One Health for Humans, Environment, Animals and Livelihoods (HEAL)

Gender and One Health context analysis for HEAL

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Introduction

The One Health approach can help achieve progress and promotes synergies on national and global priorities by generating synergies at the human-animal-environmental interface. While evidence is still scare, it is likely that the approach is highly cost-effective and improves effectiveness of core public health systems, through reducing morbidity, mortality, and economic costs of disease outbreaks. It also contributes to economic development through strengthening public health systems at the human-animal-environment interface protects health, agricultural production, and ecosystem services (World Bank, 2020). It has also been stipulated that One health enhances the resilience of local communities (Ruscio et al., 2015) through better disease prevention (Heymann et al., 2017).

Operationalizing One Health on the ground through integrated human and veterinary health services delivery is particularly well suited to pastoralist systems which are characterized through mobility and remoteness, and has the potential to address inequalities that are linked to social structures (Gammino et al., 2020). It is also recognized that population health, for cultural and economic reasons, can be a higher priority to the community than an individual human (Schelling et al., 2005). Multidisciplinary efforts to optimize the health of humans, animals, and the environment (through "One Health" initiatives) have also demonstrated that pastoralists may systematically be missed by formal health care systems, owing to their mobility and systemic factors (Schelling and Bonfoh, 2008; Diaz, 2017). Through collaboration, the communication between public health and veterinary services will be strengthened and lead to making better use of existing resources and to identify appropriate control strategies for zoonotic diseases (Zinsstag et al., 2005). Public service delivery amongst pastoralists in the east Africa is often limited by programmes ill-suited to remote, mobile populations and logistical, organizational, and financial constraints (Schelling et al. 2015; Zinsstag et al. 2016), whereas One Health can be an ideal solution for these challenges.

Pastoralism is one of the predominant livelihoods for many communities in East Africa and the Horn of Africa and contributes significantly to national economies. Livestock-focused occupations converge with people and the environment resulting in a dynamic setting in which the health of each, humans, animals, and the environment are inextricably interconnected.

Also important in pastoralist systems are gender-based inequalities. For example, women likely struggle more to access land, which may need to be negotiated through their husband or other male relative/clan. This may compromise women's individual rights with limited individual control over productive resources including land. In such situations, the clan can offer many benefits including social protection for women, but their position may be viewed as subservient, marginalized and disempowered (Flintan et al., 2019). The same is true for access to services and thus looking at One Health from a gender perspective is needed. One Health recognizes the interdependencies of human, animal, and environmental/ ecosystem health, and professionals working in a One Health approach would aim to generate an added value by jointly serving the population and to better understand all the factors involved in disease transmission, ecosystem health, monitor the emergence of novel pathogens, including zoonoses, as well mitigating risks from environmental contaminants and toxins that are capable of causing substantial morbidity and mortality, and impacting on socioeconomic growth (Lerner & Berg, 2015; One Health Global Network, 2015).

This context is interesting from a gender perspective in two ways. Firstly, given the wide scope of One Health and the fact that One Health interventions are systemic, it is likely that gender relations are affected in one way or another by these interventions. And secondly, ensuring that interventions are gender sensitive can have a positive impact on the implementation of One Health as possible barriers and inequalities are addressed early on.

Thus, when working in pastoral areas it is important to undertake a gender analysis to understand related dynamics. Gender research disaggregated by sex is a first step in gender analysis, but a fully realized gender analysis goes further by ensuring that gender-sensitive indicators, like measure aspects of life where gender disparities are experienced and gives voice to women and men about gender roles and disparities (Friedson-Ridenour et al., 2019).

To better understand gender dynamics in pastoralist areas from a One Health perspective, a context analysis based on literature review and using insights from the HEAL vulnerability assessment was conducted to cover the following topics:

- Gender dynamics in pastoral areas
- Gender in rangeland health
- Gender in animal health management
- Gender in human health management
- Existing frameworks that embed gender in One Health
- The way forward and recommendations to mainstream gender in HEAL

This review was undertaken using documents of peer-reviewed published papers, reports, project documents and data collected for the HEAL vulnerability assessment during the project inception phase. This includes data collected through focus group discussion and key informant interviews. The received data were carefully screened to collate gender relevant information on the topics outlined above.

Gender dynamics in pastoralist systems

Pastoralism is based on three pillars: rangeland (resp. natural resources at large), livestock, and humans that are interconnected for the health of the complete system – with the whole being greater than the sum of its parts. Living in a dynamic system, pastoralists all over the world are under severe pressure and an alarming number are forced to withdraw from pastoralism for a variety of reasons, including loss of communal rangelands, on which pastoralists' livelihood and existence are dependent.

These situations strongly affect the roles of men and women. There is a difference between men and women with respect to ownership and management of livestock and rangeland management. The gender differences in roles and activities arise mainly from customary rules that tend to view certain tasks or activities as "male" or "female", which historically can be related to the physical capacities of men and women or on the traditional care giving role of women. For example, in much of sub-Saharan Africa, milking dairy animals has traditionally been women's responsibility, whilst the slaughter of dairy animals has traditionally been undertaken mainly by men (Beck, 2001).

Often underestimated, pastoral women are key economic actors in the community and share equal responsibility with men for households, like managing livestock, and rangeland resources- water and grazing land and also herding and grazing in near or far rangelands (Dhikra, 2018). Differential

gendered rights to access, produce, maintain, and use livestock resources often means that women have access to, and responsibility for, caring for livestock, but not necessarily ownership or control over decision making in relation to livestock consumption, sale, and exchange (Flintan, 2007 and Kristjanson et al, 2010). Thus, women are likely to be less involved in decision-making processes, particularly those of a public nature and at community level decisions are taken without fully address women's needs. Further women can have less control over 'household' assets such as livestock. Usually decisions to sell livestock are taken as husband and wife but this might not always be the case. This results in documented income and expenditure difference between members of household, different capacity to participate in the decision on household activities (selling and buying animals, and mobility decisions). These gaps are more pronounced for women where they have lower household- and community- level decision power; own less amount of wealth, with less of household expenditure devoted to them compared to men. These can be also the result of traditional subordination of women which also compromises the health and wellbeing of women.

The study of Selam et al., (2018) indicated that most household tasks are taken care of by women. This large domestic burden creates pressure on the time women spend on their personal needs such as attending to their personal sanitation, health, and other intellectual needs, creating health challenges to women (Balehegn and Kelemework 2013).

In few areas, increasing the decision-making power of women over assets and income has proven to benefit the overall household food security and wellbeing (Badejo, 2017). This has for example been facilitated through women's cooperatives in pastoral areas (Badejo et al., 2017b). Other promising examples are interventions where women have been actively engaged in livelihood diversification and markets of livestock and livestock products and which resulted in significant improvement in socio-economic wellbeing and decision-making ability.

In the pastoral areas of Borana, the roles are structured based on gender and age groups. However, changes in pastoral production due to factors like climate change and natural disaster risks, seem to have been transforming the gender roles so that women's workload, areas of decision-making, and income-earning opportunities have increased (Abiyot and Darley, 2019). Similarly, study of Flintan et al. (2011) indicted that differential changes in women's and men's workloads following pastoral transition and livelihood changes. These examples show that the systems adapt comparably fast to new situation. Though pastoral communities can be described as patriarchal, pastoralist women play key roles in the livestock production like milking, the processing, marketing and sale of milk and milk products, and distribution within the household (Lai, 2007), and pastoral women often work longer hours than men (Flintan, 2008), where this can add more workload on women. The decline of income from livestock products, particularly affects women, where they traditionally are engaged in selling milk products to use for household expenditure (Oxfam GB, 2016).

It has been documented that access to livelihood resources, the functioning of institutions and outcomes in relation to both poverty and environmental indicators are highly gendered, with men and women negotiating livelihoods in different ways. And perhaps, especially in patriarchal pastoral societies, attention to gender dynamics, alongside generational gaps, class, and ethnic difference, cannot be ignored (Ian et al., 2020). Pastoral systems are dynamic and continue to change, for example through increased commoditization and privatization of rangeland resources, and reduced areas governed by common property regimes (Ian et al., 2020).

With many resources held communally, women and men need to have access rights to those resources through the clan or other decision-making authority. Though in general women's rights to do this are protected, it is often easier for men to do this resulting in non-equitable distributions. In particular in changing systems, traditionally protected rights of women might not be defended properly. Though women are involved in and contribute to livestock and rangeland management, they tend to have limited access to and control over resources compared to men, and customary rules and traditions can also limit women's mobility and freedom that result in women facing challenges in participating in extension meetings or group training activities on subjects such as husbandry and veterinary practices (IFAD, 2003). However, in general a 'household' or family/social grouping works as a unit with men and women having different and mutually supporting roles and responsibilities, and with access to resources that they require for maintaining these.

The nature of the work women and men perform within the livestock sector may expose them to various health and safety related concerns, such as heightened exposure to zoonotic diseases (WHO, 2009). This can be more pronounced for women given their roles in tending for sick or new-born animals. Gender disparities can also have negative consequences on women's ability to acquire or use knowledge effectively. Insecure land tenure limits the land user's ability to develop, manage and upgrade livestock activities, since it often translates into lack of land for grazing and lack of collateral for investment (FAO, 2011): often both pastoral men and women lack access to land and resources and secure tenure. The securing of individual tenure in a context of communal access, management and 'ownership' can damage this communal tenure, weakening it and the related governance structures, which in turn can have a negative impact on the pastoral society as a whole.

Both pastoral men and women have limited access to financial services, but where they do exist women are likely to have less access than men. This may result from different factors. For example, women may face legal restrictions to access credits (the need for a male's signature), customary rules, lack of credit schemes designed specifically for rural women and lack of collateral (Fletschner, 2006) and these difficulties in accessing credit may also narrow the scope of paying for health services.

There seems thus to be a mismatch between policy interventions and local conditions and understandings, and influencing policymaking at national and international level is imperative. For example, social norms and local-level politics affect market access for young people, both as producers and traders. There is still a gap in social and cultural norms and practices that influence both generational and gendered market engagement (Ian et al., 2020).

Given the limited literature available, the dynamics of gender is under-represented in research on pastoralism in the past decade compared to other areas, like pastoral livelihoods, climate change and natural resource management (Ian et al., 2020).

Guiding questions for HEAL

- How will One Health interventions in the form of intersectoral access to services affect gender dynamics?
- How are gender dynamics change in response to adaptive system changes

Gender in rangeland health

The example of rangelands of eastern Africa shows how privatization of rangelands at a local level, often as a result of processes of land and green grabbing as external investors appropriate resources, affects rangeland health (Catley et al. 2013).

Rangeland management is based on rich and diverse traditions of indigenous knowledge of local communities, and tenure systems can contribute to the social and economic well-being of the area. Rangeland health and management require mobility that allows rotation and recovery periods, conserves biodiversity and reduces the need for expensive and energy intensive external inputs such as prepared fodder (Wesche et.al, 2010).

Looking at rangeland health and natural resources at large from a gender perspective, it is important to note that men and women have different roles and responsibilities in relation to rangelands. For instance men often are engaged more in physically laborious and heavy work such as felling trees and cutting bigger branches, whereas women are engaged in collecting and fetching fodder and fuelwood. This difference also leads to a difference in knowledge about natural resources (Basudha et al., 2000).

Some studies indicate that the workload of women has increased under land fragmentation processes (like increase of enclosures) due to increased responsibilities in cattle herding and related income generation activities, and this increased rangeland degradation leading to differential changes in gender workload (Karmebäck et al., 2015). Improving rangeland health through One Health may thus have positive impacts to counteract these developments.

Women access land and natural resources as part of the collective group, resp. community. In patriarchal societies decision-making power over use and management of land and resources is more likely to be in the hands of men than in women with customary practices excluding women either implicitly or explicitly (Flintan, 2008). As a result most of women cannot easily own assets and access key resources and information. In pastoral settings based on common property management, people do not “own” the land as individuals, but rather hold collective use rights, but animals, however, are privately owned. Even when it comes to animal ownership, it remains unusual for pastoral women in East Africa to own or trade larger, higher-value livestock such as cattle or camels, although they more commonly own sheep or goats (Coppock et al., 2013). This raises the question why women cannot own large animals. From a One Health perspective, a pertinent question to be addressed would be to clarify how empowering women affect the lives of others in pastoral communities, as well as the health of the land.

Coppock et al. (2013) indicated that lack of data, combined with evidence that the leadership and management capacities of women pastoralists worldwide remains underappreciated and underused. Thus attention to gender issues remains a necessary and important topic in rangeland research, development, governance, and education (Coppock et al., 2013).

From the HEAL vulnerability assessment it emerged that interestingly, women seem to have better knowledge of infections that can be transmitted by the environment – for example airborne or waterborne diseases, cholera, and diarrhea (Borana), which is another argument to involve women in rangeland management planning to improve rangeland health.

Guiding questions and recommendations for HEAL:

- Can both women and men use rangelands, water points, other landmarks (?), is there a difference by season or livestock species?
- Who makes decisions on rangelands, water points, in terms of their access, management, charge fees, improvement, etc ? How, and are both women and men involved?
- Are both men and women able to attend capacity building events? In case of costs, who decides on who will attend? Who pays for it?
- What constraints do women and men face when using rangelands, water points?

Gender in animal health management

Household health security, pastoralism, and gender are examples of important social factors in the transmission, prevention, and control of animal diseases, but is and area which to date has been largely neglected (Badejo, 2017). Women are as familiar and knowledgeable as men about the different livestock diseases affecting their livestock and prioritized them similarly (Alemu et al., 2019), despite differences in access to knowledge. The study by Alemu et al. found that in pastoralist areas in Borana men and women similarly prioritized respiratory diseases and diseases resulting in neurological clinical signs (p.e. Coenurosis, which is a consequence of infection with the tapeworm parasite Taenia multiceps), but reasons for prioritizing differed. A study which focused on division of labour in animal health management documented that both men and women contribute significantly to animal health management, but in different roles. Women often were the ones taking care of sick animals, while men were taking animals to pasture (Kinati et al, 2018). Despite their care giver role, women can be helpless when it comes to source veterinary drug, as responsibility for this often is in the hands of men. This is despite the fact that women often are the ones administering drugs to the livestock (Badejo, 2017). Further women manage most of the livestock on a daily basis, but technical training and inputs like vaccines are usually targeted to men only, thus preventing women from accessing animal health care products and services (Miller, 2011). Similarly, women's power of decision on livestock veterinary services are limited (Kamala et al., 2005). And also, the study of Galiè et al., (2017) showed that both women and men involved in managing animal health and had similar knowledge of diseases, but in terms of accessing vet services, information on diseases, and animal medicines, women are more constrained. For example, there are some misperceptions about the cause of udder diseases (acute udder inflammation) and hence these needs understanding of the culture aspects for proper treatment and management of udder diseases being accepted (Amenu et al., 2017). This raises the question how these types of misperceptions differ between women and men, and also for different disease. Such challenges need to be taken into consideration when designing and implementing One Health interventions if women are to be effectively supported in increasing productivity and welfare of livestock and the household.

There are few studies of in the field of animal health that included social issues, including gender, social exclusion and vulnerability involving animal and human health despite their relevance (Badejo, 2017).

On the other hand, given that some zoonoses are transmitted to humans through animal source foods, it is important to note that pastoralists have poor awareness of pathogens and how they are transmitted. Similarly, awareness of prevention is low, for example, milking of mastitis affected animals can lead to infection of healthy animals if milked without washing hands between milking

animals (Amenu et al., 2017). Milking is a typical activity taken care of by women, thus they the key actors for the implementation of disease mitigation strategies and need to be given information about the ways in which these diseases are transmitted and be trained in safe food processing practices (Galvmed, 2011). As women have the main responsibility for household meals, training in food hygiene will only have the desired impact if mainly women are targeted.

It is also noted that zoonotic diseases do not affect all people, all the time and everywhere, but the exposure is highly differentiated, for example, focused on herders (often children) and wild food collectors (mostly women) (Cunningham et al., 2017). This was confirmed by Sendalo (2009) who described the roles and responsibilities in pastoral communities in East Africa in relation to livestock management, with young boys oversee herding, while women are responsible for livestock health and milk production.

Activities related to small livestock production (poultry, sheep, goats), milking and processing of milk and produce subsistence food, are carried out mainly by women (FAO, 2011, WHO, 2007), while men are more likely to be involved in hunting and large livestock production (Bagnol et al., 2015). And also, in North Africa women are responsible for cleaning barns of livestock, watering and feed livestock, milking, weaning, care of weaned animals and care of new-born animals, caring for small and sick animals and traditional animal health care (Dhikra, 2018).

Effective management of animal health is one of the main challenges pastoralists face, particularly the control of animal diseases and zoonotic diseases. For the pastoralists in remote areas, access veterinary services and inputs is difficult and can lead to poor handling or wrong use of drugs and to loss of animals or low productivity because of lack of appropriate care. While this is true for men and women, the situation is particularly dire for women as on top of weaknesses of the systems, they also face cultural challenges. Surveillance is essential in disease control and women can play an important role in this. Women are very well-informed about symptoms of disease and often they are first ones to differentiate the diseased animal, for example when they are in close contact with both cow and calf, and can observe any sudden drop in milk production early on, which could indicate illness. So, it is important to include women in animal health interventions and surveillance systems in pastoral areas (PANORAMA, 2018).

The HEAL vulnerability assessment found that women could identify major diseases and challenges affecting animal production and explained well the severity of the disease during the dry seasons (melbana). Women seem to struggle to access animal health education, but they showed knowledge of disease that have a transmission cycle involving the environment – pneumonia, flu, diarrhea, malaria. Both women and men had knowledge on zoonotic disease e.g. brucellosis, and women indicated that prevention is possible through boiling milk before use. In most of the area we found lack of awareness and access to veterinary drugs by women (Moyale). Women did not have much understanding of the quality of services and drugs offered by different animal health service providers. However, they explained that the drugs they buy from private clinics/pharmacies have better effects on animal health, both for the disease prevention and treatments. Distance and transportation access for getting health services is the main problem for both men and women. Some decisions are reported to be made through representatives, though women's needs are not prioritized in some cases.

Women from Filtu of Somali region reported to have some animal health education from MSP members and women had information about zoonotic disease like TB, anthrax and leant about diseases with environmental transmission cycles.

According to the Borana culture of work division, except for divorced couples or the widowed women, men are responsible for animal health, while women are responsible for the human (family) health.

Guiding questions and recommendations for data collection in HEAL:

- What is the division of animal management tasks between women and men, by species, animal type (young/ mature; pregnant and lactating) in HEAL sites and what are the drivers for this division of labour?
- Do women or men recognize and report symptoms in case of illness?
- How are decisions made for preventive and curative care, i.e. who decides whether, which and where to get the services, who seeks or get services; and who pays for it?
- Are both men and women able to attend capacity building events? In case of costs, who decides who attends, who pays for it
- Are there gender specific constraints (e.g. lower mobility for women) or opportunities (e.g. higher access to info in women groups?) to access animal health services
- What constraints do women and men face when looking, accessing, and paying for animal health services?

Gender in human health management

The health of pastoralists is influenced by factors specific to their way of life. In pastoral areas men dominate society and as outlined above, are largely in control of the resources, which can impact control over women's access to healthcare, making it difficult for women to obtain prevention and treatment services, even though caring for the health of family members is mainly the responsibility of women.

Pastoralists depend on their livestock for subsistence, especially on the livestock's milk and meat. Women and men's proximity to animals expose them to various health risks, including, salmonellosis, brucellosis, Q fever, or leptospirosis to name a few. Particularly, handling of raw animal products leads to higher risk of exposure to zoonotic diseases. Women are traditionally the household members responsible for handling food for both family consumption and sale (milking animals, processing the milk, and preparing meals). As a result, women tend to have greater exposure and over a longer time than men. However, the causes of morbidity of pastoralists in most of Africa is in general poorly documented.

The non-inclusion of pastoral women in health programming to improve livelihoods of pastoralists has been exacerbated by cultural practices that reduce women's mobility, respectively their ability to travel (Badejo, 2017).

The HEAL vulnerability assessment found that in Borana both, men, and women, did not have any health education as such. They had however trainings on WASH and hygiene. Women had knowledge on how to prevent infections using simple method like washing hands with soap and

using mosquito nets. Most vulnerable to health risks were children, elders, and women. There were no special initiatives to promote women's control over income and use of health facilities.

In Filtu, the husband was reported to have control over the incomes of the household. There were geographical and socio-cultural barriers to access the health facilities, especially to the main vulnerable groups in the community (women, children, elderly and people with disabilities). The direct cost of health care and possible exemption for specific groups in the community (children, pregnant women, elderly and poor) were additional challenges. Women had some education on human health services.

In Somalia both men and women had access to health education talks in the past years, for example to hygiene promotion activities, WASH etc. There were trainings on hygiene, but still a high number of the population did not receive the training. The training including hand washing and environmental hygiene. Women were aware of prevention measure like staying clean to be free from germs and use of mosquito net to prevent from malaria.

Guiding questions and recommendations for data collection in HEAL

- What is the division of labour for household chores?
- Who looks after children, sick members, and the elderly? Who decides who does what and how does that affect workload and ability to engage in other activities (income generation, religious and social groups, training, and capacity building; other)
- How are decisions made for preventive and curative care, i.e. who decides whether, which and where to get the services and who pays for it? by type of services, e.g. ante and post-natal care, kids vaccination; in case of illness.
- What constraints do women and men face when looking, accessing, and paying for human health services?
- What are specific health service needs of women and how can access to these been facilitated?

Existing frameworks that embed gender in One Health

The importance and relevance of gender in One Health seems obvious, but so far has sparsely been documented around the world (Friedson-Ridenour et al., 2019), in pastoral areas the available information are even more scarce. Surprisingly, gender tends to be a marginal topic in discussions on One Health (Badejo, 2017), likely because the approach originally has mainly been driven by veterinary and health sector and social disciplines got involved later. In addition, gender analyses in distribution of neglected tropical diseases especially those zoonotic in nature are found to be missed in most One Health discourses and literature. However, gender inequality is embedded in many institutions in society, including human and animal health institutions (Carnes et al., 2014) and often gender based inequalities are at the origin of many risk factors for zoonoses (Alders and McConchie, 2015). The gender differential poses unique health risks for men and women during their life cycle. The diverse roles played by men and women create different exposure mechanisms to domestic animals, wildlife, and the environment. In zoonotic diseases such as tuberculosis and brucellosis, gender roles play an important role in the control and prevention. Other areas where gender is important are biosecurity, response to infectious diseases and emerging pandemics,

delivery of veterinary services, and improvement in animal production and these factors have a great influence on causes, consequences and management of diseases and eco-health and on the efficacy of health promotion policies and programs (Amuguni et al., 2018)

But there are also health risks other than infectious disease. Many households use solid fuels, such as wood smoke, where women are more likely to be at home, inhaling the smoke, and this can have serious health effects. Therefore, gender issues need to be addressed by first understanding the risks and then develop adequate prevention strategies in which women play a central role as part of the solution to achieve a better impact.

Joint human and animal vaccination campaigns have been appreciated because nomadic pastoralists want vaccination for their animals but also for their children, especially against measles (Esther Schelling, 2002). Pastoralists welcome a 'One Health' approach as it has benefits of real added value of the cooperation between human and animal health services (Greter et al., 2014).

Hence, incorporating a One Health approach into public health policy is widely expected to increase efficiency and cost effectiveness of services by reducing overlap among public health c, veterinary and ecosystem sectors (Baum et al., 2017). One Health is important to adequately measure the extent the livelihoods of a population are affected by health crises, as was evident for the Covid-19 pandemic. Another example is how avian influenza outbreak increased vulnerability where livestock was used as a risk-coping mechanism and influenced savings, food security, and gender equality (Birol et al., 2010). Also, local perceptions on disease transmission from livestock and wildlife is very much understudied in pastoral areas, as was shown for Tanzania (Baum et al., 2017). A study of Badejo, (2017) in pastoral areas of Nigeria highlights the knowledge gap at the animal-human-environment interface, which is further widened because of exclusion of women and non-participation of women in One Health initiatives. This is because of their vulnerability, weak political status, geographical location and being of a disadvantaged group. They are thus directly and indirectly affected by environmental factors that prevent them from achieving sustainable livelihoods (Marmot, 2007).

Gender-based differences cause wide-ranging, often disproportionate impacts on women during natural disasters, environmental degradation, and other One Health challenges (WHO, 2007). A healthy or unhealthy environment has an impact on gender roles, for example an important coping strategy adopted by pastoralist women is the foraging for wild foods to supplement their families' diets but if the environment (rangelands) is degraded their occurrence is lessened. Women's knowledge of the environment is crucial and yet this knowledge, along with the specific difficulty women face, often is ignored in emergency drought mitigation strategies. Hence additional efforts are needed to better understand how to increase the leadership and capacity of women to recognize and manage the gendered dimensions of risks at the intersection of human, animal, and environmental health to achieve improved well-being. It was noted that transdisciplinary efforts are needed to develop a more robust understanding of how ''economic, cultural, religious, legal, and political aspects influence the ability of women to fully exercise control over their environmental health, and the health of their children, animals and plants'' (Bagnol et al. 2015).

Future work should include discussions about what is meant, for example, by women's empowerment in One Health strategies versus gender-defined roles in One Health. Benefits of women and women's contribution to overall benefits in eco-health challenges like from infectious diseases need defined approaches for future policy to optimize health as a whole. This is used to

evaluate the impact of gender policies on health at the human–animal–environment interface; understand and analyze implementation of existing policies in pastoral areas. In general the human–animal–environment/rangeland interface is not divergent, but rather intimately connected, and well placed to address inequality and foster empowerment for women. Indeed, ensuring gender sensitive implementation of One Health can work synergistically toward the health and wellbeing of all (Friedson-Ridenour et al., 2019).

Incorporation of gender in One Health education and training programs and addressing the persistent obstacles faced by women in accessing and thriving in educational and training opportunities is very important (Friedson-Ridenour et al., 2019). But there is also a need of identification and analysis of the gender differences in asset accumulation and livelihood strategies in resource-limited areas for proper planning and implementation of pastoralist development programmes like One Health (Badejo, 2017).

Another consideration is that gender integration in One Health is important because of men and women impacting the environment differently and are impacted differently by it. The way human, animal and plant diseases impact men and women differ (Bagnol et al., 2015). And as outlined above, patterns of activities resulting from socially defined gender roles influence risks of infection differently between women and men (Bagnol et al., 2015). In turn, gender roles, distribution of labour and resources play an important role in the control and prevention of diseases, and therefore gender issues need to be addressed to appreciate the risks and develop adequate prevention strategies (Bagnol et al., 2015).

Although there is an increasing awareness of the importance of addressing gender in relation to health, livestock and environment in research, and interventions, and clear arguments to do so, these issues are not yet fully and adequately integrated in most programs (Bagnol et al., 2015). Putting knowledge into action through policy change, interventions and improvement of practices seems critical as was advocated for in Eco health discussions (Charron, 2012).

The relations between drivers, operations, supporting infrastructure and outcomes of OH were explored in the study by Ruegg et al., (2017). Of the drivers, social, economic and environments were indicated as the base to work from. The social drivers include lack of participation, as well as the presence of ignorance, poverty, poor governance, mental and physical illness, and gender issues on top of these can compound the impact of these social drivers. Most of the time there are disparities of drivers across the sectors/disciplines and context, for example, gender inequality is embedded in many institutions in society, including human and animal health institutions (Sheridan, 2014), and so how these variations can be addressed with the integration of gender in a One Health approach needs to be better explored.

The evaluation framework proposed by the Network for Evaluation of One Health (NEOH), builds on the assumption of an added value arising from integration across disciplines and sectors (i.e. transdisciplinary) and includes aspects of operations and supporting infrastructure (i.e. OH thinking, OH planning and OH working). Organizing implementation of One Health interventions taking a systems approach that allows for systematic organization, learning and sharing (Ruegg et al., 2017), provides an ideal entry point for better integration of gender in One Health, also for the HEAL project.

Snow, (2008) reviewed critical points to consider in the planning stage and implementation. These variations in health seeking behaviours, and responsibilities in household care and management – both areas highly relevant from a gender perspective.

Learning and sharing as cornerstones of the NEOH framework call for participatory methods, which can be used to allow beneficiaries to integrate their experience and knowledge with the skills obtained through different learnings during working in the health of human, animal and environment (Bagnol et al., 2015). HEAL indeed follows a very bottom up approach with the community level Multi-stakeholder platforms and thus is well placed to include gender specific questions in the planning of the One Health services provided and the associated learning.

When looking at past attempts to improve access to services, experiences from efforts building on sedentarization are essential. In some cases these efforts have empowered pastoralist women economically through better market integration and in turn advanced their social status. However, in some instances, sedentarization has also resulted more in acute poverty and severe environmental degradation, jeopardizing sustainability. It was indicted that the negative long-term social, economic, and environmental consequences of a more sedentary lifestyles far outweigh the gains. It is thus important that One Health solutions in these systems address the mobile nature of pastoralists.

From these points, some guidance for data collections and recommendations for HEAL emerge:

- It is important to incorporate pastoral dynamics in One Health interventions to ensure the health of all
- always consider the culture and social practices that influence gender dynamics, especially in the planning of interventions to ensure at least a 'no harm' scenario
- Existing gender differences in ownership, responsibility, resource management, decision making and power over resources need to be carefully addressed to allow better integration of gender in One Health.
- There is a needed to address access financial limitation in gender differences for optimum health services.
- Bottom up participatory approaches are well placed to ensure women's needs are properly reflected

The way forward to mainstream gender in HEAL

Pastoralism is the one of the predominant livelihoods for many communities where livestock-focused occupations converge with people and the environment resulting in a dynamic setting in which the health of each, humans, animals, and the environment are inextricably linked.

In the dynamic pastoral system, factors like loss of communal rangeland, impacts women and men differently as there is gender differences of role and activities. Both women and men contribute to rangeland management and livestock production, but most of the time men control and make decision making on resources uses.

The nature of work of women and men related to livestock exposes them to different zoonotic diseases, with a tendency that overall exposure to zoonoses is more pronounced in women. While most of the time, both men and women are familiar with the different livestock diseases affecting their livestock, women can be helpless when it comes to accessing drugs. Further, women manage most of the livestock on a daily basis, but technical training and inputs like vaccines, accessing animal health care products and services, power of decision on livestock veterinary services and accessing information on diseases are constrained for women. Though women contribute to rangeland health and management, decision-making power over use and management of land and resources is more likely to be in the hands of men. A healthy or unhealthy environment has an impact on gender roles. Where this resulted that most of women cannot easily own assets and access key resources and information across the world's rangelands.

Ongoing gender analysis that improves understanding of the constraints faced by women with emphasis on health, social and economic factors is needed in achieving sustainable livelihood as household sustainability largely depends on women. For One Health to achieve its purpose of building sustainable livelihoods, especially in areas highly predisposed to zoonotic diseases, the planning and implementation of its programmes must capture the culture, gender relations, factors to disease occurrence and the knowledge, attitudes and practices of both genders on prevention and control. Furthermore, interdisciplinary interventions following a One Health approach require assessment of the impact and variability of all individual factors, like identification of social, gender, behavioural and health system dependent differentials (Tugwell et al., 2006), rather than focusing on the control of diseases only. For example, services delivery can improve pastoralists access to services of human and animal health, such as joint vaccination campaigns for people and animals. To ensure gender implications are captured, different indicators need to be monitored to capture changes of level of participation and satisfaction, and involvement of women in planning and decision-making process at community level. The recommendations for data capture proposed in the different sections of this report will allow the HEAL project to monitor impact of One Health on gender. Another area to address is to ensure that service providers and HEAL field staff have thorough gender training as this will directly affect implementation and recognition of gender issues. As per planned activities, this is indeed an important issue in the HEAL Phase 1.

In conclusion, the intersection of gender and One Health is obvious, but so far sparsely documented around the world and where in pastoral areas the limitation is more pronounced. Developing a more detailed Theory of Change on how One Health impact on gender, or how addressing gender inequalities affects One Health outcomes is needed. This is an important area where HEAL will be able to make significant contributions.

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