcing the need for more sustainable solutions aimed at systematically connecting communities with national governments and ministries.

Today's global and complex health and development challenges require long-term commitment and a range of approaches that are too broad for any one discipline, institution, or country to implement

on its own. The One Health concept recognizes the interconnectedness of global health issues and, as such, promotes the importance of and need for international, interdisciplinary, and cross-sectoral communication and collaboration at local, national, and international levels. This concept, therefore, is a deliberate attempt to move away from the traditional narrow disciplinary approach to a more holistic, integrated approach that requires a new set of skills to implement, including leadership, team building, communication, and multidisciplinary project management on top of the traditional discipline-based training. Thus, the One Health approach is a long-term strategy that requires the development of future global health leaders with the skills, knowledge, and experience in collaborating across disciplines and sectors to solve pressing and complex global health problems.

2.6.Universities in Support of One Health

To realize One Health, there is a need for an inter-professional and trans-disciplinary educational framework focused on developing a new generation of professional and academic leaders who can create an integrated scientific knowledge base. While universities have great potential, implementing and institutionalizing the One Health approach in Africa requires financial resources that exceed the capacity of African governments and institutions alone. Recognizing these limitations, cross-border university collaborations have become a widely accepted strategy for building institutional capacity to achieve broad development and global health goals (7). Among the different forms of cross-border university collaborations, university networks have recently emerged as a popular development strategy with support from leading international aid agencies and organizations such as the U.S. Agency for International Development (USAID), Asian Development Bank, and UNESCO. University networks typically bring together a group of institutions to collaborate on a broad set of activities or common issue.

The One Health approach across Central and Eastern Africa (OHCEA) university network was founded in 2010 as part of a 5-year USAID funded project http://ohcea.org/. It expanded upon a pre-existing network of seven schools of public health called the Higher Education Alliance for Leadership through Health (HEALTH), and currently includes 14 public health and veterinary medicine institutions and government ministries in the Democratic Republic of Congo, Ethiopia, Kenya, Tanzania, Rwanda, and Uganda http://halliance.org/. The OHCEA network embodies a One Health approach to collaboration in the area of emerging and infectious zoonotic diseases, and its long-term strategy is to build the necessary skills, knowledge, and One Health attitudes among health professionals and leaders.

As outlined above, university networks (Table 3) offer many advantages for governments and universities to collaborate and solve pressing global health challenges. The OHCEA network serves a dual purpose of implementing a One Health approach across Central and Eastern Africa while also strengthening African institutions of higher education.

2.7. Ethiopia with negligible risks and impacts of endemic, emerging and re-emerging health threats at the animal-environment-human interface.

The contribution of zoonotic diseases, antimicrobial resistance and other emerging pandemic threats, to public health security and socioeconomic wellbeing has increasingly become a critical global concern. This has been attributed to factors such as climate change, globalization, agricultural intensification, growth in human populations leading to pressure on land resources, increased global trade and travel and increased use of antimicrobial substances in animal production and food preservation. Altogether, these factors pose complex health threats that require multi-sectoral collaboration mechanisms to either prevent, or detect early and respond in a timely manner to contain them at source and mitigate potential impact on humans, their livelihoods and economies.

Ethiopia is the 2nd most populous country in Africa and the 13th in the world with a population of >94.4 million people and has a growth rate of 2.6%[4]. This, coupled with an ambitious livestock intensification plan to cater for the growing population, a rich biodiversity and close interaction between humans and animals, puts Ethiopia at elevated risk of emerging pandemic threats and other global threats such as antimicrobial resistance, food safety issues and bio-safety and bio-security, besides the already existing burden of endemic diseases. The One Health approach has been adopted as the core driver of the Global Health Security Agenda (GHSA), which seeks to strengthen countries' health systems to prevent, detect and respond to public health threats and events of national and international concern.

In the past few decades, the Government of Ethiopia (GoE) has made remarkable investments to strengthen the animal and human health services both in manpower and facilities. However, the institutions are set up in such a way that they function independently and no formal coordination exists especially when dealing with diseases that require cross-sectoral efforts to prevent and/or control. The recent GHSA International Health Regulations 2005 (IHR) Joint External Evaluation

[4]Central Statistics Authority, Country Population Projection (2017)

(JEE)[5], conducted by WHO, found that there was a strong political commitment by the GoE, to improve public and animal health systems through their respective ministries. Both sectors were found to have good capacity in the establishment of diagnostic laboratories, surveillance and response systems. However, there were gaps in communication and collaboration between the animal health and public health sectors and absence of formal or legal linkages, structures or policies for collaboration between them and with other sectors, such as wildlife and agriculture.

Although there have been no formal multi-sectoral coordination mechanisms, Ethiopia has a history of several ad hoc cross-sectoral collaboration initiatives in the management of infectious disease threats, which are usually led by individual sectors. Such cross-sectoral collaborations have been limited in their lifespan and specific in their scope and are disbanded once the threat is contained or reduced.

In recognition of intrinsic relationship between humans, animals and their environment, and as part of the implementation of the GHSA, Ethiopia has increasingly embraced the OH approach to prevent, detect and respond to existing and emerging threats. With the support of partners, the GoE formally established the National One Health Steering Committee (NOHSC) in 2017. The committee is comprised of representatives of core Government Ministries namely: Ministry of Health (MoH), Ministry of Livestock and Fisheries (MoLF), Ministry of Culture and Tourism (MoCT)/Ethiopian Wild life conservation Authority and the Ministry of Environment, Forest and Climate Change (MoEFCC).

The NOHSC is mandated to facilitate multi-sectoral coordination and collaboration among OH stakeholders at National and sub national levels and strive towards the establishment of a sustainable institutionalized OH platform in the country. Efforts to establish disease specific technical working groups (TWGs) to lead initiatives for their sustainable prevention and control have already began and are gathering momentum. The TWGs are envisaged to provide expert forums for tackling zoonotic diseases to enhance mutual accountability and collaboration among the sectors and promote greater efficiencies in the management of zoonotic diseases and other health threats using OH approach in the country.

[5] WHO, GHSA Joint External Evaluation for Ethiopia (2016)

As part of the development, stakeholders assessed the existing strengths and weaknesses, including within the national platform and multi-stakeholder engagement, funding sources and resource mobilization, disease surveillance, laboratory, food safety, bio-safety and bio-security, communications and information exchange. Besides the strengths and weaknesses found, the analysis also identified opportunities and threats in the external environment, including legislative, socio-economic, technological and environmental dimensions. These exercises have formed the backbone for the development of the national One Health Strategic Plan.

2.8.The benefits of 'One Health' for pastoralists

2.8.1. Healthy rangelands: an important component of One Health

2.8.1.1.Why rangelands?

Pastoralism as a livelihood system composed of three 'pillars' or components – *livestock or the herd*, *people or the family including institutions*, and *land and/or natural resources and most importantly "the rangelands."* These three components are tightly inter-related and are regulated by ecology and complex modes of social, political and economic organisation with livelihood strategies adapted to exploiting environmental variability characteristic of pastoralist environments (Tufts University 2011). If one of these pillars falls, is damaged or compromised, then the whole system can fail or start breaking-down. This is exemplified in the saying from the Mursi of South Omo Ethiopia: *'If you use only two cooking stones and not three, you will never cook anything'*.

As such in order to have a productive and functioning pastoralist system all three components need to be healthy – people, livestock and rangelands (land and natural resources). And it is proposed that if effectively managed as a single integrated unit (One Health Unit), the outcome is greater value than the sum of the individual parts. Though attention to rangelands health has increased in such as the rangelands of the United States, in Africa rangelands, their health and productivity have not received adequate attention and this is one of the key factors contributing to their degradation (CCM project document).

2.8.2. What is a healthy rangeland?

Healthy rangelands provide for healthy livestock that provide for healthy people. A well- functioning rangeland sustains the soil, water and nutrient availability for plants, and the plant community (see below). The Society for Range Management has defined rangeland health as:

> The degree to which the integrity of the soil, vegetation, water and air, as well as the ecological processes of the rangeland ecosystem, are balanced and sustained (Riginos and Herrick, 2010).

Ecological processes including the water cycle, energy flow and nutrient cycle. Direct measures of site integrity and status of ecological processes are difficult or expensive to measure due to the complexity of the processes and their interrelationships. Therefore, biological and physical attributes or characteristics are often used as indicators of the functional status of a rangeland and site integrity – including soil/site stability, hydrologic function, and integrity of the biotic community. In addition, from a rangeland productivity point of view, indicators would include such as the presence of palatable/non-palatable and/or useful/non-useful species. That is a healthy rangeland would have high soil/site stability, good hydrological functioning, and a diverse and strong biotic community including palatable and useful plant species (Riginos and Herrick, 2010).

At the same time healthy rangelands also provide a suite of services such as carbon and water storage, prevention of soil erosion or such as dust storms, or provision of a generally ameliorating environment that has a direct impact on human health. Further, a healthy rangeland can provide other ecosystem services such as increased biodiversity including wildlife that can attract such as tourism, or pastures that do not hard our parasites or poisonous plants. These attributes have a less direct impact on local livelihood and income-generation activities, but are, nevertheless, important.

2.8.3. What does this mean for One Health interventions?

Traditional management of rangelands has focused on the rotation and use of different grazing areas, strategic use of water points, movement to avoid parasites and/or the breaking of breeding cycles, and the optimisation of plant use and production particularly of grasses. However, with increasing pressures on land use, blockage of movement by such as fences or infrastructure, and a loss of authority of traditional management institutions, rangelands in Ethiopia are increasingly unmanaged and often degraded. Once degraded there is not only a loss of species favoured by livestock, but also these species can be rapidly replaced by non-palatable even poisonous species that are difficult to remove. Water can also be an issue – often polluted and unsafe for both human and livestock pastoral populations and particularly during the rainy season when water points are often flooded. Increasingly long distances needed to travel to find adequate grazing or water can also have a direct impact on livestock and human health (Riginos and Herrick, 2010).

As such, though traditional management of rangelands has achieved so-much, there is more that can be done to improve the productivity (including health) of the rangelands, and significant investment is required. Technical as well as institutional solutions are needed to rehabilitate degraded rangelands and reverse degradation processes underway. In addition, the functionality and productivity of rangelands needs to improved including soil and water infiltration, increased biodiversity and palatable species, and removal of invasive and/or non-palatable. The movement of livestock in search of grazing is increasingly need to be monitored, even controlled, to prevent the spread of livestock diseases, and for example the spread of invasive alien plant seeds (spread by livestock in their dung). Services provided along livestock routes such as livestock and human health posts can be complimented by grazing reserves and resting areas – managed as part of a rangeland landscape unit. All these interventions should occur hand-in-hand with investment in livestock health and human health, as an integrated management system led by communities themselves, and with support from technical experts such as local government extension workers – a One Health approach can provide the framework for this.

'One health' is particularly suited to serve mobile pastoralists. Our contemporary definition of 'one health' is any added value in terms of improved health of humans and animals or financial savings or environmental services resulting from a closer cooperation of human and animal health sectors. Here we present a summary of 'one health' studies with mobile pastoralists in Africa which were done in research partnership, demonstrating such an added value. Initial joint human and animal health studies revealed higher livestock vaccination coverage than in the pastoralist community, leading to joint animal and human vaccination intervention studies which demonstrated a better access to primary health care services for pastoralists.

A challenge remained with regard to how to assess vaccination coverage in mobile populations. With the advent of mobile phones, health and demographic surveillance can be establishing for mobile pastoralists and their animals. This presents vast possibilities for surveillance and control of human and animal diseases. Pastoralists prefer a 'one health' approach and therefore contribute toward the validation of this concept by showing real added value of the cooperation between human and animal health services (Wiese 2004).

The Sahelian belt is a semi-arid zone which borders the southern aspect of the Sahara Desert, spanning Africa east to west from Ethiopia to Mauritania. It forms a corridor through the continent where highly

mobile populations have lived for a long time. The ecological zone in the central regions includes a rainy season from June to September and a dry season from October to May. This unique ecosystem led to the development of specific agricultural inventions. One important form is mobile pastoralism which allows for the breeding of large herds of cattle, camels, goats and sheep by following the cycle of pasture growth during the seasons (Wiese 2004).

2.9.The Human – Animal Interface

The human-animal interface is a defining feature of the One Health concept. It is a continuum of contacts and interactions between humans, animals, their products, and their environment, and represents the medium allowing cross-species transmission of zoonotic and emerging human and animal pathogens. The human-animal interface is characterized by a number of attributes that have been acquired throughout the evolutionary history of the human species and the development of mankind. The main attributes of the human-animal interface include the evolutionary pathogen heritage of the human species as well as human demographics and behaviours associated with the human inventions of domestication, agriculture and food production, urbanization, worldwide migration, colonization and trade, and industrialization and globalization… (Reperant LA, Cornaglia G, Osterhaus AD., 2012)

2.9.1. Human Worldwide, Migrations, Colonization and Trade

Human migrations around the globe date to prehistoric times when groups of hunter gatherers journeyed out of Africa to colonize the rest of the world following coastlines or the migration of mega fauna. The chronic infections caused by these pathogens allowed their spread over large distances, despite the relatively slow colonization rate by prehistoric humans. In addition to dispersing pathogens along migration routes, peripatetic prehistoric humans also acquired novel pathogens as they colonized new areas. Some literature explains that, the large-scale dispersion of pathogens by humans thus started early in the development of the human species and gradually accelerated as the means to travel and trade progressed (Bar-Yosef O, Belfer-Cohen A.). The colonization of new worlds has lately been replaced by worldwide travel practices, for business or tourism, and comes with highly similar risks of spreading infectious diseases to unexposed populations or new geographic areas. Travelers in foreign countries may become exposed to pathogens they have never before encountered, and may within an exceptionally short period of time spread them around the globe.

2.9.2. Industrialization and Globalization

The industrial revolution marks a historical transition in late modern history, spanning the 19th and beginning of the 20th century, and initiating the globalization that characterizes current times. The industrialization of food production was prompted by the unabated growth of the human population and resulted in massive population growth of associated animal species. This unique attribute of the modern human-animal interface is its youngest facet and has brought challenges never faced before. The industrial revolution not only resulted in massive population growth of animal species associated with humans, including domestic, commensal, and traded species, amplifying the risks at the domestic and urban human-animal interface, but it also resulted in dramatic changes in animal husbandry, in particular farming intensification.

Lastly, and among the greatest challenges of current times, industrialization likely has had a major impact on and may continue to affect global climate in the future. Changes in climatic conditions may further favor disease emergence at the human-animal interface, by favoring certain host-pathogen systems strongly associated with environmental conditions. Global warming thus may expand or modify migratory patterns of aquatic mammals and birds, as well as the geographic range of insect vectors of zoonotic pathogens currently considered as exotic

.

2.10. Emerging Infectious Diseases of wildlife and species conservation

Growing human populations and changes in land use patterns have increased contact among humans, domestic animals, and wildlife, raising the risks of transmission of numerous pathogens from animals to humans and vice versa. The increase in human activities has had tremendous environmental impacts on biodiversity, including habitat loss, introduction of alien species, and eradication of native species, pollution, urbanization, and anthropogenic climate change. Each of these environmental disturbances affects the ecology of infectious diseases.

In addition to this the effect of Landscape structure like our continent and even has composed of multiple habitats. The mosaic of physical and biotic conditions that define each habitat and the interfaces between habitats play an important role in the biodiversity of lakes, rivers, swamps, grasslands, forests, riparian vegetation, marine seashore, and the successional regions between them. Within this landscape there are areas with human-mediated alterations like agricultural fields,

grasslands used for farm animals, controlled forests, highways, recreation areas, cities, railways, and other human contrivances that constitute a matrix surrounding the remnants of wildlife habitats.

Therefore, infectious diseases are often maintained in a dynamic equilibrium in a population that is influenced by the landscape.

2.11. Pastoral systems in the study area

Pastoralism refers to a livelihood based on livestock rising, and can be undertaken by sedentary or mobile communities (Schelling, E. 2002). Pastoralism is found in many forms throughout the world (Scoones, I. 1994 & Zinsstag, J. 2006). Composition of herds, management practices, social organization and all other aspects of pastoralism vary between areas and social groups. Traditional pastoral production systems of Africa may be classified (in order of increasing mobility) as agro-pastoralism (sedentary pastoralism), semi-sedentary-pastoralism (transhumance) and nomadic or migratory pastoralism with a high degree of mobility (Schelling, E. 2002). Mobility allows pastoralists to simultaneously exploit more than one environment, thus creating the possibility for arid regions to support human life. The traditional pastoral systems in arid and semi-arid regions of sub-Saharan Africa used to cope effectively and in an environmentally sustainable manner with the prevailing harsh and erratic ecological conditions of those regions. The ability to move their herds over large distances, grazing the diffuse and scattered vegetation of the regions' rangelands, and being able to take refuge to more favourable sites during droughts, was the foundation of their system, and was critical to their livestock and their own livelihoods.

Ethiopian pastoralists are estimated about 13.7% of the total population of the country (Table 1.). They inhabit the arid and semi-arid parts of the country and they have been among economically and politically marginalized populations (Pastoralist Forum Ethiopia.: Addis Ababa, Ethiopia, 2009). They are mainly classified as pastoral and agro-pastoral production system. Pastoralists move the herd seasonally from one area to another for the search of pasture and water, whereas agro-pastoralists are based on mixed farming practices, livestock rearing with limited mobility as compared to pastoralists, and crop cultivation to supplement their livestock production (ILRI (aka ILCA and ILRAD): 1994), (Teka, H. 2004). Sixty percent (60%) of the national territory is pastoral and agro-pastoral using area below 1500-m elevation as crude thresholds. Out of 11 regional states of Ethiopia seven regions have pastoralist communities. The proportion of pastoral communities in these regions varies and some regions like Somali and Afar are totally inhabited by pastoralist communities

whereas other region has varying proportion of pastoralist components. Somali and Oromia regions share large proportions.

Profile of Ethiopian pastoral regions

No	Regional States	Pastoral area (km^2)	Population of Pastoralists
1	Afar	29430	1301000
2	Benshangul Gumuz	8410	30640
3	Dire dawa	1100	108570
4	Gambela	17330	133600
5	Oromia	162070	4007950
6	SNNP*	30370	219670
7	Somali	325070	4002170
	Total	**624,780**	**9,813,600**

Source: *Teka, H. Pastoralism and Agro-pastoralism. Proceeding of the 18th Annual Conference of the Ethiopian Veterinary Association 107-116 (2004).*

*SNNPRS: Southern Nations, Nationalities, and People's Region;

Basel, October 18, 2011, in his research paper "Mycobacteria and zoonoses among pastoralists and their livestock in South-East Ethiopia" mentioned that:

> In Ethiopia the lowland pastoral production system is one of the major production systems in the country, with a major share of contribution to its economy. It was estimated that the livestock sector in Ethiopia constitutes 16% of the total Gross Domestic Product (GDP), one-third of agricultural GDP, and 8% of export earnings. Pastoralists raise the largest size of the national livestock resource, accounting for more than 28% of the cattle, 26% of the sheep, 66% of the goats and 100% of the camels (Basel, 2011: pd).

The current regional structure of Ethiopia is based on the ethnic territories and pastoralists in different regions also belong to different ethnic groups. Although they share the common characteristics of mobility and livestock-based livelihood, they have substantial inter-regional differences in cultural practices, religions and livestock systems.

> Basel mentioned, for example, pastoralists in Gambella and Beneshangul Gumuz keep cattle and small ruminants as main livestock whereas in the Oromia region except Karayu, pastoralist who keep camel as main livestock, the majority is cattle and small ruminant keepers. In some areas of Oromia, pastoralists like Guji and Borana they possess cattle as main livestock and additionally camels and small ruminants. The main livestock kept by Somali and Afar pastoralist are camels and small ruminants whereas cattle are an additional asset.

These inter-regional differences in different pastoral groups are also reflected in their knowledge of livestock diseases and husbandry practices.

> For example, Guji and Borana pastoralists are better in the knowledge of cattle and goat diseases than camel, whereas Somali pastoralists are experts in camel husbandry and the identification of their illnesses.

2.12. Pastoralists' Health in Ethiopia

It is understood that, Climate change, globalization, urbanization, deforestation, and intensification of agriculture are all major drivers of environmental changes. They affect human health and create or widen gaps with regard to the socio-economic status between the rich and the poor in this world. One of the most important consequences of the current geo-political dynamics and environmental change is the continued vulnerability of marginalized people to infectious diseases, which is fuelled by factors such as poverty, low social status, environmental degradation and changing ecosystems (Zhou 2012, p. 1).

This is particularly true if we look at pastoralists' health in developing countries like Ethiopia. Pastoral lands of Ethiopia cover about 60% of the total land area, with an estimation of about 8 million pastoralists accounting for about 8% of the total Country population. The healthcare delivery system among pastoral societies is extremely poor compared to rural places of non-pastoralists in Ethiopia. This is because of several factors generally associated with the pastoralist's lifestyle, including dispersed settlement patterns, seasonal mobility, and under-utilization of services even when and where they are available. Besides, health facilities in pastoralist communities are limited in number, understaffed and characterized by poorly organized service delivery, leading to infrastructures often operating at a level far below their potential capacity (FMOH, UNICEF, WHO 2011). These

conditions are drivers of a situation described by relevant literature as typical of pastoralist communities: pastoralists are prone to suffer of higher infant, maternal and U5 mortality rates than non-nomadic communities; are more likely to be affected by water-borne diseases; and susceptible to zoonotic diseases such as brucellosis, Q-fever, bovine tuberculosis and botulism due to their association with and consumption of raw, unpasteurized milk (Schelling et al. 2003).

Furthermore, the SARS epidemic, which originated and was amplified by animals in special live-animal markets, resulted in serious losses to tourism, financial markets, and numerous ancillary businesses. Currently we noted that there is outbreaks in Liben Zone in Kersadula woreda. The living animals are now affected and the income of the community also reduced accordingly. This epidemic will easily transmittable from Animal to Human. The big problem is destroying the infected animals, the bacteria stay more than two decades unless we burned in scientific way, therefore, the cost is very high and needs also high attentions.

In the case of the Filtu and Dekasuftu research (Alberto Salza, Human Terrain Analyst, 2018) and report, the considered ELP model to One Health is constituted by three equipollent elements, bound in an equilateral triangle whose vertexes are ENVIRONMENT, LIVESTOCK and PASTORALIST; its sides (untraced because their intensity is feedback-sensible) are their mutual relations; and the triangle area the resultant OH. By structure, such a triangular form retains shape and relationships under any circumstance. Therefore, it becomes meaningless (and deceiving) to speak about 'OH vaccination campaigns' if there is no consideration about the consequences on the other two vertexes of the triangle. What if I save more animals (or humans or grass)? How is the whole health system going to react? There is not much OH 'sense' in rehabilitating Human Health Posts, without connecting them to the Animal and Environmental Side and activities. Even when such efforts are implemented, the environmental side of health is obscured by the other two, mostly because the concept itself of 'environment' is not fully understood. The environment is a reactive set of organisms, while humans and domestic animals are proactive.

2.13. Livelihood

A person's **livelihood** refers to their "means of securing the basic necessities -food, water, shelter and clothing- of life". Livelihood is defined as a set of activities performed to live for a given life span, involving securing water, food, fodder, medicine, shelter, clothing and the capacity to acquire above necessities working either individually or as a group by using endowments (both human and material) for meeting the requirements of the self and his/her household on a sustainable basis with dignity. The activities are usually carried out repeatedly. For instance, a fisherman's livelihood depends on the availability and accessibility of fish (Lecture note, AAU).

The concept of **Sustainable Livelihood (SL)** is an attempt to go beyond the conventional definitions and approaches to poverty eradication. These had been found to be too narrow because they focused only on certain aspects or manifestations of poverty, such as low income, or did not consider other vital aspects of poverty such as vulnerability and social exclusion. It is now recognized that more attention must be paid to the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner (Lecture note, AAU).

The SL concept offers a more coherent and integrated approach to poverty. The sustainable livelihoods idea was first introduced by the Brundtland Commission on Environment and Development, and the 1992 United Nations Conference on Environment and Development expanded the concept, advocating for the achievement of sustainable livelihoods as a broad goal for poverty eradication.

In 1992 Robert Chambers and Gordon Conway proposed the following composite definition of a sustainable rural livelihood, which is applied most commonly at the household level:

> "A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term." (Robert Chambers and Gordon Conway ,1992)

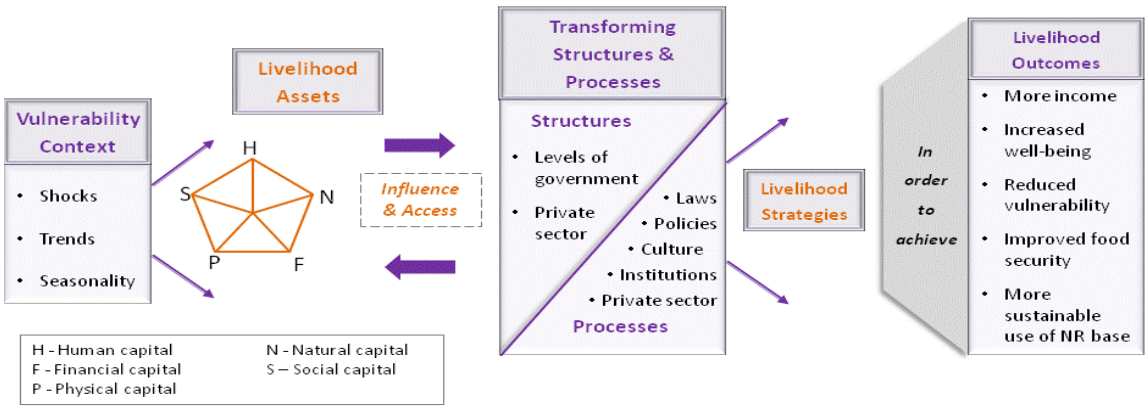
2.13.1. Livelihood Assets

Livelihood assets refer to the resource base of the community and of different categories of households. In the centre left of the diagram above we have a pentagon that stands for different types of **assets** available to local people - **human, natural, financial, physical and social**. These assets are interlinked. Each type of asset is denoted in the figure with a capital letter (H, N, F, P, S).

2.13.2. The sustainable livelihoods framework

The sustainable livelihoods framework is an effort to conceptualise livelihoods in a holistic way, capturing the many complexities of livelihoods, and the constraints and opportunities that they are subjected to. These constraints and opportunities are shaped by numerous factors, ranging from global or national level trends and structures over which individuals have no control, and may not even be aware of, to more local norms and institutions and, finally, the assets to which the households or individual has direct access. For now, we uses the household as a unit of analysis, but as we discuss in later units, it is important to recognise that not all individuals within a household have equal decision-making power, or benefit equally from household assets or income.

Sustainable livelihoods framework



Source: DFID (1999)

The vulnerability context in the above framework refers to the external environment in which people live. This includes trends (such as national or international economic trends, changes in available technology, political systems), shocks (such as illness or death, conflict, weather), and seasonality (of prices, production cycles and

so on). The vulnerability context is important because the three factors have a direct impact on the possibilities that poor people have to earn a living now and in the future. Wider economic conditions can create more or fewer opportunities; an illness in the family can deprive a family of an important source of income and can force them to sell important assets that they have built up. Seasonal shifts in prices, production and employment opportunities are one of the most enduring sources of hardship for poor people all over the world. (DEFID, 1999)

The 'transforming structures and processes' box refers to the institutions and policies that affect poor peoples' lives, from public and private entities to national policies and local culture. All of these can change both the vulnerability context and the assets to which poor people have access. The idea of **assets** is central to the sustainable livelihoods approach. Rather than understanding poverty as simply a lack of income, the sustainable livelihoods approach considers the assets that poor people need in order to sustain an adequate income to live. (DEFID, 1999)

Based on those assets, and shaped by the vulnerability context and the transforming structures and processes, poor people are able to undertake a range of livelihood strategies - activities and choices - that ultimately determine their livelihood outcomes. As we discussed earlier, poor people are usually obliged to combine a range of strategies in order simply to survive; individuals may engage in multiple activities, and the different members of a household may live and work in different places. The outcomes that they may achieve, all being well, could include more income, increased well-being, reduced vulnerability and greater food security. Sometimes one outcome can negatively affect another; for example, when poor people engage in less risky, and hence lower income activities, in order to be less vulnerable to shocks. Five types of assets, or capital as they are described in the literature, have been identified that we all, not just poor people, need in order to make a living. These are the following: (Lecture note, AAU)

- **Human capital:** skills, knowledge, the ability to work and good health. Good health is not simply a means to earning a livelihood; it is of course an end in itself.
- **Social capital:** the social resources that people draw on to make a living, such as relationships with either more powerful people (vertical connections) or with others like themselves (horizontal connections), or membership of groups or organisations. Generally, relationships of trust, reciprocity and exchange that the poor can draw on in times of need, and that lower the costs of working productively together. Like human capital, social capital has an intrinsic value; good social relationships are not simply a means, they are an end in themselves.

- **Natural capital:** the natural resource stocks that people can draw on for their livelihoods, including land, forests, water, air and so on.
- **Physical capital:** the basic infrastructure that people need to make a living, as well as the tools and equipment that they use. For example, transport and communication systems, shelter, water and sanitation systems, and energy.
- **Financial capital:** savings, in whichever form, access to financial services, and regular inflows of money.

The more assets any household has access to, the less vulnerable they have negative effects of the trends and shocks as described above, or to seasonality, and the more secure their livelihood. Often increasing one type of capital eads to an increase in other amounts of capital, for example, as people become educated (increase in human capital) they may get a better job which earns more money (increase in financial capital) which in turn means that they are able to upgrade their home and facilities (increase in physical capital). Sometimes, however, one form of capital decreases as another increases. This could be true, for example, where a person or household sells their land to migrate to a city.

The sustainable livelihoods approach is no more than an attempt to provide a tool which is 'useful to think with'. You might, therefore, find it helpful to 'test' the livelihoods framework by trying to assess your own personal situation. The very fact that you are studying this programme suggests that you are more fortunate than most people in your country, or in the world as a whole, or at least that you are not poor. What do you 'have', that has enabled you to get to your present status, and that is most likely enable you to progress further, by whatever measures you assess progress?

What shocks have you suffered along the way? Are there trends that you have benefited from? Are there structures and processes that have helped or hindered your progress so far?

2.13.3. Critiques of the sustainable livelihoods' framework

In recent years the prominence of the five capitals has been criticised by development practitioners for focusing too much on the micro-level and neglecting the 'higher' levels of governance, the policy environment, national and global economic growth and so on. This has led, for example, to a limited understanding of how markets work; how processes far from the lives of poor people nonetheless have an enormous impact on the possibilities that exist for them to earn a secure income. These issues are of course captured in the wider sustainable livelihoods' framework, within the transforming structures and processes and the 'vulnerability context' but, in practice, many people have used the idea of the five capitals more than they have the linkages between those and the wider environment in which people live. It is very important to keep in mind that the

wider environment affects not only the assets to which people have access, but also what can be achieved with those assets. (DEFID, 1999)

The sustainable livelihoods framework has also been criticised for failing to take power dynamics into consideration, as it relates to gender, for example. Again, while such dynamics are included in the framework, in practice, they have been neglected. In particular, social capital has often been seen as simply 'a good thing' whereas, in reality, social networks can be both inclusive and exclusive, with often the weakest and most vulnerable excluded. They also often involve hierarchical and coercive relationships that limit options for those at the lower levels, and even when relationships are more horizontal than vertical, the obligations that reciprocal relationships involve can be onerous. (DEFID, 1999)

All of the criticisms and limitations of the sustainable livelihoods approach outlined above are certainly valid. The approach attempts to summarise in a single set of diagrams and connected terms the extremely complex and diverse reasons for poverty and the possibilities for addressing it. Inevitably, when used in practice it is unwieldy and certain elements highlighted more than others depending on the interests of the users. Nonetheless, it remains very useful for our purposes in this module, both for considering the very micro-level details of poor people's livelihoods and for considering the wider context in which those livelihoods operate. (DEFID, 1999)

2.13.4. Livelihood strategies

According to DFID (1999) the term livelihood strategies are defined as the range and combination of activities and choices that people make in order to achieve their livelihood goals, including productive activities, investment strategies, reproductive choices, etc. Livelihood strategies are composed of activities that generate the means of household survival and are the planned activities that men and women undertake to build their livelihoods (Ellis, 2000).

2.13.5. Livelihood Adaptation, Vulnerability and Resilience

Shocks: are sudden events that impact on livelihood security. There are many different types of shock. They include:

- the untimely death of an economically active household member due to an occupational hazard,
- a fire that destroys grazing and crops
- outbreaks of infectious diseases which affect Camel, cattle, sheep and goats, etc

- shortage of water, water borne diseases,
- political violence and instability
- theft.

Trend**:** include population pressure, food insecurity, health problem and death, technological change, price, National and World trend. (DEFID, 1999)

Stresses: are long-term trends that undermine livelihood potential. These include inadequate public services, poor transport, bad communications, inferior education and inadequate health systems. Other stresses include a steady decline in the quantity and quality of stocks of natural resources, climate change, political instability and national or regional economic decline that negatively impact on household livelihoods. Some stresses stem directly from within the household and may include frequent illness, and violent or conflict between clans. (DEFID, 1999)

Vulnerability: Robert Chambers defines vulnerability as: defencelessness, insecurity and exposure to risk, shocks and stress...and difficulty in coping with them. Vulnerability has two sides: an external side of risks, shocks and stress to which an individual or household is subject and an internal side which is defencelessness, meaning a lack of means to cope with damaging loss. There are different viewpoints on the extent to which people can control and manage the factors that contribute to vulnerability. For example: People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as by shocks and seasonality – over which they have limited or no control. Other practitioners strongly disagree with the way this view makes people seem powerless. They say that people do have some control because they can prepare for and react to the factors that contribute to the vulnerability context. For example, if people understand and plan for drought and seasonal variability, they can modify the activities that might be affected. They might use drought-resistant crop varieties or methods which save water. Likewise, if people understand the source of external threats, shocks and stresses, they can decide to do something to remove the threat. (DEFID, 1999)

2.13.6. Vulnerability context

Assessing the local vulnerability context is a key part of livelihoods analysis. The poor are constantly insecure but there are certain factors and trends that can make their insecurity much deeper. Vulnerability assessment involves an analysis of factors and long-term trends. Many of these factors come from several levels away from the immediate environment.

These include factors such as:

• climate change

• seasonal variability

• drought and floods

• epidemics

• political conflict

• tenure insecurity

• a government policy that promotes retrenchment, inflates consumer prices and devalues the currency

• conservation policy that restricts access to key resources and livelihood opportunities.

Others are much closer to home and may include decisions by Regional, Zonal and woreda government officials, by members of political factions in a community that are fighting, or by the simple repair of a road.

2.13.7. Livelihood outcomes

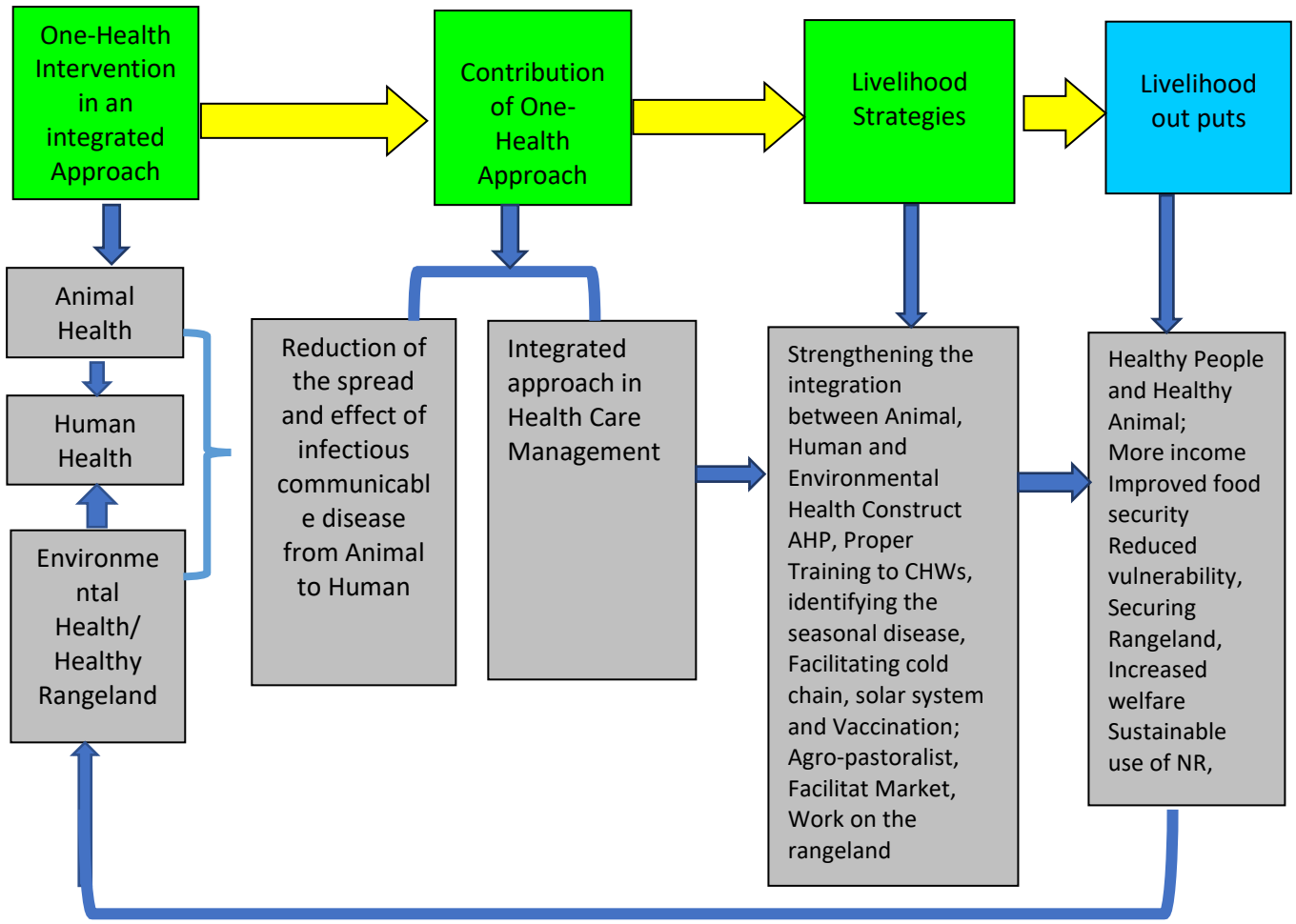
Livelihood outcomes are the achievements of livelihood strategies, such as more income (e.g. cash), increased well-being (e.g. non material goods, like self-esteem, health status, access to services, sense of inclusion), and reduced vulnerability (e.g. better resilience through increase in asset status), improved food security (e.g. increase in financial capital in order to buy food) and a more sustainable use of natural resources (e.g. appropriate property rights) (Scoones, 1998)

2.13.8. Conceptual Framework

Different types of approaches and conceptual frameworks are found to study livelihoods. This framework consists of different components which are interrelated to each other being one dependent on the other. The major components of the framework are (trends, shock, and seasonality affecting livelihoods) livelihoods assets (Human, Social, Financial, Physical and Natural Assets), mediating with Governmental and Non-Governmental institutions, livelihood strategies (agro-pastoralist, farming, non-farm activities) and livelihood outcomes (Better Health conditions, food security, saving and Income) which are the result of different components and their interactions.

As a result, there are assets (Capital) that have changed in study areas due to livelihood strategies undertaken, since livelihood strategies comprise the ranges and combination of activities and choices that is undertaken in order to achieve livelihood goals.

Conceptual Framework



Source: Own Construction

A one health approach recognizes the relationships between the human, animal, and environmental health, and applies interdisciplinary tools to solve complex public health problems

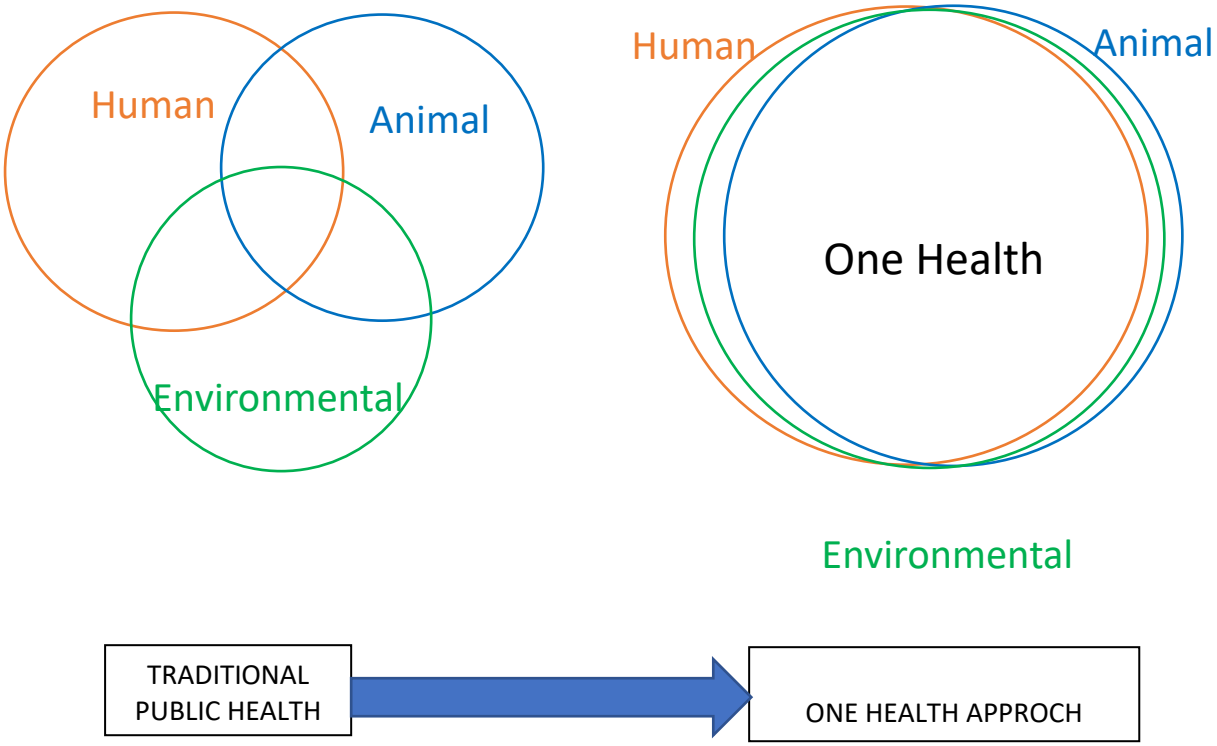


Fig.1

Enhancing Human and Animal Health Services, Livelihoods and Environmental Protections with the collaboration of the stakeholder of the new approach and lead to strengthen the above three pillars. Collaboration and cooperation are essential because they are paramount to linking these independent pillars of One Health to ensure that maximum sustainable health and economic benefits are achieved in the most efficient manner.

Chapter Three: Research Methodology

3.1.Introduction

This chapter presents the overall design and structure that is include description of the study area, types of data collection, sampling and sample size, the source and methods of data collection, like key informant interview with local authorities, animal health workers and community representatives and observations of the existing facilities.

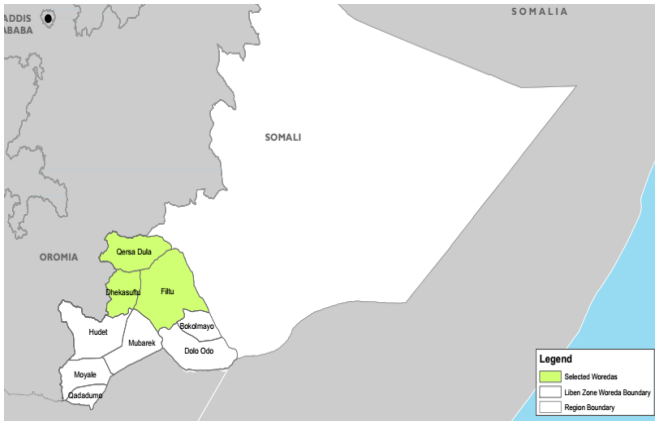
Data was gathered from existing databases, such as those managed by NGOs and human and animal health organizations (e.g. WHO's and the Food and Agriculture Organization of the United Nations, etc. Data collected at frequent intervals by the Woreda Livestock Department and other concerned bodies during epidemic outreach, while broader datasets (e.g. annual or national) may be used for evaluating health trends associated with more broad-reaching changes in, for example, national policies, multi-national corporate strategies, or climate patterns. It is important to review and assess the costs and benefits of incorporating various data sources before beginning to develop an OH study design.

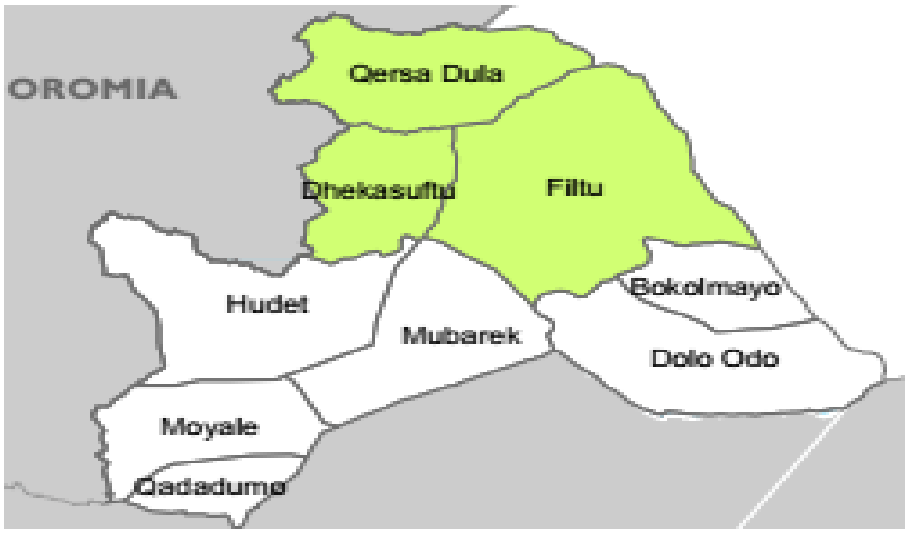
3.2. Description of the Study area

The woreda of Filtu and Deka-Suftu, from Liben Zone, Somali Region of Ethiopia, borders on the South with the Dawa River (which separates it from Moyale and Udet woreda); on the West with Dekasuftu woreda; on the North and East with the Ganale River (which separates it from Afder Zone), and on the Southeast with Dolo Ado woreda.

In Filtu woreda, short distances from highlands to the rivers provide pastoralists with a manageable territory: long-range nomadic transhumance is not common, except in case of severe droughts. Contrary to a standard long-range pastoralists' model, herders can reach dry season wells, ponds and rivers without being too far from their households and extended family camps. The impression is that absolute nomadic pastoralism is progressively decreasing, due to several factors, such as: climate changes and consequent decrease of rainfall, grass/water availability and livestock number; long-term consequences of local conflicts and inaccessibility of disputed pastures and areas; input of resettlement governmental strategies.

Actually, in visited sites during pilot project assessed there was lack of services provisions, due to: i) distance from Filtu town; ii) malfunctioning of the infrastructures and shortage of manpower (as in the case of schools and water constructions); iii) abandonment of the areas where recent conflicts occurred (around Dawa river and on the border with Dekasuftu woreda), with consequent flow of IDPs.





3.3.Types of Data Collection

In line with the interdisciplinary dimension of the research, veterinary, environmental and medical sciences, cultural mediators and focal group facilitators. Local community members also will recruit on the field to ease the interaction with pastoralists' household members. The research involves the local population at different levels: herders and relatives (elders, men, women, youth, children); human and animal health professionals (biomedical, traditional); authorities, leaders and representatives (governmental, religious, customary if possible). The majority of the information was collected at household level, FGD discustions and in the government office considering it the main agency unit in the pastoral system.

After a preliminary discussion with representatives of the concerned regional authorities, there follwup were involved in data collection processes.

1. Introduction of the concept of the research to stakeholders at woreda level (governmental authorities and NGOs representatives) and participatory selection of the main sites;
2. Introduction of the concept of the research to leaders and elders of the selected kebele and community
3. Qualitative data collection at community and household levels (through semi-structured interviews, focus group discussions, participant observation of pastoralists' daily life) and secondary data collection in the concerned offices.

The methodology applies to ensure the acknowledgement, ownership and accountability of future one health actions through the participatory involvement of pastoralists community members and representatives in both data collection and decision-making processes.

3.4.Sampling and Sample Size

Filtu and Dekasuftu Woreda was selected purposively since it has largest number of settlers among the Woreda's in which the intervention of One Health Approach programme has been carried out. To Determine the Kebeles, the sampling frame of the Kebeles of the Woreda in which the One Health Approach programme was conducted were listed, then at least 4 kebele from Filtu and 2 kebele from Dekasuftu woreda were selected by using simple random sampling (Kunka & Barsan), plus considering the One Health implementation kebeles taking into considerations.

However, the maximum required sample size for this study is 120 households, these are from pilot project implemented in these two woredas & due to the accessibility of the HH and the current border confilict we focussed only the minimum 60 households from both woreda and we found these safe comparing to other places, thus, to determine allocated sample (proportional to population size) to each woreda and kebele, and the interval the following was carry out:

Fig 2 shows the geographical location of kebeles selected for the study.

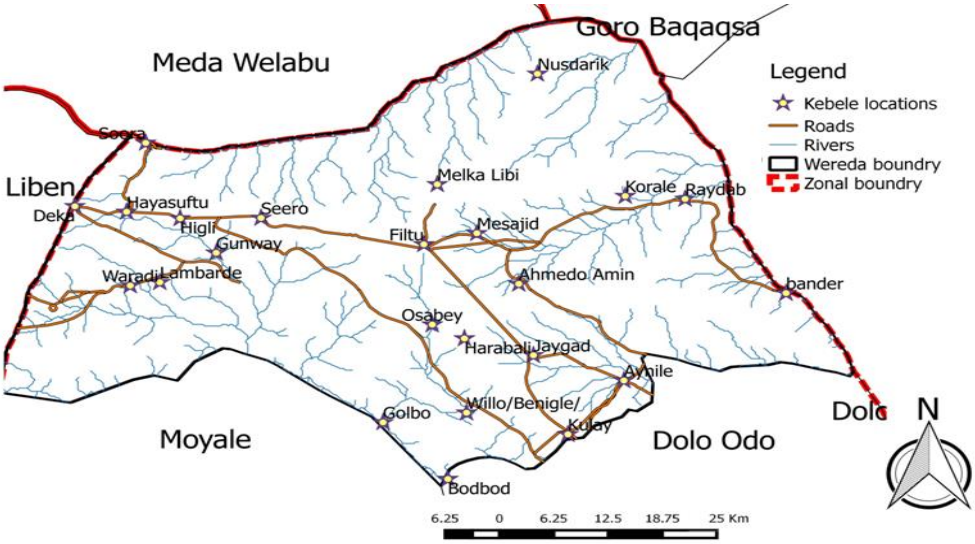


Fig 2.

3.5.Source and Methods of Data collection

Primary and secondary data collection will be plan to conduct this data collection study; we are using the following data collection instruments.

3.5.1. Primary Data

Key Informants Interview: - using semi-structured interview schedule for topics prepare to guide the specific questions during the interview. The key informant's interview has included elderly people, kebele, woreda and zonal officials,

Focus Group Discussion (FGD): - Focus group discussion with the pastoralist is one of the qualitative data collection methods in the is study. Each focus group comprise at least six to ten individuals who are from elders, women and youth. This enable to get data about the contribution of One-Health intervention during the pilot project implemented by a given NGOs at household level and to obtain opinions, attitudes and views from the group discussion participants and it help elaborate, clarify and cross check ideas, gaps, experience and arguments that has gather through other methods, a total of 12 FGDs (6 men and 6 women) selected.

Household Study: - to assess the contribution of One-Health Approach to the livelihood assets of settlers at household level and related issues, data was using structure questionnaire which comprise open ended and close ended questions.

Direct Observation: - the research of observed the situation at field level and took transect walk to observe the existing situation.

3.5.2. Secondary Data

This is to supplement the primary data, and was collected from each woreda Human Health Office, Livestock Office, Animal Health posts and from review of books, articles, published and government and non-governmental agencies reports, plus Operational Researches

3.5.3. Method of data Analysis

Tthe qualitative data gathered through focus groups discussion, Key informant interview and observation was analysed through narration. The Quantitative data was analysed by using statistical package like EPI-Info, Statistical Package for Social Science (SPSS) and MS-Excel. Frequencies, percentage, is use to analyse and describe the out puts.

Chapter Four: Result and Discussions

4.1.Data Presentation

This is a chapter deals with analysis and interpretation of the data obtained through questionnaires, interview, focus group discussion and observation. Both qualitative and quantitative data obtained have been organized presented and analysed. The data obtained through questionnaires and interview, plus tabulated and followed by subsequent analysis and interpretation to come up with the main findings.

A total of 120 sample households were sample kebeles target area of the current CCM project. It was planned to cover initially 120 HHs as per the discussion of the woreda official but due to the availability of the population and the current border conflict plus some of them also internally displaced due to draught affected kebeles, we were forced to focus on two kebeles and reached only 60 respondents. Because, the remaining were not available at the time of data collection, due to draught and conflict between the boarder in Somali and Oromia. The researcher has collected the data from the available respondents and hence their general characteristics are presented and analysed as follows.

4.1.1. Background Characterstics of the Respondents

A) Distribution of respondents by sex

The data in Table 2 presents the sex distribution or respondents both at a woreda and kebele level. The highest proportion of Male respondents, (i.e. 63%,) were found in Filtu woreda and the remaining Male HHs, i.e. 53% were from Deka-Suftu. Among the total Female HHs, the highest proportion of Female HHs respondents, i.e. 47% were found in Deka-Suftu woreda and the remaining Female HHs, i.e. 37% were from Filtu woreda.

Table 2. The sex distribution of Households by Woreda and kebele

Woreda	Kebele	Sex		Total
		F	M	
Deka Suftu	**Total**	**14**	**16**	**30**
	Sora Deka	14	16	30
	Percentage	**46.67%**	**53.33%**	**100%**
Filtu	**Total**	**11**	**19**	**30**
	Osobay	11	19	30
	Percentage	**36.67%**	**63.33%**	**100%**
Total	**6**	**25**	**35**	**60**
	Percentage	**41.67%**	**58.33%**	**100%**

B) Age Group distribution.

Table 3 presents the age group distribution of respondents both at a Woreda and Kebele level. The highest proportion of respondents, i.e. 47%, were found within the age group of 20-35 years and the proportion of respondents falling in the age groups of 36-50 and above 50 years were found to be 30% and 23% respectively. Hence, in Deka Sufto the proportion of HHs falling in age groups decreases as the age increases. But, the distribution of HHs in Filtu woreda showed slight differences as compared with Deka Suftu as in the sense that about 46% of household heads were categorized within the age group of 36-50 and HHs falling within the age group of 20-35 and above50 years were found to be 37% and 17% respectively. The age group distribution is taken from the One-Health project initial assessment document and I took the same to be consistant.

Table 3: Age group distribution by Woreda and each kebeles

Woreda	**Kebele**	**Age**			**Total**
		From 20-35	**From 36-50**	**Above 50**	
Deka Suftu	**Total**	**14**	**9**	**7**	**30**
	Sora Deka	14	9	7	30
	Total %tage	**47%**	**30%**	**23%**	**100%**
Filtu	**Total**	**11**	**14**	**5**	**30**
	Osobay	11	14	5	30
Total	**Total %tage**	**37%**	**46%**	**17%**	**100%**
	G/Total	**25**	**23**	**12**	**60**
	Percentage	**42%**	**38%**	**20%**	**100%**

4.1.2. Experience and Awareness of One-Health Approach as perceived by respondents

Table 4 presents perception of respondats on the experience and meaning of One-Health Approach before One-Health implementation program the study area. Almost all respondents did not awareness and any experience about One-Health in relation to development. 100% of the surveyed households never heard before about One-Health and its idea.

Table 4. Respondents Experiences and Awarness about Meaning of One-Health Approach before its implementation.

Woreda	Kebele	Have no experience and meaning of One-Health Before(Yes/No)			Grand Total
		FHH	MHH	Total	
Deka Suftu	Sora Deka	**12**	**18**	**30**	**30**
	Sub Total	**12**	**18**	**30**	**30**
Filtu	Osubey	**13**	**17**	**30**	**30**
	Sub Total	**13**	**17**	**30**	**30**
Total		**25**	**35**	**60**	**60**
Deka Suftu	%			50%	
Filtu	%			50%	
Grand Total %				**100%**	**100%**

Table 5. presents respondents experiences and awareness about One-Health Approach after the implementation of the program in two weredas. The highest proportion of respondents, i.e. 75%, were fully aware about One-Health Approach and have the knowledge and that, this program has protected them from Zoonotic and human, animal & environment diseases as well. Thus, awareness creation should be provided to the community members through gatherings and the vaccine campaign.

Table 5. : Respondents Experiences and Awernes about One-Health Approach after implementation in study area.

Woreda	Kebele	Fully Aware			Somehow Aware			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu	Sora Deka	**7**	**15**	**22**	**5**	**3**	**8**	**30**
	Sub Total	**7**	**15**	**22**	**5**	**3**	**8**	**30**
Filtu	Osubey	**6**	**17**	**23**	**7**	**0**	**7**	**30**
	Sub Total	**6**	**17**	**23**	**7**	**0**	**7**	**30**
Total		**13**	**32**	**45**	**12**	**6**	**15**	**60**
Deka Suftu	%			37%			13%	
Filtu	%			38%			12%	
Grand Total %				**75%**			**25%**	**100%**

4.1.3. How One-Health Approach is changing the Health condition of the study area through an integrated health strategy

As shown in Table 6, from the sample households, 44% somehow agreed that they have access to both human and animal health facilities followed by 56% fully agreed to One-Health intervention. This result incuraged the reserchers, donors and implementers, because within this short period of time the community awareness ishas been changed within the current One-Health Approach interventions. This result shows that the access to adequate human & animal health facilities observably has less variation between woredas as well as Kebeles. The trend of treatment of human and animal was managed separately before, on the basis of this collaborative intervention project applying 'one health', planning and implementing a joint vaccination campaign initiated for both livestock and children in mobile and sedentary pastoralists.

HHs suggested that to increase the number of bothe Animal and Human Health workers, strengthening proper training related to zoonotic diseses; Cold Chain with solar systems for vaccination campaign facilitated with Adequate drugs and medical equipment to each intervention sits. Plus, for each intervention Health Center, proper training to HHWs, AHWs, CHWs, government authority and proper awareness education was also provided to the community and community leaders. Due to these activities, a change is shown in the intervention areas. As in most countries, the health of Pastoralist's in Filtu and Deka-Suftu are highly dependent on the health of the environment. Recently, our country has developed a One Health strategic plan to meet its human, animal and environmental health challenges. This approach drives innovations that are important to solve both acute and chronic health problems and offers synergy across systems, resulting in improved communication, evidence-based solutions, development of a new generation of systems-thinkers, improved surveillance, decreased lag time in response, and improved health and economic savings (CCM One-Health project document).

It is increasingly clear that resolution of complex global health problems requires interdisciplinary, intersectoral expertise and cooperation from governmental, non-governmental and educational agencies. 'One Health' refers to the collaboration of multiple disciplines and sectors working locally, nationally and globally to attain optimal health for people, animals and the environment. One Health offers the opportunity to acknowledge shared interests, set common goals, and drive toward team work to benefit the overall health of a nation.

Table 6: Nearby access to adequate health facilities by OH changing the community health

Woreda	Kebele	Somehow agree			agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**3**	**10**	**13**	**7**	**10**	**17**	**30**
	Sora Deka	3	10	13	7	10	17	30
Filtu		**4**	**9**	**13**	**6**	**11**	**17**	**30**
	Osubey	4	9	13	6	11	17	30
Total		**7**	**19**	**26**	**13**	**21**	**34**	**60**
Deka Suftu	%			22%			28%	
Filtu	%			22%			28%	
Grand Total				**44%**			**56%**	**100%**

4.1.4. How the pastoralist community perceive about One-Health Approach?

Many development approaches, such as settlement schemes, implementation of water points, roads, static schools and clinics have failed or at least shown less than expected positive results so far. Attempts to replace traditional systems with new production forms underestimated the efficiency of the traditional systems.

The current implementer of One-Health with the collaboration of the regional Livestock and Health office planned to provide awareness training to the traditional healers, plus gives recognitions to traditional healers and facilitating to work jointly with the Human and Animal Health workers because they are easily accessible, in addition to this, the pastoralist community trust the traditional healers. Because livestock is so important and one of the main livelihoods to pastoralists.

Breeding practises already were taught to youngsters and the recognition of different livestock diseases and their treatment are later learnt from elders described by traditional healers for both humans and animals. Healers provide diagnostic disease services and manual healing arts including bone setting, obstetric manipulations and suturing of wounds, identifying some diseases and gives a name locally.

More studies are needed that seek to clarify the common understanding of zoonoses that could be used to guide effective and locally relevant interventions. Such studies should consider in their approaches the pastoralists' wider social, cultural and economic set up.

According the household interview how does the pastoralists/project beneficiaries perceive about One-health Approach was positively responded by majority of the sampled households. As indicated on the Table 7, 78% perceive to have adequate information through traditional healer. The remaining 22% of the HH responded from Health Center.

Table 7: The pastoralist community perceive about One-Health Approach?

Woreda	Kebele	How the pastoralist community perceive about One-Health Approach?						Grand Total
		Traditional Healer			Health Center			
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu	Sora Deka	**9**	**15**	**24**	**3**	**3**	**6**	**30**
	Sub Total	**9**	**15**	**24**	**3**	**3**	**6**	**30**
Filtu	Osubey	**6**	**17**	**23**	**4**	**3**	**7**	**30**
	Sub Total	**6**	**17**	**23**	**4**	**3**	**7**	**30**
Total		**15**	**32**	**47**	**7**	**6**	**13**	**60**
Deka Suftu	%			40%			10%	
Filtu	%			38%			12%	
Grand Total %				**78%**			**22%**	**100%**

4.2.Data Collection through Focused Group Discussions (FGD) & community HH

Two FGDs per Kebele was considered by sampling framework. Separate groups of 12 men, women, and youth representing households from the target communities participated in each of the selected Kebeles. To respect the local culture and make the discussion open, the facilitators conducted the FGDs separate for men and women. A total of 12 FGDs (6 men and 6 women) were carried out. At the start of each FGD, facilitators were encouraged to spend some time explaining the One-Health Approach and the intervention given by the existing NGOs and how this new approach is important for the pastoralist community in terms of contributing or changing the health status of the Human and Animal.

Fig.1 Conducting separate focused group discussion with female and male headed household at Seero Deka Kebele in Deka Suftu woreda (left) and Osubey Kebele in Filtu woreda (right).

Table 8: Components used in the household questionnaire and focused group discussions related to OH approach systems

Component	Explanation
Infrastructure and social services	The basic infrastructure and social services (accessible roads and livestock markets, human health facilities and animal health services, access to livestock feed or fodder resources and water sources for humans and livestock during drought.
Social networks and support systems	The share of treated milk, milk products and food in times of drought, longstanding tradition for people to help each other at the time of disaster, lend money, labor or animals to the needy households in the community, savings (Equb) and individual-based saving systems, the level of support in this community.
Environment and physical resources	Environment and physical resources Include (The herd size & quality, diversity and livestock population, pasture land and water sources, appropriate grazing techniques, access to irrigation during the dry periods, restock livestock after loss due to drought, frequency and severity of drought, vulnerability to minor shocks and stresses.)
Governance, peace and security	In this section it includes (capacity of governmental and non-governmental organizations during disaster times, structures of public administration to respond to disaster risks and conflicts.
Human capital	Access to timely and adequate livestock, livelihoods information and weather forecast, access to adequate and relevant information about hygiene and zoonoses, that is re-emerging and emerging, access to training on risk reduction strategies.
Food security	Access to adequate food, purchasing power to cope up with food shortage problems, community produce Health Animal after OH intervention, earn adequate income from the sale of livestock, opportunities for income diversification outside of livestock and farm activities, employment and income generation opportunities and status of difference in wealth and income. How One-health Approach is used to improved the livelihoods of pastoralist

4.3.Infrastructure and social services

4.3.1. Adequate access to roads and livestock markets Before OH intervention

According the household interview towards adequate access to road and livestock market was negatively responded by majority of the sampled households. As indicated on the Table 9, 78% disagreed to adequate access to road and livestock market. The remaining 22% of the HH responded “agreed”. The result shows that the access to road and livestock market by observably less in the study area.

Table 9: Response of households to adequate accessible roads and livestock markets before OH intervention

Woreda	Kebele	Adequate Accessible Roads & Livestock Market Before One-Health Approach intervention						Grand Total
		Disagreed			Agreed			
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu	Sora Deka	**9**	**15**	**24**	**3**	**3**	**6**	**30**
	Sub Total	**9**	**15**	**24**	**3**	**3**	**6**	**30**
Filtu	Osubey	**6**	**17**	**23**	**4**	**3**	**7**	**30**
	Sub Total	**6**	**17**	**23**	**4**	**3**	**7**	**30**
Total		**15**	**32**	**47**	**7**	**6**	**13**	**60**
Deka Suftu	%			40%			10%	
Filtu	%			38%			12%	
Grand Total %				**78%**			**22%**	**100%**

FHH = Female headed household; MHH = Male headed household

4.3.2. Adequate access to roads and livestock markets After OH intervention

According the household interview towards adequate access to road and livestock market was positively responded by majority of the sampled households. As indicated on the Table 10, 63% agreed to adequate access to road and livestock market. The reason behind that in the livestock market there is a free access livestock vaccine, they get a reasonable price to sell their products and have a close follow-up & treatment by the Animal Health Worker. The remaining 37% of the HH responded "disagreed". Female respondents "agree" that after One-Health approach they have got more benefits. The result shows that the access to road and livestock market is observably less variation between woredas as well as Kebeles.

Table 10: Response of households to adequate accessible roads and livestock markets before OH intervention

Woreda	Kebele	Adequate Accessible Roads & Livestock Market After One-Health Approach intervention						Grand Total
		Disagreed			Agreed			
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu	Sora Deka	**5**	**7**	**12**	**12**	**6**	**18**	**30**
	Sub Total	**5**	**7**	**12**	**12**	**6**	**18**	**30**
Filtu	Osubey	**6**	**4**	**10**	**17**	**3**	**20**	**30**
	Sub Total	**6**	**4**	**10**	**17**	**3**	**20**	**30**
Total		**11**	**11**	**22**	**29**	**9**	**38**	**60**
Deka Suftu	%			20%			30%	
Filtu	%			17%			33%	
Grand Total %				**37%**			**63%**	**100%**

4.3.3. Access to adequate human health facilities

As shown in Table 11, from the sample households, 44% was somehow agreed to accessibilty to human health facilities followed by 56% who fully agreed. The result shows that the access to adequate human health facilities observably less variation between woredas as well as Kebeles. During the FGDs the following main point was raised. Before One-Health Approach intervention was implemented, more cattle had been vaccinated than children and women; and no children had been vaccinated completely, they are not accessable and internally displaced due to different reasons. Nevertheless, the people rarely required care in health centres, coming only at late stages of illness, with the result that many diseases remained untreated.

The community elders confirmed that in Deka-Suftu showed higher child mortality in mobile pastoralist populations than in the sedentary population. In addition, mobile pastoralists face a higher risk for zoonotic diseases than do sedentary populations because of their deep dependence on and close contact with their livestock. Practices such as consumption of raw milk and meat favour the transmission of brucellosis, bovine tuberculosis and anthrax. It has also been possible to show the direct relationship of camel breeding and human Q-fever. On the basis of these findings, a first collaborative intervention project applying 'one health' was initiated, planning and implementing a joint vaccination campaign for both livestock and children in mobile pastoralists.

This campaign showed not only a health benefit but also the economic benefit in terms of savings made by the communities from closer follow-up of the CHWs cooperation between the public health and veterinary sectors. It laid the foundation for further joint health interventions in the country.

Table 11: Nearby access to adequate human health facilities in the community

Woreda	**Kebele**	**Somehow agree**			**agree**			**Grand Total**
		FHH	**MHH**	**Total**	**FHH**	**MHH**	**Total**	
Deka Suftu		**3**	**10**	**13**	**7**	**10**	**17**	**30**
	Sora Deka	3	10	13	7	10	17	30
Filtu		**4**	**9**	**13**	**6**	**11**	**17**	**30**
	Osubey	4	9	13	6	11	17	30
Total		**7**	**19**	**26**	**13**	**21**	**34**	**60**
Deka Suftu	%			22%			28%	
Filtu	%			22%			28%	
Grand Total				**44%**			**56%**	**100%**

4.3.4. Access to animal health services with the support of OH approach

As shown in Table 12 with regard to the animal health services about 58% of the respondents said there is nearby access due to OH approach, and 42% somehow disagreed to animal health services.

This improvement came after One-Health Approach interventions provided by the current project holder support, and government also give more infuses to animal health services in line with human health with the support of OH approach.

Table 12: Households responses to nearby access to animal health services.

Woreda	Kebele	agree			disagree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**3**	**14**	**17**	**7**	**6**	**13**	**30**
	Sora Deka	3	14	17	7	6	13	30
Filtu		**5**	**13**	**18**	**6**	**6**	**12**	**30**
	Osubey	5	13	18	6	6	12	30
Total		**8**	**17**	**35**	**13**	**12**	**25**	**60**
Deka Suftu	%			28%			22%	
Filtu	%			30%			20%	
Grand Total				**58%**			**42%**	**100%**

4.3.5. Access to livestock feed or fodder resources

As shown in Table 13, the majority households (93%) of them have no access to animal feed. only 7% of the respondents fully agreed to have access to animal feed, only 7% improvement is due to the intervention of OH approach activities provided by the NGOs currently implemented in this project areas.

Table 13: Response of households to nearby access to livestock feed or fodder resources.

Woreda	Kebele	disagree			agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**10**	**19**	**29**		**1**	**1**	**30**
	Sora Deka	10	19	29		1	1	30
Filtu		**11**	**16**	**27**		**3**	**3**	**30**
	Osubey	11	16	27		3	3	30
Total				**56**			**4**	**60**
Deka Suftu	%			48%			2%	
Filtu	%			45%			5%	
Grand Total				**93%**			**7%**	**100%**

4.3.6. Access to adequate and protected water sources for humans and livestock during drought.

As indicated on Table 14, access to adequate water sources for humane and livestock during drought was very much limited, 83% of HHS respond on the selected woredas. However, the limitation was seriously explained in Deka Suftu woreda in which all respondents (100 % HHs) agreed to “no access to water resources” during drought times. Due to the intervention of One-

Health approach artificial pond was constructed in Filtu Woreda, 17% of the respondents considering that during dry season they access this artificial pond.

Table 14: Response of households to nearby, adequate and protected water sources for humans and livestock during drought.

Woreda	Kebele	disagree			agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**10**	**20**	**30**				**30**
	Sora Deka	10	20	30				30
Filtu		**6**	**14**	**20**	**5**	**5**	**10**	**30**
	Osubey	6	14	20	5	5	10	30
Total		**16**	**34**	**50**	**5**	**5**	**10**	**60**
Deka Suftu	%			50%				
Filtu	%			33%			17%	
Grand Total				**83%**			**17%**	**100%**

4.4.Social networks and support systems

4.4.1. Share treated milk, milk products and food in times of drought

According to the survey findings on Table 15 below, there was no household negatively responding for sharing of treated according to the OH intervention program, food and milk products among the community during drought times. Majority of the households 86.7 % confirmed that sharing is common and increased their confident that the food and milk is treated and followed the education provided by the Animal and Human Health workers. About 14% partly approved to share food and milk at times of drought among the individuals. In general, this figure indicates that sharing is culture and OH also contribute to manage treated consumable products and increase confident also in the project areas let alone where there are crises.

Table 15: Response of the households to share treated milk, milk products and food in times of drought.

Woreda	Kebele	Somehow agree			agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**1**	**3**	**4**	**9**	**17**	**26**	**30**
	Sora Deka	1	1	1	9	17	26	30
Filtu		**1**	**3**	**4**	**10**	**16**	**26**	**30**
	Osubey	1	3	4	10	16	26	30
Total		**2**	**6**	**8**	**19**	**33**	**52**	**60**
Deka Suftu	%			7%			43%	
Filtu	%			7%			43%	
Grand Total				**14%**			**86%**	**100%**

4.4.2. Longstanding tradition for people to help each other at the time of disaster

All the interviewees responded that there are longstanding traditions of helping each other at times of disaster in the pastoral and agro-pastoral communities in the zone. This was confirmed by 100% by both sexes.

With regard to how often people gather to help during loss of livestock, it has associated results with the above two questions. This also confirmed by 100% of the survey households agreed that people often gather during loss of livestock to help each other. FGDs were also in support of the same idea that the restocking of animals is usual phenomenon in the community during loses as a result of animal disease outbreaks and related catastrophes. During this discussion's participant confirmed that after the implementation of OH-approach, the idea of helping each other strengthen by education and training with the collaboration of Animal Health Workers.

4.4.3. Lend money, labour or animals to the nearby households in the community

Table 16 shows that, lending (money and animals) to the nearby household was fully accessed by 86% and partly exercised by 14% of respondents. One-Health approach also contribute to strengthen this cultural bondage through intervention of Animal Health treatment, by facilitating the Animal Health Market to get better income and providing additional support how to manage and generate better income from animal products, due to this they can have income to lend or support others. This HHs survey and FGDs result show that there is culturally built-in of lending in cash and in kind as there is no household responded negatively.

Table 16: Response of the households to lend money, labour or animals to the nearby households in the community.

Woreda	**Kebele**	**Somehow agree**			**agree**			**Grand Total**
		FHH	**MHH**	**Total**	**FHH**	**MHH**	**Total**	
Deka Suftu			**1**	**1**	**10**	**19**	**29**	**30**
	Sora Deka		1	1	10	19	29	30
Filtu		**3**	**4**	**7**	**8**	**15**	**23**	**30**
	Osubey	3	4	7	8	15	23	30
Total		**3**	**5**	**8**	**18**	**34**	**52**	**60**
Deka Suftu	%			2%			48%	
Filtu	%			12%			38%	
Grand Total				**14%**			**86%**	**100%**

4.4.4. Community savings (like Equb) and Individual-based saving systems

Table 17 showed the percentage of respondents that accessed community savings "equb" and Individual-based saving systems working in the selected Kebeles. As indicated in Table 17, 82%

agreed to access to community savings "equb" and Individual-based saving in Deka-Suftu woreda (Sora Deka Kebele). However, 18% of the respondents have no community savings "equb" and Individual-based saving systems.

Table 17: Response of the households to community have savings in the form of "Euab" and individual-based saving systems

Woreda	Kebele	agree			disagree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**10**	**20**	**30**				**30**
	Sora Deka	10	20	30				30
Filtu		**6**	**13**	**19**	**5**	**6**	**11**	**30**
	Osubey	6	13	19	5	6	11	30
Total				**49**			**11**	**60**
Deka Suftu	%			50%				
Filtu	%			32%			18%	
Grand Total				**82%**			**28%**	**100%**

4.5.Environment and physical resources

4.5.1. People in this community own two or more livestock types

Livestock type holding for the sampled households is presented in Table 18. Majority of the respondents (81%) fully agreed to two or more livestock types, respectively. The remaining 19% disagreed to own two or more livestock types in the community. From the FGDs, it was explained that the major livestock types are camel, goat, sheep, cattle and donkey.

Every household has a variety of capabilities and assets. Household livelihood security is often influenced by the ability of the household to diversify its livelihood sources. This means using a wide variety of livelihood strategies so that the household does not depend on only a few sources of livelihood. The more diverse a household's livelihoods strategies are, the bigger its capability and asset base, and the more secure it is.

Table 18: Response of the households to people in this community own two or more livestock types.

Woreda	Kebele	disagree			agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**4**	**3**	**7**	**6**	**17**	**23**	**30**
	Sora Deka	4	3	7	6	17	23	30
Filtu		**2**	**2**	**4**	**9**	**17**	**26**	**30**
	Osubey	2	2	4	9	17	26	30
Total				**11**			**49**	**60**

Deka Suftu	%			12%			38%	
Filtu	%			7%			43%	
Grand Total				**19%**			**81%**	**100%**

4.5.2. People own adequate pasture land and water sources

Possession of pasture land and water resources for livestock is one of the major concern of pastoralists and agro-pastoralists in the project area both of them are key causes of pastoral movement and relocation. As indicated in Table 19, about 67% of the households responded that the community does not own adequate pasture land and water resources for their animals. During FGDs, majority of the respondents have access to pasture and water resources from 33% respondent; partly from 33% of the households responded to own pasture and water. According the FDGs reflection, better access to pasture and water were from those who are living on the sides of Genale and Dawa rivers that is Sora Deka Kebele from Deka suftu of selected areas.

Table 19: Response of the household to people own adequate pasture land and water sources.

Woreda	**Kebele**	**disagree**			**Somehow agree**			**Grand Total**
		FHH	**MHH**	**Total**	**FHH**	**MHH**	**Total**	
Deka Suftu		**4**	**17**	**21**	**6**	**3**	**9**	**30**
	Sora Deka	4	17	21	6	3	9	30
Filtu		**5**	**14**	**19**	**6**	**5**	**11**	**30**
	Osubey	5	14	19	6	5	11	30
Total				**40**			**20**	**60**
Deka Suftu	%			35%			15%	
Filtu	%			32%			18%	
Grand Total				**67%**			**33%**	**100%**

4.5.3. Community can restock livestock after loss due to drought

As shown in Table 20 below, 98% reported that they can restock after drought. The FGDs revealed a similar picture and restocking is a community traditional in the study areas when households lost their animals during drought periods. To strengthen this community tradition by giving training and education with the intervention of One-Health approach through the support of Animal Health Workers.

The frequency and severity of drought over the past five years were raised this the FGDs of the selected survey areas and all households responded that the level has increased. The respondents believe there is an increase of frequency and severity of drought in their respective Kebeles. Similar understanding was also given during the focused group discussion.

Table 20: Response of the households to the community can restock livestock after loss due to drought.

Woreda	Kebele	disagree			Somehow agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu			**1**	**1**	**10**	**19**	**29**	**30**
	Sora Deka		1	1	10	19	29	30
Filtu					**11**	**19**	**30**	**30**
	Osubey				11	19	30	30
Total				**1**			**59**	**60**
Deka Suftu	%			2%			48%	
Filtu	%						50%	
Grand Total				**2%**			**98%**	**100%**

4.5.4. Vulnerable to minor shocks and stresses

During FGDs, in all Kebeles, the majority of households mentioned that they become more vulnerable to minor shocks and stresses. 100% of households responded that they are vulnerable to minor shocks and stresses. During the FDGs it was explained some of the reasons why the people become vulnerable to minor shocks. Inadequate pasture for animal feed, lack of water supply for human and animal, livestock disease outbreak, loss of animals and lack of government assistance were the most prevalent reason among others for vulnerability to stress and shocks.

4.5.5. Adequate and protected water sources in the community

Under table 21, Households indicated that almost all (95%) of the respondents have no access to adequate and protected water sources for human consumption. During the FGD, it was revealed that the existing water sources are flowing water and few ponds constructed at some distance from their villages (Fig.2). The most frequent sources of water for human consumption according to the FDGs is permanent rivers. Most of the people travel long distance which ranges about 48 km (e.g. villagers travel to Genale River and travel to Dawa River like Osubey to fetch water takes them all the day).

Table 21: Response of the households to adequate and protected water sources in the community

Woreda	Kebele	disagree			Somehow agree			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**10**	**20**	**30**				**30**
	Sora Deka	10	20	30				30
Filtu		**10**	**17**	**27**				**30**
	Osubey	10	17	27	1	2	3	30
Total		**20**	**37**	**47**	**1**	**2**	**3**	**60**
Deka Suftu	%			50%				
Filtu	%			45%			5%	
Grand Total				**95%**			**5%**	**100%**

Figure 2: People collecting potable water harvested underground during rainy season at Sora Deka Kebele in Deka-Suftu woreda

4.6.Governance, peace and security

4.6.1. Capacity of governmental and non-governmental organizations during disaster times

With regard to the response capacity of governmental and non-governmental organizations during disaster times in the past five years, majority of the respondents replied that there is a decrease. This was also revealed during the FGDs by saying the number of IDPs in this year is higher than the past. As indicated in Table 22, about 68% of the interviewed households replied that there is no improvement in the response to disaster and 32% were agreed for the improvement. During the discussion they said that, due to One Health intervention in the border of Deka-Suftu and Negelle Borena, they are part of the activities of the vaccine campaign for both Human and Animal of the IDPs. At the same time the new IDPs project jointly, supported them during this campaign, even if very low improvement in response capacity to disaster by governmental and non-governmental organizations over the past five years.

Table 22: Response of the households to response capacity of governmental and non-governmental organizations during disaster times has improved over the past five years

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**5**	**13**	**18**	**5**	**7**	**12**	**30**
	Sora Deka	5	13	18	5	7	12	30
Filtu		**10**	**13**	**23**	**1**	**6**	**7**	**30**
	Osubey	10	13	23	1	6	7	30

Total		15	26	41	6	13	19	60
Deka Suftu	%			30%			20%	
Filtu	%			38%			12%	
Grand Total				**68%**			**32%**	**100%**

4.6.2. Public administration structures respond to disaster risks and conflicts

As indicated in Table 23, majority of the respondents (52%) were not confident to public administration structures to adequately and timely respond to disaster risks and conflicts, where as 45% of them confirmed that government with a collaboration with NGOs working with One-Health intervention adequately and timely responded to disaster risks

Table 23: Response of the households to public administration structures to adequately and timely respond to disaster risks and conflicts

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**2**	**8**	**10**	**8**	**12**	**20**	**30**
	Sora Deka	2	8	10	8	12	20	30
Filtu		**10**	**11**	**21**	**1**	**8**	**9**	**30**
	Osubey	10	11	21	1	8	9	30
Total		**12**	**19**	**31**	**9**	**20**	**29**	**60**
Deka Suftu	%			17%			33%	
Filtu	%			35%			15%	
Grand Total				**52%**			**48**	**100%**

4.7.Human capital

4.7.1. Access to timely and adequate livestock, livelihoods information and weather forecast

As shown in Table 24, access to weather forecast and livelihood information was not in place for most households interviewed with the proportion of 67%. This is in line with findings of FGDs, where the lack of information on weather and livestock was mentioned. With the intervention of the One Health project and introducing the surveillance system to collect data and information from the bottom up approach to reach for the emerging and reemerging zoonotic diseases. Those have the access and received information about the livestock, livelihoods information and weather forecast was reaching to only 33% of the representative respondents. The community also make use of the tradition information provided by elders who have the natural talent seeing the future.

Table 14: Response of the household to the community access to timely and adequate livestock, livelihoods information and weather forecast.

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**4**	**14**	**18**	**6**	**6**	**12**	**30**
	Sora Deka	4	14	18	6	6	12	30
Filtu		**8**	**14**	**22**	**3**	**5**	**8**	**30**
	Osubey	8	14	22	3	5	8	30
Total		**12**	**28**	**40**	**9**	**11**	**20**	**60**
Deka Suftu	%			30%			20%	
Filtu	%			37%			13%	
Grand Total				**67%**			**33%**	**100%**

4.7.2. Access to adequate and relevant information about hygiene and zoonoses that is re-emerging and emerging,

As indicated in Table 25, information on about hygiene and zoonoses**,** that is emerging and re-emerging diseases was not accessed by large majority almost all of respondent pastoralists before the intervention of the One-Health, as revealed by 82%. The rest of the respondents proportioned as 18% fully agreed to access to adequate and relevant information about One-Health approach and part of this program and have a knowledge of re-emerging and emerging diseases i.e. zoonoses and hygiene.

Table 25: Response of the households to members of the community access to adequate and relevant information about hygiene and zoonoses

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**9**	**19**	**28**	**1**	**1**	**2**	**30**
	Sora Deka	9	19	28	1	1	2	30
Filtu		**4**	**17**	**21**	**7**	**2**	**9**	**30**
	Osubey	4	17	21	7	2	9	30
Total		**13**	**36**	**49**	**8**	**3**	**11**	**60**
Deka Suftu	%			47%			3%	
Filtu	%			35%			15%	
Grand Total				**82%**			**18%**	**100%**

As indicated in Table 26, information on about hygiene and zoonoses**,** that is emerging and re-emerging diseases accessed by large majority of respondent pastoralists after the intervention of the One-Health, as agreed by 72%. The rest of the respondents proportioned as 28% somehow agreed to have access to relevant information about One-Health approach and they are more dependent in traditional way of

management and consulting the traditional healer and have not that much a knowledge of re-emerging and emerging diseases.

Table 26: Response of the households to members of the community access to adequate and relevant information about hygiene and zoonosis

Woreda	Kebele	agreed			Somehow agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**9**	**12**	**21**	**1**	**8**	**9**	**30**
	Sora Deka	9	12	21	1	8	9	30
Filtu		**7**	**15**	**22**	**4**	**4**	**8**	**30**
	Osubey	7	15	22	4	4	8	30
Total		**16**	**27**	**43**	**5**	**12**	**17**	**60**
Deka Suftu	%			35%			15%	
Filtu	%			37%			13%	
Grand Total				**72%**			**28%**	**100%**

4.7.3. Access to training on risk reduction strategies.

Most of the household's response to training on risk reduction strategies seems to be not functional in all of the project Kebeles. As indicated in Table 27, about 88.33 % of the respondents approved there is no access to training on risk reduction strategies. About 8.33 % of the interviewees had access to training on risk reduction strategies and 3.33% responded partly received.

Table 27: Response of the households to members of the community have access to training on risk reduction strategies.

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**10**	**18**	**28**		**2**	**2**	**30**
	Sora Deka	10	18	28		2	2	30
Filtu		**9**	**16**	**25**	**2**	**3**	**5**	**30**
	Osubey	9	16	25	2	3	5	30
Total		**19**	**34**	**53**	**2**	**5**	**7**	**60**
Deka Suftu	%			47%			3%	
Filtu	%			42%			8%	
Grand Total				**89%**			**11%**	**100%**

4.8.Food security

4.8.1. Access to adequate food all year round

Most of the pastoral and agro-pastoral community of the three project woredas revealed that they are unable to access adequate food all the year round. As presented in Table 28, about 89% responded that they cannot offer adequate food for their families. From the total interviewed HH about 11% households said that they have access and adequate food; the response of the households is supported by the One-Health approach

program; with the reason that as there is frequent drought in the zone, there is food deficiency especially during the dry seasons of the year in which livestock feed and water is scarce.

Table 28: Response of the households to people in the community access to adequate food all year round

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**7**	**18**	**25**	**3**	**2**	**5**	**30**
	Sora Deka	7	18	25	3	2	5	30
Filtu		**11**	**17**	**28**		**2**	**2**	**30**
	Osubey	11	17	28		2	2	30
Total		**18**	**35**	**53**	**3**	**4**	**7**	**60**
Deka Suftu	%			42%			8%	
Filtu	%			47%			3%	
Grand Total				**89%**			**11%**	**100%**

4.8.2. Earn adequate income from the sale of crops and livestock.

As presented in Table 29, income from the sale of crops and livestock products did not practiced by majority of the interviewed households. About 84 % of the HH reported that they did not earn adequate income from the sale of crops and livestock and 16 % responded adequate income from the sales of livestock after the implementation of One-Health approach program.

Table 29: Response of the households to members of the community earn adequate income from the sale of crops and livestock.

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu		**7**	**18**	**25**	**3**	**2**	**5**	**30**
	Sora Deka	7	18	25	3	2	5	30
Filtu		**7**	**18**	**25**	**4**	**1**	**5**	**30**
	Osubey	7	18	25	4	1	5	30
Total		**14**	**36**	**50**	**7**	**3**	**10**	**60**
Deka Suftu	%			42%			8%	
Filtu	%			42%			8%	
Grand Total				**84%**			**16%**	**100%**

4.8.3. Difference in wealth and income status

With respect to wealth and income status in the community, households were responding whether there is huge difference or not. As shown in Table 30, from the total interviewed about 90% reported that there is huge difference in wealth and income among the community. The result shows because of strictly follow proper Animal Health education and part of the activities; plus, selling animal products in proper livestock market. Other also (10%) responded that there is no huge difference in wealth and income status in the community.

Table 30: Response of the households to members of the community huge difference in wealth and income status

Woreda	Kebele	disagreed			agreed			Grand Total
		FHH	MHH	Total	FHH	MHH	Total	
Deka Suftu			**2**	**2**	**10**	**18**	**28**	**30**
	Sora Deka		2	2	10	18	28	30
Filtu		**3**	**1**	**4**	**8**	**18**	**26**	**30**
	Osubey	3	1	4	8	18	26	30
Total		**3**	**3**	**6**	**18**	**36**	**54**	**60**
Deka Suftu	%			3%			47%	
Filtu	%			7%			43%	
Grand Total				**10%**			**90%**	**100%**

4.8.4. Employment and income generation opportunities

As presented in Table 31, all the interviewed households reported that there is no employment and income generation opportunities in the community. During the focused group discussion similar idea was shared and they responded that even though there are opportunities to generate income and employment, they believe there is unfavourable conditions to work on it (e.g. there is good irrigation potential in some areas of the project Kebeles but there is no supply of water pumps).

Table 31: Response of the households to people in the community have employment and income generation opportunities

Woreda	Kebele	disagreed			Grand Total
		FHH	MHH	Total	
Deka Suftu		**10**	**20**	**30**	**30**
	Sora Deka	10	20	30	30
Filtu		**11**	**19**	**30**	**30**
	Osubey	11	19	30	30
Total		**21**	**39**	**60**	**60**
Deka Suftu	%			50%	
Filtu	%			50%	
Grand Total				**100%**	**100%**

4.8.5. How One-Health Approach contribute towards livelihoods assets of Pastoral communities?

In the last two decades, there has been a re-emergence of the recognition that a combined approach to health issues is needed, together with an increasing awareness that environmental health affects the health and livelihood of humans, domestic animals and wildlife, and is an important component for sustainability (CCM One-Health project document 2018). The strategic direction

of One Health is to integrate, to assess, actions and interventions that aim to promote health through common aims and collaboration between Human and Animal Health Workers.

During FGDs and interviewing the HH and community members, One-Health approach give adequate attention to the healthy rangeland, increase health and productivity and this is one of the key factors contributing to their degradation. As such in order to have a productive, improve the livelihoods and functioning pastoralist system all three components need to be healthy – people, livestock and rangelands (land and natural resources).

Services provided along livestock routes such as livestock and human health posts can be complimented by grazing reserves and resting areas – managed as part of a rangeland landscape unit. All these interventions should occur hand-in-hand with investment in livestock health and human health, as an integrated management system led by communities themselves, and with support from technical experts such as local government extension workers – a One Health approach can provide the framework for this.

With the current intervention of One-Health Approach, NGOs facilitated better market place to the pastoralist and agro-pastoralist to have a better price for their livestock and strengthening their livelihood income, rather to sale with low price without knowing the current market price.

According to the FGDs participants, One Health interventions have the potential to be more effective and generate more equitable benefits for human health and livelihoods, particularly in rural areas, than approaches that rely exclusively on treatment of human cases. We hypothesize that applying One Health interventions to tackle these health challenges help to built trust, community engagement and cross-sectoral collaboration, which was in turn strengthen the capacity of fragile health systems to respond to the threat of emerging zoonoses and other future health challenges. One Health interventions thus have the potential to align the ongoing needs of disadvantaged communities with the concerns of the broader global community, providing a pragmatic and equitable approach to meeting the global goals for sustainable development and supporting the global health security agenda.

4.9.Current condition of Animal Health Posts (AHPs) veterinary services

The physical observation data showed that Animal health clinics were provided with poor facilities in the study and selected weredas plus other veterinary service provisions area are conducted through the establishment of AHPs at wereda and kebele level. The AHPs are responsible for providing veterinary service to the livestock population of one or more adjacent kebeles. The AHPs are constructed mainly by the government but the NGO named COOPI was also involved

in the construction of AHPs. This is based on One-Health Approach and intervention that the researcher identifed the gaps of the current conditions of the AHPs. According to the study, all sample kebeles have AHPs with different physical conditions.

It was observed that Golbo, Aynile and Bodbod of Filtu wereda, and Waradi of DekaSuftu wereda had minor lock box problems which need to be fixed. Similarly, Harabali, Masajit and Korale AHPs of Filtu wereda and Gunway of DekaSuftu wereda had minor problems related to door attachments/elbows while Jaygad AHP had a wide space under the door which could allow small animals/predators to enter and damage materials in the AHP. Likewise, the walls of Ahmedo Amin, Harabali, Nustarik, and Korale AHPs of Filtu wereda had minor cracks while the walls of the rest of AHPs are in a good condition. No problem has been detected with the windows while the floors of Ahmedo Amin, Harabali and Aynile AHPs of Filtu wereda and Haysuftu AHP of DekaSuftu wereda had minor cracks that need maintenance.

The study also showed that Filtu and Malkalibi AHPs of Filtu wereda and Haysuftu AHP of DekaSuftu wereda need simple painting while the ceiling of Golbo, Ahmedo Amin, Benigle, Harabali, Nustarik, Aynile, Raydab, Bander and Bodbod of Filtu wereda as well as Higli, Gunway and Waradi of DekaSuftu wereda had minor damage on the ceiling which need maintenance. The iron sheets of roofs of Masajit, Korale, Kulay and Bodbod AHPs are loosen and need fixing with nails before major damage occurs to the roof. Major damage was observed with the ceiling of Higli AHP caused by bat fences. The majority of AHPs have no fences and Nustarik, Aynile and Bander AHPs of Filtu wereda and Seero, Gunway and Waradi AHPs of DekaSuftu wereda have fences which need major maintenance.

According to the findings, only Jaygad and Lambarde AHPs have fences at a good condition. It was also found that Filtu, Jaygad, Ahmedo Amin, Benigle and Raydab AHPs of Filtu wereda and Higli, Waradi and Lambarde of DekaSuftu wereda have latrines in good condition while Golbo, Harabali, Nustarik, Bander, Bodbod AHPs of Filtu wereda and Gunway and Haysuftu AHPs of DekaSuftu wereda have latrines/toilets which need major maintenance. On the other hand, Melkalibi, Osobey, Masajit, Aynile, Korale, Kulay AHPs of Filtu wereda and Seero and Soora AHPs of DekaSuftu wereda have no latrines. Although incinerator is needed to dispose/burn damaged, expired and other rubbish materials none of the AHPs had the facility. We learned from the study that more sophisticated incinerator may not be important for AHPs but at least a simple one constructed from bricks with a chimney can construct. The condition of AHPs and associated facilities as well as the geographical location of AHPs in Filtu and DekaSuftu weredas is illustrated in Annex 4.

4.10. Manpower

The animal health service provision in all AHPs is handled by CAHWs, Animal health technicians (AHT), Animal health assistants (AHA), and diploma holders in animal science. After the One-Health approach implemented in this area a number of Animal Health trainings provided. CAHWs are community members trained for 15-30 days and work on voluntary basis in AHPs by providing de-worming, spraying, castration, hoof trimming, community awareness creation, and also vaccination and treatment services due to critical shortage of veterinary sub-professionals in the pastoral areas. Animal health technicians (AHTs) are veterinary sub-professionals with one-year training and recruited by government to provide primary animal health care and community awareness creation activities in AHPs and veterinary clinics, assisting AHAs and veterinarians. On the other hand, AHAs are veterinary sub-professionals with 3 years of college diploma and recruited by the government to provide all veterinary clinical activities at AHP and veterinary clinics, except major surgical and specialized case handling activities, and provide professional assistance to veterinarians. On the other hand, animal science workers are diploma holders in the field of animal science and employed to provide animal production and nutrition service but unfortunately assigned in different AHPs to provide animal health service with special training because of shortage of trained manpower in the veterinary profession.

The current implemented NGOs also engaged high level professional those have a knowledge of how to implement the new One-Health Approach systems to support the pastoralist communities by providing professional assistance to AHWs and share and train the existing community and social workers.

According to the study the under mentioned AHWs got a knowledge of how One-Health Approaches important for the pastoralist communities, such as, the number of AHWs varies from kebele to kebele, as well as among the two weredas. Thus, the total number of AHWs in the sampled kebeles of DekaSuftu wereda was 16 composed of 3 CAHWS, 2 AHA, 5 AHT and 6 animal science diploma holders in the proportion of 18.75%, 12.5%, 31.25% and 37.5% respectively. In relation to their work place, CAHWS were found working in Higli, Lambarde and Soora, AHAs in Higli and Weradi, AHTs in Hisuftu, Gunway, Soora, Seero and Deka 2, and animal science diploma holders in Higli, Hysuftu, Seero AHPs and Deka 1 of DekaSuftu wereda. When the sex ratio is considered 81.25% of the workers in DekaSuftu wereda are males and only 18.75% are females.

On the other hand, the AHWs in Filtu wereda are 40 CAHWs, 1 AHA, and 5 AHT in the proportion of 86.96%, 2.17%, and 10.87% respectively. The AHA is working only in Osobey and the AHT in Aynile, Filtu town, Korale and Masajit, while all AHPs except Filtu have CAHWs. With regards

to the sex composition of the workers in the AHPs of Filtu wereda 44 and 2 workers were males and females in the proportion of 95.65% and 4.35% respectively. The difference in the composition of workers in the two weredas is due to the fact that DekaSuftu wereda is young and employing certificate and diploma holders while most of the workers under Filtu wereda are CAHWs who has been working for a long time. The number of AHWs in the sampled AHPs is presented in Annex 5 Filtu and Dekasuftu separately.

4.11. Status and capabilities of AHWs training to cop-up the program of OH approach

As one of the components of the study, the training situation of animal health-post workers (AHAs, AHTs and CAHWs) was critically explored to know the type of trainings delivered, the knowledge and level of understanding of AHP workers and identify gaps that need further work. Basically, trainings improve knowledge and create better understanding among the AHWs to enhance the performance of implementation of activities and must be considered in the implementation process. The trainings could be organized for short term, medium term or long term. Short term trainings create awareness refresh the existing knowledge on animal health delivery and related issues, and prepare workers to immediately involve in specific activities, while medium to long term trainings are useful in scaling up or upgrading the existing knowledge or skill. (CCM One-Health project document: "Training manual on Zoonotic diseases for community-based Animal Health worker and Veterinary sub-professionals, Filtu, Liben Zone, Somali Regional State. By Dr. Bireshka Kapitano"

This research found that after introducing One Health Approach and implementing, different types of trainings were conducted by different organizations as summarized in Annex 5. The study indicated that 25.4% of the trainings were related to livestock disease control, prevention and routine clinical activities such as hoof trimming, castration etc, followed by livestock disease reporting (16.9%), Zoonotic diseases and hygiene (11.9%), and transmission of livestock diseases from animal to animal (5.1%), etc. Apart from government, different NGOs consisting of COOPI, OXFAM, PCAE, PC, FAO ACPA, VSF and CCM are some of the NGOs involved in organizing trainings for AHA, AHT and CAHWs. Out of these FAO, OXFAM, COOPI, PC, PCAE, VSF, CCM, ACPA were involved in the past while PC, CCM and ACPA are still providing training to AHWs.

As Annex 6 illustrates the trainings were conducted from 1999 to 2017. Most of the trainings were carried out in 2011(11.9%), 2009 (10.2%), 2017 (10.2%), 2015 (8.5%), 2010 (8.5%) and 2003 (8.5%). When the periods of length of training is categorized, 27% of the trainings were conducted

for 1-2 months followed by 1-5 days (24%), 11-15 days (19%), 6-10 days (12%), and 3-4 months (8%), 16-20 days (8%), and 21-25 days (2%).

4.12. Cattle crushes

Cattle crushes constructed by One-Health intervention are among the animal health service provision facilities which are used to hold and restrain animals during treatment and vaccination for the safety of both the animal and the animal health worker. As a result, all AHPs are expected to have at least one cattle crush. However, only 5 out of 23 AHPs (21.7%) visited during the Study had crushes, including the crushes constructed by CCM & other consortium NGOs with One-Health Approach program in Malkalibi and Masajit right after the Study. The three crushes already present during the Study are in Filtu, Haysuftu and Lambarde AHPS. Additional cattle crushes were planned to be constructed in Osobey, Harabali, and Ahmedo Amin AHPs of Filtu wereda and Deka, Higli and Waradi of DekaSuftu weredas with the Donor covered from the Italian Cooperation fund. Most of the crushes were constructed with local material as shown on the pictures below.

Cattle crush constructed in Masajit with local materials (Left and center) and Recent construction of crush at Haysuftu, with metal (right)

4.13. Animal health service provision

4.13.1. Equipment and related facilities of Animal Health Posts

Animal health posts are expected to work at full capacity to provide the required service. They are needed to have a complete set of equipment, drugs and vaccines replenished at regular intervals with prompt and regular supervision by the wereda LPDO. As per the observation, the proportion of AHPs that either have or do not have materials or materials which need major maintenance or replacement. Accordingly, most of the AHPs have office equipment but the highest proportion of AHPs does not have veterinary equipment, drugs, vaccines and Cold Chain and solar systems. All AHPs are suggested to have a complete set of basic office equipment like Cold Chain with solar systems, veterinary equipment, drugs and vaccines. The materials need a timely maintenance,

replacement and replenishment to provide a continuous service without any significant interruption. In addition to the shortage/lack of materials, most of the AHPs are managed by CAHWs who are voluntary and part time workers and who are not paid and tend to focus on their own private business. Moreover, the shortage/ lack of essential materials in the AHP discourages the workers to appear every day in the AHPs which exacerbates the situation.

The remaining AHPs have few types and quantity of basic equipment and drugs but no vaccines which could not enable them to provide proper service.

This and other related problems including absence of cold chain and limited types of drugs, are constraining the AHP service delivery requiring close supervision, technical and material support and reinforcement from the wereda LPDO to strengthen the service provision. I recognize that with the current One Health intervention in Filtu and Dekasuftu, the NGOs processed to facilitate with the selected kebeles the Cold chain and solar systems for animal health vaccines.

The roles of non-Governmental Organizations in general, so many Non-governmental organizations (NGOs) were involved in many activities in the region. Particularly in Filtu and Dekasuftu weredas the number of NGOs were actively supporting Animal health, Human health, Water development, Education, Agriculture and trainings related to livestock health service based on One-Health Approach activities.

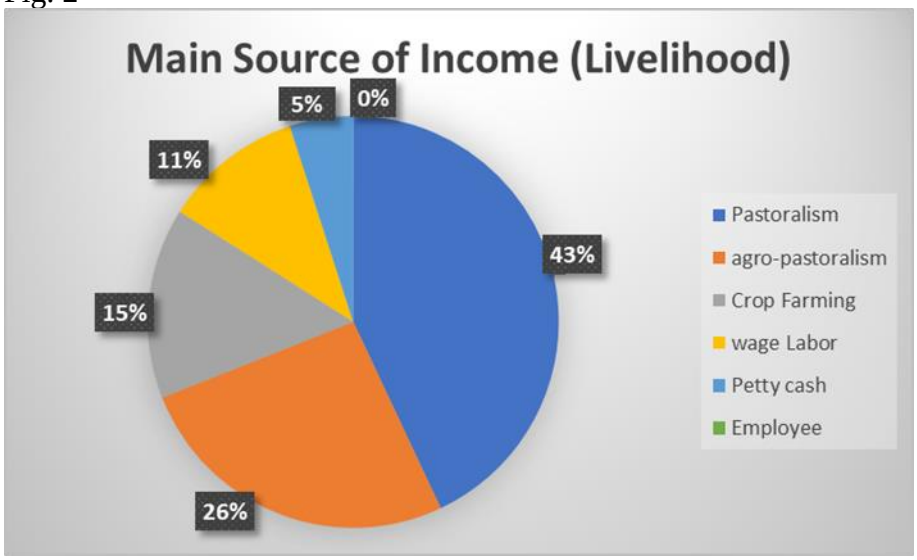
According to the study there are quite a number of NGOs that worked in the project areas in the past, but only few are present at the moment. The NGOs working in the past included FAO, OXFAM, Save The Children, COOPI, Mercy Corps, PC, CISP, NLM and HANDICAP International, RACIDA and PCA. Save The Children, PC, CISP, CCM and RACIDA are currently still working in the area. Table 10 summarizes the list of NGOs and their previous and current involvement and place of work in Filtu and DekaSuftu weredas. The respondents indicated that NGOs like CCM are making remarkable contribution to development activities in the area with One-Health interventions in Filtu & Dekasuftu, by facilitating & providing Drugs & equipment,

4.13.2. Main source of income /livelihood/ of selected kebeles

Livestock in the study area in particular and Somali Region in general are considered as a basic means of livelihood subsistence. The respondents noted that the economic activity in the study area is based on livestock rearing. Activities other than livestock rearing are also practiced as illustrated in Annex 12. The information was collected from the community by interviewing individuals randomly selected from the community members who appeared during the visit, with the help of CAHWs and community leaders. The study showed that pastoralism, agro-pastoralism,

crop farming, wage labour and petty cash are among the most important means of livelihood in the area. As per Fig. 2, about 43% of the interviewees have indicated Pastoralism to be the most important source of income followed by Agro-pastoralism (26%), Crop farming (15%), Wage labour (11%), Petty cash (5%) and Employee (0%).

Fig. 2



4.14. Livestock rearing and related problems

4.14.1. Purpose of livestock rearing

The main benefits that accrue from livestock in these areas among others include milk, meat, cash income, transportation and draught power. The study has covered all types of livestock species in the area which included camel, cattle, shoat, donkey and poultry, (refer Annex 12). In relation to the livestock benefits, camels are used for food (meat and milk), cash income and transportation. However, the respondents from Weradi and Lambarde kebeles of DekaSuftu weredas have described that camels are also used for draught power in their areas. Likewise, cattle are used for food (meat and milk), cash income and draught power; and shoats for food (meat and milk) and cash income. Similarly, donkeys are used for cash income and transportation and also for draught power in Ahmado, Amin and Korale. The study also showed that poultry are used for food (meat and eggs) and income to support the livelihood of the community.

4.14.2. Major Livestock Diseases

Livestock in the study area are affected by different bacterial, viral, parasitic (internal and external parasites) and non-infectious diseases. The serious camel diseases identified by respondents

during the study include Camel pox (100%), Anthrax (91%), Pasteurellosis (91%), Heartwater (87%), Trypanomosis (78%), Madahtaag/Gursume (70%), Brucellosis (61%), Pneumonia (61%), Gudaan(57%), Skin tumor (57%), Salmonellosis (35%), Mange(22%), Eye worm (22%), Plant toxin (13%), Mastitis (13%), Gambis/Duuliye (13%) Orf (9%), Internal parasites (9%) and Babesiosis (9%). Although they are less important Butaal (4%), Reneck syndrome (4%), Botulism (4%), Influenza (4%) and Blot (4%) were also reported. (source: CCM One-Health project document)

The study showed that animals are affected by different diseases although the situation varies among different kebeles. The diseases were listed in both English and Somali languages (Annex 7). Clinical signs were taken for diseases that have no English names (annex 4*). (I thank CCM Staff; his name is Mowlid by translating some somali words in English medical term)*

The livestock diseases identified and reported by community members and AHWs during the study were described according to their order of importance as shown in Annex 14. The above list includes both zoonotic and non-zoonotic diseases, as presented at kebele level. This helps for better understanding of the extent and distribution of each disease and the use of this information supported the design and implementation of further intervention strategies for those working currently to fill the current gap. Among the major zoonotic diseases camel diseases were anthrax, (91%), brucellosis (65%) and salmonellosis (35%).

Because of this short-term pilot One-Health approach project the promission change is shown on pastoralist communities, interms of Health both Human and Animal, selling livestock and livestock by-products, creates access to schools and creating rangeland, stocking fooder and follow-up perdedical vaccination both human and animal. The most important is big donor like Swiss Development Agency attracted and expanding the same project in different Somali and Oromia regions in Ethiopia, Somalia and Kenya with a consortium of ILRI, VSF and CCM. The Swiss Development Agency promised to implement the One-Health Project for the period of 12 years.

Similarly, cattle diseases were considered during the study and the findings presented in Annex-15. Community representatives from each kebele have indicated that cattle are important livestock species reared by the community in Filtu and DekaSuftu wereda in particular and Somali Region in general. However, they are highly challenged by lack of pasture and water, and are prone to migration for pasture and water search. As the result their exposure to various livestock diseases in the course of migration is high which is exacerbated by the stress induced due to lack of pasture and water. The most important cattle diseases identified by the respondents include Botulism (100%), Blackleg (91%), FMD (91%), Trypanosomosis (78%), Pasteurellosis (43%), and

photosensitization (43%). Other diseases of economic importance include Heart water (35%), Mastitis (35%), Anthrax (30%), Brucellosis (30%), Babesiosis (30%), Pink eye (26%), Ephemeral fever (26%), Mange (22%), Actinobacillosis (13%), Salmonellosis (13%), Lumpy Skin Disease (LSD) (13%) and Cattle pox (9%), Although they appear in the bottom of the list Pneumonia (4%), Tuberculosis (4%), Internal parasites (4%), Bloat (4%), Colibacillosis (4%) and lice (4%) were also reported.

The respondents also indicated the extent and distribution of cattle diseases in each kebele in order of importance for detail understanding of the disease situation in specific kebeles and use the information in the design and implementation of cattle disease control and prevention strategies. The cattle diseases identified by the AHWs and community members consisted of both zoonotic and nonzoonotic diseases as indicated in Annex 15. Among the major cattle diseases Zoonotic diseases were anthrax (30%), brucellosis (30%), salmonellosis (13%) and tuberculosis (4%).

Moreover the most important shoat diseases identified by the respondents include PPR (100%) Pasteurellosis (83%), CCPP (78%), Salmonellosis (78%), Heart water (70%), Pox (48%), and Brucellosis (39%), FMD (35%), Orf (30%), Botulism (30%), Foot rot (30%), Anthrax (22%), Plant toxin (17%) and pneumonia (17%). Other diseases of economic importance include Actinobacillosis (13%), Trypanosomosis (9%), Ephemeral fever (9%), Arthritis (4%), internal parasites (4%), Eye worm (4%), Mange (4%), Babesiosis (4%), Madahtaag/Gursume (4%), Rift valley fever (4%) and mastitis (4%). The shoat diseases identified by the AHWs and community members, includes both zoonotic and non-zoonotic diseases as shown in Annex 16.

4.15. Impact of livestock diseases on animal production and productivity

The study showed that the impact of diseases on livestock production and productivity is considered in-terms of mortality and morbidity. In the context of this study morbidity is expressed as loss of production, loss of market value and abortion, etc. When the impact of diseases for different livestock species were considered the impact was in the order of 25% and 75% for mortality and morbidity for camel, 24% and 26% for cattle, and 26% and 74% for shoat respectively. No significant difference was observed in the impact of the diseases among different livestock species (camel, cattle and shoat). Likewise, categories of livestock morbidity which included loss of production, loss of market value and abortion had similar values which is in the order of 31%, 31% and 13% for camel; 32%, 33% and 11% for cattle and 31%, 31%, and 12 % for shoat respectively. The impact of each disease on livestock production and productivity was

calculated based on the respondent's scoring. Annex 11. presents the impact of different livestock diseases on animal production and productivity.

4.16. Seasonal occurrence of livestock diseases

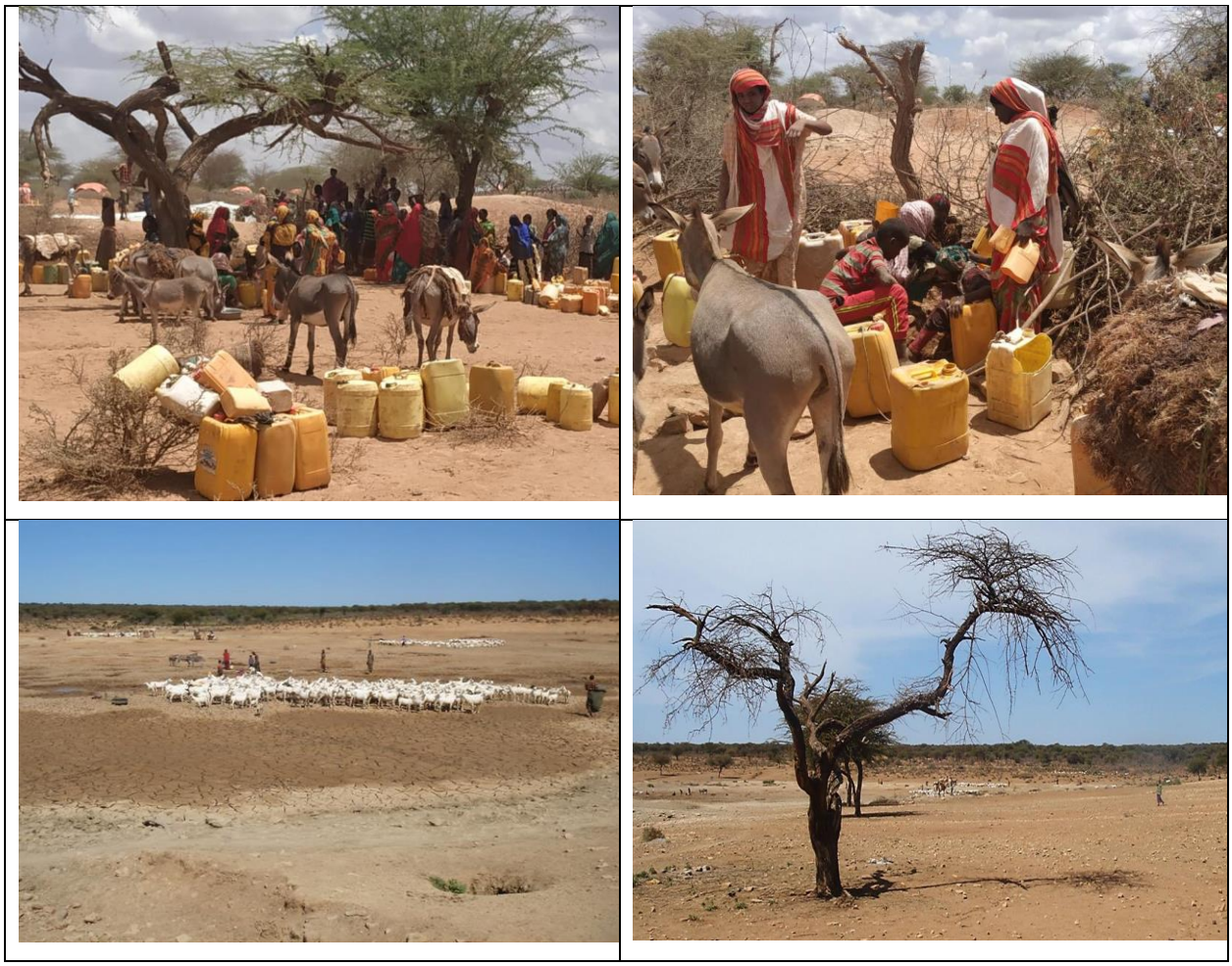
Livestock diseases occur differently in different livestock species and seasons. The current study shows that most camel diseases occur in long dry season (Jilal) followed by short dry season (Hagaa), short rainy season (Dayr) and long rainy season (Gu'). On the other hand, most cattle diseases occur in long dry season (Jilal) followed by short rainy season (Dayr), short dry season (Hagaa) and long rainy season (Gu'). Likewise, most shoat diseases occur in short dry season (Xagaa) followed by long dry season (Jilal), short rainy season (Dayr) and long dry season (Jilal). Moreover, some diseases occur in one specific season while others occur in two or more seasons. Annex 11 (a, b and c) show the occurrence of different livestock diseases in different seasons in the study area. The information obtained during the study is highly important to provide knowledge on the seasonal calendar of different diseases which is helpful in the further design and implementation of different livestock intervention strategies considering different treatments and follow-ups.

According to the seasonal occurrence of livestock diseases the One-Health project schedule proper vaccination plus providing drugs and medical equipment i.e. Solar refrigerator, creating mobile clinics to reach remote areas of the pastoralist communities. Because of this at least periodical vaccination provide and distributed medicines to health center and health posts according to the livestock types.

4.17. Diseases associated with lack of drinking water and sanitation

The diseases associate with the lack of water and sanitation were also part of the study. The respondents have mentioned some diseases and insects that occur in different kebeles as the result of lack of drinking water and sanitation. According to the respondents, the most common diseases occurring due to lack of drinking water and sanitation among others include salmonellosis, pasteurellosis, internal parasites/facioliasis, contagious exthema (Orf), ephemeral fever, mastitis, LSD, mange, botulism, influenza, actinobacillosis, lice and fleas. The most important diseases being salmonellosis (44%) followed by internal parasites (13%), lice (9%), pasteurellosis (7%) and actinobacillosis (7%). Details of the list of diseases that occur due to lack of drinking water and sanitation in each sampled kebeles are presented in Annex 18.

The project OH provide proper medications for water born diseases plus gives proper training about how to keep and treat water for consumption for Human and Animal as well. Training on sanitation prevented the transmittable diseases from Animal to Human and vis versa. The pastoralists also have a knowledge due to OH intervention that how to harvest rain water from roof catchment and keep clean the bor-hole for drinking both for Human and live stocks.



The artificial pond at osbey is almost waterless, one month only after good *deyr* rains., community faced huge problem of water shortage (Left) and getting to the waterless Harabali artificial pond (Right).

4.18. Community awareness

Community awareness provides important information to the community through the One-Health approach program in relation to the type, seasonal occurrence, reporting and control and prevention of livestock diseases. The situation of community awareness was studied through a household servy to understand the trainings delivered so far, status of their knowledge and identify gaps that need further work. According to the respondents, various awareness creation activities were conducted for a period of few hours to a maximum of one day but none of them took more than one day. The awareness creation was conducted by organizing community meetings on water

ponds, public meetings and use different events including wedding ceremony etc, supported with posters demonstrating clinical signs and control methods of various diseases.

4.19. Frequency and cost of livestock vaccine provision

The community members and AHWs involved in the interview have indicated that there are different types of vaccines supplied free of charge by the government. However, the quantity and frequency or regularity of the vaccine supply is very much limited. This makes the AHPs frequently run out of vaccines with significant impact on the proper delivery of immunization services. Annex 17 summarizes the type of vaccine provide and supplied by One-Health approach program for each animal species and cost of vaccination. According to the information presented in the table, the AHWs obtain vaccines from wereda LPDO and provide to the community free of charge. The respondents have indicated that vaccines are provided based on the disease outbreak reports and the availability of vaccines. Vaccination is conducted together with the team of veterinary personnel from region and wereda. No cold chain facilities were available at the Animal Health Post level and all vaccines that need cold chain were carefully stored and managed by the Regional and Filtu wereda LPDO.

Currently the solar cold chain procured for each intervention areas by One-Health program plus drugs and medical equipment also facilitated. The study shows that the AHPs located at Aynile and Haysutu are large with good spaces to accommodate veterinary equipment, drugs and vaccines to be distributed to other nearby kebeles. So, establishment of additional cold chain system at Aynile and Haysutu AHPs are strongly required.

Chapter Five: Conclusions and Recommendations

5.1.Conclusion and recommendation

5.1.1. Conclusion

The shared objective of the research in the One-Health Approach is to improve human and animal health in a sustainable way. The research ideally contributes to the development and implementation of locally implemented with the intervention of One-Health by Non-Governmental Organization to adaptd and acceped health interventions which are supported by the communities as well as the government authorities. Creating awareness about this new idea also needs more work until internalize the concepts of the OH by pastoralist communities. Involving representatives of the mobile pastoralists, the research community and the government authorities in the planning of projects and interventions is crucial and leads to strong engagement in the integrated approach for common goals and solutions.

The emergence and re-emergence of pathogens due to various factors threatened the health and well-being of people and animals throughout the globe. Zoonotic infections, transmissible between humans and animals, are closely associated with pastoralism. Proximity to animals, food consumption behavior, problems related to milk and meat contamination, inadequate supply of treatment drugs, harsh environment, and socioeconomic and cultural practices are the main factors that expose the pastoralists of Ethiopia to different zoonotic diseases.

The livelihood of pastoral community of Ethiopia is mainly dependant on livestock production which made them to have an intimate relationship with animals and the occurrence of zoonotic diseases very critical. There is a knowledge gap not only in the pastoralists but also in the medical professionals about zoonoses plus the concept of One-Health Approach integrated systems. Even though the animal health assistants like Community Animal and Human Health Workers had better awareness about zoonoses, they did collaborate with human health

professionals to create awareness to the community. The government and other sectors collaborated to address the health of animals and humans work together and integrate to the common goal. Therefore, capacity building training to health professionals, awareness creation to the community through health extension workers and promoting collaborative health programs in one health approach is very important for successful and sustainable disease prevention and control in the pastoral areas of Ethiopia.

The socio-cultural sustainability of the interventions ensured, as for economic sustainability, through the active involvement of communities, particularly community leaders, and strengthening of existing

systems, rather than the adoption of new ones. The strengthening of existing systems, as well, ensured a more effective, in terms of cooperation with the community and greater sustainability, disseminating in the territory some knowledge strongly linked to traditional ones and therefore reproducible in the future, once ended the intervention and the presence of the NGO on the field.The choice of instrument of the dramatization and communitarian awareness based on dialogue and on oral transmission of knowledge also well suited to communities with low level of schooling, little accustomed to formal education, and accustomed to a practice-based learning and on recurrence.

The effort shown in the Filtu and Deka-Suftu woreda should be duplicated to other areas with the collaboration of government and other sectors to address the One-Health Approach integrated systems with strong commitment.

5.1.2. Recommendations

The Problem of life conditions of pastoral and agro-pastoral communities in Filtu and Dekasuftu Woreda will not be solved by the involvement of a number of NGOs like CCM, but also needs a participatory approach where the community, public and animal health workers, and local authorities as well as other relevant sectors will be actively involved. The One-Health Approach intervention without a collaboration of the pastoral and agro-pastoral communities, the woreda, zonal, regional and federal level government bodies like universities, research institutes and donor countries should give priorities to be One-Health Approach sustainable. I recommend the following based on our research objectives and research questions that the gap what I observed to be filled by the current One-Health Approach interventions concepts.

Since wereda livestock offices are responsible for the entire animal health service provision in all kebeles, both weredas will have responsibilities to strengthen the service provision. Animal and Human Health workers assigned in the Animal and Human Health Posts are among the important health providers located closer to livestock with greater availability, accessibility, affordability, acceptance and quality and technical competence which could enable them to provide effective and sustainable services. Thus, they will have strengthn themselves by serving the community, close communication with pastoralist communities to provide the service properly. As communities are the end beneficiaries of the animal health service and key actors in the process to improve animal & human health, they are required to play a significant role by actively participating by providing proper information and report disease outbreaks to the Animal Health Workers and do not participate in illegal drug control through avoidance of using and buying from

the illegal drug delers in the livestock disease, emerging and re-emerging disease control and prevention activities .

Many livestock diseases are not limited only to animals but directly or indirectly transmit from animals to humans and are known as Zoonotic diseases. The occurrence of zoonotic diseases involves interaction of animal, human and the environment requiring coordination and collaboration of efforts between human and animal health as well as other relevant sectors to attain optimal health for people, domestic animals, wildlife, and the environment. This is highly important and value adding in terms of manpower, resource and financial savings. However, because of no or little awareness and knowledge on zoonotic diseases and their control and prevention strategies, different sectors make separate efforts. CCM & stakeholders have recognized the gap and importance of OH approach and established OH project to focus on the creation of better understanding on zoonotic diseases and their control and prevention methods which could be achieved through trainings of environmental, animal and human health professionals, authorities, other relevant stakeholders and the community. CCM Will focus on their specialities of animal & human health activities, others will manage the environmental part. It is also important that CCM in collaboration with other stakeholders establish One Health platform and strategy through which implementation of OH concept could be realized. This is an important step as it brings multidisciplinary sectors together for coordinated and collaborative efforts through effective mobilization of resources, early disease outbreak detection, reporting, introducing surveillance systems, joint planning, and implementation of effective and sustainable control and prevention of zoonotic diseases.

I believe that, One Health Approach contributes to the main goals defined by the Ethiopian government for development within the Growth and Transformation Plan (GTP II) for the period 2016-2020, in particular

- Increased livestock production and productivity & improve the livelihood of the community
- As per the identified & prioritize Zoonotic diseases by the National One Health Approach Committee to meet the GTP II, this will contribute to control of the main transmissible and non-transmissible diseases and offer of quality health services,
- The concept of OH Approach working in collaboration with other stakeholders contribute to decreased erosion and better productivity of natural resources. Environment Health part of the OH Approach

- Contribute improving quality of livestock production mean improve of livelihood and better food safety,
- Contribute to Pastoralism as a livelihood system composed of three 'pillars' or components – *livestock or the herd*, *people or the family including institutions*, and *land and/or natural resources and most importantly "the rangelands."* These three components are tightly inter-related and are regulated by ecology and complex modes of social, political and economic organisation with livelihood strategies, contribute Healthy rangeland to agricultural production and productivity aimed at the market,

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I. **A**nnex 2. Condition of AHPs and associated infrastructures.

Woreda	Condition of AHPs							
	Door	**Wall**	**Window**	**Floor**	**Roof**	**Fence**	**Toilet**	**Incinerator**
Filtu	Good	Good	Good	Good	Ceiling Cracks	No	Good	No
Melka Libi	Good	Good	Good	Good	Ceiling Cracks	No	No	No
Golbo	Lock Box & Welding	Good	Good	Good	Ceiling Damaged	No	Minor Damage	No
Jaygad	Space Under Door	Good	Good	Good	Good	Good	Good	No
Ahmedo Amin	Good	Minor Cracks	Good	Minor Cracks	Ceiling Damaged	No	Good	No
Willo	Good	Good	Good	Good	Ceiling Damaged	No	Good	No
Harabali	Minor Welding	Minor Cracks	Good	Minor Cracks	Ceiling Heavy Damage	No	Minor Damage	No
Osabey	Good	Good	Good	Good	Good	No	No	No
Masajit	All attachments Damaged	Good	Good	Good	Iron Sheet loosen	No	No	No
Nustarik	Good	Minor Cracks	Good	Good	Minor Ceiling Cracks	Damaged	Minor Damage	No
Ayinle	2 look box Damage	Good	Good	Good	Minor Ceiling Cracks	Damaged	No	No
Hayasuftu	Good	Good	Good	Minor Cracks	Ceiling Cracks	No	Minor Damage	No
Seero	Good	Good	Good	Good	Good	Damaged	No	No
Higli	Good	Good	Good	Good	Store Ceiling Cracks	Good	Good	No
Gunway	Minor Welding	Good	Good	Good	Minor Ceiling Cracks	Damaged	Minor Damage	No
Waradi	Lock Box Damage	Good	Good	Good	Minor Ceiling Damage	Damaged	Good	No
Lambarde	Good	Good	Good	Good	Good	Good	Good	No
Soora	Good	Good	Good	Good	Good	No	No	No
Raydab	Good	Good	Good	Good	Major Ceiling Damage	No	Good	No
Bander	Good	Good	Good	Good	Major Ceiling Cracks	Damaged	Minor Damage	No
Korale	Minor Welding	Minor Cracks	Good	Good	Iron Sheet Loosen	No	No	No
Kulay	Good	Good	Good	Good	Iron Sheet Loosen	No	No	No
Bodbod	Lock Box	Good	Good	Good	Ceiling Damaged & 2 iron Sheets loosen	No	Damaged	No

II. Annex 3. List of AHWs in the studied AHPs Filtu Woreda.

Woreda	Kebele	Qualification	Sex	No of Worker	Total	Percentage
Filtu		AHA	M	1		
	Osobey	CAHW's	M	3	**4**	8.70%
		AHT	M	1		
	Aynile	CAHW's	M	2		
		CAHW's	F	1	**4**	8.70%
		AHT	M	1		
	Korale	CAHW's	M	5	**6**	13.04%
		AHT	M	1		
	Masajid	CAHW's	M	2	**3**	6.52%
	Kulay	CAHW's	M	2	**2**	4.35%
	Bander	CAHW's	M	2		
		CAHW's	F	1	**3**	6.52%
	Willo	CAHW's	M	2	**2**	4.35%
	Golbo	CAHW's	M	2	**2**	4.35%
	Nusdarik	CAHW's	M	3	**3**	6.52%
	Malkalibi	CAHW's	M	2	**2**	4.35%
	Ahmedo Amini	CAHW's	M	2	**2**	4.35%
	Jayga'ad	CAHW's	M	3	**3**	6.52%
	Harabali	CAHW's	M	3	**3**	6.52%
	Raydab	CAHW's	M	2	**2**	4.35%
	Bodbod	CAHW's	M	1	**1**	2.16%
	Filtu Town	AHT	M	2		
		CAHW	M	2	**4**	8.70%
		Male			**44**	**95.65%**
		Female			**2**	**4.35%**
TOTAL					**46**	100%

(source: CCM One-Health Project document)

III. Annex 4. List of AHWs in the studied AHPs Dekasuftu Woreda.

Woreda	Kebele	Qualification	Sex	No of Worker	Total	Percentage
Dekasuftu	Higli	AHA	M	1		
		Animal Science	M	2		
		CAHW's	M	1	**4**	25.00%
	H/suftu	AHT	M	1		
		Animal Science	M	1		
		Animal Science	F	1	**3**	18.75%
	Gunway	AHT	M	1	**1**	6.25%
	Lambarde	CAHW's	M	1	**1**	6.25%
	Warade	AHA	M	1	**1**	6.25%
	Soora	AHT	M	1	**1**	6.25%
		CAHW's	M	1	**1**	6.25%
	Seero	AHT	F	1		
		Animal Science	M	1	**2**	12.50%
	Deka 1& 2	AHT	F	1		
		Animal Science	M	1	**2**	12.50%
		Male	**M**	**13**		**81.25%**
		Female	**F**	**3**		**18.75%**
TOTAL					**16**	100%

(Source: CCM One-Health project document)

IV. Annex 5. Year, number of trainees and length of training periods

Year	Number of Trainings	Proportion (%)	Number of Trainings by Length of Training Periods						
			Months		Days				
			1-2	3-4	1-5	6-10	11-15	16-20	21-25
1999	3	5.1	3						
2000	2	3.4	1	1					
2001	3	5.1	2						
2002	4	6.8	1	2			1	1	
2003	5	8.5			3		1	1	
2005	2	3.4				1	1		
2006	1	1.7	1	1					
2007	2	3.4	1	1					
2009	6	10.2	4					1	
2010	5	8.5			1	1	2		1
2011	7	11.9			1	2	4		
2012	2	3.4	1		1				
2013	2	3.4	1		1				
2015	5	8.5			5				
2016	4	6.8	1		1	1	1		
2017	6	10.2			1	2	1	2	
TOTAL	59	100	16	5	14	7	11	5	1
		Proportion	27%	8%	24%	12%	19%	8%	2%

(Source: CCM Project documents)

V. Annex 6. Main Activities of AHOs and Community Awareness

Description of activities	Activities in each animal health posts																						
	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Benigle	Harabali	Osabey	Mesajid	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	bander	Korale	Kulay	Bodbod	Proportion
Veterinary clinical activities																								%
Treatment	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	100
Vaccination	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	96
Castration	x	x	x	x	x						x	x	x			x							x	39
Hoof trimming	x		x	x	x						x		x			x								26
Activity report	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	96
Disease outbreak report	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	96
External parasites control using acaricides	x																							4
Drug sell/supply to the community	x	x	x	x	x	x	x		x									x	x		x	x		52
Community awareness creation	x	x	x	x	x	x	x	x	x	x	x		x		x		x		x		x	x	x	78
Awareness creation activities																								
Animal movement control	x		x			x	x	x	x	x									x	x	x	x	x	52
Animal disease control and vaccination		x		x	x						x		x	x	x		x	x	x		x	x	x	57
Proper use of legal drugs		x								x											x			13
Illegal drug control		x								x									x					13
Avoid consumption of raw meat and milk				x	x																			9
Hygienic and zoonotic disease control				x		x							x											13
Reporting animal disease outbreaks						x																		4
Stop treating animals on their own												x												4
Forage preservation and stop cutting trees															x									4
Means of awareness creation																								
Organizing meeting on water ponds		x			x				x	x	x													22
Wedding ceremony		x																						4
Organizing public meeting				x		x	x					x		x		x			x			x		35
Use posters of different diseases								x																4

Table 1. Human & Livestock population for selected Kebele

Filtu and DekaSuftu weredas LPDO have provided a hard copy of information on human population. The total population and sex composition in selected kebeles of the two weredas is shown in below.

Table 1. Human population based on data collected during 2010 vaccination campaign.

Wereda	Kebele	Kebele center			Human population		
		Long	Lat	Alt	Male	Female	Total
Filtu	**Filtu**	40.65707	5.11883	1272	5131	4008	9139
	Melka Libi	40.68565	5.27198	1178	2014	1586	3600
	Golbo	40.56998	4.66452	390	2165	1640	3805
	Jaygad	40.89098	4.83574	995	1428	1112	2540
	Ahmedo Amin	40.85963	5.01795	961	1576	1194	2770
	Willo/Benigle/	40.74825	4.68912	792	2463	1987	4450
	Harabali	40.74368	4.87858	1070	1735	1315	3050
	Osabey	40.67495	4.91407	991	2959	2241	5200
	Masajit	40.77014	5.14724	1021	3000	2075	5075
	Nusdarik	40.89946	5.55405	859	1092	511	1603
	Aynile	41.08408	4.77138	734	3869	2931	6800
	Raydab	41.21467	5.23465	504	865	715	1580
	Bander	41.43011	4.99442	258	3266	2534	5800
	Korale	41.08694	5.24209	595	3002	2351	5353
	Kulay	40.96452	4.63402	895	2787	2233	5020
	Bodbod	40.70832	4.51994	497	2031	1539	3570
	Total				39383	29972	69355
DekaSuftu	**Hayasuftu**	40.02257	5.20175	1286	3849	3024	6873
	Seero	40.30949	5.18618	1177	2138	1679	3817
	Higli	40.13691	5.18513	1136	1447	1137	2584
	Gunway	40.21388	5.09714	1012	1994	1566	3560
	Waradi	40.03041	5.01358	1114	3073	2415	5488
	Lambarde	40.09345	5.02208	1128	2127	1672	3799
	Soora	40.06345	5.37783	767	1644	1291	2935
	Deka01&02	39.9123	5.21602	1374	3269	2569	5838
	Total				19541	15353	34894
	Grand total				58924	45325	104249

Table 2._Livestock population based on data collected during 2010 vaccination campaign

Wereda	**Kebele**	**Livestock population**						
Filtu		Camel	Cattle	Goat	Sheep	Donkey	Poultry	TOTAL
	Filtu	200	700	6,000	2,800	1,200	650	11,550
	Melka Libi	15,344	8,344	12,000	3,000	700	350	39,738
	Golbo	3,344	12,470	16,000	4,000	300	250	36,364
	Jaygad	12,340	6,371	12,500	2,500	800	150	34,661
	Ahmedo							
	Amin	10,644	7,530	18,000	3,000	877	160	40,211
	Willo/Benigle	7,810	11,620	16,000	2,000	875	150	38,455
	Harabali	4,800	6,000	10,000	1,000	378	50	22,228
	Osabey	7,890	10,750	1,800	2,000	5,000	150	27,590
	Masajit	3,800	3,000	5,000	3,000	400	320	15,520
	Nusdarik	10,120	3,841	9,250	750	400	65	24,426
	Aynile	22,600	10,144	23,000	3,200	677	400	60,021
	Raydab	10,000	3,000	10,000	1,500	300	50	24,850
	Bander	2,800	4,380	18,000	2,000	500	250	27,930
	Korale	25,000	7,620	27,000	3,500	500	150	63,770
	Kulay	6,088	4,000	7,000	1,800	200	100	19,188
	Bodbod	2,500	10,133	9,000	1,000	500	-	23,133
	Subtotal	***145,280***	***109,903***	***200,550***	***37,050***	***13,607***	***3,245***	***509,635***
DekaSuftu	Hayasuftu	7,044	5,300	12,725	6,725	700	450	32,944
	Seero	7,088	6,200	7,070	3,614	500	200	24,672
	Higli	3,300	3,050	10,500	3,050	178	100	20,178
	Gunway	9,300	6,600	14,810	11,190	225	170	42,295
	Waradi	8,300	7,150	11,250	6,750	440	150	34,040
	Lambarde	7,544	7,000	9,100	4,400	3,800	96	31,940
	Soora	5,776	7,150	11,250	6,750	440	150	31,516
	Subtotal	***48,352***	***42,450***	***76,705***	***42,479***	***6,283***	***1,316***	***217,585***
	Grand Total	**193,632**	**152,353**	**277,255**	**79,529**	**19,890**	**4,561**	**727,220**

Table-3. One Health networks operating in Africa

One Health-related network/consortium	**Participating countries**	**Primary funder(s)**
One Health Initiative-African Research Consortium on Ecosystem and Population Health (Afrique One)	Tanzania, Ghana, Ivory, Uganda, Senegal, Chad	Wellcome Trust
One Health Central and Eastern Africa (OHCEA) university network	Ethiopia, Democratic Republic of Congo, Kenya, Rwanda, Tanzania, Uganda	USAID
One Health National Networks for Enhanced Research in Infectious Diseases (NRN-Biomed)	Tanzania, Ghana, Uganda (with partners in the global North)	European Union
Cysticercosis Working Group in Eastern and Southern Africa (CWGESA)	Tanzania, Kenya, Uganda, Zambia, Zimbabwe, South Africa, Madagascar, Mozambique, Rwanda, Burundi	Principal sources of funding include membership fees, annual subscriptions, grants, donations, and other contributions
Southern African Centre for Infectious Disease Surveillance (SACIDS)	Democratic Republic of Congo, Mozambique, South Africa, Zambia, Tanzania (with research center partners in the global North)	Wellcome Trust, Rockefeller Foundation, Google.org
Southern African Development Community Trans-Boundary Animal Diseases (SADC TADs)	Angola, Botswana, Democratic Republic of Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe	Member states, through SADC's Regional Development Fund
Training Health Researchers into Vocational Excellence (THRiVE)	African partners: Uganda, Tanzania, Rwanda; Northern partners: United Kingdom	Wellcome Trust
Consortium for Advanced Research Training in Africa (CARTA)	Tanzania, Kenya, Uganda, Rwanda, Malawi, South Africa, Nigeria	Wellcome Trust

Table 4: Condition of AHPs and associated infrastructures.

Woreda	Condition of AHPs								Crushes		Livestock Market	
	Door	**Wall**	**Window**	**Floor**	**Roof**	**Fence**	**Toilet**	**Incinerator**	**Yes**	**No**	**Modern**	**Traditional**
Filtu	Good	Good	Good	Good	Ceiling Cracks	No	Good	No	*		*	
Melka Libi	Good	Good	Good	Good	Ceiling Cracks	No	No	No		*	N/A	N/A
Golbo	Lock Box & Welding	Good	Good	Good	Ceiling Damaged	No	Minor Damage	No		*	N/A	N/A
Jaygad	Space Under Door	Good	Good	Good	Good	Good	Good	No		*	N/A	N/A
Ahmedo Amin	Good	Minor Cracks	Good	Minor Cracks	Ceiling Damaged	No	Good	No		*	N/A	N/A
Willo	Good	Good	Good	Good	Ceiling Damaged	No	Good	No		*	N/A	N/A
Harabali	Minor Welding	Minor Cracks	Good	Minor Cracks	Ceiling Heavy Damage	No	Minor Damage	No		*	N/A	N/A
Osabey	Good	Good	Good	Good	Good	No	No	No		*	N/A	N/A
Masajit	All attachments Damaged	Good	Good	Good	Iron Sheet loosen	No	No	No		*	N/A	N/A
Nustarik	Good	Minor Cracks	Good	Good	Minor Ceiling Cracks	Damaged	Minor Damage	No		*	N/A	N/A
Ayinle	2 look box Damage	Good	Good	Good	Minor Ceiling Cracks	Damaged	No	No		*	N/A	N/A
Hayasuftu	Good	Good	Good	Minor Cracks	Ceiling Cracks	No	Minor Damage	No	*		*	
Seero	Good	Good	Good	Good	Good	Damaged	No	No		*	N/A	N/A
Higli	Good	Good	Good	Good	Store Ceiling Cracks	Good	Good	No		*	N/A	N/A
Gunway	Minor Welding	Good	Good	Good	Minor Ceiling Cracks	Damaged	Minor Damage	No		*	N/A	N/A

Waradi	Lock Box Damage	Good	Good	Good	Minor Ceiling Damage	Damaged	Good	No		*	N/A	N/A
Lambarde	Good	Good	Good	Good	Good	Good	Good	No		*	N/A	N/A
Soora	Good	Good	Good	Good	Good	No	No	No		*	N/A	N/A
Raydab	Good	Good	Good	Good	Major Ceiling Damage	No	Good	No		*	N/A	N/A
Bander	Good	Good	Good	Good	Major Ceiling Cracks	Damaged	Minor Damage	No		*	N/A	N/A
Korale	Minor Welding	Minor Cracks	Good	Good	Iron Sheet Loosen	No	No	No		*	N/A	N/A
Kulay	Good	Good	Good	Good	Iron Sheet Loosen	No	No	No		*	N/A	N/A
Bodbod	Lock Box	Good	Good	Good	Ceiling Damaged & 2 iron Sheets loosen	No	Damaged	No		*	N/A	N/A

Table 5.1 List of AHWs in the studied AHPs.

No.	Woreda	Kebele	Qualification	Sex	No of Worker	Total	Percentage
1	Filtu	Osobey	AHA	M	1		
			CAHW's	M	3	**4**	
		Aynile	AHT	M	1		
			CAHW's	M	2		
			CAHW's	F	1	**4**	
		Korale	AHT	M	1		
			CAHW's	M	5	**6**	
		Masajid	AHT	M	1		
			CAHW's	M	2	**3**	
		Kulay	CAHW's	M	2	**2**	
		Bander	CAHW's	M	2		
			CAHW's	F	1	**3**	
		Willo	CAHW's	M	2	**2**	
		Golbo	CAHW's	M	2	**2**	
		Nusdarik	CAHW's	M	3	**3**	
		Malkalibi	CAHW's	M	2	**2**	
		Ahmedo Amini	CAHW's	M	2	**2**	
		Jayga'ad	CAHW's	M	3	**3**	
		Harabali	CAHW's	M	3	**3**	
		Raydab	CAHW's	M	2	**2**	
		Bodbod	CAHW's	M	1	**1**	
		Filtu Town	AHT	M	2		
			CAHW	M	2	**4**	
2	Dekasuftu	Higli	AHA	M	1		
			Animal Science	M	2		
			CAHW's	M	1	**4**	
		H/suftu	AHT	M	1		
			Animal Science	M	1		
			Animal Science	F	1	**3**	
		Gunway	AHT	M	1	**1**	
		Lambarde	CAHW's	M	1	**1**	
		Warade	AHA	M	1	**1**	
		Soora	AHT	M	1	**1**	
			CAHW's	M	1	**1**	
		Seero	AHT	F	1		
			Animal Science	M	1	**2**	
		Deka 1& 2	AHT	F	1		
			Animal Science	M	1	**1**	

Table 6. Type of training, trainees and training organizers

NO	TYPE OF TRAINING	NO OF TRAINING	PROPORTION (%)	PARTICIPANTS OF THE TRAINING	TRAINING ORGANIZERS
1	Livestock disease control and prevention through vaccination and treatment, and routine clinical activities(hoof trimming, castration)	15	25.4	AHA, AHT, CAHWs	OXFAM, GOV, PCAE, PC, COOPI
2	Livestock disease reporting including disease outbreaks	10	16.9	AHT, CAHWs	PC, FAO
3	Zoonotic diseases, hygiene and sanitation	7	11.9	AHT,CAHWs	ACPA,GOV, CCM, COOPI
4	Transmission of livestock diseases from animal to animal during animal movement/migration	3	5.1	AHT, CAHWs	GOV, COOPI
5	Type and the use of drugs	3	5.1	CAHWs	GOV
6	Control of contagious livestock diseases	3	5.1	AHT	GOV
7	Animal fattening and breeding	2	3.4	CAHWs	GOV, COOPI
8	Hygienic handling, Storage and preservation of milk	2	3.4	AHA,CAHWs	GOV
9	Eradication of PPR	2	3.4	AHA	VSF
10	Vaccine storage, transportation and vaccination	2	3.4	AHA,	GOV, OXFAM
11	Livestock (Poultry) production and livestock marketing.	2	3.4	CAHWs	GOV, COOPI
12	TOT of CAHWs	1	1.7	AHT	GOV
13	Networking of private and government pharmacies with CAHWs	1	1.7	AHT	ACPA
14	Management of animal health post	1	1.7	CAHWs	PC
15	Community awareness on disease control	1	1.7	AHT, CAHWs	GOV
16	Disease surveillance and reporting	1	1.7	AHT	FAO
17	Pastoralist health extension	1	1.7	CAHWs	PC
18	Livestock welfare and disease management	1	1.7	CAHWs	GOV
19	Seasonal occurrence of livestock diseases				

Table 7. Year, number of trainees and length of training periods

Year	Number of Trainings	Proportion (%)	Number of Trainings by Length of Training Periods						
			Months		Days				
			1-2	3-4	1-5	6-10	11-15	16-20	21-25
1999	3	5.1	3						
2000	2	3.4	1	1					
2001	3	5.1	2						
2002	4	6.8	1	2			1	1	
2003	5	8.5			3		1	1	
2005	2	3.4				1	1		
2006	1	1.7	1	1					
2007	2	3.4	1	1					
2009	6	10.2	4					1	
2010	5	8.5			1	1	2		1
2011	7	11.9			1	2	4		
2012	2	3.4	1		1				
2013	2	3.4	1		1				
2015	5	8.5			5				
2016	4	6.8	1		1	1	1		
2017	6	10.2			1	2	1	2	
TOTAL	59	100	16	5	14	7	11	5	1
		Proportion	27%	8%	24%	12%	19%	8%	2%

Description of activities	Table 8. Main activities of AHPs and community awareness Activities in each animal health posts																						
	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Benigle	Harabali	Osabey	Mesajid	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	bander	Korale	Kulay	Bodbod	Proportion
Veterinary clinical activities																								%
Treatment	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	100
Vaccination	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	96
Castration	x	x	x	x	x						x	x	x			x							x	39
Hoof trimming	x		x	x	x						x		x			x								26
Activity report	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	96
Disease outbreak report	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	96
External parasites control using acaricides	x																							4
Drug sell/supply to the community	x	x	x	x	x	x	x		x									x	x		x	x		52
Community awareness creation	x	x	x	x	x	x	x	x	x	x	x		x		x		x		x		x	x	x	78
Awareness creation activities																								
Animal movement control	x		x			x	x	x	x	x									x	x	x	x	x	52
Animal disease control and vaccination		x		x	x						x		x	x	x		x	x	x		x	x	x	57
Proper use of legal drugs		x								x											x			13
Illegal drug control		x								x									x					13
Avoid consumption of raw meat and milk				x	x																			9
Hygienic and zoonotic disease control				x		x							x											13

Reporting animal disease outbreaks						x																		4
Stop treating animals on their own												x												4
Forage preservation and stop cutting trees															x									4
Means of awareness creation																								
Organizing meeting on water ponds		x			x				x	x	x													22
Wedding ceremony		x																						4
Organizing public meeting				x		x	x					x		x		x			x			x		35
Use posters of different diseases								x																4

Table 9. Availability of different materials in the AHP

Materials	Proportion of AHPs that have or not have the materials		
Office equipment	AHPs that have the materials (%)	AHPs that have no materials (%)	AHPs that have materials that need maintenance/ replacement (%)
- Shelve	73.9	26.1	34.8
Tables	78.3	21.7	34.8
Chair	82.6	17.4	30.4
Veterinary equipment			
Vaccination syringes (4ml)	4.3	95.7	0.0
Vaccination syringes (10ml)	52.2	47.8	8.7
Vaccination syringes (20ml)	13.0	87.0	0.0
Vaccination syringes (30ml)	39.1	60.9	0.0
Treatment syringe (10ml)	17.4	82.6	0.0
Treatment syringe (20ml)	39.1	60.9	0.0
Vaccination needle	39.1	60.9	0.0
Treatment needle	34.8	65.2	0.0
Burdizo (large)	34.8	65.2	4.3
Burdizo (small)	30.4	69.6	13.0
Stethoscope	21.7	78.3	4.3
Thermometer	8.7	91.3	4.3
Scissors	4.3	95.7	0.0
Hoof trimmer/cutter	34.8	65.2	0.0
Bolling gun	17.4	82.6	0.0
Trocar and canula	4.3	95.7	4.3
Knapsack sprayer	17.4	82.6	0.0
Forceps	4.3	95.7	0.0
Cotton, role of (500gm)	4.3	95.7	4.3
Gauze	4.3	95.7	0.0

Sterilizer dish	26.1	73.9	4.3
Scalpel blade	4.3	95.7	0.0
Ice box	34.8	65.2	0.0
Disposable gloves	4.3	95.7	0.0
Refrigerator	4.3	95.7	0.0
Water boiler	4.3	95.7	4.3
Savlone	4.3	95.7	0.0
Alcohol	4.3	95.7	0.0
Field bag	4.3	95.7	4.3
Drugs			
Ox tetracycline 20%	52.2	47.8	0.0
Ox tetracycline 10%	4.3	95.7	0.0
Albendazole 300mg	17.4	82.6	0.0
Ivermectin	52.2	47.8	0.0
Albendazole 2500mg	8.7	91.3	0.0
Albendazole 250mg	8.7	91.3	0.0
Albendazole 300mg	39.1	60.9	0.0
Veridium	13.0	87.0	0.0
Penstrep	17.4	82.6	0.0
Vaccines			
Anthrax	13.0	87.0	0.0
Blackleg	13.0	87.0	4.3
Ovine pasteurellosis	8.7	91.3	0.0
Bovine pasteurellosis	8.7	91.3	8.7

I. Annex 7. List of diseases in their English and Somali languages

Camel		Cattle		Shoat	
Common name / English	**Somali language**	**Common name / English**	**Somali language**	**Common name /English**	**Somali language**
Heart water	Shimbir /qalal	Butolism	Dhabargooye	Heart water	Qalal
Camel Pox	Furuq	Blackleg	Garbagarbow	Pasteurellosis	Riinwayne
Pasteurollosis	Hargab	FMD	Cabeeb	CCPP	Sanbab/Beer maal
Brucellosis	Dhicis	Mastitis	Candhoole	ORF	Afaw
Trypanosomosis	Dhukaan	CBPP	Sanbabaka Lo'da	PPR	Diifdhere
Pneumonia	Dhugato	Trypanosomosis	Hooto/ Biiroo	Foot rot	Raaf Qarar
Anthrax	Kud	Pasteurollosis	Hargab	Brucellosis	Dhicis
Salmonellosis	Haar	Brucellosis	Dhicis	Lice	Injir
Plant Toxin	Geed Daaq	Photosensitation	Gubato	Ticks infestation	Shilin
Tick infestation	Shilin	Babesiosis	Kaadi Dhiig	Sheep/goat pox	Furuq
Orf	Afaw	Heartwater	Qalal/shimbir	Salmonellosis	haar
Mange	Cadho	Actinobacillosis	Qun	Butolism	Dhabargooye
Reneck syndrome	Shinbir	Foot rot	Raaf Qarar	Ephemeral fever	Tuunyo
Eye worm	Ilqod/Humad	Ephemeral fever	Tunyoc	Plant toxin	Geed Daaq
Endo-parasite	Gooryaan	Anthrax	Kud	Anthrax	Kud
Mastitis	Candho Barar	Ticks infestation	Shilin	Mastitis	Candhoole
Botulism	Dhabargooye	Pneumonia	Dhugato	Horn disease	Gees Boogaw
Babesiosis	Kaadi dhiid	Cow Pox	Furuq	FMD	Cabeeb
Influenza	Hargab	Internal parasites	Gooryaan	Mange	Cadho
Bloat	Dibir	Salmonellosis	Haar	Actinobacilosis	Qun
Skin Tumors	Ma'a	Mange	Cadho	Arthritis	Gamdhal
Pneumonia	Dhugato	Bloat	Dibir	Babesiosis	Kaadi Dhiig
Internal Parasite	Gooryaan/ Butaal	LSD	Korbarar	Pneumonia	Dhugato
xxxxxxx	Madahtaag/ Gursumo	Tuberculosis	Tiibii	Anaplasmosis	xxxxxxxx
xxxxxxx	Gudaan	Lice	Injir	Colibacillosis	xxxxxxxx
xxxxxxx	Duuliye/Gambis	Ephemeral fever	Tuunyo		

II. Annex 8. Quantity and condition of materials available in each AHPs

Materials description	Unit	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Willo/Benigle	Harabali	Osabey	Mesajid	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Office equipment																								
Shelve	PCs	1	1			1*	1	1	1	1*	1*	1/2	2/1*	1			1*		1	1	1*	1*	1	
Tables	PCs	2*	1*			1	1	1	1*	1	1*	2*	1	1	2/1*	1	1		1*	1	2*		1	
Chair	PCs	1*	2			1	1*	2	1*	1	1	1	1/1*	1	1	1	1		3	2	2*	1*	1*	
Veterinary equipment																								
Vaccination syringes (4ml)	PCs								4															
Vaccination syringes (10ml)	PCs	2	2	1	1*		1							1	1	1				1	2	1/1*	3	
Vaccination syringes (20ml)	PCs					1					1		1											
Vaccination syringes (30ml)	PCs	1						3		1				1	1	1	1			1				2
Treatment syringe (10ml)	PCs													1	1	1					1			
Treatment syringe (20ml)	PCs	1	2	1	1			4			1		2			1								2
Vaccination needle	Pcs	24		8	1	1		12			5		15	2			10							
Treatment needle	Pcs	24			1	1		12			10		8							7				
Burdizo (large)	Pcs	1*	2	1			1										1			1		1		1
Burdizo (small)	Pcs	1*				1*	1	1														1	1/1*	1
Stethoscope	Pcs			1	1			1		1												1/1*		
Thermometer	Pcs							1		1/2*														

Scissors	Pcs	1																						
Hoof trimer/cutter	Pcs		1	1			1	1				2					1			1				1
Bolling gun	Pcs			1																1		1	2	
Trocar and canula	Pcs									2/1*														
Knapsack sprayer	Pcs						1	1												1			1	
Forceps	Pcs		1																					
Cotton, role of 500gm)	kg									1/2E														
Gauze	role									5														
Sterilizer dish	Pcs		1				1		1	1		4										1*		
Scalpel blade	Pcs									3														
Ice box	Pcs		1				1	1				1					1			1	1		1	
Disposable glove (long sleeved)	Pcs									30														
Refregerator	Pcs											1												
Water boiler	Pcs									1*														
Savlone	Liter							1																
Alcohol	Liter							1																
Field bag	Pcs																			1/1*				
Drugs																								
Oxytetracycline 20%	Vial	50	20	20	40	20		5				8	1		50		3		80			27		
Oxytetracycline 10%	Vial		10																					
Albendazole 300mg, box of 60	box	80						7				1.5		16										
Ivermectin vial of 50ml	Vial		40	20	20	15		8	15			9	1		45				30	24		14		

Albendazole 2500mg, pack of 55	box							3	2															
Albendazole 250mg, pack of 55	box		15		15																			
Albendazole 300mg, pack of 55	box		20	10		25			6				1		35	27			10			11		
Veridium pack of 10 sachets	packs		10					2														10		
Penstrep			5					8				3							10					
Vaccines																								
Anthrax	Vial				80				20													10		
Blackleg	Vial				5				4											10E				
Ovine pasteurellosis	Vial				37				10															
Bovine pasteurellosis	Vial								4											14E				

* Materials that need maintenance/replacement

E- Expired

Table 10. List of NGOs and their area of involvement

Name of NGO	Previous place of work	Area of involvement	Current place of work	Area of involvement
FAO	Filtu	Supply live vaccine free drug, support mass treatment and vaccination, staff per diem, CAHWs and staff training	No	
Oxfam	Filtu	CAHWs/staff training	No	
Save The Children	Haydimtu, Jaygad,Aynile	Livestock treatment through private pharmacy, forage supply, area closure for forage development	Osobey	Forage supply and area closure for forage development
COOPI	Filtu, Osobey, Masajit, Korale, Kulay	AHP construction, AHP equipped Aynile and beniglie AHPs, supply drug and vaccine and provides logistic and financial, treatment and vaccination campaign, provide CAHWs training and equip, sanitation and hygiene	No	
Mercy Corps	Filtu, Malkalibi, Masajit	Provide logistic and staff perdiem for vaccination campaign, established drug Voucher system for poor families, and treatment	No	
PC	Melkalibi, Masajit,Aynile,	AHP equipped Aynile and beniglie AHPs, supply drug and vaccine and provides logistic and financial, treatment and vaccination campaign, provide CAHWs training and equip, provide logistic support		

CISP	Benigle	Rain water harvesting structure, training health workers, artificial pond rehabilitation, deep well maintenance, cattle trough construction, latrine construction	Aynle, Banighle, Masajit, Osobey, Seero, Deka, Hysuftu, Lambarde	Construction of rain water harvesting structures, artificial pond rehabilitation, deep well maintenance, health workers training, cattle trough construction, latrine construction, distribution of water filter and purifying devices
NLM	Masajit	Wash related works	Filtu, masajit, hydimtu, malkalibi	CAHWs training, planned livestock treatment and vaccination
HANDI CAP	Masajit	Refresher training for handicaps.	No	
Racida	Seero	Provide logistic support for livestock and human vaccination	Waradi, Lambarde	Provide logistic support for livestock and human vaccination
PCAE	Bander, Korale, Kulay	Located only at regional level and facilitate livestock vaccination and treatment activities	No	
Islamic Relief	No		Higli, Waradi, Lambarde	Conduct livestock treatment and vaccination in Deka wereda
CCM	No		Filtu, Melkalibi,, Jaygad, Ahmedo Amin, Benigle, Harabali, Osobey, Masajit, Hydimtu, Aynile, DekaSuftu, Haysuftu, Seero, Higli, Gunway,Waradi,Lam barde, Raydab, Bander, Korale, Kulay,	Veterinary services study, crush construction, support vaccination campaigns, AHPs rehabilitation, training veterinary and human workers on zoonotic diseases
ACPA	No		Filtu, Jaygad, Ahmedo Amin, Osobey, Gunway	Works in partnership with mercy corps, support livestock vaccination campaign through logistic and per diem support, support poultry production through training CAHWs, community and cooperatives esp women groups

Table 11. The most important livelihood activities in the selected kebeles.

Kebele	**Means of livelihood (ranked from1-5)**				
	Pastoralism	Agro-pastoralism	Crop farming	wage labor	Petty cash
Filtu	1	2	3	4	5
Melka Libi	1	2	3	4	5
Golbo	2	1	3	4	5
Jaygad	1	3	2	4	5
Ahmedo Amin	1	2	3	4	5
Willo	1	2	3	4	5
Harabali	1	3	4	2	5
Osabey	1	2	3	4	5
Masajit	1	3	2	4	5
Nusdarik	1	2	3	5	4
Ayinle	2	1	5	4	3
Hayasuftu	1	2	3	5	4
Seero	1	2	3	4	5
Higli	1	2	3	4	5
Gunway	2	1	3	4	5
Waradi	1	2	5	3	4
Lambarde	1	2	4	3	5
Soora	2	1	4	3	5
Raydab	1	2	3	4	5
Bander	2	1	3	4	5
Korale	1	2	3	4	5
Kulay	1	2	3	4	5
Bodbod	2	1	3	4	5

Table 12. The benefits obtained from livestock rearing

Kebele	Camel					Cattle					Shoats					Donkey					Poultry				
	Food (meat and milk)	Income	Transport	Draft power	others	Food (meat and milk)	Income	Transport	Draft power	others	Food (meat and milk)	Income	Transport	Draft power	others	Food (meat and milk)	Income	Transport	Draft power	others	Food (meat and milk)	Income	Transport	Draft power	others
Filtu	x	x	x			x	x		x		x	x					x	x			x	x			
Melka Libi	x	x	x			x	x		x		x	x					x	x			x	x			
Golbo	x	x	x			x	x		x		x	x					x	x			x	x			
Jaygad	x	x	x			x	x		x		x	x					x	x			x	x			
Ahmedo Amin	x	x	x			x	x		x		x	x					x	x	x		x	x			
Willo	x	x	x			x	x		x		x	x					x	x			x	x			
Harabali	x	x	x			x	x		x		x	x					x	x			x	x			
Osabey	x	x	x			x	x		x		x	x					x	x			x	x			
Masajit	x	x	x			x	x		x		x	x					x	x			x	x			
Nusdarik	x	x	x			x	x		x		x	x					x	x			x	x			
Ayinle	x	x	x			x	x		x		x	x					x	x			x	x			
Hayasuftu	x	x	x			x	x		x		x	x					x	x			x	x			
Seero	x	x	x			x	x		x		x	x					x	x			x	x			
Higli	x	x	x			x	x		x		x	x					x	x			x	x			
Gunway	x	x	x			x	x		x		x	x					x	x			x	x			
Waradi	x	x	x	x		x	x		x		x	x					x	x			x	x			
Lambarde	x	x	x	x		x	x		x		x	x					x	x			x	x			
Soora	x	x	x			x	x		x		x	x					x	x			x	x			
Raydab	x	x	x			x	x		x		x	x					x	x			x	x			
Bander	x	x	x			x	x		x		x	x					x	x			x	x			
Korale	x	x	x			x	x		x		x	x					x	x	x		x	x			
Kulay	x	x	x			x	x		x		x	x					x	x			x	x			
Bodbod	x	x	x			x	x		x		x	x					x	x			x	x			

Table 13. Major constraints of livestock rearing

Major Constraints	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo	Willo/Benig	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Diseases	1	1	1	1	1	1	2	1	2	2	2	1	2	1	1	2	1	2	2	3	1	2	3
Drought	2	2	3	2	2	3	1	2	1	1	4	3	1	2	2	3	2	1	1	4	2	1	2
Shortage of water			3	3							1	2				1	4				3	3	
Feed shortage	5	5	4	4	4												3						
Lack of market	4	4		5																			
Low market price	6			6					3														
Livestock movement		3			3	5	4		4	3	3	4	3	6	3	5		3	4	5	4	4	1
Predators		6	5			6	5	3		4	5		5	5									
Plant toxin			6																				
Urbanization						2	3		6				4	4		4						5	
Expansion of crop farming						4			7				6	3				4					
Soil erosion									5														
Low veterinary service												5							3	1			
Remoteness from wereda centre																					2		

I. Annex 4. Livestock diseases that have no English names.

No	Name of diseases in Somali language	Major Clinical signs
1	Madahtaag/ Gursume	Nervousness/aggressiveness
		Poor appetite/Eating and drinking
		Biting own lips
		Restlessness, often with circling movement
		Swelling of the head
		Rough hair
		Frequent tail switching
		Swollen elbow and joint pain
		Falling down and death
		Beating ground and kicking body parts
		Sometimes sudden death without showing prominent clinical sign
2	Gudaan	Swelling of the neck
		Shocked when moved by a person
		Chases other animals
		Screams when touched
		Oftenly staggers
3	Duuliye/ Gambis	Sudden death
		Poor appetite/stop feeding
		Udder swelling in pregnant animals with immediate death
		Stands in one place for a while, fall down and die

Table 14. Camel diseases prevalent in the studied kebeles

Camel diseases	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Gudaan	2		5	1	7		10	4	9				4	8	7		3		9			4	
Heartwater	5	8	3	6	2	8	2	5	1	5	3	4	5	5	10			8	8	2	8		6
Skin tumor	6	6		4		6	9	7	4	4	9								4		1	9	4
Camelpox	7	5	4	10	1	2	5	10	6	2	1	3	7	3	5	6	5	3	3	6	4	7	8
Pasteurellosis	4	3		8	6	9	6	9	5	3	7	5	3	4	8	9	9	10	7	4	3	5	
Brucellosis	8			3	3	4	4	6			5	2		1		7	7	5		5	2		
Madahtaag/Gursume	1	1	1	7	5	5	1	3	3				1	2	1		4				7	6	7
Trypanomosis	9	2	2			1	3		10	6	4	7		6	4		6	2	2	3	9	8	3
Pneumonia	3	10			11	7		11	7		6	6		7	9	4	8		5				5
Eye worm		9			8						10				6				10				
Anthrax		7	7	2	5	3	7	2	2	1	2	1	2		2	1	1	1	1	1	5	2	2
Salmonellosis			6	9				8	8	8						3	2					1	
Plant toxin				5						9												3	
Orf				11	9																		
Mange					10		8											6	6		10		
Gambis /Duuliye								1		7					3								
Reneck syndrome											8												
Internal parasite		4													6						11		
Babesiosis																2		7					
Mastitis																5		4			6		
Botulism																8							
Influenza																		9					
Bloat																						10	

Table 15. Cattle diseases prevalent in the studied kebeles

Cattle diseases	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Willo / Benicle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Botulism	1	1	1	3	1	4	5	2	1	1	1	1	1	1	1	1	2	6	2	7	1	1	3
Blackleg	2	3	2	2	3	8	2	6	3		2	2	6	10	4	2	4	2	4		4	6	2
FMD	3	4	3	4	4	1	4	5	2		4	5	3	5	6		1	1	1	4	2	3	4
Mastitis	6				7	6					10	6			8	8		7					
CBPP	4							9							3			5			5		
Trypanomasis	5	2	4		2	2	1	4	5	6	7	11	2	8			3		3		3	2	7
Pasteurellosis		5						7	8		8	7		4	5	4		4		1			
Brucellosis		6			6	5					3	3		3		7							
Babesiosis		7				7					6	9		6		3		10					
Photosensitization		8		1	5		3	8	4										5	6	6		6
Pink eye		9						1		2									6			5	1
Heartwater		10							7	3	5	10	5	7									9
Ephemeral Fever			5							7					10				8			7	8
Actinobacillosis			6			3													7				
Anthrax			7								4	4		2	2	10		3					
Cattle Pox						9														3			
Internal parasites								3															
Salmonellosis									6						9	6							
Foot rot										5													
Mange											9	8		9	7								
Bloat													4										
Colibacillosis																5							
Pneumonia																9							
LSD																	8			5			5
Tuberculosis																		9					
Lice																				2			

Table 16. Diseases that affect shoat production

Shoat diseases	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Pasteurellosis	1	4	5		5	7		1	1	1	4	5	1	6	4		5	4		2	2	2	5
CCPP	2	1	2		3			6	6	6		1	4	3	1		3	1	6	4	7	7	3
Brucellosis	3					6						8		7			8		2	7	4		4
PPR		2	1	1	2	1	5	2	8	3	1	3	3	5	2	1	2	10	1	1	1	1	1
Orf		3							5		5	9	7					7		5			
plant toxin		5														4	4				8		
Heartwater			4	2	7	8	1		7		3	4	6	1	3	7		6			5	3	2
salmonellosis			3	3	4	2	2	4	4	4		10	2	2	6	5	7	2	5			5	
Botulism				4	8					2	2	2						3				8	
Ephemeral fever				5															3				
Anthrax					1		3									3	6	5					
Eye worm					6																		
Foot rot						3	6					7							7	6		6	7
Trypanosomosis						4				8													
Arthritis						5																	
Pox							4	5	3		6	6		4					4	3		4	6
Internal Parasites							7																
FMD								3		7			5	8	5		1				6	9	
Actinobacillosis									2	5								8					
Mange									9														
Pneumonia										9						2				8		10	
Babesiosis														9									
Madahtaag/Gursume																6							
Riftvalley fever																		9					
Mastitis																					3		

III. Annex 9. Impact of livestock diseases on camel, cattle and shoat production

Note: The Livestock Office support me to calculate these numbers and construct the table

Disease		Morbidity			Disease		Morbidity			Disease		Morbidity		
	Mortality	Loss of production	Loss of market value	Abortion		Mortality	Loss of production	Loss of market value	Abortion		Mortality	Loss of production	Loss of market value	Abortion
	%	%	%	%		%	%	%	%		%	%	%	%
Gudaan	52	57	57	30	Botulism	100	100	100	13	CCPP	96	96	96	62
Heartwater	87	87	87	22	Blackleg	78	87	91	17	Pasteurelosis	83	91	91	40
Skin tumor	39	61	61	17	FMD	74	74	91	70	Brucelosis	39	65	65	61
Camelpox	70	96	96	48	Mastitis	0	13	13	0	Botulism	30	30	30	4.3
Pasteurellosis	70	91	91	39	CBPP	17	26	26	9	Heartwater	70	70	70	8.7
Brucellosis	22	61	61	57	Trypanomsomiasis	74	74	74	43	Orf	13	39	39	0
Madahtaag/Gursume	65	70	70	30	Pasteurellosis	35	43	43	13	Ephimeral Fever	4.3	13	13	4.3
Trypanomosis	70	78	83	70	Brucellosis	13	35	35	35	PPR	91	91	91	65
Pneumonia	35	52	52	22	Babesiosis	22	30	30	4	Foot rot	17	57	57	0
Eye worm	4	13	13	4	Photosensitization	9	43	43	0	Plant toxin	8.7	4.3	4.3	4.3
Anthrax	91	35	65	35	Pink eye	26	26	2	4	Lice	8.7	8.7	8.7	0
Butaal	4	4	4	4	Heartwater	35	35	35	9	Pox	61	65	65	35
Tick	0	4	4	0	Foot rot	0	9	9	0	Salmonellosis	57	65	65	26
Salmonellosis	30	39	35	4	Ephemeral fever	13	26	26	17	Tick infestation	8.7	8.7	8.7	0
Plant toxin	13	13	13	9	Actinobacillosis	9	13	13	0	Anthrax	35	22	22	17
Orf	0	9	9	0	Anthrax	30	22	22	3	Mastitis	0	4.3	4.3	3
Mange	0	17	22	4	Ticks infestation	0	4	4	0	Horn disease	0	4.3	4.3	0
duuliye	4	0	0	0	Fungal disease	0	4	4	0	FMD	30	30	30	17
Gambis	9	0	0	0	Mastitis	0	22	17	0	Mange	0	8.7	8.7	0
Reneck syndrome	4	4	4	0	Cow Pox	9	9	4	0	Actinobacilosis	17	17	17	8.7

Eye worm	4	4	4	0	Internal parasites	4	4	4	4	Arthritis	4.3	4.3	4.3	4.3
Endoparasite	9	9	9	4	Salmonellosis	9	13	13	9	Anaplasmosis	8.7	8.7	8.7	0
Mastitis	0	13	9	0	Mange	4	13	13	0	Babesiosis	8.7	13	13	0
Botulism	4	4	4	0	Bloat	4	9	9	0	Mastitis	0	4.3	1	1
Babesiosis	0	4	4	0	Colibacillosis	4	4	4	0	Pneumonia	17	17	17	8.7
Influenza	0	4	4	0	Pneumonia	0	4	4	0	Colibacillosis	0	4.3	4.3	0
Blot	4	4	4	0	LSD	9	13	13	0					
Qujujuc	4	4	4	4	Tuberculosis	4	4	4	4					
					Lice	4	4	4	0					

Note: Proportion of the impacts caused by each disease was based on the respondents' scoring

IV. Annex 10. List of NGOs and their area of interventions

NGO Name	Previous work	Area of involvement	Current place of work	Area of interventions
FAO	Filtu	Supply live vaccine free drug, support mass treatment and vaccination, staff per diem, CAHWs and staff training	No	
Oxfam	Filtu	CAHWs/staff training	No	
Save The Children	Haydimtu, Jaygad,Aynile	Livestock treatment through private pharmacy, forage supply, area closure for forage development	Osobey	Forage supply and area closure for forage development
COOPI	Filtu, Osobey, Masajit, Korale, Kulay	AHP construction, AHP equipped Aynile and beniglie AHPs, supply drug and vaccine and provides logistic and financial, treatment and vaccination campaign, provide CAHWs training and equip, sanitation and hygiene	No	
Mercy Corps	Filtu, Malkalibi, Masajit	Provide logistic and staff perdiem for vaccination campaign, established drug Voucher system for poor families, and treatment	No	
PC	Melkalibi, Masajit,Aynile,	AHP equipped Aynile and beniglie AHPs, supply drug and vaccine and provides logistic and financial, treatment and vaccination campaign, provide CAHWs training and equip, provide logistic support		
CISP	Benigle	Rain water harvesting structure, training health workers, artificial pond rehabilitation, deep well maintenance, cattle trough construction, latrine construction	Aynle, Banighle, Masajit, Osobey, Seero, Deka, Hysuftu, Lambarde	Construction of rain water harvesting structures, artificial pond rehabilitation, deep well maintenance, health workers training, cattle trough construction, latrine construction, distribution of water filter and purifying devices
NLM	Masajit	Wash related works	Filtu, masajit, hydimtu, malkalibi	CAHWs training, planned livestock treatment and vaccination
HANDICAP	Masajit	Refresher training for handicaps.	No	

Racida	Seero	Provide logistic support for livestock and human vaccination	Waradi, Lambarde	Provide logistic support for livestock and human vaccination
PCAE	Bander, Korale, Kulay	Located only at regional level and facilitate livestock vaccination and treatment activities	No	
Islamic Relief	No		Higli, Waradi, Lambarde	Conduct livestock treatment and vaccination in Deka wereda
CCM	No		Filtu, Melkalibi,, Jaygad, Ahmedo Amin, Benigle, Harabali, Osobey, Masajit, Hydimtu, Aynile, DekaSuftu, Haysuftu, Seero, Higli, Gunway,Waradi,Lam barde, Raydab, Bander, Korale, Kulay,	Veterinary services study, crush construction, support vaccination campaigns, AHPs rehabilitation, training veterinary and human workers on zoonotic diseases
ACPA	No		Filtu, Jaygad, Ahmedo Amin, Osobey, Gunway	Works in partnership with mercy corps, support livestock vaccination campaign through logistic and per diem support, support poultry production through training CAHWs, community and cooperatives esp women groups

V. Annex 11. Impact of livestock diseases on camel, cattle and shoat production

source: The Livestock Office: support me to calculate these numbers and construct the table

Disease		Morbidity			Disease		Morbidity			Disease		Morbidity		
	Mortality	Loss of production	Loss of market value	Abortion		Mortality	Loss of production	Loss of market value	Abortion		Mortality	Loss of production	Loss of market value	Abortion
	%	%	%	%		%	%	%	%		%	%	%	%
Gudaan	52	57	57	30	Botulism	100	100	100	13	CCPP	96	96	96	62
Heartwater	87	87	87	22	Blackleg	78	87	91	17	Pasteurelosis	83	91	91	40
Skin tumor	39	61	61	17	FMD	74	74	91	70	Brucelosis	39	65	65	61
Camelpox	70	96	96	48	Mastitis	0	13	13	0	Botulism	30	30	30	4.3
Pasteurellosis	70	91	91	39	CBPP	17	26	26	9	Heartwater	70	70	70	8.7
Brucellosis	22	61	61	57	Trypanomsomiasis	74	74	74	43	Orf	13	39	39	0
Madahtaag/Gursume	65	70	70	30	Pasteurellosis	35	43	43	13	Ephimeral Fever	4.3	13	13	4.3
Trypanomosis	70	78	83	70	Brucellosis	13	35	35	35	PPR	91	91	91	65
Pneumonia	35	52	52	22	Babesiosis	22	30	30	4	Foot rot	17	57	57	0
Eye worm	4	13	13	4	Photosensitization	9	43	43	0	Plant toxin	8.7	4.3	4.3	4.3
Anthrax	91	35	65	35	Pink eye	26	26	2	4	Lice	8.7	8.7	8.7	0
Butaal	4	4	4	4	Heartwater	35	35	35	9	Pox	61	65	65	35
Tick	0	4	4	0	Foot rot	0	9	9	0	Salmonellosis	57	65	65	26
Salmonellosis	30	39	35	4	Ephemeral fever	13	26	26	17	Tick infestation	8.7	8.7	8.7	0
Plant toxin	13	13	13	9	Actinobacillosis	9	13	13	0	Anthrax	35	22	22	17
Orf	0	9	9	0	Anthrax	30	22	22	3	Mastitis	0	4.3	4.3	3
Mange	0	17	22	4	Ticks infestation	0	4	4	0	Horn disease	0	4.3	4.3	0
duuliye	4	0	0	0	Fungal disease	0	4	4	0	FMD	30	30	30	17

Gambis	9	0	0	0	Mastitis	0	22	17	0	Mange	0	8.7	8.7	0
Reneck syndrome	4	4	4	0	Cow Pox	9	9	4	0	Actinobacilosis	17	17	17	8.7
Eye worm	4	4	4	0	Internal parasites	4	4	4	4	Arthritis	4.3	4.3	4.3	4.3
Endoparasite	9	9	9	4	Salmonellosis	9	13	13	9	Anaplasmosis	8.7	8.7	8.7	0
Mastitis	0	13	9	0	Mange	4	13	13	0	Babesiosis	8.7	13	13	0
Botulism	4	4	4	0	Bloat	4	9	9	0	Mastitis	0	4.3	1	1
Babesiosis	0	4	4	0	Colibacillosis	4	4	4	0	Pneumonia	17	17	17	8.7
Influenza	0	4	4	0	Pneumonia	0	4	4	0	Colibacillosis	0	4.3	4.3	0
Blot	4	4	4	0	LSD	9	13	13	0					
Qujujuc	4	4	4	4	Tuberculosis	4	4	4	4					
					Lice	4	4	4	0					

Annex 11a. Seasonal occurrence of camel diseases

Long dry season (Jilal)	Long rainy season (Gu')	Short dry season (Hagaa)	Short rainy season (Dayr)
(Jan, Feb, March)	(April, May, June)	(July, Aug, Sep)	(Oct, Nov, Dec)
Madahtaag/Gursume	Pasteurellosis	Pasteurellosis	Gudaan
Gudaan	Camel pox	Gudaan	Skin tumor
Skin tumor	Brucellosis	Skin tumor	Brucellosis
Heartwater	Madahtaag/Gursume	Pneumonia	Trypanosomiasis
Trypanosomosis	Trypanosomosis	Camel Pox	Madahtaag/Gursume
Pneumonia	Pneumonia	Tick	Anthrax
Anthrax	Anthrax	Trypanosomosis	Heartwater
Salmonellosis	Heartwater	Madahtaag/Gursume	Pox
Pasteurellosis	Skin tumor	Heartwater	Orf
Camel Pox	Salmonellosis	Fungal disease	Eye worm
Brucellosis	mange	Plant toxin	Mange
Mange	Duuliye/Gambis	Brucellosis	Duuliye/ Gambis
Duuliye/Gambis	Gudaan	Anthrax	Pneumonia
Protein difficiency	Orf	Duuliye/Gambis	Mastitis
Eye worm	Mastitis	Protein difficiency	Pasteurellosis
Blot	Blot	Salmonellosis	Influenza
Internal parasites	Pneumonia	Eye worm	Blot
Babesiosis		Mange	Pneumonia
Collibacillosis		Mastitis	Solmonellosis
Anemia		Pneumonia	
Mastitis			
Plant toxin			

Annex 11b. Seasonal occurrence of cattle diseases

Long dry season (Jilal)	Long rainy season (Gu')	Short dry season (Hagaa)	Short rainy season (Dayr)
(Jan, Feb, March)	(April, May, June)	(July, Aug, Sep)	(Oct, Nov, Dec)
Botulism	FMD	Botulism	Botulism
Blackleg	Mastitis	Blackleg	Blackleg
Trypanomasis	Botulism	CBPP	FMD
Pasteurellosis	Heartwater	Heartwater	Mastitis
Mirucella bovis	Foot rot	FMD	Trypanosomosis
Babesiosis	Blackleg	Foot rot	Ephemeral fever
FMD	Photosensitization	Trypanosomosis	Brucellosis
Brucellosis	Trypanosomosis	Fungal disease	Pasteurellosis
Actinobacillosis	Babesiosis	tick infestation	Mastitis
Int. Parasites	CBPP	Brucellosis	Pox
Photosensitation	Salmonellosis	Eye worm	Babesiosis
Salmonellosis	Anthrax	Salmonellosis	Photosensitization
CBPP	Blot	Mange	Mirucella bovis
LSD	Pasteurellosis	Anthrax	CBPP
Anthrax	Eye worm	Mastitis	Salmonellosis
Mange	Pox	Pneumonia	Foot rot

Ephemeral Fever	LSD	LSD	Anthrax
Babesiosis		Tuberculosis	Blot
Pneumonia		Ephemeral fever	Heartwater
Collibacillosis			Pneumonia
Tuberculosis			LSD
Lice			

Annex 11c. Seasonal occurrence of shoat diseases

Long dry season (Jilal)	**Long rainy season (Gu')**	**Short dry season (Hagaa)**	**Short rainy season (Dayr)**
(Jan, Feb, March)	**(April, May, June)**	**(July, Aug, Sep)**	**(Oct, Nov, Dec)**
CCPP	Brucelosis	Botulism	CCPP
Pasteurelosis	CCPP	Brucellosis	pasteurellosis
Brucelosis	Pasteurelosis	PPR	Botulism
Botulism	Foot rot	CCPP	Heartwater
Ephemeral fever	Pox	Pasteurelosis	Orf
PPR	Orf	Lice	Ephemeral fever
Heartwater	Heartwater	Heartwater	Brucellosis
Salmonellosis	Salmonellosis	Salmonellosis	Plant toxin
Anthrax	Mastitis	Foot rot	Salmonellosis
Mastitis	PPR	Tick infestation	Pox
Pox	Horn disease	Mastitis	Foot rot
FMD	FMD (Kills)	Pox	Mastitis
Protein deficiency	Anthrax	Actinobacilosis	PPR
Actinobacillosis	Mastitis	Mange	FMD
Plant toxin	Pneumonia	Plant toxin	Plant toxin
Pneumonia		Ephemeral fever	Anaplasmosis
Collibacillosis		Orf	Anthrax
Mastitis		FMD	Mastitis
Lice		Anthrax	Pneumonia
Babesiosis		Babesiosis	
		Pneumonia	
		Lice	

Note: Proportion of the impacts caused by each disease was based on the respondents' scoring

VI. Annex 12. The most important livelihood activities in the selected kebeles.

Kebele	Means of livelihood (ranked from1-5)				
	Pastoralism	Agro-pastoralism	Crop farming	wage labour	Petty cash
Filtu	1	2	3	4	5
Melka Libi	1	2	3	4	5
Golbo	2	1	3	4	5
Jaygad	1	3	2	4	5
AhmedoAmin	1	2	3	4	5
Willo	1	2	3	4	5
Harabali	1	3	4	2	5
Osabey	1	2	3	4	5
Masajit	1	3	2	4	5
Nusdarik	1	2	3	5	4
Ayinle	2	1	5	4	3
Hayasuftu	1	2	3	5	4
Seero	1	2	3	4	5
Higli	1	2	3	4	5
Gunway	2	1	3	4	5
Waradi	1	2	5	3	4
Lambarde	1	2	4	3	5
Soora	2	1	4	3	5
Raydab	1	2	3	4	5
Bander	2	1	3	4	5
Korale	1	2	3	4	5
Kulay	1	2	3	4	5
Bodbod	2	1	3	4	5

(source CCM project Document)

VII. Annex13. Major constraints of livestock rearing, ranked from 1 to 6

Major Constraints	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Willo/Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Diseases	1	1	1	1	1	1	2	1	2	2	2	1	2	1	1	2	1	2	2	3	1	2	3
Drought	2	2	3	2	2	3	1	2	1	1	4	3	1	2	2	3	2	1	1	4	2	1	2
Shortage of water			3	3							1	2				1	4				3	3	
Feed shortage	5	5	4	4	4												3						
Lack of market	4	4		5																			
Low market price	6			6					3														
Livestock movement		3			3	5	4		4	3	3	4	3	6	3	5		3	4	5	4	4	1
Predators		6	5			6	5	3		4	5		5	5									
Plant toxin			6																				
Urbanization						2	3		6				4	4		4						5	
Expansion of crop farming						4			6				6	3				4					
Soil erosion									5														
Low veterinary service												5							3	1			
Remoteness from wereda centre																					2		

VIII. Annex 14. Camel diseases prevalent in the studied kebeles

Camel diseases	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Gudaan	2		5	1	7		10	4	9				4	8	7		3		9			4	
Heartwater	5	8	3	6	2	8	2	5	1	5	3	4	5	5	10			8	8	2	8		6
Skin tumor	6	6		4		6	9	7	4	4	9								4		1	9	4
Camelpox	7	5	4	10	1	2	5	10	6	2	1	3	7	3	5	6	5	3	3	6	4	7	8
Pasteurellosis	4	3		8	6	9	6	9	5	3	7	5	3	4	8	9	9	10	7	4	3	5	
Brucellosis	8			3	3	4	4	6			5	2		1		7	7	5		5	2		
Madahtaag/Gursume	1	1	1	7	5	5	1	3	3				1	2	1		4				7	6	7
Trypanomosis	9	2	2			1	3		10	6	4	7		6	4		6	2	2	3	9	8	3
Pneumonia	3	10			11	7		11	7		6	6		7	9	4	8		5				5
Eye worm		9			8						10				6				10				
Anthrax		7	7	2	5	3	7	2	2	1	2	1	2		2	1	1	1	1	1	5	2	2
Salmonellosis			6	9				8	8	8						3	2					1	
Plant toxin				5						9												3	
Orf				11	9																		
Mange					10		8											6	6		10		
Gambis /Duuliye								1		7					3								
Reneck syndrome											8												
Internal parasite		4													6						11		
Babesiosis																2		7					
Mastitis																5		4			6		
Botulism																8							
Influenza																		9					
Bloat																						10	

IX. Annex 15. Cattle diseases prevalent in the studied kebeles

Cattle diseases	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Willo / Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Botulism	1	1	1	3	1	4	5	2	1	1	1	1	1	1	1	1	2	6	2	7	1	1	3
Blackleg	2	3	2	2	3	8	2	6	3		2	2	6	10	4	2	4	2	4		4	6	2
FMD	3	4	3	4	4	1	4	5	2		4	5	3	5	6		1	1	1	4	2	3	4
Mastitis	6				7	6					10	6			8	8		7					
CBPP	4							9							3			5			5		
Trypanomasis	5	2	4		2	2	1	4	5	6	7	11	2	8			3		3		3	2	7
Pasteurellosis		5						7	8		8	7		4	5	4		4		1			
Brucellosis		6			6	5					3	3		3		7							
Babesiosis		7				7					6	9		6		3		10					
Photosensitization		8		1	5		3	8	4										5	6	6		6
Pink eye		9						1		2									6			5	1
Heartwater		10							7	3	5	10	5	7									9
Ephemeral Fever			5							7					10				8			7	8
Actinobacillosis			6			3													7				
Anthrax			7								4	4		2	2	10		3					
Cattle Pox						9														3			
Internal parasites								3															
Salmonellosis									6						9	6							
Foot rot										5													
Mange											9	8		9	7								
Bloat													4										
Colibacillosis																5							
Pneumonia																9							
LSD																	8			5			5
Tuberculosis & Lice																		9		2			

X. Annex 16. Diseases that affect shoat production

Shoat diseases	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
Pasteurellosis	1	4	5		5	7		1	1	1	4	5	1	6	4		5	4		2	2	2	5
CCPP	2	1	2		3			6	6	6		1	4	3	1		3	1	6	4	7	7	3
Brucellosis	3					6						8		7			8		2	7	4		4
PPR		2	1	1	2	1	5	2	8	3	1	3	3	5	2	1	2	10	1	1	1	1	1
Orf		3							5		5	9	7					7		5			
plant toxin		5														4	4				8		
Heartwater			4	2	7	8	1		7		3	4	6	1	3	7		6			5	3	2
salmonellosis			3	3	4	2	2	4	4	4		10	2	2	6	5	7	2	5			5	
Botulism				4	8					2	2	2						3				8	
Ephemeral fever				5															3				
Anthrax					1		3									3	6	5					
Eye worm					6																		
Foot rot						3	6					7							7	6		6	7
Trypanosomosis						4				8													
Arthritis						5																	
Pox							4	5	3		6	6		4					4	3		4	6
Internal Parasites							7																
FMD								3		7			5	8	5		1				6	9	
Actinobacillosis									2	5								8					
Mange									9														
Pneumonia										9						2				8		10	
Babesiosis														9									
Madahtaag/Gursume																6							
Riftvalley fever																		9					
Mastitis																					3		

Table 17a. Seasonal occurrence of camel diseases

Long dry season (Jilal)	Long rainy season (Gu')	Short dry season (Hagaa)	Short rainy season (Dayr)
(Jan, Feb, March)	**(April, May, June)**	**(July, Aug, Sep)**	**(Oct, Nov, Dec)**
Madahtaag/Gursume	Pasteurellosis	Pasteurellosis	Gudaan
Gudaan	Camel pox	Gudaan	Skin tumor
Skin tumor	Brucellosis	Skin tumor	Brucellosis
Heartwater	Madahtaag/Gursume	Pneumonia	Trypanosomiasis
Trypanosomosis	Trypanosomosis	Camel Pox	Madahtaag/Gursume
Pneumonia	Pneumonia	Tick	Anthrax
Anthrax	Anthrax	Trypanosomosis	Heartwater
Salmonellosis	Heartwater	Madahtaag/Gursume	Pox
Pasteurellosis	Skin tumor	Heartwater	Orf
Camel Pox	Salmonellosis	Fungal disease	Eye worm
Brucellosis	mange	Plant toxin	Mange
Mange	Duuliye/Gambis	Brucellosis	Duuliye/ Gambis
Duuliye/Gambis	Gudaan	Anthrax	Pneumonia
Protein difficiency	Orf	Duuliye/Gambis	Mastitis
Eye worm	Mastitis	Protein difficiency	Pasteurellosis
Blot	Blot	Salmonellosis	Influenza
Internal parasites	Pneumonia	Eye worm	Blot
Babesiosis		Mange	Pneumonia
Collibacillosis		Mastitis	Solmonellosis
Anemia		Pneumonia	
Mastitis			
Plant toxin			

Table 17b. Seasonal occurrence of cattle diseases

Long dry season (Jilal)	Long rainy season (Gu')	Short dry season (Hagaa)	Short rainy season (Dayr)
(Jan, Feb, March)	**(April, May, June)**	**(July, Aug, Sep)**	**(Oct, Nov, Dec)**
Botulism	FMD	Botulism	Botulism
Blackleg	Mastitis	Blackleg	Blackleg
Trypanomasis	Botulism	CBPP	FMD
Pasteurellosis	Heartwater	Heartwater	Mastitis
Mirucella bovis	Foot rot	FMD	Trypanosomosis
Babesiosis	Blackleg	Foot rot	Ephemeral fever
FMD	Photosensitization	Trypanosomosis	Brucellosis
Brucellosis	Trypanosomosis	Fungal disease	Pasteurellosis
Actinobacillosis	Babesiosis	tick infestation	Mastitis
Int. Parasites	CBPP	Brucellosis	Pox
Photosensitation	Salmonellosis	Eye worm	Babesiosis

Salmonellosis	Anthrax	Salmonellosis	Photosensitization
CBPP	Blot	Mange	Mirucella bovis
LSD	Pasteurellosis	Anthrax	CBPP
Anthrax	Eye worm	Mastitis	Salmonellosis
Mange	Pox	Pneumonia	Foot rot
Ephemeral Fever	LSD	LSD	Anthrax
Babesiosis		Tuberculosis	Blot
Pneumonia		Ephemeral fever	Heartwater
Collibacillosis			Pneumonia
Tuberculosis			LSD
Lice			

Table17c. Seasonal occurrence of shoat diseases

Long dry season (Jilal)	**Long rainy season (Gu')**	**Short dry season (Hagaa)**	**Short rainy season (Dayr)**
(Jan, Feb, March)	**(April, May, June)**	**(July, Aug, Sep)**	**(Oct, Nov, Dec)**
CCPP	Brucelosis	Botulism	CCPP
Pasteurelosis	CCPP	Brucellosis	pasteurellosis
Brucelosis	Pasteurelosis	PPR	Botulism
Botulism	Foot rot	CCPP	Heartwater
Ephemeral fever	Pox	Pasteurelosis	Orf
PPR	Orf	Lice	Ephemeral fever
Heartwater	Heartwater	Heartwater	Brucellosis
Salmonellosis	Salmonellosis	Salmonellosis	Plant toxin
Anthrax	Mastitis	Foot rot	Salmonellosis
Mastitis	PPR	Tick infestation	Pox
Pox	Horn disease	Mastitis	Foot rot
FMD	FMD (Kills)	Pox	Mastitis
Protein deficiency	Anthrax	Actinobacilosis	PPR
Actinobacillosis	Mastitis	Mange	FMD
Plant toxin	Pneumonia	Plant toxin	Plant toxin
Pneumonia		Ephemeral fever	Anaplasmosis
Collibacillosis		Orf	Anthrax
Mastitis		FMD	Mastitis
Lice		Anthrax	Pneumonia
Babesiosis		Babesiosis	
		Pneumonia	
		Lice	

Table 18. Diseases that occur due to lack of drinking water and sanitation	
Wereda	**List of diseases that occur due to lack of drinking water and sanitation**
Filtu	Lice, fleas
Melka Libi	Pasteurellosis, lice
Golbo	Salmonellosis
Jaygad	Salmonellosis
Ahmedo Amin	Pasteurellosis, Salmonellosis
Benigle	Internal Parasites, Salmonellosis
Harabali	Salmonellosis,Contagious ecthyma, Internal parasites and korbarar
Osabey	Salmonellosis, Internal parasites
Masajit	Salmonellosis, Pasteurellosis, Internal parasites
Nusdarik	Internal parasites,Salmonellosis
Ayinle	Ephemeral Fever
Hayasuftu	Mange,Botulism,Salmonellosis and Lice
Seero	Salmonellosis
Higli	Salmonellosis
Gunway	Salmonellosis,Pasteurellosis
Waradi	Mastitis,Salmonellosis
Lambarde	Salmonellosis
Soora	Faciola,Salmonellosis and Influenza
Raydab	Salmonellosis,Actinobacillosis
Bander	Salmonellosis
Korale	Actinobacillosis,Lice and Salmonellosis
Kulay	Salmonellosis
Bodbod	LSD

Table 19. Reasons for livestock movement in different seasons.

	Long dry season (Jilal)	**Long rainy season (Gu')**	**Short dry season (Xagaa)**	**Short rainy season (Dayra)**
Kebele	**(January, February, March)**	**(April, May, June)**	**(July , August, September)**	**(October, November, December)**
Filtu	Water, pasture, flies	Pasture	Pasture, ater	Pasture, flies
Melka Libi	Water, pasture	Pasture, water	Pasture, water	Pasture, water
Golbo	Water, pasture	Pasture	Pasture	Pasture
Jaygad	Water, pasture	Pasture	Ticks, pasture	Pasture
Ahmedo Amin	Water, pasture	Feed, flies	Pasture	Pasture, water
Benigle	Pasture, water	Pasture, water	Pasture, water	Pasture
Harabali	Pasture	Pasture, water	Pasture, water	Pasture
Osabey	Water, pasture	Pasture, water	Flies, ticks, pasture, water	Pasture, water
Masajit	Pasture, water, weather	Feed	Feed, water, cold, weather	Feed, flies, ticks
Nusdarik	Pasture, water, flies	Pasture	Pasture, water, ticks	Pasture, flies
Ayinle	Pasture, water	Pasture	Pasture, water	Pasture, water
Hayasuftu	Water, pasture	Pasture	Cold weather, pasture	Pasture

Seero	Pasture, water	Pasture	Pasture	Pasture
Higli	Pasture, water	Pasture	Pasture, water	Pasture
Gunway	Pasture, water	Pasture	Pasture, water	Pasture
Waradi	Pasture, water	Pasture	Cold weather, pasture, water	Pasture
Lambarde	Pasture, water	Pasture	Pasture and water	Pasture
Soora	No movement	Pasture, back to river	No movement	Flies
Raydab	Pasture, water	Pasture	Pasture, water	Pasture
Bander	Pasture	Pasture	Pasture	Pasture
Korale	Pasture, water	Pasture	Pasture, water	Weather, pasture
Kulay	Pasture, water	Pasture	Pasture, water	Pasture
Bodbod	Pasture	Pasture, back hope	Pasture	Pasture, back home

XI. Annex 17. Type of vaccines and vaccination cost distributed by One-Health program

Camel Vaccines	**Vaccination Cost**	**Cattle Vaccines**	**Vaccination Cost**	**Shoat Vaccines**	**Vaccination Cost**
Anthrax	Free	CBPP	Free	CCPP	Free
Camel Pox	Free	Blackleg	Free	Pasteurellosis	Free
		Pasteurellosis	Free	Pox	Free
		LSD	Free	Anthrax	Free
		Anthrax	Free	Pasteurellosis	Free
		Blackleg	Free	PPR	Free
		Pasteurellosis	Free		

XII. Annex 18. Diseases that occur due to lack of drinking water and sanitation

Wereda	**List of diseases that occur due to lack of drinking water and sanitation**
Filtu	Lice, fleas
Melka Libi	Pasteurellosis, lice
Golbo	Salmonellosis
Jaygad	Salmonellosis
Ahmedo Amin	Pasteurellosis, Salmonellosis
Benigle	Internal Parasites, Salmonellosis
Harabali	Salmonellosis,Contagious ecthyma, Internal parasites and korbarar
Osabey	Salmonellosis, Internal parasites
Masajit	Salmonellosis, Pasteurellosis, Internal parasites
Nusdarik	Internal parasites,Salmonellosis
Ayinle	Ephemeral Fever
Hayasuftu	Mange,Botulism,Salmonellosis and Lice
Seero	Salmonellosis
Higli	Salmonellosis
Gunway	Salmonellosis,Pasteurellosis

Waradi	Mastitis,Salmonellosis
Lambarde	Salmonellosis
Soora	Faciola,Salmonellosis and Influenza
Raydab	Salmonellosis,Actinobacillosis
Bander	Salmonellosis
Korale	Actinobacillosis,Lice and Salmonellosis
Kulay	Salmonellosis
Bodbod	LSD

Table 20. Quality and technical competence of AHSPs

Service provider	Indicators	Filtu	Melka Libi	Golbo	Jaygad	Ahmedo Amin	Willo/Benigle	Harabali	Osabey	Masajit	Nusdarik	Ayinle	Hayasuftu	Seero	Higli	Gunway	Waradi	Lambarde	Soora	Raydab	Bander	Korale	Kulay	Bodbod
AHP/CAH Ws	Accessibility	x	x	x	x	x	x	x	x	x	l	x	x	x	x	x	l	x	n	x	x	x	x	x
	Affordability	x	x	x	l	x	x	x	x	x	x	x	x	x	x	x	x	x	n	x	x	x	l	x
	Availability	x	l	l	x	x	x	x	l	x	l	x	x	l	x	x	l	l	n	l	l	l	l	l
	Acceptance	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	n	x	x	x	x	x
	QTC	x	x	l	x	x	x	x	l	x	l	x	x	x	x	x	x	l	n	l	l	l	x	x
Private Pharmacies	Accessibility	l	l	n	x	l	n	l	l	n	n	x	x	n	n	n	n	n	n	l	n	n	n	n
	Affordability	l	l	n	l	x	n	l	x	n	n	x	l	n	n	n	n	n	n	x	n	n	n	n
	Availability	l	x	n	x	l	n	l	l	n	n	x	l	n	n	n	n	n	n	x	n	n	n	n
	Acceptance	x	x	n	x	x	n	x	x	n	n	x	x	n	n	n	n	n	n	x	n	n	n	n
	QTC	l	x	n	x	n	n	n	l	n	n	x	n	n	n	n	n	n	n	x	n	n	n	n
Traditional healers	Accessibility	l	x	n	n	l	l	x	x	n	x	n	x	x	l	x	x	n	x	x	n	l	l	x
	Affordability	l	x	n	x	x	x	x	x	n	x	n	x	x	x	x	x	n	x	x	n	x	x	x
	Availability	l	x	n	l	l	x	x	x	n	x	n	x	x	l	x	x	n	l	x	n	l	l	x
	Acceptance	x	l	n	l	l	l	l	x	n	x	n	x	x	x	x	x	n	x	x	n	x	x	x
	QTC	l	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	l	n	n	n	n	n

Self Treatment	Accessibility	x	x	x	l	x	x	x	l	l	x	x	x	l	x	l	x	x	x	x	l	l	x	x
	Affordability	x	x	x	l	x	x	l	l	x	x	x	x	l	x	l	x	x	x	x	x	x	x	x
	Availability	x	x	x	l	x	x	l	l	l	l	x	x	l	l	l	l	l	l	x	l	l	l	l
	Acceptance	x	x	x	x	l	l	x	x	x	x	x	x	x	l	x	x	x	x	x	x	x	x	x
	QTC	l	n	n	n	n	n	n	n	n	n	n	n	l	n	l	l	l	l	n	l	n	n	n
Illegal Drug Sellers	Accessibility	l	x	n	n	n	l	x	n	n	n	n	l	n	n	l	l	n	l	l	n	n	n	n
	Affordability	x	n	n	n	n	x	x	x	n	n	n	l	n	n	x	l	n	x	x	n	n	n	n
	Availability	l	l	n	n	n	l	x	n	n	n	n	l	n	n	l	l	n	l	l	n	n	n	n
	Acceptance	l	l	n	n	n	l	x	n	n	n	n	l	n	n	x	x	n	x	x	n	n	n	n
	QTC	l	n	n	n	n	n	n	l	n	n	n	n	n	n	l	l	n	l	l	n	n	n	n
NGOs	Accessibility	na	na	na	na	na	na	na	na	l	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Affordability	na	na	na	na	na	na	na	l	x	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Availability	na	na	na	na	na	na	na	l	l	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	Acceptance	na	na	na	na	na	na	na	x	x	na	na	na	na	na	na	na	na	na	na	na	na	na	na
	QTC	na	na	na	na	na	na	na	x	x	na	na	na	na	na	na	na	na	na	na	na	na	na	na

Key: x=good, L=less, N=not good, NA=Not available, QTC = Quality and technical competence

Table 21. Type of vaccines and vaccination cost

Camel Vaccines	Vaccination Cost	Cattle Vaccines	Vaccination Cost	Shoat Vaccines	Vaccination Cost
Anthrax	Free	CBPP	Free	CCPP	Free
Camel Pox	Free	Blackleg	Free	Pasteurellosis	Free
		Pasteurellosis	Free	Pox	Free
		LSD	Free	Anthrax	Free
		Anthrax	Free	Pasteurellosis	Free
		Blackleg	Free	PPR	Free
		Pasteurellosis	Free		

Table 22. Infrastructure and facilities required to improve AHP service provision

Kebele	Required improvement for each AHP Remark
Filtu	Improve equipment, drugs and vaccine supply, add man power, facilitate transportation
Melka Libi	Improve veterinary equipment, drugs and vaccines supply, provide training, add manpower, and facilitate transportation.
Golbo	Improve drug, vaccines and equipment supply, add manpower and maintain AHP.
Jaygad	Improve animal health service through vet equipment, drugs and vaccine supply, organize refresher training, conduct regular vaccination, increase man power, facilitate payment for CAHWs, and facilitate transportation.
Ahmedo Amin	Improve drug and vaccine supply, treatment and vaccination, add manpower, facilitate and organize refresher training/trainings
Willo/Benigle	Facilitate transportation, improve equipment, drugs and vaccine supply, add manpower, provide refresher training, and facilitate payment for CAHWs.
Harabali	Improve material supply, treatment and vaccination, add manpower, training, supply clean water, and support illegal drugs control.
Osobey	Need regular supply of quality drugs, vaccines, basic vet equipment, facilitate incentive/payment for CAHWs, additional training, facilitate transportation, per-diem, provide overcoat.
Masajit	Improve treatment and vaccination programs, organize refresher training, provide work dress, arrange sleeping area, and add man power.
Nustarik	Improve equipment, drugs, vaccine and water supply,
Aynile	Improve equipment, drugs and vaccine supply, consider female CAHWs, facilitate payment for CAHWs, and provide refresher training.
Haysuftu	Improve equipment, drug and vaccine supply, arrange refresher training, improve manpower, arrange cold chain materials and facilitate transportation.
Seero	Improve veterinary equipment, drugs and vaccine supply, improve staff capacity and facilitate transportation.
Higli	Improve veterinary equipment, drugs and vaccine supply, establish solar system for vaccine storage and management, provide refresher training, facilitate payment for CAHWs, arrange per diem, construct incinerator and crush.
Gunway	Improve vet equipment, drugs and vaccine supply, maintain AHP, improve manpower, provide refresher training for CAHWS and AHTs.

Waradi	Improve veterinary equipment, drugs and vaccine supply, construct crush, provide laboratory equipment, supply refrigerator and solar facilities, add manpower, provide refresher training, maintain lock box, ceiling, and construct fence and incinerator, facilitate transportation.
Lambarde	Improve manpower, PCDP will fulfil the AHP equipment, provide training.
Soora	Organize training, arrange refrigerator and solar system for vaccine storage, construct crush and incinerator, facilitate transportation, and provide veterinary equipment and materials supply.
Raydab	Improve vet equipment, drugs and vaccination supply, facilitate payment for CAHWs and improve salary for AHT, arrange refresher trainings.
Bander	Improve vet equipment, drugs and vaccine supply, improve response to disease outbreak, organize refresher training, facilitate payment for CAHWs, facilitate transportation.
Korale	Improve vet equipment, drugs and vaccine supply, facilitate payment for CAHWs, organize training, facilitate transportation
Kulay	Improve vet equipment, drugs and vaccine supply, improve manpower, provide training, and construct crush.
Bodbod	Improve vet equipment, drugs and vaccine supply and organize regular vaccination, organize training, provide immediate response to disease outbreak report, facilitate payment for CAHWs, per-diem, and transportation.

Questionnaire: - I. Government office and beneficiaries

Questionnaire used for study the animal health service answered by the Woreda Government Officials

Questionnaire for the study of basic information on veterinary services in the intervention areas of Filtu and DekaSuftu Weredas of Liben Zone,

Questionnaire No----------

Date----------

A) General Information

Q1. Region---------- Zone----------Woreda----------

Woreda/centre(town) location: Longitude---------- Latitude ----------Alt----------

Q2.No Kebeles ID---------- location:Longitude---------- Latitude ----------Alt----------

Q3. House Holds; Male headed---------- female headed---------- Total HH---------

Q4 Human population: Male--------- Female ----------Total----------

Q5. Livestock population in the kebele

No	Species	Total no	Remark
1	Camel		
2	Cattle		
3	Goat		
4	Sheep		
5	Donkey		
6	Poultry		
7	others		

Q6. What is the qualification, training and status of veterinary personnel in the animal health facilities?

Facility	Qualification	No	Type of training	Period of training (when)	Work place	
					Private	Govt
AHP	DVM					
	AHA					
	AHT					
	CAHWs					

Q7. Describe the services provided by the animal health facilities?

Facility	Services provided	Remark
Clinic		
AHP		

Q8. Indicate the availability and condtion of different materials in the vet facilities

Facility	Items	Unit	qty	Condition of the equipment, drugs and vaccines A)Equipment: 1. functional 2. Not functional, 3. Important but not available B) Drugs and vaccines, 1, Available, 2. Expired, 3. Important but not available
1. Healthposts	Equipment			
	Drugs			
	Vaccines			
2. Veterinary Clinic	Equipment			
	Drugs			
	Vaccines			

9. List down the NGOs and their area of involvement in the intervention area

Period	Type of NGO	Area of involvement					
		Human Health	Animal Health	Education	Agriculture	Water and Sanitation	Others (Specify)
Current							
Before							

B) Livestock production and Animal health related Information

Q10. What is the main means oflivelihood?

S.No	Means of livelihood	Rank in order of importance	Remarks
1	Pastoralism		
2	Agro-pastoralism		
3	Crop farming		
4	Wage labor		
5	Petty trade		
6	Others (specify)		

Q11. What is the purpose of rearing these animals in the areas?

Species	Food (meat and milk)	Income	Transport	Draft power	others
Camel					
Cattle					
Shoat					
Donkey					
Poultry					

Q12. What are the 10 top livestock diseases in the area for each species?

Camel		Cattle		Small ruminants	
Disease	**Rank**	**Disease**	**Rank**	**Disease**	**Rank**
1.		1.		1.	
2.		2.		2.	
3.		3.		3.	
4.		4.		4.	
5.		5.		5.	
6.		6.		6.	
7.		7.		7.	
8.		8.		8.	
9.		9.		9.	
10.		10.		10.	

Q13. What is the effect of the diseases on livestock production and productivity?

Species	Disease	Mortality	Morbidity			
			Loss of Production	Lost of Market Value	Abortion	Other
Camel						
Cattle						
Small ruminant						

Q14. Describe the seasonal calendar of livestock disease occurrence?

Species	Major Priority Diseases				Remark
	Long Dry Season (Jilal)	Long rainy season(Gu')	Short dry season(Xagaa)	Short rainy season (Dayr)	
Camel					
Cattle					
Sheep / Goat					

Q15. Have you ever encountered livestock diseases associated with lack of drinking water and sanitation? Yes ---, No—if yes, when and what are the diseases? ----------

---

Q16 Have you ever heard of trainings organized for community and veterinary personnel? Yes, No, If yes for how long and how often?

	Community Trainings			Veterinary Personnel Trainings		
Training	Hygiene	Zoonotic Diseases	Veterinary Service Delivery	Hygiene	Zoonotic Diseases	Veterinary Service Delivery
Yes, for how long						
No						
Any Comment						

Q17. In which season livestock mobility is high and why?

Seasons	**Months**	**Rank 1. high, 2. Medium 3.low.**	**Reason**
Long dry season (jilaal)			
Long rainy season (Gu')			
Short dry season(xagaa)			
Short rainy season (dayr)			

Q18. Who are the major veterinary service providers?

Service provider	**Rank**	**Remark**
Government vet clinic		
CAHWs		
Private vet pharmacies		
Traditional healers		
Self-treatment		
Illegal drug sellers (black market)		
NGOs		

Q19. Compare veterinary service providers against indicators

No.	Veterinary Service Provider	Indicator				
		Accessibility	Affordability	Availability	Acceptance by the Community	Quality and Technical Competency
1.	Government Vet Clinic					
2.	CAHWs					
3.	Private vet pharmacies					
4.	Traditional healers					
5.	Self-treatment					
6.	Illegal drug sellers					
7.	NGOs					
8.	Others					

Q20. How often do you give vaccination service?

Types of Vaccine	Benefiting animal species	Frequency		Remark
		Every 6 months	Annually	

Q21. What is the modality of vaccination service?

Type of Vaccine	Benefiting animal species	Cost Recovery	Free service	Remark

Q22. What do you recommend to improve animal health service?

…….

……

……

Questioner II. Questions to be answered by community members

1. When speaking about zoonotic diseases:
   a. Do you have any information or experiance about One-Health Approach and what it means that, zoonotic diseases? Yes/No, please explain.

      _____

   b. Which is affected by Zoonotic diseases?
2. Which one of the animals are the most affected by the diseases? Please list them down

   _____
3. Pastoralists rely on a variety of practices, such as:
   i) traditional medicine (use of herbs, manipulation etc.),
   ii) religious treatments (prayers, amulets etc.) and
   iii) veterinary medicine (drugs and techniques).

   Which one is the most of treatment?
4. Are you aware about vaccination given for human & animal beings? Yes/No.
5. What are the most serious livestock diseases in the area for each animal species?

Camel		**Cattle**		**Small ruminants**	
Disease	**Rank**	**Disease**	**Rank**	**Disease**	**Rank**

6. How do you evaluate the services provided by the Animal health post? Please indicate its strong and weak points?

Strong points	**Weak points**	**Remark**

7. Suggestions to improve the AHP quality

_____

_____

8. What are the natural resources in your environment? Please state _____

9. Have you been trained on the management of these resources [if NGOs or government give training on this?]
10. How do you think should each be managed? [if they may talk about saving water or wood]
11. In your community, do women have the right to access and control over natural resources? Yes/No
12. Do they participate in decision making like the men do? Yes/No Why?
13. In your opinion in all stages of any program design, and is committed to ensuring that social and gender integration is identified as a high priority?
14. Do you think that Gender inequalities interact with other inequalities such as ethnicity, socio-economics class and age?
15. One-Health will support the awareness-building and knowledge-strengthening activities and training needed to integrate gender considerations into all aspects of programming. Did you participate all mentioned above programs?
16. Are you aware about surveillance systems? Yes/No
17. If Yes, which surveillance systems you are using for demographic and health? Please list out any means of communication the pastoralist community is using_____.
18. Peoples are talking about Climate Change. Do you believe that Climate Change exists and affecting our continent now?
19. If yes, are you or the pastoralist community also affected by Climate Change? How?

    _____

20. Which one of the following the most important for Pastoralism as a livelihood system composed of from the three 'pillars' or components gives priorities: –
    a. livestock or the herd,
    b. people or the family including institutions, and
    c. land and/or natural resources and most importantly "the rangelands."
    d. all the above three components are tightly inter-related and gives equal priorities.

Questioner III. Identification of Particulars

Zone: _____ District: _____ Kebele_____

Supervisor's Name: _____ Enumerator Name:

_____

Date of Interview (dd/mm/yyyy): _____Signature: _____

No.	Descriptions	HH. ID 1	HH. ID 2	HH. ID 3	HH. ID 4	HH. ID5
Part I. Demographic and Socioeconomic Information						
1.1	Sex of the HH Head					
	1.Male 2. Female					
1.2	By using the table below fill it					
	1.Age of Household Head					
	2. Age of the Family: a. ____, ___, ___, ___, ___ f. ____, ___, ___, ___, ___ b. ____, ___, ___, ___, ___ g. ____, ___, ___, ___, ___ c. ____, ___, ___, ___, ___ h. ____, ___, ___, ___, ___ d. ____, ___, ___, ___, ___ i. ____, ___, ___, ___, ___ e. ____, ___, ___, ___, ___ g ____, ___, ___, ___, ___					
1.3	Your knowledge about One-Health before and after the project					
1.4	Do you have a knowledge of One-Health?					
Part II. Household Livelihood and Income Activities						
2.1	What is the main Livelihood of your Household					
	1. Pastoralist 2. Agro-pastoralist 3. Crop Farming 4. Petty Trader/Merchant 4. Employee 5.Daily Laborer					
2.2	What is the major source of income for the Household? Id 1. _____ Id 2. _____ Id 3. _____ Id 4. _____ Id 5. _____					
2.3	Activities under taken to get source and incomes of the household's members					
	2.3.1. Buying Livestock (Camels, Cattle, Sheep, Goats), did family member do this in the last year? 1=Yes 2=No					

	2.3.2. if your answer is “Yes”, Average income earned per month Id 1. _____ Id 2. _____ Id 3. _____ Id 4. _____ Id 5. _____					
	2.3.3. Selling Livestock (Camels, Cattle, Sheep, Goats), did family member do this in the last year? 1=Yes 2=No					
	2.3.4. if your answer is “Yes”, Average income earned per month Id 1. _____ Id 2. _____ Id 3. _____ Id 4. _____ Id 5. _____					
	2.3.5. Buying Livestock by products (Milk, Hide, Butter, Ghee, Cheese), did family member do this in the last year? 1=Yes 2=No					
	2.3.6. if your answer is “Yes”, Average income earned per month Id 1. _____ Id 2. _____ Id 3. _____ Id 4. _____ Id 5. _____					
	2.3.7. Selling Livestock by products (Milk, Hide, Butter, Ghee, Cheese), did family member do this in the last year? 1=Yes 2=No					
	2.3.8. if your answer is “Yes”, Average income earned per month Id 1. _____ Id 2. _____ Id 3. _____ Id 4. _____ Id 5. _____					
2.4	What are the reasons for sale of your animals? (Multiple answer is possible) 1. To purchase food 2. To purchase clothes 3. To purchase agricultural inputs and implements 4. To purchase medicines for animal and/or family member 5. To pay taxes and other debts 6. To cover health and education expenses					

	7. To pay zakat 8. Others (specify) _____					
2.5	How many months does the household income cover the expenses in the year? 1. < three (3) months 2. 4 - 6 months 3. 7 – 9 months 4. 10 – 11 months 5. 12 and more					
2.6	If the answer is less than 12 months for the above question (2.5) how did you cover the remaining months (from where did you get money for additional expenses?) Id 1. _____ Id 2. _____ Id 3. _____ Id 4. _____ Id 5. _____					
Part III. Livestock						
3.1	For each of the following Livestock please indicate how many are owned by the household. (Include those animals that belong to you, but are being raised/utilizing by other households					
	3.1.1 Number owned by your Household before One-Health Implementation Id1. Id2. Id3. Id4. Id5 a. Camel _____, _____, _____, _____, _____ b. Cow _____, _____, _____, _____, _____ c. Calf _____, _____, _____, _____, _____ d. Ox _____, _____, _____, _____, _____ e. Goat _____, _____, _____, _____, _____ f. Sheep _____, _____, _____, _____, _____ g. Donkey_____, _____, _____, _____, _____ h. other _____, _____, _____, _____, _____					

	3.1.2. Number owned by your household after One health implementation Id1. Id2. Id3. Id4. Id5 a. Camel _____, _____, _____, _____, _____ b. Cow _____, _____, _____, _____, _____ c. Calf _____, _____, _____, _____, _____ d. Ox _____, _____, _____, _____, _____ e. Goat _____, _____, _____, _____, _____ f. Sheep _____, _____, _____, _____, _____ g. Donkey _____, _____, _____, _____, _____ h. other _____, _____, _____, _____, _____					
3.2	Has the number of Livestock owned by your Household Changed (decreased) over the last 3-5 years? Id1. Id2. Id3. Id4. Id5 a. Yes _____, _____, _____, _____, _____ b. No _____, _____, _____, _____, _____					
3.3	If the answer for question number 3.2. is Yes, then what are the reasons? Please write the number on the space provide. Id1. Id2. Id3. Id4. Id5 1. Conflict _____, _____, _____, _____, _____ 2. Died (drought)_____, _____, _____, _____, _____ 3. Disease _____, _____, _____, _____, _____ 4. Sold for food _____, _____, _____, _____, _____ 5. Eaten at Home _____, _____, _____, _____, _____ 6. Stolen _____, _____, _____, _____, _____ 7. Eaten by Hayne (Wild life) ____, ____, ____, ____, ____ 8. Give for Zakat _____, _____, _____, _____, _____ 9. Others (specify) _____, _____, _____, _____, _____					
Part IV. Veterinary (Livestock Health)/Human Health						
4.1	What animal health facilities are found in your locality? (If any)? 1. Animal Health Post 2. Veterinary Clinic 3. Crush construction 4. Others: a. _____ b. _____ c. _____ d._____ e._____					
4.2	What Human health facilities are found in your locality? (If any)? 1. Human Health Post 2. Human Health Clinic 3. Hospital					

	4. Others: a. _____ b. _____ c. _____ d._____ e._____					
4.3	Do you believe that this service makes a difference in your living standard? 1. Yes 2. No 3. Not understand 4. Others: a. _____ b. _____ c. _____ d._____ e._____					
4.4	If the Answer is "NO", what is the reason? 1. …….. 2. ……. 3. …….. 4. …….					