



ONE HEALTH CASES

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One Health in Turkana County, Kenya: Applications and Lessons Learned

This case describes the development of the One Health Strategy in Turkana County, Kenya. Turkana can act as a model for implementing One Health to improve the health and livelihoods of pastoralists in the drylands of Northern Kenya and neighboring pastoral regions.

Authors: Evan F. Griffith¹, Job Ronoh Kipkemoi², Erenius Lochede Nakadio², Lindsay J. Smith¹, and Janetrix Hellen Amuguni¹

Affiliations: ¹Department of Infectious Disease and Global Health, Cummings School of Veterinary Medicine at Tufts University, North Grafton, MA, 01536

²Turkana County Government Directorate of Veterinary Services, Lodwar, Kenya

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Abstract

Pastoralists contribute to social, environmental, and economic well-being in the drylands of Northern Kenya. Pastoralism is also their way of life and how they manage their livelihoods. However, the marginalization of these communities, including the lack of basic infrastructure and services, compounded by the increasing threat of infectious disease and climate change, has led to the loss of livelihoods and poor health. One Health service delivery can improve pastoralists' health and livelihoods. This case examines the development of the One Health policy in Turkana County, Kenya. The Turkana One Health Strategy (TOHS) is undergoing final approval. We discuss the contributions of the One Health Strategic Plan for the Prevention and Control of Zoonotic Diseases in Kenya, the One Health framework for integrated service delivery, and the Kimormor outreach model to this plan. We also describe recent One Health activities in Turkana and identify the benefits and limitations of each. One Health service delivery improved access to human health, animal health, and administrative services in rural, hard-to-reach areas in Turkana. Empowering communities to lead and take ownership of One Health activities is critical for implementation. One Health service delivery has some limitations, such as being resource and time intensive and being a relatively new concept in healthcare. Turkana County provides a valuable example of how One Health policy turns into practice through multilevel coordination structures, the support of public and private partners, and transdisciplinary research. It can act as a model for implementing One Health activities in Northern Kenya and other countries.

What is the Incremental Value that Makes this a One Health Case?

This case provides a clear example of how transdisciplinary processes have contributed to the development and implementation of One Health in Turkana County. It highlights the coordination structures (e.g. County One Health Unit and Subcounty One Health Units), actors (e.g. county directors, subcounty officials, development and academic partners, and community leaders), and steps in transitioning from One Health policy development to operationalization at the community level. We anticipate it will help other academic, public, and private stakeholders and community members to develop their own One Health policy frameworks and implementation strategies.

Learning Outcomes

1. Analyze the steps required to transition from national One Health policy to subnational One Health operationalization in Turkana County, Kenya.
2. Differentiate between the contributions of the One Health Strategic Plan-Kenya, the One Health Framework, and the Kimormor outreach model to the proposed Turkana One Health Strategy.
3. Analyze the components of the Turkana One Health Strategy, including the roles of department directors, subcounty officers, community leaders, and development partners.
4. Critique the Kimormor model of service delivery in Turkana County.
5. Using a familiar context, create a One Health Strategy organogram. What partners, sectors, and services should be included? What coordination mechanisms would you include?

Background and Context

Pastoralism and One Health

Pastoralism is a specialized food production system that harnesses variable environmental conditions in arid and semi-arid lands (ASALS) to produce meat, milk, livelihoods, and income (Food and Agriculture Organization, 2018). Pastoralists rely on mobility, flexible land tenure systems, and herd diversity to match the temporal and spatial variation in rainfall in ASALS. In Kenya, over 8 million pastoralists manage most of the national livestock, including 70% of the cattle, 80% of the sheep and goats, and all camels (Wanyama, 2020). Kenya's pastoral sector is worth US\$1.13 billion, contributes 13% of the gross domestic product, and provides most of the meat consumed in the country. Pastoral lands in Kenya are also home to most of its wildlife and biodiversity, contributing significantly to the tourism economy.

However, the social and economic marginalization of pastoralists, including the lack of basic infrastructure and services, compounded by the increasing threat of infectious disease and climate change, has led to the loss of pastoral livelihoods and poor health (Krätli and Koehler-Rollefson, 2021). Given the close relationships among pastoralists, their livestock, and the rangelands, One Health holds the potential to address these issues. One Health is an 'integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent' (Adisasmito *et al.*, 2022). There is an extensive history of integrated, cross-sectoral services, referred to as One Health service delivery, among pastoralists to improve health and livelihoods (Abakar *et al.*, 2016; Danielsen *et al.*, 2021). These include integrated human and livestock vaccination, integrated human and animal syndromic disease surveillance, and combined helminth treatment and mass rabies vaccination. Benefits of implementing One Health among pastoralists include improved human and livestock health, decreased risk of infectious diseases, including zoonoses, cost savings among departments, and increased access to administrative services (e.g. national identification cards).

Turkana County, Kenya

Turkana County is one of the northern ASAL counties in Kenya inhabited by pastoralists (Fig. 1). It is the largest county in Kenya, with a total geographic area of 77,000 km². Turkana has an estimated population of 1,256,152 people, almost all of whom practice pastoralism due to limited and variable rainfall conditions found in ASALS. The county has 2,828,010 cattle, 6,731,414 sheep, 6,906,686 goats, 871,707 camels, and 623,312 donkeys. The 2010 Kenya Constitution established a new county-based, decentralized governance system (i.e. devolution). Since then, the county government has been responsible for service delivery, including human and animal health services. Information sharing and activity planning occur between various government and non-governmental organizations (NGOs) within the County Steering Group (CSG). The CSG is a coordination forum co-chaired by the county government and commissioner. County officials often plan activities, and NGOs provide monetary and logistical support. In Turkana, veterinary services fall under the Ministry of Agriculture, Livestock Development, and Fisheries and are primarily mobile, while the Ministry of Health and Sanitation oversees human health services. Environmental services and natural resource management falls under the Ministry of Tourism, Environmental, and Natural Resources.

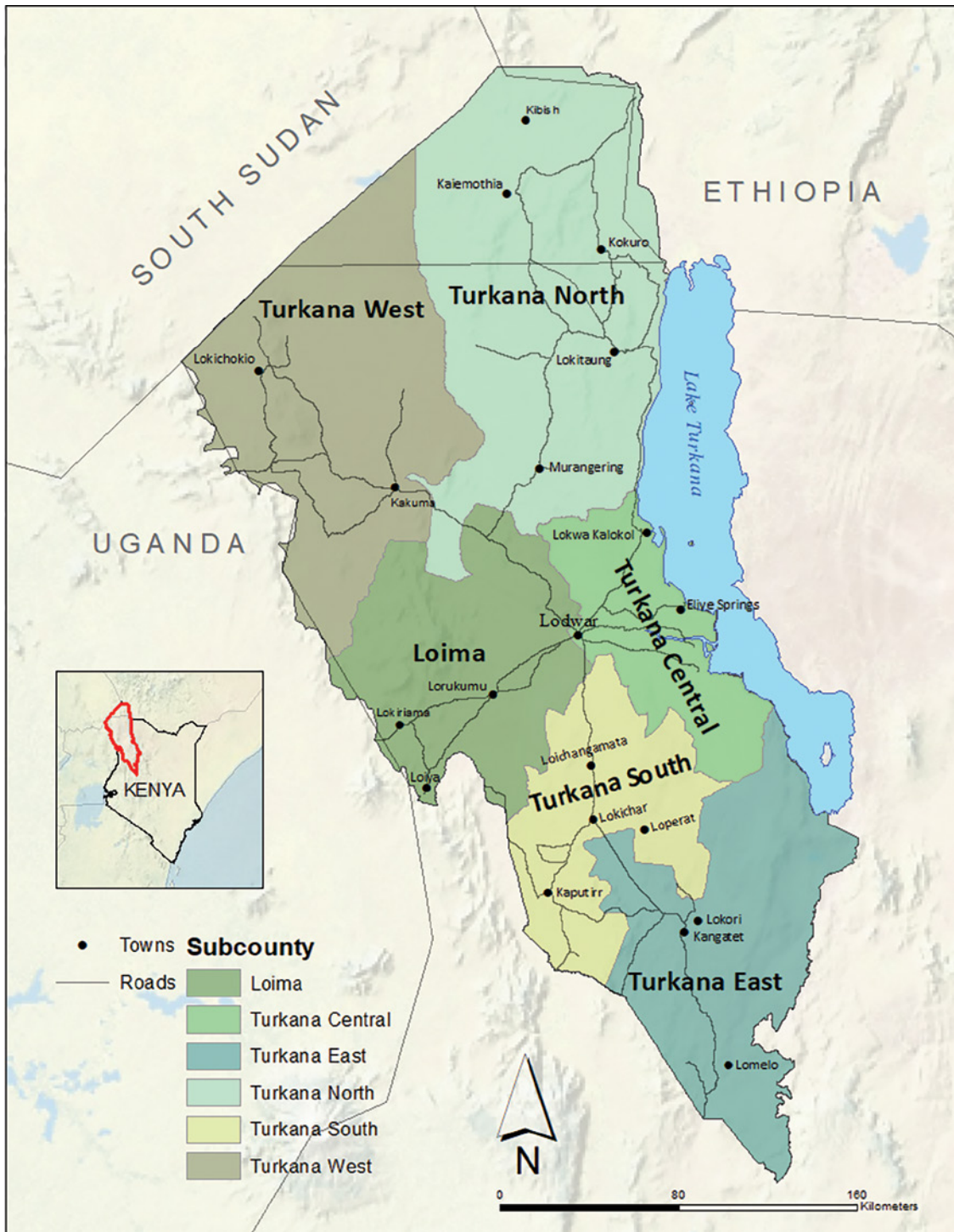


Fig. 1. Turkana County, Kenya. This map was created with ESRI ArcMap 10.8.2. Data source for map layers: ArcGIS Online.

Turkana pastoralists have poor health compared to more sedentary populations in Kenya due to limited health infrastructure, unfit service delivery models for mobile and dynamic populations, and resource limitations among departments. Livestock diseases in Turkana, including contagious bovine pleuropneumonia (CBPP), peste des petits ruminants (PPR), and contagious caprine pleuropneumonia (CCPP), threaten pastoral livelihoods. Turkana pastoralists are also at increased risk of zoonotic diseases like brucellosis, cystic echinococcosis, rabies, and Rift Valley Fever. Given the urgent need to improve pastoralists' health and protect their livelihoods, Turkana's County government and NGOs have been early adopters of One Health. In the next section, we examine the transdisciplinary process that has led to the Turkana One Health Strategy.

The Transdisciplinary Process

The development of the Turkana One Health strategy

The Turkana One Health Strategy 2023–2027 was refined and validated at a March 2023 workshop with government and non-governmental organizations (NGO) stakeholders. It is now awaiting final County Executive Committee approval, expected by the end of May 2023. Strategic objectives of this plan include (1) Strengthening the implementation of the One Health approach at the regional and county level, (2) Strengthening surveillance, prevention, response, and control interventions to safeguard One Health priorities, and (3) Promoting applied research using the One Health approach. It also identifies different stakeholders and their roles in One Health operationalization.

Various aspects of the TOHS are already in place. For example, the strategy proposes an organizational structure including a County One Health Unit (COHU), subcounty One Health Units (SCOHUs), and One Health Secretariat (Fig. 2). The COHU was formed in 2020 and operationalized in 2021 under the purview of the national One Health strategy and policies. SCOHUs in subcounties along international borders and with One Health activities have been active since then. The County One Health Secretariat is in place. It provides logistical and administrative support to the COHU. The COHU coordinates with national and county government line ministries, development partners, and community stakeholders to implement One Health activities. County directors of Health, Veterinary Services, and Environment are the primary members of the COHU. Development partners, subcounty officers, and community leaders contribute to the COHU during activity planning. Under the oversight of the COHU, subcounty officers on SCOHUs, development partners, and administrators work with community health volunteers, community disease reporters, and community leaders during the implementation of One Health activities. Furthermore, the One Health concept has been entrenched into the County Integrated Development Plan (CIDP III) to facilitate the allocation of resources by the government.



Fig. 2. Proposed TOHS organogram. National-level stakeholders include the Ministry of Health (MoH), the Ministry of Agriculture, Livestock, and Fisheries (MoALF), the Ministry of Environment and Forestry (MEF), and the Ministry of Tourism and Wildlife (MoTW). Global and local development partners include the World Health Organization (WHO), World Organisation for Animal Health (WOAH), Food and Agriculture Organization (FAO), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), International Rescue Committee (IRC), and Lotus Kenya Action for Development Organization (LOCADO). Officers on the SCOHU include a subcounty veterinary officer (SCVO), subcounty medical officer (SCMO), subcounty public health officer (SCPHO), subcounty environment officer (SCEO). Adapted from the DRAFT TOHS. Made with creately (<https://creately.com>).

Development of the TOHS integrated knowledge and perspectives from diverse fields and stakeholders to address One Health issues pastoralists face. It is also built on previous One Health research, policies, and activities in the county. Three different components are crucial to its development: (1) the One Health Strategic Plan for the Prevention and Control of Zoonotic Diseases in Kenya (2021–2025) (OHSP-Kenya), (2) the One Health Framework (OHF) for integrated service delivery, and (3) the Kimormor outreach model, summarized in Table 1.

At the national level in Kenya, the Ministry of Health (MOH) and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives (MALF) have established joint disease surveillance and response systems. The Zoonotic Disease Unit (ZDU) is a collaborative office between the MOH and MALF established in 2011

Table 1. Summary of three transdisciplinary processes and what strategic objectives and structural components they contributed to the proposed TOHS.

Transdisciplinary process	Contribution to the proposed TOHS	Description
OHSP-Kenya	<ul style="list-style-type: none"> COHU, SCOHUs <p>Strategic Objectives:</p> <ul style="list-style-type: none"> Strengthening the implementation of the One Health approach at the regional and county level Strengthening surveillance, prevention, response, and control interventions to safeguard One Health Priorities Promoting applied research using the One Health approach 	<ul style="list-style-type: none"> The operationalization of the COHU and SCOHUs is one of the objectives of the OHSP-Kenya. The three main objectives come from the OHSP – Kenya. However, they have been modified to fit the specific context of Turkana County based on the community’s needs. For example, Objective 2 in the OHSP – Kenya includes five strategies to prevent, respond to, and control zoonotic diseases. The TOHS mentions zoonotic diseases, biosafety and biosecurity, antimicrobial resistance, food safety and security, and environmental pollution as ‘One Health priorities’ for this objective.
OHF	<ul style="list-style-type: none"> COHU <ul style="list-style-type: none"> County Directors Global & Local partners SCOHU <ul style="list-style-type: none"> Subcounty officials and partners Community disease reporters, community health volunteers, community leaders, and other resource persons 	<ul style="list-style-type: none"> The structural components of the OHF organogram are almost identical to the TOHS organogram. However, the names of the components are different (e.g. ‘committee’ versus ‘unit’). The OHF included department directors, subcounty officers, development partners, and community leaders. These are reflected in the proposed TOHS organogram
	<ul style="list-style-type: none"> County One Health Committee <ul style="list-style-type: none"> Department directors Partners Subcounty One Health Committee <ul style="list-style-type: none"> Subcounty officers and partners Local leaders: Emurons, Chiefs, Elders Community disease reporters, community health volunteers 	
Kimormor outreach	<p>Strategic aim:</p> <ul style="list-style-type: none"> ‘Advocate for the adoption and implementation of an integrated model for the One Health approach (Kimormor model)’ 	<ul style="list-style-type: none"> Implementing partners: <i>USAID Afya Timiza; USAID Imarisha Jamii</i> Griffith <i>et al.</i> (2020) described this approach and included it in the OHF labeled ‘Services’ (Fig. 4)

that oversees these systems (Munyua *et al.*, 2019). The ZDU serves as Kenya's One Health Office and secretariat to the Zoonoses Technical Working Group (ZTWG). Health and veterinary services are primarily managed at subnational levels and under the purview of county governments (Fig. 3) (Zoonotic Disease Unit, 2021).

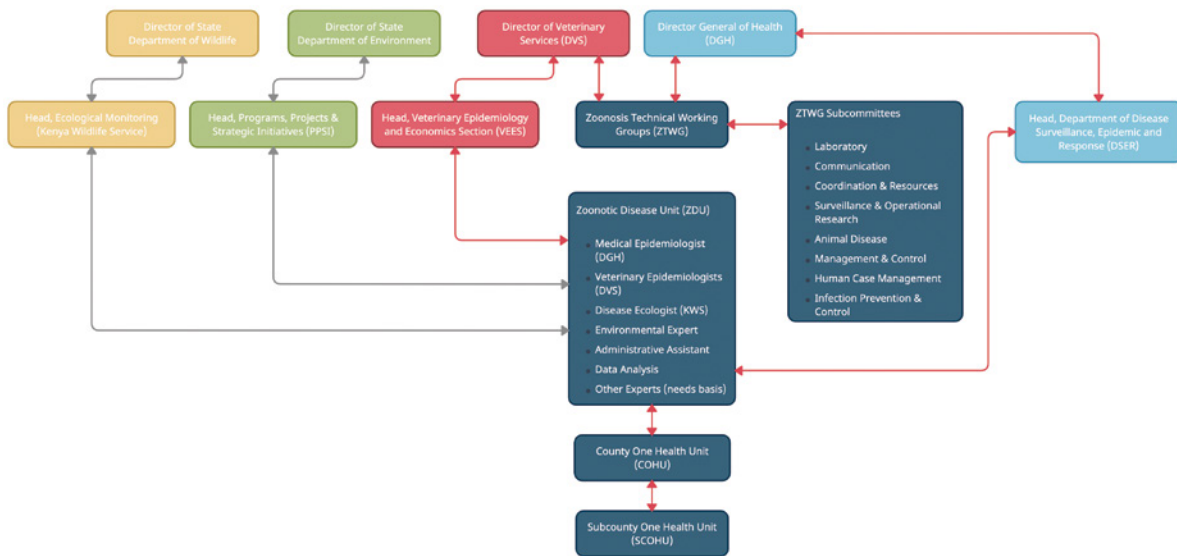


Fig. 3. The proposed organizational structure of ZDU/NZTC. Red arrows represent coordinating sectors, and grey arrows are sectors co-opted as needed. Adapted from Zoonotic Disease Unit (2021). Made with creately (<https://creately.com>).

Stakeholders from the national and county governments, non-governmental institutions, and development partners contributed to the OHSP-Kenya, which the national government is operationalizing. The objectives of the plan are to strengthen the implementation of the One Health approach at the national and county levels, to strengthen prevention, surveillance response, and control of priority zoonotic diseases in humans and animals, and to promote applied research using the One Health approach (Zoonotic Disease Unit, 2021). The TOHS adopted these same objectives, slightly adjusted to reflect the local context and community priorities (Table 1). Another objective of the OHSP-Kenya includes establishing and operationalizing COHUs and SCOHUs to strengthen One Health coordination mechanisms at the county level (Fig. 3). Turkana County formed and operationalized the COHU and SCOHUs in 2021, and both are included in the draft TOHS (Fig. 2; Table 1).

The One Health framework (OHF) for integrated service delivery provided most of the organizational structure to the TOHS (Table 1). A group of researchers, including EFG, JRK, and JHA, created the OHF by engaging stakeholders in a qualitative research process that identified challenges pastoralists faced in Turkana and designed a relevant, effective, and sustainable policy solution. It harnessed Turkana's existing funding and service delivery structures to establish an official coordination mechanism to implement One Health activities (Griffith *et al.*, 2020). Critical aspects of the OHF included a county One Health committee (OHC) composed of department directors and a subcounty OHC composed of frontline service providers, with both committees supported by NGO partners and community leaders, which are reflected in the TOHS (Fig. 4). The proposed TOHS organogram is functionally the same as the OHF organogram, reflecting the importance of this transdisciplinary research process to the TOHS (Fig. 2). The research project also played an essential role in identifying the community's needs, which were broader than zoonotic disease and included limited access to country identification cards and birth certificates. It was clear that a One Health service delivery model that included health and other public services was needed in remote parts of Turkana.

Kimormor outreach is a model of service delivery that meets these needs. It also significantly contributed to the TOHS (Table 1). Kimormor is a Turkana word that means 'all together'. *USAID Afya Timiza* first implemented this model in 2016 as a pilot program. It consists of integrated, cross-sectoral service delivery, including preventative and curative human and animal health services, provision of national ID cards and birth certificates, sign-up campaigns for the national hospital insurance fund (NHIF), and climate change sensitization, impact, and mitigation measures. As of 2022, *USAID Imarisha Jamii* is expanding Kimormor across Turkana in coordination with the COHU. Due to the success of this model, the adoption and implementation of Kimormor outreach is an objective of the proposed TOHS (Table 1). The COHU

implemented multiple Kimormor activities with the help of two NGOs in 2022. Institutionalizing Kimormor, once the TOHS is formally approved, will help to mobilize resources from the county and other development partners.

One Health often falls short of fully involving the environment and wildlife sectors. The TOHS recognizes the environment's role in sustaining livelihoods and mitigating poverty. It acknowledges factors like overgrazing, agricultural production, oil exploration, and illegal charcoal burning as sources of environmental degradation. However, a SWOT analysis conducted as part of the TOHS identifies the limited participation of environment and wildlife sectors in One Health initiatives as a weakness at the county level. The TOHS aims to tackle this issue by training environmental and wildlife personnel in the One Health approach, strengthening multisectoral collaboration and surveillance systems to curb environmental pollution and degradation, incorporating conservation and environmental protection into the Kimormor outreach model, and promoting ecological and environmental research. Turkana's Environmental department personnel are members of the COHU and SCOHUs. It remains to be seen how effective these efforts are in engaging the environment and wildlife sectors in One Health initiatives.

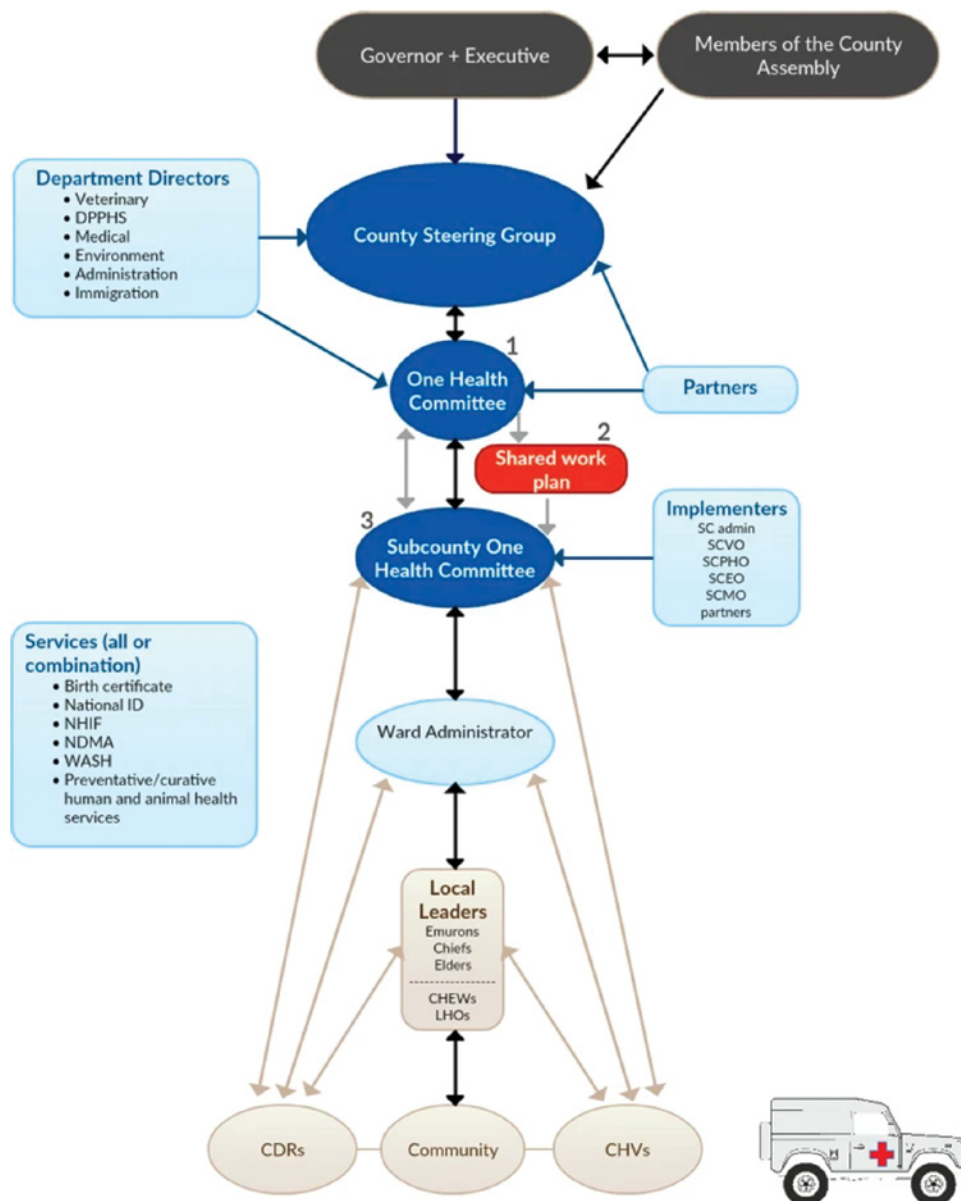


Fig. 4. The One Health framework for integrated service delivery organogram. Coordination structures include (1) One Health Committee (OHC) at the county level made up of department directors and development partners in the human and animal health sectors; (2) a shared work plan created through intersectoral collaboration on the county OHC; (3) and a subcounty OHC made up of subcounty officers, including subcounty administrators (SC admin), subcounty veterinary officer (SCVO), subcounty public health officer (SCPHO), subcounty environmental officer (SCEO), and implementing partners (Griffith *et al.*, 2020).

To summarize, the objectives of the proposed TOHS primarily came from the OHSP-Kenya. These focus on preventing and controlling zoonoses but have been expanded to include other One Health priorities. However, the organizational structure and actors involved in planning and implementing One Health activities in the county originated from the OHF. Kimormor outreach also played a role by demonstrating the success of the integrated, cross-sectoral services and has now been institutionalized by the COHU as the preferred model to reach remote communities with public services in Turkana. Through these transdisciplinary processes, the TOHS aims to reduce the threat of zoonotic diseases and provide health and other services that meet the needs of community members. Although the TOHS has not been formally validated, One Health activities have been ongoing. Next, we briefly summarize these activities in Turkana facilitated by the COHU and examine the benefits and limitations of each.

One Health Activities

Kimormor outreach

There have been two recent examples of Kimormor outreach in Turkana. The first occurred in Nakaparan village in Loima subcounty in December 2022. The COHU facilitated the joint planning and implementation of this activity. Key partners included the Africa Gospel Church Organization (AGCO), Health and Veterinary Services Departments, and community leaders. Traditional elders, chiefs, and village administrators assisted in mobilizing and sensitizing community members and site identification for the activity (Fig. 5). Subcounty officers, AGCO officials, and administrators on the SCOHU oversaw the implementation. Services included supportive treatment and vaccination of livestock, medical camps for people, and registration for national identification cards and the National Health Insurance Fund (NHIF). For livestock vaccination, 4196 small ruminants were vaccinated against Peste des Petit Ruminants (PPR), 4222 livestock were dewormed, and 351 were treated for various illnesses. A total of 187 households were reached.

The second activity occurred from 7 to 10 December 2022 in Kaapus and Lokatul villages in the Loima subcounty. The COHU also facilitated joint planning and implementation of this activity. In addition to the health and veterinary departments, the planning and implementation included the environment and immigration departments, *USAID Imarisha Jamii*, and traditional elders, chiefs, and village administrators. The SCOHU was also in charge of implementation. Services included medical outreach (e.g. nutrition screening, outpatient treatment, immunization of children, public health education, laboratory diagnosis, antenatal care, and HIV testing and counseling), veterinary support (livestock vaccination, deworming, and treatment), NHIF registration, COVID vaccination, and registration for national identification cards to community members (Figs. 6 and 7).

Kimormor outreach had many successes, and joint planning was efficient and effective. Subcounty veterinarians and community disease reporters in Kaapus and Lokatul vaccinated 84% of their target animal population. Supporting partners managed logistics such as vehicles, fuel, and supplies. Coordination and collaboration among the Ministry of Health, Department of Veterinary Services, and national and local administrative leadership successfully achieved the outreach objectives of improving access to health, veterinary, and administrative services for community members in the Loima subcounty. The chosen sites represented rural, hard-to-reach, pastoral communities where One Health outreach could be effectively mobilized. Roles and responsibilities were clearly described in the planning meeting at the COHU. Community mobilization by traditional elders, chiefs, and subcounty administrators engaged many people. Services provided were comprehensive, including COVID-19 and human papillomavirus (HPV) vaccinations. The activity also provided an opportunity to begin the Measles campaign.

A significant limitation was the time to issue ID cards and register community members for the NHIF – limiting community members' access to services. However, the need for this service helped mobilize communities. Additionally, mosquito nets were unavailable for distribution. Time restrictions limited village engagement with two more villages targeted due to long distances.

These examples demonstrate how One Health service delivery has been operationalized in Turkana County: planning and coordination occurred at the COHU with the input of department directions, administrators, community leaders, and key development partners. Implementation was led by the SCOHU, including subcounty officers, the main partner, and local community leaders. At every stage of the process, practitioners and stakeholders from different disciplines and sectors worked together to implement Kimormor outreach to address the local community's complex needs. The proposed TOHS builds on these examples to expand Kimormor outreach to other subcounties and border regions.



Fig. 5. The area chief and village administrator sensitized and mobilized community members before the Kimormor outreach activity. Photo credit: ELN.

One Health multisectoral tabletop simulation exercise and after-action review for Rift Valley Fever

Objectives of both the OHSP–Kenya and TOHS include enhancing the preparedness and response to zoonotic disease outbreaks. To meet that objective, two members of the Turkana COHU participated in a tabletop simulation in Naivasha, Kenya, in July 2022. The activity was part of the ongoing initiatives to review and update Rift Valley Fever contingency plans and relevant standard operating procedures routinely used in Rift Valley Fever outbreaks. The ZDU and UN FAO supported it as part of efforts to support the North Rift region COHUs technically. This activity shows how One Health operationalization in Turkana County focuses on a broad scope of issues at higher government levels while focusing on specific zoonotic diseases at the county level.

Joint One Health cross-border coordination and collaboration meeting for Kenya and South Sudan

Ateker communities occupy border areas that straddle Kenya, South Sudan, Ethiopia, and Uganda, commonly called the Karamoja Cluster or ‘cattle corridor’. This region is inhabited mainly by pastoralists



Fig. 6. A community public health education baraza during Kimormor outreach in Lokatul village. Photo credit: ELN.

with the same ethnic roots, culture, and dialect (*Ateker* language). The Karmoja Cluster faces common challenges of insecurity due to armed conflict, weak and under-resourced human and animal health infrastructure along the shared borders, and a high-risk mobile population. Hence, the risk of the persistent threat of infectious disease outbreaks associated with importation requires cross-border collaboration and coordinated interventions.

These communities are particularly vulnerable to the spread of infectious diseases in humans and livestock. They often share several risk factors: a common ecology, conditions ripe for disease spread, the regular movement of people, livestock, and goods, and often a socio-economic disadvantage. These characteristics make disease surveillance and rapid response in border areas critical for preventing and containing infectious diseases between countries. The Kenya-South Sudan border is an entry point for refugees and Toposa pastoralists into Kenya in search of asylum and pasture/water for their livestock, respectively. In 2005, PPR was first reported in Turkana West and confirmed to have originated from South Sudan. Recently, there was an outbreak of measles in the Kakuma refugee camp in Turkana West, which was epidemiologically linked to new refugees from South Sudan.

To address these threats and improve cross-border collaboration, the Turkana County government organized a meeting with representatives from Eastern Equatoria State in South Sudan in collaboration with all implementing partners supporting One Health. It took place from 6 to 9 March 2023 at Kakuma, in Turkana West subcounty, where officers from South Sudan and Kenya (from all levels of government) came. The agenda included a discussion of One Health operationalization within and across the border. Officials noted that Turkana County had made considerable strides in institutionalizing and implementing One Health compared to other counties in Kenya and South Sudan. In South Sudan, One Health is mainly



Fig. 7. Livestock vaccination during Kimormor outreach in Loima subcounty. Photo credit: JRK.

established at the national level and has not been operationalized at the subnational level. Below are some of the recommendations and conclusions from the meeting.

Recommendations:

- Existing community-based structures in human and animal health surveillance and reporting, such as community mobilizers (CMs), community health volunteers (CHVs), and community disease reporters (CDRs), should be used and optimized in mobilizing One Health activities.
- To enhance the quality of community-based surveillance, utilizing CDRs who can also serve as CHVs is a viable option.
- Using mobile phones to collect and upload surveillance data.
- Adopting Kimormor outreach in cross-border regions.
- Joint refresher training for CHVs, and CDRs.
 - These groups can be educated on vaccine-preventable diseases and priority zoonotic diseases through joint training sessions.

Conclusions:

- Joint planning, learning, support, supervision, and integration were determined to be possible through this activity and coordination between the government and partners on One Health activities.
- Successful One Health mobilization requires the joint creation and implementation of activities among actors and communities.
- Empowering communities to lead and take ownership of programs maximizes success for implementation.
- Human and animal health programs are intertwined in pastoral areas.

Future Directions

The following activities are planned to be implemented by the COHU in the next 6 months:

1. A final validation, printout, launch, and dissemination of the TOHS will be conducted in early June 2023.
2. Capacity building (training) of COHU and SCOHU teams.
3. Orientation of the SCOHUs in all the seven subcounties and equipping their workspace.
4. Sensitization of other stakeholders to the One Health approach.
5. Development of One Health policies and bills.
6. The COHU and other actors in the county will enhance resource mobilization and joint implementation for One Health activities.
7. Joint support supervision and review of One Health activities and outreaches will be implemented to address any issues concerning the efficiency of service delivery.
8. A cross-border One Health coordination meeting will be organized between Kenya and Uganda, bringing together government officials at national and subnational levels, partners, and donors.
9. Simulation exercise and after-action review for priority One Health issues.
10. Operationalize and share research by submitting abstracts for conference presentations.

Conclusions

Since the early 2010s, Turkana County has been a One Health leader in Kenya and the region. One Health research, national policy, and initiatives have contributed significantly to the proposed TOHS. The existing One Health infrastructure in Turkana County, including the COHU, SCOHUs, and One Health secretariat, and the support of development partners, community leaders, and pastoralists significantly enhance the implementation of One Health activities. Furthermore, the county health, veterinary services, and environment departments have an established working relationship. Once the TOHS is validated, One Health will be fully operationalized in Turkana County.

Many challenges to One Health implementation and expansion exist in Turkana County. One Health is still a new concept among most healthcare workers, and development partners are highly dependent on funding One Health activities. A lack of established donor support threatens the long-term sustainability of One Health programs and activities. Given that services in Turkana are devolved, the county and the COHU (through the ZDU) are best positioned to support One Health. There is also limited participation of the wildlife and environment sectors in One Health initiatives. Cross-border health and security issues are increasingly important, yet inadequate cross-border referral tools exist between Turkana County, South Sudan, Uganda, and Ethiopia.

Moreover, financial limitations, political instability, and marginalization of pastoralists have led to underdeveloped health infrastructure in the Karamoja Cluster. This makes multinational collaboration difficult. However, harnessing existing community-based human and animal health workers to facilitate joint disease surveillance and Kimormor outreach is promising. Different sectors compete for budget priorities and staff turnover in the county at the leadership and managerial level, including among County Executive Committee Members (CECMs) and County Chief Officers (CCOs), negatively impact political will and long-term advancement. However, it is vital to demonstrate the return-on investment of these integrated programs, including their cost-effectiveness.

There is significant momentum and opportunity for advancing One Health in Turkana. The TOHS is awaiting final approval, and stakeholders have demonstrated significant buy-in, motivating the County leadership to implement and mobilize One Health. Preliminary evidence demonstrates the success and efficiency of Kimormor outreach, and it is possible to optimize the existing integrated community outreach framework for One Health implementation. Additionally, graduates from the Kenya Field Epidemiology and Laboratory Training Program and Frontline In-Service Applied Veterinary Epidemiology Training actively contribute to the TOHS and implementation. An established partnership between researchers at Tufts University and the Turkana County government can facilitate One Health operational research, for example, by investigating the cost-effectiveness and community-level impact of Kimormor outreach. Research should also investigate the equity of the Kimormor approach and how to make it more inclusive and horizontally participative. One Health funding can be decentralized to the county level, presenting an opportunity for sustainable investment. Lastly, the county's cross-border initiatives can be utilized as an entry point for strengthening One Health.

In conclusion, Turkana County provides a practical example of how to develop and implement One Health policy through multilevel coordination structures, the support of public and private partners, and transdisciplinary research. It can act as a proof of concept on how to operationalize One Health and improve the health and livelihoods of pastoralists for other ASAL counties in Kenya and neighboring pastoral regions of East Africa.

Group Discussion Questions

1. When considering the Kimormor model of integrated, cross-sectoral service delivery, could other services be included in this framework? What other public services would improve pastoralists' health and livelihoods?
2. Which One Health activities should be prioritized across borders and in border health facilities? What are some One Health challenges beyond zoonoses that we can address at borders?
3. Due to their mobile lifestyle in rural areas, pastoralists in Turkana County benefit from the Kimormor model of integrated, cross-sectoral service delivery. Are there other communities or regions where cross-sectoral service delivery could be used? Where should it be prioritized, and for whom? Which services and activities should be prioritized?
4. The Kimormor service delivery model faces sustainable financing and capacity challenges. What subnational, national, regional, and multilateral funding sources could be explored? Should it be incorporated into existing line ministry budgets or have its separate funding? How could a return-on investment be demonstrated?
5. What operational research is needed to demonstrate the added value of the TOHS among stakeholders and beneficiaries in Turkana County? How would you design a One Health economic analysis that identifies the human, livestock, and rangeland health benefits of Kimormor outreach?

Further Reading

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